Moving Worldviews

Reshaping sciences, policies and practices for endogenous sustainable development

Bertus Haverkort and Coen Reijntjes (eds)

Compas series on Worldviews and sciences 4

COMPAS

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Reshaping sciences, policies and practices
for endogenous sustainable development

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PART I

Conference proceedings

1. The conference 'Moving Worldviews'

Since 1998 the Compas programme and its network partners from Latin America, Africa, Asia and Europe have been engaged in inter-cultural dialogues on development approaches with a focus on the South. They have studied the influence of worldviews on material and socio-cultural technological development, on scientific approaches, and on policies in different cultural contexts. A major observation is that in most non-Western worldviews there is a notion of three interrelated worlds: the material, the social and the spiritual. From the perspective of these cultures, sustainable development can only be achieved if there is a balance between the material, the social and the spiritual domains. Compas supports development that builds on local culture: its worldview, values, institutions, knowledge and practices. This approach is known as ***endogenous development***, development from within. This approach presents challenges for practitioners, scientific communities and policy makers, not only in the South, but also in the North.

Compas partners experience that the dominant Western worldview is spreading around the globe. They acknowledge the power and potentials of modern technologies but also experience the economic and cultural influence from the West as being threatening. These trends create serious problems for sustainable development and cultural diversity. Many of the traditional worldviews and practices are weakening under the influences of globalisation. But, in reaction to these developments, they also observe a growing movement towards strengthening of cultural identities and revitalisation of traditional worldviews. For Compas, the need arose to further analyse the relations between moving worldviews, sustainable development, innovative practices and effective partnerships. For this purpose, a series of continental workshops were organised in Africa, Latin America, Asia and Europe.

In Europe, the conference 'Moving Worldviews: reshaping sciences, policies and practices for sustainable endogenous development' took place in Soesterberg, the Netherlands, 28-30 November 2005. It was co-organised by the Compas office in the Netherlands, the Centre for Development and Environment of the University of Berne, Switzerland, Triple I-S and the European Centre for Development Policy Management (ECDPM), both in the Netherlands. The conference addressed the challenges arising from the present 'polycrisis' and the growing new understanding of our world arising from developments in sciences, rural development and inter-cultural dialogue.

Polycrisis: problems and opportunities

The world is approaching a critical point in its evolution. The technological, economic and political developments of the last decades of the 20th century have been tremendous. New technologies are becoming increasingly sophisticated and have been adopted on a massive scale. Their use is influencing ways of living and living standards in all corners of the globe. Electronic communication and free trade have contributed to an enormous boost in global flows of capital, products, people, information and

ideas and have contributed to important economic, social and cultural developments. They present new opportunities and challenges.

At the same time, a number of human-created crises are threatening the sustainability of global society. The deteriorating ecological situation, persistent poverty, social, political and religious tensions and conflicts between people and countries and the proliferation of weapons of mass destruction present a *polycrisis* for which appropriate answers are urgently needed.

Ecological crisis. Ecological degradation continues: climate change, diminishing natural resources, shortages of food, water and energy, industrial, agricultural and urban pollution and reduction of biological and cultural diversity are problems for which the current global systems do not have adequate answers. Important international agreements and conventions are being drawn up, but their ratification and implementation lags behind the urgency of the issues. In fact, internationally the feeling of urgency concerning ecological problems seems to be decreasing.

Poverty. Despite global economic growth, poverty still persists worldwide. Poverty has many faces and affects mainly those living in rural areas and shanty towns in the South. It leads to hunger, bad health, low education and social disintegration. However, poverty may also be accompanied by connotations such as lack of cultural identity, self-esteem and sense-giving. Nearly half of the global population has a purchasing power of less than USD 2 per day. Many social systems, where solidarity and reciprocity functioned as safety nets for the poor and provided identity and social control, are disintegrating. Despite global economic growth, poverty is increasing and the gap between rich and poor is widening.

Social, political and religious tensions. Tensions and conflicts between rich and poor, between ethnic groups and between religious groups are on the increase. Global entities try to control the global processes of production, consumption and political organisation, but at the same time, information and communication technology is breaking through conventional barriers of time and space and central control, and linking people in every corner of the globe. Migration is high: from rural areas to urban centres and from poor to rich areas in the world. The multiculturality of nations is increasing and leads to social tensions. Social cohesion of modern societies is disintegrating; traditional cultures and local institutions are losing their function. At the same time, ethnic and religious identities are receiving new momentum and new political alliances are emerging on a global scale.

Proliferation of weapons of mass destruction. Access to weapons and other means of mass destruction is becoming easier, and has escalated to an uncontrollable number of nation states and political and/or criminal organisations and individuals. International organisations engaged in trafficking people, drugs, weapons and other illegal activities are powerful. The use of nuclear energy and weapons is increasing and the necessary precautions are not always taken. Different groups accuse each other of terrorism and justify increase of use of their own weapons to fight the other.

Opportunities for new thinking. The polycrisis is leading to uncertainty and instability, but also to new opportunities. There is widespread awareness that the sustainability of the global economy, security, social system and ecology is at stake. The idea that the conventional answers to these problems do not lead to breakthroughs, and rather continue or worsen the problems, is often heard. The existing problems are human made, and thus, it is within humankind's own scope to deal with them. But we need a new way of thinking and acting.

Einstein said: *we cannot solve the problems we face with the same thinking that created the problems*. It seems as if the worldviews of conventional scientists, policy makers and corporate or individual decision-makers are not meeting the requirements of the present and future global order. To make an about-turn in our views, values, perception and thinking is a major challenge for today's scientists, policy makers and practitioners at corporate as well as individual level. And elements for this new thinking emerge from new sciences, social movements and initiatives, ecology and gender studies as well as from inter-cultural encounters. New worldviews, insights and technological and social options become available.

Moving worldviews

In the course of history, worldviews held by people have changed as a result of the accumulation of experiences, changes in interpretation of religions, scientific discoveries and inter-cultural domination and exchange. In the early middle ages in Europe, the more animistic worldviews of the pre-Christian era were superseded by the monotheistic and dualistic notion of the Christian worldview. The Enlightenment strengthened the dualistic and materialist worldview whereas more recent post-modern insights have started to question materialism and duality.

For the last centuries, the worldviews based on monotheism and the theories of the Enlightenment have dominated thinking and have influenced political, economic and scientific development in the West, and they are spreading to other parts of the globe. These worldviews are dualistic in the sense that they separate the creator and the created, mind and matter, object and subject, humankind and nature. Their understanding of the laws of nature has led to universal assumptions about causes and effects, and predictability of the course of things. The dominant systems of governance and control of nature and society are based on such assumptions. The Western worldviews are basically anthropocentric and male biased: they assign a special place to humankind, as beings with a privileged place within creation that justifies the right of humankind to control and exploit the rest of creation. The linear notion of time can be seen as a result of the sense of destiny that exists in monotheistic religions. The dominant worldview is rather materialist (Descartes) and mechanistic (Newton). It embraces the principle of competition, leading to survival of the fittest (Darwin), and of efficient contribution to the economy of the strongest (Keynes). The combination of these views has led to global exploitation of nature, domination of less powerful peoples, the use of money as a basic mechanism to express values and relations, accumulation of material wealth and acceptance of poverty as an unavoidable phenomenon. It also has contributed to rationalisation and standardisation of labour, mass production, development of weapons for mass

destruction. Aspects of care, love, reciprocity and holism, often associated with female perspectives, receive low priority.

This dominant worldview is increasingly challenged and in this respect there are different positions prevailing amongst policy makers, scientists and the general public. In recent decades, policies and sciences have emphasised materialistic modernisation in a generic way and have often been unable to integrate the diversity of visions of society in an adequate way. Mainstream science, increasingly in alliance with private companies, has created schools of thinking and stimulated developments that are not always appreciated by policy makers and practitioners. Research (e.g. UNDP Human Development Report, 2004; Quality and the Future. Sustainability outlook, RIVM 2005) has revealed that there is a great gap between the worldviews of sciences and policy institutions on the one hand and those of the public on the other. The first group emphasises ongoing economic development at global scale and increasing efficiency through technological changes, whereas the public attaches more value to solidarity, regional development and diversity. This explains the gap that exists between the different actors in the ongoing debates on issues such as redistribution of wealth, investments in care, urban and rural development, the use of genetic technology, the globalisation of markets, and quality in food production. Policies have not taken sufficient account of the wishes and values of those they were designed to serve. This has led to lack of trust between the public and policy makers.

Increasingly, the conventional, materialist and science-based approaches to development are being challenged and increasingly, innovative individuals, citizen groups, scientists and policy makers are presenting new ideas on how things can be done. New approaches to science are emerging, as are new policies and practices in domains such as rural renewal, organic agriculture, sustainable energy, complementary medicine, alternative education and solidarity economics.

The conflicts and contradictions between mainstream developments and initiatives for sustainable development indicate that a societal dialogue on worldviews and sustainable development is important and timely.

Sources of inspiration for 'moving worldviews'

Two sources of inspiration seem to provide important inputs for 'moving worldviews' and reshaping of sciences, policies and practices:

- There is much interest in new insights from sciences such as quantum physics, societal economy, ecology, gender transdisciplinarity and social learning. They find applications in fields such as health care, agriculture and rural development.
- Also worldviews, insights and ways of knowing from other cultures are becoming more explicit, relevant and popular. Many of these insights reinforce those arising from the new developments in sciences. Ethnoecology, a-dualistic perspectives and spiritual ways of knowing are insights that are strongly influencing Western worldviews.

It is important to review and question the impact of leading conventional worldviews as well as that of emerging new worldviews. Are they realistic, rigorous and practicable? Do they reflect a good balance between materialism and spirituality, between economic growth and care for people and nature? What do they teach us

about sustainable ways of production and consumption? What are the implications of these worldviews for the way science and policies are being shaped and for concrete activities being undertaken in the domain of production, land use, consumption, social organisation and sense giving?

The conference

The organisers of the conference invited innovative European scientists, policy makers and practitioners working towards sustainable development who were eager to learn from each other and to build strategic alliances. Some Compas partners from the South were also invited to share their insights on the intra- and inter-cultural and inter-sciences dialogues they are involved in.

The conference itself had the character of a collective brainstorming session and self-reflection on the existing situation and on options for the future.

The main questions for discussion were:

- What is the relation between the polycrisis and the dominant worldview in the West?
- What new insights have emerged that can lead to worldviews that have better potential for dealing with the polycrisis?

Specific questions were:

- What new insights have emerged from innovative research, social learning and rural development and how do they contribute to 'moving worldviews' in the West?
- What is the potential of inter-cultural and inter-sciences dialogue to contribute to 'moving worldviews' in the West and can their potential to deal with the polycrisis be increased?
- What are effective transition strategies in research, rural development, education and international cooperation?

This publication

The participants of the conference (see annex) all contributed an essay on their own insights and experiences. These papers are summarised in part I, Chapters 2 – 6. Part II consists of the complete versions of the contributions. These essays are complementary and there is much congruence in their conclusions. For reasons of accessibility they have been organised in chapters that indicate their main focus: Worldviews and sciences in transition; Reshaping research; Rural development initiatives; Inter-cultural dialogues on worldviews and knowledges; Learning for transition.

A summary of the plenary discussion has been included as Chapter 7 of Part I, and the summary of the overall conclusions and a final reflection can be found in Chapter 8.

For those who have limited time for reading, Part I provides a complete overview of the main points of the conference and the conclusions drawn.

2. Worldviews and sciences in transition

This chapter deals with questions like: *What is a worldview? What is the characteristic of the dominant Western worldview and what role does it play in shaping sciences, technologies and society? To what extent does the Western worldview account for the material progress that the Western world experiences, and to what extent is it related to the problems we face in the West and throughout the globe? What are the new insights that might lead us to revise our dominant worldview and what implications would they have for the scientific method and society?*

A philosopher, a quantum physicist, a holistic scientist, a scientist on knowledge systems, a policy maker on research, a development cooperation professional and a scientist specialised in transdisciplinarity throw their light on these questions. Each author provides materials that can be used for the formulation of a revised worldview and for reshaping sciences and scientific process in the direction of a more sustainable and just society.

Reflections about worldviews, the Western worldview, and inter-cultural polylogue

Nicole Note, philosopher, Leo Apostel Centre for Interdisciplinary Studies, Belgium

Note gives a philosophical reflection on the notion of worldview, placed in an inter-cultural perspective. The importance of inter-cultural dialogue or polylogue is stressed.

A worldview is seen as a map that helps people to orient their lives and make sense of the chaos out there. It serves to create order by (implicitly) moulding the world into mental categories, thus presenting an understanding of the phenomena and give meaning to them. The mental categories are unconsciously conceived as unquestionably true. Worldviews use specific principles to order the perceived world. In the West the world is conceived as consisting of identities such as humans, trees, animals. The first principle to bring order in the world is the separate and autonomous identities. In other cultures, this ordering principle may be quite different. For example, in the Andes the first ordering principle is relationships: everything is related.

The second ordering principle is expressed in language, institutions, habits and cultural events. In the West the identity leads to importance attached to 'Rationality' and to 'Self-expression' and to a dominant attitude of self-interest as a main goal in life. This leads to social and ecological problems, which need to be prevented. The author therefore introduces two additional categories: 'Ethical category' and the 'Potential to situate ourselves in a larger meaningful whole'.

In the West we believe that what we see corresponds with reality and that the observer does not play a role in knowledge acquisition. In science and society, two mutually exclusive ideas (Newtonian and post-modern worldviews) exist side by side: both claim truth value. The author suggests that reality may in essence be manifold and even internally contradictory.

An inter-cultural polylogue must make the ethical and knowledge-epistemological positions explicit and be prepared to question their 'truthness'. But an extreme relativist position deprives us of ethical standards, and indifference could be the outcome. She therefore introduces Taylor's the Best Account Principle. We can become inter-cultural by probing on ethical issues and ethical truth and being open to inside resonance (e.g. non-Western criticism of Western attitudes towards elderly people and the emphasis on for example cosmetics, appearance and externalities, neglecting intrinsic values and aspects such as vitality, taste, etc.).

Inter-cultural encounters can only be successful if:

- all participants have reflected on the first and second order principles so that they can relativise and question them;
- participants are firm enough in their own beliefs so as not to relativise their own categories to the extent that they become indifferent to or totally lose sight of their own beacons.

Inter-cultural encounters are successful only if ethical issues are discussed from within lived experiences, and is not only seen as a mental activity.

A holistic worldview for a planetary civilisation

Ervin Laszlo, holistic scientist, Club of Budapest, Germany

Laszlo takes the position that we are approaching a critical point in our collective evolution. Our world has become economically, socially and ecologically unsustainable. We run the risk of mega-disaster through nuclear accidents, climate change, health problems and pollution, uneven distribution of wealth, gender injustice, terrorism, fundamentalism, organised warfare, more weapons and arms, drop in food self-sufficiency of world's major economies, diminution of freshwater reserves.

New thinking is necessary and new scientific insights provide sufficient evidence for a robust innovation. Although not widely known or accepted, the worldviews based on the theories of Newton, Darwin and Freud have been superseded by new discoveries. These show that the universe is not a lifeless, soulless aggregate of inert chunk of matter. Rather, it resembles a living organism. Matter, life and mind are consistent elements within an overall process of great coherent and harmonious complexity. The emerging worldview is holistic and can inspire a more integral way of living, eating, healing and consuming. This worldview must reorient the basic ambitions, goals and priorities of society and should lead to a shift from extensive to intensive growth.

Extensive growth is characterised by: conquering more territories, colonising more people, imposing the will of dominant layers of societies on populations. It is based on 'Conquest, colonisation and consumption'.

Intensive growth centres on development of individuals and communities. It is based on 'Connectedness, communication and consciousness'. It is the task of every individual to shift towards intensive growth by evolving his or her own worldview and consciousness.

We have to learn to think in a new way

Hans-Peter Dürr, quantum physicist, Max Planck Institute, Germany

The contribution of Dürr goes in the same direction as the previous paper. To effectively counter the threat of super weapons, ecological and economic problems we must fundamentally correct our current behaviour. Dürr believes that the revolutionary new insights in physics could provide a starting point for defusing and solving the problems.

The paper is an update of the Russell-Einstein Manifesto. This manifesto was issued in 1955 in the midst of the Cold War. It highlighted the dangers posed by nuclear weapons and called for world leaders to seek peaceful resolutions to international conflict. It was signed by 11 eminent intellectuals and scientists, most notably Albert Einstein. The manifesto called for a new way of thinking. Yet, 50 years later the dangers have only increased and therefore the need for new thinking is even more urgent.

New insights of quantum physics render the dualism between mind and matter obsolete. In the energetically open, animate manifestation of reality, the materialist-mechanistic world can be linked to a mental or spiritual dimension. In open systems, where useful energy is being added, self-organisation develops ever richer complex systems. Pre-life then organises itself into the diversity of higher bio-ecological vibrancy. The natural sciences must reconsider their premises, from a view of reality that is primarily shaped by static substance, to a view that takes living, creative relationships as a starting point. The living are not merely bio-machines, but are embedded in a process of life that differentiates and develops constantly. The transformation of sciences and their structures of knowledge requires a fundamental dialogue between all cultures and religions.

To effectively counter the threat of super weapons we must fundamentally correct our current behaviour. But how can we do this? We believe that the revolutionary new insights in physics could provide a starting point for defusing and solving the problems. Embracing our own existence of human freedom is the feeling of love and the dedication of responsibility. We develop binding rules out of our knowledge; as a specific human answer to the world's invitation. This is the original wisdom to which all religions give their own expression.

Bio-ecologically, the world would doubtless continue to bring forth ever new dimensions even without us. But human perception and interpretation open up a special dimension: a mental-cultural sphere. For this the economy must be made an instrument of culture again, instead of the economy making an instrument of culture to exploit the world. Ecological and cultural diversity must be the guiding principle of international cooperation, systems of exchange, means of production strategies as well as rules of competition and recognition. This requires legal frameworks that ensure fair rules of the game.

To combine diversity and vitality into the driving forces of a creative process of differentiation experienceable in daily life, we must create a dynamic system that we can change through dialogue and exchange. Dialogues and exchange are needed with those who are different, who are socially excluded, and between cultures. This way, tension and conflict can be dynamically cushioned, balanced and shifted toward

moving discourse. Here is an important transdisciplinary and inter-cultural task for science, for thinking and for human society.

In many parts of the world, the inventive energies of people must be liberated from the constraints of rigidified communities and cultural dogmas. Modern individualism which historically made individuality possible is degenerating into a dismal isolation and fragmentation of the commonality and leading to mental and emotional poverty in the industrialised countries. Politico-cultural and ecological interplay between people is dominated by centralised power structures that we can and should replace. We need vibrant examples of new thinking, new institutions and societal and economic developments.

Highest priority should be given to initiatives that strengthen the responsible co-liberal person and adequate freedom for the creative individual. Polycentric economic structures that complement each other and monetary oriented market economic institutions must be connected with civil-society social, cultural and subsistence-economy initiatives. We should develop possibilities to work out conflicts through reduced violence and ecologisation of economic processes and strengthen inter-cultural and inter-religious dialogues.

Encouraging models are still to be found in traditional cultures, but they have to be rethought and adapted to the modern situation. Human beings are capable of much more than being aggressive avaricious wolves. Omni-connectedness, which we call love and which germinates from vitality, is inherent in the core of us and of everything else.

Communicating worldviews: articulating global and local knowledge

Henk Molenaar, anthropologist, Ministry of Foreign Affairs, Netherlands

Molenaar analyses the worldview of modernity and its focus on economics and monetary innovations. Monetisation is an ongoing and global process that allows the economy to emerge as a separate domain, detached from the wiser social and moral fabric of society. It turns the world into a single and tightly integrated market, resulting in a historically unprecedented creation of wealth. Through interest, time and money have become intrinsically related. In a sense money liberates, as it recognises no hierarchy, it frees individuals from the obligations of feudal bonds, common solidarity or ethnic affiliation. It offers the opportunity to escape from an ascribed social position.

However, in taking the form of interest-bearing credit, money assumes an aggressive character. In the current system it needs to grow and be used and re-used all the time. It penetrates all layers of society and every aspect of culture. Social mechanisms such as ancestral ties, reciprocity, solidarity, mutuality and moral obligations are weakened and this leaves individuals vulnerable to external influences. Capitalism tends to widen the gulf between the affluent and the poor. It fuels demands for new, external products and puts community members in direct competition, dissolving social structures and moral obligations. Economic growth takes place at the expense of environmental degradation. In the long run, the reign of the free market is neither sociologically nor ecologically sustainable.

As a social construct, scientific knowledge and capital are closely related. The dominant Western worldview reflects a claim to universality. Adam Smith's invisible hand is regarded by many as a law of nature and market mechanisms as universal principles rather than as historically specific social constructs. Likewise, Western scientists claim universal validity of their knowledge, which is based on experiment, measurement and objective thinking. It recognises no authority but its own thought process. Many of the social values that have sprung up with the growth of capitalism – freedom, civil rights, democracy and equity – are equally seen as universally valid. More than half a century of development assistance has witnessed a succession of theories, approaches and specific topics of attention. But these are merely superficial variations of the basic theme of providing capital and knowledge.

Molenaar argues that development cooperation might become more effective if it were to take note of its own historic background and open up to a real dialogue with other worldviews. But modernity does not easily recognise other worldviews. Rather, it has the tendency to aggressively silence and intimidate other views. Molenaar advocates an approach where development professionals enter into a true dialogue with local communities. Communication, understanding, equality and diversity will only come from finding ways to work together within joint rationalities.

Moving worldviews by learning from mistakes

Bertus Haverkort, research coordinator Compas, ETC Foundation, Netherlands

Haverkort shares his own personal experiences as a development worker. He has gradually learned that he has had to review and modify a number of personal, professional and cultural assumptions. Work in rural development programmes in Europe, Africa and Latin America have placed him in a position to share his Western knowledge with that of professionals in other cultures. His development as a sculptor brought him in contact with pre-Christian worldviews. This led to a process of rethinking his own cultural roots as well as Western sciences and the role of international cooperation. Inter-cultural dialogues and co-evolution of sciences are now seen as the basis for his work.

Transdisciplinarity – past, present and future

Basarab Nicolescu, transdisciplinary scientist, France

Nicolescu gives a presentation of the basics of transdisciplinarity, its methodology and the challenges it offers for science and society as a whole. Transdisciplinarity is an approach that goes 'beyond disciplines'.

Modern science was founded on the idea of a total separation between the 'Knowing Subject' and 'Reality'. Objective reality was assumed to be completely independent from the subject who observed it. But today it is becoming clear that the consequences of this break have become the threat of self-destruction of our species. The quantum revolution radically changed this situation. The new scientific and philosophical notions it introduced necessarily led to rethink the complete view of the world.

Nicolescu presents three axioms of the methodology of transdisciplinarity:

The ontological axiom: In Nature and in our knowledge of Nature, there are different levels of Reality and, correspondingly, different levels of perception. 'Reality' we define as that which resists our experiences, representations, descriptions, images, or even mathematical formulations. The 'Real' is, by definition, veiled for ever, while 'Reality' is accessible to knowing. A new Principle of Relativity emerges: no level of Reality constitutes a privileged place from which one is able to understand all the other levels of Reality. A level of Reality is what it is because all the other levels exist at the same time. There is no fundamental level. The Principle of Relativity gives a new perspective on religion, politics, art, education, and social life. And when our perspective on the world changes, the world changes as well. Every level is characterised by its incompleteness: the laws governing this level are just a part of the totality of laws governing all levels. And even the totality of laws does not exhaust the entire Reality.

The logical axiom: The passage from one level of Reality to another is ensured by the logic of the mutually exclusive contradiction (the logic of the included middle). Knowledge of the coexistence of the quantum world and the macro-physical world has led to pairs of mutually exclusive contradictories: wave and corpuscle, continuity and discontinuity, separability and non-separability, local causality and global causality, symmetry and breaking of symmetry, reversibility and irreversibility of time, and so forth. The intellectual scandal provoked by quantum mechanics consists precisely of the fact that the pairs of contradictories that it generates are actually mutually exclusive when they are analyzed through the interpretive filter of classical logic. The classical logic is certainly valid for relatively simple situations but is harmful in complex cases for example, within the economic, social, cultural, religious or political spheres. In such cases it operates like a genuine logic of exclusion: good or evil, right or left, heaven or hell, alive or dead, women or men, rich or poor, whites or blacks. This logic is a tool for an integrative process: it allows us to cross two different levels of Reality or of perception and to effectively integrate, not only in thinking but also in our own being, the coherence of the Universe.

The complexity axiom: The structure of the totality of levels of Reality or perception is complex: every level is what it is because all the levels exist at the same time. From a transdisciplinary point of view, complexity is a modern form of the very ancient principle of universal interdependence. This recognition allows us to avoid the current confusion between complexity and complication. The principle of universal interdependence entails the maximum possible simplicity that the human mind could imagine, the simplicity of the interaction of all levels of reality. This simplicity cannot be captured by mathematical language, but only by symbolic language. The mathematical language addresses exclusively the analytical mind, while symbolic language addresses the totality of the human being, with its thoughts, feelings and body. The combined action of the ontological, logical and complexity axioms engenders values.

Nicolescu suggests the following actions:

Development of transdisciplinary higher education: It is important to introduce courses on transdisciplinarity in as many universities as possible, and to introduce PhDs in transdisciplinary studies and create a Virtual Global Transdisciplinary University.

The creation of a human model of health and the emergence of a new health system: No high-technology solution can treat the entirety of the human being. In this context, transdisciplinarity can contribute to the emergence of a new health system.

Scientific studies on consciousness: Brain and mind involve different levels of Reality and perception. It is important to create transdisciplinary teams involving neurophysiologists, physicists and other disciplinary specialists of exact and human sciences, animated by a transdisciplinary attitude.

Dialogue between cultures and between religions: The transdisciplinary model of Reality allows us to define three types of meaning:

- Horizontal meaning – i.e. interconnections at one single level of Reality. This is what most of the academic disciplines do.
- Vertical meaning – i.e. interconnections involving several levels of Reality. This is what poetry, art or quantum physics do.
- Meaning of meaning – i.e. interconnections involving all of Reality-the Subject, the Object and the Hidden Third. Cultures and religions simultaneously involve one or several levels of Reality, one or several levels of perception, and non-resistance to the Hidden Third: this is the ultimate aim of transdisciplinary research.

Creation of networks of networks: The number of transdisciplinary experts is continuously increasing. The transdisciplinary culture is a necessity of our time, due to two contradictory facts: the inner evolution of knowledge and the process of globalisation.

Create living sustainability examples: From a transdisciplinary point of view, it is our duty and responsibility to use all the means at our disposal – spiritual, theoretical and practical – to find sustainable solutions to problems which, if they remain unresolved, will affect each one of us on this beautiful planet of ours – rich and poor, young and old, Muslim and Christian, believer and non-believer, male and female, North and South, West and East.

Building a new spirituality: 'Spirituality' is a devalued word today, in spite of its etymological meaning: 'respiration', in an act of communion between the cosmos and us. There is great spiritual poverty present on our Earth. It is manifested as fear, violence, hate and dogmatism. In a world with more than 10,000 religions and religious movements and more than 6,000 tongues, how can we dream about mutual understanding and peace? We need to find a spiritual dimension of democracy. Transdisciplinarity can help with this important advancement of democracy, through its basic notions of 'transcultural' and 'transreligious'.

Through the transcultural, which leads to the transreligious, spiritual poverty could be eradicated and therefore render the war of civilisations obsolete. The transcultural and transreligious attitude is not simply a utopian project – it is engraved in the very depths of our being.

The role of science in anthropogenic uncertainty

Niels Röling, innovation and knowledge scientist, Wageningen University, Netherlands

For Röling science is a social institution that 'makes sense' and 'gives meaning' by monitoring, interpreting and predicting events, and by suggesting effective action. Yet present-day science finds it difficult to play that role.

The discussion about the nature and role of science has given rise to science wars in which diametrically opposing views clash with religious ferocity. The following opposites exist: positivism versus constructivism; realism versus relativism; reductionism versus holism; hard versus soft science; extractive versus interactive science; conclusion- versus decision-oriented science; natural versus social science. The question is not, which of these is 'right'? The question is which view is most useful for what purpose?

People have become a force of nature of geo-physical proportions, affecting ecosystems that are vital for life on the planet. Most of us know that we cannot go on with what we are doing, yet we find it impossible to collectively imagine or give shape to an alternative society.

The anthropogenic changes that have been transforming the face of the planet since the fifties demand 'social transformation', but the market seems to fail on that count, as it also does where environmental sustainability is concerned.

Towards a new institution of science. Effective action emerges from iteration between emotion, perception, theory and action. Science is an institution to help take effective action. With Habermas, he distinguishes between 'instrumental', 'strategic' and 'communicative' action. Effective action in each case seems to have a totally different meaning.

We have perfected our ability for **instrumental action** to manipulate causal events. We use instrumental action also with respect to other people when we promulgate regulations and laws backed up by authority and ultimately by brute force. The principle for organising society is hierarchy.

With respect to **strategic action**, we trust in the market as the basic coordination mechanism for leading us to optimal solutions. The problem is that the market fails when it comes to the greatest challenges: anthropogenic global destruction of ecology, global inequity and human happiness. We have very little shared knowledge about how to voluntarily transform our current society into one which optimises individual happiness, social equity and ecological sustainability, and global system stability.

Communicative action is described as co-construction of knowledge, social learning, and networking. It seems that we have very limited collective knowledge about how we can socially learn our way to effective communicative action that will mitigate the disaster we seem to be bringing upon over ourselves.

Contours of the new science. Science as an institution is a conscious and explicit effort to lift the 'active ingredient' of cognition out of the mess of superstitions, rituals, beliefs, holy practices, routines, traditions, and power games that have

accompanied and retarded human advance. It is a struggle and often a political battle. Yet the invention of science as an institution and set of methods that seeks to promulgate truth is an important basis for human society, in addition to such institutions as justice and fairness.

According to new thinking about the 'wisdom of the crowd', we develop most effective knowledge if that knowledge is created by independent and highly diverse people aggregating decentralised cognitive processes. In these conditions, the 'crowd' outperforms the best experts. A science that helps us learn our way out of our current predicament must organise in this manner. This means that we must work with 'extended peers' and 'extended facts' to include especially what other people consider important. Such a science explicitly applies social construction as its basic process. The main challenge is at the interface between ecosystems and human society. Hence, we are dealing with integration of thinking in terms of causes and thinking in terms of reasons and social processes.

Social learning deals with the dynamic aspect of collective cognition, transition and transformation. Social learning takes place in a context that can most usefully be described as a natural resource or eco-service dilemma. We are dealing with a resource or a service such as fresh water, the ozone layer, clean air, biodiversity, etc., from which it is impossible or costly to exclude other people. The context is further marked by multiple stakeholders who each have a 'stake' in the resource or service. Hence the context is marked by a history of contestation. As a result of their conflicts, these stakeholders have become increasingly interdependent, that is, they increasingly realise that they cannot achieve their goals without the cooperation of the others. This sense of interdependence is essential for social learning to proceed. But the context is also marked by uncertainty and complexity. The multiple stakeholders grope their way forward. Röling believes that social learning could form the substance of a widely shared new reflexive theory about humans as a force of geo-physical change, much as economics today provides a widely shared theory about generating wealth.

A basic ingredient in science is spirituality. This human capacity to experience a fundamental unity in which the distinction between self and world, between form and emptiness, is absolved. Such a sense of spirituality is shared widely, whatever someone's religion or outlook. Spirituality in this sense supports a holistic perspective, as well as readiness to accept that humans are part of nature instead of master over it.

Such a science brings together different disciplines, spiritual and cognitive practices, and the knowledge of highly diverse people in an interactive process. The struggle now is to make it work for dealing with the great uncertainties that we face. We cannot just do more of the same and assume that some technological inventions will miraculously appear that will allow us to deal with the end of oil, climate change, and growing inequity. It is one thing to engage in science that determines what is ecologically sustainable. Natural science is crucially important to establish the parameters within which we can move. Furthermore, such knowledge is essential for monitoring and evaluating second-order emergence. But in order to succeed, we must have knowledge about human behaviour and how it can be affected. What is more, that kind of knowledge must be widely shared, much as economics is widely shared at present.

Conclusions

The authors agree that the Western worldview is biased in its dualistic and materialist orientation. It has not yet started to take into account new scientific insights of quantum physics, learning theory and transdisciplinarity. It does not sufficiently take into account the ethical aspects. It differs substantially from worldviews and knowledge concepts that exist in other cultures.

The authors agree that the bias in the Western worldview contributes to the existing ecological and social problems of the globe. The authors complement each other and present ideas, theories and strategic options that would allow the emergence of a new scientific approach. Taking into account ethical aspects, building on the new scientific insights of quantum physics and knowledge sciences, enhancing diversity and transdisciplinarity are prospective actions that would lead to a more sustainable and just development path. On this path we could decentralise and diversify the cognitive processes, include spirituality and have polylogues with worldviews that exist in other cultures.

The challenges are tremendous. The need to widen the focus of science is amply demonstrated by the critical point in the evolution of the globe: the social, economic, cultural and spiritual crises have their roots in human behaviour, the values and the use of knowledge and technologies. The link between the dominant scientific knowledge and the way the economies are governed by the laws of capital is clear. International development cooperation leads to the need for inter-cultural and inter-scientific dialogues.

The theoretical basis for new sciences is robust. Quantum physics presents solid scientific insights about the different levels of Reality, the theory of transdisciplinarity is fully developed, and the new thinking about social learning leads to operational models for the scientific process.

Suggestions are made for shifts of worldviews and values, new thinking and holistic theories, inter-cultural, inter-scientific and inter-religious dialogues, and methods of social learning. Specific recommendations are made for reshaping higher education, human health, studies on consciousness and networking. Spirituality and the knowledge and insights of other cultures are recommended by many as potential sources for these innovations.

3. Reshaping research

Influenced by the new insights from quantum physics and transdisciplinarity, among others, new research methodologies are emerging. These research initiatives do not accept the dualism between mind and matter or the primacy of matter over mind.

This chapter presents several examples of such innovations in research. The interface and interaction between mind and matter are studies in consciousness and brain research (Bosman) and in medical genetic research (L. Rist). Kieft presents insights on energetic agriculture as they emerge by learning from practical experiences of farmers. Zürcher provides research results where time and biological processes are related. The contributions of authors in Chapter 6 also refer to new scientific practices and methods: Baars (biodynamic agriculture), Stijkel (Cocreation science) and Zajonc (contemplative enquiry). The phenomena researched by the authors go beyond the present scientific perception of reality and cannot be explained in conventional mechanistic, materialist and reductionist ways. The theories to explain certain findings may not always be mature or consistent with conventional science. Electromagnetic and zero-point fields, coherence and synchronicity, self-regulation, intuition and the role of cosmic rhythms can be seen as new or as old concepts. They present themselves, or emerge, once the conventional notions and limitations of research are abandoned.

Mind-matter-environment

Saskia Bosman, consciousness researcher, Triple I-S, Netherlands

In her paper Bosman explores the interface and interaction between human consciousness (mind) and matter, also in relation to our environment.

Electromagnetic fields in the environment influence all living systems, which are electrical and magnetic themselves and thus have an influence on their immediate environment. Order and richness in frequencies have been found around healthy plants. Chaos and frequency gaps have been found in stressed and diseased plants. Various pilot studies were conducted on the electrical fields surrounding agricultural products which confirmed these observations. More experiments have to be done before it can be concluded that general patterns exist, but the preliminary results are promising and may open up new research avenues.

Initial studies by the author show different brainwave frequency distributions over the human head in different states of consciousness, resulting from various meditation and trance-induction (e.g. sound) methods. As a result of such exercises, the pineal gland produces different hormones, regulating one's state of consciousness. The pineal gland also appeared to respond electrically to sound, and this can be measured in the brain's magnetic field.

Recent literature studies and experiments show evidence of coherence among the electrical signals of various oscillators in the human body, in particular the heart and the brain. Electrical signals are used by all neuronal networks that function as a brain for receiving, processing, storing and using information. Coherence occurs when

harmony is experienced among the physical, emotional, mental and inspiration levels of functioning and the physical/instinctive, emotional, cognitive and spiritual intelligence. This is also known as 'being in the flow', which promotes peak performance and has practical applications in coaching and training.

Synchronisation and desynchronisation phenomena of brainwaves with the Schumann resonance (SR), a natural oscillating electromagnetic field in the Earth's atmosphere, are being studied. The results indicate that synchronisation occurs spontaneously, varying from day to day and from one individual to the other. Initial attempts with EEG-SR synchronisation biofeedback indicate that synchronisation can be enhanced, which may be useful in health care for self-healing of the body and coordination of brain functions (see also L. Rist).

The author's vision is that mind and matter interact with each other through electromagnetic wave phenomena and that through these, humans (and other organisms) have a strong connection with their environment. It is suspected that at a deeper level mind-matter interaction takes place through an underlying field, like the zero-point field known in quantum mechanics. This is independent of the question whether consciousness is self-existent and non-material or a product of biochemical processes. Mind may result from material processes, but exerts feedback on these. At the moment this area is overlooked by most of biomedical science.

It is important that more research on the interface and interaction between human consciousness, matter and environment is performed. The preliminary results are promising and may open up new research avenues, for example in quantum agriculture (see Kieft) and 'cosmic' dimensions of trees (see Zürcher).

The consequences of thinking about evidence in natural sciences

Lukas Rist, physician, Paracelsus Hospital, Richterswil, Switzerland

For autonomous beings (including human beings) external circumstances are not the causes of their activities. They present more or less favourable conditions under which the autonomous being produces these activities. For understanding the world we must go beyond the world of senses. Soul-spiritual conditions affect our bodily functions, such as blushing or trembling when we are excited. Hormones are the messengers of the soul-spiritual state. Interestingly, certain hormones can affect the genes and exert a regulatory influence in genetic processes. Thus information flows not only from DNA to protein, but also from immaterial soul-spiritual potentiality of the species to the hormone and then to the DNA. A way of looking at genes that accords with the spirit is fundamentally different from the view that genetic substance builds an organism in a physical causative way.

Many gene technology experiments do not deliver confirmation of the materialist theory. When they do 'succeed', malformations result or unexpected results are produced. For example, in 'knock-out' experiments, where genes are switched off by a molecular technique, people hope to gain information on the function of the deleted gene in the organism. In a certain experiment on mice, a large number of these deletions had no visible consequences for the organism, or quite different

characteristics were affected from the ones predicted from theory. Sometimes the species is even capable of forming a complete organism without a gene presupposed to be essential. This can only mean that genes are not the cause of the organism's existence, but only provide more or less favourable conditions and in some cases can be completely absent.

In another study, mice were able to overcome the loss of genetic information. The mice did a kind of 'gene-therapy' by themselves through soul-spiritual processes. Consequently, the genes are a tool for the species and not their determinants. Such observations have opened a new perspective on healing processes. Success or failure of medication or therapeutic regimens depends mostly on the human ability to reactivate the processes of autonomous self-regulation or self-healing. Interestingly, it was found that groups of patients with good self-regulation performed much better than the matched ones, which were comparable for all other documented factors. Self-regulation is not caused by medication; medication is only a condition under which self-regulation can be enhanced. Patients with low self-regulation must be helped to increase their ability to regulate themselves. This can only be done by the patient him/herself. For this, a range of non-medical therapies are appropriate.

This kind of scientific observation has impacts on our own behaviour. The fact that individual behaviour is largely determined by the individual's own philosophy of life is all too often neglected in the ethics of science. The duties science has with regard to human behaviour, i.e. regarding human health or environmental protection, go much further than what is generally practised. Therefore, a reversal in ethical development is needed in which the 'revelational' or 'convictional' ethics, which were formerly justified, are now augmented by 'cognitive' ethics.

Quantum agriculture: bridging frontline physics and intuitive knowledge of nature?

Henk Kieft, agronomist and consultant, ETC Foundation, Netherlands

A survey of emerging 'energetic-farming' techniques has been done among farmers from all over the world. A number of these techniques could be labelled 'electromagnetic techniques'. Such techniques build on the relatively recent perception that all life on earth has developed within the earth's magnetic field and therefore is sensitive to electromagnetic 'information'. Russian research has proven that electromagnetic (energy) fields of living beings and the earth interfere mutually. Photosynthesis via green-yellow light presents a clear example. Diverse techniques with sound and other frequency-patterns, or techniques to correct disturbed earth-magnetism also appear to be beneficial in agriculture. Essential management decisions also can be based on 'energetic' monitoring.

Many farmers use these techniques. In the Netherlands, for example, dozens of dairy farmers and crop-growers are actively experimenting with them. In North America and Australia dozens of farm-advisors are jumping on these trends: a new market is emerging for advice as well as for products. Most users claim positive results: improved productivity, increased animal well-being and animal health,

environmentally sound methods, lower costs and sometimes higher food quality and improved health of the farming family themselves.

The variety of techniques is huge and can be subdivided into five categories:

- Application of specific frequency-patterns to influence plant growth or animal behaviour;
- Correction of disturbances in electromagnetic fields;
- Management of cosmic information;
- Use of specific 'subtle' energies which seem to carry 'information';
- Intuitive techniques to communicate with nature.

The first four categories can be called 'Quantum-farming' as they are based on electromagnetic and quantum or string understanding of nature. Category five can be called 'Intuitive-farming' as it is related to 'subtle' energies and intuitive understanding of nature.

Building a paradigm-bridge between these two different approaches would help to mutually understand both Quantum-farming and Intuitive-farming and explore possibilities of observation of and communication with nature from different paradigms. This may also create opportunities for inter-cultural learning for sustainable development.

Cosmic trees and traditional knowledge of lunar rhythms

Ernst Zürcher, School of Architecture, Civil and Wood Engineering, Switzerland

Stories on mythical worlds and cosmic trees, some going back more than two thousand years, show common elements despite different origins. Such similarities, which cannot be explained by direct or indirect cultural influence, must have an explanation in a common psycho-spiritual constitution of human individuals, expressed in similar archetypes as described by C.G. Jung. One important aspect of the central role of trees in human culture and in our individual perception of nature is that they are embedded in different types of physiological cycles. The cosmic dimension of life has always been mentioned in old cultures. Scientific research (chronobiology) is now progressively discovering some of the rhythms related to astronomy, in plants and animals as well as in human life.

Until recently, the scientific objection to these observed phenomena was based on the fact that the known physical forces (gravitational, geomagnetic) showed too small variations to be considered as causal factors. A recent publication has approached this problem by developing a new astro-/geophysical model which integrates simultaneously the static and the dynamic aspect of gravitation. This model leads to a 'quantisation' of time and demonstrates a rhythmic, reversible sun- and moon-related effect on the supra-molecular structure of water, thus revealing a possible impact of time in biological processes, which is being studied under the label of chronobiology.

In analogy to the stories about mythical worlds and cosmic trees, certain forestry practices and rules regarding tree management and felling have been carried out. A general review of rules followed shows that tree reaction to pruning and special timber qualities and uses are mentioned in relation to specific moon-related pruning or felling date.

The experimental part of this article presents scientific studies on the influence of moon phase. They deal with elements of tree biology, chemical composition of tropical trees and palms and with reversible fluctuations of stem diameters and bio-electric potentials. Taking into account 'time' as a basic environmental factor, makes it possible to develop biotechnologies in the real sense of the term, bringing organisms to the expression of their full potentials. On this basis, a fruitful transdisciplinary exchange is possible between researchers and representatives of old traditional cultures, related to a 'cosmic' dimension of trees and to the scientific, social, philosophical and practical meaning of this level. The prerequisites of such a transdisciplinary exchange are discussed, as well as their consequences.

Conclusions

Many of the authors' findings merit further research. In all cases interactions between electromagnetic, 'subtle energy' or 'information' fields of human beings, plants or animals and their immediate environment play an important role. Little research has been done on these energy or information fields. They challenge Western science on its basic assumptions and methods and are at the borders of or even outside what is acceptable to conventional scientists. Explanations of such phenomena may come partly from quantum physics. The results may contribute to new opportunities to improve health care, food and wood production as well as human well-being.

Similar phenomena are also observed by other cultures but explained in different ways. But as knowledge on these phenomena is still limited, it is still difficult to estimate what they really have to offer. Still these cases reflect and contribute to the changing worldviews in the West and hence to personal behaviour, which determines the state of the world. The duties sciences have with regard to human behaviour, i.e. regarding human health or environmental protection, go much further than what is generally practised. This should be given more reflection in the ethics of science.

It is important that more research is performed on the interface and interaction between human consciousness, matter and environment. Transdisciplinary exchange between the different paradigms in the new sciences and between the new sciences and scientists from other cultures would help to better understand Reality and the phenomena dealt with in these research fields. The stories on mythological worlds can also play a role in trans-cultural learning. Exchange with Russian scientists is also recommended as they seem to be more advanced in the subject of electromagnetic energy fields.

Close cooperation between farmers (practitioners) and scientists in social learning modes may help to improve understanding of subjective and complex phenomena which agricultural science is presently addressing. A reversal in research ethics is needed so that science will focus on understanding Reality and on its attributes to sustainability in the broadest sense.

The research examples of this chapter raise many uncertainties. We do not yet know the answers to questions such as: How robust is their methodology? What are the opportunities involved? What are the risks involved? What is the basis for accepting or rejecting their outcomes? What is their contribution to solving the polycrisis?

But, given the urgency of the polycrisis and the limited perspectives of doing more of the same of the conventional research, we seem to have no other options than: giving at least the benefit of the doubt; showing serious appreciation of their pioneering initiatives; being curious about the outcomes; and encouraging further initiatives. Inter-scientific dialogues may further contribute to the necessary social learning process that leads to further understanding and appreciation of this type of research and of the further development of its methods.

4. Rural development initiatives

This chapter contains six articles that provide insights into questions such as:
What are the worldviews, processes and conditions leading to rural crisis?
What are the views and visions that may enhance regeneration of rural areas?
To what extent do these point to the need for new sciences, policies and practices?
And what can be learned about how farmers, scientists and policy makers can collaborate to enhance transition to more sustainable land use?

Before the development of modern agricultural technology, farming in Europe strongly depended on optimal use of the local natural resources, ecological processes and social organisation. As local conditions and social-cultural processes differ in each region, there was a wide diversity of eco-agri-cultural systems as well.

The introduction of modern technology and the ensuing increase of marketable production led to commercialisation of agriculture. Market competition and the increasing capital costs made it necessary to rationalise and improve the production process constantly. Bank and government policies focusing on maximisation of efficiency led to generic strategies for agricultural development. These developments corresponded with the prevailing Enlightenment worldview in which mechanistic and economic rationality dominated.

However, these blueprint approaches did not fit equally well in the varied ecological conditions of the different regions in Europe. A number of regions fared well and developed highly productive and wealthy farming areas. Where conditions were less favourable for these generic approaches, stagnation and degradation followed. After the change of the common agricultural policy of the EU, large parts of the initially successful farming areas also encountered troubled water. By overvaluing the economic function of agriculture and undervaluing the ecological, social and cultural functions, the consequences were an overall reduction in economic activities in the region, a decrease in biodiversity, degradation of the environment and depopulation of villages. This is the context of the experiences discussed in the essays of this chapter.

How the multifunctionality concept can restore meaning to agri-culture

David Groenfeldt, consultant, USA

Industrial agriculture has succeeded in taming nature. Nature and culture are seen as opposing forces. Food is a commodity, like water and land, that has no value beyond that attributed to it by the market. The economy now provides the meaning to life that previously culture and society provided. This concept of society and agriculture is being exported to the rest of the world, pressing people to stop with religious rituals, social customs and risk aversion and convincing them that agriculture is business.

The concept of multifunctional agriculture (MFA) offers a powerful antidote to the ideology of materialist, industrial style agriculture, and more broadly to materialist

paradigms of development itself. MFA refers to the multiple functions that agriculture provides to society, beyond the immediate production function. These functions include environmental, social, cultural, spiritual and aesthetic services. MFA presents an opportunity to reassess the role of agriculture in society, the desirable future of rural areas, the meaning of development, and even the meaning of life itself.

If in wealthy countries, multifunctionality is relegated to merely being a way of adding a dose of cultural heritage to industrial agriculture, then MFA will have no real influence. But MFA could pose a practical threat to the prevailing worldview if its scenario hinges on the empowerment of regions, where local residents participate in charting their own future (see De Rooij and by Knickel and Jahn).

The developing world has been suspicious of MFA, seeing it as yet another Northern strategy for agricultural protectionism. Developing countries already accommodate a diversity of agricultural worldviews through their indigenous communities and grassroots initiatives. If development projects also place priority on ecological, social, cultural, spiritual and aesthetic dimensions of agriculture they will help legitimise these non-materialist perspectives and help open up a healthy policy debate within the country. Indigenous peoples could also make use of the concept in their struggles over land and water rights. Not only can they refer to MFA in communicating with the outside world, but the MFA concept can also help to legitimise local 'agri-culture' internally (e.g., to the younger generation who are eager to be modern).

There are two basic levels at which the multifunctional concept can be put to practical use in our quest for a sustainable, humane world.

Multifunctional agriculture as cultural reparation. MFA has the potential to repair the severe damage that Western materialism has exacted on traditional agricultural value systems. The North has a moral obligation to its own farmers (and consumers) as well as to those of the South, to make cultural reparations for damage done.

Multifunctional agriculture as a catalyst for new paradigms. The multifunctional concept implies that it is important for people to feel connected with nature, and it is agriculture that provides that connection. Consumers should make this possible by giving support to producers, both economically and morally.

The globalised world links not only our economies but our ideologies as well. It will take all our cooperation to reform the prevailing worldview of materialism, and we can all share the benefits of doing so.

Territorial cooperative networks: new social carriers for endogenous rural development

Sabine de Rooij, researcher, European Network for Endogenous Development, Netherlands

The author presents three case studies on endogenous rural development in different parts of Europe. The cases include environmental cooperatives formed by Dutch farmers, a production and marketing association of Italian mountain farmers, and a

micro-regional network involved in rural economic diversification activities and improving liveability in a marginal rural area in Slovakia. The latter initiative was launched and is largely sustained by rural women. Though the contexts vary considerably, the cases do share some remarkable features.

- The initiators are driven by partly similar motivations, values and beliefs. Some aspects of their worldviews are comparable as well. A common motive is to create rural sustainability. This aspiration fits well with broader societal needs and priorities such as sustainable management of resources, the protection of biodiversity, valuable landscapes and cultural heritage and the production of safe and quality food.
- The pioneers revalorise local resources, which they consider a valuable and also reliable basis for developing sustainable rural communities. This creates a certain degree of independence from external resources and decisions, thus adding to more self-determination.
- They all take a territorial and integrated approach to rural issues.
- The initiatives can be considered expressions of resistance against top-down designed and generic policies that ignore context-specific circumstances and locally created solutions and strategies.
- The initiatives represent new governance structures to deal with rural issues. Self-organisation, self-regulation and new forms of cooperation between different stakeholders in the area are examples of expressions of these.
- New knowledge is generated through developing and combining different kinds of knowledge (practical or experiential knowledge, scientific knowledge from different disciplines) and constant exchange, testing and dissemination of knowledge and experiences within their networks. This is characteristic of learning organisations.[1]
- The initiatives were launched by people with leadership qualities and a relevant network.
- Their activities brought new economic perspectives in so-called marginal areas and generated social and ecological capital.

The motivations of the pioneers that take the lead and assume responsibility are diverse. Their inspiration comes from various and often multiple sources which in fact represent different spiritualities. These may concern a passion for nature (plants, animals), feelings of connectedness to a rural lifestyle, the deep satisfaction which arises from exercising their profession or using their talents (e.g. the art of farming, self-realisation) or the challenge of fulfilling a dream. Commitment to discriminated or vulnerable categories of people can be a drive as well. Values such as equity or justice are important to them. Clearly, economic motives also play a role, although creating personal wealth is not their aim. Instead their goal is a decent income for themselves and as many farming or rural families as possible in the short- and the long run.

[1] Learning organisations are skilled in five main activities: experimentation; learning from past experience; learning from others; transferring knowledge and systematic problem solving (*Garvin, D. A.* (1993) 'Building a Learning Organization' in *Harvard Business Review (*July–August. Boston: Harvard Business School).

Generally shared goals or missions are to achieve multi-dimensional sustainability (i.e. ecological, social, and economic), although different priorities are set. Ecological sustainability may include ecological farming, complying with environmental requirements, nature conservation and production, landscape management, local resource use, alternative energy production, waste and/or water resource management, local marketing, etc. Social sustainability includes improvement of the quality of rural life, work and social relationships. Creating a sense of belonging, solidarity and interpersonal trust are considered important in this respect. Economic sustainability then refers to sufficient rural employment and income opportunities, decent incomes and prospects for continuity of farming and employment.

Obviously, the pioneers have to deal with many obstacles and with opposition that might even threaten the future of their projects. Generic policies and bureaucracy, resistance from officials and political opposition are part of this. Problems in their own organisations such as conflicts or opposing interests need to be addressed as well.

Promoting sustainable development of rural areas: the 'Active Regions' pilot programme in Germany

Karlheinz Knickel and Gundula Jahn, researchers, Institute for Rural Development Research, Germany

Knickel and Jahn focus on new forms of the division of responsibilities in rural development. Relevant overall trends and the factors that contribute to a new division of responsibilities are examined. Reference is made to the situation of agriculture and rural areas in Germany and the reorientation of the agricultural and rural policies at European and at national level. Everywhere, territorially based measures are tending to become increasingly important. At the same time there has been a strong trend towards a strengthening of the regional and local level in the fine-tuning and actual implementation of measures. It is stressed that there is an increasing awareness among policy makers and governmental institutions that many questions can no longer be dealt with efficiently in a top-down manner. Citizens are less and less accepting of policies and interventions from higher levels and there is an increasing divide between governments, government institutions, administrations and the citizen.

A pilot programme has been developed to demonstrate how the reorientation of agricultural and rural development policy can be translated into practice. The initiative is fully financed from national funds. In the initial phase the main regional interest groups – consumers, agriculture and forestry, environment, retail, crafts and trades, commerce, health, municipalities, education and science – were asked to develop a joint vision for the future development of their regions. Regional partnerships and regional management teams provide the organisational basis for the implementation of the programme. The successful implementation of the initiative is seen as crucially dependent on a professional regional management. This is critically important in terms of transmission and mediator between the different parties and actors.

In the concluding part, the lessons learned so far are described, together with some ideas on further work and new initiatives. Reference is made to the organisational and technical skills required by actors in order to take an active part in the development of their region and the organisational and networking skills required by the regional management teams and agencies when providing the necessary support. Both skills are products of and conditions for successful development initiatives. An important feature of the entire initiative is that ideas compete for funds. It is the aim of the programme to stimulate innovation in a goal-oriented manner. The relevance of the region as a level of action is explained in terms of the complexity of integrated, economically, ecologically and socially sustainable development which calls for cross-sectoral approaches. This complexity is still transparent at the regional level, however, and actors can still comprehend the intertwined dimensions.

The paper concludes with two suggestions for further work and new initiatives: first, a cross-national comparative analysis of similar experiences is proposed. In this analysis the key principles of new policies and their precise functioning in the different contexts could be examined. Second, a joint initiative could aim at synthesising the more recent local development experiences in order to inform EU-level rural development policy formulation. A key question could be the supplementation of state intervention with less institutionalised mechanisms of coordination.

Can money work for the evolution of agriculture?

Gerwin Verschuur (CML) **and Anne Stijkel** (Triple I-S), researchers, Netherlands

The authors look at several social learning processes in the Netherlands in which farmers and consumers experiment together with new forms of social and economic organisation and a more organic worldview. These initiatives are a response to the mechanistic worldview that has become dominant in the industrialisation process in agriculture. In a mechanistic worldview, reality is perceived as a machine while in an organic worldview reality is perceived as life, as a living self-created system that is continuously moving and adapting. In dairy farming, for example, the cow is increasingly regarded as a machine, disconnected from land, labour and its own nature, which is to be perfected more and more. Increasingly this worldview is being questioned and people are starting to develop alternatives. Organic agriculture is one such alternative. The ethical principles of health, ecology, fairness and care are presented as the roots from which organic agriculture grows and develops. But the challenge is how to implement these principles in daily societal practice where 'capital' is the key driver of mainstream agricultural development. *Can the role of capital, and especially of money, be transformed in such a way that it catalyses the evolution of a more endogenous and sustainable agriculture?* Using two case studies, the authors explain that the answer to this question is yes.

According to Christopher Houghton Budd[1], to make proper use of money, three qualities of money need to be distinguished: purchase money, loan money and gift money. Purchase money works in trade to pay for the costs of production made in

[1] See Centre for Associative Economics, www.cfae.biz

the past. Loan money (capital) works in the present for the production of goods and services to be sold in the future. Gift money works towards the future and is most appropriate for innovations in which the risk of failure is inherent. Moreover gift money has a function in balancing the two other qualities of money. Currently the different functions of money are not in balance. The rich part of the world attaches more value to the quality of saving and investment at the expense of fair trade in the present. We need to use money more consciously by strictly separating and balancing purchase money and loan money and by using a greater share of the profits as gift money. Once we have discovered how to do this, money starts to work for us. We do not need to wait until humanity as a whole is ready for it, because individuals and businesses can start to do it immediately.

The Citizens-Multi-National (CMN), designed by Hank Monrobey, is a money system based on purchase money. The essential feature of the system is that purchase money circulates more quickly, thereby substantially reducing the need for loan money in trade, which saves capital costs. This is achieved in the same way as multinationals work, by internal overbooking between firms in a holding structure.

A two percent transaction cost has to be paid, which is used as capital reserve and for investments. In the CMN, consumers and businesses cooperate in a network and take responsibility for what money does in the network. By using purchase money to pay a fair price for agricultural products and services provided by farmers, but also by using loan money at suitable conditions, or by using gift money, the culture we build around life can be improved.

A European Network for Endogenous Development? Food for reflection and an invitation to build it

Gaston Remmers, consultant, Bureau Buitenkans, Netherlands

Endogenous development is the term used by the COMPAS programme to refer to rural development processes that have local resources as a point of reference. At present, COMPAS operates in 14 countries in Africa, Asia and Latin America, engaging 25 organisations in extensive exchanges. In Europe, the activities of COMPAS are more modest, the most important being the series of case studies conducted by Sabine de Rooij (see her contribution to this seminar). However, these activities are not embedded in an extensive European network. This is highly desirable, however, first because there are a lot of valuable efforts taking place in Europe, and second because endogenous development processes could strengthen each other conceptually and practically, and provide insights into a reshaping of the links between practice, policy and science.

The first part of this paper draws a brief sketch of endogenous development practices and trends in Europe. This leads to the formulation of a couple of themes around which new projects could be developed by stakeholders. Together these could constitute a European Network for Endogenous Rural Development.

Worldviews as moving motivations?

Kees Manintveld, consultant, Compas, ETC Foundation, Netherlands

In this short paper the author describes his life story from the perspectives of inter-culturality and the evolution of his worldview. In his childhood he learned the importance of building up rapport and a relationship with the people where he lived and the important role of language and dialect in this process. He also experienced the limitations of seeing one's own culture as the only point of reference. In his first professional employment in Senegal he learned that technology could not just be simply transferred without taking into consideration local culture and ecology. In later jobs in Niger and India he was in a better position to interact with farmers from a cultural and spiritual perspective. This inspired him to search for a new approach to agricultural development, which he found in organic agriculture, as it offered a good mix of ecologically sound technology, social justness, economic viability and recognition of farmers' knowledge. He was most interested by biodynamic agriculture, which appeared to be strongest in incorporating the cultural component. Its underlying worldview, anthroposophy, offers practical interpretations in terms of new and wider views of a variety of topical fields such as education, agriculture, medical sciences and health care, arts, socio-economic perspectives and spirituality and religion. Promoting organic farming in developing cooperation brought him in contact with the teachings of Sri Aurobindo whose teachings have some far-reaching visions regarding the long-term evolution of humankind and spirituality. These multifaceted experiences with different elements of worldviews touch him most and help him to move towards oneness between his individuality and the collective.

Conclusions

The papers show that presently there is space for initiatives to revitalise rural areas in the economic as well as ecological, social and cultural sense, at least on a small scale. Post-modern worldviews and values, improved collaboration between practitioners, scientists and policy makers, local knowledge making, new sciences, consumer awareness and enhancing policies, among others, all play important roles in successful transition towards multifunctional agriculture (MFA), rural renewal and other forms of more sustainable land use. MFA adapted to the local natural resource base and new economic opportunities such as organic farming, agro-tourism, nature and landscape conservation, traditional and innovative food practices, and services in the fields of social care and ecological and spiritual courses present an opportunity to reassess the role of agriculture in society, the desirable future of rural areas, the meaning of sustainable development, and even the meaning of life itself. The challenge is to create favourable conditions for up-scaling such initiatives to the level of large-scale sustainable rural development.

The papers provide insight into the factors that are of crucial importance for the transition process:

- *Worldviews, motivations, values and beliefs that respond to broader societal needs and priorities such as sustainable management of resources, the protection of biodiversity, valuable landscapes and cultural heritage and the production of safe and quality food.*
- *Trust in local control, integrated approaches and decreased dependency on external resources.*

- *New cooperative structures that encompass autonomous farmer networks and alliances with other stakeholders such as consumers, innovative scientists and policy makers.*
- *The use of knowledge from different sources (traditional and scientific knowledge, conventional and organic agriculture, new sciences and farmer innovation, etc) and continuous exchange of experiences within networks.*

In their innovation processes some farmers may make use of new sciences such as energetic agriculture and biodynamic agriculture. But, as each situation is different and initiatives have to build on the specific local conditions, experiences and rural culture, to a large extent, they are true social learning and transition processes as discussed by Röling (see Chapter 2).

Such holistic initiatives of rural development not only lead to improved production, income, social relations and rural culture but also to enhanced ecological functioning, conservation of the natural resource base and nature, increase in the available reserves of drinking water and biomass (which indirectly contributes to reducing climate change).

Authors support Molenaar's ideas presented in Chapter 2 of this book, that the interest-based money system is one of the main causes of economic marginalisation of rural areas. As long as farmers operate in an open market system they have to cope with these market forces. Two examples are provided of how, by using money in a different way or by creating local money and banking systems, communities can protect themselves against uncontrolled neo-liberal economics. However, factors including the monetary system, unfavourable policies and failing governance may make it difficult to sustain such renewal processes in regions where farmers are less successful in valuing rural functions or are not competitive enough in the market economy.

There are many 'endogenous' development initiatives in Europe. Such initiatives also deal with issues like rural identity, local governance and inter-cultural dialogue. A call is made for a European Network for Endogenous Development to strengthen exchange and collaboration between such initiatives, among others to assess the existing experiences in Europe. Such an initiative also could benefit greatly from North-South exchange between endogenous development initiatives as is already taking place on a small scale in the Compas network programme.

5. Inter-cultural dialogues on worldviews and knowledges

Several authors in this book have pointed at the importance of inter-cultural dialogues. The arguments vary: dealing with our self-understanding of our place in the world (Note); learning from a-dualistic worldviews and ways of knowing (Dürr); bridging the gap between academic disciplines and culture and religions as a way towards transdisciplinarity (Nicolescu); as sources for the social learning process (Röling); as a way to improve the quality of international development cooperation (Molenaar); as a way of having inter-paradigm communication and learning (Kieft); as a way to achieve co-evolution of sciences in a diversity of sciences (Haverkort).

But, is this a realistic and feasible option? There are a lot of questions in this respect:
Is it realistic to discuss this issue in an air-conditioned or centrally-heated meeting room far away from the hardship that often exists in the South? Are we not romanticising about the noble character of non-Western cultures and idealising traditional knowledges? Are we being fair when we relativise the universality of Western science with its robust research basis?

Is it realistic to expect the West to benefit from a dialogue with the South, given its enormous intellectual and material advantage and its economic and political superiority? By opening up to spirituality will the West forgo the achievements of the Enlightenment? It was after all a period during which it overcame the dogma of religious control on academic creativity and freedom, but not without a great struggle and violence. Is knowledge of Western origin not spread throughout the world and accepted as universally valid? Can we really gain from such a dialogue; is it an act of altruism, idealism or naivety?

Is 'traditional' knowledge indeed still present and vital enough to enter into an inter-cultural dialogue? What interest would people from the South have in entering into a dialogue with the West? How do they stand to benefit? Is it realistic that such a dialogue takes place just at the moment that the West is starting to become interested in subject? Is the South prepared and able to face an inter-cultural confrontation? Should there be a special process of intra-cultural dialogue for the South before entering into the inter-cultural arena? How should the issues of prestige and power associated with different knowledge systems and intellectual property rights be addressed? Is the educated elite of the South interested in becoming associated with the traditional culture and livelihood systems in the South?

What language is appropriate to use, given the ontological gap between West and South?

In this chapter, four people born and raised in Africa, Asia and Latin America respectively, and three people from Europe, who have spent a considerable part of their professional time in developing countries and have been involved in development activities and development studies, give their position.

Holding a mirror: some thoughts on the nature of European and Indian knowledge systems

A.V. Balasubramanian, director, Centre for Indian Knowledge Systems, Chennai, India; Asian coordinator of Compas

The European worldview, which has been dominant and has had a great run of 'success' over the last five centuries or so, has arrived at a situation where it wishes to take serious note of and comprehend other worldviews. Of course, looking at other sciences and technologies and knowledge systems is an endeavour the West has been engaged in for a very long time and in fact with great success. However, hitherto most of this has taken the form of Western civilisation picking up bits and pieces or even chunks of knowledge, sciences and technologies and practices from other parts of the world and putting them to its own use, showing a remarkable capacity to shape things 'in its own image'. However, in more recent times, there has been a line of thought in the West which feels that sciences, technologies, practices and knowledge, including social sciences, of other civilisations perhaps need to be looked at in a larger sense, to comprehend the worldview or the cosmovision underlying them. This has indeed resulted in some interesting initiatives, both in terms of communication and partnerships with the other civilisations, and also in terms of the re-examination of some of the basic problems or assumptions of the worldview of the modern West itself. It is perhaps quite natural that this should happen.

There are also initiatives in other parts of the world such as in India to comprehend the different worldviews of the Western and Indian civilisations. In 1947 when India freed herself from about 150 years of colonial rule, we inherited a system that was put in place by the British in which the lion's share of public resources and support went to education, health, agriculture, legal and administrative structure and governance built entirely on the principles of Western civilisation. Moreover, the governance of the country also came into the hands of a cross section of persons schooled in the Western system of education and values, who brought to our governance a feeling that modernisation and Westernisation is indeed the right and only direction for progress and development.

However, during the course of the last 50 years, there has been a slow resurgence and reawakening of interest in traditional Indian sciences, technologies and knowledge systems. This has happened due to a variety of reasons. One of the most prominent reasons perhaps is the fact that modern, Western sciences and technology have failed to live up to expectations, and a large section of the Indian population still depends on traditional sciences, technologies and knowledge systems for its material, social and spiritual needs. It is also perhaps a fact that the critical role played by Gandhi has left a deep imprint in Indian public life, and his ideas about the basic soundness of Indian civilisation, its values and approaches were perhaps only a reflection of what was already deeply felt by a vast majority of our people.

Today, in the process of rediscovering traditional Indian knowledge, many of our young scientists, social scientists and intellectuals are in a position of having to approach it and comprehend it as though they were 'foreigners' in this effort. This is because by now a few generations of Indians, who are very influential and in positions of power in our public life, have already been schooled in a system of education and

values that are inherited from the British days. This means that such a generation now has to undertake a scholarly effort to comprehend afresh the nature of Indian sciences, technologies and knowledge system in today's context. This has resulted in a slow but strong resurgence of interest in various aspects of Indian traditions.

However, during the last fifty years there have been very significant strides and changes in various aspects of sciences, technologies and knowledge systems, which have left a deep and long lasting impression on all aspects of our life and existence. It seems quite conceivable that the desirable India of the future would indeed create a blend of traditional and modern systems in various areas, whether sciences, technologies or any other aspect of India. It is interesting to see that the great initiative, or the thrust for this effort, has come initially not so much from the scholars or the theoreticians but rather from a very large section of our population who may be considered practitioners or consumers of products and services of various kinds. Remarkable and interesting efforts are already afoot at the ground level, where a large number of people are 'blending traditional and modern systems' in India in varied areas ranging from health, agriculture, housing, to name just a few examples.

Currently these efforts are at a stage where they can be assisted and helped by scientists, who provide reflections on the basic nature and character of sciences, technologies and knowledge systems of traditional knowledge, as well as the modern ways and their relative strengths, weaknesses and appropriateness to our current day requirements. This has indeed brought a cross-section of scholars, academics and researchers to a situation where they are also trying to comprehend the basic problems, assumptions and the nature of the two civilisations in order that it may provide some wisdom on how to progress on this matter. Balasubramanian ends by quoting Mahatma Gandhi: *'It is good to swim in the waters of tradition but to sink in them is suicide'*

Reconstructing epistemologies of African sciences

David Millar, professor, University of Development Studies, Tamale, Ghana; African coordinator of Compas

Millar investigates the epistemologies and ontologies of African sciences from the philosophy of ancestor-centrism. Despite obvious differences between the regions and ethnic groups in the vast African continent, one can identify common elements in the way African people see themselves, the way they know and organise themselves: in their religions, worldviews, relationships to nature, their notion of time, artistic expressions, leadership, and ethnic organisations. In contemporary Africa, traditional knowledge and values still are an important driving force in peoples' decision making and development activities. Understanding this knowledge and the way it is organised, and assessing its strengths and weaknesses, may be important steps towards building African science.

The colonial past and missionary activities have had a strong impact on the indigenous cultures and peoples. The intention was to replace traditional knowledge and beliefs, and a consequence is that it has limited Africans' capacity to solve their own problems and to develop technologies and skills that build their own ways of knowing. The efforts to introduce alien concepts and rituals have not been able to

suppress the values attached to ancestors, funerals and many other traditional practices. To a large extent, ancestral knowledge determines the way of farming, health practices and social organisation of present-day Africa.

Religious and philosophical concepts have their place within traditional worldviews. Often a hierarchy is indicated between divine beings, spiritual beings, especially the ancestors, men and women, and natural forces, such as climate, disease, floods, soil, vegetation and animals. These cosmovisions give rise to several rituals in which the elders, the priests, soothsayers and spiritual leaders play a prominent role. Cosmovision, to a large extent, dictates the way land, water, plants and animals are to be used, how decisions are taken, problems are solved, experimentation takes place and how rural people organise themselves.

Romanticising indigenous knowledge is not a good basis for endogenous development. As any knowledge system in the world, African ways of knowing will have progressive and retrogressive aspects. Phenomena such as overexploitation of natural resources, land use practices that have detrimental ecological effects, gross inequalities between men and women, misuse of their position and knowledge by political and local leaders, traditional forms of conflict resolution and warfare, are aspects that need to be observed and, together with the positive aspects, be brought into the inter-cultural dialogue.

The current leaderships (in the domains of political-governance as well as in the academic world and development fields) have done a lot of disservice to the culture and value systems of the Africans. They have plundered Africa's natural resources with impunity and total development has regressed. The author does not buy the argument that the colonial past, the globalisation, population growth, poor soil or climate are solely responsible for this dismal performance of Africa's development. It is his view that a more responsible political, intellectual and moral leadership, a leadership that respects the norms and values that Africans thrive in, would have left Africa in a better state than it was when the colonial administrations left. But this requires a real commitment to Pan-Africanism, a genuine desire and struggle to deal with Africa's material, but also cultural and spiritual resources.

Millar delves deep into the ontological aspects of the Africans and elaborates the cycle of existence of the Dagaaba ethnic group. Within a spiritual realm, humankind has several manifestations: the unborn, the living, the dead, the ancestors, and those waiting to reincarnate. Ancestral spirits define action and inaction for Africans. Humankind goes through cyclic phases: after being created, it experiences birth, living, dying, spiritualisation, ancestralisation, previtalisation and reincarnation. For each transition process, local experts perform essential functions and have specialist knowledge. This knowledge is mostly a combination of spiritual, material and social elements. Millar throws light on the African way of knowing and its scientific basis. He presents his vision on the WHAT, WHY, and HOW of African sciences. The paper evolves a mental construct to give meaning to the paradigm of African sciences. Essence, phenomenon, cosmovision and epistemology are intricately linked in this construct. The paper concludes by making a passionate appeal to fellow African scientists (and others in the diaspora) to assist in unearthing and placing the richness of African sciences in the public domain.

David Millar also refers to the parallel **International Conference on African Sciences, which** took place in October 2005 in Ghana, attended by participants from

all parts of Africa south of the Sahara: there were traditional leaders and people from universities, NGOs and government organisations and one guest from Europe. The conference made an effort to construct the African way of knowing, by revisiting traditional knowledge and learning systems.

In many parts of sub-Sahara Africa, indigenous worldviews centre around the relationship between people and their ancestors. The spiritual, human and natural worlds are all interlinked. The cycle of life and death involves the living, the dead, the ancestors and the beings yet to be born. The transitions from one stage to the other coincide with a number of practices and rituals, for each of which trained and initiated traditional specialists perform certain functions. The processes involve knowledge and skills that are handed on orally. These knowledges and skills make up an important part of African sciences. In many African societies people have a totemic relationship with an animal or plant, entailing an obligation to protect that animal or plant. People with the same totem have a special relationship with each other that crosscuts ethnic, social or professional boundaries.

The African conference acknowledged the need to strengthen intra-cultural dialogues. Many African cultures have to a large extent lost the tradition of self-reflection and internal discussion on identity, knowledge, systems of governance, justice and the accountability of traditional leaders. Identifying the strong and weak points of our own culture and traditional knowledge, and identifying ways to improve them are necessary steps for endogenous development.

The importance of strengthening South–South relationships was expressed, but relationships with the North should be maintained as well. A Policy Report was formulated in which it is stated that in Africa, at the material level, poverty is widespread. Yet at the social and spiritual levels, Africa is strong and has something to offer to the other Southern and the Northern regions. It recommends that the participating universities strengthen their own curricula; with a focus on African sciences and that traditional scientists collaborate in university programmes.

Material cultural heritage and endogenous sustainable development

Elisa Rafamatanantsoa, researcher, ACP Local Government Platform, Belgium

The author presents a case from Madagascar, where development of small enterprises and local communities is based on culture-based goods. This allows the communities to develop according to their own characteristics, providing them with new economic activities and thus enabling them to become less vulnerable and less dependent on erosive development strategies.

Craftsmanship may attain aesthetic quality and symbolic value as well as significant production value. When most of the economic and human resources are local, the economic process becomes endogenous.

Rafamatanantsoa develops four challenges for material cultural heritage in endogenous economic development:

- The capacity to organise the production systems as cultural districts;
- The capacity to promote collective intellectual property rights;

- Using business development services in cultural districts, so that members can take full advantage of their 'industrial atmosphere';
- Involving local communities, which are the real actors of development and have shown increasing interest in models based on cultural capital.

Amerindian cosmovisions and sustainable endogenous development

Cesar Escóbar, researcher, University of San Simón, Bolivia; coordinator of Compas in South America

Escóbar gives a brief sketch of the Latin American context and the position of the indigenous peoples in the continent. The economic, social and religious policies of the governments in the American states have had a different impact in different countries. Brazil, Argentina and part of Mexico have been fairly successful in their processes of industrialisation and formation of nation states. Countries with a substantial number of indigenous populations such as Bolivia, Peru, Paraguay, Ecuador Guatemala and Southern Mexico have not managed to shape an industrialised society or to reach a common national identity. The indigenous peoples find themselves in a vicious cycle: declining population, limited economic resources and low degree of political organisation. In countries where indigenous peoples have a higher presence, the debate on the desirable development model is lively.

The worldviews or cosmovisions of the Maya population of Guatemala and of the Quechua/Aymara populations from the Andes in Bolivia are presented. These worldviews have common elements: the notions of unity, connectivity and reciprocity prevail, in contrast to duality, separation and individuality that are being introduced through Western influence. Integrated land use practices, indigenous health concepts, traditional ways of learning and notions of justice reflect a holistic cosmovision, where spirituality, reciprocity and complementarity are important. These views provide the ontological, political and scientific elements for endogenous development.

The paper explores the options for endogenous development that build on indigenous values. In the economic domain, food sufficiency can be achieved by building on the ecological diversity and the mechanisms of reciprocity. In the social domain, solidarity and communal management of resources are important. In the spiritual domain, attention is given to rituals, myths and their contrast with materialist values becomes clear.

The paper elaborates on the difficulties of achieving sustainable endogenous development in an environment where neo-liberalism is the dominant economic force. Escóbar regards the ethics of unity and complementarity between sentiment and rationality as incompatible with the utilitarian and rationalist perspective of the dominant development models. In the indigenous view, the notion of individual accumulation of material wealth does not exist. The Western democratic model cannot be applied without difficulties if the people do not share the basic values, and goals. The challenge is to design a pluralist development path where the complementarity between Western cosmovisions and those of the indigenous peoples

are sought. Increasing productivity is possible without violation of the original Latin American rationality.

Escóbar also shares the experiences and outcomes of the parallel Latin American Compas workshop in October 2005. Titled 'Inter-cultural and inter-scientific dialogue of the original peoples of the Americas', participants were indigenous leaders, university professors, students, school teachers and NGO staff, in total about 80 people from different Latin American countries.

The worldviews of the indigenous societies in the Americas are based on intricate relationships between the spiritual, social and natural domains of life. Indigenous peoples do not see the world as separate entities or as a duality. Science is not a combination of individual disciplines, but integrates the natural, the social and the spiritual aspects in one inseparable whole. The traditional economy is based on reciprocity between man, nature and the divine beings. Redistribution of wealth generally takes place through a variety of mechanisms. These notions may provide an alternative to the capitalist economy that is based on individualism, exploitation and accumulation of power.

Participants stressed the importance of intra-cultural dialogues, dialogues within the communities, to revitalise indigenous cultures and knowledge. Education plays a fundamental role in this. Communities are eager to learn from and with other cultures, with support from the West in the process of increasing productivity and reducing poverty. But economic development should respect ecological balances, social harmony and reciprocity.

Discussions focused on how to reform the public universities within Bolivia and other South American countries. The rector of the University of Cochabamba in Bolivia stated that it is necessary to change the content of higher education from the perspective of intra- and inter-cultural dialogue. For this, new research approaches are needed, and participation of other social actors within the university has to increase. The reform should be a social learning process leading to a transformation of the conventional university into an inter-cultural university offering a diversity of Western and American notions in education and research.

Unless the indigenous cultures are strengthened and revitalised, and unless the indigenous languages and traditional notions of sacred nature, social cohesion and spirituality are taught at schools, inter-culturality cannot be achieved. The dominant position of Western knowledge, the use of Spanish and the aggressive behaviour of commercial corporations threaten local cultures with further marginalisation.

From scientific monoculture to intra- and inter-cultural dialogue – endogenous development in a North-South perspective

Stephan Rist, Urs Wiesmann, (University of Berne, Switzerland), **Juan San Martin** and **Freddy Delgado**, (University of San Simón, Bolivia)

The paper addresses the question of the differentiation of ontologies in different cultures and its implication for sustainable development. Sustainable development requires the definition of basic concepts concerning what humans, social relations,

society, nature, space and time are, and of the way they are interrelated. An ontology (a theory of 'how things are') is not reducible to pure cognitive analysis and, several ontologies exist in different cultures or ontological communities.

An understanding of ontology makes it possible for scientifically as well as locally based 'theories of objects' to be engaged in a dialogue. This dialogue should not only be limited to an inter-cultural activity: without an intra-cultural effort on the part of the parties involved to come to higher levels of clarity about the foundations of their own existence and forms of knowledge, a dialogue under conditions of equality would be difficult to achieve. The aim of intra- and inter-cultural dialogue should be to draw the lines that interconnect the patterns of interpretation (worldviews), of orientation (norms and values) and of action (practice). An inter-cultural dialogue which is not able to articulate the three domains of knowledge within and between the 'ontological communities' involved is very likely to fail because it does not allow not enough place for confidence, transparency and mutual respect.

Ethnosciences can fulfil a role in the establishment of a dialogue between different 'ontological communities' oriented in sustainable development. It helps, first to create awareness of the importance, differences and similarities of the ontological aspects that are related to the patterns of interpretation, orientation and action of scientific as well as non-scientific actors. Ethnosciences can serve as a springboard for engaging in broader societal processes concerning the definition of an ontology of sustainable development by initiating public platforms set up to provide feedback and debate on its findings related to policy making and implementation.

Defining elements for sustainable development as a result of inter-cultural dialogue implies that instead of a generalised 'objective' truth claim, the epistemic communities have to interact on the basis of inter-subjective validation. This means that scientific work has to adopt a multicultural perspective, making an effort to understand the 'others' in order to open up the possibility of learning about others and ourselves, of questioning and borrowing, of connecting with them, all to the end of altering and enlarging ourselves and them.

Crucial components are those relating to the concepts of nature, humans and society. The current irreconcilability between materialist, dualist and endogenous views could be overcome by seeking their relation under conditions of equality. In such a view, instead of aiming for hegemony we should look for complementarities, being aware that none has yet finished ontological reasoning. However, this means that the dialogue on different ontologies must be based on a jointly shared hypothesis, which takes account of the whole range of possibilities. This implies that what is claimed by certain 'ontological communities' to be true becomes a specific position in a debate, based on the hypothesis that it is not impossible that mind could be of a different quality than matter. Only on this basis can a dialogue between scientific and non-scientific 'ontological communities' make sense because any other position would represent an attempt to dominate the arena of the 'ontological dialogue'.

The paper concludes that alliances and networks for mutual learning between North and South are becoming particularly important. Southern groups engaged in the development of endogenous forms of knowledge have significantly deepened the intra-cultural dialogue aiming at the clarification of the underlying ontological and epistemological foundations and contrasting them with those underpinning Western sciences.

Learning from them how to overcome the hegemony of orthodox sciences, through an intra- and inter-cultural dialogue represents a contribution to the enhancement of Western culture. The approaches developed in the South represent interesting pathways to justify Western forms of endogenous knowledge. They support the underlying ontologies of innovative activities in the domains of, for example, organic foods, complementary medicines, alternative forms of social and economic organisation.

The above background allows us to state that the role of science in the process of endogenous development has to be completely re-thought. Instead of being a mechanism for the validation of other forms of knowledge, science takes on a role as one partner within a process of co-production of knowledge between different ontological communities. Rather than being a major source of concrete solutions, science promotes the establishment of social spaces where different ontological communities meet in order to constantly re-shape their relationships between them, with a view to jointly producing the knowledge they require for the realisation of their life-projects. In such a context science, rather than being the main source of solutions, contributes to introducing sufficient levels of reflexivity into the learning processes of the actors involved in the co-production of knowledge for endogenous development.

Endogenous development and moving worldviews

Coen Reijntjes, editor, Compas, ETC Foundation, Netherlands

The author gives his vision on endogenous development in rural areas as expressed by different development movements. Endogenous development often starts from revitalisation of traditional knowledge. But, to be of relevance to larger groups of people, it should focus on the broader objectives of poverty reduction and sustainable development as well. In such processes, the principles for sustainable development of the Earth Charter or the AGAPE document of the World Council of Churches could be helpful tools to inspire people's visioning of the future. Many different faith institutions and secular organisations have contributed to the formulation of these documents. However, the space for manoeuvre that small farmers have for endogenous development is limited as long as they are economically squeezed in the global market system and science and development are not on their side. Still, also in neo-liberal economies, marginalised regions may provide opportunities for small farmers if the ecological, social, cultural and spiritual services provided by farming are re-valued by consumers and the state. The increasing awareness of the importance of culture and cultural diversity is leading to an increase in intra- and inter-cultural education. The growing inter-cultural and inter-scientific dialogue may result in greater understanding of the contributions traditional and indigenous knowledge and ways of knowing could make to sustainable development. The growing motivation of faith institutions to contribute to sustainable development, the growing participation of traditional and indigenous people in the development debate and the growing insights of post-modern sciences may all lead to the moving worldviews that are needed for sustainability, global solidarity and unity.

Dialogues within and between different sciences: issues and strategies from endogenous perspective

Bertus Haverkort, research coordinator of Compas, ETC Foundation, Netherlands

The author shares the experiences of a lively international movement whose objective is to revitalise local knowledge and culture. Through their action research in Asia, Africa and Latin America, the partners in the Compas programme have learned that, even with the immense diversity in the ways local knowledge is phrased and expressed, a common feature is represented by conceiving life in terms of three interrelated and inseparable domains: the natural world, the social world and the spiritual world. None of these domains exists in isolation. In many traditional ways of knowing a notion of unity exists, according to which the natural, social and spiritual worlds are considered inseparable and integrated.

Compas uses the following definition of science: the body of knowledge and its classification under a theoretical framework. It includes the complex of producing knowledge based on a specific worldview and on assumptions, general principles, theories and methodologies about which a specific community has reached consensus. The knowledge acquired and the resulting science is always limited and subject to modification in the light of new data and information. From this definition, it can be concluded that there are many different co-existing sciences and numerous ways of knowing. In addition to the academically established and globally dominant sciences (with an assumed Western origin), there are sciences rooted in other cultures. Plurality of worldviews can lead to a plurality of sciences. The differences in ontological positions and in the sources of knowing determine the degree of compatibility and/or complementarity of sciences.

An insight is emerging of looking at worldviews, sciences and values, not as being universally valid, but as expressions of a pluralist reality. In this view, inter-cultural dialogues, mutual learning and co-evolution of the diversity of sciences are important. But, how can we form rules of the game for understanding and exchange between individual knowledge systems? To what extent can we expect contradiction, synergy or complementarity between different forms of knowledge? How can we make an exchange between e.g. Maya knowledge, Shona knowledge, Hindu and Buddhist knowledge, European knowledge and global knowledge beneficial for the participants?

Haverkort mentions two conditions for inter-cultural dialogues: acceptance of pluralism and symmetry. Pluralism in the ways of knowing leads to a diversity of sciences. Symmetry in power and in the contributions of the criteria for knowing will avoid a situation where a dominant system determines the rules of the game. Local knowledge should not be assessed by the criteria and methods used by global science, or the other way around. For an inter-scientific discussion it is important to have a formulation of the characteristics of different ways of knowing (in terms of the ontology, sources of the knowledge and epistemology) and a self-assessment of the relative strengths and weaknesses of each knowledge. This could coincide with an assessment of the power relation between the systems involved. Intra-scientific dialogue and revitalisation of indigenous knowledge are preconditions for inter-scientific dialogues.

Interaction between different cultures may result from trade, migration, missionary activity, tourism, war or mass communication as well as from friendships and networks based on solidarity and cooperation. The degree of reciprocal influence may vary greatly. In many cases the more powerful culture dominates and has an influence on the less powerful culture. There are many differences in the way positions of power and differences in effectiveness of available technologies are being used. And there are many differences in the way people react to domination.

The author presents some of the possible relations between different forms of knowledge: hostility or fights between different forms of knowledge, going underground, co-existence, utilitarianism, substitution, paternalism, syncretism, complementarity, romanticism, co-evolution, transcultural synergy. The use of power, its use, its misuse, and possibilities for correction need to be considered when looking for a relation between different forms of knowledge.

The Compas programme has started to formulate the most striking characteristics of the paradigms and epistemologies of sciences in Africa, the Andes, India, and Europe. Compas wants to provide a platform for inter-scientific dialogue that can contribute to a co-evolution of sciences. In this process, each science involved is stimulated to evolve (to develop and improve their methods and theories) based on its own dynamics as well as on the basis of interaction with other systems of knowing.

Haverkort presents a strategy for activities towards co-evolution of different sciences:

- Building more horizontal relationships between local experts and outsiders;
- Intra-community dialogue and decision making about possible interactions with outsiders;
- Learning about cosmovision, sources and forms of knowledge within the cultures;
- Learning from the community experience of coping with the dominant systems;
- Dealing with strong and weak points of the local forms of knowledge;
- Dealing with strong and weak points of the dominant forms of knowledge;
- Exchange of experiences and co-evolution.

Conclusions

The authors provide important insights into the fundamental difference between Western worldviews and knowledge and those of their own cultures. The voices from the South are quite clear: the dominant Western worldview has solved some problems, cannot solve others, and creates its own problems in the wake of solving them. There is an urgent need to simultaneously recognise the limits and hegemonic attitudes of 'Western knowledge' without falling in the trap of romanticising other (traditional) knowledges and cultures, or being blind to the shortcomings of some aspects of traditions and of the present political and intellectual elites. There is a strongly felt challenge to revitalise their own knowledge, to make the link with their own culture and to bring about a development path that is not just a repetition of the Western model, but that takes advantage of the strengths of the own values, worldviews and expertise. They do not claim isolationism, but expect benefits from South-South cooperation as well as from West-South exchange.

The Southern authors refer to the colonial and neo-colonial situations and the impact they have had and still have on their worldviews, development of their own knowledges and status of traditional knowledge. There is a long way to go before power differences have been compensated for, favourable conditions for revitalisation of traditional knowledge and worldviews have been created, and their sciences have developed. For this, an intra-cultural dialogue is important. The authors reveal lively initiatives, such as the regional conferences on worldviews, sciences and knowledge in Africa, Latin America and Asia.

At the ontological level, the most striking point is the notion of non-duality. In most of the non-Western societies, the human worlds, the material world and the spiritual world are inseparable. Although the way this connectivity is perceived is different in e.g. ancestor-centric Africa, the South America of Pacha Mama, and the Vedic or Buddhist a-material notion of the reality, the underlying notion of unity, connectivity and reciprocity is a common element.

This reciprocity is applicable to each of the three domains: nature is considered to be sacred and responds to good care by people, it needs to be given reverence, and for this a great variety of rituals, sacrifices and festivals exist. Humankind needs the blessings of the spirits and ancestors. Humankind should not dominate, but participate from a position of give and take regarding nature and the spiritual world.

To carry out these functions, humankind has 'co-created' technologies and rituals. It has organised itself in such a way that local experts perform functions to make meaning of the mutual relationships between nature, humankind and the spiritual reality.

In many situations traditional knowledge and values have been subject to erosion, some have gone underground, and may have lost their vitality and power. Therefore, before a good inter-cultural dialogue can be held, an intra-cultural process of reconciliation with the own tradition, revitalisation of the local knowledge process and strategic thinking has to take place. The educational systems, systems of governance and management of the local resources need to be given attention and require imaginative innovations. Important innovative initiatives are being undertaken in these domains.

South-South cooperation could play an important role, and needs to be strengthened. Inter-university cooperation for establishing intra- and inter-cultural curricula for primary, secondary and higher education and scientific congresses could take non-Western science as the basis of research, or at least as an equally relevant source for knowledge. Southern participants stressed the value of West-South partnerships in a collegial manner on an equal footing that allows for expertise to be shared. This requires a strategic approach where policy makers, politicians, scientists and practitioners each have their own role to play.

The increasing awareness of the importance of culture and cultural diversity is leading to an increase in intra- and inter-cultural education. The growing inter-cultural and inter-scientific dialogue may give greater insight in the contributions that traditional ways of knowing could make to sustainable development. In the West, the movement in the direction of transdisciplinarity, holistic development and social learning can benefit from the lessons from the South.

The contributors from the West explicitly advocate an ontological dialogue, analysis of the power differences and expression of the needs for corrective measures. Changes towards a more sustainable development, towards a better relationship between subcultures are urgently needed. Relinquishing the assumption of the primacy of Western ideology, science and social organisation is not an easy change. Acceptance of the idea of pluralism of ontologies and ways of knowing, and the creation of symmetry in power relations, in access to financial resources and in prestige attached to different ways of knowing, present important challenges for policy makers, scientists and the general public.

6. Learning for transition

To learn our way to new practices that provide effective answers to the polycrisis, special 'transition' approaches are being developed in for example adaptive research, rural development, inter-cultural cooperation and education. This chapter includes examples on biodynamic agricultural research and education (Baars); Cocreation as a science and an educational approach (Stijkel); a simulation game to discuss options for behaviour change (Pereira); empathetic understanding and contemplative education (Zajonc); and use of the arts in communication (Hiemstra). Other authors, including Röling, De Rooij and S. Rist contribute to this theme.

What can be learned from such social learning approaches concerning their methods and effectiveness? How widely applicable are these learning approaches? What are the conditions for their success? How can these innovations be up-scaled? How do they contribute to better collaboration between practitioners, scientists and policy makers?

How biographical experiences affect a research and training programme in biodynamic agriculture at Kassel University

Ton Baars, professor, University of Kassel, Germany

The call for biodynamic education and research was finally accepted at the Department of Organic Agriculture at the University of Kassel after 25 years. Biodynamic agriculture is grounded in the philosophy of anthroposophy, upon which its own special methodologies and teachings are based. Even within organic agriculture, scientists regard biodynamic agriculture as representing a shift from a reductionist to a holistic scientific paradigm. This holism is expressed in both anthroposophy and biodynamic agriculture at three levels: epistemology, ontology and methodology. For natural scientists the part that is most problematic in terms of acceptance is the level of ontological holism.

Four paradigmatic changes have affected Baars' vision on education and research:

- Systems, ecological relationships and systemic solutions came into his consciousness.
- Goethean science, as a holistic research method, enabled him to cross the borderline between cold objectivity and emphatic subjectivity.
- Spirituality became part of his world in such a way that it was everywhere and omnipresent.
- Through experiential science, his respect for the farmer and the farmer's insights was strengthened and it became clear that this was 'knowledge in action'.

To become an adequate biodynamic trainee it is not only important to gather knowledge about the specific biodynamic themes, but also to learn how you can investigate the living world based on a training of your own holistic and spiritual

capacities and skills to investigate and observe the world. For this purpose, Baars developed a teaching and research programme based on Goethean and experiential sciences.

Goethean science is a method for holistic understanding and thinking. Much attention is paid to learning about the natural growth and development of living organisms in their own specific environment and to understanding the 'inner gesture' of the observed, its expression. Experiential science starts in real-life reality and its knowledge is always connected with doing the 'right' actions in a specific situation. Traditional science has taught us how to tackle the measurable side of the world, whereas Goethean science and experiential science open up methods to train for the qualitative, constructive or personal side of the world.

In Baars' teaching programme at Kassel University, the following elements are important as well: training of the observation skills; use of arts; training of twelve rather than five senses; learning from real farm-life situations; training in the scientific evaluation of pattern recognition; training of distance-connection; being aware of the philosophical implications of Goethean science and experiential science.

In the anthroposophical scientific community at least five different scientific approaches can be distinguished:

- Conventional research. Biodynamics has to be proven by 'evidence-based practice'.
- Goethean science and experiential sciences. This is referred to as 'practice-based evidence'.
- New anthroposophical and holistic methods such as copper crystallisation and water drop imaging based on the information of Steiner, who had clear views on the ethereal, inspirational world.
- Rewriting or understanding the phenomena observed in the world based on anthroposophical insight.
- Discussing the basics of philosophy of science.

Some essentials of these methods have been used in the Bioveem project, which was one of the last multi- and transdisciplinary projects Baars led at the Louis Bolk Institute. This project is presented in the paper as well.

How 'Cocreation and Cocreation Sciences' can help to make the transition towards endogenous sustainable development

Anne Stijkel, researcher, trainer, Triple I-S, Netherlands

The author presents her experiences with Cocreation sciences as a postgraduate training approach. Cocreation is defined as: 'the act of engaging in a conscious creative partnership with the innate impulse of creation, the intelligence of nature and natural systems design, the intuitive collective consciousness of humanity, and each person one encounters, from a place of essential, heart-centred being.'

'Cocreation sciences' is a science in which pattern recognition in individual and societal cocreation processes is linked with other scientific insights. These insights

especially come from the field of transition sciences as well as from consciousness research, instigating the evolution of sustainability.

As a practical science, Cocreation sciences not only include experiential, intuitive and appreciative ways of knowing, combined with inter-subjective group learning, but also include experiential ways of creating. One of the pillars of Cocreation sciences is Transition sciences, which deals with systems moving from dynamic stability into a crisis where the same system may die, fall short, or stabilise at the next level.

Consciousness research is the other pillar of Cocreation Sciences, and is done through the three eyes of knowledge, those of matter, mind and spirit, as described by the integral philosopher Ken Wilber[1]. According to Wilber, spiritual science has its own domain of experience with its own forms of research methodologies, own rules and own exactness. The (common) essence of the scientific procedure in all these three forms is: (1) meet the prescriptions; (2) observe what happens; (3) check the outcome with other well-qualified researchers. Ken Wilber regards these three domains of knowledge in its essence also as three domains of individual evolution: everyone starts his or her development in the physical-sensorial domain, next goes to the mental domain, and finally enters the spiritual/transcendental domain, for example through meditation.

The training starts with a number of core questions: 'Can you imagine a world based on cooperation and cocreation, sustainability and harmony, humans, work and environment, local and global levels, for now and in the future? How can scientists provide a contemporary contribution to foster such a self-aware world?'

The training is based on the principles formulated in the Earth Charter in 2000, a declaration of fundamental principles for building a just, sustainable and peaceful global society in the 21st century, and tries to implement these principles through consciousness, self-consciousness and practice, embedded in new scientific notions and theories. The programme aims to contribute to a sustainable and harmonious society for all living forms, and regards the development of human consciousness as pivotal to this process. In the first programme, five students embarked on a mission to create together something new within our existing historical context. The training integrates knowledge from the three eyes of knowledge, but focuses on experiencing the third eye of knowledge by making use of old and new wisdom traditions and practices, and exercising new forms of knowing by meditation, silence, sound and art. By doing so, it can help to make the transition to sustainable endogenous development.

Climate change, lifestyles and social learning through computer games

Ângela Guimarães Pereira, researcher, Joint Research Centre - IPSC, Italy

Climate change is a good example of an environmental issue where there has to be a dramatically different approach at the interface between the relevant sciences, policy and society. The complexity of the phenomena being studied and possible impacts

[1] F. Visser, Ken Wilber, denken als passie, Lemniscaat 2001.

(involving different types of uncertainty and a plurality of legitimate perspectives) and implications for a broad spectrum of policy issues calls for a different conceptual framework. Funtowicz & Ravetz's 'post-normal science' framework, and its guiding principle, quality requires the engagement of an 'extended peer community' for the resolution of the pertinent issues. As a consequence, the role of science changes to encompass a wide range of environmental and societal uncertainties, as well as the relevant human values. New forms of dialogue and new mechanisms for introducing scientific issues to non-scientific contexts call for radical changes in the design of interfaces between the scientific processes and products and the audiences to be engaged. VGAS© is a computer game that consists of a set of models that relate lifestyles to emissions of three greenhouse gases (carbon dioxide, methane and nitrous oxide). VGAS© explores in particular a new concept for information tools (strongly based on games, fiction and metaphors) aimed at mediating the relevant knowledge in processes of social learning and debate. These are called **CSLoTs – C**onvivial **S**ocial **L**earning **To**ol**s**. VGAS© explores the use of 'convivial interfaces' deploying information & communication technology (ICT) to pursue the building of a convivial society and evolution of shared worldviews. Individuals may become agents of change, participating in a democratic transformation of society, in this case in order to achieve a sustainable future.

Humane endogenous development

Arthur Zajonc, professor, Amherst College, USA

Zajonc approaches the question of worldviews and endogenous development as a teacher, and as one who is moved by widespread global violence and economic inequities. He asked himself the question: *'What can I, as an educator, offer in the face of these tragic realities of today's world?'* He sketches the contours of an epistemology of intimacy and participation, that is, an epistemology of love.

The way we make sense of the world is conditioned profoundly by societal forces; we are socialised into a worldview that operates largely unconsciously and behind the scenes, but which profoundly affects the way we understand what we see, hear and feel. In the course of a lifetime we may shed one worldview and adopt another when we move from one culture to another. In addition to this, however, a second process is also at work, a 'metaprocess' that affects the very terms of our construction of meaning. We not only form meaning, and we not only change our meanings; we change the very form by which we are making our meanings. We change our epistemologies.

Whether or not we adopt an alien culture as our own is not the issue, but we become aware of the existence of alternate ways of making meaning, and these alternatives are as coherent as our own. Kegan discovered that there are several stages in the way we construct meaning. Sometime around late adolescence most young people begin to internalise the values and ideals of their surrounding milieu. At this point they have attained the stage of the 'socialised mind.' Often, in this stage, the values and views of the community are held to be superior to all others, which may lead to a 'clash of civilisations'. The answer to ethnic or ideological conflict is, therefore, not to replace one worldview with another, but instead to add to it another

often missing element, empathetic understanding. Through such a process we come to appreciate, even if we do not adopt, the worldview of the other. The increasing diversity within ourselves mirrors the global community of which we are more and more a part. Often this leads to a state in which one's identity is lost entirely and society fragments, a psychological stage of disintegration. A force of social cohesion is needed again to create a new identity. Rather than hide the interior diversity we all carry with us, we would do better to accept it and, indeed, even use it as the basis for defining our unique identity. Kegan calls this the stage of the 'self-authoring mind'. This process contributes to individuation and the main characteristic of our age, 'solitude'. To countervail this, a second impulse is required, namely the empathetic understanding we associate with love. We have to reduce the distance of relationship with each person in the world becoming thereby a 'citizen of the world'. Adam Smith assumed that commercial self-interest will knit together a world into a globalised economy. But the massive economic inequities and corruption so prevalent today show that Adam Smith's hope for a 'commercial cosmopolitanism' has failed. What is needed is a collapse of our 'circles of affection'.

The way we know today is largely based on a scientific worldview. Its emphasis on objectification predisposes us to an instrumental and manipulative way of being in the world. We need to re-situate our worldview within a greater vision of what knowing and living are really all about. This re-imagination of knowing will have deep consequences for education, consequences that give a prominent place to contemplative pedagogies. Contemplative practice can become contemplative inquiry, which is the practice of an epistemology of love in place of objectification and separation. Such contemplative inquiry not only yields insight but also transforms the knower through his or her intimate loving participation into the subject of one's contemplative attention. Contemplative education is transformative education, and the author believes the transformation leads precisely to the Stoic ideal of a collapse of the 'circles of affection'.

Contemplative inquiry and transformative learning have as features: respect, gentleness, intimacy, vulnerability, participation, transformation, education as formation, and insight. Knowing of this type is experienced as a kind of seeing or direct apprehension, rather than as intellectual reasoning to a result. Such an epistemology of love draws us towards one another, involves us in the other's world, we participate in their experience; we suffer their suffering and so know compassion not only as a sentiment but also as a potent force of moral insight. When we consider what the world needs now, to redress the economic inequities between North and South, nothing is more urgently called for than this transformation. Education, peace-building, environmental research, health care and economics are practical fields of action that can either be shaped by an epistemology of separation or by one of connection and love.

A course at Amherst College is described as a case study of transformative education. This course is one of hundreds now being taught around the United States in which a wide range of contemplative practices are being used to explore the benefits to students of a more contemplative pedagogy. The Center for Contemplative Mind has acted as a leader in this important work for the last ten years.

Endogenous development through painting

Wim Hiemstra, agronomist and coordinator Compas Programme, ETC Foundation, Netherlands

Additional means of communication beyond reading and speaking are needed in innovative learning processes. As personal preparation for paper writing, contemplation or even meditation can be used to give words to our cognitions. In face-to-face gatherings also our emotions and spirits will meet. Painting is a means of preparation and communication which addresses dimensions other than the cognitive and internalises different perspectives than those expressed in scientific papers.

To enhance multi-level communication, icon painting was used inspired by traditional iconography originating from the Russian orthodox churches. This means of communication may also enhance intra- and intercultural reflection and communication. Moreover, it allowed the author to reflect on his own role for the future, as a person and as a member of the Compas team in building a communication system among those who are determined to engage in endogenous development in Europe.

The painting is an attempt to depict the Western holistic tradition of the sacred from a personal perspective, partly linked to Christianity, to compare with and mirror the Southern cultures' concepts of life.

Conclusions

The wisdom and interests of all stakeholders can be included in action research and decision-making by way of social learning. Each situation requires its own approach. For innovation towards sustainable agriculture, for example, farmer-to-farmer exchange, participatory experimentation and conscious cocreation are important. In rural development farmer cooperation, reflection on life stories, participatory experimentation, multiple-stakeholder platforms and policy dialogue seem to be effective tools in transition processes. Where different worldviews clash, where tradition and modernity meet for example, inter-cultural dialogue as used in the ethnosciences could be very useful for mutual learning and co-evolution. Where stakeholders allow intuition and spirituality as a guiding principle, cocreation may help to find the best way to the future. Computer simulation games can be very useful to increase the awareness of people, for example concerning environmental issues. They also can be useful in individual or group decision-making for consumers as well as in policy making.

Education as such is already a transition tool which should prepare children and young adults for life-long learning and responsible social behaviour. The innovative education approaches presented in this chapter consciously include empathetic understanding and intuitive knowing by way of contemplation and meditation. This helps students to develop a way of creating meaning, which makes it easy for them to hop between worldviews and to appreciate diversity within the world and within themselves. This could even bring them to a level where they become 'citizens of the world', not by way of 'commercial self-interest' as suggested by Adam Smith but by way of an 'epistemology of love' as suggested by Zajonc.

Such contemplative learning and cocreation tools help to go beyond what is measurable, conscious and easily explicable to include intuition, spirituality, values, subjectivity and uncertainty.

These approaches enhance connection and love between all participants and their wider human and natural environment. As such they strongly contribute to a more sustainable and peaceful world and enhance better collaboration between practitioners, scientists and policy makers.

7. Summary of plenary discussions

The conference included thematic small group and plenary discussions, of which the main conclusions are presented below.

On the state of sciences

The discussions on this theme focused on the characteristics of present reductionist and materialist sciences, their institutions and the need to develop more inclusive, transdisciplinary sciences, which also include the spiritual domain. Peer review and citation of publications were seen as petrified structures responsible for the continuation of the reductionist sciences. Such structures have to be changed if sciences are to become more holistic. This is quite possible as sciences, like the economic system, are social constructions. Holistic scientists need to communicate directly with the public to show that there is more than the reductionist sciences and that this paradigm is starting to shift.

Hard scientists are often not open to using their analytical methods to conduct experiments on phenomena they do not understand. Modern science is analytical, quantitative and matter-oriented. But modern science stems from earlier science that was rooted in the spiritual dimension of life as well. Science is a social construction. It is now time to enlarge the domain of science and include the spiritual dimension again. The problem in society is that this discussion is not taking place in the open. Such discussions must be freed from the dominant position of scientists with a materialist worldview. We have to free ourselves from the materialist worldview radiated by universities.

Scientists systematically ignore results from their research that prove that non-material processes have an influence on material processes. This in fact is very unscientific and may explain the decline of materialist science. This situation can change however: holistic (transdisciplinary or inclusive) scientists should not leave reductionist scientists to represent science. They have to communicate their views directly to the public. Students and patients are looking for complementary medicine; they know and feel that there is more than the materialist paradigm. Holistic scientists have the obligation to provide them with answers.

We have three eyes of knowing: the natural, social and spiritual sciences, each with their own rules. In our scientific work we should include all eyes and have the courage to reconnect and communicate with the inner dimension. Our mind has been created by nature to help us survive. It is just one of the organs, but it now has too much influence. The role of the mind has to be reduced. The mind cannot reflect our true being. Nearly all sciences are mind made, not rooted in true being. We have become ill from our own reductionist science system, and there is a medicine: transdisciplinarity, which includes spirituality. Inclusive or transdisciplinary science incorporates knowledge that goes beyond disciplinary science. It allows other ways of knowing such as contemplative knowledge.

In African worldviews the born, the unborn and the ancestors all have a place in the ontological cycle. It is important to know what the yet unborn and the ancestors

value, so that life can be built on those values as well. You cannot combine the notion of reincarnation with the worldviews of 'real scientists'. People in Africa who cannot read and write can tell us more about the African cosmovision than learned people. In Europe people to a large extent have lost the language and structural understanding for expressing spiritual concepts.

If science wants to stay relevant, it needs other ways of knowing and communication to come in contact with the non-material or spiritual dimension of reality. In science it is therefore also important to use forms of communication other than words, such as artistic expressions or computer games, as demonstrated in this conference. These forms are important as they allow us to go outside rational expressions and include other ways of knowing.

Do we use the right methods to analyse phenomena in a holistic way? We always try to measure, but we cannot measure the spiritual dimension. Conventional sciences determine what effectiveness is, what counts and how to measure. But love and affection, human decency and justice fall completely outside the measurement paradigm. We should recognise their importance, elaborate on the sophistication of qualitative research methods, and stimulate their use. There are many initiatives in this direction: Goethean science is one of the holistic approaches that are dealing with this problem (see Baars).

Scientists in the conventional system are restricted by the dictates of peer reviews. This restricts them to the reductionist paradigm and prevents them from studying non-materialist phenomena. We tend to underestimate the power of the system to sustain itself. When we work in our institutions we are strongly influenced by role pressure. Professors are generally specialised and not allowed to be holistic. If they do not follow the rules they are likely to be marginalised. It is important to evaluate the reductionist roles Western scientists play in society and what impact this has on the roles of colleagues in other countries in the world.

We have created very effective institutions for wealth creation that are now changing the world. Institutions are grounded on worldviews. For transparency, however, it must be clear on which worldview institutions are grounded. In the dominant European worldview, matter is a central notion. But this materialist perspective is inconsistent with the pre-Christian, Christian, post-Christian and trans-Christian perspectives that co-exist in Europe. Our vision of the future is totally based on formal and market-oriented institutions which have moulded all of us. We lack knowledge on and undervalue the role of informal, indigenous and spiritual institutions.

In the economy we also have an institutional basis for what is happening – the market. If we understand the market as a law of nature, we will never be able to change it. We should recognise the fact that even the market is a social institution that can be changed. The way we organise science and the way we organise the economy are much more akin than we usually realise. The way we accumulate knowledge and the way we accumulate capital are also quite akin. This is the basis of the institutional arrangements we have to examine to make this paradigm shift.

Present-day thinking is already starting to change to new paradigms, but the old structures are still there. To arrive at new paradigms we have to shift from fragmented to integrated approaches and we have to make a spiritual reconnection. Both changes are actually taking place but separately and unsystematically. In the end both have to

come together as well. Human beings have a tremendous capacity to make things match. We believe we can be optimistic about change.

Western society has a big problem but also great potential. Many people have non-material or trans-material cosmovisions but they are not sharing them openly. If we share our insights on new paradigms in the public arena and create an ontological dialogue, we can create new institutions, norms and structures. We are much closer to each other than we believe.

On moving scientific insights and worldviews

New scientific insights are being developed, for example on self-regulation in human health and quantum and intuitive agriculture. People are ready for more holistic insights, but such insights are not yet accepted by the formal institutions. The discussions also dealt with the definition of what a worldview really is. It was concluded that it is time for inter-cultural and inter-science dialogue, also with countries such as Russia where some of the new scientific insights are already accepted.

The latest dancing gag in the Netherlands is going to a disco where everyone gets their own headset, and dances to their own music. In Japan there are an increasing number of people who spend all their time sitting at the computer or watching TV, never leaving their home, and who order their food through internet. The person does not open the door, not even for the therapist, who, for that reason is called a 'closed door therapist'. In a German newspaper a joke was made about health: 'Please make me healthy so that I can do the things that make me sick'. These individualistic attitudes are being exported to countries like Russia and China, to cultures where people still are living and working together. The process of cultural globalisation will destroy traditional social relations.

There is a crisis in the position of science and technology now, and we have to grasp the opportunity for change. This conference is contributing to the creation of a collective consciousness for a peaceful movement towards change in science. Science can learn from peaceful movements in society such as in the Ukraine. Leaders emerge at the right place and moment out of the collective consciousness. Humanity needs crisis for change.

We are increasing our knowledge all the time. Where this will lead us we do not know yet. The gene theory is not able to explain life processes in their totality. Non-material influences on life are increasingly being substantiated. The big problem is that we ignore them in our own research, even when they become visible in the results. The models and methods that we use do not fit the phenomena that we study. The public is demanding a broader view of the world. We are a science-driven society, therefore it is very important that science speaks out, saying that we should take another road.

We should try to bring the holistic story; self-regulation in human health is an example. It has been found that people possess abilities for self-regulation (see L. Rist). But does self-regulation as a medical strategy work? People with high self-regulation ability are healthier than genetically healthier persons with low self-regulation ability. This depends on the inner capacity to react to challenges from the external world. One can learn to improve self-regulation; this is leading to higher

survival rates. We should also learn to build rules that enhance self-regulation and self-healing of science and society. We should create groups that try to increase such self-regulation.

In many places farmers are experimenting with energetic techniques that are challenging the current paradigm (see Kieft). These techniques are referred to as *quantum* farming and *intuitive* farming. An inventory has been made of the experiences with these techniques. The first technique works with electromagnetic radiation while the second is based on intuitive communication and subtle energies, which seem to carry information. Some of the basic characteristics of these techniques differ substantially from conventional farming and are not acceptable to conventional scientists. This relates to the fundamentally different ways of understanding and relating to nature that these involve, including intuitive ways of knowing. Inter-cultural learning can help towards better understanding the basic philosophies and worldviews behind these techniques.

There are measurable influences between mind and body processes. We should be open to new models of nature, models that describe relationships, not only objects. Research on life processes in cosmic magnetic fields and on the influences of sound and other waves on DNA are accepted in Russian science but not in Western science. Such research may also yield other thinking models.

What is a worldview, how do we relate it to information, knowledge and wisdom? A short definition is: simplified visions of the world and the way it functions, on which we base our motives and objectives (see Note). A worldview consists of basic categories which are considered true and good and implicitly adhered to. There are often inconsistencies and questions about some of the basic categories. We cannot exactly grasp a specific worldview; it is dynamic, influenced by other cultures. A worldview is set down in its cultural manifestations, ideas and structures. A worldview is linked to identity and self-understanding and guides people at two levels: the ethical level, what is good; and the knowledge level, what is true. Both levels interact. Worldviews are always subjective. Is there something beyond worldviews, something tying us together as different cultures? Are worldviews different representations of the same?

There are deeply rooted fundamental categories concerning how we think the world is functioning. We are probably not even aware of these categories. Even science has implicit categories of which it is not aware. In inter-cultural and inter-science dialogue we can become aware of these categories. We cannot explain all phenomena with a reductionist worldview. Why should we leave out the concept of spirituality? Now it is time for other worldviews to help move Western worldviews.

On worldviews and spirituality

In the discussions on this theme non-dualist worldviews were central. These worldviews prevail traditionally in African, Asian and Latin American societies. Increasingly they also can be found in Western societies, among others due to inter-cultural interaction and new insights in quantum physics. The triple pendulum was demonstrated to discuss the notions of unpredictability, chaos, life, death and spirituality.

The participants agreed that knowledge based on the non-dualist African, Asian and Latin American worldviews should have equal standing with knowledge based on Western worldviews. Non-dualist worldviews lead to different ways of knowing and different sciences. What are the commonalities and differences between worldviews? The dominance of the Western worldview has weakened other science traditions. It has marginalised the traditional sciences and replaced them with Western notions in education, research and institutions. How can we redress this dominance and give more room to other ways of knowing?

In the dominant Western paradigm there is a general focus on individuality, democracy and free market economy. These values lead to incongruence with indigenous cultures where communality, reciprocity and traditional authorities play important roles. In sustainable endogenous development we have to work in three domains: the material, the social and the spiritual. In the material domain, productivity needs to be increased in an environmentally balanced way. In the social domain, social dynamics should be developed that ensure cohesion, cooperation and peace. In the spiritual domain, awareness of the non-dual or the sacred aspect of the world is important. The Southern and the Western worlds are interrelated and therefore not dominance or isolation but mutuality and reciprocity should be strived for. The challenge is to redefine the relationships.

How do we see development? Is it about matter and money, or is the human factor also important? In terms of education, two views are possible: education as transfer of information and skills, and education as transformation of persons. You become who you are by developing all your capacities, not just by enhancing rational knowing (see Zajonc). From the second point of view, new capacities should be created. This can be done by using our organs for gaining both experiences and deeper insights. Contemplative inquiry is a method for doing this.

The Andean worldviews were presented and discussed (see Escobar). The liberal and neo-liberal Western worldviews of the colonial and postcolonial periods have not only negatively affected the traditional economic and social systems, but also the traditional worldviews and ways of knowing in the Americas. In these traditions, nature is considered to be sacred; the people have a reciprocal relationship with nature, the spiritual world and with other people. Nature, humankind and the spiritual world are considered united, an integrated whole. Therefore food production includes mechanisms of redistribution of wealth within communities. Productivity can be increased as long as the laws of nature and its ecological processes are respected. Knowledge and insights can be gained through the notion of unity with the cosmos; contemplative methods can coincide and be balanced with rational reasoning. This is the traditional ontology or notion of how things are. The ontological fundaments of Western natural science are different, far more reductionist. There is a need for a dialogue on epistemologies, the scientific knowledge system, in intra- and inter-cultural (scientific) perspective. But this is only possible if we realise that epistemology is rooted in ontology.

A new holistic vision on reality is evolving in the West (see Dürr). Three domains can be distinguished:

- Domain of a-duality: the world of perceiving, loving, living and awareness, which cannot be measured but possess a 'reality nature'. This domain, which is spiritual, can be accessed through meditation. The notion of '*Ahnung*', describes the process

that allows one to access this a-dual actuality. The word refers to ancestral knowledge, a process of experiencing and perception that precedes inner knowledge or intuition. It comes through the heart, the brain and other organs.

- Domain of duality: the 'real' world seen as matter and object. Mind is seen as subject, separated from object. Object is seen as creation existing independently from the creator. This is the worldview on which classical physics was based. It was functional but became insufficient to explain reality as a result of the insights of new physics.
- Domain of a-duality as a construct of a living cosmos: this presentation accepts the insights of new physics, but considers these insights as a construct only, not as an ontological basis. The insights of quantum physics indicate that the real world should not to be seen as a world of matter, but as a world of events, or activities that can occur with a certain degree of uncertainty. Building blocks of atoms are not matter, but relationships. Hence, it is better to use the German term *'Wirklichkeit'* or English *'actuality'*.

In the worldview of modern people, the presentation of the real world as a-dual thus appears as a mere theoretical construct; it is considered to be of theoretical relevance only, and is not translated into an experienceable reality.

Intuition and *'Ahnung'*, as well as ancient and contemporary non-Western systems of wisdom, refer to the notion of the a-dual world. Science describes the micro-cosmos and the macro-cosmos as matter, which is separated from the mind. Our scientific language is inadequate, however, when it comes to making reference to the spiritual domain. For understanding the laws of the cosmos we have mathematics. In this scientific notion, the cosmos becomes a material entity where death is normal and life is abnormal. Yet, actually in the cosmos life is normal and death abnormal.

A triple indicator pendulum was demonstrated. It has three movable indicators that are connected with each other in series. The first indicator is connected to a fixed standard. The pendulum therefore has three points of potential and unpredictable motion. This potential motion can be seen as chaos and as life. When the three indicators are hanging down the system is motionless and can be compared with death. When all are directed upward, they are at the point of potential life. This is the point of maximum sensitivity, which can be easily influenced by small forces of attraction, e.g. between the observer and the indicators. It is the point of unpredictability, comparable with the flutter of a butterfly's wing that can trigger (but not cause) a hurricane elsewhere in the world. Here physics starts to become completely different. There is no super chaos, the indicators know of each other like human legs do. Two legs lead to the function of walking. If the body gets out of balance, then the movement of the legs can prevent the body from falling and move it forward. The legs cooperate and become an organism. We have to feed energy into our legs to create the ability to walk. The more variables (indicators), the higher the unpredictability and the closer we are to chaos and to understanding the *'Wirklichkeit'* and spirituality.

A lot of communication is communal; we are basically waves in the same ocean. We are the antenna for the world, but we are too scared to lose control and become spiritual. The challenge is to climb up the pendulum to the point of potential life and to be vulnerable without being afraid. In the moment that chaos peaks, human beings become very creative. We therefore should not be afraid of this moment. We have to

find ways to cooperate with nature for dynamic stabilisation of unstable systems. Human beings have the potential to become aware of their own role in this. If we understand that underneath it all we are coordinated, we can have the necessary trust.

In music silence is most important. Every system has more or lesser degrees of freedom. In our society the degree of freedom has increased tremendously. But much of life is now measured in economic terms and sold on the market.

In physics, if you want to explain death you have to refer to life. How does this relate to African cosmovisions where the dead are just living in a different stage of life? Is death just another quality of life? It is very realistic that the dead are still here, interacting with us.

The problem is that Western science is reductionist and dominant at the global level. There is generally little doubt about the superiority of Western worldviews. We should look for doubt, points of uncertainty. Where are these points? Agriculture, for example, has many points of doubt; this is hopeful. We seem to agree that there has to be a connection between science and spirituality, that uncertainty is the basis of our existence.

On values and valuing

The discussions on this theme dealt with the need to reform the interest-based monetary system, which also strongly controls the focus of science (see Molenaar). This system is designed to enhance wealth accumulation but at the same time it is responsible for ecological degradation, the marginalisation of the economically poor, who are the majority of the world population. The discussions focused on the differences between economic and human values, the need to move our worldviews that are dominated by economic thinking and to come to different valuing systems which also include social, ecological, cultural and spiritual values.

It seems as if economic values prevail over other human and ecological values. But non-monetary values keep society together as much as or possibly even more than monetary values. Human values have to do with individuality as well as with relations and connection. Western economic values have to do with property and accumulation of wealth. In economic bookkeeping, valuing is often virtual, e.g. the value given to oil that is still in the earth. These values can change without there being a change of relations. Value is purely a construction of the mind. In economics, values often increase when damage is caused that has to be repaired. This is also included as a gain in the Gross National Product, which therefore gives a completely wrong picture of the yearly increase of wealth in the economic system. This problem has to be tackled.

We have to reconsider the value of money and distinguish its different qualities, which are expressed in purchase money, loan money and gift money, as proposed by Christopher Houghton Budd (see Verschuur and Stijkel). Presently, there is too much loan money and too little purchase money. This is leading to fast expansion and change in the world economy. But at the same time, many people are too poor to be able purchase their daily needs.

For endogenous development in marginal areas, local money and banking systems can be created, as for example experimented with by the Citizens-Multi-National and Strohalm (Compas Magazine No. 8, p.14). In this way, local circulation

of money and products can be enhanced, the production and consumption systems and the functioning of the local market can be improved and leakages of monetary value can be prevented.

Agriculture has a special role. The farmer is a cocreator, taking care of seeds and plants and building up life. But agricultural products have become commodities and other values created by agriculture, such as ecological services, have declined. These services are not valued, and become externalised costs of agriculture. This is a key problem. How do we find ways to give value to other services provided by agriculture? This is a problem in organic trade as well.

One can make a distinction between cultural value and monetary value. Culture creates internal value. In the contemporary economy, internal values are being externalised. In development cooperation there are also two sides, the economic and the cultural. How can we work on culture to deepen the internal values so that they can become truly sustainable forces? If you place all the attention on the external – economic and institutional – aspects, in the long run you will lose.

Cultural expressions such as music, dance and crafts can obtain monetary value and generate income (see Rafamatanantsoa) but at the same time they may lose their spiritual value.

The dominance of economic thinking clearly demonstrates the need to 'move our worldview'. We are not only economic beings. The current accumulation of capital is wrong, we should think more in terms of interdependence, reciprocity, solidarity and care. The debate should be on which worldviews should prevail. The economic system has been created by humankind and can be changed when it is not functioning well.

The mismatch in our economic valuing can be changed, for example, by putting value on natural resources earlier thought of as free of cost as their availability was believed to be unlimited. Valuing water, for example, may prevent over-pumping and pollution. But if we see it as a sacred entity or a gift from God we also have the sacred duty to use it with care and prevent pollution. In Europe, the idea of paying farmers for landscape protection has now been accepted, as has using subsidies for levering the value (see De Rooij). So, there are different ways to refine our ways of valuing.

In the Earth Charter the basic human values and principles of sustainable development are well presented. The Earth Charter could be used as a basis to guide the revaluing of resources in the economic system so that all people can benefit more equally and money can be freed for sustainable development.

On experiences with endogenous development

A spectrum of endogenous development experiences from Germany, the Netherlands, Italy and Slovakia were discussed. These cases are examples of platforms of dialogues: intra-cultural between the individual and the local; inter-cultural between the local and the global. The relationships between people and nature, people and people, individual and self (spiritual centre) are important. Multi-functionality is a bridging concept in these dialogues. It was also realised that a new balance between individuality and community, between the 'I' and the 'we' has to be found to enhance sustainable endogenous development.

Conventional agriculture has changed the relationships between people and nature, people and people, and the individual and the self. In the contributions to this conference (see Chapter 4) cases of innovative experiences with agriculture and land use are presented. In these cases the underlying values on how to connect with nature are different from those in conventional agriculture. Humans are seen as part of nature and stewardship is strengthened. Also, people relate very well with one another. These initiatives have been organised outside the mainstream. To do so, strong human relations are needed, based on trust, solidarity and agreement on a mission. In the Vel-Vanla case of the Netherlands (see De Rooij), farmers have organised themselves to comply with government regulations in a self-regulating and self-accounting way. In the Italian case, the farmers organised a system of marketing outside the mainstream for which institutional relationships had to change. These are examples of self-determination. The relationship between the individual and the self is no less important but more difficult to grasp. For example, in all cases people want to realise their dreams for regional revitalisation. This they combine with compassion for nature and care for others.

From the Vel-Vanla case a lot can be learned on cocreation of knowledge. Two development tracks are being followed: the mineral track and the landscape-nature track. The farmers succeeded in achieving the goals set out by the government, but in their own way. The group became increasingly multi-disciplinary. Research takes place on the farm, in a farmer-driven way. New knowledge is being created through farmer-scientist interaction. However, the struggles with conventional scientists and the government are not over yet.

What makes people move to engage in such activities? It is not just about niches in economic terms. It is also connected to identity. And there is always a component of self, of the individual searching for more (spiritual) relation with self, nature and other human beings. This also leads to more self-awareness and self-confidence. But it is also about the relation between people and animals and nature.

The cases make clear that leaders are very much needed for endogenous development, but are scientists needed as well, or had they better stay out? There are two types of scientists who can be useful, as the case from the Netherlands shows: the scientist who has the position and the courage to confront the authority of the government, and the scientist who has the insight and courage to convince others of the fact that conventional knowledge is biased.

Researchers can have different roles, for example as a secretary in meetings; as a facilitator to help farmers reflect on actions, share insights and bring in other knowledge; and as external communicator by writing articles or books for the farmers. They can also help to make the way of thinking of farmers understandable by doing experiments to convince outsiders, experiments of which farmers already know the results.

A European Network for Endogenous Development (ENED) was proposed, which could combine an operational platform for projects and networking, to exchange experiences and be a forum for conceptual discussion. This could enhance conceptual growth and practical projects.

We should look for existing opportunities to move the European worldview. Agriculture could play a strategic role in cracking the conventional reductionist

worldview. The concept of multi-functionality could be useful in this as it is already accepted by the European Union.

Multi-functionality assigns more than one value to one object or space. This is indeed a crucial concept. The EU LEADER+ programme has already shifted to multi-functional, more holistic, approaches. Maybe we can learn from LEADER for changes in science as well.

But, in the EU, multi-functionality is used in a reductionist perspective, to increase income on the farm as farmers can no longer survive on conventional agricultural products only. For that reason, the EU wants to integrate other activities in agriculture such as tourism and processing. Originally, in traditional cultures, multi-functionality had more to do with farmers producing for multiple self-sufficiency needs. In endogenous development we can learn from this, but develop it in our own way.

In Switzerland the government regards multi-functional agriculture as too expensive to be able to legitimate it. Taxes are already very high. We have to struggle to find a different way of perceiving society in relation to what nature or landscape is. For this, we have to engage more in reflections on our own ontologies. The debate is about what kind of values we can put forward to sustain the kind of agriculture that we need.

There is no regional endogenous development without personal development. One of the dominant ways of thinking in the West is to explain all behaviours from the perspective of individuals. The challenge is to see the collective and how it relates to the individual and how to strengthen consciousness so that it is part of the whole.
We export our problems to the future and to others. The individuality of capitalism is not sustainable. Our society is suffering from this: we should identify ourselves with others, and also with animals and nature. This may not be economically profitable now, but can have great value for the future. It is an investment for the future to become more connected. We should become aware of this necessity and accept it.

Bringing in visions from outside

In a plenary session the participants shared their proposals with several Dutch guests who were specially invited for this part of the conference: Klaas van Egmond (director of RIVM, National Institute for Public Health and the Environment), Jan Huygen (a Dutch farmer), Cees Leeuwis (professor of innovation studies at Wageningen University) and Cor van Beuningen (director of Socires, a research institute for culture and society). They were asked to give their comments and suggestions, which led to further discussions, summarised here.

On diversity

European identity is a product of its historical development. History shows the battle between matter and mind which has already been going on for centuries in this part of the world. Since the Enlightenment, rational thinking has prevailed. But we are now

entering a period in which the balance between mind and matter may be restored. In a study carried out by RIVM[1], people in the Netherlands were asked about their values and their most important aims in life. The majority said that they are not in favour of the world at which the government is aiming, but they would prefer a world in which the more endogenous forces have the upper hand.

There is not one worldview but a multiplicity of views. This multiplicity of worldviews leads to a lot of social tensions, as the dominant political and religious powers tend to force their views on other people. At present, a multiplicity of views is valued more as, despite all their differences, cultures have a lot in common. The question is whether present developments are leading to more convergence or to more diversity, and also whether this kind of convergence is desirable.

The position taken in the discussion was that we have to celebrate this diversity. The different views can each throw light on reality from their own perspectives and make co-evolution of multiple views a challenge. Any '*ism*' that does not accept and tolerate other '*isms*' will cause a lot of problems. We should search for commonality between cultures but not aim for convergence of all cultures. For this we have to develop our languages to better communicate with other cultures.

On subsidiarity

The notion of subsidiarity is based on the idea that governments should empower communities for endogenous development, that they should leave communities to do everything they are capable of doing themselves. Development cooperation also should not focus on solving problems for communities but on increasing the problem-solving capacities of communities. Such social capital of communities is crucial for their vitality and reproduction.

There is a paradox in development cooperation. How can you stimulate endogenous development through external invention? In Europe subsidiarity is a notion that is not well practised. In the European Union, and specifically in the Netherlands, projects are imposed on people. European governments should practise what they preach. In development cooperation there is only limited space for spirituality, which is about sense-giving, believing, authenticity, beauty and religion. In the dialogues between worldviews, religion is a blind spot. Religion is about bowing to the mystery and the sacred, about relativising the position of humanity. Worldviews have layers of complex reasoning, knowing and wanting, of which religion is part.
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On mentality

It was stated that the reflections on worldviews should not just be mental, but rather a combination of knowledge, science, universities, spirituality, ways of thinking and relating them to sustainable development. Can sustainable development be achieved through mental changes only? Of course it has to do with our ways of thinking and

[1] RIVM (2005) Quality and the future. Sustainability outlook. Summary.

the dominant way of scientific thinking. But the thinking of scientists should take on a more listening role than the leading role it has at present. It should follow social trends rather than dictating or prescribing them. Change and innovation are happening in other layers of society. Innovation is opening windows of opportunities and may connect people who were not connected before. Establishing exchange and mutuality between people with different worldviews is a big challenge. How can we give the discussion an actor perspective and make links with the people?

On practicality

The participants were urged to make their ideas and proposals practical. There is a sense of urgency, a sense of care for people and the environment because of the continuing polycrisis. There is also a need to diversify power, to regionalise power, and restore it to the people. The worldview concept can clarify the deeper drives of people and also organise the coherence between people in communities. There is a need for coherence and a need for a paradigm shift. Presently a paradigm shift is taking place. In agriculture there is a change from food value to green value, from agribusiness to country business. This requires a process of transition.

The participants explained that they are determined not to leave the initiatives for change to others, that they are already involved in or will take practical initiatives themselves. Endogenous development is an important practical concept and an example for this. It was stated that farmers can deal better with farmers from other cultures than with other groups of the population. They often are attached to the farmland of their parents and feel their ancestral connectivity. Continuation of the farm for the generations to come is considered by some as more important than short-term revenues. It is important to discover what is going on in the communities and to connect with the worldview of the farmers. The new openness to the spiritual dimension of life is considered a hopeful development.

At the moment, we can observe two contradictory tendencies: in addition to an increase in individuality there are also tendencies towards reconnection. Let's pick up stories and build concrete examples of reconnection and initiatives to revalue relationships between humans, between humans and nature and with the spiritual domain.

Sciences, policies and actions are often based on a materialist perspective. The participants indicated the necessity of opening up the worldviews of scientists and policy makers. There are many examples that can be used in this process and which give inspiration and hope. We need new words for the approach and we need to collaborate so we can expand our understanding. We have refrained from defining exactly what we are doing to leave space for others. The conference has tried to look beyond Europe for dialogue and polylogue with other cultures. This will be mutually helpful.

8. Summary of conclusions and final reflection

Polycrisis and emerging responses

Despite the tremendous technological, economic and political developments of the last part of the 20th century the ecological situation, poverty, the social, economic, political and religious tensions and the proliferations of weapons of mass destruction present a polycrisis for which appropriate answers are urgently needed. The problems are complex and manifold: climate change, exhaustion of natural resources, shortages of food, water and energy, industrial, agricultural and urban pollution and reduction of biological and cultural diversity. Tensions between rich and poor, between ethnic groups and between religious groups are increasing. Social cohesion is losing its function in modern societies, traditional cultures and local institutions. At the same time, ethnic and religious identities are gaining new momentum and new political alliances are emerging all over the world. Access to weapons and other means of mass destruction is becoming easier, and escalating to an uncontrollable number of nation states, political and/or criminal organisations and individuals.

This polycrisis is leading to uncertainty and instability. The sustainability of the global economy, social system and ecology is at stake.

Humankind creates these problems, and it is within humankind's own responsibility and scope to deal with them. But for this, we need a new way of thinking and acting. Elements for this new thinking and acting emerge from new sciences, social movements and initiatives, ecology and gender studies as well as from inter-cultural encounters. New worldviews, insights and technological and social options become available.

Worldviews challenged

Worldviews use specific principles to order the perception of the world. In the West the world is conceived of as consisting of identities such as humans, trees and animals. But entities such as pieces of land, units of monetary capital and information are also considered as stand-alone units with their own existential characteristics. The first principle for bringing order in the world is to distinguish separate and autonomous identities. The focus is on the material world. In other cultures, this ordering principle may be quite different. E.g. in the Andes the first ordering principle is relationships: everything is related and reciprocity is the most important activity. In Africa, existence is considered to be cyclic, consisting of the living, the not yet born and the ancestors. In Vedic and Buddhist perspectives the subtle world of consciousness is the supreme moving principle and the material world is inert and insentient. In the West, the notion of identity leads to importance being attached to rationality, to self-expression and to a dominant attitude of self-interest as main goal in life. In other cultures, harmonious social relations, community interests or personal spiritual development may be far more important.

The participants of the conference agreed that the Western worldview is biased in its dualist and materialist orientation, and that this bias contributes to the existing ecological, social and spiritual problems of the globe. For the last centuries in the West, worldviews based on monotheism and theories of the Enlightenment have dominated thinking and have influenced political, economic and scientific development. These worldviews are dualistic in the sense that they separate the creator and the created, mind and matter, object and subject, humankind and nature, care and money. The Western understanding of the laws of nature has led to universal assumptions about causes and effects, and about the predictability of the course of things. The dominant systems of governance and control of nature and society are based on such assumptions as well.

The human behaviour that has led to these crises has its roots in the dominant values and the way knowledge and technologies are being produced. The link between the dominant scientific knowledge and the way economic development is governed by the laws of capital is clear.

The dominant Western worldview is at least partly responsible for the polycrisis in the world, and it is now being challenged from several corners. The conventional, materialist- and science-based approaches to development are being questioned more and more, and innovative individuals, citizen groups, scientists and policy makers are increasingly presenting new ideas on how things might be done.

Present-day thinking therefore, is already starting to change to new paradigms, but the old structures are still there. To arrive at new paradigms we have to shift from fragmented to integrated approaches and we have to make a spiritual reconnection. Both changes are already taking place, but separately and unsystematically. In the end both have to come together. Human beings have a tremendous capacity to make things match. We can be optimistic about change.

Western society has a big problem but also great potential. Many people have non-material or trans-material cosmovisions but they are not sharing them openly. If we share our insights on new paradigms in the public space and create an ontological dialogue, we can create new institutions, norms and structures.

Sources of inspiration for moving worldviews

To find inspiration and new insights to move our worldviews, participants recommend that we:

- Look at our history and reconnect with our identity. Study the era prior to the introduction of dualism. The Germanic and Celtic roots of Europe can be the source of insights about the roots of Western culture and ontology.
- Go beyond the materialist and reductionist views of science to include insights from quantum physics, uncertainty and chaos theories, transdisciplinarity, inclusive science. Include insights from complementary sciences in health, agriculture, education and other.
- Build on the wisdom of different social actors – NGOs, social movements, scientists, religious and spiritual leaders – and respect the possible differences and complementarities of gender perspectives. Explore complementarity between

science, morality and religions. Strengthen links with artists: visual artists, painters, poets, musicians.

- Enrich the Western worldview by challenging it with non-Western perspectives: their a-dualistic worldviews, their ways of acquiring knowledge and insights (gnoseologies) and the nature, origin and scope of their knowledge (epistemologies).

New scientific insights

New scientific insights from quantum physics, learning theory, transdisciplinarity and ecology are becoming more and more convincing and visible, and their influence is growing. New approaches inspired by these new insights are emerging in sciences and research, policies and practices in domains such as rural renewal, organic agriculture, sustainable energy, complementary medicine, alternative education and solidarity economics.

These insights require different methodological tools. In order to ensure that deeper levels of knowing are included in the scientific building it is suggested that we build towards a new Western gnoseology (a system of deeper knowing. It was suggested that this way of deeper knowing should be based on rationality, intuition, revelation, imagination, sensibility and the assumption that the economy and politics must serve all living beings, the earth and the cosmos. It would attach value to dialogues across ideologies, sciences, religions, economies and policies. It has respect for otherness and diversity, uses rigorous arguments, taking into account all existing information. It suggests openness to accepting the unknown, the unexpected and the unforeseeable, and tolerance, accepting opposite views as a way to deal with the multiple realities.

The insights of the participants indicate that the universe is not a lifeless, soulless aggregate of inert material where reality is primarily shaped by static substance (Laszlo); the materialist-mechanistic world can be connected with a mental or spiritual dimension, where living, creative relationships determine a process of life that differentiates and develops constantly (Dürr). The classical logic of contradictions has to be left aside once we accept the co-existence of different realities; new research should cross different levels of reality and seek effective integration of thinking, and coherence of the universe (Nicolescu). Sciences should be considered a social construction (Molenaar) and effective knowledge can be gained by independent and highly diverse people aggregating decentralised ideas and learning processes (Röling).

The theoretical basis for new sciences appears to be increasingly robust. Quantum physics seems to present solid scientific insights about the different levels of reality, the theory of transdisciplinarity is now well developed, and the new thinking about the way knowledge can be developed by social learning is leading to operational models for transition processes.

Specific recommendations were made for reshaping higher education, improving understanding of human health, human behaviour and consciousness, networking and inter-cultural, inter-sciences and inter-religious dialogues. Spirituality and the knowledge and insights of other cultures were recommended by many as potential sources for these innovations.

Insights from innovative research

The papers on innovative research presented at the conference indicate that if assumptions about a-duality of mind and matter and the co-existence of different levels or realities are accepted and if research methods include social learning, new topics and new methods for research present themselves. The interface between mind and matter is being studied in consciousness and brain research (Bosman) and in medical genetic research (L. Rist). New insights on energetic agriculture emerge from practical experiences of farmers (Kieft). New insights on tree management emerge from research on the influence of time on biological processes (Zürcher). Baars (biodynamic agriculture), Stijkel (Co-creation science) and Zajonc (contemplative enquiry) presented experiences with innovative forms of education.

The phenomena researched by the participants go beyond the present scientific perception of reality and cannot be explained in the conventional mechanistic, materialist and reductionist ways. Electromagnetic and zero-point fields, coherence and synchronicity, self-regulation, intuition and role of cosmic rhythms are concepts with which conventional science is not familiar. These concepts present themselves, or emerge once the conventional notions and limitations of research are abandoned.

These research examples provide uncertainties as well as opportunities. We do not really know the answers to questions like: What are the actual or the potential contributions of each of these fields of research to resolving the polycrisis? And what are the risks involved?

These cases reflect and contribute to the changing worldview in the West and hence to personal behaviour that is determining the state of the world. The responsibilities science has with regard to human health or environmental protection should go much further than what is generally practised. This is a call for a reversal in research ethics so that science will focus on understanding reality, on its contributions to well-being and sustainability in its broadest sense.

It is important that more research is performed on the interface and interaction between human consciousness, matter and environment. Transdisciplinary exchange between the different paradigms in the new sciences and between the new sciences and scientists from other cultures would help to build paradigm-bridges and to better understand the world and the phenomena dealt with in these different avenues of research.

Close cooperation between practitioners and scientists engaged in social learning modes may help to improve understanding of the subjective and complex phenomena that science is presently dealing with.

Inter-sciences dialogues may contribute to the necessary social learning process, to the further development of its methods and enhance its effectiveness in solving the crisis of ecology, social disintegration and violence.

Insights from innovative approaches to rural development

The papers by Groenfeldt, De Rooij, Knickel & Jahn and Verschuur & Stijkel show that presently there is space for initiatives to revitalise rural areas in the economic as well as the ecological, social and cultural sense, at least on a small-scale. Post-modern worldviews and values, improved collaboration between practitioners, scientists and policy makers, local knowledge making, new sciences, consumer awareness and enhancing policies, among others, all play important roles in successful transition towards multi-functional agriculture, rural renewal and other forms of more sustainable land use. Multi-functional agriculture is adapted to the local natural resource base and new economic opportunities such as organic farming, agro-tourism, nature and landscape conservation, traditional and innovative food practices, and services in the fields of social care and ecological and spiritual courses. It presents an opportunity to reassess the role of agriculture in society, the desired future for rural areas, the meaning of sustainable development, and even the meaning of life itself. The challenge is to create favourable conditions for up-scaling of such initiatives to the level of large-scale sustainable rural development.

The papers provide insight into the factors which are of crucial importance for the transition process, such as:

- Worldviews, motivations, values and beliefs that respond to broader societal needs and priorities such as sustainable management of resources, the protection of biodiversity, valuable landscapes and cultural heritage and the production of safe and quality food.
- Trust in local control, integrated approaches and decreased dependency on external resources.
- New cooperative structures that encompass autonomous farmer networks and alliances with other stakeholders such as consumers, innovative scientists and policy makers.
- The use of knowledge from different sources (traditional and scientific knowledge, logic and intuition, conventional and organic agriculture, new sciences and farmer innovation, etc.) and continuous exchange of experiences within networks.

In their innovation processes, some farmers may make use of new sciences such as energetic agriculture and biodynamic agriculture. But, as each situation is different and initiatives have to build on the specific local conditions, experiences and rural culture, to a large extent they are true social learning and transition process as discussed by Röling. Such holistic rural development initiatives not only lead to improved production, income, social relations and rural culture, but also to enhanced ecological functioning, conservation of the natural resource base and nature, and increases in the available reserves of drinking water and biomass (which indirectly contributes to reducing climate change).

Participants support Molenaar's insight that the interest-based monetary system is one of the main causes of economic marginalisation of farmers, rural areas and countries. As long as farmers operate in open market systems they have to cope with the market forces which favour the survival of the fittest. In the long run, farmers

with few chances to compete on the market may not be able to stay in business without some market protection. Two examples are provided of how, by using money in a different way or by creation of local money and banking systems, communities can protect themselves against uncontrolled neo-liberal economic policies.

It seems as if humankind is a servant of money rather than that money serving human need, as if economic values are prevailing over other human and ecological values. But non-monetary values maintain social cohesion as much as or possibly even more than monetary values. We have to rethink our values and conduct dialogues about them. To do so we could learn from the values used in the past. But we have to be critical and not just copy the past; conditions and needs have changed as well.

The dominance of economic thinking clearly demonstrates the need to 'move our worldview'. We are not only economic beings. The current accumulation of capital is wrong, we should think more in terms of interdependence, reciprocity, solidarity and care. The debate should be about which worldviews should prevail and what valuing strategies could be used to bring the economic system into balance again. The economic system has been created by humankind and can be changed when it is not functioning well.

In capitalist development the role of the individual is strongly emphasised e.g. in wealth creation and risk taking. Is this appropriate? In agriculture it is hardly ever the individual that decides. The individual is situated within the family and the community. Still, the individual is very important and has influence on what is happening at levels of higher aggregation. There is no regional endogenous development without personal development. One of the dominant ways of thinking in the West is to explain all behaviours as arising from individuals. The challenge is to see the collective and how it relates to the individual and how to strengthen the consciousness so that it is part of the whole. But how can you be part of the whole and still express your personality? In Africa the concept '*Ubuntu'* (I am because we are) is very central; it expresses the feeling of social unity very strongly.

We should look for existing opportunities to move the European worldview. Agriculture could play a strategic role in cracking the conventional reductionist worldview. The concept of multi-functionality could be useful in this as it values rural services besides production and assigns more than one value to one object or space.
Endogenous development is an important vehicle for developing multi-functional agriculture and moving worldviews. There are many 'endogenous' development initiatives in Europe. Such initiatives also deal with issues like rural identity, local governance and inter-cultural dialogue. Participants made a call for a European Network for Endogenous Development (ENED), which could combine an operational platform for projects and networking for exchange of experiences and conceptual discussion. This could enhance conceptual growth and practical projects. It could document and assess the existing experiences in Europe of valuing rural services (ecological, social, etc.) for sustainable management of the rural area.

Insights from inter-cultural and inter-sciences dialogues

Balasubramanian, Millar, Escobar, Rafamatanantsoa, Haverkort and S. Rist et al. present experiences and views from other cultures, where the ordering principles of the worldviews are not the duality but the connectivity between living and non-living. In most non-Western societies, the human world, the material world and the spiritual world are inseparable. Although the way this connectivity is perceived differs from ancestor-centric Africa to the South America of Pacha Mama, and the Vedic or Buddhist a-material notions of reality, the underlying notions of unity, connectivity and reciprocity are common elements. Traditional knowledge and values have been subject to erosion, some have gone underground, and many have lost their vitality and power. The participants provided important insights into the fundamental differences between Western worldviews and knowledge and those of their own cultures.

Ontological differences and power issues may prevent a simple inter-cultural exchange. The Southern authors refer to the colonial and neo-colonial situations and the impact they have had and still have on the worldviews, development of the own knowledges and status of traditional knowledge. There is a long way to go to compensate for power differences and to create favourable conditions for revitalisation of traditional knowledge and worldviews. For this, an intra-cultural process of reconciliation with the own tradition has to take place.

The increasing awareness of the importance of culture and cultural diversity is leading to an increase in intra- and inter-cultural education. The educational systems, systems of governance and management of the local resources are increasingly receiving attention, and important innovative initiatives are being undertaken in these domains in the South.

The voices from the South feel the challenge to revitalise their own knowledge, to make the link with their own culture and to bring about a development path that is not just a repetition of the Western model, but that takes advantage of the strengths of the own values, worldviews and expertise. They do not claim isolationism, but expect benefits from South-South cooperation as well as from West-South exchange. The authors reveal lively initiatives in this direction such as the regional conferences on worldviews and knowledge in Africa, Latin America and Asia.

The growing inter-cultural and inter-scientific dialogue may provide greater insight into the contributions that traditional and indigenous knowledge and ways of knowing could make to sustainable development. The growing motivation of faith institutions to contribute to sustainable development and the growing participation of traditional and indigenous people in the development debate may lead to the moving worldviews that are needed for global solidarity and unity.

The participants agreed that knowledge based on the non-dualist African, Asian and Latin American worldviews should have equal standing with knowledge based on dualist Western worldviews. Non-dualist worldviews lead to different ways of knowing and different sciences. What are the commonalities and differences between worldviews? The dominance of the Western worldview has weakened other science traditions. It has marginalised the traditional sciences and replaced them with Western

notions in education, research and institutions. How can we redress this dominance and give more room to other ways of knowing?

The changes in the direction of transdisciplinarity, holistic development and social learning can benefit from the lessons from the South. The persons from the West therefore explicitly advocate an ontological dialogue, to analyse the power differences and express the need for corrective measures. Giving up the assumption of the primacy of Western ideology, science and social organisation is not an easy change. Acceptance of the idea of pluralism of ontologies and ways of knowing and the creation of symmetry in power relations, in access to financial resources and in prestige attached to different ways of knowing, present important challenges for policy makers, scientists and the general public.

Insights from new approaches in transition and education processes

The contributions of the participants show that, to find our way to new insights and practices that provide effective answers to the polycrisis, special 'transition' approaches are being developed, among others in adaptive research, rural development, inter-cultural cooperation and education. It is important to build research on farmer knowledge, farmer-to-farmer exchange and participatory experimentation. In rural development, farmer cooperation, reflection on life stories, participatory experimentation, multiple-stakeholder platforms and policy dialogue seem to be effective tools in transition processes that aim to involve all stakeholders (Groenfeldt, de Rooij, Knickel & Jahn). Where different worldviews clash, where tradition and modernity meet for example, inter-cultural dialogue as used in the ethnosciences (S. Rist, et al.) could enhance mutual understanding. Where stakeholders allow intuitive and spiritual insights and guidance, cocreation may be very useful to find the best way forward. Computer simulation games (Pereira) can be very useful for increase people's awareness concerning for example environmental issues. They also can be useful in individual or group decision-making by consumers as well as in policy making.

Education as such is already a transition tool, which should prepare children and young adults for life-long learning and responsible social behaviour. The innovative education approaches presented by participants consciously include empathetic understanding and intuitive knowing by way of contemplation and meditation. These help students to develop a way of creating meaning, which makes it easy for them to hop between worldviews and to appreciate diversity within the world and within themselves. This could even bring them to the level of becoming 'citizens of the world', but not by way of 'commercial self-interest' as suggested by Adam Smith but by way of an 'epistemology of love' as suggested by Zajonc in this conference.

Such contemplative learning tools help to go beyond what is measurable, conscious and easily explicable to include intuition, spirituality, values, subjectivity and uncertainty. These approaches enhance connection and love between all participants and their wider human and natural environment. As such they contribute strongly to a

more sustainable and peaceful world and enhance collaboration between practitioners, scientists and policy makers.

Participants recommend creating space for education that embraces contemplation, transdisciplinarity and diversity of visions and ways of learning. This would require a revision of school curricula at primary, secondary and tertiary level. At the university level, trans-cultural education is important. Apart from Western logic and worldviews, also Asian, African, American worldviews should be taught. Experiential learning could take place in summer schools, and focus on empathetic understanding, inter-cultural dialogue, meditation and art. Through creative imagination and expression, participants could build bridges between old and new insights.

It was stated that the reflections on worldviews should not just be mental. It is a process of combining knowledge, science, universities, spirituality, ways of thinking and relating them to sustainable development. Can we achieve sustainable development by mental changes only? Of course, it has to do with our ways of thinking and the dominant way of scientific thinking. But the thinking of scientists should follow more and lead less. It should follow social trends rather than dictating or prescribing them. Change and innovation are happening in other layers of society as well. Innovation and networking are opening windows of opportunities and may connect people who were not connected before. Establishing exchange and mutuality between people with different worldviews is a big challenge. How can we give the discussion an actor-oriented perspective and make links with conventional scientists, policy makers, practitioners and the public?

Final reflection

The experiences discussed in this conference show that new thinking and acting are indeed feasible. Many building blocks are already present in the form of new philosophies, scientific paradigms and research and learning approaches, but also in the form of ancient wisdom embedded in our global cultural heritage. The participants of this conference brought together many examples in crucial domains including quantum physics, transdisciplinary science, social learning, human consciousness, health, agriculture, rural innovation and education. Persons with experience are available and platforms for inter-cultural and inter-science dialogues do exist. However, much is still questionable, uncertain or unknown, and priorities and capacities are still too limited to achieve sufficient critical mass and momentum. Difficult ethical changes in sciences, governance and economics for example, still have to be made. We have to unlearn our bad habits, have to go against the odds, and have to accept or even embrace uncertainty. Experiences in environmental management for example, show that transition is a long and difficult process and full of unconscious and conscious road blocks. As there is not one way to the future, ready-made road maps do not exist and different visions and interests, and broad processes of communication, social learning and democratic decision-making are needed.

Steps towards a more sustainable world are already being taken by the world community. Visions on sustainable development such as those written down in Agenda 21 and the Earth Charter have been formulated through global processes in

which many interest groups participated. These are very important if we are to move worldviews and give direction to the transition processes as well. But the many contradictions and differences of interests and visions between people may make it necessary to aspire to deeper levels of wisdom, if we are to be able to experience and create global unity. Transdisciplinarity, co-creation, contemplative education and inter-cultural, inter-sciences and inter-religion dialogue could contribute to the creation of such wisdom.

However, the insights of some of the participants suggest that uncertainty is immanent and that the real world can never be fully known, understood or controlled. We can learn by making connections, by communication and participation, having respect for differences and searching for synergy. Therefore we have to abandon the idea that a sustainable world can be achieved through central planning and control. Rather, it may be an evolutionary process driven by the inner desires and ways of knowing which everybody can express. Hence, initiatives should be taken at all levels, by scientists, policy makers, artists, practitioners of faiths and religions, governments, civil society organisations, producers and consumers. All have the capacity to go beyond themselves and use their capacity to cocreate, to work from within their own essence and to collaborate with peers as well as all other actors involved. Hopefully the experiences included in this book present ideas and inspiration for such initiatives.

In October 2006, there will be a follow-up conference in Switzerland, which will bring together the visions on worldviews and sciences presented and discussed in the earlier conferences in Latin America, Africa, Europe and Asia. That conference will be a real exercise in inter-cultural and inter-sciences dialogue and learning. Bio-cultural diversity will be taken as the entry-point for discussing the different worldviews of the cultures represented by the participants. The relations between sciences will be part of the discussion as will be strategies for co-evolution of sciences and collaboration between participants. The findings of the Moving Worldviews conference as well as those of the other regional conferences held in Latin America, Africa and Asia will be used as inputs for this follow-up conference.

The regional conferences were analytical and had a certain level of abstraction. They made an ontological and epistemological assessment of the practical experiences of development in different economic, socio-cultural and bio-physical conditions and from different corners of the globe. The challenge for the future is to translate these insights into action: new policies and new initiatives, new alliances between different actors to achieve a sustainable world, based on a good understanding of existing diversity and aiming at mutual dialogues and joint learning. If we accept that knowledge is a human product and thus fallible and never complete, and if we accept the principle of uncertainty in policy making and planning, how can we organise sciences, policies and actions that address the current polycrisis and build on the opportunities?

Traditional leaders, community-based organisations, NGOs, scientists, and policy makers are challenged to address key questions and formulate concrete initiatives. Relevant questions that deserve attention relate to the way sustainable endogenous development and bio-cultural diversity can be achieved by local actors, policy makers and scientists.

They deal with issues such as:

- How can the differences in power, prestige and influence between North and South and between mainstream science and innovative initiatives and development approaches be overcome?
- How can adequate funds from public, private and corporate sources be channelled towards innovative initiatives for sustainable development in the North and in the South?
- How can governments and policy institutions become more responsive to the desires and worldviews of the people they are to serve? How can top-down planning make place for a rigorous and flexible process of change that builds on the ways of knowing, the values and social organisation of the diversity of peoples?
- How can the notion of *good governance* be understood and redefined in the context of moving worldviews, inter-culturality and uncertainty?
- How can co-evolution be realised? Is a real co-evolution of different ontologies, different ways of learning and different sciences possible? What are the conditions for getting started and what are the possible mechanisms for sharing, criticising and joint learning? What contributions can Southern-based sciences, innovative global sciences, gender perspectives and ecology make?
- How should intra- and inter-cultural dialogues be balanced, organised and implemented?
- How can existing national and international governmental and non-governmental institutions and civil organisations aiming at sustainable development join hands in their policy formulation, strategy development and actions?

These issues need to be related to specific developmental issues in the domains of food production, management of natural resources, use of rural areas, biodiversity, ecology, health and nutrition, social, cultural and economic development.

Reshaping sciences, policies and initiatives for endogenous sustainable development implies moving conventional worldviews, and invites actors to undertake concrete activities. Insights and opportunities do exist and the challenge is to translate them into new practices.

Bertus Haverkort and Coen Reijntjes (eds)

PART II

Conference papers

Worldviews and sciences in transition

Reflections about worldviews, the Western worldview and intercultural polylogue

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Introduction

This paper does not really follow the 'guidelines for contributors' as asked by the organisers. We will not describe innovative experiences or the way our worldview has guided personal experiences. Nor will we make suggestions for sustainable endogenous development. On the contrary, we will try to embark on a more theoretical journey and focus on the idea of a worldview in itself. The focus on the abstract level of worldviews might make this paper more difficult to read. Yet, if we want the world to be ruled on the basis of truly intercultural communication, on the basis of a polylogue instead of a liberalist monologue, in addition to making concrete suggestions, we will have to fully understand the concept of a worldview and the driving forces behind our own worldviews. Therefore, this article will examine the idea of a worldview. What is it? What does it consist of? As we will see, we consider a worldview to be a map that helps people to orient their lives and make sense of the chaos 'out there'. A worldview serves to create order by moulding the world into mental categories and hence, to give meaning to the elements and events we see around us. At this early stage, it should be pointed out that most of these shaped categories we use to create order are implicit. In spite of this, we all unconsciously conceive of these categories as unquestionably 'true'. In our view, this could be a phenomenon – of far greater importance than is currently recognised – which is hampering the process of a genuine, in-depth intercultural polylogue.

In this paper, we will first give a broader description of worldviews and follow up with a discussion of the ethical categories and the knowledge categories, as orientating maps. We will focus on the Western worldview to know what implicit baggage we, as Westerners, bring along in an intercultural encounter. Finally, we will look at some of the difficulties facing an intercultural polylogue.

A general depiction

The Centre Leo Apostel of the Vrije Universiteit Brussel defines a worldview as follows: 'Worldview is a coherent set of bodies of knowledge, concerning all aspects of the world. This coherent set allows people to construct a global image of the world and to understand as many elements of their experiences as possible. A worldview can in fact be perceived of as a map that people use to orient and explain, and from which they evaluate and act, and put forward prognoses and visions of the future.'

This rather dense definition needs some explanation, which we will provide in the following points.

Inevitability of a worldview

As said in the introduction, people, all over the world alike, need to be able to understand the phenomena around them. The different elements influencing our lives need to make sense. If negative events such as pain, suffering or death happen to ourselves, friends, family or beloved animals, or if earthquakes or floods happen in the world, we need to be able to grasp these events, and give them a place within a framework of reference. If we cannot do so, if things are meaningless, it might influence our well-being, even to a point where we might become depressive or sick. But we also need to have some standards to evaluate our proper behaviour. To be moral, we need to know what is considered right and wrong. If we do not know this, we exclude ourselves from humankind. So we think it is erroneous to try to get rid of a framework or meta-narrative. Indeed, we believe that this is not possible. A worldview provides us with an answer to the most basic aspiration we have: the desire to be in contact with what we perceive as good, of central significance or of elemental value. We are always entrenched in a context, even if we think we are not[1].

The first-order ordering categories

In order to make the surrounding, unintelligible world meaningful and liveable, people make use of conceptualisations. They apply categorisations which bring order and make reality more comprehensible. 'Making use of conceptualisations' may sound as if this is a conscious process but the first-order ordering categories come about at the pre-reflective level. We do not really 'think' them up. The categories rather reflect what we experience as the world outside, prior to any conceptual notions. The implicit categories are built on what people have admired, questioned, feared and loved in the course of millennia.

The implicit, pre-conceptual categories differ from culture to culture, largely depending on time and place, which form the basis of experience. But the fact that categories differ is also due to the ordering principle itself. The different classifications people have in different cultures are all meant to (re)present reality. They order on the basis of what they see, live, experience. Yet, this experience can never be complete. Because of the very ordering principle itself, part of the outside world will always remain out of sight. Ordering is always also selective. We will illustrate this by comparing the Western worldview and the Andean worldview (Estermann, 1998)[2].

In the Western worldview, a main category for grasping the world at its purest is the category of 'being'. The world is conceived of as consisting, in the first place, of identities, such as humans, trees, animals. These identities have essentials:

[1] For Lyotard, one needs to be freed of a meta-narrative in order to take autonomous choices. Yet, if Lyotard says that there are no meta-narratives, he himself is creating a meaningful frame from which he is explaining and understanding the world, i.e. he cannot escape thinking, functioning and living within a frame either.

[2] For our description of the Andean worldview as well as for parts of our description of the main features of our own worldview, we borrowed some interesting insights from Josef Estermann, 1998. Filosofía Andina. Estudio intercultural de la sabiduría andina. Abyala-Yala: Quito Ecuador.

characteristics that are inherently part of their being. There are other characteristics which are considered contingent rather than substantial. A relation between entities is not regarded as an essential part of these identities, for instance. *First* there are two *separate* identities which only *nex*t have a relation. So autonomy as an inherent characteristic of an entity is a first-order ordering category through which Western people comprehend reality.

In the Andean world, it is the reverse. Relation is seen as a core category, maybe even *the* core category by which to grasp reality. Everything is relation. So, although in the Andean world it is philosophically not articulated as such, one could say that within the Andean worldview relation is seen as an essential characteristic of life, and hence, also of phenomena in the world. Both the Andean and the Western views of the world are pre-reflective interpretations of this experience of living in the world.

The first-order ordering category that we unconsciously take as a starting point will determine our approach to the world. We can take only one stance, and therefore inherently exclude others. For instance, we cannot perceive the world as essentially made up of autonomous substances and simultaneously believe that everything in the world is, in essence, relational. Once the first steps have been taken, more categories can be deduced from them. Yet, if one does not take the first step, it is very difficult to empathise with all the following steps.

The second-order ordering categories and cultural manifestations

The ordering of the world from an implicit pre-conceptual and pre-reflective level is fundamental for any culture. From this, further orderings or categorisations are deduced to create a model, a skeletal structure, a coherent frame by which to understand the surrounding phenomena. These deduced or second-order ordering principles in fact define the cultural realm. Examples of second-order categories for the Andean cultures are the principles of complementarity, reciprocity, cyclicity and integrality. Deduced categories typical of Western cultures include autonomy of the individual, rationality and duality. The difference between first and second-order ordering categories is not always very clear.

The second-order categories manifest themselves in at least three ways in a culture. Firstly, they get densely ramified in language, such as discourses, philosophical writings, oral traditions, moral sagas or fairytales[3]. Secondly, the institutional structures of a society are largely influenced by these categorisations. Examples are the way buildings are built, or the standards by which certain jobs are perceived as highly desirable, and others not. Thirdly, the deduced categories become manifest in daily habits or special cultural events. Gender roles, eating patterns, rituals, ceremonies and music festivals are all examples of this.

The deduced ordering categories are usually implicit and tacitly understood. Parents transmit values on how to behave and on how to conceive reality to their offspring. They do not express their thoughts in a systematically ordered discourse, but 'correct' their children whenever they perceive usage of the 'wrong' category. 'You behave like a girl', 'your dolls are not really alive, darling' are examples of such

[3] One could maybe even describe these manifestations as third-order ordering categories, but we prefer to call them cultural manifestations.

corrections. Children learn even more by seeing and imitating the behaviour of close relatives and by gradually coming to fully comprehend the thoughts which are key to this behaviour. Because parents and children do not articulate this knowledge verbally, one could say that this knowledge is tacit and implicit, although it is not unconscious. Yet, for some persons, these deduced categories are more explicit. In Western culture, philosophers study these themes, acquiring in-depth insights. In other cultures, central community members, such as shamans or priests, consciously and explicitly express them, and are thus important transmitters of this knowledge. First-order categories are usually even more difficult to trace, but can be raised to the level of consciousness through a major archaeological effort in intercultural encounters.

First and second-order categories as 'right' and 'true' categories

The conceptualisations serving to try and understand the surrounding physical and social world are seen as 'true' and 'right'. Tacit, implicit knowledge, based on real-life experiences, is usually very deep-seated, to the extent that it seems intuitive, self-evident and unquestionable. This holds even more so for first-order than for second-order categories. As a result, the categories employed are not merely conceived of as a selection of categories but as the *only* categories corresponding to the truth/rightness principle. As we have said, the second-order categories are further worked out, and even petrified at times, in our thinking and acting. Making the categories more concrete by ways of institutions and laws, or scientific rules, reinforces their veracity and confirms the validity of findings handed down by previous generations. This is another reason why we do not question the categories that lie at the heart of our feeling, thinking (language) and acting.

A worldview as neither pure nor static

A worldview is built up of knowledge that has been gathered throughout the ages. It reflects the lived experiences of one generation after another. But people also borrow ideas from, or get thoughts about reality imposed upon them by other cultures. Cultures are always embedded in different kinds of (power) relations with other cultures. They are not isolated blocks. As a consequence worldviews will be a mirror of these interpenetrations arising from cultural contacts. Therefore, within one worldview, different meanings and conceptions may coexist. Inconsistencies will be smoothed out and rediscovered as inconsistencies only generations later, with new ones being introduced through new contacts or findings within the own cultures. Although changes occur through ongoing intercultural contacts, they usually do so at a very slow pace. This explains why people can still perceive their fundamental categories as 'true', 'right' and 'ours'.

Ethical categories and knowledge categories as orientating maps

The different cultures around the world all have their own specific ways of ordering reality, doing so on the basis of first and second-order foundational categories. Yet, at the risk of oversimplification, one could say that the core function of these

categorisations is their role of orientating in two ways: in an ethical way (categories concerning how to be 'good') and a knowledge-based way (categories that make clear what should be considered as 'true'). Of course, in reality both categories are almost always entangled. We divide them at a theoretical level into smaller pieces so as to be able to better understand the crucial aspects.

The ethical category

Charles Taylor (1989)[4] is one of the most salient authors describing the basis of ethical categories. His work is tough to understand, but very clarifying on this subject, so it is well worth further examination.

As said before, a worldview is like a map, helping us in orienting our lives. Orientation has two aspects, which we could call an external aspect and an internal aspect. The external aspect refers to orientation in a more abstract way. To illustrate this, here is a simple example. If I go to a country which I do not know at all, I can buy a map to orientate myself. This map will provide me with the required external orientating information on the locations of cities and other landmarks, their mutual distances, their relative importance (size of dot on the map), and their interrelation (the number and nature of the different roads connecting the different places).

The internal aspect, on the other hand, relates to my own position inside the country. If I do not know a region, I will never be able to locate, for instance, a field of flowers. Suppose that someone takes me there blindfolded, takes off the bandage and tells me that the field in front of me is the field of flowers I wanted to see. I will then know where the field is (given I trust this person). But this knowledge is not really meaningful, since I cannot relate this flower field to other known points in this area.

When it comes to the ethical categories we want to make the following clear: a worldview offers a person an orientation on what is expected in terms of moral behaviour. All worldviews do this, including the Western worldview, although it does it less than other worldviews. What kind of life is worth living is a fundamental question, at the basis of human existence. A worldview orientates us with regard to who we are, and who we want to become. Returning to the example of the map, we not only need to know the locations of the cities on the map (the fundamental categories or core values) to guide us (which usually happens implicitly), we also need to have a sense of where we stand in relation to them. The worth of our lives will always be measured in terms of the ethical aspects of worldviews. In this sense, identity (even if not expressed as such in other cultures) is very much intrinsically interwoven with the ethical aspects of a worldview.

The Western ethical category

We will now go into more detail about the Western worldview in relation to this ethical aspect, and more precisely in regard to self-understanding. If one intends to start an intercultural polylogue and be a nuanced and enriching participant, one should

[4] This part is based on Charles Taylor, 1989. Sources of the Self. The Making of the Modern Identity. University Press: Cambridge, part 2.

at least consciously know and have reflected on the kind of implicit ethical categories one is driven by and where one stands in relation to these categories.

As mentioned at the beginning, an important first-order ordering category of the Western worldview is that of substance. At the human level, this has been mentally translated into the category of autonomy of the individual (seen as a separate identity). Two main categories have been deductively attributed to this individual with an essence: *a rationality* and a *possibility to express this core*.

1. As for the *rationality:* of course, most other cultures – if not all – will confirm the rational characteristic of human beings, in the sense that all will agree on the human capability to reflect. Yet, what is different is the sub-ordering that follows from this rationality, or the cultural manifestations into discourses. Different cultures take different views of 'being rational'. One does not autonomously choose what one considers rational or not. On the contrary, the first and second-order categories of each culture demarcate what is rational and what is not. The idea of rationality always restricts behaviours to a particular culturally delineated space, outside of which irrationality and chaos are deemed to reign.

One example of rational behaviour according to Western precepts is to think and act in an economic way, i.e. as *Homo economicus*. This is closely linked with efficiency. Another important feature of rationality is that of looking at the world from a position of disenchantment. Any perception of the world as 'animated' – a word that itself has negative connotations – is considered irrational. Again, another notion that is very powerfully associated with rationality is the well-known ideal of self-reliance and autonomy. Working hard to become successful is regarded as the best way to achieve this. This notion is more developed in North-America than in Europe, in general terms. As said, most of these notions are not articulated systematically but we are inculcated with them during childhood, so that we have internalised these values as 'normal' by the time we reach adulthood.

It is within this context of rationality that we understand ourselves. The space within which rationality is defined is also the space within which we orientate ourselves as to who we are (the map) and who we want to become (our place on the map). Yet, orientation is only possible when these associations are perceived as true. Therefore, we do not recognise rationality as being 'associated with' these features. From the Western perspective, rationality – truly – *is* these features. This is one of the reasons why it is difficult to criticise these features, as some alternative movements try to do. If these features are seen as merging with rationality, it follows that any criticism of the features is equal to criticism of rationality *itself* . Notwithstanding this complexity, we think the Alterglobalisation movement has made gradual progress. Alternative ideas about rationality are gaining ground and start to coexist and compete with traditional perceptions within our worldview.

2. Next to rationality, *self-expression* is another major second-order ordering principle for understanding ourselves. As said, our worldview is very profoundly shaped by the interpretation of reality as substance. As a result, we believe in an essential core deep down inside ourselves that is waiting to be expressed or developed. We are all considered to have our own particularity, which we should go in search of in this life. By and large, the standards by which we measure success in life are to the degree to which people have succeeded in realising themselves and express this authenticity, for instance in art forms, such as dance and music. Self-expression and

rationality may also coincide, e.g. in people who become successful captains of industry, managers or scientists. It should be noted that in the last few decades, the idea of the self as a person's essence has been under discursive attack from philosophers, but this has not yet found resonance in society as a whole.

Although it is clear that one cannot judge these first and second-order categories, one can judge the way they are interpreted and manifested. The point we wish to make here briefly is that, in the West, the interpretation has gone wrong along the way. We have explained this in more detail in another article (Note, Pinxten & Aerts, 2005). The *combination* of all these implicit and subtle messages with regard to rationality and self-expression seems to lead people contradictorily to a way of life that political, philosophical and religious decision-makers have not foreseen and do not consider desirable. It unwittingly, but deeply, orientates people towards the idea that self-realisation comes *first* (before anything else) and/or to an attitude of self-interest (before anything else) as the main goals in life, as this is what gives life its genuine meaning. The guiding discourses very implicitly orient people towards seeing self-realisation and self-interest as the primary and authentic principles to follow. So people start considering it – in a very unconscious way – their duty to give preference to a certain individualised way of acting. Subtly, the combination of all the discourses on rationality and self-expression promotes the belief that it is unfair (not right) to ourselves, family, fellow citizens and the state if we do not develop or realise ourselves. The lives of people who do not follow this road are depicted as unsuccessful and meaningless, that is, insofar as they have no religious or moral reasons for adopting an ascetic attitude. We think that the imposition of such supposedly 'good' behaviour is one of the things that the Alterglobalisation movement is, implicitly, standing up against.

To conclude, we would to make it clear that, although there are second-order ordering categories relating to benevolence and adopted by many people as an orienting frame, they have become overshadowed by the other categories under the influence of such phenomena as secularisation and the discourse on cultural relativism in the field of anthropology. The challenge that society currently faces is to try and re-articulate the idea of benevolence, yet stripped of its religious meaning. The more this idea becomes discursively ramified, the greater the chance that people will unconsciously favour it again as a main good within their frame of reference. In the article referred to in Note et al. (2005), we make a preliminary attempt to re-articulate these values. We 'enlarged' our worldview by introducing two categories in addition to rationality and self-expression: the ethical category and the potential to be able to be situated in a larger meaningful whole.

The knowledge category

Knowledge about 'reality' is another pillar we use to orientate ourselves and form our visions of the world. As is the case with the ethical category, the two main questions here are: firstly, what are the standards by which we consider something to be true/what is the space within which something is called true, and, secondly, where do we stand within this frame of reference about truth? Although we have not yet done enough research to confirm this, it would seem that it is only in the Western worldview that truth and rightness have become separated the Western worldview, truth is the area of science, while rightness or justness is associated with the realm of

ethics. Both worlds are separated. In other cultures, both principles seem to have been less articulated, but they invariably play an implicit role in the first and second-order categories.

If we can gain insight into what is considered knowledge (truth) and into our position with regard to it, this will influence our standpoint in an intercultural polylogue.

The Western knowledge category

Fundamental and applied scientific knowledge is based on implicit first and second-order ordering categories. Again, an important category is the thought that the world is composed of autonomous things or substances. These substances are believed to have essential and contingent characteristics. It is further conceived that the true nature of reality can *only* be known through cognition. The senses, apart from sight, are deemed secondary in knowledge acquisition. They are not considered suitable for tracing the essential, underlying and determining characteristics of the world. It is believed that at some time in the future scientists will be able to make a grid of the *entire* essential and deterministic features, which, as a unifying theory, would explain why the world, and even the universe, is the way it is. Implicit in this knowledge acquisition is the notion that it will lead to better control of the world, not in a negative sense, but to gain insight into, to place, or be able to counter as much as possible the undesirable effects for human beings living on this planet.

Along this line of thought, two other implicit statements can be made. Firstly, it is very much believed that what we see fully corresponds with external reality[5]. Secondly, the researcher, as a person, does not play a role in knowledge acquisition. He or she is an objective, external observer who has no influence on the facts. As we already saw, neither of the two stances is feasible. Firstly, we can comprehend only part of reality. Looking is making sense. Making sense is ordering. Making sense and ordering is interpreting. It is impossible to have a complete overview of all aspects of reality. Secondly, first- and second-order categories inevitably also play a role in science. No observer can escape from their own frame of reference. *Mutatis mutandis*, one can never escape from one's own research context, which inevitably influences the conception of 'facts'.

In recent times, because of the influence of post-modernity and the quantum and relativity theories, scientists and philosophers alike have been obliged to abandon their traditional attitude of objectivism and determinism. History and philosophy introduced hermeneutics; quantum mechanics brought a worldview that was completely different from the Newtonian worldview in the sense that its findings showed us that reality is indeterminate too. In quantum mechanics, an experiment that is repeated will not yield exactly the same results every time. Indeed, the result is not predictable at all. One reason is the interwovenness of the participant with this reality. Put differently: reality is such that the observer changes it by his very participation.

In science and society, these two mutually exclusive ideas exist side by side. In science, some disciplines such as genetics, still build on the older ideas of Newton.

[5] In philosophy, the idea that what one perceives and is able to articulate (in language) fully corresponds with what is perceived, is called the correspondence theory.

Other disciplines on the contrary are becoming increasingly influenced by the insights of quantum mechanics, and are making attempts to consider the consequences of these for their fields. Basically, these consequences are that the truth is not quite so absolute anymore, but has become instead a provisional truth. The public has also grown acquainted with these new ideas which have been popularised through television and books. Other areas, concerning the more serious social issues such as economics or politics, are still dominated by Newtonian views. The concepts of makeability and controllability, combined with the 'time is money' adage, create a powerful discourse on efficiency and rationalisation.

To return to the orientating function of a worldview: both mutually contradictory ideas about reality claim a 'truth' value. For a member of a community, it means that the guiding function of a worldview is not really 'working' anymore. If these discourses are to offer us any guidance, we have to conceive of them as true, not as puzzling and confusing. As the Flemish philosopher Leo Apostel and his collaborators have already understood: this confusion may well be one of the causes of the growing problems of alienation and malaise in Western society (Aerts, Apostel, De Moor, Hellemans, Maex, Van Belle, & Van Der Veken, 1994). The Leo Apostel Centre therefore envisages bridging the gaps that currently divide scientific disciplines, not with the idea of searching for one unifying theory, but to reach a common scientific statement with a necessary degree of veracity: the veracity that reality might, in essence, be manifold, and even contradictory.

As for intercultural polylogue, the starting position we take is very important within this truth-debate about reality. For example, belief in the Newtonian worldview will leave less room for bridging towards another worldview than a post-Newtonian worldview.

To conclude this part, we will repeat the definition of worldview, hoping that what Leo Apostel meant has now become clearer. In putting together the ethical and the knowledge aspects, a worldview, as a map, *explains* why something is considered to be 'good' and 'true' and at the same time *orientates us* towards this good and truth. In daily life, we can rely on this worldview, individually and collectively, to evaluate and act, and to put forward prognoses and visions of the future. A worldview is fundamental for the discourses of a society, and fundamental for its societal structure. Yet, at the same time, this worldview is influenced by societal discourses, which reflect intercultural contacts.

Worldviews and the possible difficulty of intercultural polylogue

In the previous part we elaborated on the first-order and second-order categories through which we comprehend the nature of the societal and physical worlds. We said that most members of a society are usually not really explicitly aware of the existence of such a collectively, interculturally and socially constructed worldview guiding them in relation to ethical and knowledge issues. Rather, they make tacit use of it. In an intercultural polylogue, however, a lack of awareness of the interpretational nature of these fundamental categories might cause confusion and even problems when ethical

or knowledge questions are discussed. All participants in an intercultural encounter, with different ethical and knowledge-epistemological points of view, will deeply but unconsciously take their own categories to be right or true. They may be able to question some of their own cultural manifestations, but only rarely will they be able to distance themselves from their main categories. This inevitably leads to unresolved issues on the agenda and mutual frustrations.

So we can discern opposing forces that make it very difficult to establish a genuine intercultural polylogue. On the one hand, as long as participants insist that their own basic categories are the only right and true ones, no real in-depth encounter will be possible. To bring this about, requires the skill of taking a relativistic stance. On the other hand, if participants do take such a relativistic stance, their own categories will no longer be able to serve as guidance, since they can no longer be conceived (implicitly) as *really* – ontologically – right and true. The difficult question that presents itself is therefore: how can we retain this orientating function and still be able to have a well-founded polylogue? How to combine two apparently incompatible forces? The situation becomes even more complicated once we realise that the relativist position, which is usually only adopted for the ethical guiding part of a worldview, yields a highly intricate outcome when taken to its extremes. It prevents us from taking an ethical stance *at all*. If all the ethical-cultural manifestations of the different cultures are considered equally valid, then there are no standards by which to measure what is 'good' and what is 'wrong'. Without standards – a frame – we cannot judge properly, for we will then no longer have the tools to condemn actions which we very profoundly feel to be ethically unacceptable, such as rape, child prostitution, traffic in human beings. In theory, the only possible outcome of ethical cultural relativism, taken to its extreme, is indifference.

To solve this dilemma, Charles Taylor introduced the idea of Best-Account (BA) principle (Taylor, ibid p. 73). Charles Taylor acknowledges that there is no ethical truth, in the sense of an – ontologically 'real' external truth. Truth with regard to ethical issues is always a human affair. This, however, does not mean that ethical issues are relative by definition, and that we are left with a jungle that is wholly deprived of any ethics and where everything is permitted. The following example serves to illustrate what Taylor means by the BA principle. Several decades ago, an article was written by a commission that visited Europe and whose members came from various non-Western countries. They sharply pointed out a number of weak points in our system. They commented on our habit of putting people in homes for the aged, and our overemphasis on 'sight' in seeking guidance: to them, such elements of our natural environment as parks or flowers offered for sale in shops had the feel of plastic, because they looked nice but had no smell at all and were sterile.

The observations made by this commission really touched a tender spot. One can feel their ethical 'truth' resonating deep down inside. This realisation may even trigger a change of one's ethical position, for instance, because one feels that these remarks testify to a maturity that is ethically superior to one's own viewpoint, according to which such homes are considered normal. In understanding the position of these non-Western writers, one may undergo a change, feeling that the newly adopted vision is closer to the 'truth' than one's original view.

This is what Taylor calls the BA-principle: a change from one ethical position to another through a new understanding of the inadequacy of the original viewpoint. He

coined it the Best-Account principle, because this account is temporary. The new position can in turn be challenged by another idea that we believe to be better and that touches us. The 'better' nature of this new viewpoint may well be an illusion altogether, but that is precisely why we should keep arguing and face different critics. The purpose is to grow together, interculturally, towards the Best-Account principle.

What implications do Taylor's ideas have for an intercultural polylogue? In general, to us, the success of any intercultural encounter depends on two conditions. Firstly, all participants should have reflected on their own first and second-order categories, so that they can relativise them and question both the categories themselves and their cultural manifestations. Secondly, the participants should be firm enough in their beliefs not to relativise their own categories (and those of others) to the extent that they become indifferent to or totally lose their own beacons. They may – and possibly should – convincingly stand for some of their values, as we explained with regard to Taylor's BA principle. More specifically, intercultural encounters will only have a chance of success if ethical issues are 'discussed' from within lived experiences. We use the word 'discuss' to mean more than just a mental activity. As Taylor very clearly states himself:

"The bad model of practical reasoning, rooted in the epistemological tradition, constantly nudges us towards a mistrust of transition arguments. It wants us to look for 'criteria' to decide the issue, i.e. some considerations which could be established even outside the perspectives in dispute and which would nevertheless be decisive. But there cannot be such considerations. My perspective is defined by the moral intuitions I have, by what I am morally moved by. If I abstract from this, I become incapable of understanding any moral argument at all. You will only convince me by changing my reading of my moral experience, and in particular my reading of my life story."

In closing, we wish to add one more thing. For us, an intercultural polylogue has a goal. It should in the first place profoundly deal with a delineation of self-understanding and our place in this world. Within this context, it should look for universal knowledge. This might sound odd after all we have just said, but by 'universal knowledge' we refer to its meaning within the context of the Best-Account principle. We will clarify this.

As we said before with regard to rationality, we think that most cultures will acknowledge rationality as an important category, in the sense of a reflective capacity with which to understand ourselves as humans. This recognition can now indeed have universal pretensions since the delineation is not the result of one cultural knowledge system which auto-determines its knowledge as universal, but the outcome of an in-depth and extensive process of intercultural deliberations. The knowledge about rationality is not true – in the ontological sense – because it does not re-present aspects of the world, but it is nevertheless true at a socially constructed level, where it may have this paradoxical universally constructed status.

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A holistic worldview for a planetary civilisation

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We are approaching a critical point in our collective evolution: our world has become economically, socially and ecologically unsustainable. Persisting in the values and practices of the rationalist, manipulative civilisation of the modern age will create deepening rifts between rich and poor, young and old, informed and marginalised, and human societies and the natural environment. To survive in our planetary home, we must create a world better adapted to the conditions we have ourselves created.

A Chinese proverb warns, 'If we do not change direction, we are likely to end up exactly where we are headed'. Applied to contemporary humanity this would be disastrous. Without a change in direction we are on the way to a world of increasing population pressure and poverty; growing potential for social and political conflict; escalating maverick and organised warfare, accelerating climate change, food, water, and energy shortages; worsening industrial, urban, and agricultural pollution; further destruction of the ozone layer; accelerating reduction of biodiversity; and continued loss of atmospheric oxygen. We also run the risk of mega-disasters caused by nuclear accidents and leaking nuclear waste, devastating floods and tornadoes due to climate change, and widespread health problems owing to natural catastrophes as well as to such human factors as the accumulation of toxins in soil, air, and water.

Where we are now headed is not where we want to go.

- There are higher levels of frustration and discontent as wealth and power become more concentrated and the gap increases between the holders of wealth and power and the poor and marginalised segments of the population. (80% of the world's domestic product belongs to one billion people, and the remaining 20% is shared by five-and-a-half billion, an imbalance that will only worsen, since the poor countries are paying 38 billion dollars more each year in interest than they are receiving in development aid.)
- Although more women and girls are being educated than before, in many parts of the world fewer women have jobs and more are forced to make ends meet in the 'informal sector'.
- There is a greater propensity in many parts of the world to resort to terrorism and other forms of violence to right wrongs, or at least to call attention to the perceived wrongs. There is deepening insecurity in countries both rich and poor.
- Islamic fundamentalism is spreading throughout the Muslim world, neo-Nazi and other extremist movements are surfacing in Europe, and religious fanaticism is appearing the world over.
- As governments seek to contain maverick violence by organised warfare, conflicts escalate in the Middle East, Asia, Central America and other hot-spots.
- In 2005 world military spending rose for a sixth year running, growing by 5% to $ 1.04 trillion, with the US alone accounting for $ 455 billion or almost half the

world figure. The G8 countries together are selling over 12 billion dollars' worth of arms to the poorest countries.

- Degradation of vital balances continues, in the world's atmosphere, in the oceans and fresh-water systems, and in productive soils. The consequences include the greenhouse effect with attendant climate change, and a reduction of the productivity of seas, lakes, rivers, and agricultural lands.
- There is a drop in food self-sufficiency in the majority of the world's economies, ominously coupled with the diminution of the internationally available food reserves.
- There is also a diminution of available fresh water for well over half of the world's population.

But trends are not destiny: they can be changed. Breakdown is just one of the possible futures facing us. If we wake up to the need to cope with the dangers we face and join a sense of urgency to live and act responsibly with a sense of commitment to each other and to our shared future we can still shift to a better path.

Seizing the better alternative calls for new thinking. New thinking is more holistic thinking, encompassing all the relevant factors – seeing the forest and not just the trees. This kind of thinking finds ready support in the latest insights emerging at the leading edge of the sciences.

Although it is not widely known, the worldviews based on the theories of Newton, Darwin and Freud have been overtaken by new discoveries. In light of the emerging conceptions the universe is not a lifeless, soulless aggregate of inert chunks of matter; rather, it resembles a living organism. Life is not a random accident, and the basic drives of the human psyche include far more than the drives for sex and self-gratification. Matter, life and mind are consistent elements within an overall process of great complexity yet coherent and harmonious design. Space and time are united as the dynamic background of the observable universe. Matter is vanishing as a fundamental feature of reality, retreating before energy; and continuous fields are replacing discrete particles as the basic elements of an energy-bathed universe. The universe is a seamless whole, evolving over eons of cosmic time and producing conditions where life, and then mind and consciousness, can emerge.

The emerging scientific worldview is holistic, and it can inspire the incipient holism of people as they search for more integral ways of living, eating, healing and consuming. The new worldview must reorient the basic ambitions, goals and priorities of society, in the public as well as in the private sphere. This reorientation can be grasped in reference to a shift from the extensive to the intensive form of growth. Growth is not necessarily bad or even limited: the desirability and the future of growth depends on what kind of growth we are embarking upon. Unrestrained, purely quantitative growth in energy and material production and consumption is not possible on a finite planet with a delicately balanced biosphere – ultimately it is bound to turn into growth of a cancerous kind. But there are other forms of growth as well. We shall distinguish two principal kinds: one is 'extensive growth' and the other 'intensive growth'.

Extensive growth moves along a horizontal plane on the surface of the planet: it conquers ever more territories, colonises ever more people, and imposes the will of the dominant layers on ever more layers of the population. Intensive growth, on the

other hand, centres on the development of individuals, and of the communities in which they live.

The ends of extensive and intensive growth are radically different. A basic end of extensive growth is the extension of human power over larger and larger areas. Traditionally, the means to achieve this end has been conquest: the conquest of nature and the conquest of other, weaker or less power- and domination-oriented peoples. Successful conquest led to the colonisation of other tribes, nations, cities and empires, subjugating them to the ambitions and interests of the conquerors. For most of recorded history this was accomplished by force of arms. Since the second half of the twentieth century it has also been attempted by economic means, using the power of wealthy states and global companies to impose their will and values on wide layers of the population. For states, the goal of extensive growth is territorial sovereignty, including sovereignty over the human and natural resources of the territories. The corresponding goal for global companies is to generate demand for consumption, often without much regard for the social and environmental consequences.

The paramount end of extensive growth can be encapsulated in three 'Cs': *conquest, colonisation,* and *consumption*. This end is served by corresponding varieties of means: first, the technologies that use and transform matter, the technologies of *production*; second, the technologies that generate the power to operate matter-transforming technologies, *energy-generating* technologies; and third, the technologies that whet people's appetite, create artificial demand, and shift patterns of consumption, the technologies of *propaganda,* PR and advertising. The first of these kinds of technologies built habitations with networks of transportation and communication, and increasingly powerful production structures for a growing variety of products. The second harnessed the forces of nature to drive these technologies. And the third produced the demand-provoking images and the subtle or not-so-subtle means by which the producers of products and services impose their will on clients and customers.

In intensive growth the end is very different. It can be encapsulated under three other 'Cs': *connection, communication,* and *consciousness*.

Let us take connection first. One of the great myths of the Industrial Age has been the skin-enclosed separation of individuals from each other and the disjunction of their interests from the interests of others. The former aspect of this myth has been legitimised by the worldview based on classical physics. Like the mass points of Newton, humans appeared to be self-contained, mutually independent chunks of organised matter only externally related to each other and to their environment. Classical economics reinforced this myth by viewing the individual as a self-centred economic actor, pursuing his or her own interests, harmonised at best with the interests of others through the workings of the market. The contemporary sciences no longer support this view. Now every quantum is known to be subtly connected with every other quantum, and every organism with other organisms in the ecosystem. In turn, economists know that there is a decisive connection between the interests of individuals, individual states and individual enterprises, and the workings of the globalised international system. In our world these embracing connections are evolving rapidly, and it is one of the ends of intensive growth to order them, creating coherent structure in place of random proliferation.

The second aim of intensive growth is directly linked with the first. It deepens the level of communication and raises the level of consciousness of the communicators.

Communication unfolds on multiple levels. First of all, we need to communicate with ourselves, caring for and developing our consciousness and personality. People who are 'in touch with themselves' are better balanced and more able to communicate with the world around them. We also need to be in communication with those who make up the immediate context of our lives – family, community, and work or profession. Still wider levels of communication are equally necessary: communication with other people, whether near or far, in our own community and in other communities, countries and cultures.

Communication calls for connection, but on the human plane more enters into play than connection: communication also involves *consciousness*. The full potentials of human communication unfold when the communicators apprehend the strands of connection through which they communicate. A high level of communication calls for a high level of consciousness that enables people to make use of the many, sometimes extremely subtle, strands of connection that bind them to each other and to their environment. Consciousness of these connections lifts human thinking from the outdated ego-centred level to the urgently needed community, ecology, and planet-centred dimension.

Einstein said that we cannot solve the significant problems we face at the same level of thinking at which we were when we created the problems. He was right: the problems we face today cannot be solved at the level of thinking that gave rise to them. We need new thinking – an evolution of our ideas, feelings, values and perceptions: an evolution of our consciousness. Addressing a joint session of the US Congress in February of 1991, Václav Havel, who was then president of Czechoslovakia said, '*Without a global revolution in the sphere of human consciousness, nothing will change for the better . . . and the catastrophe towards which this world is headed – the ecological, social, demographic, or general breakdown of civilisation – will be unavoidable.*'

Havel's point is well taken, but it is not a reason for despair: the breakdown of civilisation can be avoided. Human consciousness can evolve. At the innovative margins of society, in the alternative cultures, simpler lifestyles and more responsible ways of consuming are emerging. A holistic worldview is taking shape, one that perceives the human being as an organic whole, embedded in the socio-cultural sphere, embedded in turn in the wholeness of the biosphere. It is the task of every moral and responsible person to further the shift toward intensive growth by evolving his or her own worldview and consciousness.

We have to learn to think in a new way

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'All, equally, are in peril, and,
if the peril is understood, there is
hope that they may collectively avert it.
We have to learn to think in a new way.'
From the Russell-Einstein-Manifesto, 1955

Starting situation

The first fission bombs were used in 1945. In great consternation, Einstein called for a fundamental political re-orientation to make wars impossible in the future. But he did not achieve visible success: the development of fusion bombs and other weapons of mass destruction increased the deadly potential of weapons to almost unlimited dimensions and became a mortal danger for all of humanity.

Fifty years ago, prominent opposition movements formed all over the world to stop this arms race. Bertrand Russell formulated a manifesto, and Einstein signed it shortly before his death. It was an ultimatum calling for *a new way of thinking* that would ensure that, in the future, war would be completely banned as an instrument of politics and conflict resolution.

What has become of this urgent call?

In particular, it awakened groups of citizens, who attracted attention and launched their own international initiatives all over the world, initially as the peace movement, later as the environmental and third-world movement, and women's movement. In many ways, these groups courageously practised a new way of thinking. They thus played an outstanding role in the process of reconciliation among the European nations and in particular, in the successful non-violent ending of the cold war. Their insights and experience are the fertile soil for this paper.

The history of the last fifty years has clearly shown that military strategy, with its culmination in nuclear, chemical and biological weapons of mass destruction and their special use against sensitive targets is only one expression of a much deeper-based power strategy with new military, political, and above all economic components. These have led to an escalation of structural violence and terrorist reactions.

Probably the most important factor today is the structural violence exerted by the centralised economy and by the financial industry, which forms a closely entwined network around the world. Economic power has managed to seize primacy over military power and to make the latter its complete servant, with deleterious

[1] Based on Potsdam Denkschrift 2005, together with Daniel Dahm and Rudolf zur Lippe, edited by Compas for the workshop Moving Worldviews, November 2006.

consequences. And this has not happened coincidentally, but consciously and intentionally. It is widespread opinion that a growing concentration of power is a precondition for a stable world order. Meanwhile, that order's neutral international anchoring, formerly regarded as an indispensable prerequisite, is in danger of becoming meaningless.

Structural violence in economic life arises from the power interests of the hegemonic powers in combination with the worldwide hegemony of international finance capital. The geopolitical, socio-cultural, and economic power strategies, as well as the unlimited expansion of modern business and production, necessarily provoke and create incompatibilities with the spatial and material limits of our biosphere. These result in life-threatening changes in micro- and macro-climatic conditions, in the deterioration of soils, in damage to the hydrosphere and in the rapid, destructive exploitation of exhaustible mineral and energy resources. Particularly dangerous in this is the destruction of biodiversity, which is proceeding at an accelerated rate. The annihilation of the bio-ecological diversity of whole complexes of life is an irreversible loss for the geo-biosphere and for us humans as the 'top rider' of the pyramid of life. The variety of human ways of life and cultures is similarly becoming irreversibly reduced – and with this loss, the spectrum of possible future strategies and lifestyles, changes and developments is diminishing.

But the recognition of these facts remains superficial, because they reveal only dangerous symptoms and existence-threatening syndromes, which must be corrected and healed. The uncovering of the deeper causes of these dangerous developments has been neglected. The globally adapted power strategies are closely tied to our materialistic-mechanistic worldview (also called the Cartesian-Newtonian worldview). This view of the world, in which the world resembles a physical clockwork operating in accordance with strict laws is itself the result of and legitimation for a historical development. Power-seeking patriarchal hierarchies and monotheism play an important role in separating humankind from the realm of nature. The strategies that believe that there are no limits to what can be done are based on successful scientific-technological development of our civilization. The knowledge necessary for this is provided primarily by the empirical sciences, which are based on the principle of the material world as 'reality' (a reality of objects) and which project it (especially via the political, social, and economic sciences) onto all aspects and processes of life on earth.

Invitation to think further

'We have to learn to think in a new way.' Taking this challenge seriously actually means setting off on a path of learning. The essential orientations are both calling for a turn back, and encouraging different alignments. But thinking in a new way also means becoming familiar with other forms of thought than those of the problematic, prevailing conventions. Even our use of language requires further development. To achieve conceptual precision, the various scientific disciplines have defined their content in ever more specialised ways, thus creating their own respective idioms. Achieving understanding across the boundaries that we seek to overcome can thus become truly difficult. But we must be aware that our world, the *Wirklichkeit*, that we

want to trace with this new way of thinking, no longer turns out to be a theoretically closed system.

This paper is, first of all, devoted to the memory of Albert Einstein. A century ago, the great physicist prepared the transition from an old physics, triumphant without competition, to a strange, new physics that seemed paradoxical even to Einstein. The Denkschrift's occasion is the great drama of our epoch: that this exciting new physics not only opened up a different view of the world, but also, that it decisively led to the technological development of super-weapons that, ever since, have threatened the existence of humankind and much of the biosphere. We recognise that, to effectively counter this threat, we must fundamentally correct our current behaviour. But how can we do this? We believe that it is precisely the revolutionary new insights in physics that could provide a starting point for defusing and solving the problems: The dramatically changed and expanded instrumental knowledge must urgently be joined by the accompanying orientation knowledge. This will be *our* approach.

But in general, the Denkschrift is meant to serve as a catalyst to stimulate others to think in a new way and to encourage them to ask themselves how the narrowing of thought and of language can be overcome and the underlying contexts perceived more comprehensively.

A new orientation is necessary

From the materialistic-mechanistic worldview to a mental-vital cosmos

Max Planck's astonishing description in 1900 of light radiated by heated bodies and Einstein's subsequent Nobel Prize-winning insights of 1905 indicated the particle-like structure of light, the existence of light quanta, which stood in contradiction to the wave-like character of light established by Faraday and Maxwell. Twenty years later, Louis de Broglie reversed this incomprehensible 'wave=particle' ambivalence with his recognition 'particle=wave' as a necessary prerequisite to explain the strange behaviour of the electrons in the electron shells of Bohr's model of the atom.

Werner Heisenberg, Niels Bohr, Max Born and Wolfgang Pauli finally resolved the paradox of this 'quantum physics' in 1925 with a radical re-interpretation of the dynamics. It demanded a revolution in what had been the classical view of the world, with the surprising recognition that matter is not really material at all, but a web of relationships, a kind of Gestalt, or in a certain way 'information' without any carrier. The assumed fundamental ontic structure of the world, based on a primally existing substance, was rendered invalid. It must be replaced by a 'cosmos' where the first questions to ask are no longer 'What is?' and 'What exists?', but *'What happens?'* and *'What binds?'* More precisely: instead of the world assumed until then, a mechanistic, thing-filled, temporally determined 'reality' (Latin, res = thing), the actual *Wirklichkeit* (a world that *wirkt,* that effects or affects!) turned out to be 'potentiality'. The 'reality' is an indivisible, immaterial, temporally essentially undetermined network of relationships that determines only probabilities, differentiated capacity (potential) for a material-energetic realisation. The classical 'reality' of material/object-like separated things emerges only through a coarsening averaging of the potential, thus turns into a holistic, temporally essentially open, immaterial, inseparable omni-connectedness.

In 1928 Paul Dirac further developed the quantum theory into a 'relativistic-invariant' quantum mechanics, which takes into account the consequences of Einstein's 'Special Theory of Relativity'. Dirac's theory necessarily led to a 'multi-particle theory' and ultimately to the more comprehensive 'quantum field theory'. The latter includes processes of the spontaneous creation and annihilation of 'particles' (or better of 'haps' as elements of 'happenings'). To the already postulated indeterminism (the temporally essential openness), this added the new characteristic of a genuine creativity (which is more than an 'evolution', a mere unfolding of a determined future) to the relativistic quantum world. The combination 'open/creative' arouses more associations with living systems than with dead matter, so that 'pre-living' seems a suitable abbreviation.

The creative, immaterial, omni-connected constitution of the *Wirklichkeit* in this relativistic-expanded form permits us to grasp the inanimate and the animate world as merely different articulations ('haps') of such a 'pre-living' cosmos: on the one hand statically stable, on the other, open and statically unstable, but dynamically stabilised.

Due to its opening up, natural science's new, deeply changed interpretation of the world proves astonishingly suited to build bridges between scientific disciplines otherwise drifting apart and, to make possible a close connection to the arts and religions. It prepares the ground for a new, expanded common direction of thought. But there is a far-reaching limitation: the natural sciences, too, must accept that their objectifying (analytical) knowledge, which they imagined to be exact, is limited in principle, and not merely in the sense of 'not yet knowing'. The *Wirklichkeit* is not unlimitedly knowable. For this reason, also physics, as the foundation of every natural science, like other disciplines and forms of interpretation, ultimately can speak only in parables and analogies about a *Wirklichkeit* that is fundamentally ungraspable, not object-like, but describable mathematically (in terms of relations). This also means that we always come up against limits, past which we can no longer express ourselves by means of our colloquial speech. The mathematical description of the unmanifested potentiality can be experimentally tested in terms of its consequences for the manifest, thing-like/factual reality. So we are not thrown back to complete chance. The opening that is expressed in an (infinite) indeterminacy of future realisations is not completely random, but occurs within fixed tendencies characterised particularly by symmetries in the dynamic relationships implying strict laws of conservation (for example, the conservation of energy in all processes).

The ecological, economic, and cultural crises confronting and seemingly challenging us beyond our capabilities today are the expression of a far-reaching mental crisis in the relationship between us humans and our living world. And this is essentially connected with our refusal to accept – not merely formally, but consciously – this discovery of the character of the *Wirklichkeit* in the scientific context. This forces upon us a modesty about what can be known in principle. Our reluctance, however, can easily be understood. This expansion of the 'inanimate' phenomena remains essentially without graspable consequences in the context of our objectifiable everyday experiences (laser light would be a counter-example). This is why reductionist natural science, with its strict laws and the resulting predictability and manipulability, initially seemed to remain valid without limitations within this limited area of experience and thus to heuristically justify the idea of a materialistic-mechanistic world.

For the energetically open, animate manifestation of reality, to which human beings also belong, the materialistic-mechanistic world can be connected with a mental or spiritual dimension.

The surprising peculiarity of the phenomenon of life lies in its sensitivity (resulting from unstable balances), which permits it to trace and 'receive' the 'pre-living' ground of being. This corresponds to a refinement of the accustomed chaos theory, in which chaos, till now conceived as 'determinate', is replaced by quantum-physical 'fluctuations' (a highly correlated 'wiggling'). A 'new' thinking requires us to make discoveries beyond the apparent laws of nature, which were necessarily strict in the old thinking, precisely this pre-living diversity and openness that we lose in the coarsened, 'graspable' oversimplification of statistical averages.

Such a new way of viewing opens up the possibility of believing in a genuine creativity and gift for intentional action in relationship to the community. It provides the basis, on the one hand, for our striving for freedom and the development of individuality, and allows us to be different. And this, without losing the underlying omni-connectedness.

Modern scientific knowledge and traditional insights

The modesty demanded by the new insights teaches us that the new natural scientific knowledge and its consequences can hardly be called 'revolutionary', as it might appear to many modern people whose thoughts are oriented toward aspects of the Enlightenment and the reductionist science based on it. We find this 'new knowledge' confirmed in one way or another in the broad spectrum of cultural knowledge, in the diversity and forms of expression of human life in history, and in the broad diversity of living and cultural realms.

We can thus regard the 'new' knowledge presented here as an additional scientific confirmation of the diverse ethical and moral value systems of other cultures.

Consequences of modern insights for our world of experience

Inadequacies of the materialistic-mechanistic description

It seems appropriate that a coarsened summary view of the immense number (in the order of magnitude of 10^{24}) of micro-physical processes is aggregated in the 'things' we perceive. The overlaying of all these processes leads in the coarsened average to the customary classical, materialistic-mechanistic description. This tempts us to extend the classical description undifferentiatedly to *all* objects of non-microscopic size, so that averages are precise enough. This, in fact, is the reason why most people regard quantum physics and its new insights as a phenomenon solely of the micro-world and whose consequences need not concern us in the comparatively huge meso-world of our daily life. But this is generally not permissible when the collections of atoms (or better: 'haps') are not in proximity to their stable (thermodynamic) balance. If they are very far away from these states of balance, especially in proximity to instabilities (chaos points), then the averaging is foiled usually on a number of levels; this makes

the immaterial, information-bearing, pre-living connections that dominate the micro-world more or less effective on the meso-level. Instability functions as an enormous amplifying factor. This situation characterises animate nature as we encounter it in everyday life.

If we – at considerable risk – apply this consideration to the human as a living being in the mesosphere, it has far-reaching consequences for our dealings with our living *Wirklichkeit* and for our relationship to our animate and inanimate environment. The individual person, like everything else, is in principle never isolated; his or her merely seeming smallness is at the same time infinitely involved and significant in the omni-connected shared world. The many influences and impulses from other people and our geo-biosphere affect all of our activity, and not only via the bridge of material-energetic interactions mediated by our senses, but also directly through the immaterial potential connectedness common to all. Our activity in turn equally influences the entire societal structure and changes the constantly changing potentiality of the living *Wirklichkeit*. The uniqueness of the individual is thus a 'load-bearing' component of the process of common cultural evolution.

From the many-layered manifestations of the animate world, we can learn how diversity and plurality mutually combine in living complexes and develop into higher-dimensional vibrancy. Practically, this leads to greater flexibility, which is thereby a life-serving consequence of cooperative integration and less, if we interpret it in the usual Darwinist way, the actual cause of successful higher performance of one or more individuals. Here, higher-dimensionality means an extension of different qualities. Humans and human communities with their cultural and societal worlds of ideas, their creative processes, and their lively exchange constitute a special, deeply connected sphere of the animate world. Making such comparisons is not 'biologism' in the old sense, which still carries the meaning of determinism and mindlessness, since the pre-life level is an essential aspect of everything, including the thing-like 'reality' that is usually grasped as 'dead'. The proximity to a mechanistically narrowed naturalism may create misunderstandings, but the new insights require us to reach a more comprehensive understanding of our *Wirklichkeit* in a fundamentally new way of thinking in which we humans, too, understand ourselves as threads in the fabric of life, without thereby having to sacrifice any of our special qualities.

In contrast to the strictly closed systems, like those that can be constructed especially in the area of the inanimate, in which (in accordance with the Second Law of Thermodynamics) 'what is more probable will more probably occur in the future', our new insights teach: in the temporal development of an open world in which partial systems are dynamically maintained in unstable balances by the constant addition of useful energy, 'the improbable must no longer remain improbable'. Here, self-organisation opens up an unlimited field of possibilities. Life can thus develop into unexpected, ever richer, ever more complex forms. Pre-life then organises itself in the diversity of a 'higher' bio-ecological vibrancy, such as we encounter 'life' in the mesosphere of our daily life.

The insights into the micro-world suggest an interpretation of the world that leads us beyond the materialistic-mechanistic worldview. For this reason, the significance and orientation of the natural sciences must be fundamentally reconsidered. The new insight leads from a substantialist view (primarily shaped by static substance) that claims to find definite initial causes, to a thinking that takes

living, creative relationships as its starting point. These insights, which other sciences, too, have meanwhile adopted, call into question the meaning of 'science' as it has been taken for granted until now. This also suggests a new political use for the sciences. The transformation of the sciences and their structures of knowledge that is needed fundamentally requires dialogue between all cultures and religions.

Roots of an ethic

This newly-gained (but already old) knowledge of the world shows us a new ethic that opens up a new future for a more comprehensive new 'naturalistic' worldview and a less isolated view of humankind. A view where, humankind – like nature – is not merely a 'biomachine', but is embedded in a 'creaturely' way in a process of life that genuinely differentiates and constantly develops.

The dualism between matter and mind is thereby rendered obsolete. The alternatives in the 19th century were a 'positivistic explanation of nature' and a 'Christian Creator-God and world ruler'. In both systems, humankind was contrasted with nature, which Man could and was permitted to subjugate, whether justified by divine destiny or by evolutionary superiority. We leave this false alternative behind us and gain access to a consciousness of omni-connectedness, a consciousness that the natural sciences open up for a non-dualistic view of the world. This makes it possible to recognise humanity in fundamental commonality with the rest of nature.

For a long time, we have tested far too little whether civilisational goals are compatible with the conditions of the world around us. The geo-biosphere's balancing paths play out over time periods and in processes of change that are respectively very long and extremely complex for us humans. To the degree that our reason has provided us with tools and strategies for such far-reaching and consequential action, we humans have stepped outside of the very dense interactions in which the rest of nature lives in an unceasing interplay of changes. How can we, as a species in its many different communities and societies, behave toward the rest of the world so that we act responsibly for our own development and that of the geo-biosphere?

Where the sciences, too, explain our dependencies and commonalities with the conditions of the earth as a site for life, gratitude can grow as the sustaining possibility for us and can train our sense of commonality. This gratitude expresses itself in joy at 'being alive' in life. Another answer is thus needed.

Here we need to go beyond reason and, to redress its imbalances, make use of our capacity for good sense. Good sense is humankind's mental organ for perceiving relationships complexly and for including and placing ourselves in them. If reason tries to fulfil the demand for precision, good sense proceeds with value judgments based on the demand for relevance. Good sense tells us that we have freedom and are not simply bound in relationships. But in good sense it is equally clear that, in the realm of freedom, we need a specific form not only for using the world around us, but also for feeling it and answering it. This is love. With our interventions in the world, we answer our coexistence with everything else, on the one hand, and our freedom, on the other. Grasping our own existence as an answer and as a commonality out of human freedom is the feeling of love and the dedication to responsibility.

A fundamental ethic is thus rooted in the conditions of being human, the 'conditio humana' itself. We develop binding rules out of our knowledge and our always new decisions under changing conditions. But this ethic is not normative in

origin. Nor is it primarily negatively limiting; rather, it understands itself as the specifically human answers to the world's invitations. This is also the original wisdom to which all religions give their own expression. The specific way that humans have of viewing the world and of connecting with it is thus also a precious, irreplaceable contribution to evolution, to the world consciousness. That is why we should preserve the world also for humankind; bio-ecologically, the world would doubtless continue to bring forth ever new developments even without us; but human perception and interpretation opens up a new dimension, a mental-cultural sphere all its own.

Man and society in confrontation with expanded reality

The mechanistic-deterministic worldview of classical physics, with its reductive way of thinking, has been adopted for much of Western scientific and political-strategic thinking.

This world of thought did not begin with classical Newtonian physics, but it found its rational legitimation in it. The power strategies – behind which a centralistic worldview strives to homogenise the world of thought – escalated as early as the 15th century to unprecedented dominance in the Western/European colonisation of almost the entire known world. This was followed by the one-sided monopolisation of the mental, living and material resources of our earth by the European-moulded power centres. The uniformity of ideas about the knowledge society is still legitimated by the notion of a rational objectifiability of the *Wirklichkeit* on the basis of secured scientific foundations. Where conflicts arise, a lack of instrumental knowledge is diagnosed and compensatory delivery is prescribed. The foundations of this orientation are seldom questioned, though there is reason enough to do so.

The old principles of violently taking control of others, and ruthlessly pursuing ends, which classical physics so successfully carried out in dealing with inanimate nature, shape the image of what humans are and of the homogeneous nation-state, as well as ideas of good sense and people's perception, the relationship to the arts, and the demands placed on logic. This reductive way of thinking manifests itself in the limitation of human knowledge and judgment to exclusively cognitive competences. While the creativity of the unconscious is denied, the treasures of pre-lingual experience remain unused for individual development, and powerful emotional barriers can continue to exist.

Accordingly, modern societies are actually in a 'cold war' against diversity and change, difference and integration, open development and movements to balance through risks and opportunities; a 'cold war' against everything that is the source of living evolution in nature – down to the 'pre-living' ground that sustains us and all of life.

The materialistic-mechanistic description was undifferentiatedly imposed upon all forms and complexes of life. Initially this took place with the exception of humankind, 'created in the image of God', or of a specially chosen group of people,

among whom one counted oneself. It produced the fiction, so long successful in the inanimate world, of a controllable reality.

Modern physics, through the new technologies it made possible, was the trigger for many of the developments now threatening us. The instrumental knowledge resulting from it was used to secure the old orientations. The orientations newly emerging from new scientific discoveries were screened out and hardly taken note of.

The strategies of modernity have taken us into a development that is hostile and antagonistic to life, into an opposition between cultures and religions and between economic regions and centres of political power. One of the clearest expressions of this is today's economy, whose powerful representatives proclaim a fatalistic *'There is no alternative!'* in analogy to the determinism of the mechanistic worldview and the image of humanity that accompanies it. Economic-monetary centralisation and a dangerous gap in living standards and in access to public goods (water, energy, information, etc.) go hand in hand with political and civil-societal instabilities and escalating potentials for conflict.

The ecological danger facing humanity in the 21st century – the destabilisation of the biosphere and the destruction of closed circulatory processes, including the exploitation of existing natural resources – is probably history's greatest challenge. The increasing risks of violent military and structural conflicts on all social, economic and spatial levels deeply threaten the ability of human communities to act and cooperate. Conflicts over the distribution of affluence, access to public goods, and the rights of individuals and communities endanger the fundamental structures of humanity's cohesion and developmental potential. Ignored in all of these areas are the many possibilities of a living world that, in creative processes of a continuous differentiation and simultaneous or successful integration of differences (a positive-sum game), grow into an organic, diverse form of life in which the whole is greater than the sum of the parts. Which means: *'Many other worlds are possible – the future is essentially open'*.

Quantum physics challenges us to fundamentally emancipate our thinking so that flexible relationships can take its place. This will lead to a gentle dissolution of the monostructural, centralistic constructions that are the expression of the materialistic-mechanistic worldview. It is precisely this clinging to outmoded, rigid modes of thoughts that produces the catastrophes today and, in a vicious circle, prevents simple solutions, because the instruments available in the vicious circle are not adequate or suitable for breaking it apart. Abandoning the mechanistic assumptions will lead to a break down of the one-sided interpretation of evolution (as a culling at the 'end of the pipe') and the existing conceptions of homogeneous nation-states. The annihilation of all other values through the mechanism of the markets, where the strength of power demands absolute priority over development and justice, loses its justification.

Continuous change is a characteristic of cultural evolution and a criterion of cultural sustainability. If this element is lacking, a cultural model's rigidification to the point of collapse can be predicted. If cultures bind the ability to change and to engage in an evolutionary process to economic systems that are primarily attached to material prerequisites, then further cultural development can take place only within the limits of the material world. When these limits are reached, the result is cultural-evolutionary standstill. The only way to prevent this is by subordinating the respective economic model to the culture again: the economy must be made an instrument of the culture

again, instead of having the economy instrumentalise culture to exploit the world. When this has taken place, then the economy can be changed and dematerialised to a greater extent. Only a qualitative change can thus lead to new development and new employment.

Challenges for our thinking and acting

Overcoming the separation between man and nature

We must learn that, like everything else, we are not only parts of this wonderful earthly geo-biosphere, but also participants and partners, inseparably connected with it. This is also true for nature in the usual sense, which we disconnect from us and call our surroundings, materialistically perceiving in it only the provider and disposer of material and energy for human purposes. We must abandon certain mechanistic strategies, reductions and averaging, and replace them with mobility, openness and empathy, in order to provide space for creativity and action for all. This will open for us a creative vitality, integrated through organismic cooperation. It provides the basis for an ever more vital and more diversely connected, powerfully innovative evolution. It is creativity, in an open world that opens up an immense variety of successful styles of living. An ever more vibrant being takes the place of a rigidified affluence of possession; and individuals gain growing openness in their intense partnership and their supra-temporal, supra-spatial embeddedness in the living association of the earth. This dynamic interplay between people and their living world creates a true well-being, fostering and challenging individuals in their whole being.

The phenomenon of life draws its capability for continuous creative differentiation from its 'pre-living' (microphysically cognisable) primal ground, whose 'information' rises, amplified through instabilities, into the meso-sphere of higher vitality, there creatively developing into richer and more intense form. Bio- and cultural-ecological diversity, with its processes of change and balance, ultimately results from this context.

This must and can lead to a new kind of thinking that connects the fullness of our perceptual ability and mental movements, and acknowledges both conscious and unconscious motives for human action. This indicates a new evolutionary level on which a complex perception of reality creates the foundation of our thinking, feeling and acting. In this way, we can change our goals and strategies into patterns and movements of adapted effect.

Cooperative integration in a common 'game'

Our ecological, economic, cultural, social and personal relationships with each other and with the complex geo-biosphere will change under the influence of a truly newly connected, decentralised-cooperative thinking and express itself in new activity that can effectively stand up to our world's crisis and threat.

The patterns of organisation and strategies of living structures, grown in interaction with the moving living complex and dynamically adapted over billions of years, show us forms of behaviour to organise a decentralised-dynamic, multi-celled, interplay of living entirety on earth. The complementary and organismic interplay of

what is diversely differentiated and continuously changing offers a recurring, strategically successful basis for a cooperative-constructive com-petition (a seeking of solutions together) – for a positive-sum game.

Here we consciously use the open term 'game', which balances conditions and possibilities in alternating steps, in place of 'system', which, despite all cybernetic refinements, still presupposes rigid structures, rather than truly flowing balances, i.e., vibrancy. For this reason, the heterogeneity of people's and cultures' needs, the variety of their traditions and historical agreements, their rituals and forms of play, but also their hierarchies and ideas of power, must be reflected in our systems of exchange, means of production, and strategies, as well as in the rules of com-petition and recognition. The larger the pool, the greater the adaptability. The more diverse the spectrum of cultural manifestations and the more diverse the potential to adapt to changing conditions, the greater the spectrum of adaptation.

Ecological and cultural diversity promotes the evolution of styles of living open to the future in communities fit for the future. To this end, we urgently need a further and also new development of the legal framework that ensures fair rules of the game and that is subject to civil societal feedback in constant discourse. The one-sided dynamics of capital, which is expressed in shifting private costs onto nature and society, must be strongly counteracted to rebalance through such agreements about the common 'game'. The goal of future justice and responsibility must be strategy-forming for cultural, social, and economic policy.

To combine diversity and vitality into a creative process of differentiation experienceable in daily life, we must create a dynamic system, changeable through interaction, of dialogue and exchange. Dialogue and exchange are needed with those who are different and with those who are socially excluded. They must be installed and constantly adapted in the institutional and spatial overlappings between the cultures. In this way, tension and conflict can be dynamically cushioned, balanced, and shifted toward moving discourse. By understanding how to decipher the differences in languages and forms of behaviour, we can develop strategies and forms of organisation to work together to balance interests.

Decentralisation and creative exchange among people

One key to ensuring the supply of goods needed for life is integrative cooperation between the plurality of economic exchange strategies among people, communities, and their natural environment, as well as the pattern of distribution in production, use, and supply. The development of new, decentralised and polycentric patterns of production and supply take priority.

Regionally, locally and in neighbourhoods, the creative productive power must be able to unfold its life-preserving effects, which secure people's and their communities' independence, pride, and suitable ways of life. Economics must measure up to its local and regional socio-cultural relations, strategies, traditions and needs if it is to do justice to those needs and be sustainable. To this end, the greatest possible degree of decentralised supply sovereignty and subsistence must be achieved. The cooperative interplay of market, state and civil forces must function in cooperative integration. An essential precondition for this is an optimal and flexible complementarity between plural economies of local, regional and continental importance, in synergy with intercontinental supply infrastructures for goods and

services produced in a global division of labour. Efficiencies must also be socio-economically thought through; to be truly sustainable, direct and indirect ecological efficiencies must integrate temporal and spatial changes and differences. Social, economic and political processes must thereby be decelerated in order to enable regeneration, reflection and pro-activeness in all areas and to permit an adequate dynamic stabilisation.

Constraints exist only in the material limits of our site of life, the earth; the mental-cultural realm can grow with us without limits.

Man and earth

Spatially and temporally, the earth's ecological foundation has the character of a community. It must not be centrally administrated or monopolised, whether privately, by the state, or on the supra-state level. It inherently belongs together, which is expressed in coexistence and interaction as well as in the balanced interplay between the connected and the permeable. That there is a tendency today for big capital to monopolise common goods must not mislead us into accepting this tendency as impossible to overcome. We humans must change our thinking in order to make use of imaginative possibilities in our activity, rather than arrogantly enforcing ecologically impossible preconditions by violence. Everyone has the same share in the totality of the common foundation of life, the earth; and wherever they live and work, they have a trustee's duty – on all levels from the local to the intercontinental – toward the global common goods.

The ecological-material preconditions on earth differ greatly for different people and different cultures and are subject to great spatial and temporal changes. In the same way, the ecological embeddedness of people and cultures spans spaces and times and cannot be treated in either geographic or historical isolation. Ultimately, everyone is subject to the effects of all the interventions in the geo-biosphere. Against their intention, the global economic strategies have made this consequence evident. Historically, the colonial powers claimed the living spaces around the earth as their own. Their grandiose failure toward the commonality of the earth prepared a global homogenisation of models of well-being and lifestyles, ways of thinking and forms of cultural exchange. Their current successors must now accept as fact the politically and economically falsely forced unity of the world (through the reduction of the diversity of culturally different economic and social strategies and forms of organisation). The historical separations of humanity and its cultural realms in local and regional units are suspended by ruthless interventions in the general geo-biosphere. This is happening in reality, while the new thinking in quantum mechanics is teaching us to always see the overarching contexts of what is separated.

To ensure global supply, with justice toward people and communities, com-petition – cooperative rivalry – can develop constructively and protectively only through innovation and creative productivity (but not in material tests of strength) through the use of the dynamic forces of a cooperative-dialogical interaction between the earth's cultures and people. The full, cooperative possibility for development of people and of their own particular potential in activity and work must thereby stand in the centre of individual and common interest. Only in this way can a truly strengthening connection between the personal and the communal be achieved. The creative-inventive potential that is expressed in the individual particularity of one's

own path increases the stock of ideas and developments for a variety of styles of living and of new and further developments of what already exists; it is thus of irreplaceable value.

The future grows from dynamic diversity

The knowledge of cultural diversity, the fullness of our continuously growing treasure of information and creativity, and the diversity of different ethnic groups' and nations' accesses to reality are common goods to be protected, though in their own special ways. We want to reach a state in which we no longer administer scarcity with ever more compulsive strategies, but in which we shape a diverse future in consciousness of the possible fullness. Where today we continue to narrow our freedom of action, being human in the truest sense can grow out of cooperative interplay in the diverse commonality of cultures, people, and styles of living.

What can we learn from this and what can we do?

Deepening consciousness

The fatalism of mechanistic thinking turns out to be ideology. The mentally-living Wirklichkeit is inherently open; it proves to be more complex and dynamic, more creative and playful. In this way, in the 21st century, new paths are opening up to expand our perception of the Wirklichkeit and to let us recognise our own life, our individual path and our creative power as meaningful, connected and important for the future.

A new thinking can start only from truly individual people, from homo sapiens in his full, emotional and mental constitution. It demands a deepening of our consciousness. It is not so much inability in principle, but rather loneliness and smouldering fear that prevent people from exploring their own consciousness.

Today, few people speak of the mental/emotional poverty of people in the highly-developed, industrialised countries, who no longer find time for themselves in the bustle of daily life and who seek to suppress awareness of their spiritual neediness through increased material consumption and expanding security measures against external dangers. While in many parts of the world, the inventive energies of people must be liberated from the constraints of rigidified communities and cultural dogmas, modern individualism, which historically made individuality possible, is degenerating into a dismal isolation and fragmentation of the commonality.

But how should this process of people's self-alienation be halted, and how should their self-confidence and self-trust be strengthened? How can an enlivening of our life forces overcome the fear of change, which has already become a fear of life?

We urgently need vibrant examples. These are not only teachers or spiritual leaders to guide other people on specific paths; rather, all of us are also insightful people who can remind each other of the capability inherent in us that has already been successfully lived in many lives since primeval times. It is only waiting to be re-awakened and to become creatively effective through us. As a species, we can avail ourselves of it in a common dialogue and a learning culture of mutuality.

The societal institutions to support these life stances must grow out of and be strengthened by this shared conviction. In comprehensive treaties, the constitutions of democratic societies, the supra-state agreements of the peoples of the world, the core messages of all world religions and cultures, and also in the new global, civil-society initiatives (like the Earth Charter) we find attempts to put these commonalities into words. The only differences are the languages in which it is expressed and the parables used to illustrate it. Their diversity produces the differences and uniqueness of their approaches and situations. And this expresses itself also in different interpretations. But they are not incompatible in their contradictions; rather, they reflect above all the inadequacy of conceptual languages and our limited ability to learn from and with each other.

Freedom and participation

It is high time to implement a new thinking in a new activity. To this end, parallel new institutional, individual and societal developments are necessary. The current strategies for the economic, political-cultural, and ecological interplay between people are dominated by centralised power structures that we can and should replace.

The immaterial basic provisions needed to ensure the possibilities of individual and cooperative development include:

- political and social participation on a level as close as possible to those involved;
- comprehensive political contribution from everyone in their respective competencies;
- the strengthening of local decision-making processes;
- the institutional and infrastructural preconditions for emotional and spiritual development; this applies to education and training;
- the opportunity to share in humanity's pool of knowledge and information;
- art, play, communication;
- the opportunity for creative development and for social, cultural, and political community work;
- the opportunity to share in life-serving achievement, in work, in everything that supports individual development in the community and lifelong learning to promote a constructive openness to the world and no longer to power interests.

But the preconditions thus assured must still be taken advantage of, in joy at one's own effectiveness, in life activity as the expression of personality. All children enter life with this drive; it does not need to be taught. But our societies, each in its own different way, channel these energies in ever narrower pathways and destroy their primal force and vitality.

Highest priority must go to all initiatives that strengthen the responsible, co-liberal person. History teaches us that fundamentally healthy and successful societal structures decline and die if they lead to an increase in centralisation. The basic precondition for the thriving development of a society is adequate freedom for the creative individual to develop his abilities. For only this makes possible the differentiation essential to and necessary for a living society. But – and this must be emphasised again and again – differences are advantageous to a community only if they are simultaneously constructively and cooperatively, i.e., organismically, integrated with others. The greater flexibility thus gained then also provides greater

adaptability to changed or unforeseen future living conditions. This demands responsibility from the individual toward the community and participation commensurate with his particular abilities in responding to common problems and challenges.

This combination is mirrored in essence in the demand for 'freedom and democracy', but only when freedom is understood as the best possible development and strengthening of the personality in *harmony* with the freedom of others, and only when democracy is understood as the dedicated, active and responsible participation of all in shaping the community, starting in the places where we live. (This means much more than formal voting rights as practised in democratically-constituted states, which offer no possibility of a truly relevant selection). In this way, the liberal and social components do not work against each other, but are constructively related to each other: freedom and democracy must be seen as an inseparable unity. We need individual initiative in societal responsibility toward other people, but also toward our surrounding world. This prevents the one-sided exaggeration of one or the other quality that derails human society.

Steps in the new orientation

Many examples can be shown:

The economy's formal emphasis on maximum efficiency in the allocation of resources, a pillar of economic globalisation, leads to artificially homogenised living spaces and to people's maximum dependency on external factors they cannot influence. This view of efficiency, ignores a sore loss of freedom and the accompanying possibilities of personal development for the people affected, a hindrance to their creativity through the acceleration of all the processes in the environment, and not least a greater burden on the biosphere. There is no question that, all in all, such an 'optimisation of allocation' does not even add up in economic terms, if we consider the person and their development and the society in its cooperative living together – not to mention the consequences for the ecology. All too often, such decisions are not even based on short-sighted criteria of efficiency, but simply on the desire to increase power over others.

- It is necessary to build up polycentric economic structures that complement each other. Monetarily oriented market-economic institutions must be connected with civil-societal social, cultural and subsistence-economy initiatives and institutions in mutual enrichment.
- Parallel to this, decentralisation and variance in economic, political and socio-cultural institutions should be supported by flat, transparent hierarchies within their decision-making bodies.
- To this end, the monopolistic power structures concentrated in a few companies must be reduced in favour of a diversity of economic enterprises borne by the market and by civil society. Their cooperative interplay must be politically, juridically and infrastructurally ensured on all levels, from the local to the intercontinental.
- For a complementarity of plural local, regional and intercontinental economic strategies, institutions must be created and strengthened that will institute and supervise the global framework conditions on all spatial and temporal levels.

- The spatial and temporal externalisation of ecological, socio-economic and cultural burdens and costs must be stopped. Closed process cycles must be realised wherever no (almost) inexhaustible source is available (for example, the sun as energy provider).
- A 'deceleration' of economic, social and ecological processes is necessary to make regeneration cycles and creative differentiation possible.
- All of these processes urgently require a reform of international financial systems and flows. Unlimited monetary growth in a limited world increasingly uncouples economic processes from their finite ecological and socio-cultural foundations.
- The international money supply must urgently be stabilised and dynamically steered to economic activities that promote the improvement of the quality of life and global supply.
- To reduce or avoid the dangers and risks of warlike conflicts, we must promote our abilities to work out conflict with reduced violence and create the preconditions to make peaceful and cooperative interplay possible and easier. To prevent a catastrophic scenario in the conflict between Homo sapiens and the natural environment – the destabilisation of the geo-biosphere – we need an ecologisation of economic processes and strategies of production.
- The complete disarmament of all weapons of mass destruction (nuclear, chemical and biological), the reduction of conventional weapons, and the containment of arms trading are urgent for ethical reasons, but also for purely economic reasons.
- A strengthening and furthering of intercultural and interreligious dialogue and of civil-societal forces and institutions is indispensable for the successful processing and regulation of intercivilizational conflicts.
- Respecting the many kinds of tolerance limits of the dynamic stabilisation of the geo-biosphere, of the resilience of the natural foundations of life, and of their cycles of regeneration is the precondition for surviving in the future and for peace among humankind. This must be reflected in the creation of closed economic cycles of production and materials, the minimisation of ecological risks, and the internalisation of ecological burden-externalisation – a strategic orientation toward the paradigm of what is alive.

Difficulties and possibilities of the transition

'How can you buy or sell the sky, the warmth of the land? The idea is strange to us. If we do not own the freshness of the air and the sparkle of the water, how can you buy them? [...] All things are connected. Whatever befalls the earth befalls the sons of the earth. Man did not weave the web of life: he is merely a strand in it. Whatever he does to the web, he does to himself.'

These words are said to be part of a letter that See-at-la, or Seattle, Chief of the Duwamish, wrote in 1855 to the 14th President of the United States, Franklin Pierce – 100 years before Einstein and Russell called for a new way of thinking and 150 years before we set out to put this search in new words once again. If we look where our thinking and knowledge leads, we realise that here circles reconnect.

How can an evolutionary, non-violent transition succeed?

We are confronted with the difficult demand for an evolutionary, non-violent transition. After having the wrong orientation for so long, we wonder how this is possible.

Encouraging models are still to be found in traditional cultures, their wisdom and their knowledge; but they have to be re-thought and adapted to the modern situation.

Current sciences also do this, but they are not sufficiently developed in this direction.

Fundamental to an optimism that this will ultimately succeed is the fact that the ability to provide appropriate answers to the opportunities and challenges of evolution has remained subliminally present in us humans and in the capability of our existence; it merely requires more decisive attention and fostering. We can successfully make these demands only as a common humankind, i.e., not against or in ignorance of each other, but with each other in a dialogue among the cultures in which we compare all of our differently developed potentials and set them in complementarity. To this end, we need the free development of all cultures – which we desire anyway.

Our demands, however, encounter a doubly difficult situation of the nations. While the highly technologised countries must find other paths to affluence and well-being than those that modernity has thus far revealed and imposed upon them as successful, it is precisely these problematical strategies that exert an increasingly powerful attraction on all who hope to gain the same opportunities from them. The incentives for this are still in place and hinder change. And ultimately, this is not 'unnatural', because all of animate nature is again and again exposed to the danger of plunging into the more stable shapes of the inanimate. This cannot be prevented once and for all. Suffering and failure in the process of transition are part of life. The goal must be to limit the damage caused by a possible fall. The varying needs and abilities to shape that are found around the world must lead to a diversity of well-considered solutions. The diverse, culturally completely new modernities must design their own paths from their respective preconditions and, in exchange with each other, test how problematic strategies can be altered cautiously, i.e., in full consciousness of the preconditions and opportunities of old and new processes of balance. Still-living traditions of wisdom will thereby develop new influence; and changed, greater demands must be placed on the scientific-technological world.

The primary questions facing us today are not how sustainable forms of life can be created. Nature has no recipes for sure-fire or rapid success. Success is rather the result of games that are tested and work out over generations, but which are not based on pure chance, but on their deep connectedness. The biosphere shows us that this open, positive-sum game of living has uncountable winners, and not just a few, as we might expect when we compare the game of our economy, which follows completely different rules in a zero-sum or even negative-sum game (with winners and losers and a predominance of losers). We humans are not freed from working out ethical rules that foster individuals, including the weak, as members of the community. Such rules must be adapted to changing conditions in mutual trust among all participants, and thus must themselves continually change. Accordingly, we must support the interplay of the bio-system, the earth, with genuine human means.

If we continue to 'tilt' our common playing field of life through unrestrained striving for power, robbing the majority of people and a great part of the creatures on the earth of all moorings, our problems will grow into a catastrophe. This will be a catastrophe above all for us people, and not for the rest of nature, because the latter can live without people, but we cannot live without it. We must do everything to restore the playing field to a state in which all can play their own games decentrally under comparably favourable conditions and, additionally, can communicate and cooperate in friendship across all borders. That which has a future will show itself in many ways in successful results in the innumerable different games and will determine the living future of humanity in its complementary commonality.

I am life

The ground on which this new sustainable, organismic cultural diversity is to grow has been well prepared. For why do political and economic decision-makers invoke freedom and democracy, when most of them seem to have abandoned this trust in a fundamental commonality? Because they secretly know and feel that deeply anchored in people's hearts is the longing to strengthen their own physical, emotional and spiritual abilities and to further develop their personalities; and this is possible only in relative freedom. But the great majority of people do not want to use their empowerment against others who are trying to do similar things, but rather, together with them and motivated by the deeper connection, to create a more comprehensive commonality on a higher level. A new, but in truth long-proven view of the human beings is becoming visible, one that assumes a person capable of love and empathy. We should not be misled by the excesses of our modern civilization. The human being is capable of much more than being an aggressive, avaricious 'wolf' (in Thomas Hobbes' sense): freedom to strengthen oneself, not for the sake of victory in struggle against the others, but responsible for strengthening one's own contribution in favour of the whole. Co-liberality is needed to achieve an optimal, vibrant coexistence in the sense implied by Albert Schweitzer's remark, *'I am life that wants to live, amid life that wants to live.'*

All this may sound unachievably utopian. But we should remember: the mere fact of our existence as people today should show us that we are the successful result of a similar development that has already gone on for billions of years. We must continue to create new knowledge that allows more vibrancy to flower. We can trust that this power is effective in us. For omni-connectedness, which we can call love and which germinates from vitality, is inherent in the core of us and of everything else.

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Communicating worldviews: articulating global and local knowledge

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Introduction

Let me start this introduction by introducing myself. For the last twenty years I have been working in the field of international development cooperation in various countries. I have both worked as a researcher, a practitioner and a policy maker (and donor). Presently I am working as policy expert in the Research and Communication Division of the Directorate General for International Cooperation (DGIS) of the Netherlands Ministry of Foreign Affairs. My intellectual background is that of a social anthropologist specialised in cognitive systems and in economic anthropology.

The workshop on 'Moving Worldviews' is of interest to me for two reasons. The first reason is the focus on innovation and on the relations between practitioners, scientists and policy makers. These themes happen to be central to the new DGIS policy on knowledge and research. In this paper I will briefly explain about this new DGIS policy, hoping that this will be of interest to the participants. From my side, I am most interested in learning about experiences in improving relations between practitioners, scientists and policy makers.

The second reason is that the workshop deals with worldviews and endogenous development. Over the years, my involvement as an anthropologist in development cooperation has always brought me to reflect on the relations between culture and development. I have developed an interest in the rise of the dominant modern Western worldview and how it articulates with non-Western thinking. I have read and thought extensively on these issues without ever taking the time to fully develop and publish my reflections.

The invitation to participate in this workshop catalysed a process of thinking that is reflected in this paper. Time did not allow me to fully expound and substantiate all ideas presented. And some of my lines of thought and the implications thereof have not yet fully crystallised. But I hope I will raise sufficiently convincing arguments to at least feed discussions and spark off some new insights. I want to stress that the ideas and views presented in this paper are personal reflections that do not represent any official policy.

The organisers of this workshop have indicated that the worldviews held by the general public, policy makers and scientists are becoming increasingly diverse, reflecting the growth of multiculturality, new scientific insights, globalisation and individualisation. They criticise conventional, materialistic and science-based approaches and call for endogenous sustainable development. But is it really true that worldviews are becoming more diverse? And is there such a thing as endogenous development? In the following pages I want to critically reflect on this and maybe demystify some of the notions used in these discussions.

DGIS policy on research

Focus on Southern ownership

Over the last 10 to 15 years the Research and Communication Division (located within the Cultural Cooperation, Education and Research Department of DGIS) has tried to identify and support research programmes (and programmes for funding research) that are rooted in developing countries, both in terms of management and in setting the research agenda. The main focus has been on multi-annual, multidisciplinary research funding programmes.

This policy focus (Ministry of Foreign Affairs, 1992) was a reaction to earlier experiences (in the eighties and earlier) when Dutch universities and research institutes were heavily involved in development-related research funded by DGIS. These experiences revealed a marked tendency for Dutch research institutes (or other Northern research institutes for that matter) to dominate research partnerships. The research agenda was more heavily influenced by academic interests of these institutes than by development relevance.

An unintended side effect of this state of affairs was that a lot of the research outcomes were of academic interest only and were hardly used by practitioners or policy makers, despite genuine commitment of the researchers to development issues. There is, it would seem, a strong and tenacious tendency in academic circles to stick (maybe even unconsciously) to the old concept of linear knowledge production in which it is assumed that knowledge generated by research will automatically be picked up and used for innovation and development.

The policy shift during the nineties was intended to countervail these tendencies and to strengthen Southern ownership of research and the research agenda. It was hoped that this would enhance demand orientation and social relevance. Attempts were made to strengthen research capacity in the South and to promote interest in Southern academic circles for action research and participatory research methodologies.

But although quite a number of examples of relevant, demand driven, and action-oriented research can be given, the overall picture is not entirely positive. Apparently the tendency of academics to monopolise the research agenda and to assume that the outcome of research will automatically be picked up by society, is equally present in Southern universities and research institutes. Maybe this is not so surprising. After all, most academics and researchers in developing countries have received a Western type of academic education and have internalised Western notions of academic excellence and – no doubt – the linear model of knowledge production.

Those programmes that did succeed in involving various stakeholders (not only researchers) both in drawing up the research agenda and in actually conducting the research, met with other problems. Quite often they had to face charges that the research thus generated lacked academic relevance or quality. They had to deal with such statements, as 'research for and by the poor is poor research'. It turned out to be quite elusive for research to be both relevant (in the eyes of the poor) and excellent (in the eyes of the academic community) at the same time. An underlying issue here is the question of who decides on excellence, who belongs to and who is excluded from the epistemic community.

Towards a new systemic approach

Over the last year the Research and Communication Division of DGIS, in consultation with a variety of stakeholders, has developed yet a new policy on development research[1]. The reason for developing this new policy was not so much the mixed results of the previous policy as indicated above, but had to do with other effects of the approach followed during the nineties and early years of the new millennium. Because of the strong focus on Southern ownership and capacity building, the relation between DGIS funded research and the overall DGIS policy on development cooperation had weakened, and a situation had grown in which it was increasingly felt that DGIS policy was no longer informed by research, at least not by research funded by the Research and Communication Division. Furthermore, a growing gap was experienced between policy makers on the one hand and the Dutch community of development researchers on the other. These were the reasons for our Minister to express the need for a new policy to be formulated.

In doing so we have chosen not to return to the approach followed in the eighties of the previous century but to more radically rethink the points of departure and scope of a policy on research. One of the choices we have made is to no longer restrict ourselves to a relatively narrow focus on academic research but to go for a much wider knowledge agenda. We have also chosen to strengthen even further the emphasis on relevance and use of research. This is reflected in the central objective of the new policy: the effective usage of knowledge and research for poverty reduction and sustainable development.

We acknowledge that knowledge is not merely a stock of objective information accumulated over the years by research. Knowledge also implies intuition, interpretation and contextual insights. Moreover, knowledge is not only generated by research but equally by companies, civil society organisations and others. Research is not the only answer to knowledge needs. To stimulate innovation and the actual use of knowledge for development, we feel it is necessary to strengthen the interaction and exchange of ideas between researchers, practitioners and policy makers. Research is merely part of a wider knowledge system in need of strengthening. It is not the separate parts of this system (the various actors) but their interactions that are important. Capacity building, therefore, should not be restricted to research institutes but be perceived in a more integral way. This requires that attention is devoted to interactive learning processes.

This 'systems of innovation' approach will be the guiding principle of the new DGIS policy on knowledge and research. It implies that, even more so than previously, we believe that for research to be relevant it should be firmly embedded in a process of social interaction between various stakeholders in society. The approach is not only meant for research and knowledge activities funded by the Research and Communication Division but in principle applies to all knowledge and research activities undertaken in the context of development cooperation. We hope, expect, and will encourage our embassies to embrace this approach and will invest in strengthening national systems of innovation in the various sectors in which they are active in the respective partner countries. Moreover, as donors and policy makers, our

[1] '*Research in Development*', see www.minbuza.nl.

various embassies, divisions and departments should themselves be seen as actors in systems of innovation at various levels and in various sectors. The relevance of interactive learning, therefore, applies equally to our own operations.

Within this approach there is room for renewed dialogue between the Dutch research community and the various policy-making DGIS divisions of the Ministry in The Hague. In fact, attempts to revive and stimulate exchange and mutual understanding between policy makers, researchers and practitioners in the field of development are already on track. One example is the support given to the Development Policy Review Network (DPRN) for an extensive series of regionally oriented workshops (West Africa, South-East Asia, etc.) bringing together policy makers, practitioners and researchers. Another example is the so-called IS-Academy (where IS stands for International Cooperation), a programme to establish links between individual DGIS divisions and universities for long-term cooperation and exchange (students on work placements within the Ministry, PhD research on policy themes with close involvement of staff from the Ministry, participation of Ministry staff in lectures, mutual secondments, etc.). Other initiatives are being developed.

Of course it remains to be seen how effective this new and rather ambitious policy will turn out to be. A 'systems of innovation' approach in principle acknowledges the relevance and validity of knowledge and insights of various stakeholders. But true communication between stakeholders from diverging backgrounds and the articulation of their perspectives do not come about easily. I have already touched upon the tendency in academic circles to claim the setting of criteria for excellence as their specific field. Donors, on the other hand, seem to feel they have a privileged position in setting criteria for relevance. Neither researchers nor donors are particularly well known for demand orientation and participatory development. It is of interest to analyse why this is the case.

The worldview of modernity

Development, of course, is a catch-all notion comprising various dimensions. It has been defined in many different ways. But I would argue that in the notion of development there is a core connotation that is historically specific and should be recognised as such. In discussing development, development options, development policy and development cooperation, we would do well not to lose sight of this core connotation. To go straight to the heart of the matter: the notion of development carries within itself the idea of progress, an idea that is central to the worldview of Western European enlightenment and its focus on modernity. Furthermore, the emergence of this worldview is intrinsically tied up with the rise of capitalism and the market economy. And the early rise of capitalism was only possible through the invention and refinement of interest-bearing negotiable monetary instruments. In fact, I want to argue that there is a kind of monetary logic deeply embedded in the modern Western worldview and, therefore, at the core of the notion of development.

Monetary innovations and the emergence of the economic domain

It is through the use, evolvement and spread of such instruments as the promissory note, the bill of exchange, and later the cheque, the banknote, and various instruments for public debt, that the liquidity of money forms was greatly enhanced (Milnes Holden, 1955: 1-94; Neal, 1990: 4-7), that the flexibility for creating money was strongly improved[2], and that the driving force of credit and interest that is behind the dynamics of capitalism was unleashed (Wee, 1997). Originating in northern Italy, its use spread and evolved in leaps and bounds over Western Europe – from Venice and other Italian city states to Bruges, Amsterdam and London (Braudel, 1979; Kindleberger, 1984: 19-77) – and from there through international merchant capitalism, imperialism, colonialism, investments by multinational corporations, and development cooperation over the entire globe (Powell, 1966; Goldsmith, 1987: 3, 231).

Interest promoted systematic competition for scarce money between parties involved in monetary transactions. It necessitated the continuous pursuit of profit and in the process stimulated the further spread of money use. Interest concentrated wealth in the hands of a minority[3]. This driving force of credit and interest created the conditions for the monetisation of the economy, or rather the monetisation of society at large. It allowed for the economy to emerge as a separate domain detached from the wider social and moral fabric of society, and for this economic domain to widen and encroach upon other aspects of society. It allowed for the accumulation of capital and the dynamics through which capital is continuously reinvested in the development of new means of production, resulting in a historically unprecedented creation of wealth. Monetisation is an ongoing and by now global process, gradually turning the world into a single ever more tightly integrated market (Neal, 1990: 164-218).

Through monetary unification, a reduction in the levying of tolls, and the promotion and protection of trade by government, the emerging nation states reflected the interests of the growing bourgeois middle class. And the nation states further evolved by creating the legislative frameworks and institutional arrangements (the judiciary, mechanisms for public debts and taxation, central banks) that served the spread of monetisation and the economic domain[4].

The merchant's perspective at the core of the modern worldview

The influence of these processes on culture has been profound, particularly in Western Europe but increasingly also in other parts of the world. Monetisation turns things into commodities. Money is the 'universal equivalent'. It projects a single

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[2] Aglietta & Orléan (1982: 162-178) convincingly argue that most of the early capitalist monetary instruments were created and issued by private merchants and bankers for the purpose of international transfers. This allowed for the emergence of a new and autonomous economic order.

[3] See Lietaer (2001: 75-82) and Arkel & Peterse (1999: 19-57) for lucid analyses of the effects of interest. See also Roelofs (1993), Arkel & Peterse (1993) and Godschalk (1993).

[4] The Netherlands has the dubious honour of having played a vital role in the development of instruments for both public finance (*'losrenten'* and *'lijfrenten'*) and private finance (the first stocks, released by the *Verenigde Oostindië Compagnie*, the Dutch East India Company). Even the very word 'capitalists' was coined in the Netherlands and used to designate the top income segment of tax payers. See Galbraith (1975: 29), Tracy (1985), Goldsmith 1987: 249, 250), and Ferguson (2001: 114, 216).

quantitative standard of value onto a wide variety of qualitatively different things[5]. The notion of value is abstracted from concrete things and embedded in one single medium. The spread of monetisation makes an ever-growing number of products and services comparable in terms of this medium. In a sense, money levels out differences in quality and puts all things under the regime of quantitative measurement. Monetary logic is characterised by measurement and calculations in terms of an abstract standard. Money submerges society in a homogeneous universe of numbers (Aglietta & Orléan, 1982: 56).

Growing monetisation called for new accounting techniques. Double-entry book-keeping was a critical innovation in the rise of early capitalism. It transformed the understanding of the nature of wealth. It changed the notion of profit from a vague idea of growth of possessions into a hard, quantitative and measurable variable. Through this device, alienability and monetary value presented themselves as the essence of things. In the ledger the merchant appeared as the creditor or debtor of his own possessions. Possessions became detached from the owner (Buchan, 1997: 68-71).

This outlook of the merchant – the thinking and calculating individual who is detached from the object of his thoughts and who sees the world in terms of numbers and movement – became the core of the modern worldview. Projected on the world at large it resulted in the rise of the natural sciences and the idea that nature is there to be manipulated and exploited by man.

Through interest, time and money became intrinsically related. Through discounting bills of exchange that had not yet matured, for example, or through calculating compound interest, a temporal dimension was attributed to the use of money (Buchan, 1997: 61; Gregory, 1977: 211-213). But in the same process a monetary character was attributed to time itself. Here lies the origin of the abstract, linear, mathematical concept of time that was to become an integral part of the modern Western worldview (Aglietta & Orléan, 1982: 176). Interest also caused the restlessness inherent in the way time is experienced in the West, the perception that time is scarce and needs to be used to the most effect (Arkel & Peterse, 1999: 19-27), the feeling that time moves forward and passes rapidly.

The influence of monetisation on natural sciences and cosmology

Monetisation has strongly influenced the modern Western scientific worldview, as can be witnessed in the ideas – revolutionary at the time – of some of the pioneering early thinkers and scientists. Francis Bacon, whose name is associated with the empirical character of science, advocated that measurements and experiments should be the basis for generalised insights. René Descartes, another founding father of Western scientific thinking, emphasised the mathematical order of nature itself. And Isaac Newton, whose universal law of gravity reduced such widely diverging phenomena as the movement of celestial bodies and falling apples to a single underlying law, and

[5] 'Money requires and promotes the evaluation of every commodity against every other. This creates or encourages a mode of thinking inclined to comparative evaluation even of those things (if there are any such) which fall outside the power of money. In other words, the seeming universality of comparative monetary evaluation is unconsciously extended outwards into the universe of evaluation as a whole.' (Seaford 1998: 121)

whose mathematical analysis of such movements established what was to become the dominant paradigm in Western science for centuries to come, once expressed his belief that in his equations he was re-thinking the thoughts of God (Armstrong, 2005: 85-87).

Much stronger than is often perceived, there is an intrinsic connection between the monetisation of society on the one hand and the mathematisation and mechanisation of the Western worldview on the other[6]. Quite a number of influential natural scientists occupied themselves with monetary issues. Let me give just a few examples. As early as the 14th century an early pioneer of mathematical natural science, Nicole Oresme, studied the quantification and graphical representation of the intensity of qualities. But he also produced an influential treatise on the nature of money (Davies, 2002: 229-231). At the end of the 15th century, Luca Pacioli published the first printed book on algebra. A chapter of this book dealt with commercial arithmetic and double-entry book-keeping that he learned through his association with the household of a wealthy merchant in Venice (Buchan, 1997: 66, 67). In the next century, Simon Stevin, who stimulated the use of decimal fractions and symbolic algebra, was quite actively involved in developing new accounting methods. He strongly advocated the use of double-entry book-keeping in the Low Countries and was one of the first to publish tables of compound interest (Zeper, 1937). Nicholas Copernicus, who revolutionised Western cosmology by positing that the earth orbits the sun rather than the other way around, advised the Polish government on monetary policy. And Isaac Newton himself was for many years the governor of the Bank of England (Craig, 1946).

Commercial arithmetic, accounting techniques, the calculation of compound interest, and the conceptualisation and calculation of early forms of insurance were integral parts of mathematics. It is maybe somewhat sacrilegious to suggest that commercial interests pushed the development of mathematics. After all, mathematics is often perceived as the brilliant creation of the freely speculating human mind. But an honest reading of the history of mathematics nevertheless reveals these more down-to-earth influences (Struik, 1990: 105-126). This same cognitive framework was projected onto the cosmos. All main thinkers who built the new cosmology of the modern worldview were pioneers in mathematics. It is therefore not so surprising that concepts and principles inherent in the monetary core of capitalism were projected onto the world at large and seen as the nature of things[7].

This monetary influence is also reflected in another characteristic of modernity, its secular nature. Monetary logic is not sympathetic to religion (compare Armstrong, 2005: 78-80). Quantification, measurement, reducing qualitative differences to abstract generalisations and mathematical calculations leave no room for mystery. In fact, part of the intellectual excitement of the Enlightenment was precisely the demystification

[6] A superb overview of the mechanisation of the Western worldview is presented by Dijksterhuis (1950). For the influence on religion and the ideas about society see Wildiers (1988).

[7] In fact, a much earlier monetary innovation, coinage, had a comparable impact and can directly be related to the rise of Greek rationality and philosophy (Seaford 2004; Molenaar 2004). The difference with the re-monetisation that took place in Western Europe from the late middle ages onwards, is that the latter process was based on private monetary instruments that essentially took the form of interest bearing credit.

of the universe. Already as early as the 16th century, Luther claimed that God's divine nature was limited to God himself and did not permeate society or politics (Armstrong, 2005: 83). Hobbes posed that after creation God withdrew from the world. Newton, as we just saw, reduced God's thoughts to mathematical formulas. Nietzsche declared that God was dead (Armstrong, 2005: 411). And Sartre, finally, explained that modern man has a hole in his consciousness in the shape of God, indicating that modernity had not come without a price.

The influence of monetisation on social values and on the understanding of the nature of society

This conceptual framework also heavily influenced thinking on the nature of society[8]. Power was increasingly seen in monetary terms, or at least in categories derived from the economic field. This is evident in the concept of balance of power. But it is equally evident in the political theories on natural law that took the freely assumed contract as the basis for society and origin of sovereignty. Later still the notion of freedom emerged as central concept of the enlightenment. At its core this notion is based on the right to hold private property and the right to trade property (Buchan, 1997: 157). The processes through which this thinking evolved into the values of the rule of law, the concept of the individual as autonomous personality, the value of equity of chances, the concept of progress, and the values of liberalism and democracy, are well known and need not be elaborated upon here. Suffice it to say that both the social and the natural dimensions of the modern Western worldview reflect a conceptual framework inherent in capitalism.

Values of freedom and progress directly spring from monetary logic (Buchan, 1997: 33, 59). In a sense, money liberates because it recognises no hierarchy. Monetisation enlarges the freedom of individuals to approach one another as equal partners in the market place. It frees individuals from the obligations of feudal bonds, communal solidarity or ethnic affiliation. It frees labour from the shackles of the traditional social order (Aglietta & Orléan, 1982: 176) and it offers the opportunity to escape from an ascribed social position. It opens up a world that allows for self-realisation and taking initiatives. And it has the potential for unleashing economic growth. The concepts of freedom and progress reflect and positively value these workings of money.

But there is another side to this cultural dynamic that equally needs to be considered. In taking the form of interest bearing credit, money assumes an aggressive character. It wants to grow and to be used and re-used all the time. It shows a drive to break new ground, to be used for buying and selling more and more new products and services. Money thus penetrates all layers of society and ever more aspects of culture. Capital constantly seeks new possibilities for profitable investment. This causes an endless search for new resources, technical innovations and new outlets.

[8] As expressed in William Petty's 'political arithmetick', a new science to reduce the world and the actions of man to a set of numbers (Buchan 1997: 105, 178).

The aggressive dynamics of money and interest

As in pre-capitalist Western Europe, in many non-Western societies ownership does not take the form of a legal right to alienate private property. Often property rights are hierarchically organised on the basis of consanguinity and affinity (Sahlins, 1972: 92-94). Individuals, households and larger kinship groups hold overlapping rights to access land and other national resources. No member of society is fully denied such rights. Exchange between individuals, households and kinship groups takes the form of forging alliances rather than commercial transactions (Sahlins, 1972: 219-221). This is the basis for the social reproduction of the community[9].

With the penetration of capitalism, notions of private property take hold and weaken such social mechanisms. In the process it fundamentally changes social relations by casting a web of monetary logic. It reduces all qualitative differences to financial terms. It atomises society, turning everyone into a market player (Buchan, 1997: 29, 33, 191, 192). By turning land into a commodity, it dissolves ancestral ties that connect communities with the land they till and turns social obligations into commercial relations. Social reproduction of society makes way for economic reproduction of the private enterprise (Sahlins, 1972: 187; Gregory, 1977: 164, 165). Capitalism dissolves social structures based on mutuality and moral obligations (Aglietta & Orléan, 1982: 158). It undermines group solidarity and mechanisms based on gift exchange, and leaves individual households vulnerable to external influences. It breaks open local communities and exposes them to market forces. Where it arrives, capitalism tends to widen the gulf between the affluent and the poor and to reshape the structure of society, just as it did in Western Europe itself (Ferguson, 2001: 197-202).

Western money, when it finds its way in or is forced upon local communities, undermines feudal bonds or mechanisms for gift exchange and crowds out local, special-purpose currencies. It fuels demand for new, external products and puts community members in competition with one another, dissolving social structures and moral obligations. But when money finds no local possibilities for profitable investments, it tends to flow out, leaving in its wake communities in which money is scarce and traditional mechanisms for exchange and social alliances have weakened. Out of necessity people turn to producing for the external market to which they have unequal access. This is how the market ensnares communities and self-sufficiency makes way for relative poverty. These same mechanisms are at play in encapsulating national economies of developing countries.

Capitalism can be devastating in its consequences (Armstrong, 2005: 79, 80). The history of Western Europe shows how fundamentally capitalism changed the feudal organisation of society (Buchan, 1997: 56). Western imperialism and colonialism amply illustrate the aggressive and penetrating traits of capitalism. The ongoing effects of globalisation indicate that this dynamic has not come to rest. The unfettered market creates growing differences between the poor and the affluent. This results in economic and social polarisation that compromises social cohesion. Of course this is not a zero-sum game. Economic growth may well result in an absolute

[9] There is extensive anthropological literature on the subject, especially focusing on the 'gift economy'. Highlights are Mauss (1925), Sahlins (1972: 92-187), Bourdieu (1977: 3-15, 177-183), Aglietta & Orléan (1982: 147-153) and Gregory (1982: 10-112).

reduction of poverty. But such growth takes place at the expense of environmental degradation. In the long run, the reign of the free market is neither sociologically nor ecologically sustainable[10].

The victory march of monetisation is therefore ambiguous in its effects. On the one hand it frees the energy for change and innovation. It releases people from stifling bounds and obligations. It liberates and enlightens. It creates hope and stimulates emancipation. It produces penetrating scientific understanding and unprecedented wealth. But on the other hand it lessens diversity and dissolves qualitative differences. It takes away the mystery of things (Armstrong, 2005: 90). It tends to make life shallow and short of meaning[11]. It reduces group solidarity and social integration. It makes victims, excludes people from social participation and creates poverty.

Modernity's claim on universal validity

But whether positive or negative, the monetary logic of capitalism cannot be denied. It recognises no limits, just as an arithmetic series knows no boundary[12], and tends to sweep away or incorporate resistance. It implicitly claims universal validity. The dominant Western worldview reflects this claim to universal validity, even to the effect that it reduces its own capacity to understand its origin and to acknowledge the existence of other worldviews. Adam Smith's 'invisible hand' is taken by many as a law of nature. A number of theories in economics see market mechanisms as universal principles rather than as historically specific social constructs. The market has become a totem that cannot make mistakes (Galbraith, 1993: 23, 24; Buchan, 1997: 239, 240). And to the extent that the existence of other cultures and other social structures is acknowledged, they are often seen as primitive, irrational, backward, and – indeed – underdeveloped and pre-modern. This boils down to a denial of coevality (Fabian, 2002; Gregory, 1977: 34, 126), a potentially violent form of exclusion as history has amply shown.

In line with the above, many of the social values that have sprung up with the growth of capitalism – freedom, civil rights, democracy, and equity – are equally seen as universally valid (Armstrong, 2005: 81). Societies that do not adhere to these values are somehow seen as deviating from a universal norm and out of touch with the modern world. Through the global spread of capitalism, this claim to universal validity is self-fulfilling. And indeed, many of these notions have found their way into the universal declaration of human rights (United Nations, 1948).

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[10] 'Money, far from being the harmless arena of human emulation as its apologists hold, is a great destroyer. Because money is eminent desire, there is no satisfaction in the external world unless it is conveyed in money, until the world is *possessed* in monetary garb … Woods are paved, mountains mined, seas eaten, species annihilated. All the large land and sea animals of the earth, and most of its birds, are under sentence of extinction. They are being killed not by the rifle, but by a more lethal invention, money.' Buchan (1997: 278)

[11] Buchan (1997: 108) describes the speculation that led to the famous tulipmania of the 17th century. He quotes the Polish poet Zbigniew Herbert who described the process as follows: 'The order of the stock market was introduced into the order of nature. The tulip began to lose the properties and charms of a flower: it grew pale, lost its colours and shapes, became an abstraction, a name, a symbol interchangeable with a certain amount of money.'

[12] 'This seemingly unlimited power of money, inspiring unlimited desire for its unlimited accumulation, extends itself outwards, and thereby threatens traditional non-monetary values.' (Seaford 1998: 121)

Likewise, Western science claims universal validity. It is based on experiment, measurement and objective thinking. It detaches the mind of the researcher from the matter being researched and brings out the mathematical essence of things. It recognises no authority but its own thought processes, just as capitalism recognises no authority but the logic of the market. In demystifying and mathematising the universe, it champions freedom of thought, just as capitalism in monetising society champions the freedom of trade. The researcher wields knowledge in order to produce more knowledge, as the capitalist invests money to earn more money. Science accumulates knowledge like capitalism accumulates capital.

This, by the way, explains the dominance of the linear model of knowledge production. Scientists, consciously or not, tend to see themselves as the vanguard of human progress, the cutting edge of knowledge production. They claim and zealously defend academic freedom as if it were a natural birth right (Armstrong, 2005: 399). The publication in 1605 of the 'advancement of learning' by Francis Bacon was a declaration of independence by scientific rationalism, marking the autonomous role of science in progress (Armstrong, 2005: 88). But in essence, the linear model of knowledge production is a mere variant of the trickle-down theory of wealth creation.

The twin mechanisms of knowledge and capital accumulation

As social constructs and cultural phenomena, scientific knowledge and capital are more closely related than often perceived (see also Turnbull, 1997b: 847). The rise of capitalism and the rise of modern science go hand in hand, not merely because they enable one another (in the sense that scientific insights are used for industrial investments and that capital is invested in research and research infrastructure) but because of an inherent kinship. Landes (1998) has pointed at the importance of the institutionalisation of knowledge production in the history of capitalism. Through the establishment of learned societies of sciences in the 17th century, knowledge production for development became a permanent and institutionalised endeavour. The same period saw the emergence of the joint stock company in which capital became permanently invested and re-invested in the company (Dillen, 1970: 111-119; Neal, 1990: 8-9, 44-45). It is only relatively recently, with the growth of the knowledge economy and the emergence of intellectual property rights as a form of capital, that this intrinsic relation has re-surfaced.

These learned societies played an important role in building theories and creating conditions under which knowledge produced at one particular site or by one particular scientist could be articulated with knowledge produced elsewhere. Thus knowledge was standardised and made commensurable within a common framework. Through such devices as experimental accounts, diagrams and standards, the replication of tests and experiments was promoted. This created the equivalences and connections whereby otherwise heterogeneous and isolated knowledge became articulated. In this process, science came to be seen as 'universal, non-indexical, value free, and as a consequence floating, in some mysterious way, above culture' (Turnbull, 1997a: 486).

Of course, Western society is not monolithic and the Western worldview is much more complex and diversified than depicted in these few pages. Moreover, also in the West the rise and spread of capitalism met with resistance and counter movements (romanticism, communism, the blood and soil theories of national

socialism, fundamentalist movements, postmodernism, to name but a few). Therefore, there are a much wider variety of conceptual schemes, ideologies, schools of thought, and frameworks for action than I have indicated. Nevertheless I claim that the picture presented reflects the dominant underlying features of the modern worldview, and that the twin mechanisms of knowledge and capital accumulation are the driving forces of modernity and are ultimately derived from the logic of money and interest.

Meanwhile, modernity has spread over the entire globe and has found its way into the aspirations, values and conceptual frameworks of millions of individuals all over the world. Modernity is no longer limited to Western Europe or to the West at large. East Asian economies have become major drivers in this historical process. And the elites of most developing countries are familiar with and to a certain extent share the worldview of modernity.

Modernity and development

Can there be any doubt that the notion of development is closely connected to these dominant features of modernity? Development cooperation, I would like to argue, neatly fits into this tradition. Quite often, development professionals (be they researchers, practitioners or policy makers) are insufficiently aware of this cultural and historical background. They tend to project concepts and values of modernity onto other societies without being aware of the cultural violence they deploy. Of course, this holds equally for Southern policy makers and professionals who have internalised the worldview of modernity[13].

History of development cooperation

Although on the surface there may be a wide variety of motives for development assistance (political self-interest in the days of the cold war, the base economic self-interest of tied aid, cultural ambassadorship, idealism, romanticism, enlightened self-interest, genuine humanitarian involvement, or – the most recent variety – the struggle against terrorism; see also Hoebink, 1997), as a social and cultural phenomenon it is best understood as a manifestation of the underlying cultural logic discussed above.

In 1949 president Truman announced his 'bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas' (Nekkers & Malcontent, 2000: 11). Through capital investments and technical assistance (the transfer of knowledge), less developed countries were to be put on the map. This is generally considered to be the start of international development cooperation. It implicitly defines development as that which capital and scientific knowledge can bring, a self-definition of modernity.

[13] '… nationalist critiques of imperial domination often deplored the fact that colonialism had severely constricted the flow of science and technology from the West to dominated areas, and demanded that technical education and scientific facilities for indigenous peoples be expanded and improved.' (Adas 1997b: 1030)

More than half a century of development assistance has witnessed a succession of theories, approaches and specific topics of attention (Pronk, 2004: 1-5), but these are merely superficial variations of the basic themes of providing capital and knowledge. The very names of the major international players in the field of development cooperation, the International Monetary Fund (IMF) and the World Bank (and self-styled 'Knowledge Bank'), bear witness to this fact.

I have already indicated how capital opens up local communities and national economies to market forces. The global effects are well known. Over the years the gulf between rich and poor countries has widened, as has the gulf between the rich and the poor within developing countries[14]. Loan repayments, debt service and the need for money to be invested where profits can be made, resulted in a flow of capital from poor to rich countries that was much more substantial than the other way around.

As a consequence, developing countries suffer from a stifling load of mounting debts. Debt relief or debt cancellation, much discussed nowadays, may create a breathing space, but cannot fundamentally change these patterns since it only paves the way for new loans. It is only when capital can be locally invested, and locally accumulated for investment, that local growth results. The conditions under which this can be realised are still not well understood. The irony is that quite often development cooperation aimed at poverty reduction results in deepening poverty. The mere transfer of money does not lead to development.

Conditionality and ethnocentrism

Of course attempts are made by the donor community to create the pre-conditions under which markets can develop and investments can lead to growth. The structural adjustment programmes of the eighties and nineties, implemented with the knowledgeable assistance of IMF and World Bank, were meant to do just that, to rationalise government expenditures, to balance the budget, to install proper fiscal and monetary policies, and to create market incentives for private investment. The later focus on good governance was meant to stimulate the rule of law and to fight nepotism and corruption. The recent attention that has been paid to the functioning of institutions strongly focuses on improving public finance management and establishing a regime to safeguard and promote private ownership.

I do not want to romanticise non-Western cultures. Nor do I want to belittle the fact that flagrant forms of self-enrichment occur in developing countries. But I do want to stress that transactions and expenditures that are clearly irrational or even harmful from a perspective of capital investment may make perfectly good sense in the context of social reproduction of the community (Sahlins, 1972: 85-92). And apparently shameless acts of nepotism and corruption can show an unexpected morality when seen from the perspective of gift exchange and group solidarity (Sahlins, 1972: 206-209). Societies gradually moving towards a market economy cannot avoid running into these problems when going through a transition in which

[14] In 1999 the UN calculated that the combined capital of the world's top three billionaires superseded the combined GNP of the poorest countries with a combined population of six hundred million. In 1960 the richest 20% of the world population had a total income thirty times as high as the poorest 20%. In 1998 it was seventy-one times as high (Ferguson 2001: 311). See also World Bank (2005: 44-69).

one value system is replaced with another. I have often witnessed that foreign technical assistance was welcomed, not so much for the expertise brought in, but rather because the foreign expert would not be subject to a web of moral obligations that would deviate efforts from the development goals to be pursued.

In this context, structural adjustment programmes and aid conditionality focusing on good governance and institutional reform should be seen for what they are. We are faced here with the imposition of a Western model for organising society. Maybe it no longer takes the form of a conscious effort to westernise the world (the 'white man's burden' of the colonial days), but it is an imposition nevertheless. Even without realising it, modernity claims universal validity and is blind to alternatives. Such measures are based on the preconception that market mechanisms are universal and will lead to investment and growth as soon as government policies refrain from obstructing the proper functioning of the market and make room for private initiative[15]. Such thinking does not recognise the market as a social construct (Sahlins, 1972: 297-301). It reflects an ethnocentric projection that fails to acknowledge the diversity of social structures.

I believe that development cooperation may become more effective when it takes note of its own historic background, becomes aware of the culturally specific but growing validity of its own concepts, and opens up to allow a real dialogue with other worldviews. The worldview behind the concept of development and behind the practice of international development cooperation is the worldview of modernity. Those involved in development cooperation would do well to be aware of this. Abstracting the concept from this specific historical and cultural background clouds understanding and hides from view what is really taking place (compare with Kloos, 1996).

Articulating the global and the local

After these reflections, it will not come as a surprise that I have misgivings about the concept of endogenous development. Of course there are many endogenous cultural traditions and endogenous social change processes. But I feel that as soon as the concept of development is brought into the picture, we should be aware of its roots in modernity. Seen from that perspective, the notion of endogenous development is an internal contradiction. Moreover, in actual fact, examples of endogenous development as a rule do not really refer to autarkic and autonomous change processes, but rather to local responses to the global spread of modernity[16].

I also have doubts about the acclaimed growing diversification of worldviews. It is true that the globalisation of modernity sparks-off counter movements and attempts to revive cultural traditions and to assume particular local identities (Gregory, 1977: 298-308). But this is against a backdrop of global market penetration and the spread of modernity. I feel that cultural diversity is rapidly declining and we are witnessing a process of cultural globalisation (Featherstone, 1990). It is only within the by now practically universal context of modernity that elements of local traditions resurface

[15] 'Market liberalisation within countries will deliver faster growth and poverty reduction, provided markets exist and market institutions are in place. Where these conditions are not met, prior investments are needed and liberalisation should be phased.' (Maxwell 2005)

[16] See for example Haverkort, Hooft & Hiemstra (2002).

and new identities arise. It is a dynamics of articulation of the local and the global, the particular and the universal.

Through such articulation, local development, self-assertion and new identity building can take shape. And it is precisely at this point of intersection of the global and the local, that I see a role for development cooperation to play. This role is not to counter modernity; this would be quite self-defeating since development cooperation is itself a manifestation of modernity. Nor is it to blindly promote the homogenisation of global culture, as is now often unwittingly done. The role would be to cushion the transition to modernity, to find and promote possibilities for local development through articulating global and local knowledge, and to identify ways and means for local knowledge generation, capital accumulation and investment.

Global and local knowledge

In modern society, knowledge, like capital, needs to be re-used all the time. When capital is no longer invested, it loses its internal dynamics and is no longer capital. Likewise knowledge only comes to life in the minds of people. In a sense, codified knowledge stored in books and websites, is no longer knowledge. It is de-contextualised and devoid of meaning. It is mere information, to be tapped only by those who know how to access it. In that respect, the so-called 'global stock of knowledge' is a misnomer and should properly be re-named as 'global stock of information'[17]. When such information is tapped and internalised, it comes back to life and merges with the insights, concepts and tacit knowledge of the individuals involved. In the process, knowledge grows and mutates, it takes on new forms and creates new meanings.

Tapping into the global stock of information requires the ability to internalise and absorb such information. This is only possible when one already possesses a knowledge base that allows for such absorption. There must be sufficient common ground or points of contact for the external information to take root. The availability of a growing stock of global information, therefore, does not mean that such information will easily find its way to where it can benefit development. Transfer of knowledge is not at all an easy or automatic process.

A lot of efforts have been undertaken in the context of development cooperation to raise the absorption capacity of developing countries and thus allow for such a transfer of knowledge. Knowledge capacity has been built up through technical assistance, strengthening the education sector, research capacity building, and the creation of bursaries for higher education or PhDs abroad. Although there is still a need, especially in the most vulnerable developing countries, to further strengthen the capacity to access, negotiate, absorb and adopt knowledge, there are a growing number of experts and professionals who are well equipped in that respect. Even so, this does not automatically result in poverty alleviation. Like the transfer of capital, the mere transfer of knowledge does not automatically lead to development.

To benefit development, knowledge not only has to be understood, it also has to be used. Like capital, global knowledge needs to be invested and used locally to

[17] But although such knowledge or information is global in scope and pretention, it is nevertheless derived from a social process of knowledge production: '… all knowledge systems from whatever culture or time, including the temporary technosciences, are based on local knowledge.' (Turnbull 1997a: 485)

serve development purposes. It will have to leave the academic arena and enter into the real world. This means that knowledge needs to be contextualised. It needs to be applied within and adopted to a context of specific local circumstances. Experts or researchers need to work within a social context in which motivations and aspirations other than knowledge production play a role. They need to communicate with people with different backgrounds, different concepts, and perhaps different worldviews. It is through articulating global and local knowledge that new insights are born and new opportunities identified.

This requires an open, inquisitive attitude and a willingness to recognise and question one's own preconceptions. Not all highly educated professionals are able or willing to do that. Economic circumstances may not allow them to put their knowledge to such use. Maybe they prefer to pursue an academic or professional career that recognises rather than questions their expertise. Possibly they feel their talents are wasted at home and are put to more effect abroad. Unfortunately, the international brain drain complements the net flow of capital from poor to rich countries.

Communicating worldviews

Modernity does not easily recognise other worldviews[18]. As a rule, modern science has only the vaguest notions about non-Western epistemologies or understandings of the natural world (Adas, 1997a: 216; 1997b: 1028). In a sense, modernity is blinded by its own enlightenment and deafened by the roar of its industrial progress. As Turnbull (1997a: 489) has succinctly put it: 'science gains its truth-like character through suppressing or denying the circumstances of its production and through the social mechanisms for the transmission and authorisation of the knowledge by the scientific community. Both of these devices have the effect of rendering scientific knowledge autonomous, above culture, and hence beyond criticism.' In fact, non-Western accomplishments in science and technology are usually denied or belittled (Rashed, 1997).

Other worldviews, in their turn, are silenced and intimidated by the aggressiveness and success of modernity (Adas, 1997b: 1030). In many parts of the world there are still forms of traditional leadership, indigenous knowledge, and customary law and value systems. But in the face of modernity they have weakened, retreated and gone underground. This complicates communication. It will not be easy for modernity to develop self-awareness and jump its own shadow.

But in the interest of local development this is precisely what needs to be done. It is through the articulation of local and global knowledge that new contextual insights arise and possibilities for local development are identified. Local situations have changed through the greater or lesser advance of the market economy. This requires local responses and the generation of new insights and initiatives that spring from both indigenous and global sources. It calls for the emergence of local systems

[18] 'It is this claim to be able to produce universal theory that Western culture has used simultaneously to promote and reinforce its own stability and to justify the dispossession of other peoples. It constitutes part of the ideological justification of scientific objectivity ... the illusion that there can be a positionless vision of everything.' Turnbull (1997a: 485)

for savings, credit, insurance and currencies that articulate with the wider money economy but still allow for local exchange, investment and accumulation.

This is a plea for renewed and stepped-up awareness in development practice and international development cooperation of the micro level and how this level interacts with global macro-level dynamics. Comparative research in this field is welcome, but what is needed most is for development professionals (be they researchers, extension workers, policy makers, consultants or community development specialists) to enter into a true dialogue with local communities. Through such dialogue the voice of the poor can be heard and strengthened, indigenous knowledge mobilised, and possibilities for local initiatives and participatory action research identified. To once again quote Turnbull (1997a: 489), such dialogue creates 'forms of understanding in which the local, the particular, the specific, and the individual are not homogenised but are enabled to talk back'. 'Communication, understanding, equality, and diversity will not be achieved by others adopting Western information, knowledge, science, and rationality. It will only come from finding ways to work together in joint rationalities.' (Turnbull, 1997b: 850)

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Moving worldviews by learning from mistakes

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Dealing with assumptions

I was born in the Netherlands just after the Second World War. The era of post-war social and economic reconstruction and increasing food productivity was one of high expectations. We believed that the world could be made better by applying the new technologies that became available as the result of research and development. A farmer's son, I received training in agriculture and social sciences, and in the 1970s I started my work as an international development worker in the domain of agriculture and rural development. At that time the Green Revolution approach was widely accepted and I started my professional work in that context. I worked in the Netherlands, Colombia and Ghana and undertook consultancies to several other countries in Africa, Asia and Latin America. I saw mixed results and gradually learned that my personal choices and engagement in development cooperation were based on a number of **personal, professional and cultural assumptions** that continuously were subject to review. These included:

- **Academic superiority**: the idea that within my professional capacities academic approaches were superior to practical problem solving.
- **Position as expatriate: having** a job in a developing country; well paid and in the position of an 'expert', from whom local professionals should learn.
- **Focus on work and performance: a** personal idea that I am only useful and only deserve to be respected if I work hard and do a good job**.**
- **Religious upbringing:** the idea that membership of a specific religious community brings you close to truth and provides a unique and superior path to spiritual development that excludes other faiths and beliefs.
- **Western superiority**: assumption that Western knowledge and values are superior and need to be disseminated and applied elsewhere.
- **Materialism**: assumption that the world is basically made up of matter and that poverty is seen as limited access to material commodities.
- **Scientific objectivity and universality**: the idea that science is objective, neutral and universally applicable.
- **Generalisation:** the idea that knowledge, technologies and values developed in one environment would be relevant and applicable anywhere else.
- **Technical fix:** thinking that poverty reduction and human progress were dependent on new technologies.
- **Economic orientation:** thinking poverty reduction would depend on new economic regulations, in particular the free market, competition and efficiency.

- **Development as transfer of technology and economic systems**: assumption that knowledge, technologies and economic systems can be transferred without modifications and adjustment to other ecological, economic and cultural situations.
- **The importance of art as beauty:** assuming that art is related to aesthetics and implies the creation of beauty, rather than an expression of ideas, emotions and intuition through symbols that transcend words, rationality and conventions.
- Historic context of **Greco-Roman values and cultures**: the widespread belief that Western European culture has **only** Greco-Roman and Christian roots.

Dealing with mistakes

Fortunately I have experienced a number of crises. These provided me with an opportunity to unlearn, learn, modify and complement my ideas. This process is still continuing, but a provisional stocktaking and introspection has led me to the following reflections:

Putting academic knowledge in its proper place

After obtaining a university degree, I had enough self-confidence to take jobs where the objectives were to change technical, socio-economic and cultural ways of farming and to increase agricultural productivity. I initially leaned on the academic concepts and skills training I had received at Wageningen University. It was fascinating and self-assuring to apply them in practice, but to my frustration they did not result in better farming or better livelihoods. I learned that in order to be really useful in practical situations, I had to unlearn many of my academic ways of dealing with development and farming. I was forced to accept the fact that there is no technological blueprint for problem solving in different ecological, economic and cultural contexts. Different situations demand different ways of solving problems. The fact that I was born on a farm myself, and had a father who always was critical of extension workers, proved to be an important asset. It helped me to think more pragmatically, to empathise with the local farming populations and to appreciate their knowledge, values and creativity.

Expatriate position in a job

For some years I worked together with national counterparts in Colombia and Ghana and other countries. I soon discovered that although I earned far more than the national experts, I was not really better equipped personally or professionally to do the job. It took some time, but I learned that local experts in many respects are far better placed to work in development programmes than the expatriates. I started to accept the superiority of the local experts and in turn I found I had to look for ways of making my position complementary to theirs. Interestingly, this role turned out to become one of reinforcing the relevance of the expertise of the local professionals as well of the importance of local farmers' knowledge and their worldviews.

Redefining the Green Revolution in rain-fed areas

While working in Africa I realised that in rain-fed areas chemical fertilisers are often not effective, not affordable, not economical, not available and not environmentally sound. This led to a search for other ways to improve soil fertility and productivity. This was also a sign of the Western bias in agricultural development programmes and an indication that Western approaches do not necessarily work elsewhere.

In 1979 I was working in Ghana in a Green Revolution project, and the ship with fertilisers did not arrive until after the rains had started. The roads had already become inaccessible and the fertilisers could not be distributed to the farmers and therefore could not be used for that cropping season. The extension workers realised that the farmers did not have the most important external commodity on which their extension message was based.

So there we were, empty handed and after a long debate, we decided that instead of going to the farmers **with a message**, we would go and visit farmers **with a question.** We wanted to find out: *What is the farmers' own solution to soil fertility and other farming problems?*

Consulting farmers like this revealed that farmers indeed have a lot of knowledge and that this knowledge is relevant, appropriate and location specific. It may also have its limitations and therefore it is important that local knowledge is complemented with outside knowledge.

Once we asked about it with interest and respect, farmers were proud to show their knowledge. On the basis of this experience in Ghana and many similar experiences of other colleagues, we shifted our work from transfer of technology to participatory development of location-specific technologies, using as far as possible the resources that are available to the farmers in the local area. This experience was an important inspiration for the ILEIA programme (www.leisa.info), in which we documented and systematised farming methods that made use of locally available resources. Examples include agro-forestry, soil and water harvesting, botanical pesticides, integrated pest management, micro-climate management, ethno-veterinary and local health practices.

Later, we broadened our interest in local knowledge to include non-technical aspects, and by taking into account the different worldviews. Working in the Compas programme (www.compasnet.org) we learned that rural people were also prepared to share more intimate knowledge that had to do with their spiritual life: their cosmovision, beliefs and faith. Here genuine interest and respect was an important condition. My friendship and relationship of confidence with a number of local professionals in different countries and shared interests in and respect for local culture was essential. This brought me into contact with local experts, traditional leaders and persons of wisdom, who helped me to learn new lessons in a broader intercultural context.

Material and technological orientation of my work

My initial work was aimed at reducing poverty of rural people. We started programmes to increase efficiency of agriculture, increase production and produce marketable products. In many cases farmers were not interested in these objectives. After getting frustrated I gradually found I was prepared to listen to rural communities. It became clear to me that the people labelled as 'rural poor' are often

very rich when it comes to their social environment and their well-being derived from their ancestral belief system or traditional faith. In the West, poverty is determined by income in dollars per day; in Bolivia rural people define poverty as 'having no friends' and in Ghana as having no 'ancestral connection', in Sri Lanka as 'being attached to the material world' and in India as 'not being free from vices as greed, lust, intoxication, power'.

This has led me to understand that poverty has many faces and that poverty alleviation can only be done by taking into account material, social and spiritual aspects and by building on the locally available resources in each of these three domains as they are perceived by the local people themselves and as expressed in their cosmovision.

Lobbying or creating new visions

During the period in which ILEIA was developing the concepts of Low External Input and Sustainable Agriculture (LEISA), the Dutch ministry of development cooperation started to become convinced of the strength of the arguments for low external input agriculture. Our lobbying was to some extent successful. However this policy support backfired on us, as the conventional agronomic scientists argued that we did not have scientific evidence that the LEISA approach was really feasible and would be able to feed the world. We ended up in a position of trying to provide scientific justification of the LEISA programme and this drained resources from the network towards quantitative research. In the time frame given to us and with the resources available, we were not able to pass the rigid and quantitative standards of conventional scientists. Meanwhile rural people did not stop their subsistence on locally available resources, and we continued to document and systematise their experiences. LEISA is now considered a mainstream approach in complex, diverse and rain-fed areas. The lesson I learned was, that rather than criticising the conventions and lobbying for policy changes, it is more rewarding and effective to pursue one's own convictions, create a new vision, devise new methods, test them to make them work and show that alternatives are possible. Finding friends, building up synergy and complementarity and thus creating a new reality that shows its own potentials and limitations is more effective than creating resistance by trying to change systems that do not share the same logic or values.

From one religion to spirituality with many sources

In my early adulthood I became alienated from the Roman Catholic Church. I found it too dogmatic and conservative, and while working in Colombia I encountered priests who, in my eyes, were part of the system that was repressing the poor. I distanced myself from the church and, without realising it at the time, initially also from spirituality. I concentrated on my professional work and my family and enjoyed life. At a certain moment however, I became aware that the idea of sense and meaning was missing in my life. I took training in psychology, devoting ample attention to meditation, spirituality and dreaming, and this way I learned more of myself and of the importance of spiritual development.

I realised, that by leaving the church I had deprived myself of guidance in my professional development. My work in ILEIA and Compas offered me the opportunity to take part in agricultural festivals and rituals in the Andes, Africa, India

and Sri Lanka. The deep meaning and sense-giving aspects impressed me. I am now open to spiritual guidance from many different sources, none of which I consider to be superior than the others. They complement each other.

All work and no play makes Jack a dull boy, they say

Although I had heard this saying, it I could not internalise it till I was about 45 years old. The workaholic in me was coming close to being overworked: I got irritated and tired. I took a class in art and learned sculpture and discovered that this was a fascinating way to express myself. Through sculpture one can 'say' things and express emotions and impressions in a symbolic, metaphoric way, where words and rationality that dominate professional work fall short. Presently I combine professional and artistic work and this is proving to be very rewarding. www.bhaverkort.nl shows some of my art work. Through sculpture I have rediscovered my cultural roots.

Rethinking my cultural roots

As part of my study of art I made a study tour of Greece and Rome in 1999. I wanted to learn more about the roots of my culture. I admired the richness and philosophical and scientific achievements of the ancient Greco-Roman culture and I recognised the influence it has had on Christianity and Western culture in general. Then, by chance, I was given a piece of fossil (bog) wood to make a sculpture. I started to make a sculpture of a harp, thinking of Apollo. While working on the piece and by making a connection with the bogwood, I suddenly realised that this wood had grown as an oak tree in the area where I was born, but some 3000 years ago. At that time the Germanics held their rituals under the oak tree they considered sacred. And this made me realise that I am not a descendent of the Greek or Romans. Our pre-Christian culture was in fact overtaken by the Greco-Roman worldview with its religions and scientific approach. As was the case in the Americas and Africa, our cultural roots were also demonised and persecuted by missionary zeal and a holy inquisition.

I started to read Germanic and Celtic literature and discovered that they contain a wealth of myths, sagas, poems and stories, that reveal a worldview that is respectful of the forces of nature and far less anthropocentric than the present-day Western way of thinking.

Rethinking science

Reflecting further on science, it became clear to me that science is not a neutral stock of knowledge that sprouts from wisdom, serves human well-being and can be applied everywhere. Science is a product of a social system. Knowledge based on a particular set of values and worldview is produced, accumulated and shared by people of that social system.

The dominant science of today is strongly based on the materialist worldview of the West with its Greek/Christian basis. It has a linear view of time, a mechanistic notion of cause and effect, it values quantity more than quality, has separated mind and matter and is organised in highly specialised disciplines. The theory of evolution translated to economics led to a mechanism of competition between commercial enterprises where the winner takes all. Human traits such as altruism, friendship, cooperation, affection and have been made inferior to competition, war and justified domination, cultural and biological extinction.

In the colonial period and after, this science, in combination with religions was disseminated in the South and substituted the various indigenous knowledges, sciences and belief systems. These were declared inferior and superstitious and regarded as a bottleneck to modernisation.

Western science has led to impressive technologies and highly productive systems of agriculture and industry. But it has not led to global peace, ecological stability and well-being or even eradication of widespread hunger or poverty.

From development cooperation to intercultural dialogue

Learning about the worldviews of non-Western cultures it became clear to me that the notion of development, as we understand it, is a Western concept: it focuses on material growth through a linear process of application of technologies, rationality and economic behaviour and assumes the superiority of these attributes and Western culture.

Development cooperation, the way it is conventionally carried out, generally does not understand, appreciate or respect values and views of other cultures and is likely to do considerable harm to the globe: it can further environmental damage, cultural degradation and has not been able to adequately address the material, social and spiritual aspects of poverty in the world. I believe that the 'global village', created by the enhanced possibilities for communicating at global scale, offers great opportunities for intercultural exchange, dialogues and joint learning.

Dealing with the diversity of sciences

Despite their marginal position in many countries, traditional knowledge and belief systems still exist. Sometimes they exist alongside the dominant system, sometimes in clandestine or underground ways.

The lessons learned so far have made me aware of the strong and weak points of other sciences and their potential for contributing to development. But, in order to make use of the potential diversity of ways of knowing in the globe, we need to revitalise local knowledge and sciences that have been marginalised, and seek ways to encourage a co-evolution of different ways of knowing.

I am very interested in the changes that are happening in the paradigms of Western knowledge and in the way Western knowledge can learn from non-western knowledge. Acceptance of and exploration of a diversity of sciences and approaches to knowing and experiencing is a better option. Intra and inter-scientific dialogues are fascinating and important activities that can contribute to the co-evolution of sciences.

For this we need all the friends we can get.

Transdisciplinarity – past, present and future

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Going beyond disciplines

Transdisciplinarity is a relatively young approach: it emerged seven centuries after disciplinarity, in the writings of the Swiss philosopher and psychologist Jean Piaget (1896-1980). Piaget (1971) indicates that transdisciplinarity 'will not be limited to the interactions or reciprocities between the specialised researches, but will locate these links inside a total system without stable boundaries between the disciplines.' (Piaget, 1972: p. 144) This description has been subject to debate and modifications.

I proposed including the meaning 'beyond disciplines' in 1985 (Nicolescu, 1985) and I have developed this idea over the years. Many other researchers over the world have also contributed to this development of transdisciplinarity. A key date in this development is 1994, when the Charter of Transdisciplinarity[2] was adopted by the participants at the First World Congress of Transdisciplinarity.

This idea came from my long practice of quantum physics. For an outsider, it might seem paradoxical that from the very core of exact sciences we arrive at the idea of the limits of disciplinary knowledge. But there is inside evidence that disciplinary knowledge has reached its own limitations, which has far-reaching consequences not only for science, but also for culture and social life.

The crucial point here is the status of the *Subject*.

Modern science was born through a violent break with the ancient vision of the world. It was founded on the idea – surprising and revolutionary in that era – of a total separation between the *Knowing Subject* and *Reality*. The latter was assumed to be completely independent from the subject who observed it. This break allowed science to develop independently of theology, philosophy and culture. It was a positive act of freedom. But today it is becoming clear that one of the consequences of this break, the ideology of scientism, is the danger of the potential self-destruction of our species.

On the spiritual level, the consequences of scientism have been considerable: the only knowledge worthy of this name must therefore be scientific and objective; the only reality worthy of this name must be objective reality, ruled by objective laws. All knowledge other than scientific knowledge is thus cast into the inferno of subjectivity, tolerated at most as a meaningless embellishment, or rejected with contempt as a fantasy, an illusion, a regression, or a product of the imagination. Even the word 'spirituality' has become suspect and its use has been practically abandoned.

Objectivity, set up as the supreme criterion of Truth, has one inevitable consequence: the transformation of the Subject into an Object. The death of the

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[2] See page 164 for the full text of the Charter.

Subject is the price we pay for objective knowledge. The human being has become an object – an object of the exploitation of man by man, an object of the experiments of ideologies which are proclaimed scientific, an object of scientific studies to be dissected, formalised, and manipulated. The relationship Man–God has become a relationship Man–Object, of which the only result can be self-destruction. The massacres of this century, the multiple local wars, terrorism and environmental degradation are acts of self-destruction on a global scale.

In fact, with very few exceptions – Husserl, Heidegger or Cassirer – modern and post-modern thinkers gradually transformed the Subject in a grammatical subject. The Subject is today just a word in a phrase (Descombes, 2004).

The quantum revolution radically changed this situation. The new scientific and philosophical notions it introduced – the principle of superposition of quantum 'yes' and 'no' states, discontinuity, non-separability, global causality, quantum indeterminism – necessarily led the founders of quantum mechanics to rethink the problem of the complete Object/Subject separation. For example, Werner Heisenberg, winner of the Nobel Prize for Physics, thought that one must suppress any rigid distinction between the Subject and Object, between objective reality and subjective reality. 'The concept of 'objective' and 'subjective' designate […] two different aspects of one reality; however we would make a very crude simplification if we want to divide the world in one objective reality and one subjective reality. Many rigidities of the philosophy of the last centuries are born by this black and white view of the world.' (Heisenberg, 1989: p. 269) He also asserts that we have to renounce the privileged reference to the exteriority of the material world. 'The too strong insistence on the difference between scientific knowledge and artistic knowledge comes from the wrong idea that concepts describe perfectly the 'real things' […] All true philosophy is situated on the threshold between science and poetry.' (Ibid: pp. 363-364)

My line of thinking is in perfect agreement with that of Heisenberg. For me, 'beyond disciplines' precisely signifies the Subject-Object interaction. The transcendence, inherent in transdisciplinarity, is the transcendence of the Subject. The Subject cannot be captured in a disciplinary camp.

The meaning 'beyond disciplines' leads us to an immense space of new knowledge. The main outcome has been the formulation of the methodology of transdisciplinarity, which I will analyse in the next section. It allows us also to clearly distinguish between *multidisciplinarity, interdisciplinarity* and *transdisciplinarity*.

Multidisciplinarity concerns itself with studying a research topic in not just one discipline only, but in several at the same time. Any topic in question will ultimately be enriched by incorporating the perspectives of several disciplines. The multidisciplinary approach transgresses disciplinary boundaries while its goal remains limited to within the framework of disciplinary research.

Interdisciplinarity has a different goal than multidisciplinarity. It concerns the transfer of methods from one discipline to another. Like multidisciplinarity, interdisciplinarity transgresses the boundaries of disciplines while its goal still remains within the framework of disciplinary research. Interdisciplinarity even has the capacity to generate new disciplines, like quantum cosmology and chaos theory.

Transdisciplinarity concerns itself with what is *between* the disciplines, *across* the different disciplines, and *beyond* all disciplines. Its goal is the understanding of the

present world, of which one of the imperatives is the unity of knowledge (Nicolescu, 1996).

As one can see, there is no opposition between disciplinarity (including multidisciplinarity and interdisciplinarity) and transdisciplinarity, but a fertile complementarity. In fact, there is no transdisciplinarity without disciplinarity. Nevertheless, the above considerations provoked, around 1990, a more a less violent war of definitions. This war is not yet over.

There is a specific and different approach to transdisciplinarity that is characterised by the refusal to formulate any methodology and by its exclusive concentration on joint problem-solving of problems pertaining to the science-technology-society triad. This approach is represented by people including Michael Gibbons (1994) and Helga Nowotny (1994). The point of view of this transdisciplinary current was largely expressed at the Zürich Congress, in 2000 (Thompson Klein et al., 2001).

This version of transdisciplinarity does not exclude the meaning 'beyond disciplines' but reduces it to the interaction of disciplines with social constraints. The social field necessarily introduces a dimension 'beyond disciplines', but the individual human being is conceived of as part of a social system only.

It is difficult for us to understand why 'joint problem solving' must be the unique aim of transdisciplinarity. It is certainly one of the aims, but not the only aim. The use of the singular seems dangerous to us. As in religion, it would allow for unnecessary wars and unproductive dogmatism. I think that the unconscious barrier to a true dialogue comes from the inability of certain transdisciplinary researchers to think about discontinuity. For them, the boundaries between disciplines are like boundaries between countries, continents and oceans on the surface of the Earth. These boundaries fluctuate in time but one fact remains unchanged: the continuity between territories. We have a different approach to the boundaries between disciplines. For us, they are like the separation between galaxies, solar systems, stars and planets. It is the movement itself that generates the fluctuation of boundaries. This does not mean that a galaxy intersects another galaxy. When we cross the boundaries we meet the interplanetary and intergalactic vacuum. This vacuum is far from being empty: it is full of invisible matter and energy. It introduces a clear discontinuity between territories of galaxies, solar systems, stars and planets. Without the interplanetary and intergalactic vacuum there is no Universe.

It is my deep conviction that our formulation of transdisciplinarity is both unified (in the sense of unification of different transdisciplinary approaches) and diverse: unity in diversity and diversity through unity is inherent to transdisciplinarity.

Much confusion arises by not recognising that there is a *theoretical transdisciplinarity*, a *phenomenological transdisciplinarity* and an *experimental transdisciplinarity*.

The word *theory* implies a general definition of transdisciplinarity and a well-defined methodology.

The word *phenomenology* implies building models connecting the theoretical principles with the already observed experimental data, in order to predict further results.

The word *experimental* implies performing experiments following a well-defined procedure allowing any researcher to obtain the same results when performing the same experiments.

I classify the work done by Michael Gibbons and Helga Nowotny as phenomenological transdisciplinarity, while my own work (Nicolescu, 1985, 1986, 1991, 1996, 1998, 2000, 2002), as well as that of Jean Piaget and Edgar Morin (1999), I would classify as theoretical transdisciplinarity. In turn, experimental transdisciplinarity concerns a large amount of experimental data already collected not only within the framework of knowledge production but also in many fields including education, psychoanalysis, the treatment of pain in terminal diseases, drug addiction, art, literature, history of religions, etc. The huge potential of transdisciplinarity will never be realised if we do not accept the simultaneous and rigorous consideration of the three aspects of transdisciplinarity. This simultaneous consideration of theoretical, phenomenological and experimental transdisciplinarity will allow both a unified and non-dogmatic treatment of transdisciplinary theory and practice, coexisting with a plurality of transdisciplinary models.

Formulation of the methodology of transdisciplinarity

The axiomatic character of the methodology of transdisciplinarity

The most important achievement of transdisciplinarity at present is, of course, the formulation of the methodology of transdisciplinarity, accepted and applied by a considerable number of researchers in many countries of the world.

The axiomatic character of the methodology of transdisciplinarity is an important aspect. It means that the number of axioms (or principles or pillars) has to be limited to a *minimum* number. Any axiom that can be derived from the already postulated ones, has to be rejected.

This fact is not new. It arose when disciplinary knowledge acquired its scientific character, due the three axioms formulated by Galileo Galilei (1956, 1992) in *Dialogue on the Great World Systems:*

- *There are universal laws, of a mathematical character.*
- *These laws can be discovered by scientific experiment.*
- *Such experiments can be perfectly replicated.*

It should be obvious that if we try to build a mathematical bridge between science and ontology, we will necessarily fail. Galileo himself makes the distinction between human mathematics and divine mathematics (Galileo, 1992: p. 192). Human mathematics constitutes the common language of human beings and God, while divine mathematics is connected with the direct perception of the totality of all existing laws and phenomena. Transdisciplinarity tries to seriously take this distinction into account. A bridge can be built between science and ontology only by taking into account the totality of human knowledge. This requires a symbolic language, different from mathematical language and enriched by specific new notions. Mathematics is able to describe repetition of facts due to scientific laws, but transdisciplinarity is also about the singularity of the human being and human life. The key-point here is, once

again, the irreducible presence of the Subject, which explains why transdisciplinarity cannot be described by a mathematical formalism. The dream of the mathematical formalisation of transdisciplinarity is just a phantasm, the phantasm induced by centuries of disciplinary knowledge.

We have arrived (Nicolescu, 1996) at the following three axioms of the methodology of transdisciplinarity:

The ontological axiom: *In Nature and in our knowledge of Nature, there are different levels of Reality and, correspondingly, different levels of perception.*
The logical axiom: *The passage from one level of Reality to another is insured by the logic of the included middle.*
The complexity axiom: *The structure of the totality of levels of Reality or perception is a complex structure: every level is what it is because all the levels exist at the same time.*

The first two axioms derive their experimental evidence from quantum physics, but they go well beyond the exact sciences. The third axiom has its source not only in quantum physics but also in a variety of other exact and human sciences. All three are in agreement with traditional thinking, present from the beginning of historical times.

Axioms cannot be demonstrated: they are not theorems. They have their roots in experimental data and theoretical approaches and their validity is judged by the results of their applications. If the consequences of the given axioms contradict experimental facts, the axioms have to be modified or replaced.

In spite of an almost infinite diversity of methods, theories and models, which run throughout the history of different scientific disciplines, the three methodological postulates of modern science have remained unchanged from Galileo until the present day. Let us hope that the same will prove to be true for transdisciplinarity and that a large number of transdisciplinary methods, theories and models will appear in the future.

Only one science has entirely and integrally satisfied the three Galilean postulates: physics. The other scientific disciplines only partially satisfy the three methodological postulates of modern science. However, the absence of rigorous mathematical formulation in psychology, psychoanalysis, history of religions, legal theory and a multitude of other disciplines has not led to the elimination of these disciplines from the field of science. Not even an exact science like molecular biology can claim a mathematical formulation as rigorous as that of physics. In other words, there are *degrees of disciplinarity* which can respectively take into account more or less completely the three methodological postulates of modern science. Likewise, the process of more or less taking completely into account the three methodological pillars of transdisciplinary research will generate different *degrees of transdisciplinarity*. Large avenues are open for rich and diverse transdisciplinary research.

The above three axioms (ontological, logical and complexity) give a precise and rigorous *definition of transdisciplinarity*.

Let me now describe the essentials of these three transdisciplinary axioms.

The ontological axiom: levels of Reality and levels of perception

The key concept of the transdisciplinary approach to Nature and knowledge is the concept of *levels of Reality*.

Here the meaning we give to the word Reality is pragmatic and ontological at the same time. By Reality we mean primarily that which *resists* our experiences, representations, descriptions, images, or even mathematical formulations.

In so far as Nature participates in the being of the world, one has to also assign an ontological dimension to the concept of Reality. Reality is not merely a social construction, the consensus of a collectivity, or some inter-subjective agreement. It also has a trans-subjective dimension: for example, experimental data can ruin the most beautiful scientific theory.

Of course, one has to distinguish the words Real and Reality. *Real* designates that which *is*, while *Reality* is connected to resistance in our human experience. The Real is, by definition, veiled for ever, while Reality is accessible to our knowledge.

By 'level of Reality', I designate a set of systems which are invariant under certain laws: for example, quantum entities are subordinate to quantum laws, which depart radically from the laws of the macro-physical world. That is to say, two levels of Reality are different if, while passing from one to the other, there is a break in the applicable laws and a break in fundamental concepts (e.g. causality). Therefore there is a *discontinuity* in the structure of levels of Reality, similar to the discontinuity reigning over the quantum world.

Every level of Reality has its associated space-time, different from one level to the other. For example, the classical notion of reality is associated with 4-dimensional space-time (three dimensions of space and one dimension of time), while the quantum notion of reality is associated with a space-time whose number of dimensions is greater than four. The introduction of the levels of Reality induces a multidimensional and multireferential structure of Reality.

A new *Principle of Relativity* (Nicolescu, 1996, pp. 54-55) emerges from the coexistence of complex plurality and open unity in our approach: *no level of Reality constitutes a privileged place from which one is able to understand all the other levels of Reality*. A level of Reality is what it is because all the other levels exist at the same time. This Principle of Relativity is what creates a new perspective on religion, politics, art, education, and social life. And when our perspective on the world changes, the world changes.

In other words, our approach is not hierarchical. There is no fundamental level. But its absence does not mean an anarchical dynamic, but a coherent one, of all levels of Reality, already discovered or which will be discovered in the future.

Every level is characterised by its *incompleteness*: the laws governing this level are just a part of the totality of laws governing all levels. And even the totality of laws does not exhaust the entire Reality: we also have to consider the Subject and its interaction with the Object.

The zone between two different levels and beyond all levels is a zone of non-resistance to our experiences, representations, descriptions, images and mathematical formulations. Quite simply, the transparency of this zone is due to the limitations of our bodies and of our sense organs – limitations which apply regardless of the measuring tools that are used to extend these sense organs. We therefore have to conclude that the topological distance between levels is finite. However this finite

distance does not mean a finite knowledge. Take, as an image, a segment of a straight line – it contains an infinite number of points. In a similar manner, a finite topological distance could contain an infinite number of levels of Reality. We have work to do till the end of time.

The zone of non-resistance corresponds to the sacred – that which does not submit to any rationalisation. Proclaiming that there is a single level of Reality eliminates the sacred, and self-destruction is generated.

The unity of levels of Reality and its complementary zone of non-resistance constitutes what we call the transdisciplinary Object.

Inspired by the phenomenology of Edmund Husserl (1966), I assert that the different levels of Reality are accessible to our knowledge as a result of the different levels of perception which are potentially present in our being. These levels of perception permit an increasingly general, unifying, encompassing vision of Reality, without ever entirely exhausting it.

As in the case of levels of Reality, the coherence of levels of perception presupposes a zone of non-resistance to perception.

The unity of levels of perception and this complementary zone of non-resistance constitutes what we call the *transdisciplinary Subject*.

In a rigorous way, we see that 'levels of perception' are, in fact, *levels of Reality of the Subject*, while 'levels of Reality' are, in fact, *levels of Reality of the Object*. Both types of levels imply resistance.

Knowledge is neither exterior nor interior: it is simultaneously exterior and interior. The studies of the universe and of the human being sustain one another.

The zone of non-resistance plays the role of a *third party* between the Subject and the Object, an Interaction term, which acts like a secretly included middle that allows the unification of the transdisciplinary Subject and the transdisciplinary Object while preserving their difference. In the following I will call this Interaction term the Hidden Third.

Our ternary partition {Subject, Object, Hidden Third} is, of course, different from the binary partition{Subject vs. Object} of classical realism.

The emergence of at least three different levels of Reality in the study of natural systems – the macro-physical level, the microphysical level and cyber-space-time (to which one might add a fourth level – that of superstrings, unifying all physical interactions) – is a major event in the history of knowledge.

Based upon our definition of levels of Reality, we can identify other levels than the ones in natural systems. For example, in social systems, we can speak of the individual level, the geographical and historical community level (family, nation), the cyber-space-time community level and the planetary level.

Levels of Reality are radically different from levels of organisation as these have been defined in systemic approaches (Camus et al., 1998). Levels of organisation do not presuppose a discontinuity in the fundamental concepts: several levels of organisation can appear at one and the same level of Reality. The levels of organisation correspond to different structures of the same fundamental laws.

The levels of Reality and the levels of organisation offer the possibility of a new taxonomy of the more than 8000 academic disciplines existing today. Many disciplines coexist at one and the same level of Reality even if they correspond to different levels

of organisation. For example, Marxist economy and classical physics belong to one level of Reality, while quantum physics and psychoanalysis belong to another level of Reality.

The existence of different levels of Reality has been affirmed by different traditions and civilizations, but this affirmation was founded either on religious dogma or on the exploration of the interior universe only.

The transdisciplinary Object and its levels of Reality, the transdisciplinary Subject and its levels of perception and the Hidden Third define the transdisciplinary model of Reality. Based on this ternary structure of Reality, we can deduce other ternaries of levels, which are extremely useful in the analysis of concrete situations:

Levels of organisation – Levels of structuring – Levels of integration
Levels of confusion – Levels of language – Levels of interpretation
Physical levels – Biological levels – Psychical levels
Levels of ignorance – Levels of intelligence – Levels of contemplation
Levels of objectivity – Levels of subjectivity – Levels of complexity
Levels of knowledge – Levels of understanding – Levels of being
Levels of materiality – Levels of spirituality – Levels of non-duality

In 1998, I was greatly surprised to discover the idea of 'levels of Reality', expressed in a book by Werner Heisenberg, *Philosophy - The manuscript of 1942* (1998). This book has a quite astonishing history: it was written in 1942 but it was published in German only in 1984. I read the French translation of the book in 1998. There is not yet, to my knowledge, an English translation of this book.

The philosophy of Heisenberg is based on two main ideas: the first is the notion of levels of Reality corresponding to different modes of embodying objectivity in terms of the respective process of knowledge and the second is the gradual erasing of the familiar concept of 3-dimensional space and 1-dimensional time.

For Heisenberg, reality is 'the continuous fluctuation of the experience as captured by consciousness. In that sense, it can never be identified to a closed system [...]' (Heisenberg, 1998: p. 166). By 'experience', he understands not only scientific experiments but also the perception of the movement of the soul or of the autonomous truth of symbols. For him, reality is a tissue of connections and of infinite abundance, without any ultimate foundation.

'One can never reach an exact and complete portrait of reality', (Ibid., p. 258) writes Heisenberg.

The incompleteness of physical laws is therefore present in his philosophy.

Heisenberg asserts many times, in agreement with Husserl, Heidegger and Cassirer (whom he knew personally), that one has to suppress any rigid distinction between the Subject and Object. He also writes that one has to renounce the privileged reference to the exteriority of the material world and that the only way to understand the nature of reality is to accept its division in regions and levels.

Heisenberg classifies the numerous regions of reality in only three levels, in terms of the different proximity between the Object and the Subject (Ibid., p. 372). He deduces that the rigid distinction between exact and human sciences has to be abandoned, a fact which sounds very, very transdisciplinary.

Heisenberg's first level of reality corresponds to fields which embody objectivity independently of the knowledge process. Classical physics, electromagnetism and Einstein's two theories of relativity belong to this level.

The second level corresponds to fields that are inseparable from the knowledge process: quantum mechanics, biology and the sciences of consciousness (e.g. psychoanalysis).

Finally, the third level corresponds to fields created in connection with the knowledge process. He situates there philosophy, art, politics, the metaphors concerning God, the religious experience and the artistic creative experience.

If the first two levels of Heisenberg totally correspond to my own definition, the third one mixes levels and non-levels (in other words, the zones of non-resistance). The religious experience and the artistic creative experience cannot be assimilated to levels of Reality. They merely correspond to crossing levels in the zone of non-resistance. The absence of resistance and especially the absence of discontinuity in the philosophy of Heisenberg explain the difference between his approach and mine. A rigorous classification of regions in levels cannot be obtained in the absence of discontinuity.

Heisenberg insists on the crucial role of intuition: 'Only an intuitive thinking could bridge the abyss between old and new concepts; the formal deduction is impotent in realising this bridge […].' (Idem, p. 261) But Heisenberg did not draw the logical conclusion concerning this impotence of formal thinking: only the non-resistance to our experiences, representations, descriptions, images or mathematical formalisms can bridge the abyss between two levels. This non-resistance restores the continuity broken by levels.

The logical axiom: the included middle

The incompleteness of the general laws governing a given level of Reality signifies that, at a given moment of time, one necessarily discovers contradictions in the theory describing the respective level: one has to assert A and non-A at the same time. This Gödelian feature of the transdisciplinary model of Reality is verified by the whole of the history of science: a theory leads to contradictions and one has to invent a new theory that solves these contradictions. This is precisely how we went from classical physics to quantum physics.

However, our habits of mind, scientific or not, are still governed by the classical logic, which does not tolerate contradictions. The classical logic is founded on three axioms:

- *The axiom of identity*: A is A.
- *The axiom of non-contradiction:* A is not non-A.
- *The axiom of the excluded middle*: There exists no third term T ('T' from 'third') which is at the same time A and non-A.

Knowledge of the coexistence of the quantum world and the macro-physical world and the development of quantum physics have led, at the level of theory and scientific experiment, to pairs of mutually exclusive contradictories (A and non-A): wave and corpuscle, continuity and discontinuity, separability and non-separability, local causality and global causality, symmetry and breaking of symmetry, reversibility and irreversibility of time, and so forth.

The intellectual scandal provoked by quantum mechanics consists precisely of the fact that the pairs of contradictories that it generates are actually mutually exclusive when they are analyzed through the interpretive filter of classical logic.

However, the solution is relatively simple: one has to abandon the third axiom of classical logic, imposing the exclusion of the third, the included middle T.

History will credit Stéphane Lupasco (1900-1988) (Badescu and Nicolescu (ed.), 1999) with having shown that the logic of the included middle is a true logic, mathematically formalised, multivalent (with three values: A, non-A, and T) and non-contradictory (Lupasco, 1951).

In fact, the logic of the *included* middle is the very heart of quantum mechanics: it allows us to understand the basic principle of the superposition of 'yes' and 'no' quantum states.

Heisenberg was fully conscious of the necessity of adopting the logic of the included middle. 'There is a fundamental principle of classical logic which seems to need to be modified: in classical logic, if one assertion has a meaning, one supposes that either this assertion or its negation has to be true. Only one of the sentences 'There is a table here' and 'There is no table here' is true. There is not a third possibility and this is the principle of the excluded middle. […] In quantum theory, one has to modify this law of the excluded middle.'

Our understanding of the axiom of the included middle – there exists a third term T which is at the same time A and non-A – is completely clarified once the notion of 'levels of Reality', is introduced.

In order to obtain a clear image of the meaning of the included middle, let us represent the three terms of the new logic – A, non-A, and T – and the dynamics associated with them by a triangle in which one of the vertices is situated at one level of Reality and the two other vertices at another level of Reality. The included middle is in fact an *included third*.

If one remains at a single level of Reality, all manifestation appears as a struggle between two contradictory elements. The third dynamic, that of the T-state, is exercised at another level of Reality, where that which appears to be disunited is in fact united, and that which appears contradictory is perceived as non-contradictory.

It is the projection of the T-state onto the same single level of Reality which produces the appearance of mutually exclusive, antagonistic pairs (A and non-A). A single level of Reality can only create antagonistic oppositions. It is inherently self-destructive if it is completely separated from all the other levels of Reality. A third term, which is situated at the same level of Reality as that of the opposites A and non-A, cannot achieve their reconciliation. Of course, this conciliation is only temporary. We necessarily discover contradictions in the theory of the new level when this theory confronts new experimental facts. In other words, the action of the logic of the included middle on the different levels of Reality induces an open structure of the unity of levels of Reality. This structure has considerable consequences for the theory of knowledge because it implies the impossibility of a self-enclosed complete theory. Knowledge is forever *open*.

The logic of the included middle does not abolish the logic of the excluded middle: it only constrains its sphere of validity. The logic of the excluded middle is certainly valid for relatively simple situations, for example, driving a car on a highway:

no one would dream of introducing an included middle in regard to what is permitted and what is prohibited in such circumstances.

On the contrary, the logic of the excluded middle is harmful in complex cases, for example, within the economic, social, cultural, religious or political spheres. In such cases it operates like a genuine logic of exclusion: good or evil, right or left, heaven or hell, alive or dead, women or men, rich or poor, whites or blacks. It would be revealing to undertake an analysis of xenophobia, racism, apartheid, anti-Semitism, or nationalism in the light of the logic of the excluded middle. It would also be very instructive to examine the speeches of politicians through the filter of that logic.

There is certainly coherence among different levels of Reality, at least in the natural world. In fact, an immense self-consistency – a cosmic bootstrap – seems to govern the evolution of the universe, from the infinitely small to the infinitely large, from the infinitely brief to the infinitely long. A flow of information is transmitted in a coherent manner from one level of Reality to another in our physical universe.

The included middle logic is a *tool for an integrative process*: it allows us to cross two different levels of Reality or of perception and to effectively integrate, not only in thinking but also in our own being, the coherence of the Universe.

The use of the included third is *a transformative process*. But, at that moment, the included third ceases to be an abstract, logical tool: it becomes a living reality touching all the dimensions of our being. This fact is particularly important in education and learning.

It is important to note that the combined action of the ontological and logical axioms engender the notion of *paradox*. The paradox is the suspension of the contradictories (A, non-A) in the space between two levels of Reality. Therefore, there is no need to introduce paradox as a 4th axiom of transdisciplinarity (Paul, 2003).

Recent findings in the physiology of the brain give a particularly deep understanding of the action of the included middle. High technology tools, like single photon emission computed tomography, allow us to rigorously visualise the blood flow patterns in the brain during widely differing activities such as solving a mathematical problem or Zen meditation. Different specialised zones of the brain are now identified. Of course, the notion itself of 'reality' is empty without the participation of the brain. This does not necessarily mean that the brain creates reality. We can merely say that we have inside ourselves an apt apparatus for perceiving reality.

Based on these neurophysiological discoveries, Andrew Newberg and Eugene d'Aquili introduced a series of *cognitive operators*, which describe the general functions of the human mind (Newberg et al., 2001). Between them, of particular interest for us are the binary operator and the holistic operator.

The binary operator means the 'human brain's ability to reduce the most complicated relationships of space and time to simple pairs of opposites – above and below, in and out, left and right, before and after, and so on' and it 'gives the mind a powerful method of analyzing external reality' (Newberg et al., 2001: p. 63). The brain constructs in such a way, during the evolutionary process, a binary representation of the world, very useful for survival in a hostile environment. However, culture has extended this binary representation, in terms of exclusive contradictories, to ethical, mythological and metaphysical representations, like good and evil, the space-time

background of such representations being erased. The binary operator describes, in fact, the neurological operations of the inferior parietal lobe (Ibid., p. 51). The classical logic is a product of the inferior parietal lobe.

In its turn, the *holistic operator* 'allows us to see the world as a whole. […] The holistic operator most likely rises from the activity of the parietal lobe in the brain's right hemisphere.' (Ibid., p. 48) The holistic view is also a product of the evolutionary process. When our ancestors were confronted with a wild animal, the binary representations were not sufficient for survival. If our ancestors had spent their time analyzing the different parts of the wild animal and the associated pairs of the mutually exclusive contradictories, they would simply have been killed and we would not be here to think about an excluded or included middle. The holistic operator erases contradictories and therefore is connected with the action of the included middle.

The complexity axiom: the universal interdependence

There are several theories of complexity. Some of them, like the one practised at the Santa Fe Institute, under the general guidance of Murray Gell-Mann, winner of the Nobel Prize for Physics, are mathematically formalised, while others, like that of Edgar Morin, widely known in Latin America, are not.

In the context of our discussion, what is important to understand is that the existing theories of complexity include neither the notion of levels of Reality nor the notion of zones of non-resistance (Nicolescu, 1996, 1998, 2000). However, some of them, like the one of Edgar Morin (1977, 1980, 1986, 1991, 2001), are compatible with these notions. It is therefore useful to distinguish between *horizontal complexity*, which refers to a single level of reality and *vertical complexity*, which refers to several levels of Reality. It is also important to note that *transversal complexity* is different from vertical, transdisciplinary complexity. Transversal complexity refers to crossing different levels of organisation at a single level of Reality.

In a paradoxical way, in fundamental physics, complexity is embedded in the very heart of simplicity. Indeed, popular works state that contemporary physics is a physics where a wonderful simplicity rules (in fact, more rigorously said, *simplexity* rules), through fundamental 'building-blocks' – quarks, leptons and messengers of physical interactions. But for physicists working within physics, the situation appears infinitely more complex.

For example, according to the superstring theory in particle physics, physical interactions appear to be very simple, unified, and subordinate to general principles if they are traced within a multidimensional, 11-dimensional space–time (10 dimensions of space and 1 dimension of time) and involve an incredible amount of energy, corresponding to Planck's mass. But complexity appears at the moment of describing our familiar world, which is characterised by four dimensions and by low energies. Unified theories are at their strongest at the level of general principles, but they are very poor at describing the complexity at our own level of reality.

From a transdisciplinary point of view, complexity is a modern form of the very ancient principle of universal interdependence. This recognition allows us to avoid the current confusion between complexity and complication. The principle of universal interdependence entails the maximum possible simplicity that the human mind could imagine, the simplicity of the interaction of all levels of reality. This simplicity cannot

be captured by mathematical language, but only by symbolic language. Mathematical language addresses exclusively the analytical mind, while symbolic language addresses the totality of the human being, with its thoughts, feelings and body.

It is interesting to note that the combined action of the ontological, logical and complexity axioms engenders values. Therefore, there is no need to introduce values as a 4th axiom (Cicovacki, 2003). The transdisciplinary values are neither objective nor subjective. They result from the Hidden Third, which signifies the interaction of the subjective objectivity of the transdisciplinary Object and the objective subjectivity of the transdisciplinary Subject.

Future paths

After a long hibernation of a quarter of century since Piaget, transdisciplinarity experiencing an accelerated development in the 1990s. Today, transdisciplinary activities are flourishing in many parts of the world (Nicolescu (ed.), 2005). Transdisciplinary institutes, associations and networks are being created in Brazil, France, Italy, Canada, Romania, South Africa and Switzerland. Important international conferences have dedicated entire sessions on transdisciplinarity, in Russia, Turkey, Canada, Austria, the USA, the Netherlands and other countries. New transdisciplinary magazines are constantly being published in several countries and on the internet. A surprisingly large number of transdisciplinary books have been published in the last few years, covering an amazingly diverse range of subjects, such as education, 'science and religion' studies, economics, management, therapy, geography and landscape studies, post-colonialism, nursing, health, social science, storybook activities for children and even studies of the work of Jacques Derrida from a transdisciplinary point of view. Two publishers in France, one in Brazil and one in Romania have founded 'Transdisciplinarity' series. A quite new phenomenon, transdisciplinary lectures are now given in several universities in the USA, Spain, Romania, France, Brazil and even transdisciplinary chairs have been created.

We are now living in a new period of the advancement of transdisciplinarity.

The theory of transdisciplinarity is fully developed. Now the time for action has arrived. In the past, our actions were concentrated in the field of education, a fact which is natural because of the central role of education in individual and social life. But now we are obliged ethically to extend our activities in the scientific, social, political and spiritual realms.

Let me describe, in few words, the kind of actions that are, in my opinion, of an urgent nature.

Development of transdisciplinary higher education

Transdisciplinary education, based on the transdisciplinary methodology, allows us to establish links between persons, facts, images, representations, fields of knowledge and action and to discover the Eros of learning during our entire life. The creativity of the human being is conditioned by permanent questioning and permanent integration.

The epistemological aspects of transdisciplinarity presented above were studied on a practical level in 1997 at the International Congress held in Locarno, 'What University for tomorrow? Towards the transdisciplinary evolution of education',

sponsored by UNESCO, CIRET and the Government of Ticino (Locarno Declaration, 1997). The participants adopted the Declaration of Locarno, and experiments conforming to the recommendations of the Locarno Congress have already been performed in different countries: Brazil, Canada, France, Romania, USA, Switzerland, Argentina and Spain. The Locarno Congress also stimulated a rich theoretical reflection, in particular on the invention of new methods of education in relation to the new technologies (Harvey and Lemire, 2001). An entire recent issue of the E-zine 'Transdisciplinary Encounters' was dedicated to experiences in transdisciplinary education (Bot (ed.), 2005). Similar experiments have also been carried out, independently of the Locarno Congress, in different countries.

One of the important points is that we have accumulated a lot of useful data from practical work, justifying one of the basic assumptions of the transdisciplinary education. In transdisciplinarity, we always talk about three types of intelligences: the analytical intelligence, the feeling's intelligence and the intelligence of the body. This idea is similar to the idea of multiple intelligences developed by Howard Gardner (1999). The difference with the theory of Gardner is that we speak, in fact, about a new type of intelligence, founded upon the equilibrium between mind, body and feelings. Transdisciplinary education is an *integral education*. A person is therefore not confined to choose a job connected with his or her own type of intelligence, but he or she is able to exercise his or her freedom of choice, as a result of the internal flexibility between the three types of intelligence which, in fact, everybody possesses.

At the beginning, our claims sounded exotic, like a new utopia. It is very encouraging that recent scientific work in biology, such as that of Antonio Damasio (1999), demonstrates the cognitive dimension of feelings and emotions. Also, in a very stimulating book, Jean-Louis Revardel shows the extraordinary pertinence of the axioms of transdisciplinarity in studying the universe of affectivity (Revardel, 2003).

Another significant point is that important work on the formation of transdisciplinary educators has already been performed, for example in Brazil (through the persistent and rigorous actions of CETRANS (CETRANS; de Mello, 2000, 2003) and several other Brazilian organisations and universities), in Romania (Bertea, 2003) and in France, at the University of Tours (Demol (ed.), 2003; Paul and Pineau (ed.), 2005) and in other French universities.

In fact, networks of transdisciplinary educators are now present in different countries. They enable us to think in terms of three new stages in transdisciplinary education.

First of all, it is important to introduce courses on transdisciplinarity in as many universities as possible. Of course, transdisciplinary courses are not very rare, but we know of only one example of a course *on* transdisciplinarity, i.e. about the epistemological foundations and practical applications of transdisciplinarity. The Claremont Graduate University (CGU), one of the most highly rated universities in United States, recently instituted a new transdisciplinary course requirement for all doctoral students. The mission of CGU is to prepare a diverse group of outstanding individuals to assume leadership roles in the worldwide community through teaching, research and practice in selected fields. At Claremont, all PhD students must now take a 'T course' ('T' for 'transdisciplinary') sometime in the first two years of their programme. A second important development would be the creation of a PhD in

transdisciplinary studies. There are several examples of transdisciplinary PhD theses,[3] but they were all performed within a given discipline. There is even a PhD thesis in philosophy, on the foundations of transdisciplinarity (Bambara, 2002). However, the time has now arrived to create a specific PhD in transdisciplinary studies. It will create the appropriate space for academic studies and also for social action in the field of transdisciplinarity. It will also allow students with transdisciplinary interests to find an appropriate place to accomplish their research. The very prestigious Stellenbosch University in South Africa is at an advanced stage of creating such a PhD.

A third important development would be the creation of a Virtual Global Transdisciplinary University. This is feasible, given the existence of transdisciplinary networks in several countries and the extraordinary advancement of informatics today.

Towards a human model of health

In many contemporary societies, the human being is increasingly becoming a collection of numbers, codes and electronic files. The physical body itself is seen as a juxtaposition of genes, cells, neurons and internal organs, each organ and part thereof being under the control of super-specialists who do not communicate between themselves. Of course, high technology treats these organs, prolonging our life, and nobody can complain about this positive fact. However, no high technology can treat the entirety of the human being.

In this context, transdisciplinarity can contribute to the emergence of a new health system. One might think that this is again a utopia, an unnecessary luxury. However, empirical data accumulated show that transdisciplinary teams, acting in the field of health, can bring about a better quality health care system – a system which succeeds in simultaneously satisfying our bodily, mental and psychical needs whilst, at the same time, reducing the costs of having to treat all the different maladies and disorders separately.

Very interesting transdisciplinary experiments have been performed in Québec, in Canada, where the Institute for Health Research of Canada (IRSC) is assisting such initiatives. These include mention the activities of the transdisciplinary team of Patrick Loisel (2005), Professor of Medicine at the University of Sherbrooke, acting in the field of workplace handicaps, which affect more than one million of Canadians per year. Another example is the transdisciplinary team of Daniel Boisvert (2005), Professor at the University of Québec at Trois Rivières, acting in the field of intellectual deficiencies, which affect more than one million persons in Québec and France. Interestingly enough, these experiences demonstrate very directly, at a very concrete level, the three pillars of transdisciplinarity.

Scientific studies on consciousness

Only a few years ago, 'consciousness' was still a forbidden word in scientific research, being regarded as a kind of magic reminiscence. However, scientists have slowly started to recognise that there is a missing link between neurons and the human being. John Eccles, winner of the Nobel Prize for Physiology and Medicine, is amongst the pioneers in this regard (Eccles, 1989).

[3] See Transdisciplinary PhD theses in the References.

Like quantum mechanics, the scientific theory of consciousness will certainly be a collective creation. It is important to create transdisciplinary teams involving neurophysiologists, physicists and other disciplinary specialists of exact and human sciences, animated by a transdisciplinary attitude. Brain and mind, like anything in this world, involve different levels of Reality and perception. I am personally convinced that consciousness is the ultimate frontier of science and philosophy in the 21st century and that transdisciplinarity has very much to contribute to this advancement of science.

Dialogue between cultures and between religions

The transdisciplinary model of Reality allows us to define three types of meaning:

Horizontal meaning: interconnections at one single level of Reality. This is what most of the academic disciplines do.
Vertical meaning: interconnections involving several levels of Reality. This is what poetry, art or quantum physics do.
Meaning of meaning: interconnections involving all of Reality – the Subject, the Object and the Hidden Third. This is the ultimate aim of transdisciplinary research.

It may seem paradoxical to speak about cultures and religions in transdisciplinarity, which seems to refer, by the word itself, to academic disciplines. However, the presence of the Hidden Third explains this fake paradox.

The crucial difference between academic disciplines on the one hand and cultures and religions on the other can be easily understood in our approach. Cultures and religions are not concerned, as academic disciplines are, with fragments of levels of Reality only: they simultaneously involve one or several levels of Reality, one or several levels of perception *and* the non-resistance zone of the Hidden Third.

Technoscience is entirely situated in the zone of the Object, while cultures and religions span all three terms: the Object, the Subject and the Hidden Third. This asymmetry demonstrates the difficulty of their dialogue: this dialogue can occur only when there is a *conversion* of technoscience towards values, i.e. when the technoscientific culture becomes a true culture (Nicolescu, 2004). It is precisely this conversion that transdisciplinarity is able to perform. This dialogue is methodologically possible, because the Hidden Third crosses all levels of Reality.

Technoscience is in quite a paradoxical situation. In itself, is blind to values. However, when it enters into a dialogue with cultures and religions, it becomes the best mediator for the reconciliation of different cultures and different religions.

Creating networks of networks

The existence of transdisciplinary networks is today a fact of life. Of course, this process will continue in the future.

The very existence of these networks signifies that the number of transdisciplinary experts is continuously increasing. These researchers are certainly not 'experts' in the usual meaning of this word: they are not ultra-specialists in a very narrow discipline. However they are transdisciplinary experts, because they have knowledge of the methodology of transdisciplinarity, because they are involved in practical applications of transdisciplinarity and because they are socially attached to

transdisciplinary values. These transdisciplinary experts constitute the seeds of transdisciplinary local networks. These networks have to link up in order to form networks of networks, crucially important for action at a national or regional level. In the not too distant future, these different networks of networks will join in order to form a planetary network of networks, which will be the seed of the transdisciplinary culture.

The transdisciplinary culture is a necessity of our time, due to two contradictory facts: on one side, the inner evolution of knowledge and, on the other side, the process of globalisation.

The inner evolution of knowledge is marked by the already mentioned disciplinary big-bang. It is therefore more and more difficult to understand the complexity of our world today and to take appropriate decisions: an expert in one discipline is ignorant of thousands and thousands of other disciplines. The decision-makers are confronted with this fact.

From another angle, globalisation requires, by its own dynamics, that bridges be built as well as links between different areas of knowledge and between different views of the world. If globalisation is to be reduced to only the economic dimension, it will inevitably lead to new exclusions and a new form of slavery. Globalisation with a human face, serving the human race, requires a transdisciplinary culture, able to harmonise different fields of knowledge, different cultures and different views of the world.

Creating examples of living sustainability

In April 2005, I had the privilege of visiting the Lynedoch EcoVillage Development just outside Stellenbosch in South Africa where I witnessed an emerging example in sustainable living. Lynedoch EcoVillage Development is a very good working example of an *integrated sustainable development* approach where strategies and action plans are being consciously pursued and implemented to *connect* social, economic and ecological objectives whilst incorporating technologies that span the fields of energy, water, waste and sanitation and building materials. Lynedoch is also a learning and educational hub. As a socially mixed community – kept apart by years of racist policies and practices – it is organised around not only a child-centred learning precinct, but it is also home to the *Sustainability Institute*, which offers an MPhil degree in Sustainable Development, where students from across the African continent can learn about sustainability in action.

From a transdisciplinary point of view, if our aim is to not only understand the world, but to also find solutions to the complex problems facing us all today, including having to change the systems of reference which produce these problems, then we simply have no choice but to act decisively in our search for alternative, sustainable modes of living. In the 'Planetary Era' there is no one single, big problem – only series of overlapping, interconnected problems – that Edgar Morin so aptly described as a 'polycrisis' (Morin and Kern, 1993: p. 109). How we as the human species are going to respond to this over the next decade or two might very well be decisive for our peaceful and continued existence on the Earth. From a transdisciplinary point of view, it is our duty and responsibility to use all the means at our disposal – spiritual, theoretical and practical – to find sustainable solutions to problems which, if they remain unresolved, will affect each one of us on this beautiful

planet ours – rich and poor, young and old, Muslim and Christian, believer and non-believer, male and female, North and South, West and East.

Building a new spirituality

'Spirituality' is a completely devalued word today, in spite of its etymological meaning as 'respiration', in an act of communion between us and the cosmos. There is great spiritual poverty present on our Earth, manifest as fear, violence, hate and dogmatism. In a world with more than 10,000 religions and religious movements and more than 6,000 tongues, how can we dream about mutual understanding and peace? (Welter (Ed.), 2005) There is an obvious need for a new spirituality, conciliating technoscience and wisdom. Of course, there are already several spiritualities that have been present on our Earth for centuries and even millennia. One might ask: why is there a need for a new spirituality if we have them all, here and now?

Before answering to this question, we must face a preliminary question: is a Big Picture still possible in our post-modern times? Radical relativism answers this question in a negative way. However, its arguments are not solid or logical. They are in fact very poor and obviously linked to the totalitarian aspect of the political and philosophical correctness expressed by the slogan 'anything goes'. For radical relativists, after the death of God, the death of Man, the end of ideologies, the end of History (and, perhaps, tomorrow, the end of science and the end of religion) a Big Picture is no longer possible. For transdisciplinarity, a Big Picture is not only possible but also vitally necessary, even if it will never be formulated as a closed theory. We are happy that the well-known art critic Suzi Gablik, in her book *Has Modernism Failed?* (Gablik, 2004)[4], recently joined our point of view. The last chapter of her book is entitled 'Transdisciplinarity – Integralism and the New Ethics'. For her, the essential intellectual change of the last two decades is precisely transdisciplinarity. This change was anticipated by the great quantum physicist Wolfgang Pauli (1900-1958), winner of the Nobel Prize for Physics, who wrote fifty years ago: 'Facing the rigorous division, from the 17th century, of human spirit in isolated disciplines, I consider the aim of transgressing their opposition […] as the explicit or implicit myth of our present times.' (Pauli, 1999)[5]

The first motivation for a new spirituality is technoscience, with its associated fabulous economic power, which is simply incompatible with present spiritualities. It drives a hugely irrational force of efficiency for efficiency's sake: everything which can be done will be done, for the worst or the best. The second motivation for a new spirituality is the difficulty of the dialogue between different spiritualities, which often appear to be antagonistic, as we can testify in our everyday life. The new phenomenon of planetary terrorism is not foreign to these two problems.

In simple words, we need to find a spiritual dimension of democracy. Transdisciplinarity can help with this important advancement of democracy, through its basic notions of 'transcultural' and 'transreligious' (Nicolescu, 1996).

The *transcultural* designates the opening of all cultures to that which cuts across them and transcends them, while the *transreligious* designates the opening of all

[4] The first edition was published in 1984.

[5] Chapter 'Science and Western Thinking', p. 178. This chapter was first published in 1955, in *Europa – Erbe und Aufgabe*, Internazionaler Gelehrtehkongress, Meinz.

religions to that which cuts across them and transcends them (Nicolescu, 2003). This does not mean the emergence of a unique planetary culture and of a unique planetary religion, but of a new *transcultural and transreligious attitude*. The old principle 'unity in diversity and diversity in unity' is embodied in transdisciplinarity.

Through the transcultural, which leads to the transreligious, the spiritual poverty could be eradicated and therefore render the war of civilizations obsolete. The transcultural and transreligious attitude is not simply a utopian project – it is engraved in the very depths of our being.

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CHARTER OF TRANSDISCIPLINARITY

(adopted at the First World Congress of Trandisciplinarity, Convento da Arrábida, Portugal, November 2-6, 1994)

Preamble

Whereas, the present proliferation of academic and non-academic disciplines is leading to an exponential increase of knowledge which makes a global view of the human being impossible;

Whereas, only a form of intelligence capable of grasping the cosmic dimension of the present conflicts is able to confront the complexity of our world and the present challenge of the spiritual and material self-destruction of the human species;

Whereas, life on earth is seriously threatened by the triumph of a techno-science that obeys only the terrible logic of productivity for productivity's sake;

Whereas, the present rupture between increasingly quantitative knowledge and increasingly impoverished inner identity is leading to the rise of a new brand of obscurantism with incalculable social and personal consequences;

Whereas, an historically unprecedented growth of knowledge is increasing the inequality between those who have and those who do not, thus engendering increasing inequality within and between the different nations of our planet;

Whereas, at the same time, hope is the counterpart of all the afore-mentioned challenges, a hope that this extraordinary development of knowledge could eventually lead to an evolution not unlike the development of primates into human beings;

Therefore, in consideration of all the above, the participants of the First World Congress of Transdisciplinarity (Convento da Arrábida, Portugal, November 2-7, 1994) have adopted the present Charter, which comprises the fundamental principles of the community of transdisciplinary researchers, and constitutes a personal moral commitment, without any legal or institutional constraint, on the part of everyone who signs this *Charter*.

Article 1:

Any attempt to reduce the human being by formally defining what a human being is and subjecting the human being to reductive analyses within a framework of formal structures, no matter what they are, is incompatible with the transdisciplinary vision.

Article 2:

The recognition of the existence of different levels of reality governed by different types of logic is inherent in the transdisciplinary attitude. Any attempt to reduce reality to a single level governed by a single form of logic does not lie within the scope of transdisciplinarity.

Article 3:

Transdisciplinarity complements disciplinary approaches. It occasions the emergence of new data and new interactions from out of the encounter between disciplines. It offers us a new vision of nature and reality. Transdisciplinarity does not strive for mastery of several disciplines but aims to open all disciplines to that which they share and to that which lies beyond them.

Article 4:

The keystone of transdisciplinarity is the semantic and practical unification of the meanings that *traverse* and *lay beyond* different disciplines. It presupposes an open-minded rationality by re-examining the concepts of 'definition' and 'objectivity.' An excess of

formalism, rigidity of definitions and a claim to total objectivity, entailing the exclusion of the subject, can only have a life-negating effect.

Article 5:

The transdisciplinary vision is resolutely open insofar as it goes beyond the field of the exact sciences and demands their dialogue and their reconciliation with the humanities and the social sciences, as well as with art, literature, poetry and spiritual experience.

Article 6:

In comparison with interdisciplinarity and multidisciplinarity, transdisciplinarity is multireferential and multidimensional. While taking account of the various approaches to time and history, transdisciplinarity does not exclude a transhistorical horizon.

Article 7:

Transdisciplinarity constitutes neither a new religion, nor a new philosophy, nor a new metaphysics, nor a science of sciences.

Article 8:

The dignity of the human being is of both planetary and cosmic dimensions. The appearance of human beings on Earth is one of the stages in the history of the Universe. The recognition of the Earth as our home is one of the imperatives of transdisciplinarity. Every human being is entitled to a nationality, but as an inhabitant of the Earth is also a transnational being. The acknowledgement by international law of this twofold belonging, to a nation and to the Earth, is one of the goals of transdisciplinary research.

Article 9:

Transdisciplinarity leads to an open attitude towards myths and religions, and also towards those who respect them in a transdisciplinary spirit.

Article 10:

No single culture is privileged over any other culture. The transdisciplinary approach is inherently transcultural.

Article 11:

Authentic education cannot value abstraction over other forms of knowledge. It must teach contextual, concrete and global approaches. Transdisciplinary education revalues the role of intuition, imagination, sensibility and the body in the transmission of knowledge.

Article 12:

The development of a transdisciplinary economy is based on the postulate that the economy must serve the human being and not the reverse.

Article 13:

The transdisciplinary ethic rejects any attitude that refuses dialogue and discussion, regardless of whether the origin of this attitude is ideological, scientistic, religious, economic, political or philosophical. Shared knowledge should lead to a shared understanding based on an absolute *respect* for the collective and individual Otherness united by our common life on one and the same Earth.

Article 14:

Rigor, *openness*, and *tolerance* are the fundamental characteristics of the transdisciplinary attitude and vision. *Rigor* in argument, taking into account all existing data, is the best defense against possible distortions. *Openness* involves an acceptance of the unknown, the unexpected and the unforeseeable. *Tolerance* implies acknowledging the right to ideas and truths opposed to our own.

Article final:
The present *Charter of Transdisciplinarity* was adopted by the participants of the first World Congress of Transdisciplinarity, with no claim to any authority other than that of their own work and activity.

In accordance with procedures to be agreed upon by transdisciplinary-minded persons of all countries, this *Charter* is open to the signature of anyone who is interested in promoting progressive national, international and transnational measures to ensure the application of these Articles in everyday life.

Convento da Arrábida, 6th November 1994
Editorial Committee
Lima de Freitas, Edgar Morin and Basarab Nicolescu
Translated from the French by
Karen-Claire Voss

The role of science in anthropogenic uncertainty

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Introduction

During my stint as a member of the parents' committee of a secondary school, a historical event occurred. The last cohort of the post-war baby boom had entered school, and from one year to the next the number of new entrants dropped dramatically. The committee spent hours deliberating about the new situation and the teachers were up in arms because their jobs were at stake. If there is one thing that is predictable in a country such as Holland, where births and deaths are recorded with precision, it is the exact size of the cohort that will enter secondary school. A major drop in the number of entrants, such as at the end of the post-war baby boom, can be known years ahead. And yet, the school only reacted when it actually happened. There had been no anticipation or preparation.

We are now faced with events that, though more difficult to predict than a cohort of school children, are likely to affect our lives not just a bit, but very deeply indeed. Global climate change has driven average annual temperatures out of the normal range of a thousand-year old oscillation, and reputable scientists are predicting a 'no-analogue' situation, i.e. one that has never existed before. Yet it is only with the greatest difficulty that governments and the population at large can be cajoled into taking this threat seriously. The indicators of global change in water use, nitrogen fixation, extinction events, CO_2 content, depletion of fish stocks, etc., all show sharp increases around the 1950s, but we all seem to take a dip in economic growth or employment far more seriously than the environmental uncertainties of which most of us are becoming increasingly aware.

We are certain to run out of the relatively cheap fossil fuel on which our transport and food systems depend. Yet it is politically virtually impossible to change transport systems, or even to stop the use of inefficient vehicles. Pretty and his colleagues (Pretty et al., 2005) have calculated 'food miles', the number of miles the food in UK supermarkets has been transported within the UK, and the figures are astonishing. Yet, as a result of our total dedication to the free market, there is no preparation of our agriculture and food systems for a time that diesel and fertilisers might become prohibitively expensive. All we seem capable of is more of the same.

Water is another major issue. Experts in sectoral agencies, such as the FAO, have calculated the future fresh water requirements for respectively agriculture to feed the already born; anticipated urban and industrial development; and maintenance of the hydrological systems on which human populations depend. They discovered that they each had planned to 'spend' the same quantity of fresh water available for future

human use. Now the agencies responsible have started a 'dialogue' to negotiate the distribution of available fresh water supplies (Röling and Woodhill, 2001).

Humans have become a major force of nature (Lubchenco, 1998). As living organisms, humans depend on ecological services and a high complexity of the web of life. We are fundamentally altering both, and with that we have created high uncertainty with respect to very salient issues. These have very high stakes in terms of human survival and yet normal puzzle solving science is no longer capable of improving the problems that confront us (Funtowicz & Ravetz, 1993). We have entered an anthropogenic risk society that requires reflexive modernisation (Beck, 1994) and adaptive management (Gunderson et al., 1995).

The risk is not only environmental. It is likely that an interconnected world such as ours will experience major disintegration, conflict, upheaval and war, if we do not address the present and increasing global inequalities. At the same time, it seems impossible for the world economy to continue to grow on the basis of increased consumption and consumer demand until everyone on this planet can satisfy preferences dictated by the most desirable lifestyles possible. In that sense, the future cannot be driven by the aggregation of ever-expanding preferences. But, the expanding lifestyles of the trend-setting rich are not negotiable. To me, this complex of contradictory certainties is a key source of global instability, unilateralism, terrorism and conflict.

For most of the uncertainties we face, the world seems to behave like the secondary school I described above: incapable of anticipating the future or preparing for it. We seem to have no alternatives for economic growth and market forces when it comes to theories that underpin the design of a sustainable society. Politicians desperately seek to maintain their popularity without making any effort to prepare their electorates for times to come. In all, our knowledge about likely futures seems totally irrelevant to the way we live. We assume ever-lasting continuity of expanding opportunity. If we talk about science and a 'knowledge society', it is to better compete in the world market and to develop technologies for growth, not for preparedness for discontinuity and sustainable development.

Yet the general level of education of the world's population has never been higher than at present. Our stock of knowledge, our media coverage, the development of science, the numbers of scientists and similar variables have never been as favourable as now.

It is all very interesting!

The question that arises is: what is the role of knowledge and science in anthropogenic uncertainty?

The lazy eight

The ecologist Holling and his colleagues (Gunderson, et al., 1995; Gunderson & Holling, 2002) have developed the 'lazy eight' as the basic model for the dynamics of ecosystems. Periods of growth and accumulation ('accession') lead to vulnerability and instability that in turn lead to crisis and eventual regrouping and reorganisation of available resources and energy. Hurst (1995) has applied the lazy eight to human organisations (Figure 1). The period of growth (life cycle) depicted by the solid line

moving upwards from bottom left to top right is a period of accumulation and growth. It is a time of more-of-the-same. We tend to act as if we are permanently on the line of expansion and growth. We are not, if only because the linear economic drivers are embedded in ecosystems with a basically cyclical dynamic (Holling, 1995).

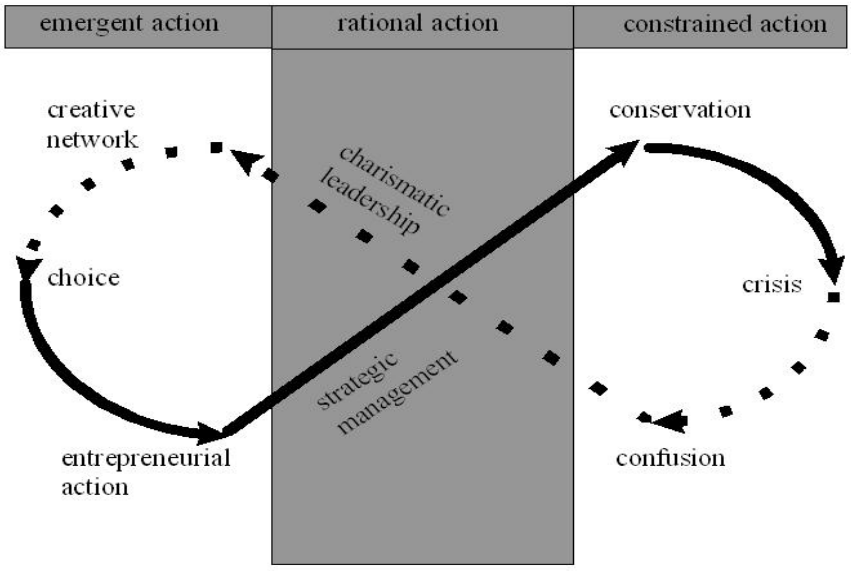

Figure 1 Holling's Lazy eight applied to human organisations (Hurst, 1995)

The problem is that we do not know when the upward life cycle line turns into crisis. Are we in a crisis already? And if so, who says? One of the interesting aspects of our times is the debate about these issues. Many claim that we already are deeply into crisis, some even say that the situation is irredeemable. But others insist that we can go on as before as long as we develop appropriate technologies. The real issue is whether we have to change our preferred lifestyles, that is, adapt what we want to what a sustainable society would allow us to get (we call this *adaptation*), or whether we can develop technologies to continue to generate the gets that we want (we call this *growth*). In this paper, I assume that we need to adapt, not only because of insufficient resources and limited carrying capacity of ecological services, but also because it is more interesting to explore the question what it would take to adapt, than what it takes to do more-of-the-same. Also the question might well be asked whether adaptation necessarily means that we have to settle for a lifestyle that is less satisfactory than the one the more prosperous among us now enjoy.

The interesting aspect of Hurst's cycle of crisis and renewal is that different phases of the cycle require different responses in terms of behaviours, leadership, forms of organisation and institutions. What we know about and are good at is the more-of-the-same phase. Recent tsunamis and hurricanes have shown our lack of preparedness when it comes to responding to crisis. In this paper I want to explore what it takes to anticipate the global crisis, to respond *before* it takes place, and to do better than the secondary school I described in the introduction to this article.

Second-order emergence

Human impact on ecosystems and the ecological services on which we depend is the unintended outcome of human activities with different anthropocentric purposes, such as producing food, making money, gaining power, acquiring wealth, and increasing comfort and security. The collective impact of these human activities on ecosystems emerges in the form of undesirable outcomes from the ecosystems. Typical examples are increased oscillations of seasonal flooding as trees that hold water in higher parts of the catchment are cut down to make place for farming; the decrease in the size of fish caught as species respond with early sexual maturity to fishermen catching large adults in the population, the sexual transformation of aquatic organisms as a result of oestrogen emitted by women using the pill to prevent births, or the emergence of pernicious weeds as a result of population increase and concomitant shortening of fallow periods in West Africa.

Such emerging ecological outcomes can only be prevented or corrected if people work back from the ecological outcomes to the behaviours that caused them and take concerted action to change those behaviours so as to generate more desirable outcomes. This is called 'second-order emergence', the emergence of ecosystem properties based on a reflexive correction of human behaviour (Gilbert and Troitzsch, 1999). There certainly are examples of human societies that managed to do this. Seventeenth century Japanese shoguns recognised the threat caused by the rapid denudation of the mountains and hills. Japan, though densely populated, now is one of the most forested countries in the world (Diamond, 2005). But on the whole, second-order emergence is not straightforward. It is, for example, impossible to 'undo' the population growth in West Africa as a means to get rid of pernicious weeds. Therefore, in the usual case, some new way of dealing with emerging ecological problems must be found, comprising the development of technologies, the exploitation of alternative natural resources, and adaptation (e.g., reducing births or adopting simpler life styles).

The problem is seldom lack of knowledge of what is happening. Ecological dangers, such as the increasing scarcity of pollinators for our crops, the hole in the ozone layer, and many other actual or potential dangers, are often spotted early by scientists, who make every effort to make their findings known in the world. Anyone who regularly reads a popular science magazine, such as the New Scientist, is confronted nearly weekly with new evidence in this regard.

The problem is much more with the utilisation of the emerging information. We all know of oil companies that refuse to acknowledge the reality of climate change. We all know of politicians who bury unpopular information in order to be re-elected. And we ourselves are all too aware that we only marginally change our preferred lifestyles, whatever the information. Instead of adapting our behaviour in accordance with obvious exigencies, we hope that new technologies will solve the problems so that we can carry on as before.

Given the proud name *Homo sapiens* that we have bestowed upon ourselves, this type of blindness seems wholly unbecoming. What is more, it is fascinating and intriguing. How can the best and the brightest collectively be so stupid? And more to the point, what would it take for us to behave more in line with the human predicament and privilege of having to live by our wits, of having eaten from the tree

of knowledge? We have found ways to escape 'the vale of tears', we have created opportunity for billions of humans to survive and expand their life expectancies. Can we now use that same intelligence to take ourselves in hand to keep us from destroying the ecological conditions for human life?

To put it in another way: are we hard-wired as *Homo economicus*, forever bent on individually satisfying ever-expanding preferences, or are we able to grow new synapses and sustain the ecological base of our society? And if so, can such individual learning be translated into language, institutions, organisations and common purpose that are essential for concerted action?

Implicit in this question is the assumption that the issue is not so much the development of appropriate technologies to change ecological outcomes, but the development of collective human behaviours that change ecological outcomes. In other words, what is in short supply is not so much technical or ecological knowledge, but knowledge how to manage our own impact on the environment. We must learn how to translate desirable environmental states and processes into desirable concerted human action, and work back to the shared purposes, language, learning, institutions, and forms of management and organisation that it would require.

I find this the fascinating issue, the translation of sustainable management of ecosystems and ecological services into modern human institutions, coordination mechanisms, learning processes and so forth. If sustainable development were to become a widely shared enthusiasm, it could, I believe, trigger a new era of creativity, development and achievement, and provide a new source of wealth, as did the automobile that now provides employment to large numbers of people in industrial countries.

The elements of individual cognition

Living organisms react to their environment in a way that is different from what one would expect on the basis of their weight and velocity. Sunflowers follow the sun, bacteria are attracted to optimal conditions; in fact, even very simple organisms seem capable of perceiving their environment, of judging it one way or another, and of taking action in it so as to elicit desirable outcomes. This ability is called cognition, the very essence of life (Maturana and Varela, 1992; Capra 1996).

Figure 2 shows the minimum elements necessary for a 'sentient being'. Of course, one can have endless discussion about the merit of this selection, but for me, the elements in Figure 2 seem sufficient to parsimoniously explain purposeful behaviour, learning and a few other issues. That is, they are heuristic in generating a number of useful insights that serve our purpose.

- *Emotion (to want)*: an agitation of mind, or strong feeling, including love, horror or desire, usually distinguished from knowledge or will. Of course, will can be driven by emotions, such as love, as can the development of knowledge. Emotions drive intentions, goals, objectives, preferences, etc. When we talk of efficiency, effectiveness, etc., we always implicitly assume a goal. We are very good at assuming or attributing goals. For example, economics attributes humans with a universal tendency towards rational choice, i.e., behaviour that is rational in the

pursuit of satisfying preferences. There is increasing proof that this attribution is false most of the time.

- *Perception (to get)*: information about the environment. Of course, such information is not projected objectively on the mind, but selected, interpreted, judged and transformed. Yet, any organism must have an ability to realistically assess what is going on in its environment, so as to compare what it gets with what it wants. Impaired observation of the environment, for example by faulty sense making, lack of monitoring, pre-conceived ideas of what should be observed, etc., can be fatal or hold back development. The creationist ideas of Cuvier, the leading palaeontologist at the time, for 20 years led to the refusal to accept that the fossilised bones which Dubois had dug up in the banks of the Solo River in Java in the 19th century were human. Fossilised humans simply could not exist.
- *Theory (to know)*: some kind of accumulation of experience into rules, cause/effect relationships or associations that allow the organism to expect, interpret or predict events and choose appropriate behaviour. Such theory can be hard-wired into an organism, for example a lizard just out of the egg 'knows' instinctively how to behave like an adult. But theory can also be learned during the lifetime of an individual and passed on in a tradition or culture. Thus monkeys have been observed to be able to learn new behaviours that become part of the 'cultural repertoire' of the troupe, so that, depending upon their learning, monkeys of the same species might have different 'cultures', e.g. eat different foods, (Waal, 2001). In other words, theory can be geno-typical or pheno-typical. The debate continues as to whether this holds for humans too. Evolutionary psychologists claim that the millions of years humans have persisted as hunter-gatherers has had a strong genetic impact in terms of the hard wiring of our brains (Pinker, 1997). Others claim that the human ability to grow new synapses as a result of learning overrides any such inherited barriers to change.
- *Action (to do)*: the ability to act upon the environment, to flee it, to change it, or utilise it, by using means that might include strong jaws, fast feet, technology, capital goods, etc. Action tends to be goal seeking. Once goals are known, behaviour tends to be rational. Action assumes means and capacity.

These four elements allow us to make a number of observations about cognition.

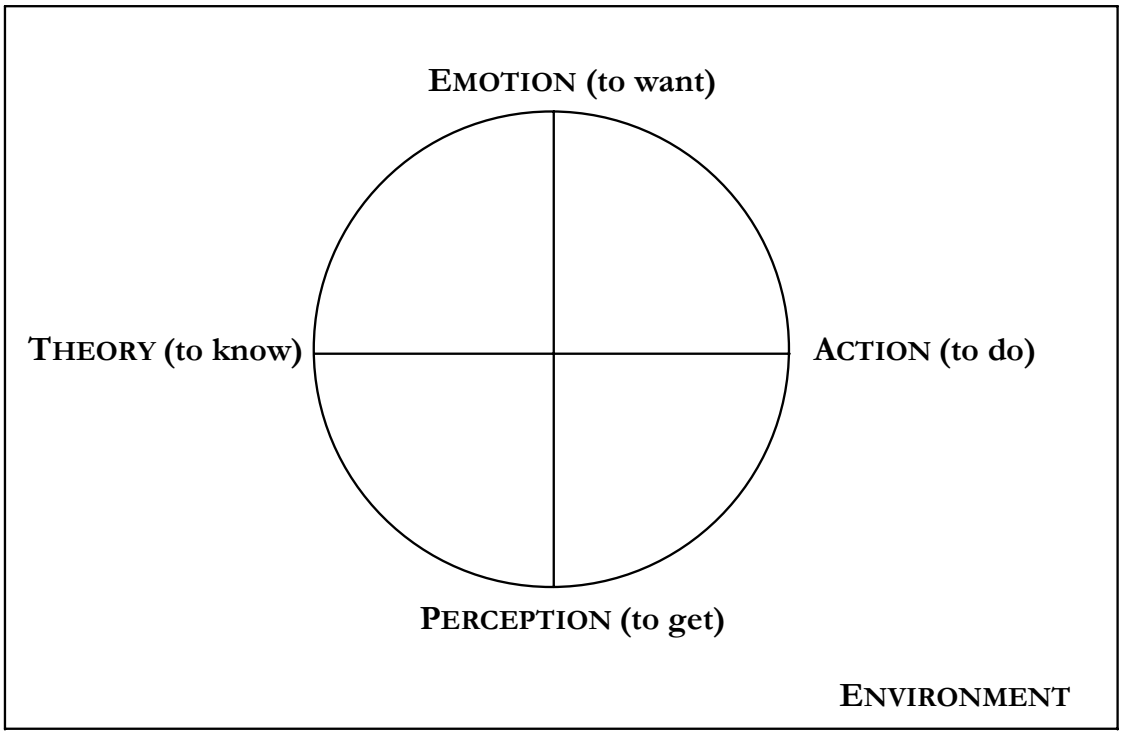

Figure 2 A cognitive agent or 'sentient being' in its environment
(After Maturana and Varela, 1992; Capra 1996; Bawden, 2000; adapted by Röling, 2002)

1. *Emotions.* Emotions are of overriding importance of in providing the guiding force or intentionality to the cognitive agent. People are driven by hunger, thirst, sex, addictions and a need for security. Social recognition, reciprocity, comparative status, power, relative wealth, justice, competition, etc., become important once basic needs have been fulfilled (Maslow, 1945). It seems to me that understanding human intentionality is of primary importance if we want to think about the possibility of attaining sustainable development. We shall have to do better than the economists' methodological individualism that sees society as determined by the aggregation of individual preferences. Of importance seems to be new economic research, which has established that measures of human happiness consistently do not correlate with GNP or average individual income (Layard, 2005). In other words, all our mad plunder of the earth's resources for economic growth is not necessary for human happiness. What's more, rational choice can become irrational if pursuit of preferences and the institutions required for it undermine happiness. This opens new perspectives on the need to identify the forces behind the economic drivers that propel our society towards non-analogue states. We need to understand how the individual human talent of adapting wants to gets, of cutting one's coat according to one's cloth, can be translated into sustainable development at a societal level, where a limit in consumption soon leads to a recession.
2. *Coherence and correspondence. Two dynamics determine the quality of cognition. One* is *coherence* among the four essential elements of cognition. Cognitive agents seem not able to tolerate cognitive dissonance (as Festinger called it in 1957) and seek to correct it.

Thus they tend towards coherence. If a major change takes place in an agent's wants, gets, theory or ability to act, dynamic mutual readjustment to arrive at a new coherence can be expected. The other dynamic is *correspondence*. Cognitive agents that are out of tune with their environment eventually perish. Thus there is a need for an agent to maintain effective action in its domain of existence (as Maturana and Varela called it). To this end, the coherent set of theory, intentionality, perception and action must correspond to 'reality'. Coherence and correspondence are not automatically in line. In fact, in changing circumstances, strong cognitive coherence might be an impediment for finding new correspondence. The proverbial example, that provides a metaphor for our own society, is the demise of the medieval Nordic communities on Greenland as a result of their inability to adapt their coherent lifestyle to climate change, which stands in sharp contrast to the effective adaptation of the contemporary Inuit (Diamond, 2005). Lewin et al. (1952) have spoken of 'unfreezing' of such coherence. Kuhn (1970) speaks of 'paradigm change'. Presently, 'transitional change' is used for the fundamental societal changes required for sustainable development (Amadi et al., 2001). Fundamentalism seems to be a pathological state in which coherence overrides correspondence. It seems to me that the relationship between strong coherent frames, such as those underpinning American conservatism (Lakoff, 2004), or the market fundamentalism of neo-liberal economics, and their lack of correspondence with an anthropogenic collapse of the ecological services on which we depend, is a key area for our research. The very coherence of the ideas that make us blind to what science (in its role of providing 'gets') tells us about our environment creates a need for more appropriate frames or theories that can be widely shared.

3. *People hold different coherent cognitions*. It seems that different coherent cognitive frames can be held by people in similar circumstances. Van der Ploeg and his colleagues (Van der Ploeg, 1994) have established that farmers in similar market and technological contexts can develop entirely different coherent cognitive frames. Thus specific 'farming styles' can be discerned. For example, dairy farmers optimising their profits are very different from their colleagues who strive for an optimal herd, or farmers who see frugality as the hallmark of a good farmer. Farmers with different styles have very different information and feedback needs that express themselves in the way they use computerised decision support systems (Leeuwis, 1993). Farmers have different coherent frames for business, property and family respectively, where family overrides the other two when a choice has to be made when the frames conflict. On the other hand, it seems that the business frame with its emphasis on competition, efficiency, profit, a short-term outlook, etc., has become dominant in our society, at the cost of a more nurturing family frame with long-term care for the ecological foundations of future generations. It would be of interest to study coherent frames of non-industrial peoples more in tune with the need to maintain ecological services. In addition to business, property and family frames, we might need to develop a modern ecological frame and promote its relative dominance over others.
4. *Spirituality*. The human ability to have intense spiritual experiences (e.g., Maslow, 1964) is of interest here. For example, what we call 'development', i.e. an increased capacity of society to satisfy aspirations and desires, is the opposite in

Buddhist eyes. For Buddhists, desire, greed and craving for what one does not have are the sources of suffering. In industrial societies, they are essential for growth and much of our public communication is geared towards fostering them (e.g., Servaes, 2004). For a Buddhist, development would mean a more widespread human capacity to free oneself of wants, and to overcome the discursive thought of the cognitive agent. Buddhist meditation practice is geared to exactly that. Overcoming the cognitive agent in oneself allows one to realise one's 'Buddha nature' and experience enlightenment (a very different enlightenment from the break-through of science and technology as a result of the European Renaissance!). The humanist psychologist Maslow has made a hobby of asking people about their 'top religious experiences' and published his results (1964). Everybody apparently has the capacity to have such experiences. What is more, people typically agree when describing what they experienced. These descriptions include (p 89):

- Truth (honesty, reality, completeness);
- Goodness (desirability, decency, justice, willingness, attraction);
- Beauty (wealth, simplicity, liveliness, purity);
- Wholeness (unity, integration, order, structure, synergy, oneness);
- Transcendence of dichotomy between self and other (acceptance, overcoming polarities, relativising identity);
- Life (dynamism, flow, continuity, self-regulation, never ending);
- Uniqueness (nothing can be compared to it);
- Completeness (perfection, nothing is missing, un-improvable, wealth in the sense that all is there);
- Completion (fulfilment, climax, total satisfaction, no further striving necessary);
- Playfulness (fun, happiness, joy, humour, exhilaration).

It seems that spirituality, and concomitant inspiration, is a mechanism by which people make sense of the world and that helps them to be within it. Instead of action, identity and control, which are the hallmarks of the cognitive agent, spirituality seems to foster a sense of unity, 'no-self', goodness and completion. In that sense, it would seem to be an essential ingredient in a sustainable society.

Let me make it very clear that I consider spirituality very different from religion, even if it sometimes is an aspect of the latter. For spirituality, god, his son, his prophet, heaven, hell and reincarnation , etc., are not necessary. Spirituality is essentially beyond discursive thought and beyond the stories and frames that give our life meaning. By all accounts, spirituality is a deep experience of unity, goodness and perfection. Having that experience, even for a short while, affects people's outlook on what is important.

Learning

Learning can be defined as a change in the composition of, and mutual relationships among, the elements of cognition. Thus a change in environment might trigger adjustment of wants, theory and action. A new technology that allows more effective action can lead to an adaptation of theory, wants and gets. New aspirations can lead to an overhaul of the cognitive agent. Hofstee (1964), for example, has described the consequences of changes wrought when Dutch farmers started to compare themselves with entrepreneurs instead of labourers as their main reference group. Can such cognitive changes all be called learning?

If we look at how people have survived and progressed, it has always been on the basis of advancing their knowledge and of learning to take effective action informed by a realistic construction of the circumstances in which they find themselves. As anthropologists have remarked, there is not a people in the world that has not adopted better and more effective methods and tools when they became available (Herzkovitz, 1962). African family farmers are a good example of such continued learning. In recent years, they have, on the whole, been able to maintain food security for a very rapidly growing population, without much access to such technologies as fertilisers, even during times of war and epidemics such as HIV/AIDS. Of course, this does not mean that major droughts, increasing food prices, or other disasters do not lead to food crises. But on the whole, food production per capita in Africa south of the Sahara has only gone down by 0.2% during the past 20 years (IAC, 2004). Although agriculture in Africa has been called 'stagnant' because of this lack in growth in output per head of the population, it is in fact highly dynamic if one looks at the growth in the number of people that are being fed.

Though exemplary for the cognitive mechanisms by which humans have survived and adapted to changing circumstances, African farming is not sustainable. In fact, most observers agree that it is based on nutrient mining and degradation of natural resources and ecological services. Van Haaften (2003) has shown for West African villages that a very high (0.9) correlation exists between strictly psychological measures of alienation and stress on the one hand, and natural science measures of vegetative denudation, loss of soil fertility and erosion, on the other. In other words, learning to unsustainably exploit the environment for human purposes can lead to pathology.

Merton (1957; see also Röling, 1971) has suggested that adapting means to new cultural ends through innovation or rebellion is the 'normal' human mode of adaptation, while inability to fit means to new ends leads to frustration and pathological pacification of new ends through ritualism, escapism and fatalism. In the same vain, it has been suggested that the exposure to the wealth and lifestyles of industrial nations first led to a revolution of rising expectations, then resulted in a revolution of rising frustrations as adaptation of gets to wants proved elusive, while old means of adaptation and pacification, such as organised belief in forces greater than man, had become obsolete (Lerner, 1958).

The question then is: is learning only healthy if it represents adaptation of gets to wants? Or is learning the much more inclusive process of increasing correspondence between the cognitive agent and changing circumstances, including an

adaptation of wants to gets? I believe that learning can and must include adapting gets to wants, but only if social norms and institutions make such an adaptation acceptable, and especially if the adaptation does not mean accepting suffering and poverty. But now we are running ahead of the story.

Collective cognition: a first round of perspectives

Cognition becomes even more interesting if one considers the possibility of the agent being a collective, such as a family, firm, community, nation or the whole world. Can humans act as a cognitive agent at a global scale? Can people share emotions, theories and perceptions so that the concerted action required for sustainable development becomes possible? And more importantly, can learning processes be envisaged by which emotions, theories, perceptions and actions converge and become coherent and correspondent at higher scales than the individual?

In this paper, I cannot give answers to all these questions. The area is still under construction. But I can give some ideas that seem relevant to the issues raised. I start off with an overview of what I consider some important literatures. In the next section, I will look at processes of social learning.

Common property resource management

In the seventies, Hardin (1968) used economic reasoning to demonstrate that it was perfectly rational for humans to destroy what he called 'the commons' but what were in fact common pool resources, i.e. resources to which access cannot be denied while use by one reduces the benefit others can derive from it (Steins, 1999). His metaphor 'The tragedy of the Commons' would reverberate for years to come and challenged economists to provide reasons why perfectly good economics might not destroy such open access resources as sea fisheries, clean air, or ground water aquifers. Ostrom (1992) came up with an important answer. Although many examples exist where people have indeed destroyed their 'commons', much as predicted by Hardin, Ostrom found many examples also of peoples who had managed to stave off such a fate. Study of these examples showed that these peoples had been able to create 'common property management regimes' with the following characteristics:

- Access to the resource can be limited to members of a specific group;
- These people can communicate with each other and make agreements;
- Limitations are agreed to the utilisation of the resource by each member;
- Sanctions for misuse are agreed and imposed;
- Some mechanism for surveillance of compliance has been negotiated, created and paid for.

These mechanisms suggest that it is perfectly possible for people to voluntarily create institutions that fit wants to possible gets without creating frustration, simply because the limitation of gets is seen as fair and reciprocal. Everyone agrees to take less from the common good or give more for the public good. As long as free-riding or uncontrolled extractions are prevented (trusted surveillance is essential), people happily comply. The existence of common property resource management regimes

suggests that people can learn to sustainably manage natural resources and ecological services. The key is the development of institutions (sets of rules that are widely accepted).

Institutions

O'Brien (in prep.) describes how Yeltsin's decree that transformed the Soviet Union into a market economy led to an outburst of economic activity. Muscovites placed tables on the street and began to barter goods. It only slowly dawned on Yeltsin and his advisers that it takes more to create a healthy market economy. The privatisation of Soviet collective enterprises led to the rise of a mafia of super-rich without leading to 'the greatest benefit for the greatest number' which is supposed to be the result of 'the invisible hand' of the market. Western economists with their predominantly neo-liberal perspective could only counsel more liberalisation. The ensuing 'change in values and morals and the switch to a consumer society have had a dramatic impact on the health and mortality of Russians', so that life expectancy, in 1960 one of the highest in Europe, has dropped dramatically since 1989 (New Scientist, 24 Sept. 2005: 25).

The case of Russia illustrates the nature and importance of institutions. Take a bank. It is not so much a building full of money. A bank is a subtle set of rules based on widespread agreements, carefully crafted and tested regulations and practices, and especially trust. One cannot just build a bank. It takes a slow development, a cultural transformation. Paper money, credit, insurance and cheques, all these were invented, developed and accepted to facilitate the market economy and reduce transaction costs, as North (1990), the father of institutional economics, so aptly named them. To transform Russia into a market economy requires the painstaking development of the institutions that allow the market to function. O'Brien's (in prep.) fascinating study focuses on the Alumni Associations that have spontaneously grown as a result of internationally assisted training courses for young Russian enterprise managers. In the new market economy, the networks and opportunities they provide are experienced as essential institutions.

Economics is slowly discovering institutions. We ourselves are only aware to a limited extent of how far we have gone to develop institutions, in terms of sets of rules, norms, narratives and prescriptions, to support economic development. We have destroyed the larger extended family, have set farming on a treadmill with a 2% loss of farm enterprises every year, have regimented our lives in nine-to-five jobs with 25 days annual holiday, declare people obsolete at 65 or earlier, force millions daily to listen to inane exhortations to buy things that they do not need, and so on. We have done all this to foster the market economy. Yet we are hardly aware of these institutions and if we are, we find it hard to protest against them or change them. Yet they are all man-made, even though neo-liberal economists consider the market as a phenomenon of nature.

Sustainable development requires, first of all, that we become aware of the institutions in which our lives are embedded. Secondly, we must create an institutional base for a sustainable society. In that sense, we require a transformation that is comparable to Russia's, hopefully with less dramatic consequences for our life expectancy. If institutions can be seen as the structuration of collective learning and widely shared intentionality, 'unfreezing' of existing institutions and the creation of

new ones will require deliberate learning, experimentation with alternatives and deregulation.

Mary Douglas' cultural theory

The British anthropologist Mary Douglas (1986) has been deeply concerned with institutions, especially since she had become aware of the extent to which methodological individualism rules our lives as a consequence of growing up in a Catholic convent school with a very strong hierarchical structure in which she had felt very happy. She posits two major dimensions: grid and group. Grid refers to the extent to which people are constrained by rules, while group refers to the extent to which people are part of groups. The two dimensions lead to four ways of arranging human affairs (Figure 3). These are not alternatives in the sense that they are separate options. They represent different ideal forms to which a society might gravitate. But as it gets closer to one ideal, the negative aspects of that form of arranging human affairs become clearer and the pull of the opposite stronger. Thus there is no perfect way of arranging human affairs. Societies shift continuously and success in achieving a movement to one ideal automatically increases the chances that it will be drawn to another (Hood, 1998).

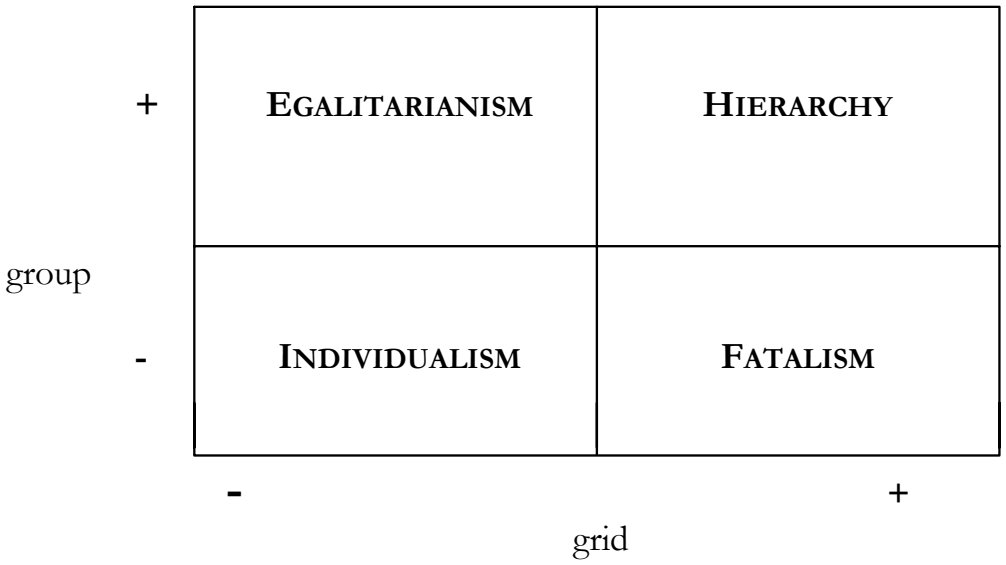

Figure 3 Typology of ways to arrange human affairs
Based on Oversloot (1998), and Douglas (1996)

According to Mary Douglas, individualism is the dominant current preference for arranging human affairs and it permeates our society to an extent that we are not even aware of. It seems likely that a sustainable society would require another dominant form, probably a more hierarchical organisation based on a common agreement that that is what is required to ensure trust, reciprocity and equity. It is also interesting to speculate about the shifts that would take place as we move from stability and growth to crisis in Hurst's lazy eight. It seems likely that coping with crisis would require initial egalitarianism as old rules prove no longer effective and people search out each

other in decentralised regrouping during confusion. Anticipation of crisis would require building decentralised egalitarian networks that could provide resilience when the old complex, highly integrated institutionalised market society shifts into crisis.

The wisdom of crowds

A recent book about the 'wisdom of crowds' (Surowiecki, 2004) presents a perspective on the best ways of mobilising human knowledge in rapid change. It plausibly argues that crowds are better than individual experts at getting the right answers to important questions. Mobilising the wisdom of crowds requires decentralised decision making by independent and diverse (small groups of) people. They need not be a random sample or representative of a population. What is crucial is that mechanisms exist for aggregating and synthesising what the 'crowd' has generated. As many experiences with methodologies for working with large groups suggest, the aggregation of what has been generated by brainstorming, small group processes, open space sessions, future search, etc., is very difficult and often not successful. But the point made by 'wisdom of crowds' is important. In responding to issues and challenges for which we presently do not have good answers, it seems important to decentralise and create opportunities for independent and diverse autonomous agents to generate answers. Funtowicz and Ravetz (1993) had already argued that the anthropogenic uncertainties with respect to issues with high salience cannot be addressed by puzzle solving science, or indeed professional consultancy, but require 'extended peers' and 'extended facts'. Instead of only scientific peers to determine what is true, the new uncertainties require widespread democratisation of science and involvement of non-scientists in determining what is useful and effective knowledge. Extended facts not only refer to scientific facts but also to who believes what. A critical analysis of the way different categories of people frame the world is an essential ingredient in dealing with anthropogenic uncertainty.

Competition and cooperation

There is increasing evidence that the picture of humans as inherently competitive and engaged in struggle and conflict is tarnished and deeply affected by Victorian views. Of Darwin it is said that though he purportedly read the laws of the jungle into Victorian society, he had really applied the laws and ideas of Victorian society to the jungle. Adam Smith's influential theory on the invisible hand of the market that emerges out of individuals competing to satisfy their greed goes back to the same root of a ruthless society in early industrialisation. Neo-classical economics still bears this imprint and emphasises competition, struggle for dominance, the survival of the most innovative, etc. During the 1980s and 1990s the Wageningen sociologist Norman Long developed an 'actor-oriented perspective' that assumed actors intend to realise their own projects through struggle in the 'arena' and used the metaphor of 'battlefields of knowledge' (Long and Long, 1992). He was not interested in cooperation or participation, and preferred to think in terms of conflict, negotiation, struggle, etc.

There is increasing evidence that this emphasis is mistaken and that it is not only normal for people to cooperate but that their ability to cooperate is what sets humans apart from other species. Internal cooperation is an important survival mechanism (e.g., Turchin, 2005). These ideas find support in modern experimental economics and

anthropology. They show that the greedy, rational, aggressive and competitive human nature assumed by neo-classical economics is untenable. This opens the way for totally new thinking about the possibility for humans, at different scale levels, to agree to engage in concerted action for sustainable development. What is required is the development of institutions that shape and channel such cooperation and make it feasible by creating trust, reciprocity and equity. Equity seems an important condition. Cooperation among humans seems to become more difficult as discrepancies in wealth lead people to lose sight of the common cause. According to Turchin (2005), new developments in complexity science and the physics of systems that are out of equilibrium lead to the conclusion that growth often leads to the rich getting richer and to 'dramatic differences' between distinct parts of a system. 'Glaring inequality has a corrosive effect on the willingness of people to cooperate.'

Sustainable development requires concerted action to ensure that human activity is constrained within the limits of what ecological services can bear. Sustainable development therefore is essentially about cooperation, perhaps especially at a decentralised scale. It seems inescapable that equity is an essential counterpart of ecological sustainability. However, at present, unbridled economic growth in liberated markets that allow individuals to pursue their preferences with minimal government interference, the ideal of the neo-classical economics and the policies of most modern governments, are leading to rapidly increasing inequities.

Reasons for despair

If we take stock of where we have got to, we do not come away with great optimism that modern society can learn its way to sustainable development. The manifold and interlinked web of institutions that underpins modern capitalism solidifies the powerful frames of methodological individualism (society is an aggregation of individual preferences) and market fundamentalism of neo-classical economics. The power of economic thought as a widely held frame on human nature and society is astonishing. Market fundamentalism seems to be the only idea that we have when it comes to designing society. Of course, there are people in the fringes who have other ideas. The worrisome point is the enormous power of neo-liberal economics in political party programmes, the management of companies and other organisations, and in organisations in charge of designing the development of society, such as the World Bank. The power of the neo-conservatives in the US is one case in point. The deliberate financing of think-tanks and media coverage by US conservatives has created a virtual stranglehold of conservative frames in the US. Nearly 80% of all talking heads on US TV represent conservative points of view (Lakoff, 2004). But also in our own backyard, conservative economists play central roles. In the Netherlands, the current Minister of Agriculture, the chairman of the board of Wageningen University, as well as the director of the Social Sciences Department of that same University are old friends, are all agricultural economists concerned with the competitiveness of the agricultural sector (the Minister is a large arable farmer himself), and are all active Christian Democrats. I consider this situation a recipe for ecological disaster in that such a constellation of conservative power hinders any serious search for alternatives and loses precious time that we might have for inventing a more sustainable society.

The nexus of, on the one hand, simplistic market fundamentalism, as the guiding principle for the design of society, and, on the other, the stranglehold of economic institutions raises the spectre of a society that is sluggish monster that is totally not resilient in the face of ecological crisis. We worry about attacks of Muslim terrorists, but the real danger for our future lies in the fact that our own coherent frames and our nailed down institutional frameworks do not allow us to create new correspondence with a rapidly changing environment of our own making. Indeed, our lack of resilience is not only caused by inflexibility, it is especially caused by the fact that those very inflexible frames and their structuration into institutional frameworks are the cause of our environmental predicament. In that sense, I find our lack of widespread ability and tools to reflect on human behaviour an important source of pessimism and reason for my professional interest in doing something about it.

Reasons for hope

At 68, I am young enough to need some reasons for hope. Luckily there are some. Given the power of economics, one has to look for sources of hope in changes in economic thought. Information from other disciplines seems largely irrelevant for neo-classical economists. And changes are indeed creeping into economic thought. One of the most hopeful is the rise of institutional economics that allows for the idea that the market is a human creation instead of phenomenon of nature. North, the father of institutional economics, even received the Nobel Prize for Economics for his work. Of course, institutional economics is still very weak compared to neo-classical economics. Yeltsin did, for example, mainly draw on neo-classical advisors. In Wageningen UR, the only institutional economists can be found in a research institute, not in the University.

A second point of hope is the acceptance among economists as a scientific fact that people have some innate ability and tendency to cooperate instead of just being aggressive, conflictive and competitive males. Of course, ordinary people have known this all along but it was not accepted in economic science, such is the power of frames. A wonderful story underpins this point. Waal (2001) describes the development in primatology in which the Japanese view of the world wins over the dominant Anglo Saxon emphasis on individualism, aggression and competitive struggle. Primates, monkeys and apes had, in the Western perspective, always been seen as being dominated by powerful males who competed for dominance. The Japanese meanwhile, who have lived with monkeys for centuries and who consider them as possible reincarnations of people, take an entirely different view. Thus they were able to observe how, in one group of temple monkeys, a female, Imo, discovered that grain thrown on the sand of the beach could be consumed much more easily if she threw handfuls of sand and seeds in the water and scooped up the clean grain. This discovery was soon copied by infants and young females. Slowly, the habit spread in the population, with older males finally caving in. The troupe of monkeys began to frequent the water and learned to eat seaweed. The Japanese concluded that troupes of monkeys can learn and even develop 'cultures' that might differ from those of other troupes. The initial reaction of Western primatologists was one of shock horror. One English scientist even took it upon himself to travel to Japan at his own cost to tell the Japanese off. Nowadays, Japanese primatology prevails.

A third source of hope is the recognition among economists of the socially constructed nature of preferences that economists consider the driver of rational choice. Sen, 1999received the Nobel Prize for Economics for developing this subject. Recently, in an interesting study, the economist Richard Layard (2005) presented overwhelming evidence that neither income nor GDP, the most widely used criteria for 'progress', are correlated with any measures of human happiness. Such research questions the sacrifices our economic institutions ask us to make in terms of spending time on relationships, nurturing extended families, and especially in terms of the destruction of the ecological services on which human life depends.

In addition to such and other changes in economic thought, I have some other reasons for hope. One is the gradual erosion of positivism and its belief in absolute truth, and the slow rise of constructivism, as people begin to realise that the nature of knowing is based on painstaking construction and testing of concepts, ideas and theories, with a view to taking effective action in the environment. Constructivism is the basis for relativising stranglehold frames, and is part of the on-going Copernican Revolution that removed the Earth from the centre of the Universe and humans from the pinnacle of creation (Tarnas, 1991). Constructivism allows for the idea that, in order to deal with entirely new situations such as anthropogenic ecological collapse, we need to energetically work to construct new realities and to create conditions for them to emerge, for example by mobilising the wisdom of crowds.

Arbitrariness of economic pursuits

One reason for optimism is that it seems possible to create wealth and opportunity out of any human enthusiasm, as long as people pay for it. Tulip bulbs, beautifying one's house, painting oneself, enjoyable interaction, sex, gardening, war, automobiles, bad food that leads to obesity, virtual experience, cock fights, you name it, and people can become excited and willing to exchange labour, money or valuables for it, and generate wealth. There seems to be no reason why we could not curb major sources of ecological destruction. We are currently so clean that we become asthmatic because we have not been sufficiently exposed to germs when we were small. Less use of water and chemicals are called for. We eat too much fat, meat and sugar than is good for us. We sit too often in cars and move far too little. We are becoming addicted to virtual experiences in games, films, permanent music, and in continuous communication. In other words, wealth creation could become much less destructive of the environment, as long as we change our enthusiasms, our status symbols, and take our own health more seriously. Sustainable development can be fun. Also, and perhaps more importantly, it can become a new source of creativity and excitement and inspiration.

Final reasons for hope are the human capacity for spirituality and the gradual ascendancy of women in modern society. The question is whether all these small reasons of hope will amount to a serious transformation of our mad society. I find particularly worrisome the lesson from history that powerful and rich elites in times of crisis are able to maintain lifestyles long beyond the point where it is prudent to do so (Pain, 1993). That is why, in my view, decentralisation that allows multiple autonomous agents to evolve new responses to environmental change is a key ingredient in resilience.

Collective cognition: social learning processes

The term social learning was first invented by Holling and his colleagues (e.g. Gunderson et al., 1995). In itself, this was remarkable because Holling is an ecologist and not a social scientist. However, his studies led him to formulate the cyclic nature of the lazy eight discussed in an earlier part of this paper. This cyclic nature of ecosystems obviously conflicts with the linear and growth-oriented nature of economic systems. As a serious natural scientist, he discovered that knowledge of human behaviour is indispensable for professionalism. Resilience of ecosystems requires adaptive management by people, i.e., the creation of human opportunity through experimental probing and shared learning of what is possible within ecological constraints. This was called 'adaptive management', a concept that has generated considerable excitement (Holling, 1995) for it emphasises the nexus between what is desirable for ecological sustainability and resilience, and human knowledge, practices and institutions.

This interface between human practice and ecological imperatives has generated excitement for many years not only in people concerned with organic farming, indigenous knowledge and anthropology, but also in agricultural sciences in general, that have been concerned with forestry rather than dendrology, agronomy rather than botany, animal production rather than zoology, etc. The interest is in 'harnessing the energy of the sun through plants, for human purposes' (Wit, 1970). Unfortunately, like the economists, agricultural scientists have assumed the human purposes (productivity and resource efficiency) and have largely ignored the institutions that are the counterpart of technological exploitation. They have been lured into the easy analysis of cause-effect relationships and ignored the human reasons and their freezing into frames and institutions. In boldly addressing social learning for adaptive management, Holling and his colleagues in the Resilience Alliance[30] have provided a tempting role model.

Social Learning has been the key concept behind a major European research project (2000 – 2004), 'Social Learning in the Integrated Management of Water at the Catchment Scale' (SLIM). What follows reflects the results of that project. I focus on social learning here because it is the dynamic process aspect of collective cognition. It is one thing to focus on the concerted action, the institutions and the frames we need for sustainable development, quite another to focus on the dynamics of transition and transformation. Social learning deals with the latter.

Context

Social learning takes place in a context that can most usefully be described as a natural resource or eco-service dilemma. We are dealing with a resource or a service such as fresh water, the ozone layer, clean air, biodiversity, etc., from which it is impossible or costly to exclude other people. Joint use involves sub-tractability: use by one will subtract benefits from another user's enjoyment of the resource or service (Steins, 1999). The context is further marked by multiple stakeholders who each have a 'stake'

[30] E.g. Jane Lubchenco, who has been one of the driving forces behind the 2005 Millennium Report on Ecosystem Assessment (Millennium Ecosystem Assessment, 2005).

in the resource or service. Typical are arable farmers, pastoralists, nature conservationists, etc., who have competing claims on the resource. Hence the context is marked by a history of contestation. As a result of their conflicts, these stakeholders have become increasingly interdependent, that is, they increasingly realise that they cannot achieve their goals without the cooperation of the others. This sense of interdependence is essential for social learning to proceed. But the context is also marked by uncertainty and complexity. The multiple stakeholders grope their way forward.

Coordination mechanisms

Table 1 shows that different social scientists and philosophers have arrived at similar distinctions between three domains that can be called coordination mechanisms.

Discourses	**1. Use instruments**	**2. Assume rational choice**	**3. Rely on emergence from interaction**
Rural policy practice (pers. com. Rob Schrauwen)	Regulating	Compensating	Stimulating
Rationality (Habermas, 1984)	Instrumental	Strategic	Communicative
Basis for individual behaviour change (Kelman, 1969)	Compliance	Identification	Internalisation
Preferred ways of arranging human affairs (Hood, 1998 based on Mary Douglas' cultural theory)[31]	Hierarchy	Individualism	Egalitarianism
Organisational co-ordination mechanisms (Powell, et al. 1992)	Hierarchy	Market	Network
Causes of 'wealth of nations' (Bowles and Gintis, 2002)	Resources (such as power or natural resources), 'state'	Invisible hand of market forces	Social capital, trust, community

Table 1 Distinctions made in the literature with respect to approaches to coordinating human affairs

Table 2 shows that these mechanisms have very different underlying thoughts, mechanisms and dynamics. The first two mechanisms, hierarchy and market, are well known. We can all reproduce most of the points made in the first two columns. The third is less familiar. Bowles and Gintis (2002), for example, present the third mechanism as something rather novel in economics. Of course one can talk endlessly about the theoretical merits of Tables 1 and 2. For me, they are very useful for drawing attention to the key characteristics of the third column, that we can label

[31] Mary Douglas discerns a fourth dimension, fatalism, where the sense of belonging to a group is weak, but the domination by rules is strong.

'interactive emergence', 'co-creation of knowledge' or indeed 'social learning', as I do in Table 2.

One point that must be emphatically made is that most situations show a mix of the three coordination mechanisms. Social learning does not replace the other two. But so far, social learning has not been given much attention or emphasis. It is, for example, rare to find development projects that explicitly invest in interaction, although most of us would agree that people, networks, new patterns of interaction and, sometimes, new institutional arrangements are usually the most important outcomes of projects. I believe that social learning could form the substance of a widely shared new reflexive theory about humans as a force of geo-physical change, much as economics today provides a widely shared theory about generating wealth.

Properties	**Hierarchy**	**Market**	**Social Learning**
Rationality	Instrumental	Strategic	Communicative
Dynamics	Causation	Rational choice, exchange of values	Multiple stakeholders exchange of meanings, competing claims, interdependence
Mechanism behind effect	Power, legitimation, technology	Greed, invisible hand	Negotiated and agreed concerted action, reciprocity
Dominant institutional arrangement	Hierarchy	Individualism	Cooperation and mutuality
Basis for individual change	Compliance	Identification	Internalisation, adherence to agreement
Origin of welfare	Access to resources, power, technology	Autonomous market forces	Social capital, trust, concerted action, institutions for second-order emergence
Purpose	Control over causal factors	Win, gain advantage	Resolve resource dilemmas
Intervention mechanisms	Regulation, coercion, social and civil engineering	Laissez-faire, fiscal policy (compensation, subsidies, etc.), deregulation	Process facilitation, soft system methodology, interactive policy making, external incentives, multi-stakeholder processes
Criteria for success	Realisation of formal goals, increase of computing power	Fulfilment of individual needs, GNP, income	Widely shared meanings, joint solutions to dilemmas, institution building
Conditions for failure	Lack of information and control, vague goals; no legitimation	Lack of resources, market failure, distortion of market forces	Absence of interdependence, inequality in power relations, external disincentives

Table 2 The characteristic properties of the three coordination mechanisms

Key descriptors of social learning

Below is a list of the key descriptors of the social learning process used in SLIM. These key descriptors include context and history and multiple stakeholders already described.

- History and Context
- Multiple Stakeholders

- Desirable Sustainable Concerted Action
- Social Learning Process
- Facilitation
- Institutional Framework Conditions
- Policy Support and Science Linkage

These key descriptors can be seen as the essential aspects of coherent configurations of social learning situations. Of special importance in SLIM's experience are facilitation, and institutional and policy support. In other words, social learning is not just a learning process among the immediate stakeholders in the contested resource, it also requires learning at higher levels among major institutional and policy actors. Facilitating social learning means creating social spaces for learning at multiple scales. Of course, social learning requires decentralised autonomous agents to learn and evolve answers locally. But it also requires aggregation of what is learned in institutions, regulations and policies. Thus social learning requires bottom-up and top-down processes that Giddens (1984) called structuration. Our SLIM and Farmer Field School research shows that it is one thing to work and achieve results at the local level, quite another to ensure or change the higher level framework conditions that allow the local level learning to be scaled up and institutionalised. As we already noted when we discussed the 'wisdom of crowds', aggregation upwards is complex and we are not (yet) very good at it.

One of the interesting outcomes of SLIM is the role that socio-technical, or boundary objects play in generating interest and eventually mutual recognition and agreement among multiple stakeholders. Working with such objects allows different categories of people to 'meet' and get to know each other. Thus social spaces for learning at multiple scales and socio-technical objects replace the earlier notion of platforms (Röling, 1994) on which representatives of stakeholders slug it out in order to agree on shared visions or maps.

Conclusion

Some, for example John Gray (2002), claim that humans have only progressed in terms of technology but that their basic nature has not changed. He therefore considers the notion of 'progress' entirely flawed. Instead he speaks of *Homo rapiens* whose improved technology has only improved human capacity to rape and pillage the earth and exploit other people. And indeed, if one looks at the dreams about the future of some visionaries, who only seem to be concerned with such criteria of progress as computing power and the extent to which machines can replace humans, one would be inclined to agree with him. Others, such as Ken Wilber (2000) are more optimistic. They see definite reasons for claiming human progress, such as the abolition of slavery, the slow penetration of democracy, and the extent to which we seem able to guarantee a reasonable standard of living for entire nations.

I believe that the jury is still out. If we cannot deal with ourselves as a major and destructive force of nature, we have not made any progress at all. Indeed, the extent to which a few terrorists seem able to induce us to give up civil liberties and other achievements will be insignificant when it comes to a serious threat to prosperous

lifestyles and other privileges, unless we are able to anticipate these events. The reflexive modernisation (Beck, 1994) that this will require is predicated upon us widely sharing knowledge about ourselves, about institutionalisation, social learning and cognition. This paper should be read in the context of that challenge.

Science as an institution is a conscious and explicit effort to lift the 'active ingredient' of cognition out of the mess of superstitions, rituals, beliefs, holy practices, routines, traditions, and power games that have accompanied and retarded human advance. Copernicus had to retract his bold insight that the earth was not the centre of the universe. Dubois had to hide his fossil Java Man in a closet because he was under creationist pressure. And nowadays, climate change cannot be possible because it does not suit the oil companies that helped to elect Bush. The truth does not emerge automatically. It is a struggle and often a political battle. Yet the invention of science as an institution and set of methods that seeks to promulgate truth is an important basis for human society, in addition to such institutions as justice and fairness.

The struggle now is to make it work for dealing with the great uncertainties that are upon us. We cannot just do more of the same and assume that some technological inventions will miraculously appear that will allow us to deal with oil running out, climate change, and growing inequity. The insurance companies do not believe it, and most of us do not believe it.

It is one thing to engage in science that determines what is ecologically sustainable. We can calculate our ecological footprint; we can calculate the carrying capacity of the earth, or the amount of CO_2 we can release into the atmosphere. All that is natural science, and it is crucially important to establish the parameters within which we can move. Furthermore, such knowledge is essential for monitoring and evaluating second-order emergence. But in order to succeed, we must have knowledge about human behaviour and how it can be affected. What is more, that kind of knowledge must be widely shared, much as economics is widely shared at present.

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Reshaping research

Saskia Bosman, *Mind-matter-environment*
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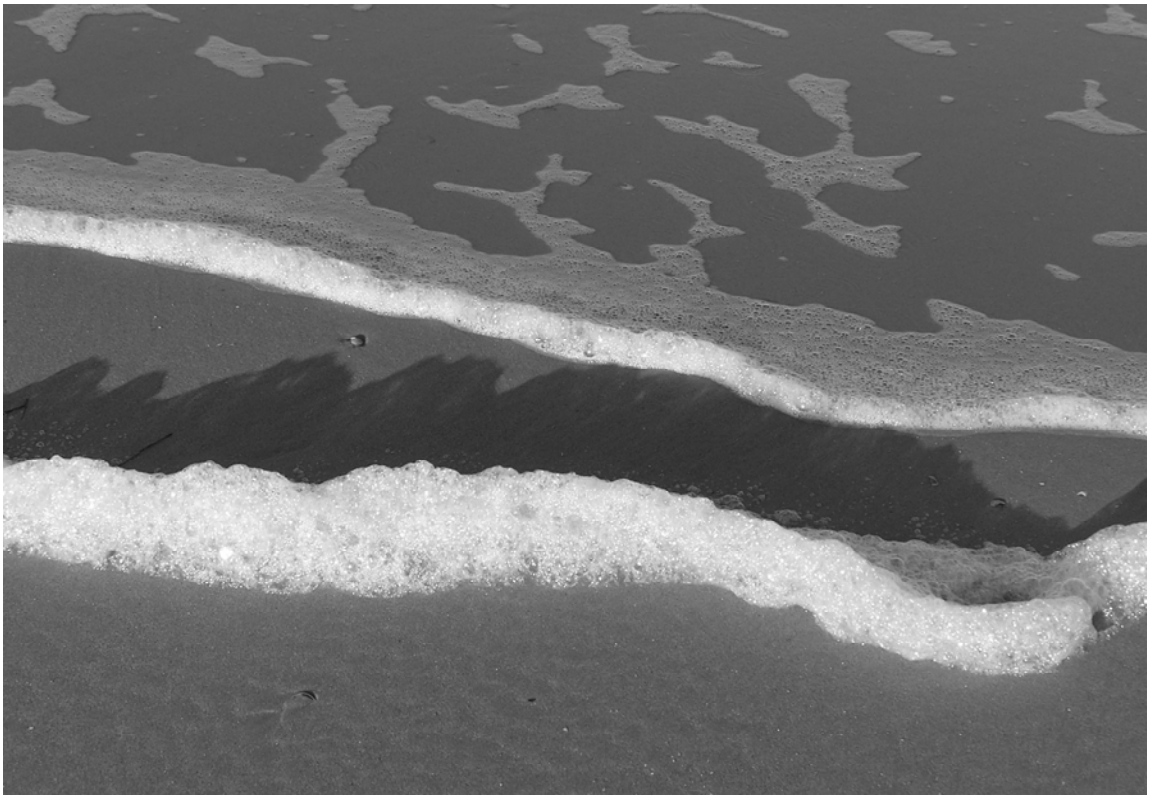

Mind-matter-environment

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Introduction

The central aim of most of my research projects is describing the interface and interaction between consciousness and matter, also in relation to our environment. While doing my research, I am aware of the fact that the scientific paradigm is part of the modern Western worldview, which perceives the world from a disenchanted stance, as consisting of autonomous things, while other cultures' worldviews are entirely different. For example, the Andean worldview sees everything as relation and animated, as Note mentions in her paper. Buddhist and Yogic worldviews from the East consider all of material reality as stemming from our consciousness. The modern Western, scientifically inspired worldview is also different from ancient (including pre-Christian) worldviews in the West, which have been (partly) forgotten. Nevertheless, I have tried to study themes (like the relationship between consciousness and matter), which are regarded as quite unusual subjects in Western materialistic, objectivistic, reductionistic science.

In this way I also explore the boundaries of the Western scientific paradigm. As scientists we also experience, think and act within the limitations (and possibilities) of our Western first- and second-order ordering principles (see Note's paper). This has resulted in implicit statements like 'what we see corresponds 100% with external reality' and 'the researcher as a person does not play a role in knowledge acquisition'. However, these statements have been challenged by quantum mechanics. Hopefully my studies will assist scientists (including myself) to become aware of their largely unconscious assumptions (ordering principles) and to start to expand the scientific paradigm. Hopefully these attempts will help to facilitate intercultural understanding and polylogue, so a common ground can be found from which to co-create a sustainable world.

My vision relating to the research summarised below is that mind and matter interact with each other through electromagnetic wave phenomena and that through these, humans (and other organisms) have a strong connection with their environment. I suspect that, at a deeper level, mind-matter interaction takes place through an underlying field (at a deeper level than the electromagnetic field), like the zero point energy field known in quantum mechanics. This is independent of the question whether consciousness is self-existent and non-material or a product of biochemical processes. Mind may still result from material processes, but exert feedback on these. At present, this area (wave and resonance phenomena) is overlooked by most of (biomedical) science, which tends to focus on biochemical and pharmacological lock-and-key molecular processes in (part of) the organism, hardly, if at all, taking into account consciousness, wave phenomena, resonance and the environment.

In my opinion it is important that more research be supported and performed in this area, because it will provide valuable material to assist (world) society in its transition toward sustainability.

The studies

My initial studies show different brainwave (electroencephalogram or EEG) frequency distributions over the human brain in different states of consciousness, resulting from various meditation and trance-induction (e.g. sound) methods. One of the most striking results was the finding of the sharp vertex wave, manifesting exactly on the top (crown or vertex) of the head in all EEG wavebands (delta, theta, alpha and beta, 0.5 to at least 30 Hz) at the moment subjects felt themselves starting to 'move' on an inner journey. In neurophysiology these waves are known to occur at the moment of falling asleep (Shagass, 1972) However, these subjects did not fall asleep but stayed conscious and experienced a journey.

Throughout the course of the day and during such exercises, the pineal gland, a small hormone gland in the centre of the brain, produces different hormones, regulating one's state of consciousness (Bosman, 2003). The pineal gland is connected to the optical nerves and receives information about the daily cycle of light and dark and about the seasonal changes in day length. It produces the hormone melatonin, derived from the essential amino acid tryptophan.

The pineal gland is hollow and connected with the third brain ventricle, filled with cerebrospinal fluid and is surrounded by blood in a sinus. The pineal gland secretes its hormones into the cerebrospinal fluid as well as the blood. All its hormones bind to the serotonin receptors, which are found in most parts of the brain. During the waking state at daytime until the evening, the pineal gland produces serotonin, a hormone which keeps us in the normal waking state. When darkness sets in, the serotonin is converted into melatonin by the pineal gland. Melatonin makes us increasingly sleepy until we fall asleep (Reiter, 1977). It has been suggested that just before we start dreaming, the melatonin is converted (again by the pineal) into pinolin, 5meo-DMT (5methoxy-DMT) and DMT (dimethyltryptamin), which are known to generate visionary activity (Callaway, 1988; Strassman, 2001) It has been argued that at least the latter three pineal hormones are able to enter cells and their nucleus and to intercalate with the DNA double helix, altering its spatial configuration and thus its pattern of gene expression (McKenna & McKenna, 1993). These insights and ideas about pineal activity come from many sources and are described in a literature study (Bosman, 2003).

In an experimental study the human pineal gland appeared to respond electrically to sound, which can be measured in the brain's magnetic field. Using a 180-channel SQUID device for neuromagnetometry and spatial filtering and statistical software we were, to our knowledge, the first worldwide to observe a tiny but significant response of the human pineal gland to click sounds (Bosman & van Dijk, 2005).

Later literature studies and experiments show evidence of coherence (similarity of rhythms, not necessarily of phase) among the electrical signals of various oscillators in the human body, including the heart and the brain. Electrical signals are used by all

neuronal networks that function as a brain for receiving, processing, storing and using information: the abdominal brain, the heart brain and the head brain. Coherence occurs when harmony is experienced between the physical, emotional, mental and inspirational levels of functioning (Reiter, 1977; McCraty, Atkinson, Tiller, Rein & Watkins, 1995; McMillin et al., 1999; Zohar & Marshall, 2001). This is also known as 'being in the flow', which promotes peak performance. This is implemented in some forms of coaching and training.

Currently I am studying possible synchronisation phenomena (similarity of frequency and phase) of brainwaves with the Schumann resonance (SR), a natural oscillating electromagnetic field in the Earth's atmosphere. Its frequencies are 8, 14, 20, 26, 33, 39, 45 and 51 Hz (very low frequencies). The Schumann resonance is maintained by thunderstorm discharges. This worldwide resonance phenomenon was discovered in the early fifties by the German physicist W.O. Schumann (Schumann, 1952; Schumann & König, 1954). From that time on similarities have been noticed between EEG recordings of human brainwaves and recordings of Schumann resonance waves in the atmosphere. It was suspected that human brainwaves synchronise, at least from time to time, with the Schumann resonance (König, 1974; Oschman, 2000).

The results of our study show preliminary indications that synchronisation of human brainwaves with first 2 modes (ca. 8 and 14 Hz) of the SR occurs spontaneously, although it varies from day to day and from individual to individual. Initial attempts have been made to carry out EEG-SR synchronisation biofeedback. This may be useful in health care, as 8 and 14 Hz brainwaves are associated with self-repair of the body and coordination of brain functions respectively. An interesting observation is that, when synchronisation was observed during relaxation, participants reported having felt a deep unity with and being part of nature (Bosman, Kostecky, Holtrop, Van Nuffel & Kroeks, 2004). Of course, caution in this type of research is needed, by studying what the brain really does to maintain health, as avoiding the SR frequencies from time to time (implying flexibility of the brain) may also have a biological function. In neurofeedback training (for clinical as well as peak performance purposes) flexibility of the brain in going from one frequency band to the other, is considered important for maintaining health and wellbeing.

Electromagnetic fields in the environment influence all living systems, which are electrical and magnetic themselves, thus interacting with the fields surrounding them. For instance a tomato plant or a tree are influenced by the electrical field around them, but because they also have their own electrical fields they change the field characteristics in their immediate vicinity. Order and richness in frequencies (1 Hz to several kHz) have been found around healthy plants, chaos and frequency gaps have been found in stressed and diseased plants by biologist Philip S. Callahan (1994, 1995). I have done various pilot studies on the electrical fields surrounding agricultural products, varying from milk to tomatoes and also water and trees. In many cases energetic agriculture was involved. Products experienced as more vital, and thus as having a higher quality, tended to show ordered, frequency-rich spectra and less vital products tended to have chaotic spectra, sometimes with gaps (a lack of peaks) in them in the frequency range of 1-30 Hz. More experiments need to be done before it can be concluded that general patterns exist, but the preliminary results are promising and may open up an interesting new research avenue in quantum agriculture (see

Kieft's paper). This method, combined with the study of circadian fluctuations in the bioelectric potentials of trees may also contribute to gaining insight into the 'cosmic' dimensions of trees (see Zürcher's paper).

In a wider field I cooperate in a study on weak natural light emission in humans. Photons originate in metabolism, but are highly coherent and possibly used by the cells for communication purposes. These studies are aimed at the possible relationship between photon emission, relaxation and stress (Van Wijk, Koch, Bosman & Van Wijk).

Discussion

Biofeedback on coherence between, for example, the electrical fields of the heart and the brain enables individuals to learn to achieve coherence between mind and emotion, attaining more inner peace. Also, biofeedback between two or more individuals, to achieve coherence of heart rhythms, has been demonstrated to be possible and is experienced as increased connectedness. This is a powerful instrument for social learning. We suspect it is possible to increase synchronisation of brainwaves with the Schumann resonance using biofeedback. This could be a powerful instrument not only for (preventive) health care, but also for what could be described as 'environmental learning': as unity and interaction with nature on a deep level and being part of nature are experienced. These levels of biofeedback, played in the form of biofeedback games (software), may empower individuals and groups to take responsibility for their own health, for each other and for the environment.

In his paper, Henk Kieft mentions the interesting case described by the Swiss anthropologist Jeremy Narby. In his fascinating book Narby describes the astonishing practical botanical knowledge that shamans in the Amazon jungle have and how they obtain it, communicating with the global network of DNA-based life under the influence of ayahuasca tea (Narby, 1998). Narby in fact suggests that this experience is not dependent on ayahuasca, but on a trance-like, altered state of consciousness, that shamans in other societies also reach through practices such as drumming and dancing. On the one hand, this amazing shamanic plant knowledge, obtained without laboratory tests, cannot be ignored by science. In fact it is taken so seriously that pharmaceutical industries approach the shamans for help in finding medicinal plants in the jungle. On the other hand, the ayahuasca experience of the shamans and Jeremy Narby himself point to some kind of (possibly electromagnetic) emission by the DNA, which our brain may be able to make sense of.

Communication with DNA may not be such a crazy idea. Gariaev and his team found out that when a DNA sample is calmly spoken to, changes occur in its spatial conformation and thus its gene expression (Gariaev et al., 2000). Glen Rein et al. found the same effect even with loving intention, characterised by an internally coherent electrical field of the heart (Rein & McCraty, 1993). People trained in this internal coherence were better able to influence the conformation of a DNA sample than untrained participants. DNA emits various wavebands of electromagnetic radiation, at least in conjunction with proteins and water, as it is in the cell nucleus.

What Jeremy Narby describes may again be an example of field phenomena, which may help bridge the gap between science and intuitive knowledge. This case

should stimulate scientists to undertake a deeper study into how shamans (and people in general) obtain knowledge in an altered state of consciousness and also how living systems may transmit information to humans. The outcome could teach us about unsuspected possibilities of human consciousness and thereby expand the paradigm of science.

One important aspect of the above-mentioned altered state of consciousness is that a unity with nature is experienced. Recently some brain researchers have done studies on brain activity during such deep experiences of unity, or mystical experiences as these are also called. Andrew Newberg and Eugene D'Aquili at the University of Pennsylvania used imaging techniques to study brain activity in meditating Buddhists and praying Franciscan nuns. It was found that their transcendent experience of deep unity was solid and tangibly real, involving a chain of neurobiological events that could be measured, recorded and reproduced (Newberg, D'Aquili & Rause, 2001).

It is also known that the substance in ayahuasca that causes the alteration of consciousness in the Amazonian shamans is DMT, and that this is also produced by the pineal gland (possibly) just before dreaming sets in. This may also be what is happening during non-drug mystical experiences and near-death experiences (also often characterized by deep experiences of unity), as was one of the implications in the study on the effects of external DMT, done by Rick Strassmann at the University of New Mexico School of Medicine (Strassman, 2001) The events going on in the brain or the above-mentioned chain of neurobiological events, are just starting to be mapped (Newberg, D'Aquili & Rause, 2001).

All studies mentioned above illustrate that electromagnetic fields and possibly also the underlying zero point energy field may be the bridge between consciousness and intuitive knowledge such as we find in anthroposophy, shamanism and intuitive agriculture and the 'hard', materialist science of atoms, molecules and bigger material structures (Laszlo, 1993, 2004; McTaggart, 2001).

Conclusions

It is clear that science today is confronted with phenomena that cannot be explained in a mechanistic (Newtonian) or in a materialist, reductionist way. We are becoming aware that science is the way we, scientists, think and perceive and that this is largely unconsciously influenced by Western culture-specific tacit knowledge, hidden deeply within our minds. Our challenges today are:

- To bring this tacit knowledge, our deep unconscious programming to the surface through self-reflection and to become aware of it.
- To explore with an open mind those phenomena, which cannot easily be explained in what we presently know as a scientific way. In this way we are exploring the boundaries of the present dominant scientific paradigm.
- To be prepared to expand the paradigm through which we think about ourselves and about the world, even if it means opening up to other forms of knowledge besides scientific knowledge.

In the Miller-Bawden Quadrants (see Figure 1 in Niels Röling's paper) this would mean a shift from quadrant I (technocentric) to quadrant III (holocentric), in a worldwide intercultural sense. One paradigm is not better than the other, but these different paradigms are useful in different contexts.

This requires of us a readiness to change, not only as scientists, but also as human beings. I think this is a way for ourselves (and thus for science and technology) to escape from our present unsustainable spiral. It may offer a possibility for us as (Western) scientists to start a real dialogue with other cultures and with (other 'thought collectives' in) our own culture, learning from their knowledge. It may also offer us a possibility to discover the gems in the partly forgotten worldviews of our own, Western past. In this way we may be able to co-create a sustainable world.

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The consequences of thinking about evidence in natural sciences

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Introduction

In recent times, the initial criterion of the truth of science has increasingly been replaced by the criterion of utility, thus leading to 'isolation ethics' (Teutsch, 1979) in the sense of self-interest. Today, a reversal in ethical development could take place if the revelational or convictional ethics, which have already been justified, are now augmented with cognitive ethics.

Epistemology, a science of understanding

The assumed subjectivity of thinking (Kant, 1877) contradicts the experience of the engineer, who – by 'objectively' thinking and understanding and acting – can effectively influence the inorganic sphere of the world. To overcome this contradiction, a science of understanding is required that shows how man can understand the world. This epistemology was successfully established and implemented by Steiner (1921). In trying to observe one's own cognition processes, one can easily apply and modify Furrer's (1980) arguments: 'It is not enough for us to think, act and perceive. Experiments can only be carried out if nature itself is thinkable, treatable and perceivable. Yet we can only find out by experiment whether nature has these qualities.'

However, nature's essential quality is not its questionability but its mental conceivability and its functionality. One could even say that any science is the science of behaviour i.e. ethology, since all thinkable expectations of behaviour (hypotheses) are observed in the experiment as nature's actual behaviour.

The cognition process can be followed by anyone who observes his or her own efforts to understand. This is illustrated in Figure 1.

The perceivable and questionable world phenomena – which need explanations – draw on human concepts created through thinking. Experiments show whether or not the expectations concerning behaviour are confirmed by world behaviour. If this is the case, the world of phenomena is no longer questionable; its functionality and its laws will be recognised and understood. In other words, the world becomes real; we can realise the world. By linking conception and perception, our concepts – which always have a generic character – become individualized, i.e. a generic concept becomes an individual representation (Witzenmann, 1983).

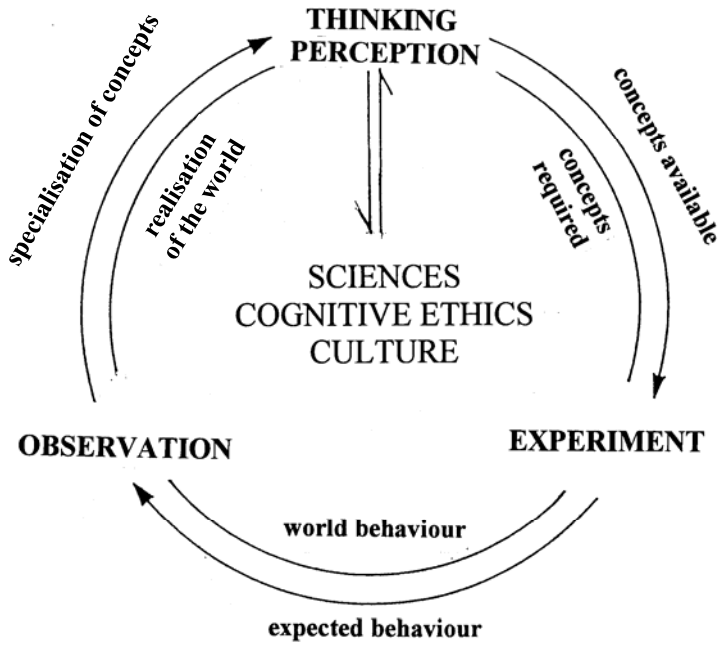

Figure 1 Diagram of the process and evolution of sciences, cognitive ethics and culture

By carrying out this cognition process in all the different spheres of conception – corresponding to the different spheres of being (inorganic, physiological, psychological and spiritual) – mankind recognises the world and thus creates the different sciences (physics, biology, psychology and the humanities). Cognitive ethics derives from the links between scientific understanding of the world and of human nature. Implementing these ethics by acting according to reason and understanding leads to cultural progress in the form of a metamorphosis of natural evolution.

Autonomous beings and causality

From the above point of view it follows that for *autonomous* beings – including human beings in their knowing and doing – external circumstances are not the causes of this autonomous activity, but they are more or less favourable conditions under which the autonomous being produces these activities. Conversely, it follows that physical causality, the principle of external cause and stimulus, always presupposes that the factors under consideration manifest no autonomous activity, that they are passive. This applies to non-living things (M. Rist, 1985).

In his introductions to Goethe's scientific writings on the distinction between the phenomena of inorganic and organic nature, Rudolf Steiner commented as follows: 'An example of the former kind, for instance, is the collision between two elastic balls. [...] We have *comprehended* this phenomenon when we are able to state the velocity and direction of the second ball on the basis of the mass, direction and velocity of the first and the mass of the second; when we see that, under the given conditions, that phenomenon must occur as a matter of *necessity*. But this means only

that what is presented to our senses must appear as a necessary result of what we have to postulate in the idea. If such is the case we have to say that concept and phenomenon coincide. There is nothing in the concept which is not also in the phenomenon, and nothing in the phenomenon which is not also in the concept.'

Living beings, such as plants and animals, are different in that in the constant metabolism, change of shape and behaviour, the autonomous activity of the animal or plant species comes to expression. It is characteristic that, throughout their life history, organisms of a species remain the same, whereas their material composition constantly changes. Because of this, the modern geneticist is forced to speak of a genetic 'programme'. Rudolf Steiner (1884 – 1887) expressed it thus: 'For instance, it cannot be said of the plant that size, form, position, etc. of the roots determine the sense perceptible characteristics of the leaves or the flowers. A body in which such would be the case would not be an organism but a machine. It must be admitted, rather, that physical characteristics in a living entity do not appear as effects of other physically perceptible conditions, as is the case in inorganic nature. All sensible qualities appear here rather as a result of something which is not perceptible to the senses. [...] We must go beyond the sense world. What is perceived does not any longer suffice; if we are to explain the phenomena we must conceptually grasp the unity.' Goethe described this higher ideal unity whence all animal and plant species come as the 'type' *(Typus)* or as Rudolf Steiner (1886) put it: 'The type is the true primal organism; either primal plant or primal animal according as it specialises ideally. It cannot be any single sensibly real living entity.'

This ideal differentiation of the primal organism is based on two formative tendencies (see Figure 2): plants are organisms which both functionally and morphologically – from seed, through seedling and green leaf to flower – open out more and more to the environment, and indeed lose themselves in it as pollen. In fertilisation this abandonment to the environment *(Weltensein)* reverses and in fruit and seed formation leads back once again to the closed form of autonomy *(Eigensein)*. This counteracting form-tendency prevails in the animal organism. Animals increasingly close themselves off from the outer world with their skin (fur, feathers, shell etc.) thus emphasising their autonomy or *Eigensein* (M. Rist, 1993). This gives only the main tendencies, the ultimate form depending on two aspects:

How the autonomy of particular plant *(Weltensein)* or animal species *(Eigensein)* metamorphoses, specifically develops: 'The type *(Typus)*, i.e. the revelation of the principle in the organism, its idea, the animality in the animal, which out of the life that unfolds from it, has the power and ability to develop a multiplicity of outer forms (species, genera) out of its inner potential.' (Steiner, 1884 – 1897).

How the outer conditions are formed, amongst which the individualisations of the type take place.

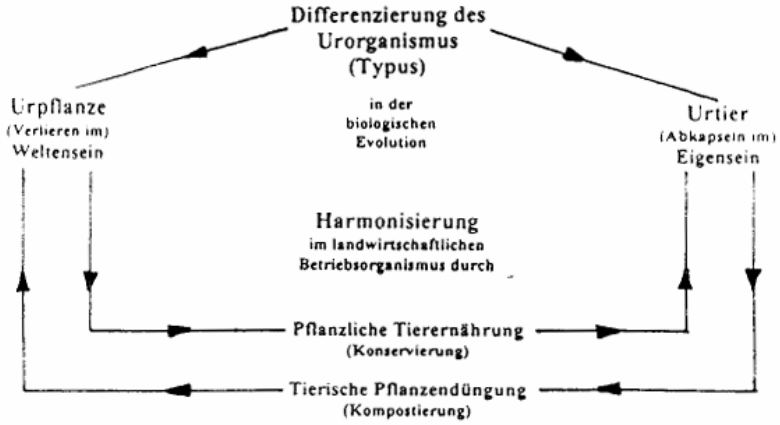

Figure 2 Differentiation of the primal organism (Urorganismus) in primal plant (Urpflanze) and primal animal (Urtier), and the harmonisation of this polarity through agriculture, where plants are food for the animals and animal excrement is food for the plants

It is not that external circumstances shape the organism, but that these can provide more or less favourable conditions. What appear physically are only particular metamorphoses, individualisations of particular species that develop from the type. The species as such are not physically perceptible, only their representatives in the form of individual organisms, which under particular conditions are not exactly the same, but, because they belong to the same species, are similar. '...since it [the organism] is here subject, not only to its own formative principles, but also to the conditioning influences of the external world – since it is not such as it ought to be according to the nature of the self-determining entelechy Principle, but also such as it is through the influence of something else upon which it depends – it therefore appears as if never in full accord with itself, as if never heeding only its own nature. Here human reason now enters and forms in *idea* an organism not corresponding to the influences of the external world, but heeding only that principle.' (Steiner, 1884-1897)

This shows that the species are soul-spiritual beings which, stemming from the spiritual cosmos, enter into earthly events. That a plant or animal species is not an abstract concept, not even a subjective scheme for putting things in order, but soul-spiritual potential, can be clarified by the following example: we know that soul-spiritual conditions affect our bodily functions, such as blushing, trembling with excitement or raised adrenaline levels with stronger stimuli. This has been demonstrated experimentally in bullocks which had differing blood adrenaline level according to the level of psychological stimulus (Unshelm et. al., 1978). The hormone production is the result of the stimulus and not the reverse. Hormones provide the conditions for our soul-spiritual state to affect our bodies. Hence we call them messenger substances. Interestingly, certain hormones can affect the genes and exert a regulatory influence in genetic processes (Wehner & Gehring, 1990). Thus information flows not only from DNA to protein, but also from immaterial, soul-

spiritual potentiality of the species to the hormone and then to the DNA. Thus we can answer the question raised above as to what life is in the following manner: *life is the autonomous interaction of the respective plant or animal species or human individuality with the prevailing environmental conditions.*

Consequences for our perspective on genes

A way of looking at genes that accords with the spirit should comprise more than the inadequate view that genetic substance builds up the organism in a physical causative way. Rather, the genetic substance is the *condition* under which the omnipotence of the species individualises itself to a specific phenomenal form, similar to its predecessors, from whom the genetic substance came (L. Rist, 2000). The genetic substance is the condition for obtaining a Friesian calf by mating a Friesian cow with a Friesian bull. That an organism of the cattle kind arises at all is not attributable to the genetic substance, but to the soul-spiritual 'information' of the species of cattle. The soul-spiritual information can be seen as being associated with the 'morphogenetic fields', as proposed by Rupert Sheldrake (1983 and 1991).

Unbiased observation of gene *technology* or genetic *engineering* suggests that these designations are inappropriate because for one thing many experiments do not 'succeed', i.e. do not deliver confirmation of the materialistic theory (Goodwin, 1984; Holliday, 1988; Heusser, 1989; Reiber, 1995; Strohman, 1997), or when they do 'succeed', malformations result or unexpected results are produced. It is not so much a matter of a mature 'technology', but rather can be regarded as an interesting field of scientific research. To this one might add that many experiments which have not succeeded according to the current theory have not been reported (Fox, 1991). If mechanical technology had a similarly uncertain outcome, hardly anyone would set foot in an airplane or even a train.

The most extensive proliferation of gene manipulation has been with bacteria. The reason is probably because bacteria can be easily cultured in millions, and the few good examples easily isolated and multiplied. It is also worth noting that bacteria have a natural tendency to exchange genes. Furthermore, bacteria allow the introduction of genes from higher organisms, but even then the outcome is not at all certain, as shown for example by the *Escherichia coli* bacterium, which received a foreign gene for the oxidation of naphthalene to salicylate, but unexpectedly produced the dye indigo (Ensley et al., 1983). In addition we need to consider that in prokaryotes (organisms with no cell nucleus, including bacteria) it is always the whole gene that is expressed whereas with eukaryotes (organisms with a proper cell nucleus, which include almost all plants and all animals,) only a part of the gene is expressed. Here, even at the molecular level, lies a functional difference between the simpler and the more developed species.

In some cases DNA sequences code for more than one protein, and genes can overlap. By varying the splicing (Lewin, 1991), different proteins can be obtained from the same nucleotide sequence. The more highly developed species are less able to adapt to different environmental conditions than universal organisms, which can appear under various conditions and therefore from an experimenter's point of view are more easily manipulable.

In the transition from bacteria to higher organisms it is clear that genetic engineering experiments are most successful with plants that are more closely related to one another (Potrykus, 1991). Even here the boundaries are once again closely set, as for example with the 'tomatato' which was a protoplast crossing between the two nightshade species tomato and potato. Although it grew, it resulted in neither an edible tomato nor an edible potato. Both species could still influence the genetic material but this led to corresponding disturbances in their species-specific formative tendencies, especially their assimilation into the corresponding fruit or root regions. In addition it should be noted that in plants, genes foreign to the species are soon no longer expressed, i.e. brought to appearance, but through a molecular reaction (methylation) are inactivated (Meyer, 1996). This is known as 'gene silencing': the transgene concerned poses an unfavourable condition for the plant species and can be silenced by it.

Stable expression of such transgenes is difficult to attain, especially when the environmental conditions vary a lot. Thus in an open air experiment petunias containing a so called colour gene from maize initially showed the desired colour. But when a period of hot weather arrived – i.e. a change in the environmental conditions – they lost the colouration, showing that the gene had been inactivated (Linn, 1990). So-called pleiotropic effects also appeared, whereby features other than pigmentation were affected. The transgenic petunias had more leaves and shoots per plant and were more resistant to pathogenic fungi. They showed greater vitality and lower fertility than the unmanipulated petunias (Meyer, 1995). During the hot weather the vitality of the transgenic petunias was suppressed. This illustrates clearly how the petunia species can more or less effectively influence its hereditary material depending on the environmental conditions.

Gene manipulation encounters the greatest difficulties with mammals. An example is the 'knockout experiments' on mice in which genes are switched off by a molecular technique. Out of approximately a million treated cells, only one with the desired effect could be found (Capecchi, 1994). In the 'production' of transgenic animals one can hardly fail to notice the enormous 'embryo consumption'. In a large experiment on pigs lasting three years, only 8% of the manipulated egg cells gave rise to births. Of these 8%, only 7% had in fact taken up the transgene. This corresponds to a success rate of only 0.6% (Pursel et. al., 1989). In the animals that actually took up the foreign gene, its effect in most cases showed up as deformations or functional disturbances. For instance, the pigs grew faster. But in the long run this was detrimental to health as the pigs showed a strong tendency to gastric ulcers, arthritis, cardiomegaly, dermatitis and kidney diseases. Through this intervention, the conditions for the porcine species became so unfavourable that it could only imperfectly form its organism. The 'growth hormone' gene became – in the language of genetics – an arthritis gene.

In the aforementioned knockout experiments, people hope to gain information on the function of the deleted gene in the organism. To the amazement of the experts a large number of these deletions were without visible consequences for the organism, or quite different characteristics were affected from the ones predicted from theory (Tautz, 1992; Brookfield, 1992). When the species is capable of forming a complete organism without a gene presupposed to be essential, it can only mean that genes are

not the cause of the organism's existence, but only provide more or less favourable conditions and in some cases can be completely absent.

In a study in mice, Wuerbel (2000) 'knocked out' a gene thought to be responsible for an important 'memory-receptor'. The underlying idea was that, without this specific gene (the cause of a good memory), mice would have memory problems. Effectively, mice with this memory-knock-out could not remember things they learned one day earlier, but only if they were kept in a standard cage. Therefore, the experiment seemed to confirm the hypothesis that this 'memory-gene' is important for memory functioning. But no effect was observed with the same mice if they were kept in a species-typical, enriched environment, i.e. the cage was different from the poorly designed standard cage. Under species-typical, enriched conditions the knock-out of this gene had no effects on memory-function and mice could remember as well as control mice without knock-out. The loss of genetic information could be overcome by the mice. The mice developed a kind of 'gene-therapy' themselves. In essence, this is easily understandable because, under species-typical conditions, every species is better incorporated in its own organism and can develop a species-typical, healthy body with normal capacities. A detailed overview of such phenomena can be found in L. Rist (2000).

That soul-spiritual doings can influence physiology is easy to observe scientifically. For example, moods of the soul like sadness are first of all pure soul-spiritual processes, i.e. a sad thought comes into the consciousness and this thought can then become so strong that the physiological activation of lacrimation occurs. That the sadness occurs previously to the lacrimation is clear and observable, and is therefore a demonstration that non-material processes can influence material ones. The same is true, but more difficult to observe, for the handling of genes. They do not give cause to a certain effect but provide conditions under which the species has to deal with its physiology. The genes are a tool of the species and not their determinants.

Consequences of this perspective for healing processes

Because every human being possesses individual skills and autonomy (self-regulation) everyone is his or her own species, and success or failure of external actions taken (medication, therapeutic regimens etc.) depends mostly on the ability to reactivate the processes of autonomous intervention or self-regulation. In the end, healing always means self-healing.

Medication, for example, can establish favourable conditions for better self-regulation (for further explanations of the term self-regulation see Grossarth-Maticek, 1999), but self-regulation is not caused by the medication. Therefore in humans with low self-regulation capacities, the same medication is less effective than in those with high self-regulation because, while it can improve the conditions under which self-regulation is expressed, it cannot improve this ability itself. For example, Stierlin & Grossarth-Maticek (1998) report that during a questionnaire study in 1973/4, from collectives of 3410 cancer patients they composed small groups of matched (and

therefore comparable) pairs according to age, sex, tumour entity, tumour expansion and therapeutic modality (i.e. radiation, chemotherapy, operation or mistletoe-therapy additional to conventional treatment). At the time when the questionnaire was distributed, they had all suffered from cancer for the same amount of time (date of first cancer diagnosis). But these matched pairs were strongly different in their psycho-social status (self-regulation abilities, well-being and other indicators). In 1995, approximately 20 years later, the survival rates were recorded. Interestingly, it was found that the groups with good self-regulation performed much better than the matched ones where all other documented factors were comparable.

For example, mistletoe-therapy with Iscador in addition to conventional treatment in a group with good psycho-social status resulted in a survival time of 12.6 years whereas the survival time in the control group (also with mistletoe-therapy in addition to conventional treatment) with low self-regulation was about 5 years. This clearly demonstrates the impact of self-regulation on measurable outcomes in medicine, and is proof that medication is a condition under which self-regulation can take part, but is not its direct cause. If the latter case were true, the difference in low and high self-regulation groups must have been the same because they received the same treatment, and had the same history and severity of cancer.

In addition to medical treatment, patients with low self-regulation must be helped to increase their self-regulation ability. But this cannot be done by external actions or another person. It must be achieved by the patient himself. All other people involved in the treatment are 'just' a help for the self-regulation: they can give hints, etc., which help the patient himself to become active, and for this, a range of non-medical therapies are appropriate.

Because the research area and medical practice extend into the field of soul-spiritual processes, building bridges and connections from the material to the non-material world, we prefer not to speak not of evidence-based medicine but of cognition-based medicine.

Science and ethics

This kind of scientific observation of the world has impacts on our own behaviour. The fact that individual human behaviour is largely determined by the individual's own philosophy of life is all too often neglected in ethics. This is illustrated in Figure 3.

If the constituent principles of life are coincidence and necessity (Monod, 1971), the individual can only fatalistically submit to these coincidences and necessities. lf, however, the struggle for existence (Darwin, 1884) is the adopted principle of life, it is evident that the individual will try to win control, in order to ensure survival through individual or group egoism. lf ecology is the guiding principle of life, then the individual's efforts will go into conserving and protecting the environment. However, if the world we live in is not only seen as a material world but also as a world that respects and reflects the intrinsic nature of every species, then it is only reasonable to behave accordingly.

PHILOSOPHY OF LIFE	HUMAN BEHAVIOUR
chance and necessity	fatalistic obedience
struggle for existence	individual or group egoism
ecology	conservation and protection of the environment
intrinsic nature of species	according to intrinsic nature of species

Figure 3 Philosophy of life and the resulting human behaviour

Basic research and cognitive ethics

The duties science has with regard to human behaviour go very much further than what is generally practised. Thus basic research really means searching for the relation between mankind and the world and finding out which of the previously mentioned or other constituent principles really correspond to our own world, as well as that of nature in general. These two questions cannot be answered without a suitable science, i.e. without epistemology. Consequently, such basic research would lead to cognitive ethics, to acting on the basis of a loving understanding and to true cultural progress.

This vision should not be considered an illusion. We have already made noteworthy progress, despite the obstacles and setbacks we have encountered.

Species-typical housing-systems, feeding- and breeding-methods, alternative perspectives on genes and complementary medicine are consequences of an understanding of plants, animals and human beings as autonomous partners with their species-typical, and in humans individual, needs and wants. Therefore the complementary approaches presented in this paper have a preventive function, and thus the potential for a major impact on plant, animal and human health, because they prevent the development of diseases at all levels of the respective organisms.

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Quantum agriculture: bridging frontline physics and intuitive knowledge of nature?

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Introduction

Over the last decade all over the world a series of post-organic – energetic – farming techniques has started to emerge. These techniques tend to emerge at farm level and the major claims made by practitioners are concerning higher productivity, increased animal wellbeing, environmentally sound and 'energetically' healthier food. Moreover, these claims are challenging from a paradigmatic perspective: understanding nature from 'front-line fundamental physics' may come close to understanding it via 'traditional knowledge'. For the purpose of this essay we will distinguish two sub-sets of 'energetic' techniques: quantum farming and intuitive farming.

Understanding the worldviews behind both these farming techniques may be relevant in the context of our global reflections on sustainable development, as Compas seeks to develop. In this paper I try to contribute to shaping an approach for systematic paradigmatic reflections starting from the various farming practices.

Inventory of energetic farming principles

Last year during a sabbatical I had the opportunity to prepare a survey of emerging 'energetic-farming' techniques among farmers all over the world (Kieft, 2005).

Many of these techniques could be labelled 'electromagnetic farming'. They build on the relatively recent perception that the biosphere surrounding our planet has developed over millions of years within a global electromagnetic field. Therefore all life must be sensitive to electromagnetic 'information'. Photosynthesis that takes place via green-yellow light (wave-length around 570 nanometres), only a very small part of the electromagnetic spectrum, presents a clear example. But other techniques using sound and other frequency-patterns, or techniques to correct disturbed earth-magnetism also appear to be effective. Dozens of dairy farmers and crop growers in the Netherlands are actively experimenting with these techniques. In North America and Australia dozens of farm-advisors have jumped on these trends: a new market is emerging for advice as well as for products.

Farm magazines from Australia (Sait, 2003) and North America (www.AcresUSA.com) are publishing first hand experience. In Europe relevant information was also detected – but has not yet been explored – in Russia, Hungary, Rumania and Bulgaria. Formal research has been going on for some years now at universities in India and Austria. In the Netherlands the 'Atlas of innovating dairy

farmers' (in Dutch, Wolleswinkel et al., 2004) was the first publication of these techniques based on direct interviews with farmers.

As our worldview and our understanding of processes of life change, so do our farming techniques. A chemical view of those processes has led us towards developing chemical techniques to control the processes. A biological view develops biological farm management. And so an 'electromagnetic' perspective – almost unavoidable – brings forth electromagnetic techniques in agriculture.

Indeed, in practice dozens of farmers are experimenting, and they are adapting their view of themselves and their farms. Some are even starting to re-define food-quality. These farmers base essential management decisions on 'energetic' monitoring. Most users claim positive results: improved productivity, increased animal well-being and animal health, environmentally sound methods, lower costs and sometimes higher food quality, resulting in improved health of the members of the farming family themselves.

The variety of techniques they apply is broad. We have – provisionally – subdivided them into five categories.

Applying specific frequency-patterns to plants or animals. Sound-broadcasters on crop fields are an example (Box 1). And perhaps traditional techniques of singing and drumming in Sri-Lanka work on the same principles (Helvetas Sri Lanka, 2001). Ultra-sonic devices for chasing away mice or ultra-violet light for catching (and electrocuting) flies are already easily available in garden-shops. In the domains of much higher frequencies we find the Para-TB box, which claims to reduce the incidence of paratuberculosis in dairy cattle (Wolleswinkel et al., 2004).

Box 1 Sonic Bloom: Foliar fertilisation with sound

The method combines a sound broadcaster (4000 to 6000 Hz) with a nutrient-spray. The sound, emitted some 15 minutes before fertilizing, opens the stomata, enabling them to absorb more water, nutrients, oxygen, carbon dioxide and other gases. The nutrient-spray delivers 55 micro-elements, amino-acids and water plants. This combi-treatment results in higher production, more tasty fruit, longer shelf-life and higher nutritional values. Indonesian research reports a 100% increase in production of rice, tea and cacao. Comparable experiences have been reported from Japan. Experiments show that sound treatment for a period of 45 minutes, just before spraying herbicides, reduces the required doses by 50 to 80%.

See www.earthpulse.com/science/plants.html.
See Paul Oliver (2002).
See www.ecosonic.net
See www.sonicbloom.com

Electromagnetic fields. If one conceives of the electromagnetic fields around the earth, it makes sense to try to correct irregularities or disturbances in the (intersections of) field-lines. The Dutch 'BronCorrector' has been available since the 1950s, and the 'Energie Box Bovis' came onto the market in 2005. See www.broncorrector.com.

Managing cosmic information. This type of information might consist of vibrations in the highest frequency domains of the electromagnetic spectrum (Lovel, 2002). In India the relatively recent Sanjeevan System is based on philosophy and techniques of Prana-energy. Certain cosmic forces are caught by specific plants, prepared and sprayed over crops. The results are promising, with 30-50% production increase or higher resistance against diseases and longer shelf-life. In bio-dynamic agriculture the same shift is already taking place from applying cosmic information collected in 'matter'-preparations towards electromagnetically broadcasting 'information'. This seems to have comparable effects on plant growth to those of material preparations (Box 2).

Box 2 BioDynamics and Sanjeevan system

Bio-dynamic agriculture researcher Hugh Lovel (2002) developed 2-metre-high field-broadcasters, emitting specific energy patterns to fight weeds and insects. One broadcaster can handle fields of up to 1000 hectares. 'Field broadcasting can revolutionize agriculture, fertilization would gradually decrease, particularly the use of nitrogen fertilizers. … Its safety, simplicity and low cost …'

The **Sanjeevan system** uses the solar, lunar and cosmic energies stored by plants. According to this system each and every plant receives these energies, but some plants are identified as having maximum capacity to store [and/or activate] these energies. … They are collected and cleaned. Specific parts of the plants are used to activate specific energy. A 30:30:40 combination of methanol, cow urine and water is used as solvent. Then the extract is fermented using yeast extract (10 g yeast is taken for 10 litres of solvent). Gases generated during the fermentation are expelled after every 4 to 5 days. The fermentation is completed in one month, after which the solution is filtered. The fermented extract of the plant is considered as the source of specific solar/lunar/cosmic energy. The mother tincture (basic extract) is then potentised 100 times. For this purpose 1 ml mother tincture is added to 10 ml of chlorine free, clean water. This is solution A. One ml of solution A is then taken and added again to10 ml of chlorine free, clean water, thus obtaining the final solution. It is applied as a foliar or soil application. (Hemangee Jambhekar, 2004)

Applying specific subtle energies that seem to carry 'information'. The hypothesis is that 'structure-information', for example of a chemical, can also be transferred without the chemical matter itself. Some techniques transfer this information indirectly via 'informed' matter, such as Grander water (www.grander.com) or Penac powder (www.plocher.de). In other subtle techniques, like radionics, one tunes in directly but at a distance to the object which is to be treated using resonance. I am not aware of any possible positioning of these subtle energies on the electromagnetic spectrum. They are techniques that may be controversial still from a scientific point of view, but interesting results have been reported from field work (Box 3).

Box 3 Energetic agriculture and Eco-therapie

In 'energetic agriculture the farmer manages living organisms by optimising energy fluctuations from the earth and the cosmos. Eco-therapie re-balances these energies for a healthier farm. The farm manager himself becomes stronger. The farm yields healthier produce. This technique works both in organic and conventional farming, even in intensive pig-rearing and in hunting. One pig-farmer in the Netherlands – after one year of Eco-therapie – reported an average of one extra piglet per sow per pregnancy and he reduced his veterinary expenses by half. A shrub-grower reported plants with longer shelf life and better paying clients. See Vermue, 2005; www.ecotherapie.org

Intuitive techniques. A large variety of more intuitive techniques persist, or are emerging and re-emerging on the farming scene. These include intuitive communication with nature, either via instruments like dowsing rods (Perelandra Gardening, 2003) or directly via meditation (e.g. Findhorn). Many of the 'older' techniques probably developed through meditative understanding of nature. Some traditional farming techniques in Bolivia also relate to 'energy' management (Box 4). These may be based on Andean shamanic philosophy and related communication techniques with nature. In this case also I am not aware of any positioning of these energies on the electromagnetic spectrum. But even in the Netherlands dozens of farmers exploring energetic farming accept 'intuitive' and non-scientific information for guiding their farm management decisions.

Box 4 A Bolivian example of 'energetic' farming

This is relevant here in relation to the **shamanic views** in the same cultural area. For many Andean farmers the energy concept […] plays a crucial role in all life processes. Not only in food quality [ ] but also in qualifying soil production capacity, health of a house or a plot etc. (personal communication Freddy Delgado, 2005)

It might be relevant to further distinguish different qualities of electromagnetic energies and subtle energies, but that is beyond the scope of this paper.

Developments in modern physics seem crucial for farming

The question may arise whether these techniques are so very new. We find examples of intuitive farming in all areas of the world. Some of them are new indeed, such as the Sanjeevan System and Microvita Farming in India (Box 2). 'New' or rather 'lost' farming knowledge are emerging in the Western world, such as 'trans-matter' techniques based on Global Scaling (ZZB) and the use of radionics in farming, which has been going on for roughly half a century. Others are much older, such as the traditional farming in Bolivia described above. Understanding new 'vibrational' techniques may shed new light on the values and virtues of various old 'intuitive' techniques. Below I explore some developments in 'modern' physics.

1. Fundamental physics has recognised already for years that the humans, as part of the biosphere, are surrounded by electromagnetic fields of energy, but in practice this knowledge was rarely applied. This may now be changing.

All life on earth has developed within the earth's magnetic field. Thinking in terms of electromagnetism therefore is essential if we are to really understand the processes of life. Every single cell of the body is 'surrounded' by or embedded in an electromagnetic field. Billons of these cells shape an energy field around each organism, whether it is a bacterium, a plant, an animal or a human. All living beings are surrounded by their own energy field. NASA has studied these earth- and cosmic magnetic fields intensively (http://antwrp.gsfc.nasa.gov/apod see e.g. picture of November 25, 2002).

It is evident, and has already been proven by Russian research, that these energy fields of living beings and of the earth do interfere with each other (Raum&Zeit, 2004). Researchers at the Ludwig Boltzmann Institut in Vienna (Austria) have used very sensitive devices to measure this magnetic influence of specific geographic locations on human bodies (Forschungsstelle für Bio-sensorik, 2002).

2. New theories are emerging in fundamental physics, which make a shift from the Newtonian view of attracting forces between bodies towards emerging 'string-theories' in which interference is through vibrating waves. The smallest 'particles' in which we have learnt to perceive the world, like protons, neutrons, electrons, which are in turn made up of even smaller particles, can also be perceived as super-short elastic strings. Vibrating at higher frequencies they are able to carry more energy, and are able to shape more matter. And the type of this matter depends on the specific vibration-patterns of the strings (Brian Green, 2004).

All matter and all life has a (species-)specific optimum position in the electromagnetic spectrum. Frequencies of different character, even extremely weak ones, may therefore have negative effects on an organism's health. The issue of negative influence is not only a matter of intensity of vibration or radiation but also of specific frequencies (even very weak ones) that are relevant for the particular organism in case (Raum&Zeit, 2004).

With these new 'quantum' and/or 'string' views on nature, the influences of electromagnetic vibrations of sound, light, colour and other domains of electromagnetic vibrations (e.g. ultra-violet -, x-rays, gamma-rays, cosmic radiations on the process of life are becoming clear, and as a result both emerging 'energetic farming' techniques and 'traditional endogenous farming techniques' are starting to become self-evident. For example, Bruce Tainio shows a clear relation between the plant-sap pH and the frequencies emitted by the same plant (Sait, 2003, p. 100). He also relates both measurements to the plant's resistance to diseases and pests and hence also to its health.

3. According to Global Scaling information, not everything is to be found in the genes of living organisms (Raum&Zeit, 2004). It is not only DNA but probably also the electromagnetic field that shapes plant growth. This is however not a matter we will pursue further here.

Basic worldview and knowledge assumptions related to attitude towards nature

Some basic characteristics of these energetic farming techniques differ substantially from conventional farming techniques. Different underlying assumptions and worldview have to be clarified. These relate to fundamentally different human attitudes towards nature and consequently different ways of knowing nature/farming: 'man and nature as intimately connected and communicating' versus 'man as researcher observing and analysing the object of nature'. And this in turn is paralleled by the differences in worldviews, in which nature is animated or not.

In the current conventional wisdom of the West, communication is regarded as taking place through the five senses and instrumental enlargers of these, and these are therefore the only reliable ways to know nature. This is the basic axiom of philosopher Kant, and is broadly accepted in Western science. With this axiom in mind, all other forms of direct of indirect communication with nature are ignored, denied or ridiculed. This attitude may well be a fundamental block in communication between 'physics' ways of knowing and 'intuitive' ways of knowing.

Compared to 'conventional' farmers, energetic farmers seem to have a more holistic worldview, a belief in nature as being informed and communicative, and they trust their intuition as a basis for acquiring practical farming knowledge from soils, plants and animals themselves, from 'nature-spirits' or from 'above' (Wolleswinkel et al, 2004). They rely much less on formally validated scientific knowledge and often are no longer on speaking terms with conventional extension staff. They suggest that energetic values could be a new health quality indicator for soils, crops and food (electromagnetic radiation levels of soils and food, or Bovis values for subtle energy qualities).

For the purpose of this paper we divide the emerging techniques into two subsets, according to the degree we can understand them from a 'formal scientific' point of view or from an 'endogenous knowledge' point of view (there is some overlap though):

1. Q-farming, related to electromagnetic and quantum or string understanding of nature
2. I-farming, related to 'subtle' energies and intuitive understanding of nature

Set 1 can be understood to a reasonably convincing degree as described above by applying fundamental physics (e.g. quantum mechanics, zero-point energy, super-string theories, Global Scaling etc). For this paper we label Set 1 as 'Quantum Farming' (borrowed from Hugh Lovel).

Understanding Set 2 requires an additional hypothesis about the fundaments of understanding nature. Interestingly a wide variety of such hypotheses is emerging (e.g. hologram structure, functioning of mind, mind-matter relations, orgone-theory, ether-theories, theory of cellular oscillations, theories on subtle energies.) and these seem to resemble more 'intuitive' interpretations of the fundaments of nature. An example of Andean shamanic knowledge will be explored below in this paper. We label Set 2 as 'Intuitive Farming'. For the sake of comparison we label dominant farming science and practice as 'Conventional Farming'.

Basic Compas question

This comparison of the assumptions behind Quantum- and Intuitive-farming raises the very challenging and basic question of communication between paradigms. Is it thinkable that the different worldviews of knowing nature might approach each other, or even integrate with each other? It would be feasible to check this by exploring the same techniques from both perceptions of nature.

My conviction is that the above question may be very relevant in the context of intercultural learning and sustainable development, for which we may have to reconsider fundamental human attitudes-towards-nature and the communicational consequences thereof. I perceive the current world development trends as non-sustainable, and I assume the underlying worldviews of this perspective to be fundamental, therefore I believe the subject deserves intensive and urgent attention in the near future, also in farming.

From the perspective of the main questions posed by the Compas programme, a 'two-perceptions' analysis of energetic agriculture may help to provide an increased understanding of the basic nature-philosophies of these farming approaches. It may help as well to develop a new language for communication between intuitive-farming, Q-farming and frontline western science as a way of knowing nature (even if it might initially result in hypothesis formulation only).

How should we proceed?

In distinguishing Q-farming and I-farming, it may be possible to use the concepts and practices applied in these two categories of farming to bridge the gap between the two different basic views-on-nature.

I do not present the techniques for the sake of technical interest, but I focus my reflections here on the basic principles behind the techniques. These relate to the ways in which communication with nature is assumed to take place.

The table below lists a selection of farming techniques in five basic categories, according to the way in which they 'interfere' with nature.

Intuitive farming techniques include Attentive working (I-At, green thumb) and direct communication with nature e.g. in meditation (I-Co).

Quantum farming techniques include broadcasting specific Frequencies (F), capturing and broadcasting Cosmic influences (K) and correcting irregularities in earth Magnetism (M).

Applying 'informed' material and/or subtle Energies (E) could figure under both categories and is therefore very open to interpretation from both worldviews.

Continent	Farming Technique	I-At	I-Co	E	F	K	M
Asia	Hela Govithana, Sri Lanka	A			F		
	Sanjeevan agriculture system, India			E		K	
	Sonic Bloom, Indonesia, Japan				F		
EU	Balancing, Eco-therapie, radionics	A		E			M
	Bovis BioBox			E		K	M
	Old bee-keeping literature		C	E		K	M
	ParaTB boxes, Leen de Vink				F		M
	Animal Health Center, Global Scaling, Switzerland			E	F	K	M
US-Australia	BD Broadcasting Towers			E	F	K	
	Plant Talking System, distance advice		C			K	
	Perelanda Garden + Nature intelligence	A	C	E		K	M
	Power of Prayer on Plants	A		E		K	
	Sound Machines, R. Karbowski, USA				F		
South America	Indian agriculture (Compas Bolivia)	A	C	E			

Table 1 Overview of energetic farming techniques by continent

Understanding intuitive communication with nature

We have already said quite a lot about the perception of nature in fundamental physics. To arrive at a relevant reflection about whether energetic agriculture can form a bridge between fundamental physics and intuitive knowledge, more has to be said about intuitive ways of knowing nature. A challenging case in this respect is presented by anthropologist Jeremy Narby (1999) in 'The Cosmic Serpent, DNA and the origins of knowledge'. His way of thinking and working seeks the bridging potential between paradigms, starting with language and images. He has explored the origin of the astonishingly broad practical botanical knowledge of (medicinal) plants that shamans in Latin America have and the techniques they use for communication with nature. He formulated the hypothesis that shamans in Latin America – in a 'defocalised' state of consciousness after drinking ayahuasco tea – might be able to 'read DNA' and the information it contains. During these 'hallucinations' the human mind might be able to communicate with the global network of DNA-based life around us. As part of his research he himself took part in ayahuasco-sessions, and so tried in person to bridge the two paradigms and their – apparently – contradicting axioms and inherent ways of knowing. His hypotheses are challenging indeed: the images of 'pairs of snakes' appearing during such processes may have their counterparts in the images and wording of 'double helixes of DNA' in science. The 'fluorescing spirits' may be the counterparts of 'bio-photon emissions of DNA'. Interestingly, both shamans and physicists perceive spirits and bio-photons respectively as 'pure light'. Narby also explores the neuro-physical processes related to consumption of such teas, the weak radio waves also emitted by DNA, the quartz-like crystal structure of DNA and so on, all underpinning his hypothesis, both at the level of techniques and at the level of worldview and for both the Q-techniques and the I-techniques.

This hypothesis would indicate that *both ways of knowing,* through apparently contradicting approaches/paradigms, *describe the same reality of nature*, indeed in different *languages* but astonishingly comparable *images*. However, the basic hurdle in communication between both ways of knowing seems to be the mutually excluding paradigms of human-nature relations, which even prevent attempts at communication: shamans assume nature to be animate and able to communicate; Western scientists assume nature to be inanimate and therefore unable to communicate. This seems to result in Narby's hypothesis and shaman knowledge not being accepted as scientifically relevant, which in turn results in non-communication.

More avenues could probably be explored to help fulfil the basic quest in this paper, along the lines of the work –among others- of Fritjof Capra (Tao of Physics), Ken Wilber (hierarchy of energies), Ayurvedan philosophy about understanding nature and its laws and Buddhist literature about the illusion of matter.

Proposal for activities

This case shows clearly that Western science is confronted with – as yet unexplainable – practical experiences and intuitive knowing in farming, and that it is being challenged on its basic assumptions and methods. Our case of Energetic farming might help us to build a paradigm-bridge from the perspective of farming experiences. Such a bridge would help to mutually understand both Quantum agriculture and Intuitive farming and to mutually explore possibilities of observation of and communication with nature from different paradigms. Obviously this would require a very open mind of all participants, beyond their own paradigms. I think it would be worth the effort, however, as it could eventually enrich both ways of farming and both ways of 'knowing nature'.

So again: what might be practical ways of getting this kind of trans-paradigm communication functioning? I present a proposal, with activities in a logical sequence, which I hope will be discussed and improved upon during the Compas conference.

- Make inventories of quantum farming systems and intuitive farming systems. PhD students interview farmers (and researchers) and listen not only to the information but also to the wording and images.
- Select some cases/persons open for experiments with trans-paradigm communication about their farming techniques, results, effects and problems.
- Screen anthropological literature on farming descriptions, communication with nature, etc.
- Screen existing physics-theories related to subtle energies (e.g. quantum vacuum fluctuations, bio/photon measurements, DNA radio/wave emissions, orgone theories) for language and image fits.
- Prepare for trans-paradigm communication:
  - Bring leading scientific institutions and people together (e.g. LBI Vienna, ZZB Germany, Hugh Lovel USA, Bulgarian Agricultural University, Club of Budapest) to prepare for trans-paradigm conversation. (Here we could also include institutions and people from the health sector.)

  - Bring leading shaman institutions and people together (e.g. from the Andes, India, Europe) to prepare for trans-paradigm conversation.
- Organise inter-paradigm communication between Q- and I-farming practitioners and researchers/'knowers'. A 'Socratic' approach of posing thoughtful questions might be effective.
- Synthesise content, language, images and methods and deduce commonalities and diversity. Formulate tentative conclusions from emerging evidence or – if possible – hypotheses for further exploration.
- Then, also develop an improved approach for inter-paradigm conversation.
- Publish and train.

In conclusion I would just add that it is important to record visually all interviews and conversations or debates, as this builds a good basis for secondary analysis by all interested participants.

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Cosmic trees and traditional knowledge of lunar rhythms

Potentials for innovative scientific research and bio-compatible applications

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World trees, cosmic trees

In many ancient cultures, trees are objects of worship, or there is a mythic Tree of Life, World Tree or Cosmic Tree that plays a central role.

The adoration of trees is well known from the Celtic culture. Several tribe names are an expression of the dimension taken by trees: the *Eburones* and the *Eburovices* contain the word *ibor* (yew, *Taxus baccata*), while the *Lemovices* took their name from the elm, *lem* (*Ulmus* sp.) (De Vries, 1977).

Norse or Germanic mythology is built on a tree called *Yggdrasil*, thought to be an ash (*Fraxinus excelsior*), although some commentators have suggested it may be a yew. There are few symbols in myths as challenging or as rewarding as this tree. A. Chetan and D. Brueton (Chetan & Brueton, 1994) describe it as follows: '*Yggdrasil is the guardian tree of the gods who maintained the fabric of the universe, and the axis that binds together the three worlds earth, heaven and underworld. From here the gods preside, and from his seat Odin can look into all three worlds at once. Yggdrasil rises to the sky, and its branches overspread the whole of creation. Three roots support it; one stretches to Hel, the world of the dead, another to the world of the frost giants and the third to the world of humans. At its feet are several springs tended by the goddesses of fate, the Norns, and also the wells of Mimir and Hvergelmir. […] The waters of the well of Mimir are the source of wisdom. […] Hvergelmir's spring is the source of eleven rivers, and serpents lurk nearby. Around the base of the trunk is coiled a huge serpent who continually gnaws the roots ….'.*

A deeper study of other myths and cosmovisions shows striking similarities, as mentioned by J. Narby (1995) A South American shamanic description under the influence of *ayahuasca*, a hallucinogenic drug, depicts almost the same World Tree, as a living spiritual column between Gods, Heaven and Earth, linked to waters and surrounded by a giant serpent, the Anaconda (Figure 1).

[1] Modified and completed version of the article 'Lunar Rhythms in Trees: Traditional knowledge under a new scientific light', IUFRO, Arnhem 2003.

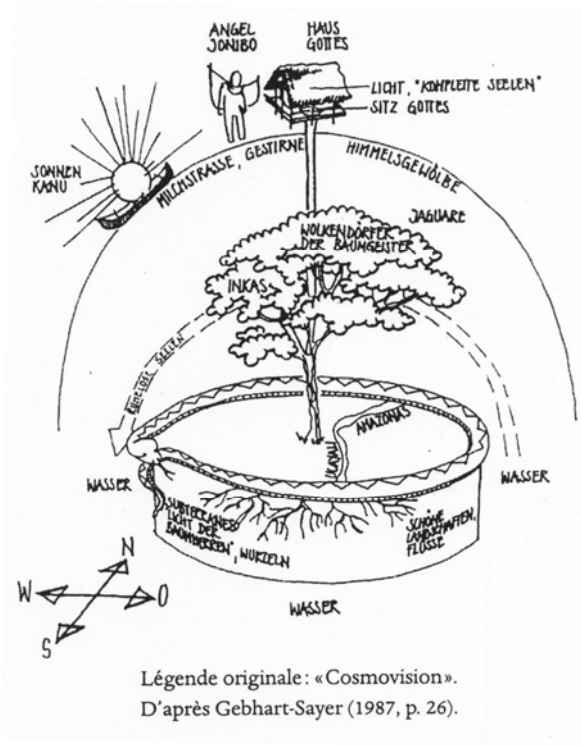

Figure 1 The central role of the tree in an amerindian cosmovision (after Gebhart-Sayer 1987, in Narby 1995).

These similarities, which cannot be explained by direct or indirect cultural influence, must have an explanation in a common psycho-spiritual constitution of human individuals, expressed in similar archetypes, as described by C.G. Jung.

One important aspect of this central role of trees in human culture and in our individual perception of nature is that they are embedded in different types of physiological cycles. These life rhythms are linked to the day-night-alternation, to the seasons (both from the apparent movement of the sun), and are also synchronous with cycles of the moon, of solar activity, of planets and with the zodiacal/stellar constellations. The cosmic dimension of life has always been mentioned in old cultures; scientific research (chronobiology) is now progressively discovering some of these rhythms related to the astronomic periphery, in plants and animals as well as in human life.

The present article mentions some examples of traditional knowledge of this type linked to trees. It presents some corresponding, pioneering scientific evidence, to demonstrate that the relationship between man and nature has also deep, far-reaching and unexpected dimensions.

Forestry traditions

According to documents from more than 2500 years ago, certain forestry practices and rules regarding tree felling and wood utilisation were carried out in observance of moon cycles, as was also done in agriculture and horticulture practices.

One can review the different types of rules followed for felling, pruning and coppicing. These rules are known in Europe and on other continents and stem from both traditional sources and present-day practitioners. The analysis of these rules shows that tree reaction is thought to depend on the specific date of the intervention. Special timber qualities and uses are also connected to such specific dates. The moon-related felling date supposedly ensures advantageous physiological reactions or special wood properties (Hauser, 1973; Broendegaard, 1985). Specific uses of wood based on well-defined properties mentioned in forestry felling traditions include: construction timber, shingles, wooden chimneys, firewood, wine barrels, cheese packaging boxes, longbows, wooden ploughs, resonance wood for musical instruments, etc. (Zürcher, 2000).

Role of scientific research

The aim of research lies in the critical examination of a possible element of objective truth underlying the above statements and in understanding the phenomena which could be responsible for the experiences described. Facts and practices must be separated from deviation and superstition. At stake here from the scientific point of view is usually the synodic lunar rhythm (period 29.5 days); much less research has been carried out on the role of the two other main moon rhythms (the sidereal and the tropic, both with a period of 27.3 days) in biological processes. A good review of scientific research on lunar rhythms in organisms has been published under the title 'Biologie des Mondes' (Endres & Schad, 1997).

Chronobiological (re)discoveries and confirmations

There have been a number of scientific studies carried out in relation to moon phases (as synodic lunar rhythm), dealing with elements of tree biology such as germination (Zürcher, 1992; Bagnoud, 1995) and the initial growth of tropical trees (where strong and systematic variations and their complicating aspects have been observed) (Zürcher, 1992, 1998). Recent research carried out jointly by several US Universities tested, at the level of secondary chemistry, the Central-American indigenous practice of timing the harvest of palm leaves for roofing by taking into account the moon phases. Significant differences appeared in carbon content and calcium content as well as in hemicellulose fraction, which could explain the effective higher durability (Vogt, Beard, Hammann, O'Hara Palmiotto, Vogt, Scatena & Hecht, 2002). Reversible, circadian (daily) lunar-synodic fluctuations of stem diameters (for trees held under constant conditions) (Zürcher, Cantiani, Sorbetti Guerri, Michel, 1998) provoked a controversial discussion (Vesala, Sevanto, Paatero, Nikinmaa, Perämäki, Ala-Nissilä, Käätiäinen, Virtanen, Irvine & Grace, 2000).

An interesting differentiating synthesis has recently been achieved by K. Holzknecht (2002) through long-term measurement of (bio-)electric potentials in European spruce and Swiss stone pine: while during the growth season the measured electric potentials followed a diurnal rhythm (responding to the known daily changes of light and temperature), during the winter period the potential variations were

correlated with the calculated circadian gravimetric tides during the waning lunar phases. At that time, the global curve exhibited a lunar and semi-lunar course. Interestingly, there are periods of rest during the growth season where the tidal correlation also becomes briefly evident. Until recently, the scientific objection to these observed phenomena was that the known physical forces (gravitational, geomagnetic) had too small variations to be considered as causal factors. A recent publication has approached this problem by developing a new astro-/geophysical model, which integrates simultaneously the static and the dynamic aspect of gravitation. This model leads to a 'quantisation' of time and demonstrates a rhythmic, reversible sun- and moon-related effect on the supra-molecular structure of water, thus revealing a possible 'zeitgeber' in chronobiology (Dorda, 2004).

In the utilitarian field of material technology, some studies concentrate on the relation between wood and water according to the felling date (drying process) and on the consequences for the wood properties (Zürcher & Mandallaz, 2001). Systematic and repeated tree fellings (6 x 5 spruce trees) in two opposing lunar phases from the point of view of the three rhythms mentioned (synodic, tropic, sidereal) were carried out in Zurich during the winter 1998-1999. This was followed by an analysis of the drying behaviour and determination of oven-dry density and compression strength, before exposing a series of samples to weathering conditions. While the fresh density of the felled trees, as a result of random selection for felling rank, was quite equivalent, significantly lunar-correlated variations appeared after the drying process in the oven-dry density and in the relative density (this is the value of oven-dry density in % of the initial density) (Figure 2). The significance is obviously due to the stronger variations in December and January; these variations are more marked for the outer sapwood samples than for the inner, drier heartwood material tested.

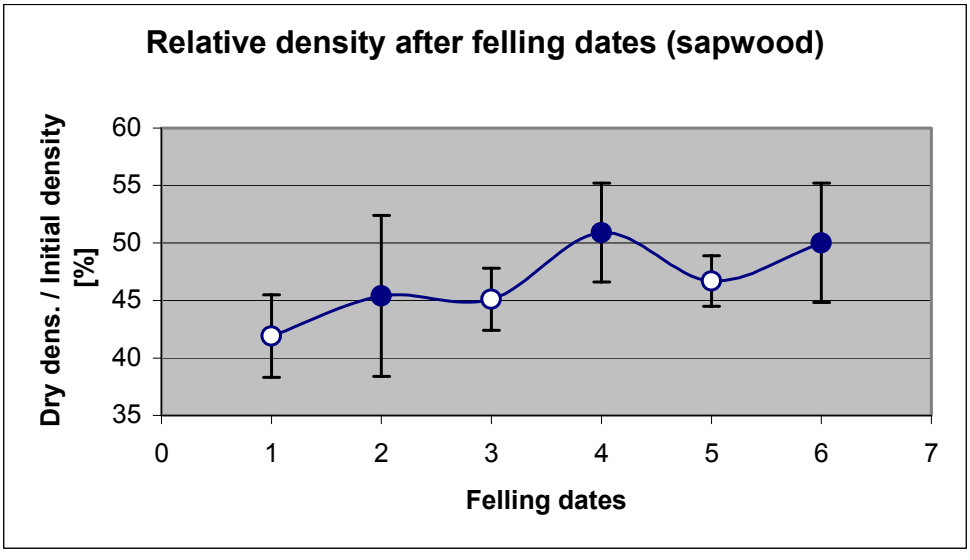

Figure 2 Systematic, lunar-correlated variations of European spruce-wood densities: Relative density (oven-dried/initial fresh density) of sapwood after 6 successive lunar-correlated felling dates in Zurich. 1 / 3 / 5: fellings before full moon, in ascending phase, in Pisces; 2 / 4 / 6: fellings before new moon, in descending phase, in Leo (mean values +/- standard deviations; after data in Zürcher and Mandallaz, 2001)

A further important indication of the reality of the investigated phenomenon is given by two similar, geographically independent research studies in this field with European spruce (J. Triebel (1998) with 120 trees; U. Seeling and A. Herz (1998) with 60 trees). These two previous investigations with 6 felling dates each, however, could not significantly indicate the influence of the felling date on the wood properties at a global level. But if the sapwood oven-dry density curves of the three sites and the three years in succession are compared, then it becomes obvious that from the felling date 3 (4) to the felling date 6 (7) significant systematic and parallel fluctuations between waxing moon ('full moon', fm) and waning moon ('new moon', nm) oven-dry density values exist (Figure 3). This means that for the whole of the 6 December and January nm-fellings, the kiln-drying density is significantly higher than that of the 3 fm-fellings of December. The relation to the December fm-value amounts to 11.6% and 9.0% respectively for Zurich, about 8.7% and 17.0% for Tharandt and about 12.0% and 9.1% for Freiburg Im Breisgau. To avoid misinterpretation, it must be stressed out that the lines connecting the punctual mean values of figures 2 and 3 have merely a visual function and do not correspond to effective measured values.

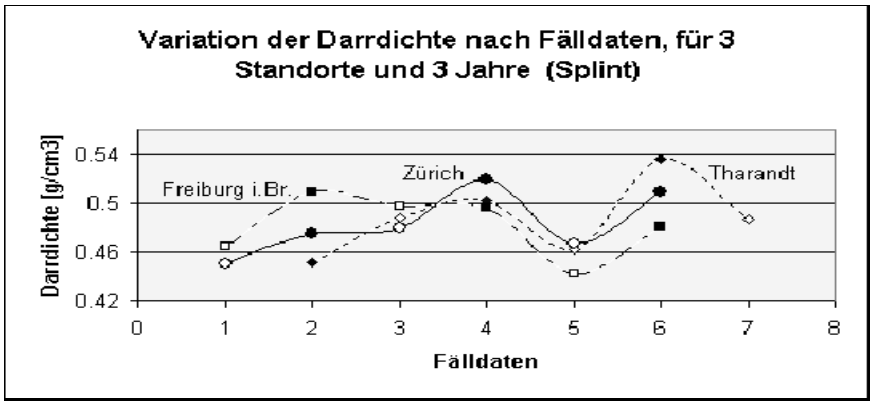

Figure 3 Systematic variations of oven-dried sapwood-densities of European spruce after successive lunar-correlated felling dates in 3 sites and 3 years. Zurich 1998-1999: plain line/Freiburg i.Br. 1997-1998: dotted line 1/Tharandt 1996-1997: dotted line 2. 1 / 3 / 5 / 7: fellings before full moon, as in Fig.1; 2 / 4 / 6: fellings before new moon, as in Fig.1 (according to Zürcher and Mandallaz, 2001; Seeling and Herz, 1998; Triebel, 1998)

For the determination of the compression strength for each of the four cardinal directions in the sapwood and the heartwood, eight evenly-grown samples per tree were tested. The data show a very close correlation with the value distribution of oven-dry densities for the sapwood as well as for the heartwood (correlation coefficients sapwood: 0.989 / heartwood: 0.971). In both cases the systematic differences between 'full moon' and 'new moon' samples of the series 3 – 6 were obvious. Sapwood as well as heartwood showed the most significant differences between felling date 4 (nm) and felling date 5 (fm): 17.8% and 22.6% respectively. For the whole investigation, the nm-average value in sapwood (47.2 N/mm²) surpasses the fm-average value (41.9 N/mm²) by 12.6%. The heartwood's nm-average value (40.7 N/mm²) surpasses the fm-average value (36.6 N/mm²) by 11.2% (Figure 4).

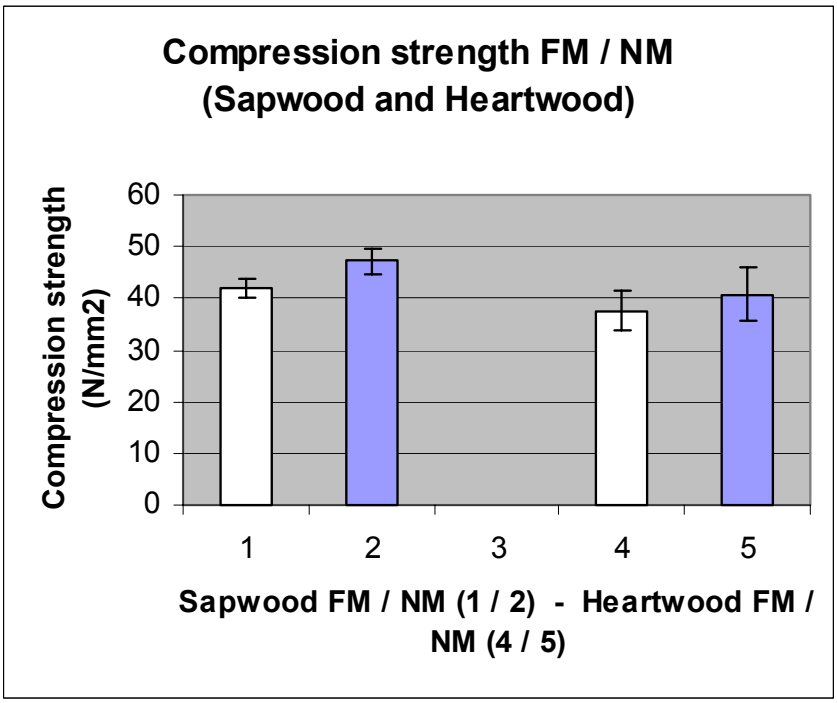

Figure 4 Comparative mean values of compression strength of sapwood (left) and heartwood (right) of European spruce (Picea abies) from successive lunar-correlated felling dates in Zurich. White bars: fellings before full moon, as in Fig.1; dark bars: fellings before new moon, as in Fig.1 (mean values +/- standard deviations; according to data in Zürcher and Mandallaz, 2001)

A comparison of the initial fresh densities of the samples illustrates the apparent reason for the traditional felling practices: from initially relatively homogeneous material (average fresh density of sapwood nm-samples was only 1.0% higher than the average of sapwood fm-samples; for heartwood samples it was 1.8% lower) it seems possible to regulate the drying behaviour and the final physical wood properties through an accurate choice of the felling date in relation to the position of the moon. This moon-related effect must be understood as additional to the influence of the site and to the effect of the season of the year. The analysis of the samples after 2.5 years of weathering suggests that these effects have a permanent character (Zürcher, 2003). In addition to mechanical properties and durability, traditional rules mention differences when the wood is used for energy. Unexpectedly, burning tests and statistical analyses published by Seeling (2000) show that samples from specific felling dates in 'waxing periods' actually have higher heat values than samples from corresponding dates in 'waning periods'. The results of a recent large-scale study of different sites in Switzerland made by the author confirm significant lunar periodicities in the drying process (water loss, shrinkage and relative density) of the wood samples. However, the differences between the global mean figures are much lower than in the previous studies.

A recent publication deals specifically with the role of the sidereal moon position. Some traditions, probably going back to the Chaldean and Egyptian cultures (Vreede, 1996), state that zodiacal constellations should be taken into account when working with plants. H. Flückiger and S. Baumgartner (2002) based their study of

Mistletoe (*Viscum album* L.) berries on the fact that the exact shape of a large variety of buds shows systematic reversible variations that can be mathematically defined with a single parameter λ (lambda) (Edwards, 1993). The same type of cyclic slight shape modification could be seen here at the fruit level, as well as a significant correlation with the zodiacal constellations in which the moon is positioned at the moment of sampling (Figure 5).

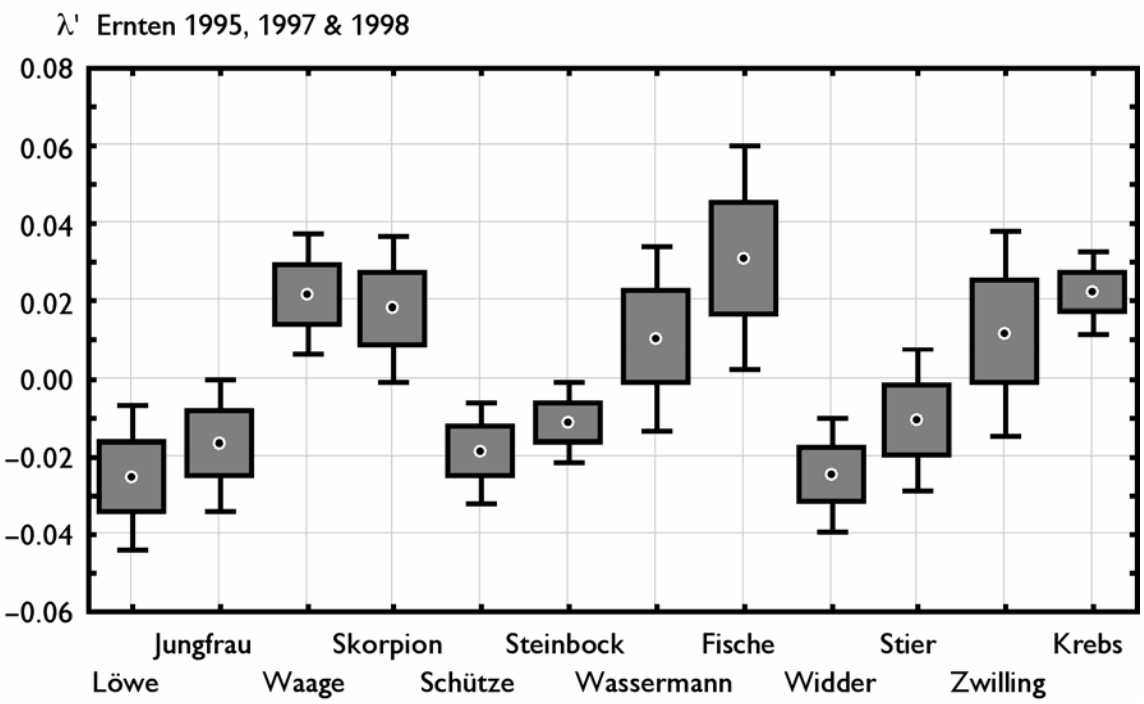

Figure 5 Values of λ (lambda) (mean +/- single and double standard deviation) of Mistletoe berries (collected 1995, 1997 and 1998) as a function of moon position in the zodiacal constellations (with the kind agreement of 'Elemente der Naturwissenschaften' and authors H. Flückiger and S. Baumgartner)

Lunar rhythms in the human organism

As mentioned in detail by Endres and Schad (1997), the influence of moon rhythms and positions is not limited to plants. Many scientific works also show a role in animal and human life. A good example is given by the human fertility cycle, which is clearly periodic. The Swedish chemist Svante Arrhenius (winner of the Nobel Prize for Chemistry 1903) found, as other studies have confirmed (e.g., Folin et al., 2001), the mean periods of menstruation and the incidence of childbirth to be 27.32 days: this is the same as the sidereal moon cycle, which is two days shorter than the synodic cycle. Furthermore, there was a correlation with electromagnetic fluctuations in the atmosphere, which also followed a sidereal cycle (Arrhenius 1898, cited in Morgan, 2001). A Brazilian analysis of the frequency of births confirmed this rhythm, and was in agreement with the results concerning natality in Germany obtained by Svante

Arrhenius (Mikulecky & Lisboa, 2002). Nevertheless, these last authors state that this topic remains controversial.

Similarly to this first (sidereal) periodicity, a recent medical analysis shows that mortality variations in general and cardiovascular mortality in particular are correlated to the synodic moon phases in the form of a semi-lunar wave. Fourier analysis of these 1.8 million and 1.1 million respective cases of death indicates in addition shorter variation periods of 3.7 and 2.96 days (1/8, resp. 1/10 of the lunar month) (Strestik, Sitar, Predeanu & Botezat-Antonescu, 2001).

A synthesis and its prerequisites

On this basis, a fruitful exchange is possible between scientists and foresters who are aware of the 'cosmic' dimension of trees and its philosophic/scientific meaning. As a matter of fact, the works presented here on astronomic rhythms in organic life give an insight into an unexpectedly common level between trees and human beings. They lead to a rehabilitation of parts of ancient, almost forgotten knowledge. One positive consequence is the enhancement of the intrinsic value of each tree, from a physical, and also a social and spiritual point of view.

From the epistemological and methodological point of view, a synthesis between traditional perception and modern thinking seems possible if:

- Thinking is actively observed and recognised in its real essence, offering the relational component of the process of knowledge, binding together the diverse elements of observation. The scientific elaboration of a monistic ('one-world') science of knowledge was the fundamental achievement of Rudolf Steiner [27,28], making multiple practical and innovative applications possible, from medicine to agriculture.
- The mind-matter discontinuity is bridged. In his book 'The Web of Life', Fritjof Capra (1996) emphases in an analogous sense that mind should not be considered as a thing, a product of brain physiology, but as a process – the very process of life. 'The organizing activity of living systems, at all levels of life, is mental activity'. Citing Bateson: 'Biological forms consist of relationships, not of parts, … , and this is also how people think.'
- Nature is objectively considered as intelligent. A new step in this direction was recently made by the anthropologist Jeremy Narby (2005), presenting experimental and scientific examples and arguments from interviews with traditional healers and with researchers in the life sciences. As a result, Narby proposes a world concept explained by science which integrates the experience of shamans.

Potentials and perspectives

These efforts towards a new understanding of chronobiological phenomena and the discovery of unexpected dimensions could allow diverse promising applications. Examples of potential activity fields include:

- 'Cosmobiological' plant breeding and selection, respecting the fundamental nature of species and avoiding artificial modification of the genome (a type of 'cosmo-genetics');
- High-quality reforestation, with disease-resistant seedlings from tree nurseries with high germination rates;
- Ecological and biocompatible wood technology, using, where appropriate, naturally decay-resistant timber from chronobiologically correct tree fellings.

Taking into account 'time' as a basic environmental factor makes it possible to develop bio-technologies in the real sense of the term, bringing the organisms (in our examples: the plants and their specific substances) to the expression of their full potential.

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Rural development initiatives

David Groenfeldt, *How the multifunctionality concept can restore meaning to agri-culture*
Sabine de Rooij, *Territorial cooperative networks*
Karlheinz Knickel and Gundula Jahn, *Promoting a sustainable development of rural areas*
Gerwin Verschuur and Anne Stijkel, *Can money work for the evolution of agriculture?*
Gaston Remmers, *A European Network for Endogenous Development?*
Kees Manintveld, *Worldviews as moving motivations?*

How the multifunctionality concept can restore meaning to agri-culture

David Groenfeldt
Indigenous Water Initiative
Santa Fe, New Mexico, USA

The materialism that pervades modern Western culture is reflected in the agricultural sector, which has become a production-oriented industrial style of cultivation. Industrial agriculture has long been assumed to be the inevitable future of our agrarian landscapes. Indeed, agriculture's declining share of the labour force and concomitant increase in labour productivity has served as a measure of development achievement. Developed countries have less than 10% of the labour force in agriculture, and usually less than 5%. The US statistic is around 2%. Agriculture is a task that we no longer have to do; labour-saving machinery does it for us. We are also spared the burden of processing food commodities into food that we can eat. Agribusinesses process the food for us.

Disconnecting with nature is not merely a by-product of modern life, but a central intention of our society. Nature and culture are seen as opposing forces, in the Euro-centric worldview. Taming nature has been a way for Western Civilisation to highlight our achievements as a people.[1]

It is bad enough that we Westerners have done this to ourselves, but in our Western way, we feel compelled to share it with the rest of the world, and we are busy cajoling developing countries that they too should adopt our industrial agricultural strategy. Food is a commodity, like water and land, that has no value beyond what the market recognises. Stop practising your silly religious rituals and social customs; overcome your aversion to economic risk; learn that agriculture is a business, that your household is really an economic unit, and you can improve the profitability of your farm enterprise. Or you can contract out your farming operation and go into another line of work that pays you more. Are you uncertain whether to farm or do something else? Let the economic analysis help you decide: which option is more profitable? That's your answer.

How did we get here?

How has it happened that Western farmers, and particularly European farmers who have inherited an unbroken indigenous cultural tradition, have accepted so easily the materialist worldview of agriculture? And how did farmers in developing countries so readily agree to the terms of the Green Revolution, that required them to exterminate

[1] Scott (1998) offers an interesting overview of this phenomenon in his chapter entitled, 'Taming Nature: An Agriculture of Legibility and Simplicity'.

friendly insects and contaminate their organic soils with chemical fertilisers and herbicides? What were they thinking?

Of course there are many reasons that farmers have given up many of their traditional ways, but I want to focus on the realm of worldview. How did that change? Here the term 'semiotic conquest' is useful. This term is borrowed from an anthropologist, Arturo Escobar (1995), who described the replacement of indigenous Latin American cultural values by Western (North American) capitalism. Instead of traditional culture and society providing the meaning to reality, the new semiotic regime puts the economy first and foremost, and society and culture have to fit inside the requirements of that economy. The economy provides the meaning to life that culture and society used to provide.

This description of semiotic conquest applies equally well to the indigenous farmers of Europe and Japan. In addition to the economic signals from the market, there were many other channels of communication all giving similar messages: the government itself through agricultural policies and extension messages, newspaper articles, political leaders, and even religious leaders. Producing more is a good thing. The means used in the production process were not questioned very much. In the modern (industrial) worldview, the traditional emotional connection to the land, and to one's animals is outdated. Modern life demands a new view of the world as a market, and the farmer's job is to grow products that can be sold in that market. The process of creating those products needs to become efficient. There is no benefit in feeling kinship with your cow if your cow is not an efficient producer of milk. Get rid of that cow and your profit margin will improve!

In the context of development assistance projects, there is a Trojan Horse quality to semiotic conquest. For example, the gift of new canals and diversion weirs, agricultural extension, and credits for agro-inputs also brings hidden gifts: new values and ideologies. There can be many levels and arenas of semiotic conquest. At a meta-level, the very introduction of any new approach represents a challenge to the status quo. When that challenge is supported by clear authority (education) and prestige (wealth, status), it has greater impact. And when the new approach is seen as one small piece of a much greater, and still unseen whole of what Western-style life can offer, the impact on indigenous values is all the greater.

Multifunctionality to the rescue?

The concept of multifunctional agriculture offers a powerful antidote to the ideology of materialist, industrial style agriculture, and more broadly to materialist paradigms of development itself. Multifunctional agriculture (MFA) refers to the multiple services (functions) that agriculture provides to society, beyond the immediate production function. These functions include environmental services (e.g., wildlife habitat, or in Japan, the flood control functions of paddy terraces are especially important), social services (rural employment), cultural and spiritual services (cultural identity, religious observances), aesthetic services (landscape), etc.

At the level of worldview, the multifunctional concept represents a re-thinking of the materialist paradigm. There are also other ways to view the MFA concept: as a justification for agricultural subsidies, as a strategy for negotiating with the WTO, for

example. The multifunctional concept is certainly motivated by both politics and economics, but from a perspective of 'moving worldviews' the political economics are largely irrelevant. Far more important is the opportunity presented by MFA to reassess the role of agriculture in society, the desirable future of rural areas, the meaning of development, and even the meaning of life itself.

Two separate policy discussions on MFA are taking place, and with little interaction: one discussion based in Europe, and the other in Japan. In Europe, the concept has evolved from negotiations surrounding the EU's Common Agricultural Policy (CAP). MFA is now part of the official policy of the EU, articulated in the Agenda 2000 reform, and in the European Model of Agriculture.[2] During the past several years the EU has sponsored an active programme of research on MFA, most notably the Multagri Project (www.multagri.net).[3] A parallel initiative has been the programme on Europe's Rural Futures: The Nature of Rural Development (NoRD)[4] with primary involvement from the Worldwide Fund for Nature (WWF). The debate in Europe is rich and broad-based, encompassing a great deal of social and economic analysis and stimulated by a larger debate about the future of Europe itself.

In Japan, the focus of MFA has been on paddy agriculture specifically and has taken a much more narrow focus, at least in the English-language literature. Multifunctionality is officially recognised by the Ministry of Agriculture as a basis for making investment decisions in the agriculture sector. There has also been an effort to coordinate a common position with other paddy producing countries in the region. One visible expression of this interest is the Japan-financed International Network on Water and Environment in Paddy Fields (INWEPF)[5] which grew out of the World Water Forum held in Japan in 2003. The focus is on paddy-based agriculture in Monsoon Asia, where there is an acknowledged, historical 'paddy culture'.

The (potential) significance of multifunctional agriculture

What does the emergence of the MFA concept portend for the future of agriculture and the evolution of a more sustainable worldview? Is MFA simply an expression of mainstream society's regret at the loss of heritage, stimulating small corrective measures to preserve bits and pieces of that heritage through the equivalent of open-air farming museums? I believe that the MFA concept is far more significant; the logical implications of MFA offer a fundamental challenge to the prevailing materialist

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[2] For an overview of policies, see *Evaluation of policies with respect to multifunctionality of agriculture; observation tools and support for policy formulation and evaluation: Summary Report* by Melanie Kröger & Karlheinz Knickel. (www.multagri.net/section/deliverable/exec_file.php?doc_id=372).

[3] A related French programme conducted through INRA, Cemagref, and CIRAD has compiled a comprehensive series of reports on various aspects of MFA. See their website: www.inra.fr/Internet/Directions/SED/multifonction/

[4] A report summarising this project can be downloaded at http://assets.panda.org/downloads/nordiifinal.pdf

[5] The INWEPF website is maintained by the Japanese Ministry of Agriculture, Forestry, and Fisheries: http://www.maff.go.jp/inwepf/index.htm

worldview. How far will this logic be allowed to go? Let us apply this question to three different MFA contexts: (1) wealthy countries, (2) developing countries and (3) indigenous peoples.

The potential impact of MFA in wealthy countries

The multifunctional concept clearly offers a toehold for worldview reform, but with such high stakes, there is a very great danger that MFA will be defined into irrelevance. The strategy is simple: focus on the importance of traditional agricultural practices and specialty products as connections to cultural heritage and identity, and find ways of preserving this heritage in museum-like settings that will not challenge the status quo. Clearly, this is what the WTO should encourage! The tendency for European researchers to describe their agriculture as having entered an era of 'post-production' only adds to the marginalisation of the MFA concept. The connotation is that MFA is relevant only for societies that no longer need to produce their own food.

One scenario whereby MFA could pose a practical threat to the prevailing worldview hinges on the empowerment of local areas and sub-regions, where local residents participate in charting their own future (e.g., the 'Active Regions' pilot programme in Germany described in the paper by Knickel and Jahn in this workshop). Another interesting scenario hinges on national policy debates stimulated on one hand by the backdrop of EU integration, and on the other hand by inputs from research and advocacy organisations such as WWF and other environmental groups. If the media, intelligentsia, and political leaders were to take up the issues of rural development and MFA, then perhaps this could lead to real changes in the prevailing worldview.

Similar scenarios can be envisaged for Japan, with the difference that the government itself is strongly supportive of the MFA concept. The prevailing worldview in Japan is perhaps already more aligned with MFA than is the case in Europe, and certainly than is the case in the United States. There is a strong dimension of emotional and spiritual values associated with paddy cultivation in Japan, which is considered perfectly acceptable to incorporate into rural policies.

The potential impact of MFA in developing countries

The developing world has been suspicious of MFA, seeing it as yet another Northern strategy for agricultural protectionism. Where the MFA concept resonates best is with grassroots initiatives to revitalise local agriculture, where the multiple local benefits of agriculture are obvious to all concerned. But at the level of national policies, MFA remains an abstraction. In Asia, the few development assistance projects that use the term, 'multifunctionality' are JICA-supported, and the multiple functions recognised are tied to water saving irrigation practices, flood control, or community empowerment through water user associations. The more nuanced benefits of cultural heritage and landscape, while well recognised in Japan's domestic policies, have not filtered down to development assistance policies, nor have developing country governments themselves embraced the concept. Even in Bali, where agricultural tourism is a recognised part of the tourism industry, the cultural heritage values of the agricultural sector have not been well addressed in policies.

A similar lack of interest in the MFA concept appears to prevail in EU-funded programme s. The MFA policies that attract so much interest within the European

context have not found their way into development assistance policies, much less into the policies of the assisted countries. The operating (and unexamined) assumption appears to be that the MFA concept is incompatible with high levels of agricultural production. This is why it is so unfortunate for Europeans to define their own MFA as 'post-productionist'. The agro-ecological approaches promising productivity based on indigenous knowledge offer a better role model for developing countries.[6]

Is there a MFA-friendly scenario for developing countries? If so, it will hinge on a willingness to question the prevailing agricultural model. The agricultural policies in developing countries represent the legacy of a long process of semiotic conquest. And that process continues. It is important for the North to acknowledge that in the realm of meaning, values and worldview, there remain very strong connections between the North and South (and the West and the East). The decision-makers in developing country agriculture ministries have – with perhaps a very few exceptions – been educated in the North, and proudly reflect the worldview of scientific rational materialism of Northern universities. Shifting the agricultural paradigm in developing countries will require efforts at two levels (1) within the North, where meaning is communicated through formal training, and through the policies embedded in development assistance projects, and (2) at the grassroots, where promising initiatives are well established which encompass MFA concepts without using the terminology.

The potential impact of MFA among indigenous peoples

The fundamental linkages between agriculture and the cultural heritage and identity of a society suggest that how agriculture is handled is also fundamental to cultural sovereignty. This linkage is motivating Japan to protect its agrarian heritage; for indigenous peoples whose culture is under threat from so many forces, their agricultural way of life takes on added importance. The MFA concept, however, is seen as one part of a larger struggle pitting indigenous peoples against the commodification of agriculture as prescribed in international trade agreements. Speaking during the Third Ministerial Meeting of the WTO in Seattle (USA) in November 1999, an indigenous leader outlined her views as follows:

....the whole philosophy underpinning the WTO Agreements and all regional agreements like NAFTA, MERCOSUR, etc. contradicts indigenous peoples' worldviews, concepts and practices related to environment, trade, and development, the way we regard and use knowledge, and our core values and spirituality. The principles and policies they promote such as trade liberalisation, export-oriented development, trade barriers, leveling the playing field, comparative advantage, most-favoured nation and national treatment, and worst, the patenting of lifeforms are antithetical to most of our core-values and beliefs.[7]

While MFA would appear to be highly consistent with indigenous worldviews, the concept is seen as a second-generation issue. The first priority is to recapture lost

[6] See, for example, Pretty (2002).

[7] Statement by Victoria Tauli-Corpuz, Director, TEBTEBBA FOUNDATION (Indigenous Peoples' International Centre for Policy Research and Education), Presented at the 'Human Face of International Trade: Health and Environment', 29 Nov. 1999, United Methodist Church, Seattle, Washington, USA. (www.ratical.org/co-globalize/impactsOfWTO.html). The full text of the Indigenous Peoples Seattle Declaration can be found on the Tebtebba website: www.tebtebba.org.

land and water rights, and only then can the details of agricultural policies become relevant. From an outside perspective of development assistance strategies, however, the MFA concept becomes very much relevant in formulating development interventions that support indigenous values. Here again is an example of the need for donor countries to embrace MFA if the concept is to be adopted by indigenous peoples.

How can we operationalise MFA?

There are two basic levels at which the multifunctional concept can be put to practical use in our quest for a sustainable, humane world. The first level pertains to agricultural policies. MFA offers a way of repairing the damage done to traditional agricultural practices, lifeways and worldviews. I refer to this as 'cultural reparation'. The other level for practical action is at the level of worldview – our own Northern worldview(s) and the worldviews of other societies and cultures. The MFA concept challenges the materialist worldview and provides an opening for new paradigms of agriculture and development to be considered.

Multifunctional Agriculture as Cultural Reparation

Indigenous farmers whether in Europe, Africa, or Asia (or New Mexico, or anywhere that indigenous farmers are found) have all shared the common experience of losing important pieces of their agricultural way of life. To some degree, all have experienced the conquest of a powerful, alien worldview, that has pushed them to renounce their traditional perspectives as outdated and embarrassing. Many have resisted, and the scene today is a complex mixture of resilient pieces of traditional worldviews blending with new ideas, new technologies, and new markets. The multifunctional concept offers a framework for galvanising these disparate bits and pieces of the old and the new into a dynamic agri-culture that serves the cultural (and production) goals of the societies concerned. In this sense, MFA has the potential to repair the severe damage that Western materialism has exacted on traditional agricultural value systems. The North has a moral obligation to its own farmers (and consumers) as well as to those of the South, to make cultural reparations for damage done. Multifunctional agriculture offers us (the North) a way of making those reparations operational through practical projects, policies, and programmes.

Multifunctional Agriculture as a Catalyst for New Paradigms

The multifunctional concept implies that it is important for people to feel connected with nature, and it is agriculture that provides that connection. Through the food we eat, we quite literally transform bits of nature into bits of culture. There is no need to resort to metaphor; we only need to interpret our own direct observations. If the MFA concept is taken seriously, there is a logical slippery slope that can lead to questions about ultimate meaning and purpose in life. Perhaps materialism is not the only value system imaginable!

Conclusions

The concept of multifunctional agriculture is very powerful. It has the potential to catalyse a successful challenge to the prevailing worldview of materialism. Realising that potential requires some or all of the following measures to be taken:

- The North has to take MFA seriously. If multifunctionality is relegated to merely being a way of adding a dose of cultural heritage to industrial agriculture, then MFA will have no real influence. However if the MFA concept serves as a catalyst to re-assessing the nature of agriculture and its role in modern society, then the Northern worldview will be open to change.
- MFA needs to be incorporated into development assistance programme s. Developing countries already accommodate a diversity of agricultural worldviews through their indigenous communities and grassroots initiatives. If development projects also place a priority on social, cultural, spiritual and aesthetic dimensions of agriculture they will help legitimise these non-materialist perspectives and help open a healthy policy debate within the country.
- Indigenous peoples need to make use of the MFA concept in their own struggles over land and water rights. As multifunctionality becomes more accepted in mainstream policy discussions (and provided that the concept retains its core meaning of social, cultural and spiritual values), the term itself can serve a useful purpose. Not only can indigenous peoples refer to MFA in communicating with the outside world, but the MFA concept can also help to legitimise local agriculture internally (e.g., to the younger generation who are eager to be modern).
- Local communities/regions need to be empowered to make their own decisions about local agriculture and land use. Empowerment includes legal rights, access to information, and assistance in planning, strategising and envisioning the future.
- Consumers need to appreciate the multifunctional services of agriculture, and be willing to support producers, both economically and morally. This implies the need for partnerships (linking consumers and producers) and awareness campaigns.

Reaping the benefits of the multifunctional approach demands efforts in both the North and the South. The globalised world links not only our economies but our ideologies as well. It will take all our cooperation to reform the prevailing worldview of materialism, and we can all share the benefits of doing so.

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Territorial cooperative networks: new social carriers for endogenous rural development

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This paper examines three case studies that I have carried out on endogenous rural development in different parts of Europe (De Rooij, 2004, 2005, forthcoming 2006). The cases concern environmental cooperatives of Dutch farmers, a production and marketing association of Italian mountain farmers, and a micro-regional network involved in rural economic diversification in a marginal rural area in Slovakia. Although the historical backgrounds and contexts vary considerably, the cases share some remarkable features.

Environmental cooperatives

These are relatively new institutions within the professional agricultural world in the Netherlands (Marsden et al., 2001; van der Ploeg et al., 2002; NJAS, 2003; Stuiver and Wiskerke, 2004). They embody new forms of cooperation between farmers in a specific locality, and are aimed at ensuring continuity of farming in a sustainable way. This includes ensuring that care of nature, landscape and environmental quality become integral parts of the farming practices. The cooperation builds on shared values, beliefs, a feeling of belonging and local traditions while simultaneously strengthening this same basis.

Environmental cooperatives in the Netherlands have arisen in response to the generic policies of the Dutch government for coping with the negative effects of modern farming methods on environment, nature and landscapes. The farming families involved in the cooperatives considered that the government approach ignores specific local conditions, and that it therefore posed a real threat to the continuance of their farms and their communities.

Environmental cooperatives, then, are the self-organised and common effort of local people to develop their own answers to these problems. Collective accountability for the fulfilment of the targets set by the government is a key characteristic. Also crucial is the use of regional potentials. 'Trace the resources you already possess and start strengthening these' is their motto. It appears that the effects of the collective approach are superior to the results of innovative strategies of single farming families.

The case I have studied is that of two vanguard environmental cooperatives – VEL/VANLA[1] – in the Friesian woodlands in the north of the Netherlands. They

[1] VEL (Vereniging Eastermar's Lânsdouwe) and VANLA (Vereniging Agrarisch Natuur- en Landschapsbeheer Achtkarspelen

were founded almost fifteen years ago. Their members represent some 80 to 90% of the farming families in the area. This means that nearly all farmers, irrespective of farm size, gender and generation, are convinced of the advantages of membership.

The central activities of the VEL/VANLA environmental cooperatives entail two tracks, a so-called 'nature and landscape' and a 'mineral' track. Together these constitute an alternative strategy to existing government policies for fighting the acidification caused by modern farming practices, as well as for preserving the abundant nature in the area and the unique landscape. Briefly, the first track consists of farmer-managed restoration and improvement of the historic valuable landscape and the bio-diversity in the region. This coincides partly with an area-based landscape plan that includes some 12,000 hectares. This plan has been developed in cooperation with four, more recently established environmental cooperatives in the region. The second track refers to a farm management system known as the 'cycle system', and is about the enhancement of the nitrogen efficiency in the production cycle. The system is intended to solve environmental problems (groundwater pollution, acid rain) connected to previous high gifts of fertiliser, cattle slurry manure and the high ammonia deposition from the animal stalls while simultaneously raising farmers' incomes (by decreasing costs and increasing profits). The core of the system is to improve the efficiency of the separate elements of the production cycle, i.e. the soil, plant, animal and manure cycles as well as their interrelations (Reijs et al., 2004)[2]. The underlying design of the system is the result of close cooperation between farmers and scientists of different disciplines. Although the activities related to the two tracks are intertwined at cooperative level, members can opt to participate in single activities.

Up to now, the achievements of the cooperatives are multiple and can be seen at different levels: in addition to environmental improvement, upgrading of the historical landscape and biodiversity, the farmers involved have benefited financially. Provisional analysis of research data shows that involvement in both 'tracks' pays off. Farmers engaged in the two programmes realise better financial results than farmers participating only partially or not at all. Time plays a role: the longer farmers take part in the programmes, the higher their incomes. The gains may amount to an average extra annual income of 18,000 euros per farm. This amount does not include the extra costs incurred, so the actual extra profit will be a little lower (van der Ploeg, Verhoeven, Oostindie, & Groot, 2003). Additionally, the environmental cooperatives have generated paid work for local women. Part of their work is ensuring that farmers comply with the requirement of the landscape management programmes in which they participate. Administrative work linked to the application of subsidies also belongs to their task package.

[2] The underlying theory is that better manure (i.e. natural instead of artificial fertiliser) used in the right way will improve the soil quality. This will have a positive effect on the grass quality without affecting its quantity. Subsequent mowing of the grass at a later moment than usual results in a changed composition of the grass structure, which in turn lowers the need for concentrates in the diet of the cows. The changed diet improves both animal's health (fewer diseases, longer life) and their milk. The latter now contains higher percentages of fat and protein and thus commands a higher price. The diet further improves the quality of the manure, which in turn pays off in terms of soil quality and ecological advantages (improved N-efficiency). The reorganisation of the forage production, the diet and the production of manure, results in a decrease in milk production per cow. The farmers deal with this by milking a few extra cows.

Membership of the VEL and VANLA-cooperatives is advantageous in other respects as well. As a legal entity, the cooperatives act on behalf of their members towards governments and other stakeholders and are accountable for the results. They further mediate between the farmers and other landowners on the one hand and the relevant governmental agencies on the other. The benefits include an optimal use of governmental programmes for agriculture and rural areas. For governments on the other hand, environmental cooperatives are a clear point of contact and imply a reduction of both the administration costs and the time needed to check the fulfilment of the commitments.

An important achievement of the environmental cooperatives is the strengthening of social cohesion within the farming community in the area. The environmental cooperatives involved are characterised by self-organisation[3], self-regulation and pro-activity (Wiskerke et al., 2003; Stuiver & Wiskerke, 2004). Instead of passively waiting for newer and sometimes conflicting generic rules and regulations, they have taken the lead in solving regional level problems. That is, they have developed their own rules, structures and strategies to comply with governmental requirements and even to go beyond these. Their aim is to develop a way of farming that is more sustainable than the conventional methods. Internal control mechanisms are set up to ensure that implementation and progress of the activities are well monitored and evaluated. The essential pre-conditions to search for and apply region specific tailor-made solutions were established by negotiating ministerial approval for an experimental status. Today, this 'governance experiment', in which the environmental cooperatives determine the rules for achieving the targets set by the government as regards environmental, nature and landscape conservation, is only possible as part of scientific research (Stuiver & Wiskerke, 2004).

The mechanisms of self-organisation and self-regulation make environmental cooperatives an expression of a new mode of rural governance. They represent a 'new contract between local, regional and national authorities and farmers' (Wiskerke et al., 2003). Their being embedded in a broad network and the formation of strategic alliances (e.g. with environmental or consumer organisations, scientific researchers, policymakers and politicians) imply that environmental cooperatives have the potential to exert considerable political influence at local, regional and national level. This potential can however only be deployed if there are change agents at all levels. Only through participation, input and influence of different stakeholders at the same time, has the present initiative of environmental cooperative become viable.

Farming families involved in the environmental cooperatives need a high degree of motivation, energy, endurance, trust and to show solidarity. Opposition and resistance regularly block or inhibit activities and come from different sides. A main obstacle is the central government bureaucracy, including its officials. Here, deviation from generic rules is considered very problematic. Opposition also comes from within, i.e. the agricultural professional world itself and has its origins in vested interests and in ideological conflicts about the future of farming.

[3] According to Ostrom (1990) self-organisation refers '[t]o bottom-up governance of local civil society beyond the market and short of the state making use of associations, informal understandings, negotiations, regulations, trust relations and informal social control rather than official coercion' (in Wiskerke et al. 2003, p.12).

It should be mentioned here, however, that the two cooperatives presented here symbolise a turning point in Dutch rural history: since their establishment in 1992, more than 300 similar rural cooperatives have been started by farmers and other rural inhabitants in the Netherlands. Some time ago, VEL and VANLA merged with the four other regional environmental cooperatives into one larger environmental cooperative.

Multifunctional farming and autonomous farmer-governed promotion and marketing networks

These are key elements in the strategy to revitalise an area in Italy threatened by ecological decay, fading regional economic activity and depopulation. The Abruzzo is a mountainous region of high natural value and a large part of the region is also a protected nature area. Traditionally, sheep and goat breeding were the main economic activities here. Globalisation of wool production and Italian agricultural policies promoting modernisation of agriculture put an end to these however. The arrival of a few young sheep farmers a number of years ago was a turning point, which has brought new prospects to the region. They re-introduced multifunctional farming (or 'economy of scope') and set a new trend in the region by starting cooperation between farmers. At first, this partnership included joint marketing and distribution of their products that initially consisted of various types of cheese. Gradually, this partnership evolved into an interregional network of mainly organic farmers (ATER) who produce a range of high-quality region-specific products and jointly promote and market their products in different 'niche' markets. The network operates independently from the mainstream infrastructure and trade relations. Farmers govern the network. To overcome institutional obstacles that hinder the implementation of their ideas, they have organised themselves in a political way (APRO). Alliance building is another strategy to accomplish this (see Milone, 2004).

In the view of the pioneering farmers, multifunctional farming is the basis from which to achieve coherence between ecological, economic and social dimensions of sustainability (e.g. Knickel & Renting 2000; Arzeni et al., 2001; van der Ploeg et al., 2002; Belletti et al., 2003). It implies that farming is not limited to agricultural production but also meets broader societal needs, such as environmental protection and nature preservation, provision of services (e.g. agro-tourism, education, and care activities) and safeguarding of rural traditions.

Crucial elements in the strategy followed by the sheep farmers involved include reconnection to resources in the own environment, multiple use of resources, and diversification of products and services in combination with high quality production. Organic production lays the foundation for this quality. Another characteristic feature is long production chains within the farm. Paid work outside the farm is a complementary building block (Milone, 2004). In their farm practice, the pioneers translate multifunctional farming into many different activities and services. These include a range of self-processed ecological and specific products (e.g. different types of cheese, meat, and woollen products), agro-tourism activities (restaurant, shop, and accommodation), educational and creative activities. Valuable resources are the

mountain pastures and the traditional breed of sheep that maintains and reproduces the pastoral landscape and the special and abundant flora and fauna. Nature, landscape and local cultural traditions are important resources when it comes to tourism. The same goes for local real estate (empty farm buildings and village properties) and human resources. The latter may comprise good entrepreneurship, mobile, flexible and skilled labour power, traditional local knowledge about pasturing and cheese making, local food habits and cooking traditions.

Equally important in the multifunctional farming approach is the development of new relationships between farmers themselves and between farmers, their institutional environment and consumers. The use of modern communication and information technology is a powerful tool in linking the different groups, for exchanging and disseminating knowledge and experiences and for marketing of their products and services.

The achievements appear to be many-sided. First, farmers that follow this pathway and comply with the rules set by the network seem to generate higher incomes than farmers following the mainstream development model of scale-enlargement, specialisation and intensification i.e. 'economies of scale' (ibid.). Second, the pioneers' strategy of sustainable local resource use bears fruit beyond the farm level. In the past years, it has become clear that extensive sheep grazing in the Abruzzo mountains maintains the productive potential and the ecological values of the endangered pastures. It also appears to be a key tool in protecting the geophysical balance, and the prevention of erosion and the spreading of forest fires.

Scientific research data underpin these achievements. The 'art' of mountainous farming, commonly carried out by knowledgeable farmers and shepherds, thus translates into a strong regional resource. The strategy of multifunctional farming simultaneously benefits the local economy. Involved farming families now earn a higher income and can think again of farm enterprise continuity. At the same time, the broadening of the farming activities has created new employment for the local population. Local women work for instance in the farm shops, as cheese makers or as designers of woollen cloths. They consider this a step forward in work quality, as this work is physically less exhausting than working in the fields or in the mountains. People outside the villages benefit as well as there are now work opportunities as wool processors, shepherds or producers of gadgets. Strengthening of the regional identity and a livelier village life are other gains. Many tourists have returned to the region and traditional local events and fairs attract many visitors. Another great merit is that young people no longer automatically turn their backs on the countryside. A growing number are returning because farming is once again perceived as a profitable and attractive activity. Especially appealing are the financial success, the social status of producers of region specific quality foods and the new social identity linked to participation in the network.

The different forms of cooperation emerge as new sources of economic benefits, of increased societal respect and political influence. These, in turn, add to feelings of self-esteem. Cooperation further stimulates the generation of creativity, new knowledge, and of innovation. An example is the mobile cheese-making unit, a product of cooperation between pioneers and the regional extension service. Thanks to this invention, the cheese-makers were able to by-pass European regulations that threatened to block mountain cheese making. Cooperation with various scientific

researchers was very fruitful as well. Research data now scientifically underpin the sustainability of their production methods and approach. At specific moments in their development, this appeared to be crucial information that supported the farmers in their negotiations concerning the legal restrictions that threatened continuity of production and helped them obtain the support of influential policy makers and other involved stakeholders.

Endogenous rural development initiated from outside agriculture

This example concerns a multi-stakeholder rural network in a less favoured rural area in southern Slovakia. Major problems in this region are a high unemployment level (in some villages even 50%), low incomes, out-migration of young people, a relatively low educational level, a passive and suspicious population, and ethnic tensions.

The participants of the network include NGOs, entrepreneurs, mayors of different villages in two micro-regions (29 villages in total), and micro-regional policymakers and politicians. External experts and researchers e.g. sociologists, occasionally support the network. The underlying idea of the network is that the many problems in the area can be better dealt with by joining forces. Through the network, already existing local projects and initiatives can be linked up and strengthened, and knowledge and experiences can be exchanged. The fact that some villages had successful experiences with the creation of new employment, improvement of the liveability and the involvement of villagers in village projects was a stimulus. Another intention is to design new plans for the micro-regions as a whole. It is further assumed that the network can lobby to promote their interests at regional and national level in a more powerful way than each of them can do separately. Some participants are members of the National and Regional Rural Parliament and have good connections with regional and national level politicians and policymakers.

The network has its origins in a rural women's grassroots initiative to provide social services for the local community. Additional goals were creating paid work for women and decreasing their workload in the family. The motor behind the project was a local female leader with a strong (and during the course of the project, expanding) network. The initiative emerged within in the context of a rural society facing the effects of the radical political and economic reform of 1989. After the closure of the local agricultural cooperative, almost all villagers found themselves unemployed – overnight. For their livelihood the majority became dependent on household plot production, income from 'black' work and social security payments. The services previously supplied by the cooperative became part of the women's household task package. Most people acquiesced to the new situation, including young people, as showing initiative had been discouraged for a long time under the Communist regime. Also the belief that only previous ('socialist') employment strategies could solve their problems was still strong. In the latter approach to (rural) development the focus was on investments in large-scale infrastructural projects (electricity, sewage, road construction works, etc.) and in big industrial plants.

The pioneering women, however, had no trust in this road to development which they consider insecure, costly and not very sustainable. In their view, these kinds of strategy make rural areas dependent on the policies of investors and companies acting at global level. Moreover, they keep the villagers passive and unaware of their own capacities to create employment and to improve living conditions in their village. Instead, the women introduced what they term a typically 'female' approach to rural development. This entails the combination of projects with a social and thus not a primarily economic focus, geared to local needs, and entrepreneurial activity on a small scale. The use of locally available resources is also a characteristic. The major concern is not profit making, but creating durable employment opportunities, increasing rural vitality and halting depopulation.

When sociological research revealed that the pioneers' plan to founding a food service for elderly people would fill a gap, the women started the project. In the beginning (and also thereafter) the input of voluntary labour was crucial as was the gaining of financial support. When the food service developed into a very successful activity, they expanded their services gradually to include general home care and introduced new services including internet facilities (they introduced the first internet connection in the region), accommodation, education and skill training (e.g. languages, computer courses; how to write a funding proposal, how to manage an NGO). So far more than one hundred people from the micro-region have participated in one of the courses and people's access to the internet has – as one woman observed – 'opened the window to the rest of the world'. In addition, they have become involved in village renovation activities, environmental projects, social-cultural activities, and in supporting local (female) entrepreneurs, including starters. They deliberately involve young people in the projects. They want to strengthen their rural roots, making village life more attractive to them by responding to their needs and stimulate feelings of responsibility for their village.

In order to create a formal organisational framework for the different and expanding activities, the women had meanwhile established an NGO, 'Ozveny', the first NGO in the region. The NGO-status made access easier to national and international networks, to information and advice and to new funding resources (governmental money, donor organisations and funds).

Clearly, an improved service level is not the only achievement of the women of Ozveny. The projects generated paid work (in particular for local women) and will generate more work in the future. Women's domestic workload has been reduced as well. An important merit of the pioneering women – in particular of the leader of Ozveny – is that they inspired leaders in surrounding villages to set up their own NGOs and local-level projects (e.g. social services, transport, revitalisation of traditional crafts, and tourism). The establishment of the multi-stakeholder micro-regional network can also be considered an achievement.

At this moment, designing a common plan for tourist development is an important activity of the network. The focus is on rural tourism as the area contains many different resources attractive for tourists. For example, proximity of ski resorts, hot water springs, rich nature, beautiful landscape, forests and cultural heritage that includes Gothic churches and traditional local crafts. To compensate for the current lack of accommodation they plan to renovate unused public buildings and uninhabited houses. Since the plan was launched, local people's awareness has started to grow that

preservation of the regional ecology – an asset previously not considered as having extra value – is a key for success.

Presently, the network is trying to qualify for the EU-LEADER+ programme to further the realisation of their ideas. Because of pre-conditions for accessing the programme, they have started to cooperate with two other neighbouring micro-regions. It is recognised that successful operation of the network will take time and that many lessons still have to be learned. Additional activities with potential, which the network may map out and start to promote, include ecological farming and farm diversification, wood processing industry and crafts, and improvement of the educational level (Trvdonova, 2003).

It must be stressed that more important than the described 'overflow' into a widening range of new activities, is that the same initiatives ('modest' as they might appear at first sight) have contributed significantly to the creation and further enlargement of social capital[4]. This can be seen in many ways and at many levels. According to the actors involved, the Ozveny-initiated activities have clearly triggered a change in attitudes. Family ties are for instance no longer the only basis for cooperation. Yet, the culture of distrust concerning 'others' or 'pioneering voices' as well as a lack of respect are still considerable and constitute obstacles for change. Most people for instance are still hesitant about voting for local leaders with innovative ideas.

Nevertheless, underlying values seem to be changing, albeit apparently quite slowly. To substantiate this, those involved refer to:

- the widespread recognition of the significance of projects with a social focus;
- the mobilisation of local business people, who now recognise the importance of social activities that they are now keen be involved in;
- the growing awareness that the service sector can generate income;
- people's recognition of the potential of locally available resources;
- breaking down of the dominant way of thinking that only large-scale economic projects can offer perspectives in rural areas.

In fact, the Ozveny-initiated projects appear to be a vehicle for breaking through the apathy and passiveness, which have dominated many people's lives since the changeover in power. At least some people understand now that own initiative can pay.

Similarities in worldview and values

The starting point and shared view in all these examples is that sustainability – in ecological, economic and social respect – is the only way for mankind to survive in the long run. It includes among others the creation of a harmonious relationship between human species and nature. The value of stewardship is important in this respect and implies that human needs must be fulfilled with minimal negative effects on ecological values and thus assumes, as Dixon et al. (1995) stress, 'an ethic of personal

[4] e.g. Mihaylova 2004 and Shucksmith 2000 elaborate on the concept of social capital

responsibility, of behaviour based on reverence for the earth and a sense of obligation to future generations'.

Corresponding strategies, such as the use of locally available resources, ecological farming methods, respect for animals, delivery to regional markets, ecological education fit well with this view. Local resource use is also believed to be a pillar of economic sustainability. In addition, they all attach importance to the development and/or maintenance of small and medium enterprises.

Social sustainability on the other hand, is among others also associated with committed, responsive and inclusive organisations that have inspiring and strong leadership and management qualities. Such organisations are also learning organisations: capable of learning, and adapting to changes in the market, politics and policies, technology and knowledge. The creation of well-balanced interpersonal relationships is believed to be another building block for social sustainability. Such relationships are built on mutual trust, respect and solidarity, and should result in better cooperation and partnership. Gender equality is, explicitly or implicitly, a value strived for. In the Slovak case, equality is also a concern in ethnic relationships.

The organisations reject a system of control and command of nature (exploitation, exhaustion, highly technology dependent) and people, as well as top-down organised structures, and generic rules and regulations. Instead, the pioneers emphasise values such as autonomy, ownership, self-control and accountability: people must have the chance to make own choices, to take responsibility. Implicitly they strive for a redistribution of power in society.

Cooperation is stressed as an important value and is partly built on mutual respect, reliability, unity and solidarity. What connects people is a feeling of belonging to the same community, the feeling that they have to deal with the same problems, that they are part of a common effort to achieve transformation, to improve their situation. The cooperation may be between farmers or entrepreneurs in the same sector, between different stakeholders in a certain region (farmers, entrepreneurs, NGOs, policy makers, and politicians) or at different levels of society (local, regional, national, international). Cooperation in the field of knowledge generation is of another nature. Farmers and citizens involved work together with supportive researchers, advisors, experts, trainers and teachers. Cooperation may include people of different class, generation, gender, ethnic group or different geographical location. Cooperation is encouraged by networking, lobbying and advocacy.

The belief that farmers and other rural people need to be responsive to the needs of urban population implies that food production methods are attuned to new norms concerning the quality of nature and environment, animal welfare and healthy and nutritious food. It also implies that they no longer consider rural areas to be the unique location of agricultural production and the domain of farmers. They perceive rural areas as locations consisting of various kinds of valuable capital i.e. ecological, economic, cultural and social capital. These resources provide the farming and non-farming population with many new jobs and income opportunities.

The actors share a perception of farming which is different from the traditional view that farming is merely about producing food and raw materials. In their approach, farming is a multi-functional activity and may also entail maintenance of biodiversity and landscapes, water management, energy production, facilitation of

agro-tourism, supply of care services, marketing and/or distribution of locally specific products.

Those involved believe that rural development and the associated policy must be primarily a bottom-up driven and participative process. In their view, real progress does not come from the outside world, though external actors must certainly support it. Own initiative, taking risks and being accountable for own actions are associated values. They also believe that new institutional rules need to be created.

Inspirations and motivations

The pioneers are all passionate and keen persons, very determined to make their dream come true. Their sources of inspiration and motivation are various and sometimes overlapping. A number of major inspirations emerge, including a passion for nature. There is attachment to and love of rural life or a rural lifestyle: living in a small social community, in a peaceful and clean environment close to nature. Most pioneers have rural roots. Another motivation is social commitment: commitment to the many (long-term) rural unemployed, concern about their poor living conditions and/or about growing disparities between different categories of people (class, generation, gender, ethnical, rural/urban) and/or a deteriorating social climate in the villages. This latter aspect refers to the value of equity. Also strong are a desire for autonomy and self-control, and an urge towards self-realisation.

Additionally, pioneers seem to share some personal characteristics and qualifications. The desire to realise a dream is strong, i.e., to accomplish an ideal or a goal set. A pioneering spirit is also recognisable. The pioneers strongly believe in the feasibility of their ideas despite scepticism and pessimistic predictions. The plans and strategies involved go against mainstream views, policies and institutions. Pioneering activities can be characterised as a continuous search for new products, services, methods of production, processing, marketing and distribution. Their strength is that they simultaneously search for new supporting structures i.e. new institutions and policies.

Specific personal qualities or 'core capacities' of the initiators emerge, including: self-esteem and agency (the capacity to achieve the goals), creativity and an intuition for available regional potentials in terms of economy, ecology, and liveability. Pioneers have the capacity to recognise and valorise locally available resources as well as to mobilise and acquire external resources. They are also capable of defining their own position in the context in which they are operating and of analysing this context as well. They have excellent networking skills and good leadership qualities. They are able to mobilise other people to join or support their initiative and to design smart strategies. Pioneers are open to other people's experiences, and are willing to continuously gather new knowledge and skills. They are experienced in tracking down and combining valuable and relevant information. Most of them are part of a number of different social circles. Flexibility and the ability to adjust strategies or agendas when necessary are additional capabilities.

Weaknesses and obstacles to further development and change

Although these grassroots initiatives differ in many respects, such as locality, historical background, economic situation and cultural setting, they have all encountered and still do encounter similar factors that thwart, inhibit or endanger the full development of their plans. Clearly, obstacles and weaknesses are multi-dimensional (of an economic, political, social and/or cultural nature) and can be located at macro-, meso- and micro-level. The macro-level refers to the administrative and legal system, politics and political environment; the micro-level to the individual and grassroots level; the meso-level includes all kinds of intermediate organisations.

Following Bolger (2000) I distinguish four levels at which weaknesses, constraints or threats can be identified. This classification, which was developed within the theoretical framework of capacity development, allows also for determining what capacities and capabilities need to be adapted, improved or acquired in order to develop the full potential of the initiatives.

The broader system level or enabling environment. This refers to the general societal environment in which the initiatives are being developed and consists of the legal-, administrative- and policy-frameworks and political environment, including political commitment, attitudes and values; technology; social and cultural context; economic trends. The major and shared obstacles that emerge at this level are bureaucracy (rules and regulations, paper work, organisational obstacles), resistance from bureaucrats and political opposition.

Bureaucracy is considered a chief obstacle. For the farmers among the pioneers, compliance with the ever-expanding web of the top-down imposed generic rules and regulations stands out as a core issue. Deviation from these rules has juridical and financial consequences. Close cooperation with researchers who are willing to scientifically refute the critics on pioneers' alternative methods and techniques, has proved to be one of the mechanisms to create some room for manoeuvre. The Slovak pioneers point to the EU rules and regulations as well as to national legislation ('sometimes stricter than EU-standards'). Their examples include national regulations concerning the processing of agricultural products and the many costly certificates needed to start up a business.

Bureaucracy is also experienced as a huge problem when it comes to getting access to capital. Procedures inhibit access to money ('There is money but there are too many authorities in the chain in between') and thus put the implementation of projects at risk. In addition, Slovak rural people lack information and advice about getting loans and support for starters. Requirements, such as having starting capital and having to start paying back the start-up loan already after six months, are other inhibiting factors. People experience these as impossible constraints. The lack of finance for co-financing EU-projects is a problem as well, in particular in regions not near to the capital city. Difficulties with mobilising own financial resources may hamper access to structural funds. Additionally, national tax policies are experienced as an obstacle that reduce the amount of financial support: 'The Slovak government

creams of the direct payments: on top of the 19% tax the state takes an extra 12, 5% of the money we get from direct payments'.

The lack of (access to) capital/money is not just a Slovak problem. All the pioneers mention it. In the Dutch case, national politicians and policymakers reserved a too small budget for farmer managed nature- and landscape restoration and conservation. In the Italian case, payment for nature and landscape management appeared initially impossible because of contradictory legislation. The rules determining access to subsidies for pasture management were in conflict with those for renting these very pastures.

Besides bureaucratic rules, regulations and procedures, the administrators working within the bureaucratic institutions are obstacles for change. Likewise, political opposition plays an inhibiting role. According to the pioneers, many politicians and policy makers only pay lip service to rural development. The Italian pioneers link the opposition of administrators to their lack of vision or understanding concerning rural transitional processes: 'This is a period of transition and local administrators don't recognise that our initiative is promising. They still favour the dominant system. The point is that we are too far ahead for the average official'.

In Slovakia, opposition is attributed to a negative attitude of administrators vis-à-vis entrepreneurs: 'Many administrators still act as if entrepreneurs are personal enemies. They consider them to be capitalists, people who are richer than they are. They are jealous; they envy successful entrepreneurs, so they are not very willing to help them.'

The Dutch environmental cooperatives have to deal with (national level) administrators who consider deviation from generic rules as risky (loss of control) and as a blow to their authority. They have no faith in the methods developed by the pioneers and distrust the effects as well as scientific research that confirm these results.

Clearly, the opposition and resistance from bureaucrats and politicians can be explained in different ways. They may be either ignorant, lack understanding or commitment, or have serious objections against the new developments. This means that their behaviour may express both a power struggle and a cultural problem. In the latter case, an attitude change among bureaucrats and politicians and a change of the culture of their organisations are needed for rural development policies to become effective and efficient.

Other issues at the broader system level that the pioneers point to are corruption (Slovakia), inconsistencies and differences of opinion and policies between national, regional and local policies. These hamper the deployment of their initiatives. The same goes for the limited synergy of the initiatives with local administrations, both with administrative and technical departments (Italy). All three cases emphasise that there is a lack of clear rural development objectives within policies. The pioneers complain that measures focused on rural areas are, in spite of everything, very much geared to the agricultural modernisation model. The Slovak pioneers believe that current policies do not really stimulate rural economic diversification. They are still aimed at and favour large-scale enterprises, instead of being supportive to SME-development. Also, the budget allocated to rural economic diversification activities appears too small to be able to finance all the applications. Obviously, institutional problems, such as unsolved land ownership rights, land fragmentation and a very

limited land market, still very much inhibit innovations in Slovak agriculture, including multifunctional farming. The farmers among the pioneers (irrespective of the locality) further stress that the concept of multifunctional farming is biased. That is, the normative framework for multifunctional farming is created by policymakers, politicians and researchers ('Their vision on multifunctional farming is disconnected from rural practice'), and not by (or in consultation with) the farmers themselves.

The sector/network level. This comprises sector policies, strategies and programming frameworks of all sectors and networks involved in rural development. Apart from the already mentioned policy bias (e.g. preference for the agricultural modernisation model within agricultural policy), which is partly due to the strong lobby of existing interest groups, sectoral approaches imply compartmentalisation of policies. This is at odds with the broad and multi-sectoral view required for an area-based and integrated approach which implies dealing with a broad range of issues that crosscuts many policy fields and policy levels.

The case studies show the restrictions of a sectoral approach to rural development. The environmental cooperatives, for instance, have to deal with various ministries (e.g. Agriculture, Spatial Planning, Economic Affairs) while within those ministries different boards play a part in the project. All of them have their own expertise, agenda and 'rules of the game'. A lack of coordination and coherence, conflicting competencies and priorities, old routines and different working styles can block full development of the initiative. Additionally, other stakeholders as several privatised governmental organisations and agencies that are part of the cooperatives' network participate in the decision-making and implementation processes. What makes it more complicated are the newly introduced models of governance (more decentralised and bottom-up); these hamper rural development processes as well. This implies that consultations, negotiations and finding the middle ground are both long-lasting and vulnerable processes.

The sector level further includes other obstacles such as opposition from vested interest groups within the mainstream professional agricultural world i.e. the agro-industry, farmers' unions and knowledge institutes. Environmental cooperatives have to deal with opposition from this side. As the results of the cooperatives become more and more promising, this opposition is growing, as examples from the Italian case show.

The organisational level. This refers to the internal capacity of the various organisations involved and comprises financial resources, internal (consultation) structures, work processes and procedures, staff quality, leadership, strategies of the organisation to achieve the goals set, linkages to other groups and organisations. The organisational culture, history and traditions, acceptance of the mission among the members, extent of shared norms and values promoting teamwork and pursuit of organisational goals refer to the institutional dimensions of organisations and are part of this level as well.

Generally, the Slovak pioneers mention weak rural leadership as an obstacle for rural economic diversification: 'Leadership must be innovative and challenging. The problem is that in most villages the (mostly female) mayors are not very educated. They don't think globally. People often choose such a low-educated person for they prefer someone like themselves. They distrust people that are 'different'; they presume

those will not act in the advantage of village people.' Within the grassroots organisations involved, it is not the current leadership but the continuity that is experienced as a problem. Current leaders appear to have problems with delegating tasks and sharing influence. This endangers the organisation and their mission, not only in the future but also today as a too high workload might result in a straining of current leaders.

Maintaining support for the mission and related activities among the participants of the initiative and among other stakeholders is equally important. As the interests of the involved people and other stakeholders may vary (due to class, gender, generation, ethnic differences) and/or change over time, there is a potential threat if controversies are not dealt with correctly. Therefore, acceptance and compliance with the organisation's 'rules of the game' by all participants must be assured constantly; if not participants may decide to give up. An organisation thus needs mechanisms to ensure observance. Opposition, failure or bad results, delay or recurrent adjustment of activities might also decrease the motivation of participants and thus weaken the social basis of the initiative. Good communication between board and members, as well as transparent decision-making, is crucial. Another point of concern is of a financial nature: time and again, huge efforts must be made to guarantee the financial basis of the organisation. Without access to money, the organisation cannot function and does not achieve its goals. We have already referred to the problems within organisations operating at the broader system level (biases, prejudices, political preferences, organisational structures, rules and regulations).

The community and or individual level. This relates to social trust, mutual support, the ability to learn and cooperate and individual capacities such as knowledge, skills (negotiation, networking, cooperation, public performance, etc.), attitudes, values, motivations and beliefs. The Slovak pioneers consider people to be the biggest obstacle in rural development processes. Their knowledge, skills and capabilities still very much reflect the past way of life and requirements instead of being geared to the new socio-economic and political situation. According to the pioneers, most people can be characterised as passive, inflexible, not prepared to take initiative, risks and responsibility, and unwilling to cooperate – with other people or other enterprises. The latter is rooted in a lack of mutual trust and respect for each other. Of course, problems with cooperation may also be caused by still insufficient organisational capacity. An absence of working habit due to long-term unemployment is another attitudinal problem reported by the Slovak pioneers, as is the weakening of social coherence. This may be due to growing disparities (e.g. class and ethnic differences) between villagers ('people are afraid of differences'). Individual farmers block rural economic diversification as well because many of them focus on primary production ('they can't think otherwise').

Concerning the Dutch environmental cooperatives, problems at this level are encountered in the relationship between the more conservative and the more radical farmers. The Italian case showed that the family-based organisation of the farm might emerge as a weak point: divorce could jeopardise the whole construction (but didn't in this case).

Critical factors for successful endogenous rural development

From the case studies, we identify various factors that are decisive for the successes gained so far. These include personal attributes, organisational capacities, and general economic, political and societal trends.

Personal level capacities:

- A pioneering spirit, a visioning of the future, energy and endurance;
- Craftsmanship, entrepreneurship, organisational capacity and networking skills;
- Certain degree of social commitment, loyalty, reliability and the willingness to cooperate;

Organisational level capacities:

- Strong and effective organisations i.e. with self-organising and self-regulative capacity, proactive; democratic structures; clear objectives;
- Competent leadership (inspiring, knowledgeable, strategic), engaged and committed participants;
- Access to finance;
- Active participation in new systems of governance (bottom-up); establishing cooperation and partnership between different sectors (private, public and non-profit) and stakeholders within a locality or between different localities as new mechanisms of promoting sustainable rural development; creating new relationships – between farmers, between farmers and institutions, between farmers and consumers;
- Learning capacity: open to creative thinking and innovation; improvement of existing and production of new knowledge and creating the conditions to use this knowledge in the practices of farming and rural development. Cooperation is important to create synergy between the different knowledge systems.
- Forming part of influential networks and being a partner in strategic alliances, among others to create political support. Advocacy and lobbying for their interests: the pioneering farmers managed to get support for their alternative approach in circles of politicians and policy makers. The farmers used broader public concerns to highlight their own problems. Smart alliances with powerful lobbies such as the environmental movement and consumers' organisations encouraged political commitment;
- Awareness of the culture and context within which the initiative is developed and using this as a building block; building (on) shared values, a feeling of belonging, and social networks of trust.

More general capacities:

- Developing strategies that correspond with broader societal needs;
- Rooting economic activities in the local context i.e. the ability to make an analysis of the regional competitive advantages (nature and landscapes, region specific knowledge, foods, traditions and events, cultural heritage, art, etc.); use and improvement of local resources;
- Awareness that sustainability is multi-dimensional and requires coherence between ecology, economy and social life;

- Political sensitivity: understanding of the changes in and the effects of the politico-economic and institutional context on rural economic activities; anticipating and influencing changes in policies and rural governance structures.

Looking to the future, it must be recognised that it is uncertain whether these initiatives will generate long-term and enduring results. On the one hand, they have a firm basis since the initiatives are owned by local actors who derive tangible results from their work, including work satisfaction. On the other hand, these initiatives remain vulnerable due to dependency on political and, especially, administrative and bureaucratic decisions. How this complex balance will turn out in the long run remains to be seen.

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Promoting sustainable development of rural areas: the 'Active Regions' pilot programme in Germany

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In line with the orientation of the workshop 'Moving Worldviews' we focus our essay on new forms of a division of responsibilities in rural development. We start by outlining relevant overall trends and examining the factors that contribute to a new division of responsibilities. In the second part a concrete example is given. The example is a pilot programme instigated by the Federal Ministry of Food, Agriculture and Consumer Protection (BMVEL) in Germany at the end of 2001 called '*Regionen Aktiv* (RA) – *Land gestaltet Zukunft*'. We conclude with the lessons learned so far together with some ideas on further work and new initiatives.

Why innovations in science, policy and practice are needed: agriculture and rural areas in Germany

Policy orientation at federal level

The fundamental reorientation of the Common Agricultural Policy (CAP) adopted in Luxembourg in June 2003 reflects the changes that had already started in agricultural policy at national level. The BMVEL attached particular importance to the large-scale decoupling of direct payments from production, the reinforcement of rural development support through new measures and additional funds via modulation, tying direct payments to compliance with food safety, environmental and animal protection standards (cross-compliance), the reform of the common organisation of the market in milk and milk products as well as reinforcing budgetary discipline. It is hoped that the changes will benefit the developing countries, especially because they help to dismantle trade-distorting subsidies. All of this places the EU in a favourable starting position to also demand concrete steps from third parties towards fair global trade as well as social and ecological standards (BMVEL, 2004: 14-15).

The consumer, food and agricultural policies pursued by BMVEL since 2001 are guided by the sustainability principle, more emphasis on markets and actual demand, and the reinforcement of consumer protection, animal welfare and environmental protection. This reorientation is due to the pressures linked with globalisation as well as the more trends in society, societal demands and economy (BMVEL, 2004: 10; Knickel, 2006).

The objective of the Federal Government pilot and demonstration project 'Active Regions – Shaping Rural Futures' (see below) is to demonstrate how the reorientation of agricultural and rural development policy can be translated into practice. In this respect and in terms of its bottom up character it is experimental (BMVEL, 2004: 11-12; Knickel/Peter, 2004).

As a result of these EU and national level changes, rural development policy and regionally based measures have become increasingly important. At the same time there has been a strong trend towards a strengthening of the regional and local level in the fine-tuning and actual implementation of measures.

Driving forces of rural (local) development in Germany

There are at least three factors that reinforce regional and local development in Germany: first, the important role of regions in a federal system, second, the increasingly important question of curbing public spending, and third, an increasing recognition of the advantages of new forms of governance and, more specifically, bottom-up approaches (Knickel, 2005).

1. In the federal system of Germany rural and local development policy is formulated and implemented at four distinct institutional levels subordinated to the EU level: while the federal state has a broad influence on the general direction of rural and other policies, the Länder are responsible for the more detailed design of important policy schemes and measures. The lower government levels of counties, districts and communes also play an important role in the effectuation of policies. They are responsible for implementing region-specific measures and projects within the framework provided by the Länder and they occasionally design and run their own policy schemes drawing on their own funds. As a whole the system of policy formulation, interpretation and implementation is perceived as too complex, over-demanding in terms of administration and coordination and, linked with that, in many respects inefficient.

2. Public budgets are under increasing pressure and there is a resulting need to reduce public spending. At the same time, processes and dynamics of change as well as societal demands are becoming more and more challenging. The diversity in situations and demands (e.g. differences between eastern and western Länder, and between north and south) further complicates tasks. Overall, the amount of government intervention now exceeds what is sustainable and what is cost-efficient. Agricultural and social policy are two main areas where this clearly is the case. Centrally designed and administered programmes cannot deal with the enormous diversity (which is a good reason for a federal system and the implementation of the subsidiarity[1] principle).

3. There is an increasing awareness among policy makers and government institutions that many questions can no longer be dealt with efficiently in a top-down manner. Citizens are less and less willing to accept policies and interventions (steering) from high-level government institutions and there is an increasing divide between governments, government institutions and administrations and the citizen. Representatives of governments appear rather distant from everyday problems and solutions. Comprehension, approval and recognition of government interventions tend to be low. A renewed effort has to be made to reduce this gap. A closer look

[1] The principle of subsidiarity means that what the lesser entity can do adequately should not be done by the greater entity unless it can do it better. Taken over into EU policies, it is used as an instrument for determining when the Union is to act in areas not coming under its exclusive competence. From www.euractiv.com

shows that indeed more and more initiatives aim at encouraging civil society engagement, the work of NGOs and private-public partnerships.

Regional governance – the way forward in regional development?

New local and regional development initiatives are examples of state intervention and government activities being supplemented with less institutionalised mechanisms of coordination at regional level ('from government to governance'). Frame steering replaces traditional interventionist policies, territory- and function oriented measures replace sectoral ones, and regional markets are paid new attention. The mobilisation of endogenous regional development potentials allows for a counterbalancing of the negative effects of globalisation, and an effective realisation of environmental and social objectives that are neglected at state level. Regionalisation is often seen as the second pillar of globalisation (Fürst, 2001a, b; Benz/Fürst, 2003: 11).

Globalisation enhances the search for small-scale areas of identification. Inhabitants increasingly see their own regions in a positive light. Their understanding of regions is more defined by historical, geographical, economic or social facts than by administrative determination (Benz/Fürst, 2003: 19f.).

In spite of the increasing attention being paid to regional governance and the evident merits of regional and local level approaches, regionalisation should not be seen as an automatic process. While one can recognise an economic, social and cultural valorisation of regions, it achieves political value only through the cooperation of regional actors and the creation of the necessary institutional conditions (Benz/Fürst, 2003: 23).

Decentralised and local steering is generally seen as a favourable approach for development processes because of

- its potential counterbalance in the process of globalisation;
- the bigger scope which it provides for sustainable economies;
- its potentials to counteract against deficits of democracy and policy 'fatigue' in large parts of society;
- the possibilities for implementing ecological and social goals that are neglected on central state level (Knickel, K. et al., 2004: 2).

Towards new relationships between practitioners, researchers and policy makers

The Regionen Aktiv (RA) – Land gestaltet Zukunft (Active Regions – Shaping Rural Futures)[2] pilot programme in Germany is an example of an innovative support scheme that specifically addresses the development of rural areas by generating new economic activities and linking them to enhancing environmental quality. It was initiated by BMVEL in 2001. The programme is expected to be an example of how the revised German agricultural policy (*Agrarwende*) that started in 2001 can be implemented (Knickel, 2005). RA is an EU Leader+ type initiative that is fully

[2] Further information on the pilot programme is available at the homepage www.modellregionen.de

financed from national funds. It is also possible for both an RA and a Local Action Group to operate in the same area.

In the initial phase the main regional interest groups – consumers, agriculture and forestry, environment, retail, crafts and trades, commerce, health, municipalities, education and science – were asked to develop a joint vision for the future development of their regions. Participants were required to focus their contributions on the following objectives:

- strengthening rural areas and creating additional sources of income;
- nature-friendly and environmentally compatible agriculture (including for example the expansion of ecologically managed areas using regional connections in production, processing and marketing;
- consumer focus, i.e. greater consideration of consumer interests by means of transparent, high-quality production and improved marketing methods to strengthen demand for high quality foodstuffs.

The concepts presented had to be agreed upon at regional level by those actively involved, including the major regional interest groups.

At the beginning of 2002, a jury chose 18 model regions out of more than 200 applications on the basis of the quality of their plans for integrated and sustainable regional development. Designing the programme as a competition encouraged regions to demonstrate greater innovativeness in their development concepts and methods of implementation. The size of the regions ranges from 320 km^2 to 5,800 km^2, the typical size being 1,500 to 2,000 km^2. The model regions have between 36,000 and 1.2 million inhabitants. The RA programme defines regions as functionally or spatially homogenous areas (often coherent landscape units) with common problems and potential, which may encompass several municipalities and districts (BMVEL, 2001, 2002; Knickel, 2005).

The Federal Ministry then provided a support framework, actively backing up regional development activities including a regional management structure and the implementation of innovative core projects (BMVEL, 2002: 9). The 18 'model-regions' receive financial support of approx. 3 million euros over a 6-year period to implement their proposals. Overall, financial backing of more than 45 million euros has so far been provided by the BMVEL during the period 2002 to 2007. The last instalments are paid on the basis of a mid-term evaluation and actual achievements.

A key idea of the programme is to better coordinate and strengthen the various functions of rural areas. The programme has made different stakeholders pull together and get more involved in 'their' region. In doing so, regional actors have realised that the transition to more sustainable and consumer-oriented farming is much more positive than many would have believed. With its range of innovative, workable projects for regional marketing, RA provides an opportunity to develop farmer-consumer relations and to integrate new partners from the crafts and trades and tourism sectors. The revitalisation and strengthening of urban-rural linkages – especially through green tourism, recreation activities and direct marketing of agricultural products – is a closely related aim, promising mutual benefits (Brunori & Rossi, 2000; Knickel & Renting 2000: 8; Knickel & Peter: 2005).

Cooperation structures

The regional partnerships provide the organisational basis for implementing the programme (BMVEL 2002). A group representing those who are actively involved and holding decision-making power runs the specific organisation in the individual regions. A regional public body *(Abwicklungspartner)*, often the district authorities or the agricultural office, has the responsibility for financial management and budget administration. Regional management teams play a critical role as networking- and skill-building agents. They support the development and interlinking of projects and work with the relevant bodies within the regional partnerships (Knickel et al. 2004b: 8).

An accompanying research programme focusing on the policy-practice interface and the further development of relevant support frameworks was started in 2002.[3]

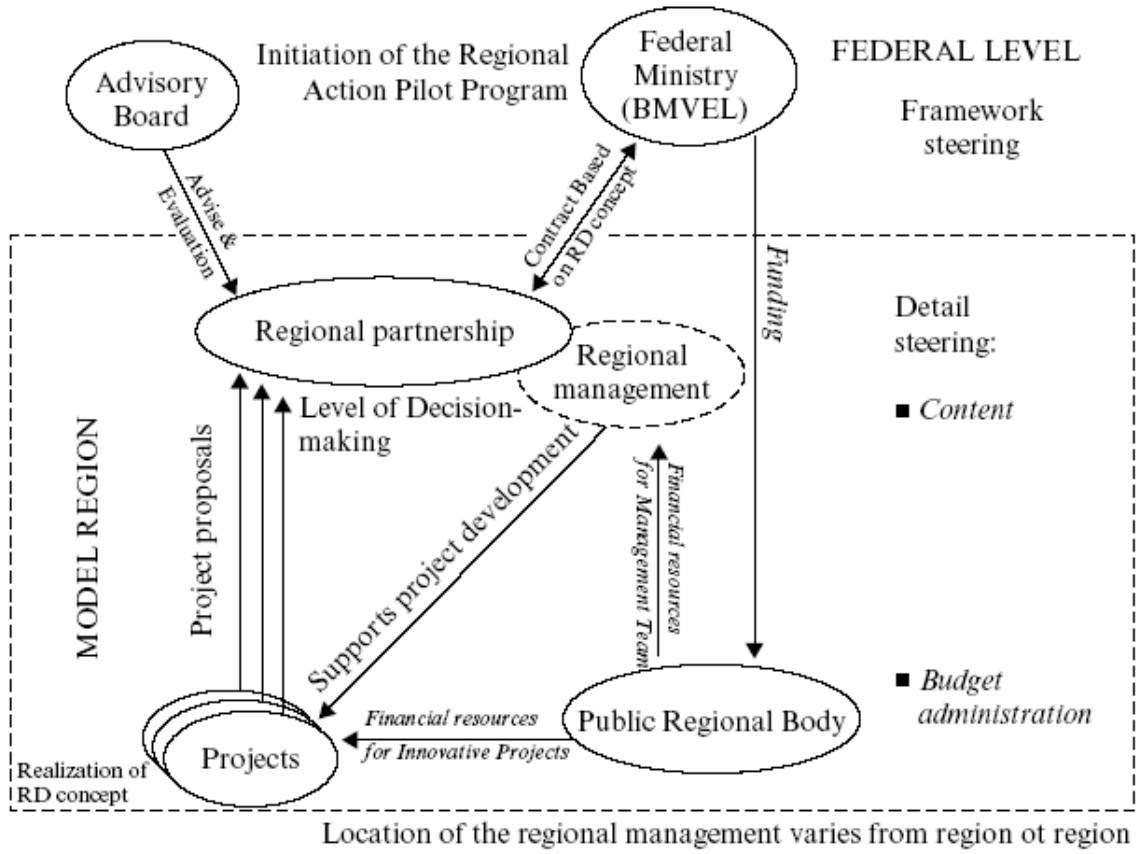

Figure 1 Overview of organisational structures in a typical model region (from Knickel & Peter 2005; based on BMVEL 2001)

The regional partnerships established in each model region support the intersectoral and multidisciplinary exchange of information, interlink key actors and groups and help raise awareness of the regional development process. They initiate new development approaches expressed in arrangements and negotiations between

[3] See Knickel and Peter (2005), Peter and Knickel (2004) and http://www.ifls.de.

different actors and groups and also serve as an instrument for the creation of social cohesion.

Instead of everyone having to participate, the partnership ideally represents the various regional interests as a regionally acknowledged group. New relationships between groups and sectors that had previously acted separately have been formed and are still being formed. The pilot programme also contributes to a heightened awareness of specific regional potential and identity, which helps uncover and exploit new possibilities for amenity-led rural development. Regional identity is used as an economic development tool that is linked to the enhancement of regional landscapes and biological conservation values (Knickel & Peter, 2005).

Professional regional management is vitally important: the successful implementation of a programme like RA is crucially dependent on a professional regional management. The regional management is critically important in terms of transmission and mediation between the different parties and actors (see Figure 1). It connects the public, project carriers, the elected board of the regional partnership and its members with each other. Regional managers need to have a wide spectrum of competences and skills, above all communicative and process management skills. The capability to promote dialogue, to structure participatory processes and to provide and organise appropriate advice and to create links with relevant authorities are all critically important. A good knowledge of relevant support programmes and regulations as well as of public relations is important. In order to fulfil all these tasks in an adequate way most regional partnerships have hired more than one person for management tasks and have established regional management teams.

Overall, it can be stated that the RA programme strongly contributes to a higher regional self-responsibility. It has initiated learning processes and also heightened motivation for joint action (Knickel et al., 2004). The programme builds on the idea, the success and the experiences of Leader+. Meanwhile elements of these innovative approaches are becoming mainstream rural development policy. The experience gained in the RA programme has been incorporated into the regular support provided within the 'Joint Task for the Improvement of Agricultural Structures and Coastal Protection'. It is expected that the new integrated rural development strategies and regional management will now help to realise previously unused potentials for innovation in rural areas (BMVEL, 2005: 4).

Lessons learned so far

The kind of innovations needed

Fundamental to the pilot programme is the idea that regional actors themselves take charge of the development of their region, and the emphasis of the programme rests on exploring development processes carried by newly-involved actors.

Identifying critical knowledge and skills and making them accessible to actors is crucial on the path towards sustainable development of agriculture and rural areas. Communication, organisational, moderation, mediation and networking skills are important factors. The regional management teams of the model regions function as an important agent of networking and skill building, and at the same time need further training themselves to successfully fulfil this task (Knickel et al., 2004).

In an ideal situation, the agency implementing the support programme has the role of a facilitator. Particular support ought to be given by making sure enough money is available to carry out skill-building activities. The primary role of regional management teams and agencies is that of learning agents and regional level catalysts that assist in translating overall programme objectives into regional initiatives.
The regional management teams have so far proven to be the main 'motor' of development in the model regions (Knickel et al., 2004).

Ideas compete for funds

The support mechanism tries to encourage community participation and action, and to facilitate the creation of new alliances between the relevant groups and joint action. The authorities facilitate the transition. One of the keys to the success of this implementation and participation process is the establishment of a professional regional management. Communication skills, organisational talent and the ability to moderate and mediate are critically important and must be strengthened in each region throughout the funding period (Knickel et al., 2004).

The efficiency of the RA approach is closely related to the competition idea. First the more than 200 development proposals competed for a limited amount of funding at national level (and the most convincing proposals were chosen on the basis of a criteria-led selection process). Later, at regional level, the project plans compete for limited funds (again decided upon on the basis of a set of project selection criteria and a clear and transparent procedure).

The financial accounts of the regional partnership and funding of all activities is controlled by the public body put forward in the development proposal (and agreed upon with the Federal Ministry). Often this is the regional agricultural office or, in several regions, the distinct administration. Here the administrative and public support-related regulations are well-known. Also, advice can be given to the most suitable funding programmes for specific projects. The idea is that the core funding is mainly used to establish working structures and facilitate the process and that other, additional funds can be sourced for projects. RA shows that scarce public funds can be used in more effective ways. Regional management teams substantially support the work of state authorities.

A problem in some regions is that, to some extent, individual projects are not sufficiently integrated into the overall regional development plans. There is also too little internalisation of regional objectives, and singular interests prevail. Sometimes decisions concerning projects seem to be taken by informal circles without clear criteria (Knickel et al., 2004).

Stimulating innovation in a goal-oriented manner and allowing for subsidiarity

Insufficient institutional synchronisation tends to result in a lack of coordination between different policies that affect rural areas. Therefore contradictory policies sometimes constrain farmers wishing to adopt or strengthen RD practices. One example is environmental regulations and spatial planning procedures, which play a key role in regulating land-use conflicts in densely populated areas. On their own these do not lead to the win-win situations, which require more constructive approaches (Knickel, 2005).

The relevance of the region as a level of action can be explained in terms of the complexity of economically, ecologically and socially integrated sustainable development, which calls for cross-sectoral approaches. In contrast with higher levels, this complexity is still transparent at the regional level and actors can still comprehend the intertwined dimensions. Because of their proximity to the regional situation and problems, as well as their direct perception of interrelations, changes and impacts, the motivation and involvement of the relevant actors, stakeholders and the population can be achieved more effectively from within the region (WWF, 2002; Knickel & Peter, 2005).

The RA approach as a whole secures the two central principles of sustainable regional development: stimulating innovation in a goal-oriented manner and allowing for subsidiarity (WWF, 2002). Overall, it is not surprising that the RA programme is one of three major initiatives that constitute the core of the German Sustainable Development Strategy. The programme addresses new societal demands expressed, for example, in the Biodiversity Convention, the EU Flora-Fauna-Habitat Directive and the EU Water Framework Directive. In many projects the guiding principle is the decoupling of economic growth from increased resource consumption and the linking of environmental interests with economic developments through the active creation of synergies.

General effects of the new division of responsibilities

With their various models, ideas and scenarios, the model regions assist the further development of RD policy. The entire approach is informed by three basic principles: markets (demand, competition, etc.), coordinated planning (guidelines, framework, etc.), and negotiation (networks, partnerships etc.) (Brunori & Rossi, 2000; Knickel et al., 2004b; Knickel, 2006; Van der Ploeg et al., 2002).

The RA model and demonstration project presents a new model of providing support to rural development. Instead of arbitrarily throwing money at the problem, targeted investment is made in people's innovative strengths. RA views the model regions as mature and responsible partners who are more than able to manage their proposals themselves.[4] Rather than being burdened with a mountain of paperwork, regions are treated as independent partners who are well able to read and understand regulations and budget requirements. What sets RA apart from other support mechanisms is that it does not involve a huge rule book full of definitions and provisions that go into minute detail, but gives the model regions a framework within which they can develop and restructure.

The programme has made different stakeholders pull together and become more involved in 'their' region. In doing so, regional actors realised that the changeover to more sustainable and consumer-oriented farming is much more positive than many would had believed. With its range of innovative, workable projects for regional marketing, RA provides an opportunity to develop farmer-consumer relations and to integrate new partners from the crafts and trades and tourism sectors.

[4] See for example Renner et al. (2002) for a comprehensive overview in the context of societal steering processes and sustainability.

In more general terms the Council for Sustainable Development (Nachhaltigkeitsrat, 2005: 54) points out that the State can only tackle key future issues by engaging in dialogue with citizens and those participating in economy and in society. 'The development of visions and concrete goals requires broad social communication and each individual to be responsible for their own actions. ... The Länder and municipalities, unions, environmental groups and development organisations, agricultural and consumer groups, science, the church, and individual citizens have proven in the past how they are able, by means of concrete measures within their own spheres of influence, to contribute to increased environmental protection, quality of life, economic growth and social fairness.'

Limits to participation

Development processes crucially depend on good cooperation between private and public actors. Regional management has been experienced as an efficient way for promoting such cooperation processes. The regions themselves (i.e. regional partnerships in our case) have to provide the management capacities that are necessary for moderating and shaping cooperation processes and projects in a targeted way. The goal must be to respond to the needs of a cross-sectoral development process in terms of awareness raising, advisory services, planning and project development, implementation, communication as well as monitoring and evaluation.[5] A continuous qualification of regional actors in relevant (management) skills is crucially important.

A broad discussion of decisions may obviously be at the cost of professional depth. Participatory decision making costs much time and consensus is difficult to achieve when many interests are involved in decisions. In this respect, the limits of 'participation' have to be taken into consideration. The ideal of consensus and absolutely 'symmetrical' relations between actors has to be discarded and a model of task division established, which can be worked with efficiently (IFSA, 2004).

Local communities and (new) social movements appreciate the new platform for experimenting with innovative concepts such as 'autonomous, regional development', that stress the importance of participation, social inclusion and regional identity (Knickel, 2005). Although intersectoral networks and cooperation have been established in the model regions, they need to be further strengthened and broadened if they are to be able to support sustainable development.

Suggestions for further work and new initiatives

Cross-national comparative analysis of similar experiences

RA is an attempt to implement a new approach towards the promotion and framework steering of processes of change. It links hierarchical steering with economic incentives and negotiation-based agreements. Agreements between the Federal Ministry and the model regions provide the framework for the overall project. The regional development plans are binding for the allocation and use of funding. The

[5] From: Eckpunkte für die zukunftsfähige Entwicklung ländlicher Räume, Berliner Konferenz (Juni 2004).

Federal Government's role is thus limited to setting the goals of the competition and to prescribing a set of minimum requirements as regards decision-making structures and self-assessment mechanisms. One such minimum requirement is that a maximum of 20 percent of core funding can be used to finance the regional management teams.

A cross-national comparative analysis should examine the key principles of such new policies and their precise functioning in the different contexts. The analysis could focus on success factors. The self-evaluation activities within regions and national level accompanying research programmes should be taken into account. In the RA programme the following key factors have been identified (BMVEL, 2004: 19; Knickel et al., 2004):

- continuity in core actors from concept development to implementation;
- conceptualisation and implementation of lighthouse projects in all fields of activity;
- appropriate goals and manageable size of the different fields of activity;
- transparent and effective way of selecting the most promising projects.

Informing EU-level rural development policy formulation

A cross-national comparative analysis of similar experiences could also help to ensure that EU-level policies are more responsive to the new challenges and opportunities in rural areas and that the impacts and achievements are adequately monitored and evaluated.

A key question is the supplementation of state intervention with less institutionalised mechanisms of coordination. Framework steering replaces traditional interventionist policies, territorially and function-oriented measures replace sectoral ones and more attention is devoted to regional markets than simple integration in vertical production chains. The regional-level initiative must at the same time remain embedded in the greater EU and global context (Künast, 2001). The experience gained indicates that this can also contribute to the effective realisation of environmental and social objectives that tend to be neglected at the EU- and national levels (Fürst, 2001a; 2001b).

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Can money work for the evolution of agriculture?

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The cow as our mirror and our mentor

What is at stake at the global level is that people have to learn to adjust their cultures to nature. Mankind is causing the extinction of life forms to such a degree that we are in danger of becoming extinct ourselves. In the Netherlands the challenge of adjustment of culture to nature is exemplified in the way we deal with cows. The cow is an icon of Dutch identity and the way Dutch cows live expresses our agri-culture, our culture of dealing with nature. Half of the surface area of the Netherlands is covered with grassland, in which we traditionally have grazing cows. Cows give us milk that we transform into a range of dairy products, which have been important in our trade relations with other countries and a source of our wealth as a nation. But the cow is losing its value in our economy. With the devaluation of the cow we are witnessing the transformation of a part of Dutch culture: the part that represents our relationship with nature, with each other and with ourselves. Milk prices are decreasing ('spring water is more expensive than milk') and farmers are investing in milk quota instead of buying land. Milk quota represents 15% of the cost price of milk and this percentage is increasing every year. More quotas per hectare imply that farmers become dependent on fodder bought from elsewhere. A fast growing number of farmers are keeping their cows inside year round (in 2005 19% of farmers did so). Another observation is the development of milk robots and new housing systems with artificial light to enhance milk production.

These are the signs of an industrialisation process that we have seen before with pigs and chickens. Animals are devalued and limited in their possibilities to express themselves in ways other than through milk, meat and eggs for people. In the industrialisation process animals are becoming machines, in which respect and love for the animals is lost. The culture of working with nature is being impoverished. The quality – i.e. the poverty – in our relationship with our cows, the farmer and ourselves is reflected in the price we pay for dairy products. This is a blind alley.

It is our deep conviction that we have to learn to adjust, to attune our cultures, including our agricultures, to nature, and that money plays an important role in this attuning process. This raises for us, as researchers, some core questions:

- What is the challenge for farmers and consumers in attuning our agriculture to nature in terms of values, changing worldviews and growing consciousness?
- What is the vision of the world we live in when agriculture is attuned to nature?
- What is inspiring us today in Dutch initiatives of endogenous sustainable agricultural development, i.e. bottom-up, inside out, of farmers and consumers?

- What is the role of money in agricultural development today and what role could it play for the attuning of agriculture to nature?

We will take a nomadic route through these questions and will start by looking at some Dutch initiatives before we focus on the role of money, which is the key issue of this essay.

Crisis as a challenge

Mainstream societal and agricultural development is moving away from nature, but there are signs of hope. We will mention some of the initiatives aiming at a (more) healthy relationship of people with each other and with nature.

In 2001 foot-and-mouth disease hit the Netherlands and, because of the strong Dutch export position in global dairy markets, healthy cows were not vaccinated against the disease, but killed instead. The Dutch population did not accept this and Stichting Milieubewustzijn (the Foundation for Environmental Consciousness) offered the Dutch people an opportunity to act positively, bottom-up, following the path from powerlessness to strength from within. Farmers and citizens were invited to support a project called 'Adopt a Cow Now!' Farmers were asked to embark on a process together with citizens, aimed at making cattle-raising more sustainable. And citizens were asked to embark on a process with farmers whereby they would become an adoption friend, paying an annual contribution of 45 euros a year, with the opportunity to meet the farmer twice a year and become part of a learning process. The project issued a newsletter five times per year called 'Koevoet'. The word, which literally means 'cow foot', is Dutch for 'crowbar'. Koevoet was thus meant as means for levering support for sustainable agriculture supported from Dutch citizens. At the start the project attracted a lot of media attention; it grew quickly into a network composed of 70 farmers and 2000 citizens, and then stabilised at that level.

The foot-and-mouth had barely finished when a 'silent killer' of cow welfare appeared. CLM, the Centre for Agriculture and Environment, observed in 2002 that dairy farmers were starting to keep their cows inside all year round and this was attracting media attention. Market research showed that consumers were willing to pay a premium price if cows were given the opportunity to graze outside. One medium-sized dairy cooperative, CONO, responded to that and offered farmers a premium price for grazing cows. In organic and biodynamic farming grazing was already part of the production standards. At government level the discussion arose as to whether grazing could be paid for in agri-environmental programmes or whether it could be made a condition of income support to dairy farmers.

In 2003, Stichting Milieubewustzijn, CLM and Biologica (the Dutch platform for organic farming) started a project called 'Lokale Boer Consumens verbanden', which can be translated as local farmer conshuman associations. The word 'conshuman' is intended to hint at the difference between the consumer who chooses for short-term self-interest and the human being who is willing to balance short-term self-interest with long-term common interests. A network was established of twenty farmers working directly with consumers via subscription systems, farmers markets or farm shops. These farmers want to deepen the relation with their consumers and want to develop their farm in line with the needs of their consumers. The associations offer

different forms of mental and spiritual support, labour or financial support for farmers in return for the values the farms offer to the people. The project was explicitly presented as a social learning process, consisting of many questions and few answers at the start. The project got off to a quick start, because the interest from farmers was high, but stagnated soon afterwards because the three organisations did not see eye to eye and donors did not provide the funding needed to implement the project as planned. Nevertheless, the project survived because of the commitment of Stichting Milieubewustzijn, CLM and some of the farmers, regardless of the lack of project funding. Over the course of three years the network continued to raise questions without external funding. A key question that came up was the balance between giving and receiving. In the fall of 2004 the farmers and 'conshumans' involved in the project discovered that farmers are programmed to unconditional giving in a context of consumers saying 'it is not enough, give me more'. During an emotional meeting we discovered and felt the pain of the robbery of human dignity. In that pain we also discovered our identity as a network.

In 2004, Stichting Milieubewustzijn and CLM got the opportunity to learn about the process behind the robbery and how this can be transformed into fair trade and association. This opportunity came in the form of a design project for a 'Buurderij'. A Buurderij is a non-existent Dutch word that is a mixture between the Dutch word for farm (boerderij) and the Dutch word for neighbour (buur). The challenge in the Buurderij project was to design new forms of social and economic organisation in the countryside. In the design process we discovered that our relationship to money is a key factor in the industrialisation process that is taking place within agriculture and in the robbery of human dignity.

In the summer of 2005, Stichting Milieubewustzijn and CLM invited a number of organisations to become part of a new social learning network called 'LoeiGoed!' Loeigoed is a Dutch expression for extremely good, but the first part of the word refers to the sound cows make. Notice the value we put on the sound of cows in this Dutch expression. The idea behind LoeiGoed was to scale up cooperation between different organisations to find a way of ensuring the continuation and survival of Adopt a Cow. The partners in LoeiGoed had difficulties in defining common ground. In the autumn of 2005 Stichting Milieubewustzijn helped the 'Adopt a Cow Now' project to become an independent self-supporting organisation, called 'Koevoet'. As a result of that decision farmers and citizens cooperating in the project will stand on their own two feet and will have to decide on their own path, but will retain the original goal: perpetuating the process of sustainability through learning and experiencing new forms of relationships, and social and financial commitments.

Towards the transformation of a mechanistic worldview

The contradictory developments with regard to the cow can be better understood if we take a look at the different worldviews underlying them. The worldview underlying the mainstream development of industrialisation of dairy farming can be characterised as mechanistic, while the worldview underlying the signs of hope can be characterised as organic. In a mechanistic worldview reality is perceived as a machine, while in an

organic worldview reality is perceived as life, as a living system in which there is continuous movement and adaptation. Elisabeth Sahtouris (1999) made an overview table of the differences between the two worldviews.

Mechanic	**Organic**
Allopoiesis	Autopoiesis (self-creation)
Inventor created	Self-created
Hierarchic structure	Holarchic embeddedness
Top-down command	Holarchic dialogue/negotiation
System engineered	System negotiated
Repaired by engineers/experts	Repairs itself
Evolution by external redesign	Evolution by internal redesign
Exists for product or profit	Exists for health and survival
Serves owners' self interest	Serves self/society/ecosystem

The key word in the organic worldview is autopoiesis, which, according to Chilean biologists Humberto Maturana and Francisco Varela (1992) is the process they define as life. They consider a living being as a closed entity capable of generating and renewing its own components, consistent with its environment. This means a living being, from organism to organisation, is able to organise and maintain itself. If this concept is understood, the other words in the table follow logically from it.

We would like to use this overview table to consider our use of *land*, *labour* and *capital* in agriculture, as a mirror of our worldview. A worldview is not just our perception of reality – it also shapes it, for example through the use of land, labour and capital by individual farmers and the farming sector as a whole. If one perceives the world as a machine, one tries to create and treat cows, people and other living beings as if they were machines. Taking a historical perspective of 200 years, agricultural development started based on land with a large labour force and little use of technology and capital. During the industrial revolution the labour force was replaced by machines until it took the form of a family farm. In the green revolution a further intensification of land use occurred, with increasing yields per hectare. In livestock keeping of pigs and poultry, agriculture started to become disconnected from the land, followed shortly afterwards by glasshouses producing vegetables and ornamental plants on rock wool. The industrialisation process continues and in glasshouses and in livestock systems robots are taking over from human labour. In mainstream farming agriculture is disconnected from land and labour and is becoming increasingly reliant on capital (interest paid to banks), fossil fuels and automated technology. Based on a mechanistic worldview, this form of agriculture as a machine took 200 years to create, and the machine continues to be perfected each day up to the limits of the living systems we are working with. Innovation is based on the idea that a cow is a machine. However, a cow is a living being, just as we are, and not a machine.....

So, increasingly intrigued by the difference between machines and life forms, we started to be interested in life itself. The more we discover about life the more we are amazed by its complexity. We start to understand that machines are simple tools compared to life itself. Through this growing consciousness, individuals start to change their values and behaviour, but feel the systems and structures do not fit anymore. They start to question current systems and structures and the collective

worldview underlying them. One of the outcomes could be that they become unstable and eventually will disappear, to be replaced by something else. The key question of humans and of humanity is one about consciousness: *In what world do I want to live, do We want to live?* The answer put forward in an organic worldview is a world that maintains and strengthens health and life of soils, plants, animals and people. *If we choose that path, what are the values we need to have in common? And if we are clear about our worldview, can we create systems and structures to make it work?*

Adopting an organic worldview

Assume people were to adopt an organic worldview. What would this agriculture look like, in terms of the use of land, labour and capital? In the global organic movement, IFOAM, consensus has been reached recently on four ethical principles of organic agriculture (IFOAM 2005). The principles of *health*, *ecology*, *fairness* and *care* are presented as the roots from which organic agriculture grows and develops. The principle of health states that organic agriculture should sustain and enhance the health of soil, plants, animals and humans as one and indivisible. The principle of ecology states that organic agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them. The principle of fairness states that organic agriculture should be built on relationships that ensure fairness with regard to the common environment and life opportunities. The principle of care states that organic agriculture should be managed in a cautious and responsible manner to protect the health and well-being of current and future generations and the environment.

Our first comment on these principles is that we are very happy with the ethical underpinning of organic agriculture. And we fully agree that land and people are of central concern for the development of agriculture. People are the central players and people define their relationship with land in their individual value systems, in collective worldviews and in production processes on the ground. The four principles can guide the organic movement to innovate more in the social and cultural areas. But as far as we are concerning, the challenge lies in the implementation of those principles into daily societal practice where 'capital' is the key driver of mainstream agricultural development. This raises the question: *'How could the role of capital, and especially of money, be transformed in such a way that it catalyses the evolution of a more endogenous and sustainable agriculture'?* This is a question of transition management towards organic evolution, or even more precisely: towards organic-cultural evolution.

The role of money in evolution

The role of capital, and especially of money, urgently needs to be reconsidered in relationship to humanity's global challenge of adjusting our exploitive cultures to the carrying capacity of our planet. As we said before, our relationship to money is a key factor in the industrialisation process in agriculture. We will explain how money works

in a mechanistic worldview and how money can work in an organic worldview for quality of life on earth.

Mainstream agricultural development, based on the mechanical worldview, is increasingly disconnected from land and labour and becomes increasingly reliant on capital (interest paid to banks), fossil energy and automated technology. Systems based on high levels of capital input give more revenue than systems based on land and labour. In other words capital gives more revenue than land and labour. A certain amount of money invested in technology, will generate more output and revenue than the same amount of money invested in land or paid to people. With regard to revenue from labour, this goes so far that farmers become redundant and have technology do the job for them. The farmers quit farming, take part-time jobs elsewhere or scale up and incorporate other farms. Agriculture becomes the art of buying cheap inputs, interpreting input and output data and watching TV monitors. In many cases this is not the job farmers had chosen when they started their farm. The new generation of farmers prefers the term agrarian entrepreneur for their job and, indeed, it better reflects the relationship they have with nature. With regard to revenue from land, in glasshouses this goes so far that, with the input of capital, the living soil is replaced by substrates, which are more productive. In general the technology is not designed to enhance the quality of life of soils, plants and animals but to maximise revenue per euro invested.

Our conclusion about the consequences of this mechanistic worldview is that labour and land are subordinate to capital. People, animals, plants and the earth are used to make money. We have constructed the money system as society has enslaved us to work for money. Paradoxically, this is called economic freedom. The money system is a 'robbery of human dignity' because it seems we will do anything for money. In a mechanistic worldview this is not a problem because we get what we want. We have envisaged the world as a machine and here we are…. machines ourselves. Thus, so far, the role of money in evolution has enslaved people to think and act as machines. So, the concept of evolution itself is full of values; *evolution of what, of whom? Where is the way out?*

Examples of money in a more organic-cultural evolution

The fact that we perceive becoming machines as a problem indicates we are at the end of the mechanistic worldview. People grow up, their self-awareness grows and they realise they do not want to become a machine producing more and more just for money. Truly 'grown up' people want money to work for them. In the current thinking and system this is only possible if you have a lot of money. A lot of human creativity is put into becoming very rich, often at the expense of others. But there is also creativity found in the design of money systems that can work for everybody and not just for a few. We have had the opportunity to work with two designers: Christopher Houghton Budd who is working on an associative economy, and Hank Monrobey who is working on a Citizens-Multi-National.

We need to examine the question: *How can money work in an organic worldview, in a living system that is able to organise and maintain itself, consistent with its environment, as well as in a culture that intends to grow in consciousness about global interconnectedness and take responsibility for it?*

We first need to reconsider money. According to Christopher Houghton Budd[1], an economic historian unmasking our economic reality, money has no value in itself. Money is always an expression of value attributed by people to a good, service or idea. Money needs to circulate to have value and cannot be stored without losing its value. Possession of money makes no sense when it cannot be properly used for the creation or maintenance of human values. To make proper use of money, three qualities of money need to be distinguished: *purchase* money, *loan* money and *gift* money. These three qualities are consistent with human nature.

Purchase money represents the material existence of man (tangible), loan money represents the spiritual existence of man (intangible) and gift money represents the human soul. Purchase money works in trade to pay the bill for the costs of production made in the past. Loan money (capital) works in the present for the production of goods and services to be sold in the future. Gift money works in education and human development in general. Gift money works towards the future and is most appropriate for innovations in which the risk of failure is inherent. Moreover gift money has a function in balancing the two other qualities of money (as the human soul is balancing what we experience as a spiritual being with what we experience as a physical being).

These qualities of money are present and working, but most people do not consciously use them. The result of continuous substitution of land and labour by capital is that the world is drowning in loan money, while there is a shortage of purchase money. In practical terms banks are drowning in loan money while people are unemployed or have little purchasing power. In other words we overvalue the production processes in the present, and have unrealistically high expectations of the revenues they will deliver in the future while we undervalue what we have achieved in the past: prices for products and services are too low and therefore incomes are too low. As a result we have continuous inflation in the use of loan money (capital) and continuous deflation in the use of purchase money. Because we do not separate these two qualities of money we do not observe this reality. In our statistics we observe a nominal inflation and that means we become poorer, we have less purchasing power with our income. What we fail to recognise is that we lose purchasing power only because the capital component (loan money) in product prices increases. This is a dead end road, which leads to a big bubble of loan money that has no connection with what is actually produced. We are simply increasing the capital costs of our products and services at the expense of labour and land and quality of life generally.

We need to learn to use these qualities of money more consciously and to balance past and future by balancing the qualities of money. Once we have discovered how to use money consciously, money starts to work for us. To be able to use money consciously we need to start to strictly separate purchase money and loan money. We do not need to wait until humanity as a whole is ready to do this, because individuals

[1] See Centre for Associative Economics, www.cfae.biz

and businesses can start to do it immediately. People can use accounting for this purpose. The use of purchase money becomes visible in the Income and Expenditure account. The use of loan money becomes visible in the Balance Sheet. The use of gift money becomes visible at the closing of the entries. That is the moment when it is decided where the profit goes. This needs to become a more conscious choice, and it will be a great challenge for people to become detached from the possession of money as a goal in itself. What can replace the attraction of possession of money in an organic worldview is the attraction of enabling people to fully express their potential in life, people consciously serving their own goal in life by enabling other people to serve their goals. This process of becoming conscious about money also has to take place at the global level. To restore the balance in economic life globally we have to accept that a big part of what we still believe is loan money, needs to be used as gift money. In order words, we can choose to give away or spend our savings consciously, or to just lose it in the Enrons and Parmalats around us.

The Citizens-Multi-National (CMN), which is being designed by Hank Monrobey (2004), takes a different approach, but one that fits in the picture presented above. The Citizens-Multi-National can be perceived as a money system based on purchase money. The essential feature of the system is that purchase money is circulated more quickly (26 times instead of 6 times per year), thereby substantially reducing and eventually phasing out the need for loan money in trade. This is achieved in the same way as multinationals work, by making internal transfers between firms in a holding structure. By transferring every euro spent to a collective account number, the money can be used to pay bills immediately. This system works if there are sufficient firms in the structure who are trading with each other, and it substantially reduces capitals costs. The competitiveness of multinationals largely depends on savings of capital costs. Logical if you consider that more than 50% of the cost price of products is capital costs and Value Added Tax. The Citizens-Multi-National is a 'holding' owned by enterprises and consumers, and they divide the bonuses otherwise earned by the CEOs of multinationals.

A second key feature of the CMN is that for each transaction a 2% transaction cost has to be paid, of which 1.6% is used to build a capital reserve that can be used to avoid inflation or deflation in the system, but which can also be used for investments. The Representative Board of the CMN makes decisions about the use of the capital reserves. The effect of the Citizens-Multi-Nationals on quality of life depends on the consciousness of the participants as represented by their Board. The system already works (partly) in the mechanistic worldview (used by multinationals) for continuous price cuts and exploitation of life on earth. The intention of Hank Monrobey is that the system is used for the well-being of people and the system can indeed work for better quality of life, if the people in the system want it. In any case the Citizens-Multi-National will be helpful in raising consciousness of consumers and businesses with regard to money. In the CMN consumers and businesses cooperate in a network and have to take responsibility for what money does in the network. If the networks are not too big, and there is enough trade within the network, the local CMN structures will provide a good learning opportunity for everybody involved in the sound treatment of money.

Considerations and conclusions

In this essay we have taken a nomadic route along the challenges facing farmers and consumers in attuning agriculture to nature, visions on farmer-consumer relations, and inspiring Dutch initiatives which are bringing the vision to life. We elaborated on the role of money in agricultural development today and its potential role in the future. In this section we will only discuss and summarise the role of money.

Can money work for the evolution of endogenous and sustainable agriculture? Yes, there is plenty of opportunity to use money consciously for the enhancement of quality of life of people (farmers and consumers), animals, plants and soils. First of all, by using purchase money to pay a fair price for agricultural products and services provided by farmers, but also by using loan money under suitable conditions or by using gift money, the culture we build around life can be improved. As long as the big money systems move in the wrong direction, the new culture will remain the result of individuals making conscious choices with their money. Individuals can make money work for them.

Can money work in the service of sustainable use of land and labour in Dutch dairy farming? Yes, there are many hopeful initiatives. What needs to be done now is to connect farmers working in this direction, organise dialogue on learning experiences and give these farmers a stronger voice in society, and acquire more experimental space. Equally, the stories of the people who have experienced the quality of life on these farms should be publicised. Gift money is needed for that purpose. What is needed at farm level is investment in the quality of land use and labour use. Farmers should learn to improve the quality of their soils by intervening less. Loan money is needed for that purpose. What is needed at consumer level is to pay a fair price for dairy products coming from farms that support life, as well as for related services. Purchase money is needed for that purpose.

It is hard to adopt an organic worldview and take responsibility for it if you have grown up and live in a world in which a mechanistic worldview dominates. Our personal experiences are that we felt, and feel, a terrible shame and pain when we fully recognised the consequences of our worldview and behaviour expressed in our use of money. We are conscious that we are also 'guilty' of shaping the world we live in, if we look at our own use of purchase, loan and gift money. It takes courage for each individual to go through that process, and it requires compassion for consumers who are hesitating. What has given us the courage to tackle the shame and pain is that we also recognised the freedom we would gain by taking responsibility for our acts, and the accompanying joy and power of co-creating living systems and a culture attuned to nature. We will become coherent and authentic in our values and our acts, each of us in their own unique way: 'Walk my Talk' and 'Talk my Walk', and so make the difference by 'Being the Change'. Of course it is a long process to make an organic-cultural worldview work fully in each farmer or consumer and at the level of society and humanity as a whole. But each person who becomes authentic will inspire other people to follow the same path. Structures and systems based on this new more 'conscious cultural evolution' will be even more helpful. Some sparkling examples are already shown in this essay.

Coming to the harvest: individuals, nations and unions of nations have to learn to balance the value given to the past (through trade), the present (through investments) and the future (through innovation). The stability of our money is an expression of that balance. The society that succeeds in balancing the qualities of money will harvest stable money without inflation and deflation. But we as humanity will harvest more: the survival of our planet earth, of our human dignity and the sparkling emergence of a Conscious Culture.

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A European Network for Endogenous Development? Food for reflection and an invitation to build it

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Introduction

Endogenous development is the phrase used by the COMPAS programme to refer to rural development processes that have local resources as a point of reference. At present, the COMPAS programme operates in 14 countries in Africa, Asia and Latin America, engaging 25 organisations in extensive exchanges. In Europe, the activities of COMPAS are more modest, the most important being the series of case studies conducted by Sabine de Rooij (see her contribution to this seminar). However, these activities are not yet embedded in an extensive European network, although this would be highly desirable for a number of reasons. First, there are many valuable efforts taking place in Europe within the domain of endogenous development. Second, endogenous development processes could strengthen each other conceptually and practically, and provide insights into a reshaping of the links between practice, policy and science. Third, the current COMPAS-partners in the South need a sparring partner: to strengthen their own efforts and to gain legitimacy within their own context. And fourth, European partners can learn from the current COMPAS experience, as they go about exploring endogenous development.

This paper draws a brief sketch of endogenous development practices and trends in Europe, identifying a couple of themes around which new projects could be developed by stakeholders, that together could come to constitute a European Network for Endogenous Rural Development. Please read these proposals as an invitation to add your own thoughts and suggestions. The paper ends with a concrete proposal for further development.

Endogenous development in Europe

On behalf of COMPAS, a survey was conducted in early 2005 to map European expressions of endogenous development (Remmers, 2005). This survey was of a much more generic character than the detailed case studies done by Sabine de Rooij. Here we present some major findings.

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Endogenous development: 'old wine in new barrels'

Endogenous development is not a new thing in Europe. On the contrary, there is a huge diversity of individuals, organisations, networks, scientists and policy-environments that deal in one way or the other with a type of rural and agricultural development that goes beyond the dominant paradigms, and that is based on local values and resources. It is impossible to give a complete overview; the important point to note is that once we start to look for, they are everywhere, their number seems to be growing and their results become more tangible. Three very telling and comprehensive experiences in the Netherlands, Italy and Slovakia were documented by Sabine de Rooij, and are synthesised in her contribution to this seminar.

European (rural) discourses around endogenous development are currently more likely to be formulated around concepts like multifunctional agriculture, rural development, cultural spatial planning, learning systems, local governance, regional development, and, increasingly, identity. There are many expressions of these concepts in the field: farms, regional networks, spatial plans. Examples include regional products, nature-conserving farmers, small entrepreneurship for local economies, spatial plans that build on cultural heritage, etc. At the European level, a Leader policy has been operational since the early nineties, aiming to grant maximum voice and responsibility to local actors concerning the development of their region. At present, EU-member states are struggling to incorporate Leader into their mainstream policies, a requirement of the European Commission as of 2006.

Identity as a hot issue and the 'spiritual renaissance'

An increased awareness of issues concerning identity and belonging can be perceived throughout all trends and discourses, and beyond the domain of rural and agricultural development. In Western Europe, this seems to be rooted in an overpowering individualisation combined with globalisation, resulting in feelings of isolation, fragmentation, leading to a search for a new and embedded individuality and a spiritual 'renaissance' beyond the classical schemes of religion. In Eastern Europe, this seems to be (at least partially) a response to a subordinated position people consider themselves to be in (currently vis-à-vis the EU, and in communist times vis à vis central government). Working with identity in Eastern Europe leads to a sense of empowerment (pride and dignity are important assets); in Western Europe it includes dimensions of spiritual growth. While the spiritual dimension of endogenous development, which is so emblematic for COMPAS' work in Africa, Asia and Latin-America, is less taken for granted in Europe, the discourse of identity is closely linked to the discourse of values.

Mismatch between 'top' and 'down': the region as a new focus

Related to the last point, there are a great number of people, whose values coincide with a regionally focused type of development. They give priority to solidarity over efficiency. Yet, the Dutch National Institute for Public Health and Environment (RIVM, 2004) traced a big gap between the value system of the policy-making context and that of the people the policies are made for. There is, in other words, a gap between top and bottom. The fact that the Leader programme is encountering so many obstacles in becoming mainstream, is indicative of this. So, while the public demands to be heard, the authorities are still struggling with how to address this issue.

The contribution of Knickel and Jahn to this seminar provides a German proposal for regional governance.

Little articulation between different bodies of knowledge on endogenous development

There is a scarcity of efforts (both scientific and practical) that explicitly aim to bridge, within the realm of natural resource management and rural development, different bodies of knowledge on endogenous development (scientific, spiritual etc), that match material solutions with immaterial needs. Also, only superficial attention is paid to the link between personal development and the development of the 'context' (be it rural, agrarian, global). There seems to be a conceptual 'void' that needs to be addressed.

Preliminary conclusion: Europe's position between integrated natural resource management and spirited communities

There are quite a few scientific and practical networks in Europe that deal in some way or another with new approaches to rural development. If there is any chance of establishing a new one around endogenous development, it should have a clear added value. To identify this added value, we put forward the following diagnosis.

The 'alternative' dynamics in rural Europe seem to boil down to two major trends. On the one hand, there are an increasing number of efforts to generate more integrated farming systems and integrated rural development practices, including both social and natural sciences. On the other hand, there is an increasing concern, or maybe even a 'desperate' search, for a meaningful life, a sense of belonging, not only to one's kin or the environment, but also to oneself. The ontological dimension of rural and agricultural development seems to be becoming more and more important. See Diagram 1 for a visualisation of these trends.

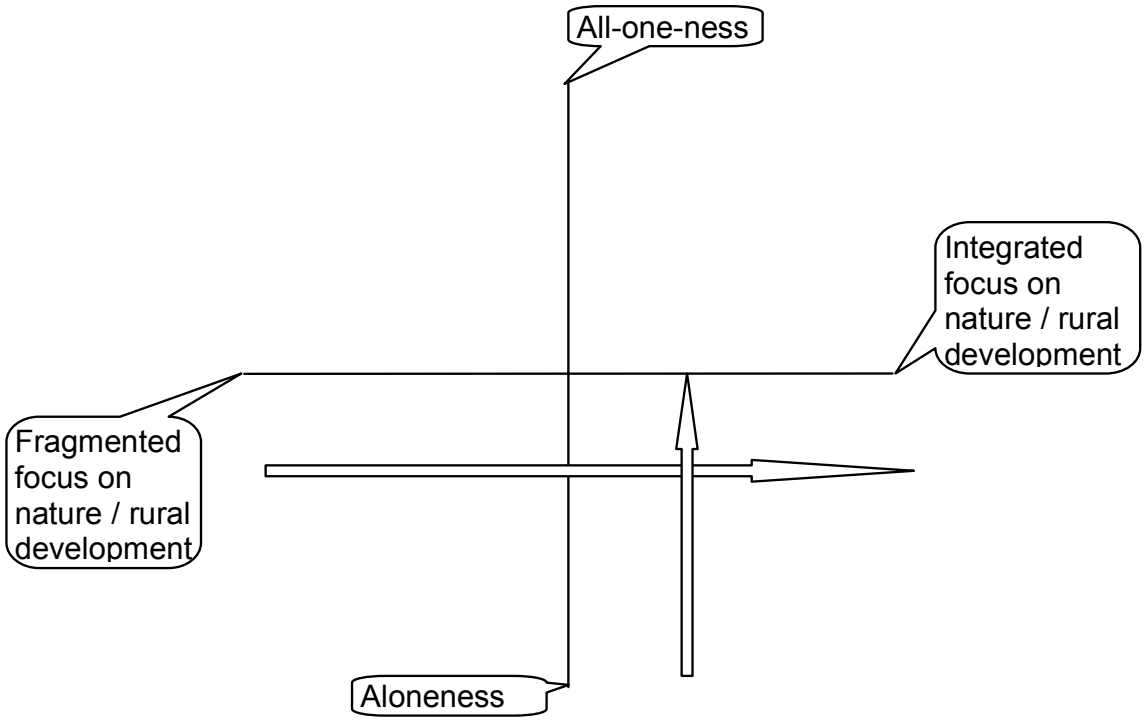

Diagram 1 Europe's position between integrated natural resource management and spirited communities (arrows indicate trends in Europe)

In this diagram, the vertical axis could be termed the *axis of community and being* (ESSENS), the horizontal axis the *axis of the earth and doing*. (PRAXIS). The vertical axis addresses views of the self in its relation with itself and others (being with), the horizontal axis addresses views of the self on the environment and how one can operate in it (acting in or upon).

The horizontal axis goes from totally fragmented and dissected perspectives on natural resource management and rural development, towards fully integrated perspectives. The vertical axis has as its essential position the establishment of 'union' or 'community' of persons with their world: they can be either completely isolated ('aloneness') or in communis (all-one-ness). It goes beyond a move from the individual towards the collective. Collectivity is not a prerequisite for a sense of community; it is an outcome. It is possible to be physically alone, yet fully in contact, and vice versa. Essentially, both axes depict a possible transition away from Cartesian dualism, from disintegration towards integration, both at the individual level of being and at the environmental (or contextual) level of action. A glossary of dimensions that can be recognised within this diagram is presented in the table at the end of this paper (see page 285).

Europe has made a considerable move towards the right in terms of the diagram over the past 10 years; many efforts have been generated to integrate natural sciences into coherent management, and the social domain is increasingly being taken on board in rural development schemes. Of course, there is still a lot to do, but the important thing is to highlight the move in consciousness that Europe's farming systems are making. Europe's position on the vertical axis is quite diverse, but given its tendency

toward individuality, it is incipiently moving up. While making a move towards more integrated approaches to nature and rural development, it inevitably encounters issues of community and being.

We can recognise the above-mentioned moves as changing worldviews. The point we want to make is that both tendencies are at present developing independently from each other. Our stance is that they should be developed in mutual correspondence. Numerous observations on rural development support and social learning support this view: whatever institutions, rules, instruments or policies we invent, the success in the end lies with the people involved. Their preparedness to 'blend' different worlds (policy, practice, collective, private) is crucial. To put it bluntly: there can be no regional development without personal development.

A possible focus for a European Network for Endogenous Development

Following this diagnosis, a European Network for Endogenous Development with a distinctive added value would need a focus that:

- bridges both trends discerned (integrated PRAXIS and integrated BEING (or ESSENS);
- aims to engage in comparative review and exchange with partners in other parts of the world;
- brings together practice, policy and science.

Needless to say, such a network should be intellectually challenging, able to deliver concrete results and capable of having an impact on policy development. Strategic operation requires ample attention.

A mission for a future European Network for Endogenous Development could read as follows: *to research, develop and compare the relation between worldviews, rural development and natural resource management.*

Under this mission, we envision a network that would grow around the following domains:

- Conceptual development
- Project development at 'field' level
- Policy dialogue
- Curriculum development
- Public Relations and Coordination

Specific projects can be formulated in any one of these domains. The important thing to highlight, however, is that they should try to reinforce and feed each other. That is why we need the network.

We are very keen to discuss and enrich with you both the diagnosis and its translation into network focus and domains. If we can find common ground, it seems that either one of the domains could be used to start up the network. In this section, we make an effort to delineate the contours of the domains.

Conceptual development

Background Beyond the different discourses over rural development, a similar perspective seems to arise. Academic circles affirm there is a need for a conceptual sharpening and sharing of the concept of endogenous development. The challenge would be to not only define a list of practical key issues that are always at stake (like working bottom-up, focus on regional resources etc), no matter what field you work in, but also to come closer to the mindset that enables a person or an organisation to opt time and again for a development path that is not the usual one. Endogenous development aims at growth, yet is radically opposed to the present dominant development paradigm. At the same time, it is only poorly recognised as a 'modus operandi' or a state of mind that permeates all levels and domains, yet having totally different expressions. Making explicit what endogenous development means at one level may help to identify what it means at another, and so a mutually strengthening process may evolve. In another paper for the Worldviews seminar, I have elaborated a first attempt at a comparative conceptual grounding (Remmers, 2006).

General goal and output. Through an inter-scientific dialogue and a dialogue between practice and theory, this conceptual domain should generate overarching concepts that are insightful for academics and practitioners alike. Encounters and output should be inspiring, not condemning and blaming. The output should legitimise and conceptually strengthen the practical projects developing 'on the ground'. It should generate 'grand narrative', that binds people and gives direction. The current worldviews seminar is a first effort to do so.

Type of network. This is mainly an intellectual network. We expect valid contributions to be made from fundamental perspectives within psychology, spirituality, economics, complexity theory, philosophy, sociology and process thinkers. These fundamental contributions should be crossed with insights and concepts from the applied sciences in the field of rural and agricultural development. The current work of Compas with the University Consortium should feed in into this network, or even completely overlap with it.

Possible funding for future research projects. Funding is likely to come from the EU 6th and 7th Framework Programmes, WOTRO, which is part of the Netherlands Organisation for Scientific Research, and EU-COST (European Cooperation in the field of Scientific and Technical research).

Project development at 'field' level

'Background' and 'general goal and output' should be maintained, as they are generic headers, see e.g. the domain of 'Conceptual development'. The objective is to develop a series of projects that bring the philosophical considerations down to more tangible results for rural areas, by addressing real rural and agricultural needs. The projects should be able to test new conceptual insights. Engagement of policy makers in such projects would be appropriate so that policy dialogue takes place. There are at least two major domains within which projects could be developed: *identity and rural development*, and *linking top-down and bottom-up* (see box below).

Major Domains for project development

Identity and Rural Development

Projects under this heading would share an action-research approach, in which identity of regions is investigated (in a participatory way), and translated into tangible socio-economic and spatial development options. Projects could deal with issues such as a village landscapes, regional products, landscapes, tourism, etc. An example could be the transnational Leader project 'European Culinarium' (identity expressed through the stomach and operating in various countries), but then more tailored to regional roots (history), rural values and managing landscapes. For example, a project called *Rural Values* might emerge.

Type of network: This could be a network of NGOs and consultancies (e.g. ETC, CLM). The Leader network is a logical associate, as is the Rural parliament of several countries.

Output: Hands-on projects that produce visible results, and that enthuse people in the regions.

Keywords: regional products, identity, landscape, agriculture, social movements

Possible funding: Leader plus transnational funds. For 2007 and beyond, we could think of Interreg (presently there are no calls open). The Dutch Belvedere fund (promoting spatial quality through cultural heritage) has limited, yet accessible resources.

Linking top-down and bottom-up

Both in East and Western Europe, there is an urgent need for new forms of public-private partnerships in the domain of rural development, between governmental institutions and a host of civil movements and commercial enterprises. At present, fundamental institutional arrangements often inhibit the generation of endogenous development. There is a lot of effort going on to stimulate bottom-up development, and there are quite some attempts to re-organise top-down steering structures, yet they only meet each other reluctantly. While the gap in Western Europe may be characterised by the enormous amount of rules and regulations (lack of freedom), at present in Eastern Europe (at least in some countries) there is an absence of linkages; people 'at the bottom' operate in a void.

The boundaries of 'Responsibility' could be examined under this heading.

Examples of overcoming the gap include the Stadteland Cooperation in the Netherlands, the Fundación Penyagolosa in Castellón, Spain, and 'Active Regions' pilot project in Germany (see paper Knickel and Jahn, 2005)

Type of network: This could be a network of NGOs, government bodies, and academic institutions, that together seek to develop alternative arrangements.

Output: Insight into a diversity of institutional arrangements, strengthening of alternative steering models, room to experiment with developing steering models. By definition it should include some practical projects.

The project could include seminars, workshops, training and coaching that enable partners to envision other institutional set-ups.

Keywords: governance, institutional arrangements, innovation, top-down, bottom-up.

Possible funding : Leader plus transnational funds. For 2007 and beyond, we could think of Interreg (presently there are no calls open).

At present, we are developing the following transnational projects, some of which are still at a very preliminary stage. You are more than welcome to join and enrich them:

- Village development plans and local governance. We are currently engaged in setting up a European network , mainly based on the Leader contacts, working towards a transnational project by mid 2006.

- Regional development and regional responsibility. In the Netherlands, ETC is building, through the Leader+ network, a Community of Practice of 'frontier regions', regions that in some way are ambitious and quite successful in developing new arrangements between top and bottom. It would be interesting to see whether the experience as described by De Rooij in her paper to this seminar could be linked and strengthened through a European project.
- Rural constellations. This project proposal aims to apply Hellingers' family constellations approach as an action-research tool for rural development (in collaboration with Jet Proost of Wageningen University and Research Centre.)
- Rural values. Under this generic heading we would like to develop projects that try to highlight the values that drive people in and around the rural areas, and consider them as possible vehicles for rural development.
- Energetic agriculture (see Henk Kieft's paper).
- The inner space of the Dutch delta. A series of workshops will be held in the Netherlands, under this title, in which the intimate relationship between the 'planning' of our inner space and our planning and use of the physical outer world is examined. It will culminate in an exhibition early 2007 (Bureau BUITENKANS, together the Dutch Innovatie Netwerk Groene Ruimte en Agrocluster, Kasteel Groeneveld). A broader European dimension to this project would be more than welcome.

Policy Dialogue. We would like to programme specific activities to address policy makers within any of the projects mentioned.

Curriculum development. Dialogue with universities and schools of higher education is also important, to examine ways of adaptating their curricula. In our view, these developments should follow from efforts to build tangible projects that yield inspiring results from research and practice.

Public Relations and coordination. For the network to function, a coordination unit should be in operation. This is difficult to fund, unless we find a likeminded charity. It could be organised as a spin-off of other cooperation projects. To start with, however, we have a different proposal, which we outline below.

A first move: www.ened.eu

Besides the need for focus of a European Network on Endogenous Development, we also need something to start off with. We realise how difficult it is to gather people around interesting issues when no money is readily available. There are many networks running across Europe that are involved in some way or another with endogenous development. Some of them are known to us, others not. Most people will not engage in any new network if there is no clear added value offered. So, at this initial stage, we should find a way that is attractive and at the same time minimises the effort required of those who are potentially interested. Therefore, we propose to host a website, www.ened.eu. This website will be designed as an interactive source. Its

ambition will be simple: to offer a space where any network operating in Europe that feels affiliated with the issues of endogenous development can leave a trace, a website link and/or a short description. We invite you to put your details on the site right now. We hope that gradually an interesting body of networks will become available, that may spur each other on and may lead to new alliances. We will manage the website over the course of a year and will design proper follow-up action. This may be through convening a workshop, or a short email conference. Eventually we hope that funded projects may evolve from it. The costs for running this site will be carried by ETC-Compas, ETC-Adviesgroep Nederland and by Bureau BUITENKANS. Ready, steady…. GO!

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Horizontal axis		**Vertical axis**	
Axis of earth and doing		**Axis of community and being**	
View of the environment		**View of the self**	
PRAXIS		**ESSENS**	
Left pole	**Right pole**	**Lower pole**	**Upper pole**
Fragmented view on nature	Integrated view on nature	Man is disconnected of him/herself	Man is connected with others and the world
Distinction between subject and object	Subject and object co-create each other	Total individualism, sharp boundary between the individual and the rest	Total collectivity, no borders between the individual and the rest
World can be known and described in universal terms	World is inherently different according to the perspective of the subject	No back-up, stand alone	(Inter-)generational back-up
Sectoralism	Integrated approaches, social and natural science work together	Local networks, clans	Global networks
Man can be situated outside his/her environment	Man is part of his/her environment	Strong attachment to own identity	Identity is emergent property
Separation of mind and body	Body and mind are integrated and co-creating each other	Strong time and place attachment	Time and space evaporate as categories
Nature is reducible to composing elements	Nature is an emergent property of its composing elements	Dedicated to nearby, individual goals	Dedicated to global, transpersonal goals
Positivism	Constructivism	Analysis leads to new views and meaning, but mainly helps to confirm the status quo	Views and meaning arise from nothingness; research has a wholly different, 'detached' meaning. Intuitive insights/wisdom
Singles out some issues and develop them strongly (very efficient)	Advancing the total quality of linked issues, improving the 'bedding'	Contraction	Expansion
Powerful, straight, goal oriented, quick, hard and sometimes dirty	Receptive, englobing, supportive, slow, soft and goal-seeking	Strongly self-referential	
Symbol: phallus (masculine) (animus)	Symbol: course of a river (bedding) (feminine) (anima)	Black spot	Radiant halos
Along this pole, growth is recognisable, going from a strongly decontextualised way of farming with a clearly identifiable profit, towards farming styles that take into account more dimensions of the physical and human environment. They become more and more contextualised, and acquire meaning in relation to their environment.		Along this pole, growth can be recognised from a totally isolated position, where one's attachments to one's own convictions are very strong, to a more collective attitude. Solidarity is the capacity to recognise and accept (the weaknesses) of the other. There is no boundary between you and the other.	

Table 1 Generic indications of the meaning of both axes in Diagram 1, page 279

Worldviews as moving motivations?

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Introduction

As an ETC colleague, I joined the Compas team recently mainly to provide support in matters such as planning, reporting, contracting and institutional set-up. Although I have been sympathetic to the Compas initiative since its inception I have never been involved in the implementing activities. In my regular consultancy work the cultural aspect is always there, but I have never made it to a subject of explicit study. Therefore, I do not feel I am in a strong position to write a full paper on the subject of moving worldviews. Instead I will give an account how worldviews have moved me in a personal way.

First imprints by local culture

Already early in my childhood I was confronted with changing social and cultural environments because of the movements my parents made. Although the moves all took place within the Netherlands, I experienced them as having quite some direct effect upon me. The first move was when my parents decided to live on a houseboat. The houseboat was tied up to the land of a market gardener outside a village near the town of Leiden. Fortunately, there was no kindergarten in the village, and not having reached school age, I was able to be with the gardener much if not most of my time: in the garden, in the greenhouse, on his little motorboat steering its way to the auction hall in Leiden. A fabulous year, not bothered by formal schooling, that is how I still perceive the year before I had to start at the primary school in the village. There, I literally experienced how it was to come from outside the local cultural setting. The experience was heightened as a result of having an even more special position by our living on a houseboat[19]. These first impressions were not always pleasant, as many a time contacts developed into direct confrontations.

The second move was to Middelburg, the capital of the province of Zeeland in the south of the Netherlands. There, the encounter with local culture was much less negative. But the need to understand and speak the local dialect was much stronger. Moreover, I experienced, although I was again an outsider myself, how much more difficult it was for the minority group of Moluccans living in our Dutch society. In comparison my own problems seemed minor. The third confrontation was when my

[19] At that time in the Netherlands (1950s) one benefited from certain tax reductions because people living on houseboats were officially considered as gipsies, not having a fixed place of abode. This applied to us, even though my father was a government officer.

parents decided to move onto the land again, and we went to a nearby village. Again a different culture, with a slightly different dialect and different behaviour, even more original (could one say pure?) than the dialect spoken in the capital town.

These childhood imprints helped me early on to understand the importance of building up a rapport and relationship with the people where I live. They also helped me to appreciate the significance of language and dialect as a vital and powerful tool for expressing oneself and being understood. On the other hand, the process of mirroring, helped me to gain a first glimpse of the serious limitations that arise when one's own culture is taken as the only point of reference in dealing with other people or influences from outside.

Enriching experiences

The first inter-cultural contacts in a professional setting taught me that one can make serious errors when the local cultural background, in terms of presence and history, are not duly acknowledged. During my practical training period I worked in the irrigation department of a Dutch company producing vegetables and fruits in Senegal, destined exclusively for export to the West European market. The focus on economic thinking from a company bias was in quite some cases so strong that the human aspect was easily lost. People making one technical mistake could be dismissed for that one error regardless of the rules spelled out in national labour laws. Also ecological effects were simply overlooked or not regarded as important by the company. Thus, the company drew heavily on groundwater for irrigation, which made the groundwater in the ponds and wells in the surrounding dune landscape drop to dangerously low levels for the gardeners producing for the local market. The reckless spraying of pesticides and almost fearless and naive handling of chemicals by the workers made me aware that technology could not just be simply transferred without taking into consideration local culture and ecology.

Searching

These experiences were amplified in my first job as a project manager in a small integrated development project in Niger. Although the social component was more sound, because it was embedded in a local structure, the cultural component remained a cause for concern. Discussions with farmers on their practices and the reasons they gave for doing things were always very rich and joyful. On many occasions we also touched upon the deeper spiritual levels of life and the influence of religion. Often I discovered a much greater enthusiasm and openness for a spiritual agri-culture among farmers than among national agronomists who were well trained in the 'modern' way of farming.

The experiences in this typical project setting definitely caused me to go in search of a new technological approach in agriculture. Moreover, I sought a sound founding philosophy that was able to connect science with philosophy and faith. In the end organic agriculture looked like a promising approach because it offered a good

mix of ecologically sound technology, social justness (fair prices of agricultural products), economic viability and recognition of farmers' knowledge. These elements were covered already by organic farming before they became the leading cornerstones of the worldwide movement for sustainable development from 1987 onwards. Among the organic farming movements, bio-dynamic agriculture appeared strongest in incorporating the cultural component as an equally important aspect for balanced farm development in a social context. Its underlying worldview, anthroposophy[20] or the wisdom of the human being, offers practical interpretations in terms of new and wider views on a variety of subjects such as education, agriculture, medical sciences and health care, arts, socio-economic perspectives and spirituality and religion. This worldview explicitly takes the spiritual world as an essential resource for inspiration, analysis and reflection.

Anthroposophy consciously encourages the exploration of the spiritual world as part of our personal development path. Its essence is very open and stimulating personal growth. In a developmental sense, it attributes more value to fewer steps in growth, if these are ones that are consciously taken by oneself and really implemented in life, than more steps which may have been more or less 'copied' and not really practised.

My first steps in promoting the principles of organic farming in developing cooperation brought me in contact with the teachings of Sri Aurobindo (http://www.sriaurobindoashram.org/). His philosophy has not been translated into practical life as much as anthroposophy has, but it has some far reaching visions regarding the long-term evolution of mankind and spirituality in itself.

Worldviews: oneness in multiplicity

Somehow, the step to fully ally myself with one particular philosophy or worldview has always been and will be difficult for me. Doubts and questions have and always do rise to the surface. But two exciting certitudes become increasingly apparent to me. The first one relates to the understanding that the magnitude of life is far beyond my capability of comprehension. The second one is the deeply felt recognition that 'we need to experience the vast multiplicity of truths of spirit', a central element of the integral yoga philosophy of Aurobindo (http://www.kheper.net/topics/Aurobindo/main_points.html). It is exactly this multifaceted experience with different elements of worldviews that can move (or touch) me and help me move towards oneness between my individuality and the collective.

[20] Anthroposophy was founded by the Austrian scientist and philosopher Rudolf Steiner (1861-1925).

Inter-cultural dialogues on worldviews and knowledges

Reconstructing epistemologies of African sciences

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Introduction

Science has once more assumed centre-stage for development in general and for salvaging the human race from complete demise. The world is often referred to as a global village with the underlying assumption that science (read technology) has reduced both time and spaces for interactions. Hence, a 'universal science' is subsumed under this discourse. In establishing the bases for a 'scientific world', professionals and practitioners lose sight of the earlier colonisation role that the 'universal science' has played in subjugating Africa to the western world. With this short and myopic memory, we run the risk of walking on the same road twice – prescribing a 'universal science' again, which will be a recipe for (re)colonisation of Africa. According to Wiredu (2005), colonisation of Africa was not only a political imposition but a cultural one as well.

Instead of bemoaning this situation and waiting for doomsday, African scholars have assumed a proactive posture – questioning the status quo and querying whether Africa has a science to bring to the discussion table and in so doing carve a niche for herself in this 'global scientific village. A number of pertinent questions arise immediately: *Can we provide an alternative logic that will query and challenge the 'dominant' or 'conventional' science? What are the challenges that Africa has to offer? Do these challenges present themselves in a competitive form that will enable them create a credible constituency for constructive dialogue?*

This study intends to contribute to an anticipated intra- (within Africa) and inter- (Africa and the rest of the world) scientific dialogue by attempting, in addition to contributing to the answers to the pertinent questions, to generate information for a logic/rationale and vocabulary; in fact a paradigm (foundational theory) for an alternative science based on a worldview of the African.

The position taken here is that there is no one body of knowledge referred to as 'African Science' as you would for European or Western Science. It is more apt to refer to 'African Sciences' because of the proliferation of expression of bodies of *knowledges*. The basic building blocks are similar, but differently expressed because of the cultural, spiritual, philosophical and other specificities resulting from empirical encounters. Hence, pluralism is a better expression of what Africa has to share with the rest of the world. There is also no distinction between 'science' and 'arts' in the African context. What rural people have is a body of knowledge constructed (and perpetually being reconstructed) from generation to generation and over time and space covering various livelihoods and life-encountered experiences. African Sciences include therefore all the so-called sciences and arts.

I see ancestor-centrism as a philosophy, with cosmovision as one perspective of a worldview expressing this philosophy. Endogenous development is therefore a strategy that carries along with it a body of knowledges and sciences within the context of African peoples' cultures. This sets the stage for the ensuing.

The 'roots': ancestor-centrism

I start my presentation by looking at a concept I refer to as a*ncestor-centrism* (for lack of a better terminology) – a concept I have found to be very widely expressed in many cultures in Ghana. It is about our heritage: a heritage that is not static or an unchanging artefact of a former way of life, but a heritage that is adapting to the contemporary world and contact with others and that will continue to change.

As a matter of survival, the ancestors have long sought to understand the regularities and irregularities in the world around them, recognising that nature is underlain with many unseen patterns of order. They have learnt to decipher and adapt to the constantly changing worlds. For the ancestors there is a recognition that many unseen forces are in action in the elements of the universe, resulting in new sets of relationships which point to the essential balances and diversity that help nature to thrive (see Goduka, 1999).

There are various expressions and vocabulary surrounding the relations between the living, the dead, and the yet-unborn, which form part of the philosophy behind the linkage of the African to his/her ancestors (male and female). In Ghana the various expressions of ancestor-centrism are found in indigenous vocabulary such as Saakumnu in Dagaari, Nyaaba Itigo for the Gruni, and Amaamere for the Akans. The Ubuntu concept is known throughout Ghana and East and Southern Africa

The ancestors are at the apex of the ontological ladder. All knowledges and wisdoms emanate from here and are created and re-created by them. The development of knowledges is guided by the spiritual influences of the ancestors (by showing ample signs of concordance and discordance). There is an array of spiritual institutions that safeguard the interest of the ancestors, and that are in constant dialogue with the ancestral world – forming a vital link of inter- and intra-connectedness with *Mwin* (God).

The concept of spirits is key in the expression of *Saakumnu*. The positions of the Dagaaba with respect to spirituality are captured by Uka (1991) and in Goduka (2001) thus:

'……..Indigenous spirituality has no historical founder. It came into existence as a result of human experience of the mystery of the cosmos. In an attempt to solve the mystery of the universe, indigenes have asked questions, searched for answers, and come to the conclusion that the mystery must be supernatural power, to whom belongs both the visible and invisible.

It is a spiritual value and practice that is grounded and originated from the indigenous people's environment. It is neither preached nor imported to them. It permeates the private and public lives, as well as in their daily activities. Indigenes are not converted to their spirituality. Each is born into it, lives by it, practices it either in public or private life.

It has no written literature, sacred scriptures or creedal forms. It is an essentially oral tradition passed on also through mythology and legends, stories and folktales, songs and dances, liturgies and rituals, proverbs and pithy-sayings, adages and riddles. Some of these oral forms are preserved in

indigenous arts and crafts, symbols and emblems, names of people and places. Thus the African works of art are not merely for entertainment or for pleasing the eye. Rather they usually are a means of transmitting cultural and spiritual values, sentiments, ideas and indigenous cultural 'truths'.'

Within the context above, the Dagaaba believe that all living things have *sie or vuru* – this is *Mwin's* (God) gift to all His creation on earth. If there is no *sie* or *vuru*, there is no life or the living thing is dead. In the tree kingdom, for example, the Dagaaba believe that the *sie* of a tree can do harm to a person who kills it. There is a popular saying, '*a tie nyogu na*', meaning the *sie* or soul of the tree has harmed the person who killed it.

Limiting my studies to the Dagaaba (Dagaari is my native language, so I have conducted my investigations directly, through experiential learning and participant observation), I have done an in-depth investigation around the concept *saakumnu* – ancestor-centrism. I have used *saakumnu* as my starting point for a deeper understanding of the epistemologies and ontologies of African sciences, which I outline below.

Ontological cycle of existence

Within the African context, the discourse about the ancestral spirits (ancestor-centrism) almost invariably makes a link between the 'living', the 'dead' and the 'yet-unborn'. These three are inter-connected and provide a basis for the reconstruction of African sciences as shown in Figure 1.

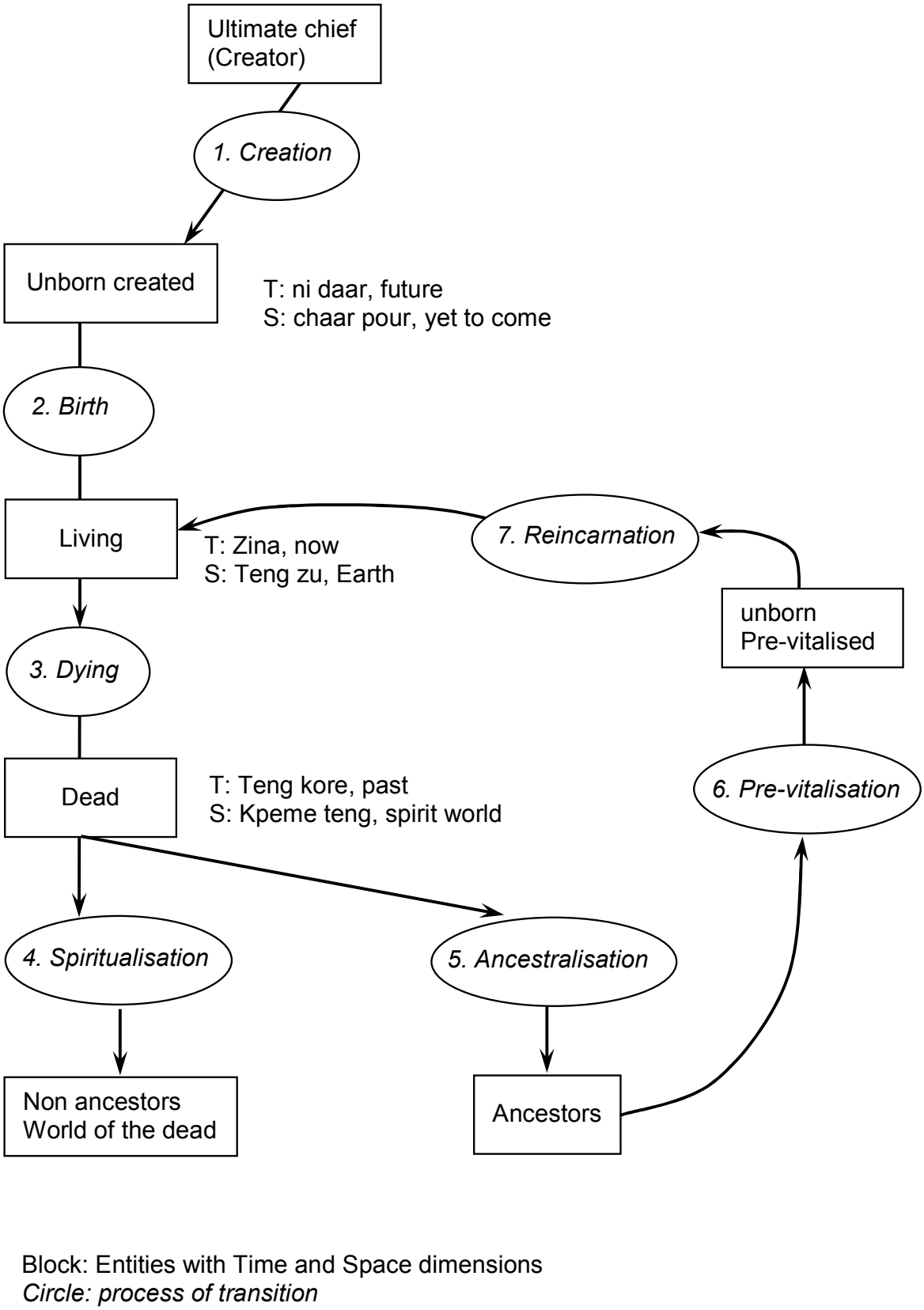

Figure 1 Dagaaba ontology: cycle of existence

Kpeme-teng: the world of the dead

It is important to emphasise that not all the dead in Africa are known as the ancestors. The qualification (which can refer to a man or woman) refers to the following categories:

- The founder of the community or village;
- The first settlers of the clan or lineage;
- A person that has lived a life that is in some way special or spectacular, has made a unique contribution to the community and has therefore been 'canonised'.

Hence in the World of the Dead (*Kpeme-teng*) we have, through an unknown process of spiritualisation, a category of spirits in general (non-ancestors), and by a similarly unknown process of ancestralisation, a specialised category referred to as ancestors (*Saakumine*). The Dagaaba believe that it is only the category of Ancestors that has the ability to re-incarnate in birth as and when they wish.

Some of the ancestors (*Saakumine*), through a process referred to here as pre-vitalisation, manifest themselves in 'unborn pre-vitalised forms', which through reincarnation, are then born into the world of the living.

Kpeme-teng, the World of the Spirits, is a space. The time element that coincides with this space is referred to as *Teng-kore* (Past).

Teng-zu: the world of the living

One category of the living (the Dagaaba say it is the smaller percentage) is contributed from the ancestral world. A larger percentage comes from God (the Chief of the gods – *Naa-mwin*). The Chief of the gods, through the process of creation, develops the 'unborn created'. Then through the process of birth, they join the living on the Earth (*Teng-zu*). Eventually, through the process of dying they become spirits and return to *Kpeme-teng* for the cycle to continue.

For the living, *Teng-zu* is the space that coincides with the time referred to by the Dagaaba as *Zina* (now, the present).

Chaa-pour: the world of the yet-unborn

From the above, it can be seen that the world of the yet-unborn, in the cosmovision of the Dagaaba, comprises the un-born pre-vital (of the ancestors) and the un-born created (of God).

This world of the un-born occupies is referred to as *Chaa-pour* and the time dimension is *Nidaar* (future).

Hence, the ontology of the Dagaaba concerning their existence has the following elements, with their definitions of time and space:

- Entities are: Unborn Created (*Nidaar*) and Unborn Pre-vital (*Chaa-pour*), the Living (*Zina* and *Teng-zu*), and the Dead, consisting of non-ancestors (*Teng-kore*) and ancestors (*Kpime-teng*).
- The processes of transition towards existence include: creation by Chief of the gods, birth, dying, spiritualisation, ancestralisation, pre-vitalisation and reincarnation.

To keep the wheel of existence turning, the Dagaaba identify the following institutions and functionaries:

- Birth attendants (women, young and old);
- Dying attendants (very elderly women);
- Undertakers (largely men);
- Special visionaries for reincarnation (fortune tellers and sorcerers – 'gifted' men and women);
- Functionaries for pre-vitalisation and creation are not human, but purely spiritual; they communicate with specialised soothsayers who are human (both men and women 'with the second eye').

The roles and rituals associated with these processes are interesting for further investigation.

Cosmovision and various forms of knowledges

Religious and philosophical concepts have their place within traditional worldviews. Often a hierarchy is indicated between divine beings, spiritual beings, especially the ancestors, men and women, and natural forces, such as climate, disease, floods, soil, vegetation or animals. These cosmovisions give rise to several rituals in which the elders, the priests, soothsayers and spiritual leaders play a prominent role. Cosmovision, to a large extent, dictates the way land, water, plants and animals are to be used, how decisions are taken, problems are solved, experimentation takes place and how rural people organise themselves (Haverkort & Hiemstra, 1999; Millar, 1999).

For the traditional people in Northern Ghana gods, spirits, ancestors, spiritual and political leaders, sacred groves, lands and shrines, ritual crops and animals, food items and cash crops are all interrelated. Obviously, Christianity, Islam and Western education have influenced the cosmovision of the Africans, especially those with formal education.

According to Gonese (1999), for the Shona, the human world, the natural world and the spiritual world are linked. The natural world provides the habitat for the spirits and sends messages from the spiritual world to the human world. The spiritual world provides guidance, punishment and blessing to the human world. People therefore have to relate to both the natural and the spiritual world.

From these examples of traditional cosmovisions in two countries as far apart as Ghana and Zimbabwe, it becomes clear that in the general traditional African worldview, land, water, animals and plants are not just a production factor with economic significance. They have their place within the sanctity of nature. Moreover, certain places have a special spiritual significance and are used as locations for rituals and sacrifices, for example sacred groves, shrines, mountains and rivers (Millar, 1999; Gonese, 1999). Fig trees and baobabs are often treated as sacred trees. The sun, moon and stars feature in myths and beliefs of many people. Certain animal species have a spiritual significance too. Cattle, sheep, goats and chicken are often used for sacrifices and other religious purposes. Creeping wild animals frequently feature in religious concepts. Snakes, lizards, chameleons and certain birds are considered messengers of the spiritual world.

Rain is regarded by African peoples as one of the greatest blessings of God, who is often referred to as the 'giver-of-rain'. Many people make sacrifices, offerings and prayers to God in connection with rain. Rainmakers are reported in all parts of the continent. Their duties are to solicit God's help in providing rain or halting it if too much falls.

These worldviews have resulted in the development of knowledges, knowing and their epistemologies. A study of the cosmovision concept has resulted in the following constellations of bodies of worldviews of African knowledges, depicted both in Figure 2 and in the box below.

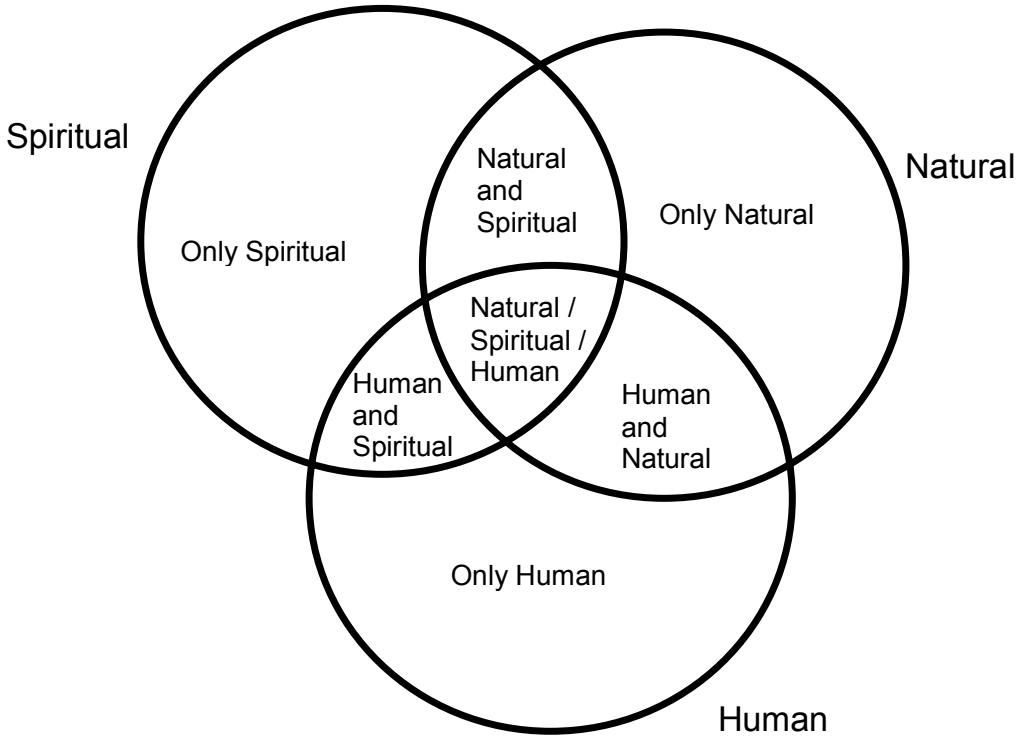

Figure 2 Constellations of cosmovision related knowledges

The three circles depicting African worldviews

Social/Human World, Spiritual World, and Natural World – the interaction of the three worlds implies the following constellations of knowledges:

- Knowledge resulting from Social interactions only
- Combination between the Social and Natural
- Combination between the Social and Spiritual
- Knowledge resulting from Natural interactions only
- Combination of the Natural and Spiritual
- Knowledge resulting from Spiritual only
- Combination of Social, Spiritual, and Natural

The last constellation is the perfect state, which strives for balance or harmony with itself.

These constellations highlight the heterogeneity and complexities of African Sciences, therefore engendering different bodies of knowledges and sciences that should underscore the development of Africa.
Conventional research concentrates on the 'horizontal level' – the Social and the Material. Investigation and research concerning the African should also be targeted at the 'horizontal level' but especially the ***'vertical', which deals with higher order discourses – the spiritual aspect of the African culture.***

African ways of knowing: the WHAT, the HOW, and the WHY

In order to build an understanding of the theories behind African sciences, we start by analysing the wisdoms surrounding the WHAT, the HOW, and the WHY of African culture. The ensuing is a reconstruction of these wisdoms as independent emerging properties and their various properties when they intersect or interact.

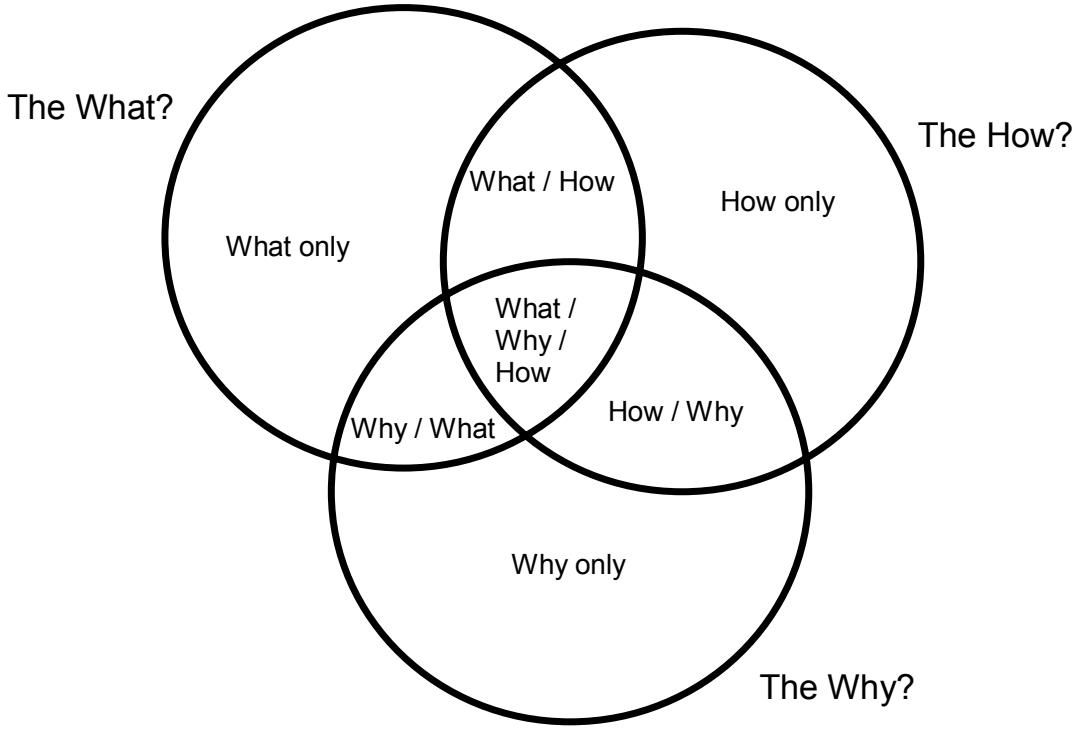

Figure 3 Constellations of knowing

The logic behind the three circles: African ways of knowing

The WHAT, the HOW, and the WHY – the interaction of the three implies the following constellations of knowing:

- Knowing resulting from the WHAT only
- Combination between the WHAT and the HOW
- Combination between the WHAT and the WHY
- Knowing resulting from the HOW only
- Combination of the HOW and the WHY

- Knowing resulting from the WHY only
- Combination of the WHAT, the HOW, and the WHY.

The last constellation is the perfect state which strives to be in balance or harmony with regard to the various forms of knowing.

The WHAT (Subject): Modifying the position of Mifflin (2000), phenomenon is defined here as any state or process known through the senses and by intuition or reasoning. Any fact, circumstance, or experience that is apparent to the senses (and by intuition) can be appraised or defined. This appears to be the central emerging property of the WHAT of African science.

It is characterised by sense and meaning-giving and also by intuition through experiencing and feeling. Because it combines sensing and intuition it has elements of realism. It is a type of realism based on the doctrine that the external world exists independently of perception and relativity, which puts perception at centre-stage in ascribing meaning to phenomenon.

The ultimate desired outcome of phenomenon in the African construction of the WHAT is expressed in essence. Miller (1997) defines essence as, '…. that which makes a thing what it is. The inner nature or most important quality of a thing or person. The nature of a thing throughout its change from potentiality to actuality.' For the African, essence signifies 'both an inner self and an inner peace' attained also through maintenance of our ethics of the community, reflections, meditations, predisposition, and 'calls'. It is the holistic total of the meaningful elements of an entity, our existentiality, our life world. The real essence of the WHAT is in the 'whatness' – its quiddity, something which makes it what it is and hence makes it different from others. For the African it captures the element of identity or 'whatness' – 'things are what they are'.

For the African, essence and therefore quiddity are also essential properties of the HOW and the WHY. This illustrates the complexities of African sciences. We come along with a new set of challenges to the scientific world, querying the very basis of our professionalism.

THE WHY (Reason): As part of the African logic, if phenomenon is established, there is the need to establish the WHY. The dimension of the WHY spans spirituality, humanity and nature. The central emerging property of the WHY things happen as they may is their cosmovision (their view of the world or worldview and also experiences they have encountered through experiential learning). Through the lenses of our cosmovision, sense or meaning is attributed or given to a WHY of an action or inaction. This becomes a basis for establishing 'knowing structures' – ontology, that helps attain essence and quiddity.

For the African, the concept of cosmovision includes the assumed interrelationships between spirituality, nature and humankind. It describes the role of supernatural powers, the natural processes that take place and the relationship between man and nature, and it makes explicit the philosophical and scientific basis on which interventions in nature take place (Haverkort & Millar, 1992). (It must be established here that there is not one cosmovision for Africa but many, as perceptions and beliefs of the cosmic world differ.) It often indicates a hierarchy of divine beings, spiritual beings (especially the ancestors) and natural forces (such as climate, diseases,

floods). These hierarchies give rise to several rituals in which the elders, traditional priests and soothsayers play prominent roles and prescribe the way problem-solving and general experimentation can take place. Cosmovision predisposes the way the African peoples go about knowledge and technology development, which form their indigenous knowledges. Hence, indigenous knowledges, and the cosmovisions inherent in them, determine how society organises itself and how effectively it achieves its goals (Millar, 1996).

THE HOW (Method): The way 'knowing' is conducted deals largely with the African epistemologies. 'Knowing' is constructed from a combination of realism, relativity and ontologies, which lend themselves to the establishment of essence/quiddity.

In order to deepen my understanding of the ways of the different ways of knowing – epistemologies – and to (re)construct the structures of knowledge and knowing – ontologies – it was important to look at this at various levels of addressing the WHY and the HOW, as in the diagram below.

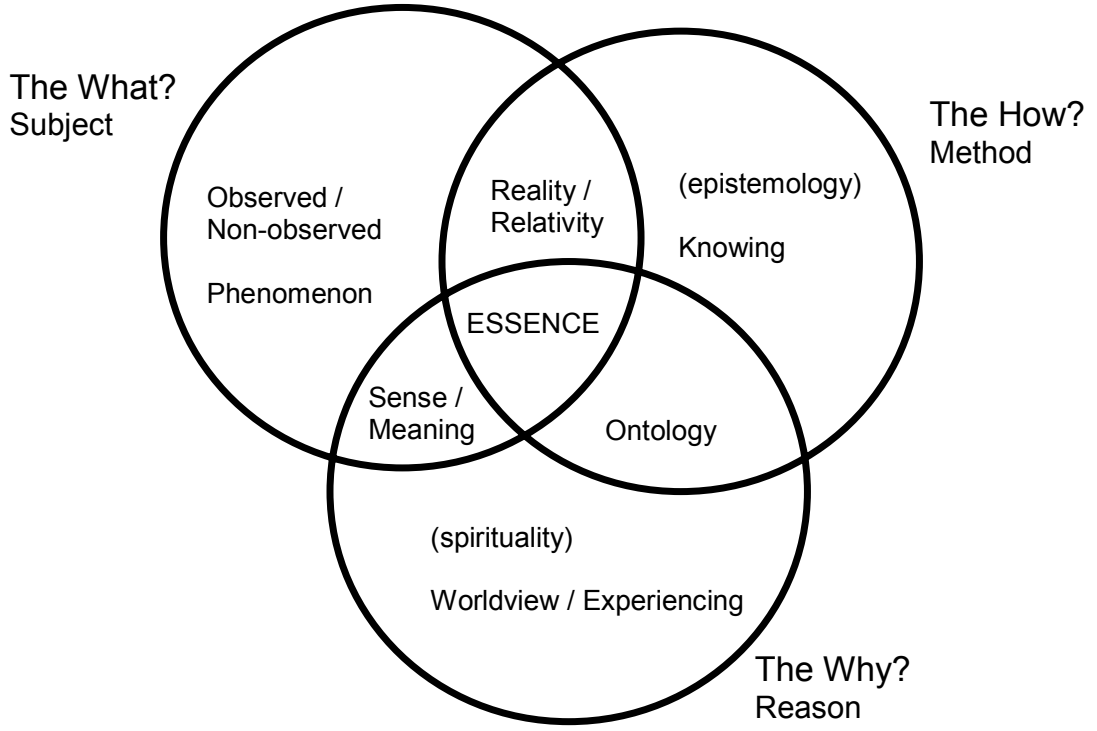

Figure 4 A paradigm for African sciences

The logic behind the three circles: aspects of African sciences

The WHAT (expressed in **Subject**), the HOW (expressed in **Method**), and the WHY (as in **Reason for Being**) – the interaction of the three implies the following constellations of knowing:

Subject:

- Phenomenon (Observed/Non-observed)
- Reality/Relativity
- Sense/Meaning
- Essence/Quiddity

Method:

- Epistemology
- Ontology
- Reality/Relativity
- Essence/Quiddity

Reason:

- Ontology
- Spirituality (worldview/experiencing)
- Sense/Meaning
- Essence/Quiddity

These constellations express themselves in the following forms:

- Knowing about/from the SUBJECT only (as in phenomenon – observed/non-observed)
- Combination between the SUBJECT and the METHOD (as in reality/ relativity)
- Combination between the SUBJECT and the REASON (as in the sense/ meaning)
- Knowing about/from the METHOD only (as in epistemology)
- Combination of the METHOD and the REASON (as in ontology)
- Knowing about/from REASON only (as in spirituality – worldview/experiencing)
- Combination of the SUBJECT, the METHOD, and the REASON as in essence/quiddity

This last constellation is the perfect state which strives to be in balance or harmony with regards to the various emerging properties of knowing.

Conclusions

I conclude this discussion on a paradigm of African Sciences by drawing attention to the overlaps and interactions from the ontology of the African notion of existence – the vital link between the living, the dead and the yet-unborn. I have elaborated entities and processes linked to these discourses and their defined characteristics of time and space from the perspectives of the Dagaaba of the Upper West Region of Ghana (an ethnic group also found in Burkina and Ivory Coast).

I have established that ancestor-centrism is a key to African knowing systems. Variously called *Saakumnu*, *Nyaba-Itgo*, *Amaamere*, or *Ubuntu*, ancestor-centrism is central to understanding the persistence of African knowledge and belief systems despite have gone through several persecutions and attempts to stifle this body of knowledge.

From an ancestor-centric position, my investigations showed that essence/quiddity is a common denominator for Africans' ways of knowing. Essence/quiddity is the desired state of our body of knowledges. The WHAT, the HOW, and the WHY of the African epistemologies have essence as a central determinant.

Although I am an African scholar, this is my first attempt at pulling together the series of investigations that I have been involved in since 1980 with respect to the indigenous knowledges of my people. In my attempt to deepen my understanding I

have ended up realising, from the tuition I received from the traditional knowledge experts I encountered, that it is a type of science that is very complex and better understood by the people themselves than by the 'outsiders'. Some of this knowledge can be, and indeed is, expressed outwardly for expanded learning and sharing, but most of it is 'internally' locked up and requires 'different sets of tools for scientification'. These tools include empathy, immersing/embedding, initiation and just being born into it, tutelage/apprenticeship, experiencing/ experiential learning and a calling.

As I grow in this 'new form of learning' it is my hope that I will find peers to help complement my deficiencies. This remains for me a lifelong challenge and, for that matter, a challenge for African sciences and scientists – the schooled and the 'natives' who we often refer to as 'unschooled' are all key players in establishing a niche in the world of science for African sciences.

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Material cultural heritage and endogenous sustainable development

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Introduction

The present article analyses how material cultural heritage can be used as a strategic asset for sustainable economic development, especially for local communities. With initial support from international agencies and progressively by themselves, an example is given of high-quality goods based on material culture that form a basis for a self-sustained endogenous economic development.

Tangible, intangible and material cultural heritage

There are three concepts of cultural heritage:

- Tangible Cultural and Natural Heritage: works of art, monuments, historic centres, parks or natural sites in which the beauty of nature is the dominant character;
- Intangible or Oral Cultural Heritage: oral traditions and expressions, performing arts, landscape, social practices, traditional knowledge, competences, and *savoir faire*;
- Material Cultural Heritage: goods based on material culture (functional objects, functional artefacts) mainly supplied by industrial districts: design-based goods, textile, apparel and fashion, ceramics and furniture, gastronomic products, etc. Material cultural heritage is based on tangible and intangible components associated with a local community.

These three concepts of cultural heritage developed out of the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (October 2003). UNESCO published its Third Proclamation of Masterpieces of the Oral and Intangible Heritage of Humanity in 2005. This aims at celebrating and safeguarding selected elements of the intangible cultural heritage.

Material cultural heritage

Despite the growing attention paid to human culture, one must admit that in general, material culture is underestimated, mainly because of the old stereotype about the low quality and low economic value of handicrafts, the primary products of material

culture. As a result, material culture receives too little consideration in cultural programmes and economic development strategies.

However, there is today worldwide evidence that material cultural resources, namely culture-based goods, can be instrumental in development, especially for micro- and small enterprises and local communities, allowing them to develop according to their own characteristics, providing them with new economic activities and thus enabling them to become less vulnerable and less dependent on current more erosive development strategies.

In fact, craftsmanship does not necessarily mean low-quality production. It may attain aesthetic quality and symbolic value as well as significant production value. Goods based on material culture have become a modern example of sustainable and endogenous growth based on the localised cultural industries. Indeed, when most of the economic and human resources are local, the economic process becomes endogenous.

Material cultural heritage, and design-based goods, can all be articulated in chains of creation of value, with innovative experiences apparent at every level: aesthetic, legal, productive, distributive, technological and educational. Moreover, such activities take on new economic significance when they assume the form of, and are governed in the logic of industrial cultural districts; they create a path to economic growth through the growth of small- and medium-sized firms which are intensely integrated within the territory and in the local community.

In the last decade, the trends in development have broadened the role of culture in models of economic development. Culture is a capital asset accumulated by a community whose members refer to it to connote their identity (Santagata, 2002). Aside from the notions of physical capital, natural capital, social capital and human capital, *cultural capital* has gained in importance as a fundamental asset for development. Preserving and fostering cultural capital has become a significant target for most strategies for development, shared by the main international donors and agencies.

However, efforts have been directed mostly to tangible heritage assets recovery and conservation (monuments, natural environment, museums, etc.). Some attention has also been given to the preservation of intangible cultural heritage, but this has not been significant. Unfortunately, evidence has shown that it is very difficult for this kind of project to become self-sustained and that funding for conservation cannot last forever.

It is therefore necessary to find new strategies for economic development based on intangible and oral cultural heritage and material cultural heritage. Material cultural heritage can enable projects to be self-sustaining, as selling culture-based goods and services is a way of raising income. Moreover, the sectors that make the culture-based goods 'are all engaged in the creation of marketable outputs whose competitive qualities depend on the fact that they function at least in part as personal ornaments, modes of social display, forms of entertainment and distraction, or sources of information and self-awareness, i.e. as artefacts whose symbolic value to the consumer is high relative to their practical purposes' (Scott, 2000, p. 3).

The following challenges need to be considered if material cultural heritage is to be instrumental in endogenous economic development:

- The capacity to organise the production systems as cultural districts or cluster;
- The capacity to promote collective intellectual property rights;
- The use of business development services in order to develop cultural districts, so that its members can take full advantage of their 'industrial atmosphere';
- The involvement of local communities, which are real actors of their development, and have shown increasing interest in models based on cultural capital.

The industrial and institutional cultural districts

The concept of cultural district was introduced by Alfred Marshall and has become known worldwide among economists, geographers and sociologists. This notion has been presented by Becattini and his followers as a new general model of local development as well as a key (and unique) feature of Italian industrialisation in the post-war period (Becattini, 2003).

This concept of cultural district is quite new in most developing countries. A cultural district is where most of the production has its basis in the cultural context of the area. The products are incorporate the symbolic and aesthetic potentials inherent in the local culture. The local resources, human and material capital and *savoir faire* (creativity and ingenuity), are considered the main inputs in cultural production, which leads towards endogenous growth and sustainable economic development.

Industrial cultural districts belong to the endogenous growth models that are based on the presence of small firms (Storper and Harrison, 1991) and specific forms of social local regulation. The basic components of this particular strategy of district building are based on:

- A local community that is cohesive in its cultural traditions and accumulation of technical knowledge and social capital;
- A low level of product standardisation;
- Accumulation of savings and the presence of strongly entrepreneurial cooperative local banking;
- A bent towards open international markets;
- Public financial support along the entire chain of the creation of value;
- A high rate of birth of new firms as a result of social capability and interactive learning;
- The ability to be district minded, to become a local system, and to produce positive externalities in the field of design, technological innovation, managerial organisation, the creation of new products, labour market flexibility and commercial distribution.

In Italy, Murano-Venice is an example of industrial cultural district; the glass showpieces that are produced have an attractive aesthetic look, which is rooted in its cultural value and endogenous creativity and ingenuity.

The essential characteristic of an institutional cultural district is its grounding in formal institutions that allocate property rights and trademarks to a restricted area of production. These rights take on the meaning of community or collective property

rights. In this sense, they legally protect the cultural capital of a community in a given area. Their protection concerns the intellectual and intangible components of the culture embedded in the goods and services produced. This right is normally established through the setting up of a collective trademark that only the local producers can exploit.

The content of the goods produced in these districts is strictly connected to the local civilisation and *savoir faire*. Furthermore, the economic advancement of these products is naturally correlated with the local culture: the more their image and symbolic icon is identified with local customs and cultural behaviours, the more they seduce consumers (cultural lock-in) and the more their production is fostered. In this case, the importance of culture is all-inclusive, mobilising the aesthetic, technological, anthropological and historical content of the district (Santagata, 2002).

The collective property right of the prestigious Italian wine Barolo is an example. Its *protected designation of origin* has become the sign of quality wine produced locally, giving the district an identity of institutional cultural district.

The Italian experience shows that a process of endogenous economic development may be supported by a strategy based on cultural district models. In this perspective, the presence of small firms is essential to a district, but the presence of many small firms does not in itself form a district. One of the most meaningful characteristics of a district is the interdependency of its firms: in this type of 'industrial atmosphere', frequent contact favours the exchange of specialised inputs; continuous and repeated transactions cause information to circulate. Within the districts, it is easier to find contractors, to verify the quality of goods and services and to sign standardised contracts. The social habitat of the industrial district consists of large families and of firms where the entire household, including the wife and children, are employed. Tacit knowledge, mutual trust and the accumulation of social capital are pervasive traits of local society and culture.

These cultural district models represent good practices of sustainable endogenous growth led by individuals, communities and public authorities. Even if a district is supported by a mix of individualistic behaviour and cooperative spirit, the role of local and regional governments is an imperative aspect for the successful consolidation of these models. While most developing countries are currently undergoing a process of decentralisation, the concept of cultural districts should be developed gradually.

In developing countries, many potential industrial districts exist, for example where there are a number of small- and medium-size enterprises belonging to the same value chain and producing a good based on the local material culture; positive externalities generated by the free circulation of knowledge and skilled workers; trust and cooperation; some local institutions supporting the local system.

Most developing countries are developing decentralised local government structures. As the representatives of the grassroots level, local governments are well placed to boost culture development, but in most cases they lack the theoretical basis and skills for cultural development, as well as the human resources that can play a vital role in community mobilisation, indigenous resources utilisation and partnership building between local governments and communities. Therefore, local governments and communities should be involved in the process of reflection and action, allowing

them to strengthen local economies through the production and marketing of cultural goods and development of cultural districts.

In order to develop the potential of a cultural district, it is imperative to assemble the local artists and develop a strong partnership with the local and district governments so that sustainable strategies and favourable policies can be formulated. The potential is there but needs strengthening and streamlining at public as well as private level. NGOs can play a role of catalyst and a bridge between artists' communities and local governments for the promotion of cultural districts. Once the cultural district models are recognised in one district, they will regenerate the indigenous skills among young people by establishing proper capacity building institutions and creating employment opportunities in the cultural sector, which will ultimately enhance the quality, production and consumption of culture-based goods at global level.

As mentioned earlier, cultural districts are a new concept in most developing countries and need to be structured. It seems to be difficult for policy makers and other stakeholders to adopt proper strategies aimed at achieving the development of cultural districts. These countries require an institutional framework capable of coordinating actions: developing networking capabilities, establishing a formal system for creation and protection of intellectual property rights, in sum, providing members of cultural districts with the services they require. To this end, the formation of craftsmen organisations should be promoted and supported.

These organisations could take the form of cooperatives, associations, non-profit organisations, etc., and would be mainly in charge of providing craftsmen with tools that help them to solve problems they face in each phase of the value chain for culture: training, fund raising, market access, demand development, among others.

Attention should be given to the material component of cultural capital of the cultural districts, so that they can become self-sustained by selling their cultural products and services.

Collective property rights

The goods based on material cultural heritage are characterised by many intangible inputs, including aesthetic design, decoration, technological innovations and traditional knowledge. All these inputs increase the counterfeiting ratio (economic value of intellectual components : economic value of the raw components) of the goods, which is likely to lead to an increase in the probability of illegal copies (Benghozi and Santagata, 2001). Therefore a system intellectual property rights is the main way to protect the honest producers from illegal and unfair competition.

While the *individual* intellectual property rights safeguard individual producers, providing them with the efficient incentives to invest, mostly in quality and reputation, the *collective* intellectual property rights pertain to all the producers located on a given territory.

Among the collective property rights protecting culture-based goods, the Protected Designation of Origin (PDO) (in French *appellation d'origine contrôlée, AOC*) is a distinctive sign, usually the name of a village or locality, assigned to a product whose characteristics are deeply rooted in the local social and cultural environment or

territory (Santagata, 2004). The entitlement to use the abbreviation 'PDO' offers a means of protecting the traditional practices of a specific well-defined region. The PDO gives rise to an exclusive right, namely to a monopolistic power, which is shared among the producers located in one protected area. The *geographical indication* is also a distinctive sign, usually the name of a village or locality, assigned to a product whose characteristics are deeply rooted within a local technique or to a particular production process performed in an area. This second type of protection is less intense and strict, and is usually used in reference to the field of unfair competition.

In contrast to the two rights mentioned above, the *trademark* is a feature typical of the market for reputation (Lanes and Posner, 1987). While the trademark or the brand name protects a single producer, the designation of origin protects all the registered producers in a given place. The former is a form of individual protection; the latter is a form of collective and community protection.

Collective intellectual property rights present some interesting advantages:

- As they create a monopolistic privilege, they allow an increase of prices and of yields, which contribute to a substantial accumulation of capital;
- Legal protection generates incentives so that producers find their incentives in the investment and valorisation of products that have been selected through a long cultural tradition;
- Legal protection and economic incentives lead to better control of the productive and distributive process, with a remarkable increase in the quality of the products.

Business development services

Small and medium-sized enterprises (SMEs) play an important role in the achievement of broader development objectives, including poverty alleviation, economic development, etc. The provision of business development services, including a vast range of financial and non-financial instruments, has been shown to be a strategic tool in accomplishing these objectives. Business development services are delivered at the micro-, meso- and macro levels.

Micro-level instruments are delivered directly to beneficiaries (artists, craftsmen, cultural entities) and usually include a combination of training, extension, consultancy, counselling, information delivery, business linkages promotion, technology development and transfer, funds provision or facilitation, as well as the development of commercial entities.

Meso-level interventions aim at enhancing the efficiency, effectiveness and sustainability of indigenous local organisations, through institutional development and capacity building. Macro-level interventions, undertaken by governments, include setting up national SME agencies, supporting conferences, meetings and publications, establishing regulatory committees, decentralising SME development policy to the local level, supporting national and local dialogue on SME promotion strategies and measures, export and bank credits, strengthening the advocacy capacity of trade associations.

Experience shows that, if appropriately directed, business development services can become fundamental tools for allowing cultural actors to overcome obstacles they

usually face in their development, particularly in cultural districts. In practice, the collective provision of business development services is more efficient than individual assistance, in terms of outreach and cost-efficiency.

Donors' support for these interventions has increased significantly over the last decades. Donors have accumulated considerable experience in this field and have adopted some major changes in their approach, particularly regarding impact, cost-effectiveness and sustainability of interventions. It seems easier then to imagine that donors would be more interested in providing business development services to projects based on material cultural capital – which in the medium and long run are expected to become self-sufficient and sustainable due to marketable features of the cultural goods – than supporting interventions for projects purely based on intangible or tangible cultural capital.

Local communities

Most craftsmen and artists in developing countries are involved in cultural production as a means of subsistence. Its informal nature means it contributes little to national economies. Since craftsmen and local community artists are not organised, culture-based goods production and access to the global market is not only limited but also lacks the proper strategies for quality design and promotion. In most cases, formal guilds and craftsmen's associations are absent, resulting in exploitation by middlemen. In order to promote and develop culture-based goods, it is imperative to mobilise and organise the local craftsmen communities in guilds, associations and organisations, so that their real potential can be fostered in a comprehensive and organised way.

Once artists are organised, it is easy to seek new forms of training to enhance their skills and creativities in the production of quality goods. Training can improve the knowledge of artists by exposing them to the global market of culture-based goods, which will improve their skills and strengthen their creative potentials. Introduction to new technologies, orientation towards modern global trends in cultural production and new promotion strategies, and physical and virtual networking should be the main contents of these trainings.

The process of local artist communities' development consists of four stages: mobilisation, organisation, production and promotion. At the *mobilisation* stage, local artist communities should be assembled, oriented and mobilised through formal and informal meetings. Once they are mobilised, they should be organised in one *organisation* or network to act collectively and to avoid unnecessary competition. Capacity building training constitutes a part of the organisation stage. *Production* of culture-based goods needs good-quality raw materials and continuous monitoring to produce quality goods. The *promotion* stage is very important as it represents the distribution phase of the value chain. In this stage, new marketing strategies, networking with other associations, partnerships with local government, proper contacts with other firms and continuous monitoring are essential if the quality goods are ultimately to play a vital role in the strengthening of local communities as well as their economies.

Example of a culture-based good: the Ambositra handbags and baskets[1]

Cultural activities have been performed for centuries throughout Madagascar, but each region has developed its own cultural expressions according to local habits and available materials. Each region has come to specialise in particular culture-based products, especially in craft production. Even within regions, there are clear aesthetic, functional and structural differences in products from one small village to another. Progressively, incipient but well-rooted cultural districts started to emerge and consolidate and their importance started to grow considerably, as has happened in Ambositra.

Ambositra is a small village in the central south of Madagascar, well known for the quality of its wicker and raffia handicrafts. Raffia is a special fibre used for making bags. A few years ago, artisans in Ambositra created their own design of handbags and baskets made of raffia.

On the tourist route to the southern part of Madagascar, Ambositra attracts many tourists who are aware of the quality of its handcrafts. Many of them show great interest in the Ambositra handbags and baskets. Craftsmen understood this, but they lack the capacity to produce the handbag at a larger scale: producing a large quantity while respecting norms such as standardised size and quality. As has happened with other handcrafts produced in other regions of Madagascar, some failures can be identified in promoting the value chain of production of the Ambositra handbags and baskets. The main obstacles include:

- No mechanisms for selecting artists and promoting the inclusion of talented individuals into the handbag production;
- Unprotected individual and collective intellectual property rights;
- Design not in accordance to market trends;
- Lack of market access to both national and international level;
- Training and funding limitations.

Some investors suggested that the craftsmen organise themselves in an association, and then provided them with training and funding to start up activities.

[1] Personal experience in July 2005: story told in Ambositra, Madagascar.

The result has been spectacular: Ambositra handbags and baskets have become fashionable in various capitals and major cities of Europe, and are favourite items during the summer. The models have spread all over the world, even reaching the Sally beach in Dakar, Senegal, where there is a special shop selling exclusively the Ambositra handbags. The creativity of the Ambositra craftsmen has been rewarded with the broad success of its handbags and baskets. This leads to the notion of creativity and fashion.

Creativity-based goods are among the most specialised of all goods. Creativity, like culture, is profoundly rooted both in time and in space (Santagata, 2002). The culture of creativity, or its inherited capital, is inextricably linked to a place, or – in a social sense – to a community and its history. When creativity is committed to aesthetic values, the form, original functions, and goods 'created' are laden with symbolic values. This is because the aesthetic, the design, and an original function or new forms are recognised by consumers, not only for their measurable qualities and quantities, but also because of the signals that touch their heart, soul, emotions, ambition and courage.

For fashion goods, creativity is actually the core of the production chain of value. The convention of originality – i.e. the quest for novelty – implies the formation of a sense of social belonging: people like a particular piece of apparel that is original and allows them to develop a sense of distinction, but at the same time, also allows them to develop a sense of social belonging.

The fashion world has been deeply influenced by the emergence of creativity. The behaviour of consumers and producers has changed extensively in response to the rhythms and changes of creativity, a good that is both rare and inexhaustible.

Conclusion

To sum up, under appropriate conditions, the potential of a cultural district can be significant. Some benefits, both economic and social, include:

- Job creation with subsequent unemployment rate reduction;
- Income generation and poverty alleviation;
- Reduction in the emigration rate;
- Non-erosive development;
- Preservation of cultural heritage by means of self-sustained development due to material component-based strategies;
- Links with other sectors of the economy, especially tourism.

Creativity is a generation-based good whose major challenge is the continuity of production at constant quality. If creativity is essential in the search for sustainability, then memory is in turn vital to creativity. That holds true for individuals and for peoples, who find in their heritage – natural and cultural, tangible and intangible – the key to their identity and the source of their inspiration.

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Amerindian cosmovisions and sustainable endogenous development

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Latin American context and the indigenous question

During the last hundred years, the countries of Latin America have followed roughly the same pattern of development. From the first to the third quarter of the twentieth century, most policies followed were Keynesian or nationalist populist in nature, where the state played a fundamental role, not only in the economic sphere but within the social and religious life of the population.

The local driving forces were those that advocated the formation of the nation, including the creation of an internal market and a national economy, the creation of a collective identity, cultural and linguistic homogenisation of the population and the formation of collective beliefs concerning the origin of the nation, collective history and the idea of the nation in the future. The specific mechanism of development was that of industrialisation, in emulation of the countries of the western Northern hemisphere.

The worldwide economic crisis of the 1930s forced the Latin American nations to pay greater attention to their internal markets and less to the international economy. In the absence of clear international pressure, internal development was to varying degrees successful in the different countries. Brazil, Argentina and Mexico were most successful when it came to industrialisation and the formation of the nation state. Colombia, Venezuela, Chile and Uruguay experienced lower levels of industrialisation but were succeeding in laying the foundations for industrial development that would take place later with the neo-liberal wave of development. Bolivia, Peru, Paraguay and Ecuador however did not consolidate their industrial basis or a common national identity.

From the 1970s Latin America experienced a wave of so-called neo-liberal development policies, in which the role of the state in the domestic economy was severely reduced, and development took a more externally oriented path. The failure of industrialisation policies, deteriorating balance of payments and external debt crises were factors that impelled the states of Latin America to search for alternative policies to Keynesianism. The international context of the time caused the countries to look abroad, to the United States and Europe, and neo-liberalism found an easy base in a world with US hegemony, the IT revolution and the trend towards globalisation.

Common to all the countries of Latin America was orientation towards the model of the western Northern hemisphere. This was not a new development, but continued the tradition that had started during the colonial era, of Latin America being regarded as slow in relation to Europe and therefore not developed. The logical

outcome of this assumption was either the extermination of the indigenous population or its definitive alienation from Western civilisation.

The process of alienation of indigenous populations (whether ethnic groups, towns, nationalities, nations or civilisations) is regarded as an indication of the backwardness of these groups in relation to a supposed 'line' of evolution and development of urban centres and cultures. The debate surrounding this assumption has been amply covered by Haverkort et al. (2003). The book cites many examples of other processes of development, which have different visions from the Western vision when it comes to worldviews and cosmovisions.

Eight percent of the total population of Latin America consists of indigenous peoples, with concentrations in Bolivia (62% of the total population), Guatemala (43%), Peru (40%) and Ecuador (35%). The social, economic and political marginality of these groups is inherited from the colonial period but continuing into the present. The situation has devolved into a vicious circle in which the indigenous populations continue to decline, as does the wealth in the hands of the indigenous people, and their political participation. Exceptions are found in the political organisation MAS (Movimiento al Socialismo) in Bolivia and Pachakutec in Ecuador.

Indigenous production is largely bound up with small-scale farming and therefore does not have the same capacity for wealth generation as other forms of production such as capitalist enterprises, cooperatives or even micro-enterprises. There is little concentration of productive assets, which to a certain extent is a result of the low productivity of the cultivation systems. Statistics indicating the contribution of the indigenous economies to the national economies are also lacking. This is an indication that a substantial proportion of the production is neither monetised nor included in the market economy. Much circulates through non-mercantile mechanisms of reciprocity and redistribution in family and communal circles and local regional markets.

The absence of recognition of indigenous forms of economy can be an explanation of why indigenous populations have been largely ignored in the formulation of public policies by the state. The recognition of indigenous forms of organisation offers an alternative to the simplistic visions of 'natives' in contrast to 'Westerners'. It also offers an alternative to racist or religious explanations of the current position of indigenous populations.

We consider that the indigenous question must be approached from two different but complementary angles: first from an ideological vision, building on the traditional concepts of life or cosmovision and its resulting epistemological derivation; and second from specific material, therefore mainly economic level. By combining both of these it is possible to derive a different conception of development.

'Other' conceptions of development

It is no coincidence that the countries with larger indigenous populations are also where the Keynesian and neo-liberal 'models' of development have been less successful. It is in these countries that indigenous cosmovisions and material possibilities overshadow the other options.

Table 1 provides an overview of the most influential cosmovisions in Latin America, those of the Maya, Quechua and Aymara groups.

Cosmovision / Theme	Maya	Quechua/Aymara
Principles	Integrity, diversity, harmony, unity and complementarity. The Mayan calendar is the key to understanding the cosmovision since it relates the origin of life, the measurement of time, the movement of life, the possibilities for harmonious relations between human beings, norms for ethical and moral conduct. It is a synthesis of different fields and specialties of human beings.	Balance, complementarity • To feel (Spirit) • To think (Knowledge) • To do (Experience) • To be able (Organisation)
Spirituality	The spiritual experience is animistic in sense of a coexistence balanced daily with elements of nature: wind, movement of the air, cold, centre of the cosmos, centre of the Earth, the heart of the fire, body fluids.	The spirituality is animistic because the balance with living beings that surround the community is celebrated: plants, animals, vegetation, hills, etc. Balance between positive and negative energies is sought in nature.
Natural territory and resources	Handling of resources is done in close relation to the Mayan calendar, involving rituals, social relations and ecological balance.	Territorial occupation by ecological levels (maximisation of access to zones of production), continuous or discontinuous. The territory is made up of three parts: the sky (*Alajpacha*), the earth (*Kaypacha*) and the subsoil (*Ukhupacha*). Harmonic re-creation of natural resources. Production in balance.
Medicine	Integral medicine: takes care of spiritual, psychological, mental, moral and physical aspects of human beings. Health problems arise when advice and norms for behaviour are not followed, or when energy is not channelled completely. Special treatments using plants and elements of the nature also exist.	Inner balance of the body. Balance with nature and natural energies. Treatment of disease takes into account the spirit of the person as much as the physical part, and includes elements of nature: plants, animals, fire, water, etc.

Cosmovision / Theme	Maya	Quechua/Aymara
Learning	The wisdom: we feel, we live, we think, we engage in a dialogue and we are made well. This is fundamental to autonomous learning.	Internal and external to human beings: to know, to include and understand, to discover, to re-create.
Justice	Conflicts are solved by means of the advice of the most respected elders within the community. The calendar plays an important role because the causes of the conflicts can be found in it.	Communitarian justice: consists of service to the community rather than payment of fines. Responsibility is not only to the family but also to the community.

Table 1 Cosmovisions of various indigenous groups in Latin America

In general terms Latin American Indian cosmovisions do not know dualistic dichotomies between feeling and rationality that are characteristic of Western cosmovisions. In the West spirituality has been relegated to the world of religion, leaving rationality to dominate the other spheres of life. Feeling and rationality are united in the indigenous cosmovisions, which assign living things not only with a use but also the capacity to transmit energy. Following this vision, it is important to maintain balances by means of rituals so that daily life unfolds in an auspicious way for humans.

The aspects covered by Latin American indigenous cosmovisions can be characterised in the following ways:

- They have a totalising character; there is no ontological differentiation between beings that share life: the human, animals, plants and natural worlds have the same value.
- The main paradigms in the cosmovisions are balance, reciprocity and complementarity, which mutually influence each other.
- Religion is regarded as animistic as not only humans but also all living beings are regarded as having souls or spirits.
- Medicine consists of the search for physical and spiritual balance within human beings.
- Justice also carries the same connotation of balance between human beings and nature.
- All these elements seek the totality of life: individual and collective accomplishments in all facets of existence, not only material subsistence but also in the social sphere (prestige, recognition), norms and rituals in balance with nature.

Latin American indigenous cosmovisions have survived throughout history, partly because they are not susceptible to the logic of disruption. They have incorporated elements from the dominant cultures, progressively complementing their own knowledge and experience in the fields of management of land and resources, medicine, education and justice.

Although these practices are sometimes labelled 'archaic' in reference to capitalist development and its social and political institutionalism, the fact is that they have coexisted along with the capitalist system in many countries for a number of centuries. They have resisted becoming dependent on the dominant ideology, but are inserted into the capitalist ideology (liberalism) when circumstances determine (e.g. representative democracy, internal markets and monetisation of labour).

This approach to characterising Latin American endogenous cosmovisions enables us to establish which elements of endogenous development policies have arisen from the cosmovisions.

Elements of sustainable endogenous development

As we have already mentioned, discussion of the model of development requires awareness of the context within which policies are born. This places the discussion on the ideological plane, where Latin American indigenous cosmovisions receive priority and are regarded relative to the material, social and spiritual Judaeo-Christian conceptions.

We refer once again to Haverkort et al., in which some structural characteristics of Christian cosmovisions are outlined. When it comes to superseding these, the Latin American indigenous cosmovisions have an important paradigmatic role to play as they represent the aspirations of a number of different societies.

There is a direct bond between cosmovision and daily life of communities. Indigenous peoples approach daily reality from the point of view of a unity between feeling, thinking and acting. In this sense the elements of sustainable endogenous development (SED) are intimately bound up with the spheres of material, social and spiritual daily life, first reinforcing capacities and local potential (intra-cultural level) and as praxis incorporating exogenous elements in cosmovisions (inter-cultural level) (Delgado et al., 2006).

The material sphere

In terms of economics, surplus production is redistributed among all members of the community. The market works in such a way that collective accumulation takes place. The means of production are thereby redistributed within the confines of the community, and although this reduces the potential for productivity increases, it makes production more sustainable in the medium to long term. The ultimate goal of production is to achieve nutritional sufficiency, and the orientation is in terms of use value and reciprocity.

The territory is inhabited in harmony and balance with the elements and natural resources within it. Therefore low-input appropriate technologies are used that suit the ecological characteristics of each region. Sustainable endogenous development in the material sphere has the following fundamental characteristics that underlie the intra- and inter-cultural method:

- Territory occupied for living and food production is spread over a maximum number of altitudinal levels and ecological niches, to allow for diversification of production (and therefore also nutrition) with use of minimal energy and technologies available in the local context.
- The promotion of plural economic dynamics, not only guaranteeing nutritional security and resource maintenance, but also monetary complementarity and increase of productivity.
- Where possible productivity increase takes place through the productive concentration of assets available at a particular moment (earth, water, seed, technology, income).
- Channelling production that exceeds local needs into market systems at the regional level: strategy to avoid the chaos of the market and the vulnerability of the individual or the group to this mechanism.
- Dynamic regional production can be geared towards the global economy, opening up the potential to expose the global economy to Amerindian principles such as those of sufficiency, reciprocity and complementarity, and conversely to undergo the effects of the global economy at regional level.

The social sphere

The mechanisms of wealth distribution also ensure that there is little social differentiation. Sharing ensures that marginalisation does not occur and that quality of life is maintained. The social organisation and mechanisms involved resemble those of participative democracy. There is also rigorous social control of those holding positions of authority, as these positions are rotated. This is reflected politically in the participative and direct way in which local development planning takes place.

Within the vision of unity and complementarity, the social sphere is directly related to the material dynamics of the community. The characteristics that need to be supported and developed include the following:

- Without denying individuality, the communitarian logic of decision making in communal life and at the municipal level ensures uniformity of benefits. In this way participative democracy transforms into a regional phenomenon which needs to be spread and strengthened through a continuous flow of information towards the communities and training of leaders who have the capacity to extend their influence to the local level.
- Local social organisation must be capable of affecting the regional political level in order to contribute to the democratic deepening of the societies and the establishment of public policies that promote activities in the material sphere in the indigenous communities. This is possible by extending the work area to reproduce the micro-level experiences at the regional level.
- A direct relation exists between social organisation and political activity. For that reason sustainable endogenous development also supports political protagonists of Latin American indigenous communities.

The spiritual sphere

Spiritually, the vision of the sacredness of the natural and social world s provides direction for re-creating sustainable societies. This is a subject of central interest at a time when environmental and social crises have become universal. Rituals imbue deep ethical meaning in both individuals and at the collective level, and it is this ethical element that has been displaced by Western civilisations and their logic of accumulation.

In the same line, sustainable endogenous development can be a central paradigm for the ethical framework of individuals and the collective, with a religious or ritual background necessary for revaluing and searching for the importance of social meaning at regional and national level. The elements of sustainable endogenous development in the spiritual sphere include:

- Revaluing Latin American indigenous rituals and calendars to strengthen the self-esteem and the cosmovisions of the societies that practise them.
- Reconstructing and revaluing the mythical world of Latin American indigenous cosmovisions, because these contain creation myths and describe the mission of societies as they pass within the natural world.
- Increasing awareness of the influence of Judaeo-Christian religions on the essence of Latin American indigenous cosmovision and the dangers of the material and social disintegration of societies as a result of changing principles.

Difficulties facing sustainable endogenous development

Without wishing to idealise Latin American indigenous cosmovisions, it is important to emphasise the main difficulties they face. Attempts to extrapolate these systems from the micro- local level to the macro level have largely failed. As of yet there have been no in-depth studies of the reasons for these failures, but we can outline some points that may be indicative.

The first point is that systems based on the Latin American indigenous cosmovisions must have an ethical base as a precondition. The unity between feeling and rationality is what gives meaning and ethical values. However, if the Latin American system is only seen as a utilitarian and rationalist mechanism, its failure will be guaranteed.

The second point is related to economic rationality. In the Latin American indigenous cosmovisions the logic of accumulation of wealth is not prominent. Economic activity is mainly a means of satisfying the material necessities of subsistence, leaving space for social life, leisure and cultural development. It is not designed to generate mechanisms of accumulation, as these are not the aims in the face of an uncertain future. The endogenous economic rationality is intimately bound up with the sustainability of productive systems. Overproduction for maximum benefit implies the risks that systems collapse, and this is what happens when productive systems are subjected to the rationality of economic accumulation. This is the experience of many rural development policies.

The third point is related to political experience. Participatory democracy is effective under conditions of shared common ethics, values and objectives where political action represents authentic service. When a system that works on the basis of these premises is confused with the particular interests of class, nationality, region or religion, the result is participation that is less democratic than representative.

Finally, the processes that are implemented must be seen from a diachronic perspective, of the medium- and long term, in which social learning is fundamental to the transformation of society. The failures occurred in a logic of immediacy, where the process character is ignored and learning is relegated to repetition and transmission.

It is necessary to deepen and strengthen the insights in the failure of attempts to extrapolate from the micro level to a wider level so that they can be successful and the character of Latin American indigenous civilisations becomes visible.

Following the arguments in favour of complementarity, sustainable endogenous development cannot be achieved unless it is complemented by exogenous or culturally different elements. In that sense, it is important to gather experiences of economic productivity increases that do not do violence to Latin American indigenous rationality. In the social field, the combination of representative and participatory democracy based on the spaces present, is of key importance in the advance of societies that embrace total life.

Sustainable endogenous is not a fundamentalist view of Latin American indigenous society, nor is it a new intrumentalisation of the indigenous cosmovisions for western ideology with Judaeo-Christian origin. It rather is a pluralistic approach that complements indigenous and exogenous perspectives to face the material, social and spiritual reality of the 21st century.

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From scientific monoculture to intra- and inter-cultural dialogue – endogenous development in a North-South perspective

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Introduction

By the end of the 1980s the World Commission on Environment and Development (1987) defined sustainable development in terms of 'meeting the needs of the present without compromising the ability of future generations to meet their own needs'. It gave rise to the 'age of sustainable development', which in 1992 became a globally shared goal for development.

In 2002, at the World Summit on Sustainable Development (WSSD) held in Johannesburg, the participants stated that the progress that has been made in sustainable development is rather ambiguous. On the one hand, wider social awareness of the need for sustainable development has proved to be a slow and time-consuming process. Key indicators show that the situation today is worse than it was ten years ago, especially with regard to the pollution of air, water and soil, resource consumption, as well as poverty and North-South income disparity. On the other hand some progress has been made with regard to the Agenda 21 issues: population growth and mortality rates have slowed down, access to health and education has increased and the role of women has been strengthened (Hens and Nath, 2003:12).

A major challenge for the implementation of the concept of sustainable development is its essentially normative character. It defines what to aim for without saying how to do it in specific social, ecological, economic or historical situations. In order to make the concept operative it must be translated into a set of new action-guiding ethical values by individuals and groups (Wiesmann, 1998). Through these, sustainable development brings into play a highly complex, broad range of often contradicting actors, structures, institutions, norms and values. They constitute the arena in which the normative principles of sustainable development have to be translated into new ways of producing and reproducing natural, material, human, social, and cultural resources. Such a broader view on sustainable development has contributed to overcoming the initially dominating emphasis on the protection of natural resources, mainly based on a specific combination of ethical values associated with the idea of intrinsic values of nature and the application of bio-ecological sciences and corresponding technologies. Although it is highly productive to organise sustainable development on the basis of the recognition of the intrinsic values of nature, it does not guarantee that this concept finds societal consensus when concrete issues of development are at stake (Kellert, 1997). This means accepting that not all

groups share the intrinsic values of nature, which is especially true for those who have the interests in, power and/or resources to act against the corresponding principles.

As a consequence, overexploitation, conservation or sustainable use of natural resources have to be understood as ecological expressions of specific, socially and politically defined institutions, norms, values and structures (Pretty, 2003; Veeman and Politiylo, 2003). The resulting 'societal turn' has led us to understand sustainable development as a result of social and political negotiation and learning processes between main actors involved (Leeuwis, 2000). However, taking account of the central position of 'future generations' in the definition of sustainable development brings a normative element into play, which is directly related to a specific concept of the 'nature' of humans and the relations through which they interact. Considering the needs of future generations can only be meaningful when the conception of humans goes beyond a merely ego-centric and materialist understanding of life and living beings. This implies recognising that, without a specific view on the world, which allows us to establish a meaningful – and thus action-guiding – relationship between humans, society and nature, sustainable development will remain literally without sense. This means social interaction cannot be understood only in terms of a negotiation-based and ego-centric optimisation of utilities. In such a view the questions on how to consider the widely unknown interest of physically and socially not yet present 'future generations' in a negotiation process of ego-centric oriented actors will be almost impossible to answer in a satisfactory manner. It is therefore not surprising that many initiatives in the field of sustainable development relate implicitly or explicitly to a concept of humans which – while not ignoring ego-centric or strategic action by principle – takes account also of the capabilities of humans for 'communicative' action (in the sense of Habermas' theory of communicative action), embracing an important resource for societal transformation beyond mere aggregation of individual preferences (Röling, 2002).

Relating the notion of sustainable development to 'future generations' not only implies a certain understanding of social actor and interaction, but also means putting forward the question of adequate understanding in regard to space, time and scale. What are adequate definitions of space, time and scale for assessing the impacts of the current forms of social and economic organisation and how many 'future generations' should be taken into account? Where will they live? These are becoming concrete questions, which have to be answered in order to operationalise the principles of sustainable development in concrete actions of today. In such a view the modernist, technocratic view of sustainable development has been replaced by a new vision of the world, in which the authority of science and technology is questioned and more emphasis is placed on cultural diversity (Redclift, 1993).

Sustainable development therefore requires the definition of basic concepts on what humans, social relations, society, nature, space and time are, and the determination of the relations through which they are interrelated. Consequently, the discourse of sustainability is related to a specific, socially constructed and culturally shaped theory on the nature of basic subjects related to sustainable development. Considering the importance of cultural diversity in the definition of concrete actions aiming at the implementation of sustainable development means recognising that this can only be achieved as far as it is based on a shared theory of 'how things are'. Such a 'theory on how things are' is considered an ontology. By ontology we refer to 'the

theory of objects. And it is so of every type of object, concrete and abstract, existent and non-existent, real and ideal, independent and dependent. Whatever objects we are or might be dealing with, ontology is their theory' (Poli, 1996). Moreover the same author refers to three theses which in the context of the search for an ontology of sustainable development have special importance. First, an ontology is not a catalogue of the world or a taxonomy but refers to a general framework or structure within which catalogues or taxonomies may be organised suitably. Second, an ontology is not reducible to pure cognitive analysis and is therefore not an epistemology and, third there is nothing to prevent the existence of several ontologies, rendering the top categories explicit and therefore enabling verification of whether there are reasonable translation strategies and which categorisation can serve best to achieve certain objectives.

Such an understanding of ontology provides a framework that allows dialogue between different theories of objects, whether they are reducible to pure cognitive levels or not. Such a framework makes it thus possible that scientific as well as other endogenous or local-based 'theories of objects' can engage in a dialogue in order to define the 'nature' of the basic objects related to sustainable development.

That the definition of an ontology in regard to sustainable development is far more than a challenging theoretical exercise is illustrated by the case of agri-food studies for which it has been shown that the ontological choices are determining the analytical points of entry in the relationship between theory and praxis of the normative stances involved (Goodman, 2001:182). Pointing in the same direction are the works on the underlying principles of green revolution or a traditional form of natural resource management of Dayak people in South East Asia where the ontological foundations define the specific content of what humans, society and nature are, delimiting through this the scope, direction and rationality for defining what natural resources are and how they have to be used (Dove and Kammen, 1997; Yapa, 1993). In such a view it becomes clear that the definition of elements for an ontology of sustainable development could contribute significantly to overcoming the 'vagueness' and incidental or instrumental interpretations of sustainable development.

A clear expression of this is also found in Agenda 21 (1992). In this worldwide agreement on sustainable development, chapter 35 states that current research should be broadened to include, on the one hand, more involvement of the public in defining long-term societal goals and formulating sustainable development scenarios, and on the other hand to develop methods for linking the findings of established sciences with endogenous knowledge.

The principles of Agenda 21 reveal that sustainable development requires a conceptual differentiation that is able to meaningfully articulate scientific and non-scientific forms of knowledge. Taking account of the need to define the ontological foundations of sustainable development based on social negotiation and collective learning processes raises the question of how such an 'inter-ontological' dialogue could be operationalised in concrete interfaces of development.

The objective of the present paper is therefore to examine some of the foundations on which such a dialogue between 'ontologies' is possible. In a first step we will define the basis upon which academically recognised sciences can interrelate with other, e.g. endogenous forms of knowing. In a second step, a comparison of the

conceptions of plant growth, underlying Western agronomic and Andean knowledge will help to identify some key factors that have to be considered when a dialogue between different ontologies is at stake.

'Modern science' and endogenous forms of knowledge

Sustainable development in general and sustainable management of natural resources in particular have to draw on a broad range of knowledges, which encompass both academic and non-academic, e.g. endogenous, indigenous or 'local', forms of knowledge. This challenges those forms of natural resource management that are based on disaggregating knowledge into specialised disciplines and specialisations. However, it is not the mere fact of the disaggregation of knowledge that is challenged; the critical aspects are related to the questions on who is setting the issues for a particular disciplinary research agenda and how the findings should be re-integrated in function of a societal process oriented in the principles of sustainable development. As a consequence, the roles of conventional scientific knowledge production in the context of societal processes are placed under public scrutiny.

A first reaction to the societal demands on a disciplinary mode of scientific knowledge production is an interdisciplinary approach. Although still based on a disciplinary vision of knowledge, it seeks to coordinate the objectives and methodologies in order to achieve a less fragmented view on environmental issues, e.g. as is currently happening in research on climate change (Norgaard, 2004). Although interdisciplinarity allows us to integrate natural and social sciences and humanities, the definition of the issues to be addressed and the corresponding 'theories of objects' or ontological foundations essentially remain within the academic community. As a result, the problems of a lack of societal participation in issue-setting and its application to concrete development goals are almost the same as they are in the case of disciplinary based knowledge production.

A second more comprehensive reaction to the societal claims about a disciplinary based knowledge production is the transdisciplinary approach. By increasing the scope and the number of interactions of knowledge production it seeks to go beyond the boundaries of scientific actors and has thus become a key feature of sustainability research (Hirsch-Hadorn, 2002). Transdisciplinarity aims for a shift from disciplinary based scientific, to a more societal mode of knowledge production by integrating everything that is between, across and beyond disciplines (Nicolescu, 1996). Transdisciplinary approaches to research are therefore essentially based on a societal issue setting and the building of bridges between natural, social sciences and humanities as a basis for integrating scientific as well as non-scientific forms of knowledge and actors (Hurni and Wiesmann, 2004).

This societal mode of knowledge production is the logical concretisation of a fundamental fact that has not been sufficiently taken into account by the scientific community for a long time: although science – usually defining itself as an autonomous, value-free knowledge system – has been very successful, it has always been – and will always remain – part and parcel of the 'social processes' that bring

actors, institutions and nature into specific, culturally shaped and historically evolving relations (Norgaard, 1994). Transdisciplinarity takes into account that science is part of the processes it describes and therefore focuses on a systemic view of social and 'natural' dynamics that are shaping the world. It also recognises the plurality of forms of knowledge, world views and the ethical values connected to them within different social and cultural groups (Scholz et al., 2000). A major challenge for transdisciplinarity therefore consists in finding ways of encouraging a dialogue and cooperation between heterogeneous groups of social actors with different forms of knowledge, instead of imposing a single, internally thoroughly coherent view of the world through a hegemonic discourse that silences all other discourses, by positioning itself 'outside' the issues to be addressed.

When looking within the academic sciences at how this could be achieved, we consider that the so-called 'ethnosciences' could play an important role in advancing transdisciplinarity and sustainable development. By ethnoscience we use Atran's definition (1991): a scientific realm which aims to understand how humans – in spite of their fragmented and limited interactions with the world – develop different forms of knowledge and beliefs. This allows us to understand how humans vary their knowledge and beliefs within different ecological and historical contexts in order to express the manifold possibilities offered by human cultures. More concretely, ethnosciences refer to the set of concepts, prepositions and theories that are unique to each particular culture group in the world (Meehan, 1980). Ethnosciences are essentially cross-disciplinary, based on increased collaboration between social sciences and humanities (anthropology, sociology, history of science, psychology, philosophy) with natural sciences such as biology, ecology, agronomy, climatology, astronomy, or medicine. At the same time ethnosciences are increasingly transdisciplinary in their nature (Ingold, 2000). Integrating ethnosciences into societal modes of knowledge production allows us to systematically take account of the cultural – and therefore also ontological – differences and similarities of the forms of knowledge of the actors involved in specific issues of sustainable development. Hence ethnosciences allow us to explore the dimensions and boundaries of the arena in which an inter-ontological dialogue would be possible.

How can we relate academic and endogenous forms of knowledge?

As shown above, a central issue related to science and sustainable development concerns the links between academic, local or endogenous forms of knowledge. For a proper definition of such a relationship it is necessary to examine the corresponding choices. The debate in science about its relation to endogenous knowledge is not new: since the beginning of the Enlightenment, the natural – and to a lesser extent – social sciences have always understood their 'mission' as a conscious and critical revision of 'local knowledge', often considered superstitious or romantic. It is therefore not surprising that the relation between academic and other forms of knowledge is often reduced to an evaluation of the coherence and consistency between the two forms of

knowledge in question, with science making a hegemonic claim to truth. However, as Table 1 shows, this is not the only possible relationship.

The typology reveals that an intercultural perspective is the most adequate way of relating different forms of knowledge, because it encompasses the highest potentials for cooperation based on mutual respect, maintaining the autonomy of the different processes of knowledge production. Suggesting an intercultural relationship between different forms of knowledge raises three major issues that need to be addressed.

First, the comparison between the different attitudes reveals that the relation between science and local knowledge depends on specific ethical positions. No relation between academic and endogenous knowledge can thus be 'value-free', making it impossible to define something like an 'objective' or 'science-based' relationship. Second, an intercultural perspective implies establishing the broadest possible field of interaction between different types of knowledge. This means that the interrelation must be based on a process of deliberation that should at least involve the interrelated dimensions of practice, values, worldviews and cosmovisions. Another necessary condition is the agreement on fundamental ethical principles before embarking on intercultural dialogue. The main one is the will to communicate, which can be formulated as: 'I accept the possibility that the Other may be right'. An intercultural relation means shifting from competition and uniformisation to the search for complementarities and cooperation between different forms of cultural knowledge that aim for mutual learning and adaptation in the light of obtaining new insights rather then just confirming existing ones. The drawbacks of non-acknowledgment, arbitrariness and paternalism presented in the typology can only be overcome by founding the relationship between different types of knowledge on an intercultural basis.

Attitude of science towards local knowledge	**Characteristics**	**Examples**
Unacknowledging	Science simply ignores a practice based on local knowledge.	Veterinary research does not investigate the effects of a ritual to prevent mouth and foot disease in the Andes.
Utilitarian	Elements of local knowledge that can be scientifically understood or validated are accepted and increase the stock of scientific knowledge.	Aspirin is based on a local practice developed by the Ancient Egyptians (using dried myrtle leaves) and the Greeks (with willow bark), unaware of its active ingredient (salicylic acid).
Paternalistic	Traditional knowledge is conceived of as a starting point that requires 'updating' by science.	Indigenous field crops are modified through genetic engineering and traditional livestock breeding is 'blended' with 'modern' technologies.

Attitude of science towards local knowledge	Characteristics	Examples
Neo-colonial	Traditional knowledge and local data are taken from local people and research institutions.	Scientific studies are carried out in developing countries by researchers from industrialised countries without collaboration at the publication level
Essentialist	Local knowledge is fundamentally better than science, it should not be influenced by Western technology and should have the right to remain as is.	'Going native', rejection of potential contributions from science; focus on preserving local knowledge in its 'pure form'.
Intercultural	Science is aware that it is only one type of knowledge among others, and that knowledge is always embedded in cultural and historical settings. Science and local knowledge can benefit from comprehensive interaction.	Development of complementary medicine and health care systems; clarification of interactions that have not (yet) been explained by science (e.g. homeopathy, traditional healing).

Table 1 Typology of academic and endogenous forms of knowledge (based on Rist and Dahdouh-Guebas 2006)

The third issue relates to the fact that real intercultural communication is more likely to happen when the parties involved have shared questions on fundamental aspects related to the form of knowledge they represent. Consequently, the identification of such questions of common interest is turning out to be an important condition for the establishment of a dialogue between different forms of knowledge.

Ethnoecology and sustainable management of natural resources

A most prominent field of ethnosciences is ethnobiology. This is often almost identical to what is defined as ethnoecology. Bentall (1993) defines ethnobiology as a new branch of science which brings together two important areas of human knowledge – ethnology, the study of cultures, and biology, the study of life. Gragson and Blount (1999) define ethnoecology quite similarly as the study of the interactions between organisms (plants, animals, biodiversity) and the physical, biological and human factors to which they are related. Due to the similarities for the purpose of the following discussion, we consider ethnoecology and ethnobiology to be interchangeable.

Instead of disaggregating the practices as found in the life worlds of farmers, traders, craftsmen or shamans and packing them into the highly specialised disciplines of ecology, agronomy, forestry, botany, medicine etc., the ethno-approaches are adopting a more comprehensive view, focusing on social practices in order to reveal

the underlying cultural dimensions (Atran, 1991; Nazarea, 1999; Posey and Plenderleith, 2002; Winkler Prins and Barrera-Bassols, 2004).

Ethnoecology allows us to explore ways overcoming disciplinary views on natural resources by building bridges between aspects normally studied separately in the natural and social sciences or humanities. Gragson and Blount (1999) consider that a key difference between ecology and ethnoecology is the point of reference from which an explanation is derived. While in the first case the explanation is given by a scientifically informed analyst, in the case of ethnoecology the explanation derives from people belonging to diverse cultures, actively participating and intervening in relationships defining a particular system. Through this the ethno-approaches offer an interesting entry point to the study of the manifold human-nature relationships at the basis of many environmental conflicts. Ethnoecology also allows us to unfold the 'theories of objects' or the ontological assumptions of scientific as well as non-scientific forms of knowledge. Through this, ethnoecology sheds light on the specific background against which 'nature' is perceived, defining the grounds upon which 'natural resources' are defined and the ways in which they have to be managed (Wiesmann, 1998). From this perspective, ethnoecology permits us to keep in touch with 'concrete' aspects of natural resource management without ignoring the related more general social, cultural and cognitive aspects. Ethnoecology provides a conceptual tool for a more comprehensive understanding of the arenas, actors, forms of knowledge and the corresponding ontological and eventually existing epistemological foundations, which have to be taken into account in the search for more sustainable management of natural resources.

Although the starting points of the ethno-sciences are at local to regional levels, due to the rapidly growing interdependencies with the factors of global change, they are also highly relevant for analysing global tendencies. Ethnoecology allows us to demonstrate how new communication, transport or other technologies as well as unequal distribution of resources, power and opportunities affect the patterns of action, orientation and interpretation of local actors; furthermore, it allows us to trace these back to the norms, values and aspirations of endogenous and other marginalised people. Ethnoecology also gives evidence about 'local' counter-notions of globalisation which are derived from their own 'cosmocentric' – and therefore more than global views of life – allowing them to participate in the worldwide debates on the kind of globalisation which should be envisaged in view of sustainable development (Toledo, 2001). In light of this, the ethnosciences are helping to correct the widely accepted but mainly unjustified assumption that endogenous knowledge represents only a locally-based collection of an empirically generated body of experiences that is impossible to relate to current tendencies of global change. However, the ethnosciences show that, rather than lacking such a global dimension, local knowledge refers to a different ontological background against which global phenomena are interpreted.

However, it is important to underline that the claim for a better relation between academically accepted and endogenous forms of knowledge is not only relevant for a sustainable resource management in Southern or Eastern societies where indigenous people represent an important share of the population. In Northern or Western societies there is a growing acceptance that currently available alternatives for sustainable development are often based on 'local' forms of knowledge initially

developed outside of conventional sciences (Fry, 2001). Clear examples are organic and biodynamic farming (Conford, 2001; Kloppenburg, 1991) or the emerging field of agro-astronomy (Vogt et al., 2002; Zürcher and Cantiani, 1998). These 'alternative' forms of knowledge are based on recently generated experiences, often linked to specific social movements that are searching to overcome the present limitations of science-based processes of knowledge production. Organic agriculture provides an example of how scientific, expert and different forms of 'local' knowledge are interplaying, in the sense of a societal process of knowledge production that now represents the most advanced translation of the principles of sustainability into the agri-food system (Rist, 2003).

At a global level the relevance of endogenous forms of knowledge for sustainable development has been widely demonstrated mainly in regard to natural resources management, e.g. biodiversity (Maffi, 2001), water (Cremers et al., 2005), and soils (Winklerprins, 1999). But it is important to emphasise that the practical relevance of ethnoecology for sustainable resource management also consists in pointing out specific forms of social organisation that are compatible with the social principles underlying sustainable development e.g. community-based regulations of access, distribution and use of natural resources, considering changing contexts and needs in the perspective of adaptive and learning- oriented reasoning (Armitage, 2005; Rist, 2003; Rist et al., 2003).

The manifold 'alternative' approaches to knowledge production aim at linking sciences with local communities of 'practitioners'. They seek to jointly develop alternative ways of farming, foresting or healing, based on empirical and theoretical knowledge, only partially recognised by main-stream sciences.

Against this background, we identify four aspects that justify the high importance of ethnoecology for the search for more sustainable management of natural resources.

First, ethnoecology gives concrete conceptual and methodological insights on how to envisage inter- and transdisciplinary research in the field of natural resources.

Second, ethnoecology makes explicit norms, values, experiences and associated specific competences of users of natural resources in 'traditional' (peasants) as well as in 'modern' (organic farmers) societies. By making explicit the dimensions of valuation of 'nature', ethnoecology shows how 'natural resources' are socially constructed and also allows us to elucidate the factors acting on this process. This enables us to better grasp the underlying principles of a steadily growing number of examples showing highly significant contributions of local and endogenous forms of knowledge to a more sustainable management of natural resources.

Third, ethnoecology helps to make it clear that knowledge of local people do have notions of 'globality' which are based on their own cultural background and that they expect to participate with them in current discourses on globalisation and sustainable development.

Fourth, ethnoecology allows us to create a solid ground for better linking practices, orientations and patterns of interpretation in an intercultural perspective. Instead of competition and hegemony the relation between different forms of knowledge is based on respect, complementarity and cooperation. Cultural diversity, rather than being an obstacle, becomes a fundamental resource for joint knowledge

production, considering that the participants involved in the dialogue represent specific ontological foundations related to 'nature', humans and society and the relationships through which they are interacting.

Ethnoecology as a stepping-stone for an ontological dialogue between natural science and Andean cosmovision

In this section, we will explore how ethnoecology can help to identify continuities and discontinuities between natural science and endogenous knowledge. The following example is part of an initiative, carried out by the Agroecology Programme University of Cochabamba (AGRUCO), Bolivia and the Swiss Development Agency. The main objective is the establishment of an intercultural dialogue and the cooperation between scientific and Andean or endogenous forms of knowledge as represented by Aymara communities. In other words, ethnoecology served as a steppingstone for engaging in a societal mode of knowledge production based on the principles of transdisciplinarity and sustainable development.

Ethnoecology in Andean communities

Ethnoecological research has helped to reveal how the specific ecological knowledge and practices of indigenous people are underpinned and shaped by the specific forms through which they conceive nature, space, time, human and non-human spiritual beings and their mutual relationships (Delgado, 2002; Rist, 2002; San Martin, 1997). This Andean concept of the man-nature relationship becomes visible when considering the specific notions of plant growth of the Aymara communities: plants are considered to represent the hair of 'Mother Earth'; they produce as a function of how humans treat her. If she is treated well, she will give good harvests and protection for everyone. 'If we treat her badly, natural disasters will occur and the harvest will suffer or may even disappear', is an often-heard sentence in the Andes. Plants encompass physical, biological and spiritual qualities. Through this constitution, they inter-relate with other living beings like minerals, water, air, animals and humans. Plant growth is a mirror that reflects to what degree humans have achieved to interiorise the principles of 'Earth's Mother' (Pachamama) into their personal and societal action: 'If we are good hearted there is always good production' (Rist, 2002).

In regard to interpretation, the Andean concept of plant growth is concerned above all, with the question *why* plants are growing. Accordingly the patterns of interpretations are holistic, and relate and integrate the plants into a whole unity that include nature, human beings and society; the explanation of social or natural phenomena is based on the assumption of a meaningful intelligible man-nature relationship (see Table 2).

Andean people in the highlands of Bolivia perceive life as a continuously changing interplay of social, spiritual and natural-material aspects of life. Humans, on the basis of their social, cognitive and emotional capacities, participate in a spiritual world that is directly linked to social life and natural-material processes. The spiritual sphere of life becomes the main connecting element with the other domains of life.

Through this, the physical space is transformed into a 'living landscape' in which human beings, animals, plants and spiritual beings coexist. Time has a cyclical notion, in which life, seasons, stars and planets, historic periods or natural resources are constantly on their cyclical way between the different spheres of existence. Such a pattern of interpretation is based on the assumption that 'nature', in the shape of 'Pachamama', 'talks' to people related with her (Rist, 2002). Nature becomes thus meaningful and intelligible: instead of through 'words', communication happens through 'signs of Pachamama'. This helps to assess the current state of the interplay between the three basic spheres of life, the material, the social, and the spiritual spheres. The relationship between humans and nature thus shows a clear notion of co-evolution between the material, social and spiritual domains of life (Delgado and Ponce, 2003). It is worth noting that the Andean worldview is not finalist, as there is no concept suggesting that 'Pachamama' obliges people to behave or evolve in a preconceived direction. Thus, the relationship is based on communication rather than on determination. Achieving good growth of plants becomes thus a moral challenge. This brings into play a theory referring to 'how things are': an 'Andean ontology'. Such an 'ethno-ontology' admits the possibility of a relationship between mind, man and matter (Van den Berg and Schiffers, 1992).

Although such an ethno-ontological interpretation of plant growth is helpful, we must be aware of its social constitution. While action-guiding values and norms are commonly present in the discourses of Aymara people, the underlying theoretical knowledge – in the sense of explicitly elaborated concepts – can only partly be perceived by most members of the communities. Nevertheless, it is important to highlight that there is growing evidence that people of Andean communities are engaged in elaborating something like elements for an 'Andean ontology'. An increasingly reflexive treatment of their own history, identity, religiosity, culture and the socio-economic and ecological context in which they are evolving is playing a major role in this (Delgado, 2002; Loayza, 1996; Rist, 2002; Ticona, 2000; Wachtel, 1990). Among these components of an 'Andean ontology', the peasants are paying much attention to the relationship between mind, man and matter e.g. expressed as the inquiry into whether rituals, moral behaviour or other symbolic practices can directly influence natural and social processes (Rist, 2002).

Ethnoecology of natural sciences

The ethnoecological findings on plant growth were fed back to the communities as part of the intercultural dialogue that they have maintained for many years with the University of Cochabamba. This provided a space for asking questions about the ethnoecology of the scientific interpretation of plant growth. The latter is an issue for natural-, especially agronomic sciences, and explains the matter from an essentially materialist background based in causality. It forms part of an ontology of 'modern sciences' which according to Guttenplan (1994:76) refers to a 'world [that] seems to consist of such things as particles, atoms and molecules governed by laws, and it is this orderly and increasingly complex arrangement of energetic matter that gives shape to the world we experience. One science – physics – studies the physics of energetic matter at the most basic level, and it is for this reason that the scientific worldview is often called 'physicalism'. Other sciences – from chemistry through biology – attempt to unravel the laws that govern more complex configurations up to, and including, the

organisms that have populated this planet.' Such a view assumes that 'natural laws' are independent of human behaviour (see Table 2).

Natural science based view	Andean view
Plants are biologically determined organisms, which are the result of natural evolution driven by the 'survival of the fittest'. They are face stiff competition from other organisms competing for the same mineral and atmospheric substances. Plant growth depends on environmental factors such as temperature, water, minerals and atmospheric gases. Agronomically, it is understood as a process of human manipulation of genetic (domestication, breeding) and environmental factors (fertilisers, pesticides, soil preparation) aiming at a maximum of economic utilities.	Plants are considered to be the hair of 'Mother Earth'; they produce as a function of how humans treat her. If she is treated well, she will give good harvests and protection for everyone. If she is treated badly, natural disasters will occur and the harvest will suffer or may even disappear… Plants encompass physical, biological and spiritual qualities. Through this constitution, they inter-relate with other living beings like minerals, water, air, animals and humans. Plant growth is a mirror that reflects the degree to which humans have managed to interiorise the principles of 'Mother Earth' into their personal and societal action: 'If we are good hearted there is always production' (Rist 2002).
Interpretation: Explanation is concerned above all with the question of *how* plants are growing. Interpretation is reductionist, bound to a disciplinary view of natural processes, perceived to happen independently of human behaviour; explicitly empiricist-materialist non-intelligible explanation.	**Interpretation:** Explanation is concerned above all with the question *why* plants are growing. Interpretation is holistic, relating to an integrated whole that includes nature, human beings and society; explanation is based on the assumption of a meaningful intelligible man-nature relationship.

Table 2 Ways of interpreting plants and plants growth according to Andean and conventional agronomic sciences

Natural processes are conceived of as non-intelligible, meaning that they are based on causality and are thus independent of any human, social or spiritual category of 'meaningfulness'

Taking a look at the ontological foundation of ethnoecology itself helps to further clarify the arena configured by the encounter of endogenous and scientific forms of knowledge. Ethnoecology, which forms part of cognitive anthropology, represents a 'dualist ontology' according to which '… persons can neither know nor act upon their environment directly, but only indirectly through the medium of their cultural representations. This supposition rests upon a cognitivist account of perception whose roots lie deep in the western dualist world view.' (Ingold, 1992:40)

The example of the encounter of natural science with the vision of Aymara communities revealed fundamental ontological similarities and differences. Both can agree on the existence of three main realms of life, which can be called a social, material and spiritual sphere of the world (see Figure 1). The main differences are based on the basic assumptions about the ontological quality of, and the relationship between, a material, social and spiritual domain of life. Such a point of view makes clear why it is so difficult or even impossible to arrive to a consensus concerning

concrete issues, such as exploitation or conservation of biodiversity, the use of renewable or non-renewable energies or the role of markets within the wider society. Finally the basic values, which lead to a certain stance being given priority with regard to these questions, are an indication of the underlying ontological assumptions.

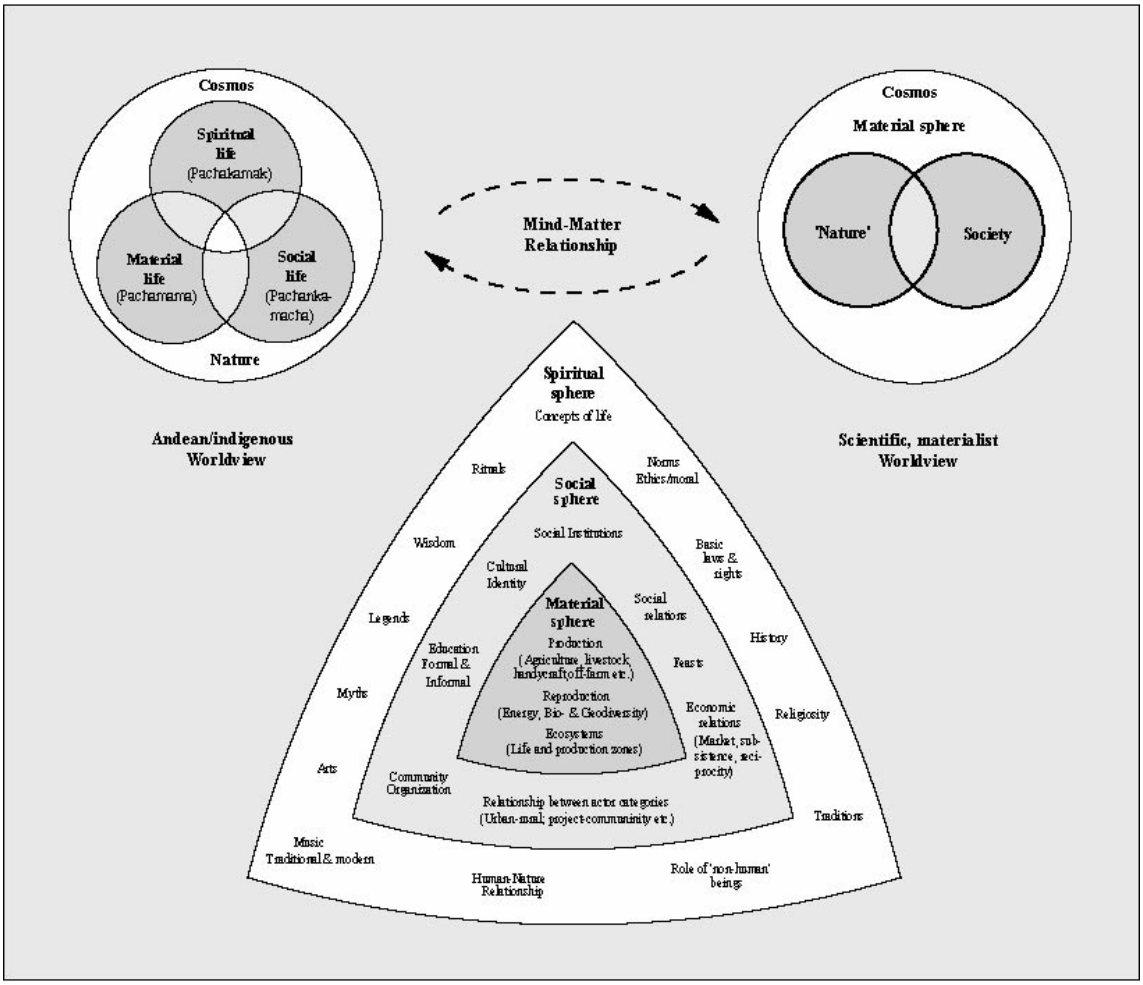

Figure 1 Key features of an Andean endogenous and scientific naturalist (materialist) 'theory of objects' or 'ontologies' (Rist and Dhadouh-Guebas, 2006)

The endogenous vision of the Aymara clearly suggests a direct relation between the spiritual domain of life and social and natural processes. Social and material life is perceived as a kind of 'materialisation' of spiritual phenomena – not necessarily based on causality – in the domains of social and material spheres. This view is also characteristic of many other endogenous cultures in Africa, East Asia and also in the case of biodynamic farmers in Western countries (see Haverkort et al*.,* 2003) and can thus be considered a more general feature of approaches for resource management organised on cognitive fundaments beyond a materialist or dualist understanding of life.

From the point of view of sciences, the two most prominent stances are the materialist and naturalist one. On the one hand, a materialist ontology suggests that ultimately processes belonging to the material sphere of the world determine all phenomena related to the social and spiritual domains of life. On the other hand, a

dualist view perceives social and cultural manifestations as unconnected to the 'laws of nature'. Mind is considered to belong to a subjective sphere of human existence rejecting the possibility that human consciousness can know whether or not there is any direct connection between mind, body and matter. In regard to Figure 1, this means posing the question whether social or material life are perceived as closely related to the wider domain of spiritual life or whether the social and spiritual sphere are determined by the central domain of the material sphere.

Ethnoecology, although based on a specific – dualist – worldview, allows us to describe the worldview of the Aymara Indians (or other indigenous groups) which is neither materialist nor dualist. However, ethnoecology leaves indigenous people alone when they start to ask themselves about the 'reality' of their own ontology on mind, body and matter: while the materialist and dualist points of view base their forms of knowledge in an ontological answer, the indigenous people seem to suggest organising the dialogue between the three different 'ontological communities' involved, into a question about the relation between mind, body and matter.

In such a view, it becomes evident that a dialogue between different ontological communities that takes the premises of interculturality seriously should be based on re-formulating the materialist and dualist ontological answers in terms of possible stances regarding a commonly shared, not yet definitively answered common question, which puts in the centre of the debates a hypothesis of a mind-matter interrelationship. This would allow all three parties to critically revise their own and other experiences, views and knowledge taken for granted from within the perspective of a joint and societally based process of searching for an answer to the hypothesis of a mind-matter relationship, and the consequences arising from this for a concept of life and the implications this would have for the kind of development which should be envisaged.

This means that the encounter of social and natural sciences with endogenous knowledge constitutes an interface of three different ontologies.

Dialogue between 'ontological communities' in view of endogenous development

The above sections provide good evidence for stating that the vagueness, arbitrariness and intentional or unintentional misinterpretations of sustainable and/or endogenous development could be overcome by defining a corresponding ontology. This should go beyond the highly abstract statements expressed as 'considering the needs of present and future generations' or 'putting local resources and capacities into the centre of the process of development' by conceptually differentiating what it means in regard to specific notions on humans, society, social interaction, nature, space and time.

In order to make more explicit what this means, it is useful to consider the following four basic features which are related to what Poli called an 'ontology for knowledge organisation' (1996). First, 'An ontology is not a catalogue of the world, a taxonomy… an ontology is the general framework (=structure) within which catalogues, taxonomies, terminologies may be given suitable organisation' (ibid.:313).

Second, 'An ontology is not reducible to pure cognitive analysis (in philosophical terms, it is not an epistemology or a theory of knowledge).' (ibid.:313). Third, 'There is nothing to prevent the existence of several ontologies, in the plural. In this case too, ontological study is useful because, at the very least, it renders the top categories explicit and therefore enables verification of whether there are reasonable translation strategies and of which categorisation can serve best to achieve certain objectives' (ibid.:314). Fourth, 'Reality is organized into diverse levels and there are highly sophisticated interdependencies among these levels and within them.'(ibid.:314)

Understanding an ontology as a general framework within which the basic items of sustainable or endogenous development can be organised and taking account of the existence of actor specific ontologies which could represent diverse, but interrelated levels of reality, sets the stage for a dialogue between 'ontological communities'. Meenaghan and Gibbons (2000) describe ontological communities as groups of people who have a common heritage, such as religion, language, ethnicity, or culture and affirm their own strong identity within the context of larger, more complex modern communities.

Regarding the conditions and features of an ontology of sustainable and endogenous development, the findings presented in this paper allow us to identify the following, indeed preliminary, items. A first fundamental feature is the societal and process-related character of an ontology of sustainable and endogenous development. The definition of the key concepts of an ontology for endogenous development cannot be left to one or several scientific disciplines alone. The generally well-developed theories of objects of the different scientific disciplines constitute a necessary, but not sufficient condition for the development of an ontology of endogenous development. Understanding the construction of a theory of objects for endogenous development as part of a dialogue between different ontological communities means integrating non-scientific actors into the corresponding process. As the examination of the interaction between University and Aymara communities has demonstrated, ethnosciences represent especially appropriate means for such a purpose, as they allow us to reveal ontological commonalities and differences between the different communities involved.

As the example of the different patterns of interpretation of plant and plant growths shows, the definition of an adequate relation between local or endogenous and scientific knowledge cannot be limited only to an *inter*cultural dimension: without an *intra*cultural effort of the parties involved, aiming at coming to higher levels of reflexivity and leading to more clarity about the ontological foundations of their own forms of knowledge, a dialogue on equal conditions would be difficult to achieve. Through this, the ontological communities would be able to make more explicit the lines of interdependencies that draw the different types of knowledge related to the patterns of action (practice) together, of orientation (norms and values) and of interpretation (worldviews).

As a consequence, the intercultural dialogue is more likely to become productive, because it embraces the three fundamental types of knowledge that are characteristic of the different ontological communities, avoiding through this the biases resulting from fragmented and partially unreflecting communication. Ethnosciences can play a triple role in the establishment of a dialogue between different 'ontological communities' oriented in sustainable development. First, it helps

to create awareness within the scientific community of the importance of the ontological aspects, permitting a visualisation of how they are related to the actor-specific patterns of interpretation, orientation and action of scientific as well as non-scientific stakeholders. Secondly, through this ethnosciences contribute to the preparation of the ground to show to what extent the supposedly more 'concrete' issues related to agriculture, livestock keeping or forestry for instance are interdependent with the underlying ontological foundations. This means that ethnosciences can, thirdly, serve as a steppingstone towards engaging in broader societal processes concerning the definition of an ontology of endogenous development which is acceptable for at least the majority of the actors concerned, allowing better guidance of the processes of policy making and implementation.

Moreover, striving to define elements for an ontology of endogenous development as a result of intra- and intercultural dialogue means accepting that, instead of a generalised 'objective' truth claim, the ontological communities have to interact on the basis of intersubjective validation. In terms of social interaction this implies a shift from strategic to communicative action as a more adequate form of interaction for jointly defining aspects of an ontology of endogenous development. This means that scientific work has to adopt a multicultural perspective, which implies making an effort understand the 'others' in order to 'open up the possibility of learning about others and ourselves, of questioning and borrowing, of connecting with them, all to the end of altering and enlarging ourselves and them' (Fay, 1996:245).

The findings of the reflections presented so far, allow us to state that the crucial contents of an ontology of endogenous development are related to the concepts of nature, humans, society, social interaction, space and time. The comparison of the three ontologies meeting at the interface of natural and social science and endogenous knowledge showed that the specific differences between the notions of humans, society, social interaction, nature, space and time are closely related to different positions in regard to the underlying understandings of mind, body and matter and the ways in which they are interrelated. The current ontological incompatibilities between materialist, dualist and endogenous views could be overcome when they relate in more equal conditions. This could be achieved on the basis of a jointly shared question, which takes account of the whole range of ontological positions. A question, which could be shared, at least by the three ontological positions presented here, would be the one addressing the relation between mind, body and matter.

If such a question were considered a common issue of the different ontological communities, the materialist, dualist and endogenous views, instead of contradicting each other, could agree on the hypotheses which reflect different levels of 'reality' and experiences and which are related to a jointly shared and indeed not yet fully answered question. Organising such a multi-ontological process of communication around a commonly shared question would prevent the different ontological communities from falling into the trap of fundamentalism because even if they are different, they further develop their thinking in a process of permanent interaction with other ontological communities, which would strengthen attitudes of openness, dialogue and joint learning.

From a North-South perspective, the present paper allows us to conclude that endogenous forms of knowledge and approaches to development in 'Western' cultures share almost the same destiny as endogenous or indigenous forms of

knowledge in Southern countries. Due to the ontological, and by implication also epistemological, hegemony of orthodox sciences, other forms of knowledge and the corresponding ontologies and epistemologies hold a weak position in the societal process of knowledge production for development. Building alliances and networks for mutual learning between North and South becomes therefore particularly important. Southern groups engaged in the development of endogenous forms of knowledge have significantly deepened the intra-cultural dialogue aiming at the clarification of the underlying ontological and epistemological foundations and contrasting them with those underpinned to sciences (Balusubramanian, 2005; Escobar, 2005; Millar, 2005).

Learning from them how to overcome the ontological hegemony of orthodox sciences, through an intra- and inter-cultural dialogue represents a contribution to the enhancement of Western culture based forms of endogenous development. The approaches developed in the South represent interesting pathways that allow us to overcome the justification of Western forms of endogenous knowledge mainly in terms of the outcomes of their underlying ontologies, e.g. in the form of organic foods, medicines, alternative forms of social and economic organisation.

In order to further break ground for endogenous development it will be of paramount importance that the ontological foundations of these endogenous practices become more visible within the intra- and inter-ontological dialogue which has to be established with the orthodox sciences. As a consequence, people and institutions related to endogenous development rather than focussing on the evaluation based on orthodox sciences should make efforts to develop concepts and methodologies based on their own ontological assumptions (see papers in this book by Baars, Davis, Kieft, Rist, Zajonc and Zürcher).

The background outlined above allows us also to state that the role of science in the process of endogenous development has to be completely re-thought. Instead of being an instance for the validation of other forms of knowledge, science takes a role as one partner within a process of co-production of knowledge between different ontological communities. Rather than being a major source of concrete solutions, science promotes the establishment of social spaces where different ontological communities meet in order to constantly re-shape their relationships between them in view of jointly producing the knowledge they require for the realisation of their life-projects. In such a context science rather than being the main source of solutions, contributes by introducing sufficient levels of reflexivity into the learning processes of the actors involved in the co-production of knowledge for endogenous development (Dürr, 2005; Röling, 2005).

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Endogenous development and moving worldviews

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Endogenous Development

Change and development cannot be enforced, they have to come from within the own person – family – community – society, its own culture, religion, values, knowledge, institutions, experiences and place. For Compas this is endogenous development.

In endogenous development in rural areas the local population assesses, revitalises and renews its own society, not in a dogmatic fundamentalist way, but with an openness for adaptation and innovation and knowledge from outside the own circle, from other farmers and science. Endogenous development can be supported by indigenous or external development facilitators and supporters. Such processes may have different phases: e.g. emotional integration, situation analysis, healing, visioning, learning on alternatives, revitalisation, training and capacity building, action research, monitoring and evaluation, networking, sharing, policy dialogue, etc. Endogenous development is emancipatory, with a strong desire to take part in the global community, but without losing cultural identity.

Endogenous development includes intra- and inter-cultural dialogue and learning, e.g. on aspects such as indigenous versus international ways of knowing-research; indigenous versus scientific knowledge; indigenous spirituality versus introduced religion; indigenous values versus values related to the consumer culture; indigenous leadership versus state governance; indigenous economics versus market economics; indigenous subsistence agriculture versus modern market agriculture; indigenous learning versus formal education.

In my opinion, an endogenous type of development is actually taking place in the following categories of initiatives:

- A. Traditional and indigenous movements that defend their ancestral land rights, language and culture, heal traumas originating from colonial repression, revitalise their culture, spirituality and knowledge and increase their income and well-being.
- B. Rural movements in marginalised areas where communities regain confidence in their own traditional ways of farming, values, leadership, institutions, genetic resources, knowledge and experiences and improve their livelihoods by way of participatory innovation processes in which indigenous and traditional knowledge is combined with insights from outside the community, from farmers or science. Culture, faith, rituals, spirituality, community and place are very important for these farmers as well.
- C. Religious reform movements aiming for spiritual renewal, poverty reduction and ecological regeneration. They do this by motivating and empowering the local population (poor and rich) to collaborate and improve the livelihoods of the poor

and regenerate the local ecosystem. Examples are the Hindu Swadhayh movement in India and the Christian Base Communities in Brazil.

Such initiatives are taking place in the South as well as in the West. The Compas Network has partners from both category A and B.

- D. There are also post-modern initiatives that come closely resemble these processes of endogenous development. These initiatives build on the global inter-cultural, inter-religious and inter-science dialogue and new scientific paradigms, among others based on quantum-physics and consciousness research. This leads to processes of co-creation for spiritual, social, ecological and technical renewal and sustainable development. The Integral Movement initiated by Ken Wilber is an example of this category.

In practice, endogenous development may combine characteristics of all four categories and it may be difficult to define exactly what should be called endogenous development and what not, especially in the West where modernisation and market development have modified most traditions. But, in whatever form, endogenous development can be an effective tool to move worldviews and practice.

Sustainable development

There are many organisations and people working on sustainable development and several international initiatives to analyse the present situation of the world in order to formulate principles and action plans for sustainable development. Well known examples include the Club of Rome, the Brundtland Commission, the UN World Summits on Sustainable Development, the Millennium Development Goals and the Earth Charter Initiative.

Endogenous development also can be seen as a process towards sustainability in its broadest sense, although not necessarily consciously. There may be a fundamental difference with most of the above-mentioned agendas for sustainable development, however, for these follow the more conventional economic, social and ecological criteria and do not relate to culture and spirituality. The principles for sustainable development presented in the Earth Charter were formulated in a participatory process that involved many people, civil society organisations, religions and indigenous peoples. The principles formulated by the Earth Charter therefore may be most appropriate to use in endogenous development as an aid to vision the future.

Massive poverty due to the economic system

Everywhere in the world, rural communities are changing fast due to the spread of the consumer culture and the global market economy. This wave of change seems to be impossible to stop as it contains the promise of development and modern life, as already enjoyed by the West and the rich in the South.

The wave of change is driven by the promise that it will lift people out of poverty, that economic growth will create employment for all, with salaries that make modern life affordable. Also, development cooperation is now strongly focused on

increasing poor people's capacity to operate and compete on the market. However, as Henk Molenaar in his essay for this conference has explained, the monetary system and free flow of speculative capital are functioning in such a way that economic wealth and power is accumulating with a happy few. For this reason, more than half of the world population remains poor in our fast growing global economy.

But, does this mean that poverty reduction will not be possible without changing the economic system? Or are there effective ways to benefit from the market without being out-competed or over-run by change? Are there effective ways to enforce the redistribution of wealth? How can the liberal economic system be reformed into a more ecologically sound and solidarity-based economic system? This problem is beyond the capacity of endogenous development to resolve.

Science should take its responsibility

As Molenaar explains, the market economy has become so dominant that science and technology are strongly focused on serving the needs of the economic system. As in the market economy, much of the social and ecological costs are being externalised, scientists do not need to worry much about social and ecological impact of their products. But if we want to reduce poverty and ecological degradation, this has to change and science institutions need to take their responsibility and aim for sustainable development.

One of the most critical issues is the massive use of fossil energy. Modern societies have become completely dependent on fossil energy and technology that is fuelled by this energy source. This has made societies very vulnerable, not only in securing access to these products, but also concerning environmental impacts such as climate change and loss of biodiversity. For poor people operating in the margins of economic viability the risks are even greater, as they will be the first casualties of price increases, climate change or ecosystem collapse. Most cultures evolved around the need of communities to survive on the locally available resources, as they did not have access to external resources at that time. This traditional skill is still very much needed in the economically more marginal areas in the world. It therefore should regain its status also within universities.

The alternative way for marginalised small farmers

Small farmers often find it very difficult to compete on national and international markets. There may be little demand for their local products, their commodity products may not have the required quality, their land may be too steep, poor or patchy for mechanisation, credit may be expensive and input and transport costs may be relatively high due to geographical isolation. This makes them vulnerable e.g. to competition from large-scale farmers, traders who keep the farm gate prices low, consumers who can switch to alternative products, ecological degradation as a result of the use of modern farming technology and climate change. As terms of trade generally become less favourable for farmers, they are forced to intensify their

production, to find more land, to specialise, mechanise or innovate. Many do not succeed, are economically and socially marginalised and are forced to look for other sources of income. Falling back on subsistence and semi-subsistence agriculture often is no option as they have already degraded or sold their land and lost their traditional knowledge and genetic resources. Only if the integrity of their agro-ecological system is repaired soon and their dependency on the market reduced, might it be possible for them to continue to gain their livelihood through semi-subsistence farming.

Endogenous development which is reoriented towards the multi-functional agro-ecological principles of traditional and organic agriculture; active adaptation and innovation; value adding through processing and chain management; cooperative marketing; and close collaboration with other development stakeholders, may lead to rural renewal, as for example demonstrated by Sabine de Rooij in her paper for this conference. The alternative, joining the fast growing urban population, may be even less comfortable for small farmers, certainly where there is economic stagnation as in many poor countries. Also under urban conditions, people depend on fossil energy and fossil energy technology and international competition. If oil prices go up there is high risk that they will lose their job as well.

Loss of cultural diversity

Industrially produced consumer products now can be bought all over the world. Due to mass communication, international trade and tourism, economic and cultural globalisation has speeded up considerably. Due to these outside influences, local economies and cultures are under high pressure to 'modernise'. The monetary system strongly enhances specialisation, mechanisation and mass production often at the cost of local production systems, local products and the local ecosystem. This has a strong influence on traditional culture, knowledge and skills as well.

Modern science has little interest in the insights of traditional and indigenous cultures and formal education often follows the Western urbanised curriculum and dominant language, leaving little space for the insights of other cultures and other languages. Schoolchildren in rural conditions do not learn much about rural and community life and how to make the best of it. They start to look down upon traditional and rural life and often prefer to migrate to the city in search for urban jobs and lifestyle.

Political repression of indigenous peoples is widespread. For these reasons, many traditional and indigenous cultures and languages are seriously threatened. This is leading to a loss of cultural diversity, maybe the richest and most important human heritage we have. Increasingly there are initiatives to start intra- and intercultural education and support to indigenous research. We still may be able to answer the question what traditional/indigenous ways of knowing could contribute to the creation of a better world before it is too late. This also can be part of endogenous development.

Moving worldviews

Most institutionalised faiths focus mainly on securing spiritual well-being, and for a long time their interest in securing peace, social justice, human well-being and 'integrity of creation' has been limited. However, the urgency of the actual situation seems to be changing this attitude and participation in initiatives like the Earth Charter seems to be growing. Will faith institutions really take their responsibility, reduce inter-faith tensions, promote peace, develop vision and build capacity for endogenous sustainable development? This would give a tremendous boost to the creation of a better world.

Growing new insights into 'new sciences' such as quantum-physics, consciousness research and transdisciplinarity (see the respective conference papers by Dürr, Bosman and Nicolescu) and better understanding of the insights of traditional and indigenous cultures, and the essence of faith, may all contribute to moving worldviews as people start to recognise the unity, interdependency and vulnerability of life on our beautiful spaceship earth.

Dialogues within and between different sciences: issues and strategies from endogenous perspective

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Globalisation and localisation of knowledge

The European workshop, 'Moving worldviews, reshaping sciences, policies and actions for endogenous development', addresses an issue that is increasingly receiving attention from scientists, policy makers and practitioners. Until recently, the diversity of worldviews, values and ways of knowing has been given little regard in science and policies. Currently, however, these themes are receiving attention in lively debates on globalisation, cultural diversity and the role of religion.

Compas is an international programme for inter-cultural dialogues in cultural diversity and endogenous development. Through a series of regional conferences, it wants to contribute to this debate by looking at it from an inter-cultural angle. In September 2005, a conference was held in Bolivia, Latin America under the title 'Intra- and inter-scientific dialogue of the original people of the Americas'. In October of the same year, a conference was held in Ghana on African Sciences, and early 2006 a workshop on *Indian sciences* will take place in India. In September 2006 a global inter-scientific conference will be held in Geneva, Switzerland.

These events are part of a more general rethinking of the role and nature of knowledges and sciences in the globalising world. On the one hand, one can observe a continuing proliferation of mainstream or global sciences and technologies. Modernisation, globalisation and proliferation of market-thinking are seen by many as a desirable and unavoidable process. On the other hand, one can observe a renewed interest in local cultures and endogenous development, and an acceptance of the pluralistic nature of worldviews, sciences and knowledges. This renewed interest is a response to the globalisation process that, although contributing to global economic growth, is also criticised for not doing enough to solve problems of poverty, social conflicts, sense giving, for reducing cultural diversity and its negative impact on local economies.

The ongoing process of globalisation involves the entrenchment of modern knowledge and technologies throughout the world. Profit-driven values and corporate interests to a large extent determine the global direction of research and development. Commercial enterprises, universities and international and national research organisations apply this global science in their research and development programmes and apply it in technologies for production of food, medicine and communication systems, in commercialisation and promotion of these products and of the lifestyles that go with them. In agriculture, the use of external inputs has increased due to extension advice and subsidy policies. In health, commodities and knowledge of

Western allopathic medicine have reached out to all corners of the globe. Food habits and styles of dressing are changing globally as a response to international marketing.

Although these efforts have led to a definite increase in productivity and to increased health for many, the awareness of the problems associated with this approach is increasing. Environmental pollution and degradation, loss of biological and cultural diversity, international and local conflicts, poor health and persistent poverty in certain regions of the globe are serious problems. Privatisation and liberalisation have kept or put access to health services and to agricultural inputs beyond the reach of large groups. Many young people are no longer educated in the traditional way of life and are leaving the rural areas to live in urban centres. Under the influence of mass media and marketing, a general westernisation of taste and consumption is taking place. These processes strain local economies and influence the social and cultural inheritance of the local communities. The confidence in traditional cosmovision, leadership and practices is declining and as a result, the local dynamics, social cohesion and local mechanisms for conflict resolution are being undermined.

Thus, globalisation has triggered local responses, called 'localisation', that emphasise cultural identity, local ownership and local culture. Part of this 'counter development' are the numerous new social movements emerging around the world that are expressing their disagreement with the current mainstream understanding of globalisation. The search for new ways of living gives rise to alternatives, e.g. movements for fair trade, organic agriculture, complementary medicine, production of renewable energies, multi-functional land use and other forms of education. The uneasiness with globalisation and the associated homogenisation also leads to a re-valuation of cultural identity. Ethnicity, religion, language, local values and knowledge are receiving attention and play important roles in the national and international debates.

This is the case in the North, but also in the South. Despite the apparent acceptance of dominant concepts and technologies, a number of traditional or indigenous societies with their own locally based institutions and values have survived and/or are being revitalised. A wealth of local or indigenous knowledge still exists that is based on specific cosmovision and traditional leadership. Indigenous knowledge and leadership have their strengths and their weaknesses, and, although often not respected or even noticed by outsiders, they still form the basis for the decisions made by the majority of rural and a large part of the urban people in the world.

Endogenous development, development born from within, builds mainly but not exclusively on local resources, values, knowledge and leadership. As an approach, it is receiving increasing attention as a response to the problems associated with the globalisation process.

This paper is a result of the experiences of Compas, an international programme on endogenous development. Studies on local knowledge in different cultures have drawn attention to the global diversity in ways of knowing. A further understanding of the various ways in which people in different cultures see the world, learn, and build up and exchange knowledge is an important challenge. It may contribute to more symmetrical cross-cultural dialogues and acceptance of pluralism of worldviews and ways of knowing.

This paper addresses the following questions

In an inter-cultural perspective:

- What are important differences in worldviews and how do these affect the ways of knowing?
- What is knowledge and what is science?
- What types of relationships can exist between dominant science and the different local knowledges?
- How do we look upon endogenous development and how can it contribute to co-evolution of knowledges?
- What activities could we undertake to enhance co-evolution of different ways of knowing?

Different worldviews

Across the globe, people perceive existence in different ways and these different ontologies, cosmovisions or worldviews lead to different ways of perception, learning, interpretation and knowing. A major divide can be observed between those who believe in the primacy of the material world and those who (also) believe in a non-physical reality.

A representative of materialist thinking is Edward Wilson, a biologist at Cornell University. He claims that all tangible phenomena, from the birth of stars to the workings of social institutions, are based on material processes that are ultimately reducible, however long and tortuous the sequences, to the laws of physics. This thesis is supported by modern (Cartesian) physics, but also by neurologists who interpret behaviour, memory and emotion exclusively as brain functions, and by gene biologists who explain characteristics of living beings by the genome structure only. Evolutionary biology provides the thesis of transition and progress through competition and mutations.

Materialist thinking is dominant in Western cultures. But also there, other visions exist: vitalism is the metaphysical doctrine that living organisms possess a non-physical inner force or energy that gives them the property of life. Vitalists believe that the laws of physics and chemistry alone cannot explain life functions and processes. Vitalism is opposed to mechanistic materialism and its thesis that life emerges from a complex combination of organic matter. Christian de Quincey presents the vitalist vision. He takes the position that, unless energy at its ontologically most fundamental level already came with some form of proto-consciousness, proto-experience or proto-subjectivity, subjectivity, conscious experiences or subjectivity would never emerge or evolve in the universe. Laszlo's theory of the Akasha (or zero point) field provides a theoretical basis for the bridge between consciousness and matter.

These insights are supported by the results of quantum physics and gave rise to the chaos theory. In chaos theory, nature is recognised to be a highly complex, interlocking network of nested systems. Relationships between the parts are dynamic and ever changing because they involve complex networks of feedback and feedforward loops. It becomes difficult or meaningless to identify individual causes, and to predict behaviour of complex systems. No part can control the whole, because

every part contributes to the changes of the whole and therefore of the parts themselves. Instead of controlling, we can only participate. Participation counts: every part, every individual can make a difference.

Chaos and uncertainty are natural. They are a key component of the universe. Chaos may cause uncertainty but it also creates the opportunities that give rise to hope and change. People need to prepare for chaos and accept uncertainty as a natural condition. Teachers, policy makers and development workers cannot control the entire universe, but they can make impacts on the small slice of the universe they reside in, despite all the chaos evident in it.

The existing diversity of life forms can be explained by the evolution theory in which new species and life forms emerge from the process of survival of the fittest. Others claim that nature is not exclusively regulated by competition and substitution. Cooperation, harmony and complementarity do also occur in nature. The German physicist Dürr (2001) draws attention to the fundamental immaterial connectedness of the real world. All matter and also man are an inseparable part of the all embracing immaterial reality that obeys non-deterministic laws. Contrary to the 'dead' material, where the law of entropy leads to increasing disintegration and disorder (paradigm of the dead), the life processes and evolutionary change produce progressively higher organisation: differentiation and integration (paradigm of life). This latter process will only take place with energy inputs and or with deliberate decisions.

According to Dürr, the dominant economic dogma that reduces *homo sapiens* to *homo economicus* stimulates the paradigm of the dead: competition leads to winner takes all and global trends towards uniformity, rather than to a win-win situation that allows continued co-existence and co-evolution. Globalisation, as it is taking place now, reduces cultural diversity, accumulates power and spreads uniformity in behaviour, food habits and energy use. The dominant Western system glorifies aggressiveness, toughness, reckless advancement and an arrogant lack of empathy. It undertakes great efforts to make people fit into a world which is perceived as a great battle field for survival, with everyone fighting the others and all jointly attacking nature. This world is claimed to be true as it is sanctioned by an infallible science, despite all the traditional wisdom to the contrary.

In Dürr's view, people do not need to be taught empathy, fairness, responsibility, generosity, kindness and the play of win-win games from scratch. They just have to be reminded of their ingrained competence in constructive cooperation as a participant in the general process of life. He advocates a development model that increases cultural diversity and respect for differences.

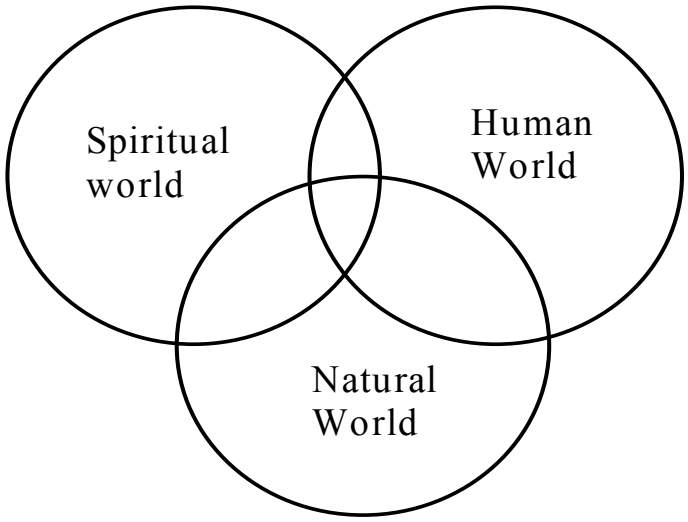
The notions of Laszlo, de Quincey and Dürr are consistent with the worldviews that are predominant in non-Western cultures.

Non-Western cosmovisions

Through their action research in Asia, Africa and Latin America, the Compas partners have learned that local knowledges in most cultures include a wide diversity of assumptions, concepts, technologies and ways of experimenting, teaching and learning that are specific to the culture and ecosystem.

The work done so far has also brought to light, that even with the immense diversity in the ways local knowledge is phrased and expressed, a common feature is represented by conceiving life in terms of three inter-related and inseparable domains:

- **the natural world,**
- **the social world and**
- **the spiritual world**.



Local knowledge in the natural domain includes thematic fields related to specific agricultural, health and other practices.

The social domain includes knowledge about local organisation, local leadership and management of natural resources, mutual help, conflict resolution, gender relations, art and language.

The spiritual domain includes knowledge and beliefs about the invisible world, divine beings, spiritual forces, ancestors, and translates into values and sense-giving and related practices such as rituals, festivals.

An important feature is that none of these domains exist in isolation. In many traditional ways of knowing a notion of unity exists according to which the natural, social and spiritual worlds are considered to be inseparable and integrated.

Different ways of knowing and plurality of sciences

The conventional way of knowing is based on a separation of observer and the observed world. The resulting knowledge is compiled by observation and application of quantitative methods and is organised in specialised disciplines. It focuses on the material world, has an anthropocentric perspective and has difficulty in relating to the spiritual world. In this view 'science' is an activity where 'true' knowledge can only be acquired by rational reasoning and the application of quantitative methods of observation and investigation.

This position is dominant in the West, but it is being challenged. It is widely held that there are two different sources of knowing: rational reasoning and measuring on the one hand and intuitive learning on the other.

- In the rationalist worldview, a separation is made between object and subject, between people and nature, between mind and matter, between quality and quantity. These notions lead to a scientific approach where natural laws can be discovered by putting nature to the test. Knowledge then is the result of rational, logical or scientific reasoning and observation and measuring of an objective world.

- Knowledge can also be rooted in intuition and connectivity with the greater unity. Sources for these kinds of knowledge include meditation, seeing from a connection with the supernatural world, visions, dreams and trance. Often this type of knowledge can only be accessed by persons with special qualities and positions in society. The knowledge contributes to ethics and sense-giving and may be expressed in rules, myths, metaphors or stories that convey awe or morality. It links mysteries with real life. Their messages can be understood in multiple ways. Ascribing meaning to it requires a process of meditative reflection. In cultures or situations where the worldview is based on a unity of the natural, the social and spiritual worlds, it is not the separation, but the unification, the connectedness between these three domains that plays a role in the way knowledge is gained.

Every form of knowledge – including the one produced by natural and quantitative sciences – is socially constructed. This means that knowledge cannot exist separately from the worldview and the process of its construction.

We take as the definition of science: the body of knowledge and its classification under a theoretical framework. It includes the complex of producing knowledge based on a specific worldview and assumptions, general principles, theories and methodologies about which a specific community has reached consensus. The knowledge acquired and the resulting science is always limited and subject to modification in the light of new data and information.

From this definition, it can be concluded that there are many different co-existing sciences and numerous ways of knowing. Besides the academically established and globally dominant sciences (of an assumed Western origin), there are sciences rooted in other cultures. Plurality of worldviews can lead to a plurality of sciences. The differences in ontological positions and in the sources of knowing determine the degree of compatibility and or complementarity of sciences. A joint learning process or dialogue between different forms of knowing would be impossible or meaningless if the sciences involved contradict each other. If they are strictly based on either materialist or vitalist assumptions or oriented exclusively to rationality or to intuitive ways of knowing and if the partners involved do not accept the relevance or feasibility of the other ways of knowing, dialogues are not useful.

The insight is emerging that we should look at worldviews, sciences and values not as universal, but as expressions of a pluralist reality. In this view, inter-cultural dialogues, mutual learning and co-evolution of the diversity of sciences are important. But then, how can we form rules for understanding and exchange between individual knowledge systems. To what extent can we expect contradiction, synergy or complementarity between different forms of knowledge? How can we make an exchange between for example Maya knowledge, Shona knowledge, Hindu and Buddhist knowledge, European and global knowledge beneficial for the participants?

Two conditions have been mentioned by Klein Goldewijk (2005): acceptance of pluralism and symmetry. Symmetry in power and in the contributions of the criteria for knowing, will avoid a situation arising where a dominant system determines the rules of the game. Local knowledge should not be assessed by the criteria and methods used by global science, or the other way around.

But, as we elaborate in the next section, in the current international scene, acceptance of pluralism and symmetry is far from reality. Acceptance of pluralism of different ways of knowing goes against the claim of universality of (Western) science. The West has a dominant position in the globe: economically, ideologically and scientifically, and this makes a symmetric relationship with non-Western systems very difficult.

For an inter-scientific discussion, it is important to have a formulation of the characteristics of different ways of knowing (in terms of the ontology, sources of the knowledge and epistemology) and a self-assessment of the relative strengths and weaknesses of each knowledges. This could coincide with an assessment of the power relation between the systems involved. In terms of the Peruvian traditional scientist, Jose Illescas: intra-scientific dialogue and revitalisation of indigenous knowledge is a precondition for inter-scientific dialogues.

Relations between different sciences and forms of knowledge

Interaction between different cultures may result from trade, migration, missionary activity, tourism, war or mass communication as well as from friendships and networks of solidarity and cooperation. The degree of reciprocal influence may vary greatly. In many cases, the more powerful culture dominates and, deliberately or by implication, has an influence on the less powerful culture. When analysing the different ways in which sciences and forms of knowledges inter-relate it would be impossible to discuss them all. There are many differences in the way different positions in power and differences in effectiveness of available technologies, are being used and many differences in the way people react to domination.

Without claiming to be comprehensive, therefore, we have presented some of the possible relations between different forms of knowledge in the table below.

Type	Characteristics	Examples
1. Clash or hostilities	Violent occupation, wars, resistance, fights between civilisations.	Fights between religions or political lines; independence or resistance movements; terrorism and anti-terrorism.
2. Going Underground	The suppressed knowledge continues to exist but not openly. In order to avoid repression, hostilities or rejection, local knowledge continues in a clandestine way.	Many local knowledge systems: shamanism in Sri Lanka; spirit mediums in Africa; traditional leaders in the Andes.
3. Parallel knowledges	Different ways of knowing co-exist openly without interaction; cultural or scientific apartheid.	Conventional medicine and Ayurvedic medicine co-existing in India; Islam, Christianity and other religions co-existing in Europe; conventional and bio-dynamic or organic farming; voluntary isolation from certain aspects of international exchange of a country like Bhutan.

Type	Characteristics	Examples
4. Utilitarianism and selective inclusion	Elements of local knowledge which can be scientifically understood or validated are accepted for enhancing the stock of scientific knowledge; may imply assessment of local knowledge by outside scientists and lead to ex-situ conservation of local knowledge.	Aspirin is made, based on a local practice already used by the Ancient Egyptians and Greeks, without their knowing its active ingredient. Local medicinal practices for malaria treatment; adoption of Arab mathematics and Chinese gunpowder by Western scientists
5. Substitution	The dominant system forces the introduction of exogenous concepts to substitute local traditions.	Missionary activities to substitute traditional religions, privatisation of land, introduction of European languages as national language, exogenous rule of law to replace traditional juridical systems, republican and democratic systems of governance, hygiene measures as conditions for export.
6. Paternalism	Traditional knowledge is a starting point but must be 'up-dated' by scientific contributions.	Transfer of technology in education, health and agricultural extension programmes.
7. Syncretism	The dominant and dominated systems merge and incorporate each others rituals, beliefs and knowledge in such a way that *both* systems believe that their knowledge is the one that is dominant.	European knowledge with Cartesian knowledge and Catholicism merged with Andean or Maya beliefs, health practices and rituals.
8. Complementarity	Two different ways of knowing and using mechanisms of exchange and mutual learning aimed at complementing each other.	FRLHT in India, with activities to exchange and compare different health care traditions.
9. Romanticism	Local knowledge is romanticised and considered basically 'good' and should have the right to remain as it is.	'Going native', rejecting possible contributions of global science; enhancing capacity of resistance of local actors.
10. Co-evolution	Different forms of knowledge evolve simultaneously, in the first place on the basis of their own dynamics (revitalisation) and partly as a response to their interaction/dialogue with other forms of knowing.	Experiences of Compas partners in Europe (co-existing farming styles), Africa (Ghana and Zimbabwe),Latin America (Picads).
11. Trans-cultural and transdisciplinary synergy	Sciences knowledge that they represent one type of knowledge among others and that knowledge is always culturally embedded and forming part of historic development. Both can benefit from comprehensive interaction.	Sciences acknowledge that knowledge is always culturally embedded and forming part of historic process. All can benefit from comprehensive interaction and possibly integrate in a way that goes beyond any particular culture or discipline.

Table 1 Typology of relations between different forms of knowledge

Issues

The typology leads to six issues to consider when looking for an inter-relation between different forms of knowledge:

- First, due to global interdependence and communication, almost any type of knowledge available today is influenced in some way or another by the dominant way of knowing. This makes it difficult to distinguish 'pure intra-cultural ways of knowing'. Yet, the papers by Escobar, Balusubramanian and Millar for this Moving Worldviews workshop provide important insights into the way of knowing in Guatemala, the Andes, India and West Africa, and their differences with and relation to the dominant worldviews and values.
- Second, the relative strength and position of a specific science is the result of the use of power. This means that the degree to which a certain way of knowing is spread and accepted may depend more on its power base than on its intrinsic quality. In his paper Molenaar gives important reflections on the mechanisms involved in this process and the dilemmas it offers in international development cooperation.
- Third, the global domination of the rationalist way of knowing and the emphasis of the use of knowledge for unlimited accumulation of material wealth creates important problems at global level. Dürr's paper elaborates on this aspect. He warns that our problems will lead to catastrophe for us people. He claims that we must do everything to put the playing field back into a state in which all can play their own games in a decentralised way under comparably favourable conditions and can cooperate and communicate in friendship across all borders. Zajonc's paper provides inspiring examples of university teaching on Eros and insight.
- Fourth, a mutual learning process and dialogue between different types of knowledge involves the revision of power, values and worldviews. This is a way to overcome the suppression and paternalism mentioned in the typology. A synergetic relationship and co-evolution between sciences can only take place if the wars between sciences, mentioned by Röling in his workshop paper, can be turned into peace or start with peace talks.
- Fifth, in the inter-scientific dialogue, emphasis needs to be placed on a reflection on what the specific starting position of each form of knowledge is: What are its sources (the role of rationality and intuition, the values involved and the way meaning is ascribed to things)? How does it relate to the natural, social and spiritual worlds? How is it placed in terms of power and conflicts? On the basis of these, a process of intra-scientific dialogue can be designed that aims at the revitalisation of the form of knowledge.
- Sixth, the idea of integration of (scientific and local) knowledge, by taking the best of both, is not realistic in all circumstances. Sometimes different knowledges have contradictory or mutually exclusive positions. For example, the hegemony between mind and matter may be seen differently; the notion of connectivity and unity may be different from the notion of separation and disciplinarity. Rather than having the idea that the end of inter-scientific dialogues would be one integrated scientific construction, we may have to accept or embrace the fact that a diversity of ways of knowing exists, each unravelling part of the complex reality.

On the basis of the reflections above we can now take a closer look at the approach and experiences of endogenous development and its implications for inter-cultural dialogues.

Supporting endogenous development

Endogenous development refers to development that is mainly, though not exclusively, based on locally available resources, such as land, water, vegetation, knowledge, skills and competencies, culture, leadership and the way people have organised themselves. External knowledge and resources are often used as complements to local resources. It has mechanisms for local learning and experimenting, building local economies and retention of benefits in the local area. Endogenous development does not imply isolation, nor does it limit its attention to local processes. It may use some opportunities provided by globalisation.

Compas experiences

Compas is an international cooperative programme with some ten years of action research and learning from local knowledge in different cultural and ecological environments. Revitalising local knowledge and building on this knowledge in development programmes is the final goal. Compas is involved in an inter-cultural dialogue aiming at a co-evolution of knowledges and sciences. The field activities of the 25 partner organisations include support to local people in their endogenous development processes. This is development based mainly, though not exclusively on the locally available resources, local knowledge, culture and leadership. Endogenous development is open to integrating traditional as well as outside knowledges and practices. It has mechanisms for local learning and experimenting, building local economies and retention of benefits in the local area.

A consortium of nine universities provides scientific support that includes contributions in the formulation of the specific paradigms, epistemologies and the launching of related research and teaching activities. As mentioned above, Compas has learned that, even with the immense diversity in the ways local knowledge is phrased and expressed in different cultures, a common feature is that existence is perceived in terms of three inter-related and inseparable domains: the natural, the human and the spiritual worlds, whereas the conventional way of knowing is based on the separation of observer and the observed world and focuses on the material world.

Local and outside knowledge are always interacting, sometimes competing, replacing or confronting each other, sometimes as an inter-cultural dialogue. The Compas partners try to understand these interactions and influence them in such a way that social learning and co-evolution can take place.

The Compas partners have ongoing programmes in the domains of poverty reduction in marginal areas, participatory development, local management of natural resources and ecological processes, low external input and sustainable agriculture, biodiversity, local health systems. These programmes build on local knowledge and enhance cultural diversity. Based on their experiences the partners have concluded that the conventional approach to support development, consisting of transfer of technologies, knowledge and values from the modern world to the underdeveloped world, needs to be revised. Rather, traditional knowledge and values that exist within the communities, with their technical, social and spiritual dimensions, need to be accepted as the starting point for development, from within the own culture.

Compas functions as an international network that links practical support to people in rural areas with theoretical reflections about development options. The approach of the Compas programme can be described as action-research on endogenous development. It aims to be complementary to the many organisations that have similar focus but that restrict themselves to field work or research or to the technical aspects of indigenous knowledge.

Supporting endogenous development does not imply a narrowly defined development approach, nor does it romanticise or reject traditions. Endogenous development is seen as an approach that is complementary to the ongoing technological and economic global processes. It wants to address local needs and contradictions, use local potentials enhance local economies and link them to international systems with optimal terms of trade. It supports co-existence and co-evolution of a diversity of cultures. Inter-cultural research, exchange and dialogues will be helpful to find the most desired development path in specific contexts, building on experiences accumulated.

Indigenous knowledge and practices may not have all the answers to present-day challenges. They may have certain limitations or setbacks. But farmers and rural and urban people in the South take decisions and define their relationship with outside knowledge and agencies based on their own culture and values. Therefore, for development organisations to be effective in supporting endogenous development, they need to understand the basic characteristics and acknowledge the existence of local forms of knowledge, and the worldviews that they are based on.

The Compas partners started their work on supporting endogenous development by carrying out systematic activities for learning with and from rural people about their knowledges, practices and worldviews. Subsequently initiatives have been taken to test, adapt and improve the traditional practices and to enhance endogenous development. Networking and training have taken place and a number of workshops and publications have led to a further systematisation of the experiences so far.

In the course of these processes the Compas partners have identified the following components for supporting endogenous development:

1. Building on locally available resources;
2. Objectives based on locally felt needs and values, acknowledging the interests of different social categories;
3. *In-situ* reconstruction and development of local knowledge systems: understanding, testing and improving local practices and enhancing the dynamics of the local knowledge processes;
4. Maximising local control of development;
5. Identifying development niches based on the characteristics of each local situation;
6. Selective use of external resources;
7. Retention of the benefits in the local area;
8. Exchange experiences between different localities and cultures;
9. Training and capacity building for rural people, development staff and researchers;
10. Networking and strategic partnerships;
11. Further understanding of systems of knowing, learning and experimenting.

Intra- and inter-scientific dialogues

In the Compas programme we have started to formulate the most striking characteristics of the paradigms and epistemologies of sciences in Africa, the Andes, India, and Europe. We are only at the beginning of this process. Of course, there are also many differences within each of the regions but in a preliminary way we have found some characteristics, summarised here for each continent.

Africa: A worldview with a hierarchy between divine beings, spiritual beings, ancestors and natural forces. Sacred character of natural resources. Cyclic notion of time. Powers of ancestral spirits. Use of magical powers both in negative and positive terms. In the African reality, one can observe a dual system of beliefs and knowledge: traditional and modern. They co-exist and each of them goes with specific values and this often leads to different decision making. (See Millar's paper.)

India and Sri Lanka: The real world and the fundamental principles of organising life systems are different form those in the West. Scientific methods are not limited to the five senses. The mind, when free of prejudices such as lust, anger, greed, intoxication, delusion and jealousy can complement the senses and understand the reality from within. The Vedic knowledge has a notion of nine existential principles and qualities. The health system is based on these principles. In tribal knowledge, powers of symbols and of sounds are important. In Buddhist systems, meditative techniques can lead to mental states that disclose a range of different powers (time, location, sounds, symbols, plants, persons).

Latin America, the Andes: The natural, social and spiritual worlds are expressions of a unity. Sacred time-space goes beyond the physical or socio-economic domains (Pacha Mama). The cyclic notion of time; mutual and reciprocal relationship between humans, animals, plants; living astrology; the role of rituals and fiestas.
The Mayas: The religious worldview, the Maya calendar, own system of mathematics (based on the number 20) allowing pyramid architecture, own health and agricultural systems that build on the calendar, rituals and ecological principles. (See Escobar's paper.)

Europe
Conventional, Enlightenment: Measuring and the use of the five senses is knowing; rational logic; materialism; mechanistic, self-interest of individual or group as organising principle.
Post modernity: Uncertainty, diversity, chaos and self-regulation, holism, synergy rather than generic principles and universal science or values (such as human rights, democracy, good governance). Post-normal science, transdisciplinarity. (Several papers in this publication, e.g. Baars, Bosman, Kieft, Laszlo, Molenaar, Pereira, Röling and Zürcher touch upon the different scientific paradigms that are complementary, contradictory or transcending conventional science.)

Co-evolution of sciences

Compas wants to provide a platform for inter-scientific dialogue that can contribute to a co-evolution of sciences. In this process, each science involved is stimulated to evolve (to develop and improve their methods and theories) based on their own dynamics as well as on interaction with other systems of knowing.

The *objectives* of the intra- and inter-scientific dialogues are:

- To understand, describe and exchange the epistemologies and paradigms of the sciences involved;
- To strengthen and revitalise the marginalised sciences ;
- To determine the strengths, weaknesses and comparative advantage of each science;
- To look for synergy and opportunities for mutual learning as well as for contradictions and exclusions;
- To question, challenge and criticise each other in order to determine those aspects of the science and value systems that need modification and improvement;
- To balance the power and financial resource base of the different sciences.

The epistemological interpretation of the different Asian, African and Latin American and European knowledge systems, their ways of learning and experimenting and their mutual relationships needs attention. Therefore, it is important to systematise and make more explicit the concepts and theories behind indigenous forms of knowledge in order to share them as part of a possible co-evolution of the diversity of sciences.

Risks and code of conduct

Based on the experiences, the partners of Compas realise that it is not without risks for an outsider to work with indigenous knowledge and practices.

Risks involved are:

- The extraction of local knowledge for purposes not in the interest of rural people;
- Disturbing the existing status quo and dynamics at community level;
- Domination of local processes by outsiders who do not understand the local values and mechanisms of decision making;
- Introduction of values and lifestyle that are not consistent with or complementary to the local values;
- Prying into people's private matters (e.g. beliefs and spirituality, power relations).

The partners have agreed to work with rural people according to a code of conduct that respects the diversity of ways of knowing, accepts and supports the local ownership of local knowledge and local development processes, defines a complementary role outsiders may play and accepts the need to learn from and with local people. Publications are mainly aimed at strengthening local ways of knowing, and are written as far as possible in local languages. Publications will avoid mentioning technical details but will focus on the methods and strategic issues.

Co-evolution of different ways of knowing: towards a strategy

Actors involved

Given the wide range of options in belief systems, values, practices, knowledge concepts, and power positions, there are many modalities for intra- and inter-cultural relations. The present dominant position of materialist values and global technologies tends to marginalise minority cultures and diminish cultural and biological diversity. Therefore, to achieve a more egalitarian, just and sustainable relationship between different forms of knowledge, new paths have to be explored.

Building on the analyses and arguments discussed so far we suggest an intra- and inter-cultural social learning process carried out by multiple actors. The process will include at least the following actors: local people, their intellectual, political and spiritual leaders, local NGOs, government agencies for rural development, education and research, educational institutes and research centres. However, also national and international donors and development agencies can play their role.

Each actor can contribute to the social learning process in their own unique way. Local people can share their local knowledge. NGOs and governmental development agencies can support the process of revitalisation and improvement of the local knowledge and way of knowing. Schools can include local forms of knowledge in their curriculum. Universities and research centres can do supportive research on the epistemologies and support the action research programmes. National governments can give policy priority to endogenous development and revise their current mechanisms for development in this light. International agencies for research and development and donor agencies can make available funds for these activities. International media of communication can be used to give credibility and prestige to this process and to support the mutual exchange process.

In fact, the choice for endogenous development and for co-evolution of forms of knowing is a major shift in paradigm that will not take place easily. The present systems for research and development have their own interest in the continuation of the status quo. Therefore, a careful strategy of activities at different levels will be important.

Possible activities

Below we present a number of activities that together could contribute to an approach for actors in the Compas programme, i.e. local communities, NGOs, universities and regional and international coordination units.

Re-building relationships

A prime condition for successful cooperation of these actors will be a relationship between actors that is horizontal as far as possible and is characterised by mutual interest and confidence. Hence, the first step to take is to critically analyse and reconstruct the different relationships as they currently exist. NGOs working with rural people have to make clear that their role is not that of an external agent who comes with a certain message or technology to be transferred. Learning with and from local people and working on the basis of their cosmovision implies that the outsiders

accept the rules of the game as expressed by the communities. The traditional codes for hospitality, confidence building, respect and communication have to be accepted and obeyed. This may mean procedures of selection and processes of initiation, and participation in rituals that have a different cultural background and meaning for local people than for outsiders. Universities have to accept the fact that their conventional knowledge has its limitations, and also have to accept that their role in this process is predominantly one of learning. The funding agencies have to get used to a downward accountability. The international coordinators should learn from and with the regional coordinators and these with the local partners and these in turn with the local communities. The communication and interaction will not only be about conventional professional subjects, but may involve spiritual and cultural aspects and a lot will depend on good social relations and skills. This means that the role of supporting people and organisations changes radically: instead of teaching local people on how to resolve their manifold problems, they concentrate on learning from local people as the basis for exploring possible synergies between different forms of knowledge. External actors become companions and animators of communications within and between different groups related to endogenous development. Instead of aiming directly at participatory development of technologies, they become agents for participatory skill and competence development involving local as well as external people, aiming at enhancing and broadening local control on development. This requires a process of personal preparation where the conventional professional standards, attitudes and skills are scrutinised and modified where necessary.

Intra-community dialogue and decisions about possible interactions with outsiders

An inter-cultural dialogue and a process of co-evolution require that the different parties involved are prepared and interested in exchange. Yet, it is not evident that local communities, traditional experts and spiritual or political leaders are positive about it. Keeping local knowledge separate, or hidden from the eyes of outsiders, can be used as a defence mechanism, as a way to protect the traditions and to be free from external influence. Also, within a community there may be different positions: not everybody will have the same interest and position. Differences in gender, age, social position, class, caste, professional background, can lead to a different knowledge, value and position towards exchange with others. Therefore, before we can assume that an inter-cultural dialogue is desirable and possible, we need to have a view of the community as it is differentiated in social class, gender, age groups. How do they see their situation: the potentials and risks of exchange, possible synergies, power relationships, conflicts? What would be the strategies of negotiation and joint learning?

Which internal and external factors do local actors consider to be responsible for strengthening or debilitating endogenous development and the cultures in which they are rooted? Which points are considered important for the traditional culture to be maintained, and what points from the dominant or formal system can to a certain extent be included into the traditional system and who decides on this? This then leads to a vision on the desired closeness or distance of collaboration: on the desirability of the ways, contents and partners of a co-evolution.

Learning about cosmovision, sources and forms of knowledge within the cultures
This activity consists of trying to understand the way of knowing within the cultures involved in this process. The cosmovision, values, the way people learn, teach and experiment and their logic and knowledge concepts and theories must be made clear and understood in order to be able to have internal reflection on the strong and weak points of the own knowledge. We could try to understand the cosmovisions, how the different sources of knowledge, like rationality, intuition, inspiration etc. are being used and combined and how they lead to the understanding by the holders of local knowledge. Sharing these aspects could then lead to a joint reflection. Specific needs can be identified for strengthening, revitalising or enhancing the way of knowing. Based on these, possible changes required in relation to traditional education, training, research or macro conditions and policy environment can be identified.

Learning from the community experience of coping with the dominant system
It is important to find out to what extent the local communities are already dealing with the dominant system. Is it possible to describe the relationship of the local culture and the way of knowing with the formal/dominant system in the area? Can the typology presented in this paper be used to make such a description? Can we learn from the community how they have managed to survive/change and co-evolve with the dominant/formal system? How do they do it and how shall we as NGOs, universities or other supporting organisations relate to that, and how do we deal with this when certain value differences between them and us become clear? What are the possibilities and limitations for inter-cultural dialogue?

Dealing with strong and weak points of the local forms of knowledge
On the basis of a self assessment of the sources (e.g. rationality and intuition), proposals can be formulated to revitalise local knowledge. Suggestions can include transformation of existing mechanisms of learning and teaching, recovery of lost knowledge, mobilisation of people or resources to come to grips with local knowledge, or healing of practices that are considered ineffective or detrimental. For each of these possible options appropriate approaches can be chosen. These approaches could initially be chosen from the available scale of indigenous options. This may be an important focus of the action-research activities for endogenous development of the partners involved.

Dealing with strong and weak points of the dominant forms of knowledge
The basic hypothesis of this paper is that Western knowledge is one of the possible forms of knowledge. It is not universally applicable. It has its own strengths and weaknesses. An inter-cultural dialogue based on mutual confidence and horizontal relationships can only take place if all partners involved are prepared to have a self-critical attitude. There are considerable theories and reflections on the character of Western science. In the battlefield of knowledge, debates are held on issues such as objectivity versus subjectivity; universalism versus relativism; specialisation and disciplinarity versus holism and transdisciplinarity; quantitative method and qualitative methods; neo-positivism and actor perspectives. Hence, it is clear that also within the dominant scientific tower, there are different perspectives and positions. Western

knowledge applied to agriculture or health practices has great impact on the globe. It has led to impressive results, but it has not been able to solve all problems related to food security, health, poverty, environmental sustainability and peace. Therefore, there is a perspective for inter-cultural and inter-scientific dialogue, on condition that Western science also accepts its limitations and is interested in finding ways to deal with them. The balance between sources of knowing: rationality, quantification and the material world, on the one hand and empathy, intuition, sense and meaning, need to be explored and where necessary corrected. Non-Western scientific traditions can offer a lot to Western science.

Exchange of experiences and co-evolution

An important step would be to look for opportunities for mutual learning and exchange and for co-evolution. It could be understood as a dialogue between partners allowing themselves to maintain a certain degree of divergence between the different forms of knowledge involved. Respectful dialogue implies the willingness to listen, openness to learning, responsiveness to information, questions and suggestions as well as the courage to criticise when necessary. It needs to avoid the pitfalls of rejecting positive elements of deficient forms of knowledge, as well as avoiding the risk of romanticising or idealising any of the forms of knowledge involved. The question whether it is feasible to achieve inter-epistemological cooperation in the sense that it leads towards transcultural synergy has not yet been answered. Possibly this can only be done in a satisfactory way, once the local systems as well as global systems have gone through their own processes of transformation, recovery, mobilisation and healing.

The challenge

This paper is an effort to get to grips with the co-evolution and inter-scientific dialogue in a situation where the starting position of the different actors is not equitable and where the differences in status, power, and resource availability are tremendous. We have to learn a lot if we are to overcome our Western bias. Compas wants to play a stimulating role in creating a platform for the dialogue and therefore we need to be open to other positions and approaches. We are ready to receive constructive criticisms and suggestions for improvement.

Compas' experiences in inter-cultural and inter-scientific dialogues are still rather limited. In this paper we purposely presented more questions than answers. We are convinced that answers can result from a continued joint learning process and dialogue between different forms of knowledge. This is a difficult process, which we have to learn ourselves. What seems to be clear for us might be questionable for others and the other way around.

Our challenge is to accept the uncertainty and through our mutual social learning process try to come closer to answering the questions. We invite professionals and scientists in local organisations, NGOs, universities, government bodies, national and international development agencies to join us in this effort. We look forward to the opportunity to strengthen our ties with organisations based in the South as well as in the North, in initiatives that reshape sciences, policies and actions.

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Learning for transition

How biographical experiences affect a research and training programme in biodynamic agriculture at Kassel University

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Introduction

Moving worldviews are easily connected with a change from the dominating Western worldview towards the worldviews of for instance Bolivian, Ghanaian or Indian people. In these countries, as a result of specific religious aspects present in these cultures, people developed other ways of behaving towards each other and their surrounding world. However, there are also different worldviews present within Western society, although there is little acceptance of other scientific paradigms. The influence of Western science in our society is so strong, that alternative methodologies and ideas like homeopathy are strongly suppressed. An example of a Western alternative worldview on farming is biodynamics and its background in anthroposophy. The strength of anthroposophy is that its philosophy is connected with a theory (epistemology), new research approaches (methodology) and a vitalistic view on substances (ontology) (Gloy, 1998). In this paper, the consequences of the anthroposophical worldview in relation to agriculture are discussed.

All forms of sustainable agriculture are knowledge-intensive. Organic farming has expanded the horizons of agricultural practice. It is questionable, therefore, whether or to what extent the methods, techniques, social approaches and organisation that have been used in agricultural research and extension to intensify conventional agriculture are suitable for supporting organic farming (Röling & Jiggins, 1998). A paradigm shift is needed. It is clear that organic farming calls not only for new knowledge and techniques, but also for new attitudes, socio-economic behaviour and mentality in farm practice, in science and advice. With regard to systemic and participatory development, Bawden et al. (2000) describe the intensive reform of the agricultural curriculum at the University of Western Sydney. The stepwise evolution of methods of research and extension has also been described for agricultural changes in the developing countries (Chambers, 1992).

Since 1981 there has been a research- and teaching programme in ecological agriculture at the University of Kassel, Department 11. During the last five years there has been a unique situation, where there are 17 professors specialising exclusively in a number of aspects of organic farming. This has meant an enormous process of conversion within the existing, conventional agricultural education at the Kassel University. However, students have asked specifically for training and education in the field of biodynamic farming, which is one of the oldest types of organic agriculture (Vogt, 2000). Biodynamic farming, which seeks to implement anthroposophical

principles in farming practice, distinguishes itself from other blood groups by its emphasis on the life forces that play a key role in agriculture. Agriculture is not just a matter of physical, chemical or even biological (in the sense of genetic and evolutionary) processes. This emphasis on life forces adds several very essential additional considerations with respect to the objectives and especially the practices followed in organic farming. The key differences are:

- The emphasis on the farm- and site-specific nature of farming – the farm is seen as a living entity on its own (Steiner, 1924);
- The use of methods to identify and manage life forces (e.g., the use of certain compounds in compost making);
- The emphasis on the intrinsic nature of beings and their integrity (Verhoog et al., 2002), and the effort to understand these e.g. through Goethean research approaches (Bockemühl, 1980);
- The central role of human spirituality in relation to the development of the universe and its consequences for human nutrition.

In this paper, I start by introducing my personal experiences in the field of biodynamic training/education and research. Several biographical developments significantly affected my view on education and research. I call these changes paradigm shifts. My worldview has moved from a reductionist, negative and competitive view towards a more holistic, spiritual view. I highlight the steps of change I have undergone below to show that these changes were accompanied by inner conversions.

Biographical aspects

Born in Amsterdam (1956), at an early age I wanted to become a veterinarian. During teenage summer holidays I was introduced in farm life and met different farm animals on a small farm. Because of the small number of places available at Veterinary School I was not admitted first time round. I therefore decided to start a degree in biology, specialising in ecology. By the end of the first year, I had become overwhelmed by the scale of the environmental problems threatening the continuity and the sustainable development of our world. I felt it was my personal responsibility to solve these environmental problems, and the ecological knowledge offered at the university was my first adult awakening. Although in the second year, I was offered a place at Veterinary School, I decided to continue my study in ecology. My interest in new alternative food and nutrition philosophies increased, as I felt that conventional agriculture had not only strongly reduced the quality of our nature and landscape, but had also decreased the quality of our food. I became a vegetarian for a period of more than 10 years. After a short interest in macrobiotic food, I encountered 'alternative' agriculture. In those days, alternative agriculture in the Netherlands was dominated by the biodynamic movement, in terms of size and inspiration. I remember that in contrast to other biology students, I was convinced that organic agriculture was the right answer to a number of environmental, social and economic problems within society because of its holistic character. For me, organic agriculture included

comprehensive solutions (for the environment, animal welfare, the third world and farmers' incomes) rather than separate solutions. I started to develop a deep antipathy to symptomatic solutions, which did not radically change 'false' farming situations. Philosophically, I did not feel comfortable with the so-called 'critical biologists' in the Netherlands, who were connected within the Leiden Group of Environmental Biologists (Milieubiologie) and the Centre for Agriculture and Environment (CLM) in Utrecht. Those groups were much more politically oriented and in my opinion, the scientists involved were merely attacking the negative sides of conventional agriculture to reduce its negative outcomes. It was simply not my way of living.

So my first paradigmatic conversion was based on these new ecological insights gathered in the first 3-4 years of my biology study. It was not the world that had changed, but I had changed through an inner development. This new view on the world opened up my thinking about relationships (auto- and synecology), interdependence and sustainability, and last but not least, made me feel responsible for the world we live in and the earth we live on. Rather than knowledge of single facts, insight based on the understanding of ecosystem processes became important and relevant (Bormann & Likens, 1979).

In 1978/79 I followed a part-time course on biodynamic agriculture at Kraaybeekerhof. I combined this with volunteer work at one of the oldest biodynamic horticultural farms in the Netherlands: Sloterland, which was established in 1937. On this 1.5 ha farm a wide range of crops and fruits were grown, hedges housed bird life and compost was used to improve soil fertility. Two elements in this Kraaybeekerhof training changed my thinking about life and opened up new areas of the 'same world'. Again, it was not the world that had changed, but my relationship and my observations of the world through the following:

- A holistic way to teach biology, called Goethean phenomenology (or Goethean science, Bockemühl, 1980; Seamon & Zajonc, 1998);
- The anthroposophical view on the development of the earth, the evolution of man and the central role of man in nature.

Although I was in the middle of a scientific degree in biology at Utrecht University, my worldview had changed for a second time as a result of this Goethean phenomenological method. The Goethean scientific method examines the non-physical elements of the world. Goethean science has proved to be an essential method to elaborate reductionist observations and the method is intended to reconcile reductionist and holistic approaches. Goethean science has opened up a scientific road map to become connected with what is observed and to investigate the non-material elements present in the world. The German poet Wolfgang von Goethe was searching for the essentials in the world. Within himself, Goethe discovered the imaginary 'proto-plant', a non-physical idea of plants, which covered all potential plant shapes present in the world (Von Goethe, 1978).

In my personal development, I will never forget the inner flash I had, when after weeks of repeated observations of a group of trees and bushes, making drawings and looking for the expression of their growth gesture, I experienced the natural growth and development of the trees during spring time as an upward movement, which was connected with changes of colours over time. This step towards an empathic observation in terms of a *growing process* I experienced as my second paradigmatic change. Rather than a scientific interest for facts and figures, which only could be

measured and weighed, I became interested in natural processes of development, which were the essential elements of life (Schad, 1985). In later times, I realised that this change was a fundamental one from a philosophical point of view. With Goethean science, I crossed the border which separated positivism in science from constructivism within real world experiences. The object-subject relation changed due to Goethean science. Attitudes such as involvement, connectedness and expression were important elements of this new science and these attitudes opened up new areas of the world around me. Due to the scientific work of Jochen Bockemühl (1980, 1977), the Goethean methodology could be learned in a scientific way.

At the same time, anthroposophy presented me with the realistic existence of a spiritual world, which was not only present in a Sunday feeling of church religion. More like native American Indians, I felt that spirit was present in everything around me. Although church religion had been part of my childhood, I left the protestant church at the age of twenty. At the same time, anthroposophy revived my religious feelings in a more spiritual way. Spirits were present everywhere in the world surrounding me, accompanying plant growth for instance and not only far away in heaven. I became aware of a realistic connectedness of matter and spirit. For instance, spirit was also connected with plants and an elemental world accompanied each plant in its growth and development. Due to anthroposophy, I no longer lived in two separated worlds: a Sunday world of religion and mid-week world of materialism. Anthroposophy distinguished different non-materialistic qualities, which were described as different bodies (e.g. the etheric, astral and I-body). A range of spiritual entities accompanied the living world everywhere and at all times. Additionally, anthroposophy positioned man in a different relation to the rest of nature, and evolutionary development was completely opposite to the Darwinian worldview, closer to Intelligent Design. From this spiritual point of view, man was not the last step in evolution, but rather the first step in evolution (see also Bolk, 1930). Evolution was not a matter of coincidence and trial and error, but development was present with a goal. At the same time, the physical development of species, represented by fossils, is not denied (Mees, 1990; Verhulst, 1999 and Bosse, 2002). Due to anthroposophy, life in general as well as my personal life acquired sense, because of the presence of human faith and reincarnation, this offered me respectively goals in life and new possibilities later on. The understanding of anthroposophy and its integration in my way of living and my scientific life was my third paradigmatic change in the understanding of the surrounding world.

In 1985 I started working as a scientist at the Louis Bolk Institute in Driebergen in the Netherlands. The roots of this institute are in anthroposophy and the Goethean approaches are practised in the scientific work. Additionally, other anthroposophical methods were used to investigate the so-called etheric or living world. Steiner had suggested that the copper crystallisation (after E. Pfeiffer) and capillary method (after WALA) could be used to investigate the expressions of the (invisible) etheric world. At the Louis Bolk Institute, the water drop method (after Schwenk) was part of the research in water quality. Although I did not practise any of these methods by myself, there was an intensive exchange of knowledge between the different departments of the institute.

At that time, there was a strong vision within the agricultural department on how to develop knowledge coming from and together with agricultural practitioners (Anonymous, 1985). We not only wanted to develop scientific insights, we also wanted to develop farmers' independence. This had to be done in such a way that this knowledge is connected with everyday farm practice. We were conscious that a lot of knowledge is hidden within everyday experiences, so-called tacit knowledge. The character of this knowledge is holistic on the one hand and adequate, context-related on the other. Cooperation and interaction with individual farmers and farmer groups finally led to the implementation of a bottom-up approach in several research projects. From that moment on I was closely connected with organic dairy farmers and new projects were born based on the intentions of farmers who were considered to be pioneers. In 1999, a handbook was published about this methodology in Dutch, entitled 'The farmer as an experiential scientist' (Baars & De Vries, 1999). In 2002, a scientific reflection on this way of working took place and I completed my thesis in English about the scientific approach practised at the Louis Bolk Institute. The methodology was characterised as 'experiential science', a term used explicitly to emphasise the differences with experimental knowledge (Baars, 2002). The development and exploration of experiential science was the fourth paradigmatic change in my scientific career. My former colleague Albert de Vries completed his thesis in 2005, in which he further developed the knowledge gathered during our own daily work (De Vries, 2005).

Experiential science is based on the unique knowledge gathered by pioneering farmers. A case study evaluation is the basis of this method and a strong scientific element of the methodology is the so-called pattern recognition done by experts (Kiene, 1998). I have shown, that action, feelings and thinking are part of the knowledge process (Baars, 2002). Experiential knowledge and insights are primarily based on farmers' actions and the reflection on the learning process during action rather than on experimental deduction. Over a 20-year period, a methodology has been created based on intensive cooperation between single farmers or farmer groups and scientists/advisors. In this cooperation all members were equal, each bringing in their specific, but different observations and knowledge. The method is not hierarchical or top-down out of the ivory tower of science. Insights gathered from experiential knowledge are based on the reflective observation skills of these experienced practitioners.

This experiential knowledge is not only holistic, but also adequate. As in formal science, experienced practitioners develop valid knowledge (Snoek, 1993) and in new, unknown situations they have a capacity to integrate for diagnosis ('knowing what') and the right action, needed at a specific moment ('knowing that'). These human skills and capacities have to do with the right side of the brain processes, where experienced people only need fragmental information to recognise and understand a situation (Servan-Schreiber, 2005). The end of a (re)search process of professional agricultural practitioners is a 'system that works' for their specific situation and in their context (Röling, 2000). Rather than hard science, the interest is present in the 'soft side of reality' (after Röling, 1997). The systemic development of a new practice is based on subsystems, which together form the new management. These subsystems, which are developed in a stepwise fashion, can be described as a set of 'novelties' (Swagemakers, 2002) to show the innovative side of this knowledge-in-action.

University graduates receive the title Master of Science (MSc). To develop experiential knowledge in a scientific way, it was clear that learning during action is based on other preconditions than theoretical learning. In a moment of intuition, the expression 'Masters in Action (MAc)' arose, which highlights the contrast between the two sorts of education: education between first-hand learning in practice and second-hand learning in theory. For me this action-knowledge has become as if not more important than formal scientific knowledge. In daily practice this experiential method of evaluating and learning from practical experiences of professionals can be combined with on-farm experimentation (Baars, 2002).

Since 2000, researchers and advisors inside and outside the Louis Bolk Institute have been trained to use these experiential skills in practice. An important project involving this approach is 'Bioveem', an inter- and transdisciplinary project which I present below (Baars et al., 2005). From a methodological point of view, the project is an enlargement of the handbook written about experiential science (Baars & De Vries,1999).

In summary: I mentioned four paradigmatic changes, which affected the way I am observing and understanding the world nowadays. These paradigmatic changes affected my vision on education and research:

- Systems, ecological relationships and systemic solutions came into my consciousness.
- In Goethean sciences a holistic research method was presented.
- Spirit became part of my world in such a way that it was omnipresent.
- In experiential science my respect for the farmer and the farmer's insights was strengthened and it became clear that this type of 'knowledge was in action'.

Philosophical reflections

In my thesis (Baars, 2002) I use a four-quadrant matrix (Figure 1; after Miller, 1985; Bawden, 1997 and Röling, 2000) to explain the different steps of paradigmatic change (Figure 2). The matrix reflects two polarities derived from the philosophy of science:

- The objective, positivistic approach to knowledge, versus the subjective, constructed one. This contrast reflects different epistemologies in the way we try to understand the world;
- The holistic versus the reductionist approach to observation, thinking and explanation.

	Constructivism (subjectivism)	**Positivism (objectivism)**
Holism	3. HOLO-CENTRIC	2. ECO-CENTRIC
Reductionism	4. EGO-CENTRIC	1. TECHNO-CENTRIC

Figure 1 Matrix to distinguish between different scientific paradigms

The paradigmatic steps I have gone through correspond with the description of the changes in the scientific community, where the integration of natural sciences and social sciences are discussed (Röling, 2000). Starting in the worldview of quadrant 1, my education in ecology made me conscious of systemic knowledge and process development presented in quadrant 2. I crossed the border that separates positivism and constructivism, when I encountered Goethean science (Quadrant 3). Anthroposophy can be seen as a step into the 4th quadrant. In a paper about the different ways to solve a pest problem in agriculture, these four quadrants were used to distinguish between the possible approaches. Bawden (1995) mentioned the solution 'praying' as the action for this 4th quadrant. Anthroposophy might correspond with this solution, because religious aspects are present in anthroposophy from an atheistic and materialistic worldview, which dominates scientific belief.

However, this stepwise inner development does not show how I have worked out the methodology used in experiential science in this matrix. In my thesis, I positioned the starting point of experiential science in this 4th quadrant (Figure 2). My motivation to start in a quadrant that combines reductionism and constructivism, was oriented on the action side of experiential science. The basics of experiential science are adequate and well-timed actions; this is reductionist, because it is an answer only for this particular situation. At the same time, the action is constructivist, because it can only be made by the professional who is present and responsible for the situation. In the final description of how the methodological steps in experiential science were carried out in practice, I have shown that experiential science will start in quadrant 4 (Figure 3; the constructivist, adequate action). Before you decide to support the action research by any experiment (quadrant 1), you have to be aware of two types of context in relation to the farmer's action: the biographical context of the farmer (quadrant 3) and the physical restrictions and challenges of his specific farm ecosystem (quadrant 2). If you have investigated and described these two elements, on-farm experimentation (quadrant 1: on-farm action research) can be helpful to bring new insights. The process, however, is cyclical. Due to actions and reflections on the one hand and on-farm experiments on the other, insight into the specificity of the farm grows. Therefore, I described a repeating cycle of these steps as the essence of the experiential process, where both farmer and scientist are involved. This process of actions, reflections and experimentation will come to an end, once the farmer has developed a new 'system that works'. This is a new set of management actions that fit in a new farming situation, and at this point, the farmer's search process for this specific topic stops. The new insights can be described (Baars, 2002) and if records are kept of the steps of development, these results can be published in a peer-reviewed setting (Baars & Veltman, 2003).

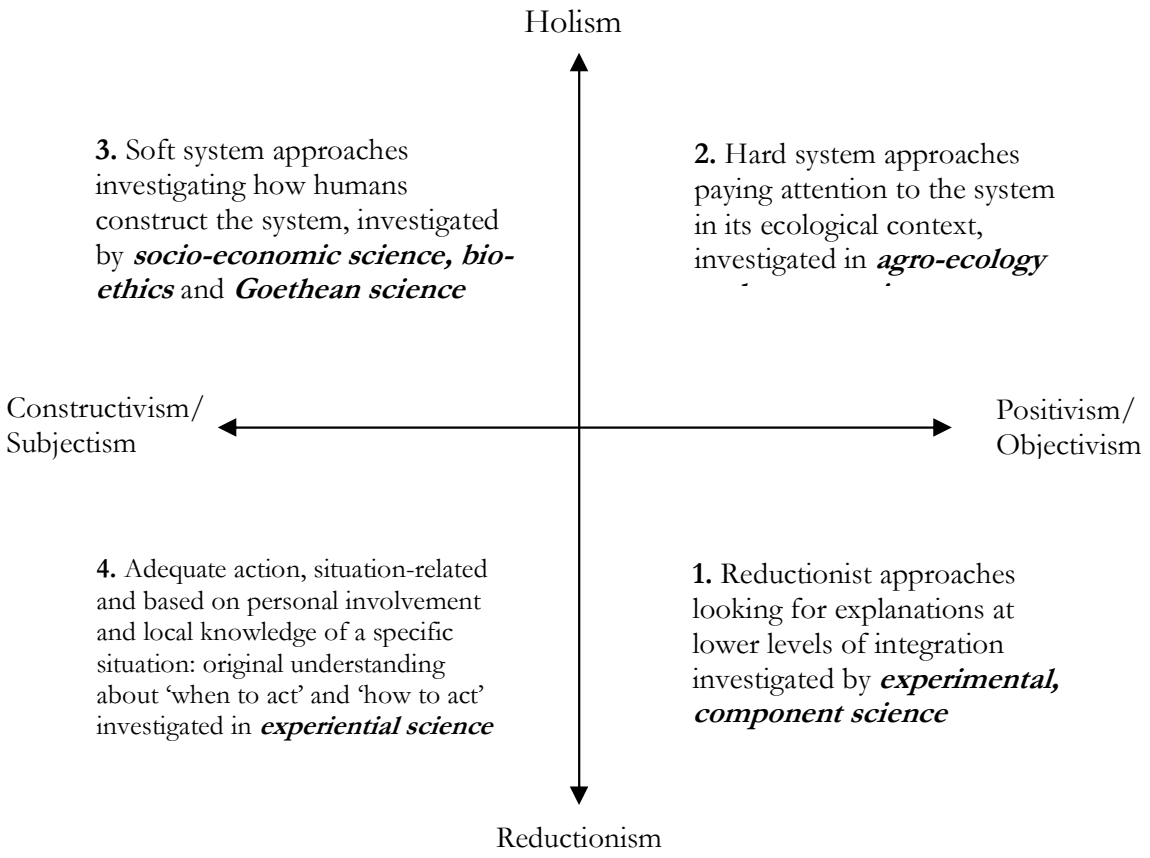

Figure 2 Scientific approaches based on the Four-Quadrant matrix

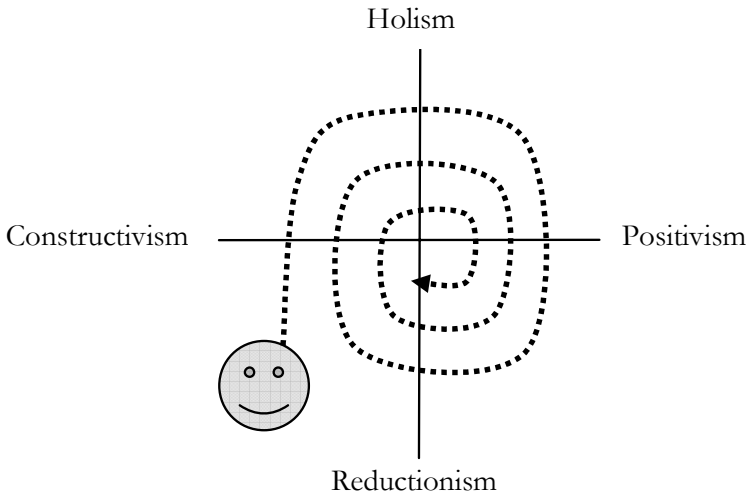

Figure 3 The steps undertaken in experiential science within the framework of reductionist versus holistic science approaches (vertical axis) and of the constructed world versus the objective world (horizontal axis)

In the next section I discuss the consequences of these paradigm changes for teaching and research activities. Finally, I describe the Bioveem project, an outcome of a transdisciplinary experiential research project with pioneering organic dairy farmers. I regard the project as an example of how I would like to integrate farmers' experiences and scientific knowledge in scientific cooperation.

Teaching activities at the University of Kassel

Although for a lot of people in the outside world biodynamic farming is connected with knowledge about the relationship between the stars and moon and plant development, or the specific influence of the so-called biodynamic preparations on the development of soil and plants, I am convinced that biodynamics cannot be understood without a good knowledge of anthroposophy. To become an adequate biodynamic trainee it is not only important to gather knowledge about specific biodynamic themes, it is also important to learn how you can investigate the living world by training your own holistic and spiritual capacities and skills to investigate and observe the world. Students therefore should learn how a holistic worldview can be accompanied by holistic teaching methods.

A teaching programme has been developed, based on the two approaches mentioned above: Goethean sciences (Bockemühl, 1980) and experiential sciences (Baars, 2002). Goethean science is used to train the students in scientific holism, but this is isolated from the farm reality. Goethean science is not connected with actions, but is a method for holistic understanding and thinking. Goethean sciences respect the entity of the object of research. The basic elements of this method are the comparison in time and space of the observed in its natural development, the inner imagination of these shapes and development, and the reading of its gesture (Bockemühl, 1977). These observational and comparative methods are used to understand the otherness. The Goethean method is empathic. Much attention is paid to learning about the natural growth and development of living organisms in their own specific environment. A second step of this methodology is to understand the 'inner gesture' of the observed, its expression. Through Goethean science, researchers have developed new holistic insights concerning for instance landscape development, plant breeding and evolution.

In contrast, experiential science starts in real life reality and its knowledge is always connected with doing the 'right' actions in a specific situation. In experiential science, the personal on-farm experience of farmers is as important as the so-thought objective knowledge gathered from scientific experimentation. As a matter of principle, farmers have to reconcile holism and reductionism. Through reflections on their daily actions, they build up inner holistic images of their cultivated plants and their farm animals, as in Goethean science. Like all experienced practitioners in other professions, farmers use these holistic images to make decisions in new and unknown circumstances: at the right time and in the right place. Pattern recognition is an important element of this type of experiential knowing and acting (Kiene, 1998).

I realise that a lot of what I have learned in the last twenty years and what I am now integrating in a research and teaching programme, has to do with the understanding of and learning from 'the soft side of land' (after Röling, 1997).

Traditional science has taught us how to tackle the measurable side of the world, whereas Goethean science and experiential science open up methods to train the qualitative, constructive or personal side of the world.

For my teaching programme at the University of Kassel therefore the following elements are important:

- Training of the observation skills. Seeing is something else than observing and most people are rather lazy observers. Their brain fills in what they assume is there in terms of old imaginings, instead of using different perspectives to build up a holistic and real-life picture of the observed. Repeated observations in time and space are used to build up this picture. Comparative studies between related plants and animals are used to become aware of differences and of the specific elements of the single species or example.
- Use of arts. Goethean science cannot be developed without the arts, just as the left side of the brain cannot function without the right hemisphere. Eurhythmics is an art that makes people aware of movements rather than of fixed forms only. Moving is the basis of change and of being aware of the developing process. Simple drawing techniques (plants) and modelling techniques (animals) are used to look at the expression of the observed.
- Training of twelve rather than five senses. In anthroposophy people assume there are more than the traditional five senses. The so-called 'sixth sense' corresponding with our feelings, is much heightened in anthroposophy. Due to the awareness of these 'new' senses it is possible to discuss what lies behind the gap which exists between positivism and constructivism. Meditation is considered part of education as well. Students are shown that one can train the subjective areas of the body connected with feelings, expressions, meanings, intuitions and other inner imaginings. Steiner introduces for instance the moving sense (German: *Bewegungs-* or *Eigenbewegungssinn*) and the thinking sense (German: *Gedanken-* or *Denksinn*). These senses are the tools for understanding the steps made into the 'subjective' world.
- Learning from real-life farm situations in combination with a focus on challenges rather than on an attitude of reductionist and symptomatic problem-solving. Successful practitioners are visited, their situation is analysed and their learning process and biography are understood.
- Training in the scientific evaluation of pattern recognition. Pattern recognition is the key for experiential science. Different forms of pattern recognition are distinguished and taught.
- Training of distance – connection. Students are trained to be aware of their connectiveness rather than to maintain a (scientific) distance towards the observed. How can you be involved with the other without losing your objectiveness?
- Being aware of the philosophical implications of Goethean science and experiential science. Students should be aware that the chasm that ultimately separates the different scientific approaches has to do with the non-acceptance of ontological holism in the traditional scientific community.

Research activities at the University of Kassel

Before I describe my own research topics and the research methodologies used, I will first describe in general how anthroposophical researchers deal with science and anthroposophy. In the anthroposophical scientific community, one can distinguish at least five different scientific approaches:

- The themes of interest are based on anthroposophical information from Steiner's work (In German: *Angaben*); however the scientific methods used can be conventional or traditional. So, randomised split plot or randomised clinical trials and double-blind situations are used to test the outcomes of a hypothesis. A lot of scientific work on the biodynamic preparations, for instance, is done on small-scale plots or field trials (König, 1999). Behind this methodological choice is the acceptance of anthroposophical insights in the traditional scientific world. Biodynamics has to be proven 'evidence-based practice'.
- The scientific methods used are based on holistic insights and, in the way they are used, they will reconcile holism and reductionism. These methods are directly connected with the observed (Goethean science, experiential science). Within the anthroposophical movement I feel a principal difference between the two methods. Goethean science is an accepted method, initiated by Steiner. Goethean science focuses on the 'right and holistic' understanding of the world. In Goethean science, the most impressive work in the last decades has been done by people like J. Bockemühl, W. Schad, T. Goebel and A. Suchantke. In farm practice, the Goethean method is also used in the understanding of the biodynamic preparations or to make new steps in landscape development (Baars and Van Gelder, 1994). Experiential science was not initiated by Steiner, however it has developed in strong connection with anthroposophy. Experiential science focuses much more on doing the *'right actions'* in the world rather than developing the *'right thinking'* gathered by Goethean science. However, the right actions cannot be taken without a holistic understanding of the world, which has been developed in Goethean science. Recently De Vries (2004) developed new steps in experiential science. Experiential science is based on the insights of professional experts, such as farmers or social workers. Van der Laan (2003) calls this type of insight 'practice-based evidence' and the learning process is based on casuistry and reflection on the evidence.
- The scientific methods used are anthroposophical and holistic. The background of new methods such as copper crystallisation and water drop imaging are completely based on the work of Steiner, who had clear views on the etheric, inspirational world.
- Rewriting or understanding the phenomena observed in the world based on anthroposophical insight. This type of work resembles a literature review. Scientists are fairly aware of the otherness of the anthroposophical worldview and use this insight to show other connections in the world. The Louis Bolk Institute has produced a book series, called Bolk Companions, in which medical doctors 'rewrite' human physiology, embryology, etc., based on Goethean and anthroposophical insights. Another example is Wolfgang Schad, a biologist who described the inner connectedness of mammals based on the threefoldness of

man. It is not the mammals that have changed, but our opinion on how they are connected. The idea of threefoldness is one of the basics of anthroposophy: Steiner describes how action, feeling and thinking are the three elements of our soul. This trinity is very often distinguished to separate the surrounding world.

- Discussing the basics of science philosophy. This work is often combined with one of the above entries to broaden scientific approaches. Recently the Louis Bolk Institute organised the scientific conference, Such Is Life (Baars and Baars, 2006 in prep), to stimulate awareness of the relationship between new methodologies and its philosophical implications.

At the University of Kassel it is my job to build up a research programme for the Department of Biodynamic Agriculture. The main methodological mix that will be used in my research programme is based on the first three points. The main themes will be: the differentiation of the Demeter[1] milk quality and trading in this; growth and development of young stock and in-herd calf-rearing and research on life forces and their validation. Independent of the themes, I find it important that all scientific work is connected with the farmers' knowledge and insights, and is evaluated in a participatory way.

Since participatory research is a central element in my research approach, I now highlight some essentials of this method based on the Bioveem project, which was one of the last multi- and transdisciplinary projects I headed at the Louis Bolk Institute (see also Baars, 2002; Baars et al., 2005; Iepema et al., in prep).

Case project: Bioveem

The Bioveem project is presented as an example of an approach that links experiential science, bottom-up learning, system-prototyping, farmer-to-farmer learning, multi- and trans-disciplinary research and on-farm research. Specific attention is paid to each farmer's worldview in biographical interviews. The first goal of the project was 'system development based on bottom-up choices of the farm manager'. Bioveem had the following characteristics:

- Instead of a selected set of disciplines, in principle all disciplines should collaborate in the project in a transdisciplinary way.
- The project is farmer-oriented and three groups of farmers took part in the project:
  - Innovative farmers who act as pioneering entrepreneurs in specific areas of organic farming. Their farms are treated as experimental stations (see Box 1).
  - Optimising farmers whose farms are used as a testing ground for existing knowledge in organic dairy farming.
  - Farmers in conversion from conventional to organic farming.
- Only themes of interest were formulated, and the details of the project were initially left blank. Only after the farms had been selected could research projects be implemented.

[1] Biodynamic certification.

- A link was made with the extension service, DLV. One of its tasks was to advise and support each farmer in specific data collection, if necessary.

The following mission was formulated: 'Dairy farmers, researchers and advisors combine their specific knowledge, visions and skills. Together they deliver a unique contribution to the strengthening, development and expansion of organic dairy farming in the Netherlands.' Bioveem was an extension of the idea of farm-prototyping based on pilot farms. In the Bioveem project, the optimisation group of farmers is used for the purpose of prototyping desirable future organic farming systems. This group is used to demonstrate existing knowledge and farmers are assisted by researchers and extension workers in adapting existing knowledge to their specific situations. However, we have added an innovative group to the project, which consists of farmers who go in search voluntarily of future developments of knowledge that does not yet exist. The basic requirement for joining the innovative group is personal involvement of an individual farmer with a specific type of organic farm. Action research and mutual learning are the methodologies that accompany this group. The whole innovative farmers' group acts as an interactive 'research-group' at the same level as the research farms for applied research. New topics will be tested and developed within specific farming circumstances. In bottom-up co-operation between farmers and scientists, these farmers explore the limits of the diversity of farming systems (see Box 1).

Box 1 Innovative farms/pioneers in the Bioveem project

Ten to fifteen innovative farms with different farm and soil types, distributed across the country have been selected. This group comprises dairy farmers who are consciously committed to organic agriculture. They have been operating organically for some time, have overcome the teething problems and are now considering how to proceed. The direction of development varies between participants, depending on their personal management style. The farmer chooses the themes to be developed and the desired outcomes in consultation with the project team. Personal involvement provides an incentive to push back frontiers. The farmer is prepared to take risks. Each farmer in this group adds a unique element to the group as a whole in terms of operational style, challenges or objectives.

The objective is to open up and generate new knowledge and to make the individual's search for solutions a conscious process, which can then be communicated to others. Monitoring and analysis provide insight into the effects of the farmer's actions. The guidance provided is individual and characterised as a 'guided trial-and-error search process'. The farmer's knowledge and experience are an essential part of the operation. The researcher is detached and on equal terms with the farmer. The farmer is explicitly encouraged to develop methodologies by experimenting in the farm context. Exchange of experience among the participants in this group is important. The specific new insights obtained are developed within the context of a specific farm and should therefore be considered as hypotheses or principles rather than as transferable concepts. The next step is to further quantify and model the new insight (if necessary on experimental farms) and to test it on the optimisation farms.

The themes covered include farm quality and business development; farm economics; chain development; milk product quality; manure application, soil fertility and crop rotation; cultivation of grass and fodder crops; animal feed, inter-sectoral cooperation, livestock breeding; animal health and fertility; environment and nature. They involved

trans-disciplinary cooperation within a number of agricultural organisations and research institutes.

Participatory action research and experiential learning of pioneering farmers were integrated into a larger setting within the project. Each of the pioneering farms acts as an experimental station. The positive side of this approach is that we focus on a diversity of farming systems and other farmers can recognise their own style of farming in one of these pioneers. Therefore, the variety of chosen pioneering farming systems will be as large as possible. Each pioneering farming system has its own context, goals and restrictions, which will be described in the yearly monitoring of facts and figures about the farm. In this praxis, the pioneering group of farms together acts as a 'garden' for the development of future organic farming (Figure 4). Each of these pioneering farms can be further improved, depending on the goals and possibilities of each individual farmer (bottom-up). This group of diverse farm practices can be used by researchers who are developing different farm-related themes together with an individual farmer or a farmers' group.

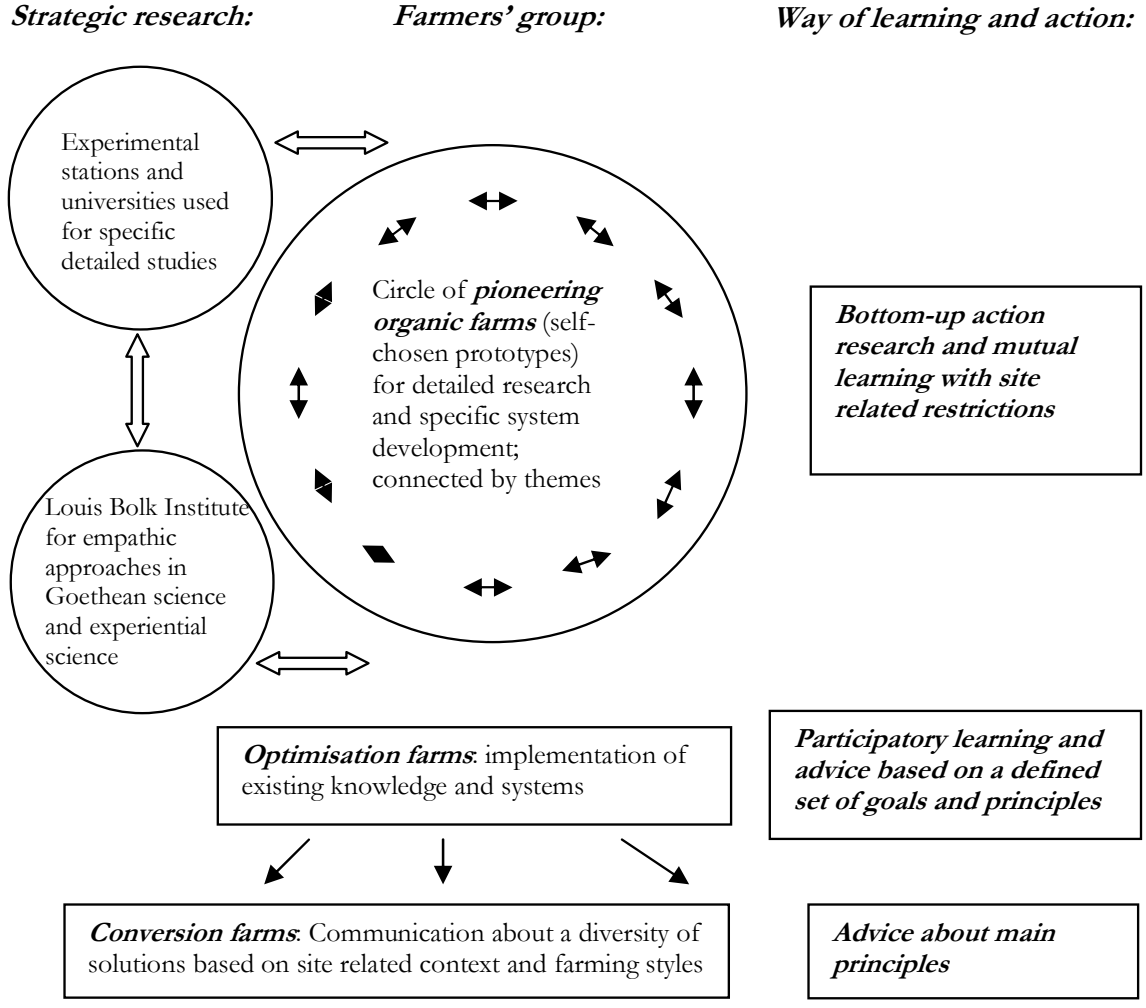

Figure 4 Initial R&D model including extension in the BIOVEEM project and the assumed relation to strategic research, which can be implemented by different research organisations. The pioneering farmers are considered as self-chosen prototypes exploring new areas of interest. The optimisation farms are considered as 'future good farm practice', based on existing knowledge and experience showing the level of knowledge about organic dairying. The conversion farms receive general advice.

Concluding remarks

Within agriculture, the practice of biodynamic farming shows the greatest contrast to conventional farm practices. The top-down scientification of conventional farming has created an enormous uniformity in farming systems, breeds and races, water tables and landscapes, but also in on-farm management (Van der Ploeg, 1987). Due to the contrast mentioned, generic solutions do not exist in biodynamic farming, and different science and education is needed (Baars, 2002). Tools like artificial fertilisers, pesticides and allopathic medication of farm animals is not used. Therefore, it makes sense in biodynamic farming to start with knowledge gathered from 'practice-based evidence' rather than to push biodynamic farming into the direction of an 'evidence-based practice' (Van der Laan, 2003). Characteristics of a new programme in science and education in biodynamic agriculture are: casuistic rather than generalist, holistic rather than reductionist and constructivist rather than positivist, involving real-world settings rather than isolated experimental situations. Goethean science and experiential science are important methods for this training programme. In research projects, the competences of professional farmers and their expert knowledge form a crucial starting point for the development of insight into biodynamic farming systems.

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How 'Cocreation and Cocreation Sciences' can help to make the transition towards endogenous sustainable development

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Introduction

In this contribution I will describe our experiences in the Netherlands at our International Institute for Inclusive Science ('Triple I-S') with the new transdisciplinary field of Cocreation Sciences, which we started as a one-year postgraduate training in 2004. Its programme was based on our experiences with the network 'Spirit in Science' since 1997, and their four Dutch conferences, as well as with the two international conferences 'Seeds of Wholeness' (see www.seeds-of-wholeness.org).

The training, a real journey, started from the core questions: 'Can you imagine a world based on cooperation and cocreation, sustainability and harmony, in humans, work and the environment, on local and global levels, now and in the future? How can scientists provide a contemporary contribution to foster such a self-aware world?'

We started from the principles formulated in the Earth Charter in 2000 and tried to implement these principles through (self-)consciousness and practice, embedded in new scientific notions and theories. The programme's objective was to contribute to a sustainable and harmonious society for all living forms, and placed the urgent development of human consciousness as pivotal to this process. Five students started with the mission to create something new together within our existing historical context. The programme is based on three pillars: (1) the theory, with transition sciences and consciousness research; (2) the practice, focused on harmony, sustainability and quality of life and (3) the dimension of self-inquiry: who am I and what is my gift to the world? We describe the first and third pillars in this article. The second pillar is described in two other articles in this publication (see Verschuur & Stijkel 2006; Bosman 2006).

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Cocreation

Cocreation is essentially a divine process between beings in conscious connection with their wholeness, an evolving phenomenon of creation between the masculine and the feminine.

Barbara Marx Hubbard can be seen as the mother of cocreation, when she comes with her revolutionary book 'The revelation: Our crisis as a birth' (1993). She describes cocreation as 'the act of engaging in a conscious creative partnership with the innate impulse of creation, the intelligence of nature and natural systems design, the intuitive collective consciousness of humanity, and each person one encounters, from a place of essential, heart-centered being.'

You can interpret this definition (at least, within Triple I-S we do so) in such a way that we as humankind are making the evolutionary step from procreation to cocreation, from giving birth to physical babies to creating and cultivating Seeds of Wholeness ('sacred brain children').

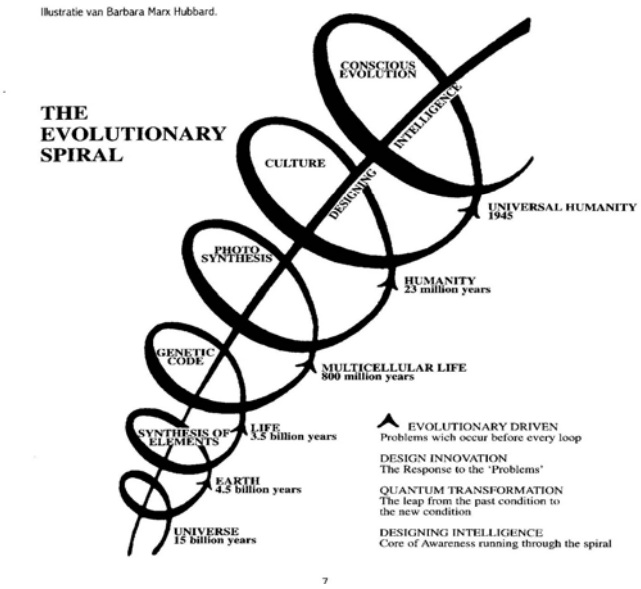

Figure 1 Our crisis as a birth (Barbara Marx Hubbard, 1993)

According to Hubbard (1998), the fulfilment of the self-interest of the individual together with the fulfilment of the self-interest of the whole (group, planet, universe) is at the core of the cocreative process. After millions of years of evolution we are facing an unprecedented crisis. We perceive it as a birth. All we have to do is enter the evolutionary spiral. The driving force in this evolutionary spiral is 'designing intelligence' (see Figure 1, core), not to be confused with Intelligent Design (ID), the controversial and deterministic concept of the Creationists, in which there is no room for evolution, only for God as The (only) One Creator.

For us, cocreation is an inclusive concept (see Figure 2). You only can become a 'master' in cocreation as your knowledge deepens through the lessons of cooperation, competition and conflict, as well as of survival. This requires for intrapsychic as well as interpersonal insight and healing, with attention to, and acceptance of light sides as well as shadow sides.

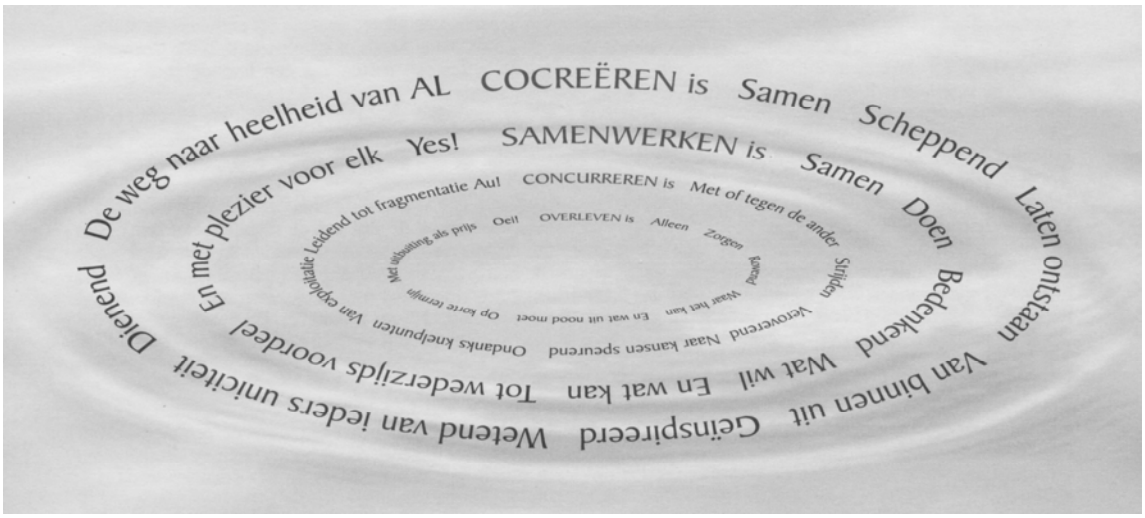

Figure 2 The concept of cocreation is inclusive (Stijkel, 2003)

Cocreation Sciences

After years of experiences, such as a foundation based on practical cocreation processes and projects, we decided to make a step towards abstraction, from cocreation to Cocreation Sciences. This is a science in which pattern recognition in individual and societal cocreation processes are linked with other scientific insights, especially from the field of *transition sciences* as well as from *consciousness research*, instigating the evolution of sustainability, especially as formulated in The Earth Charter (2000). The Earth Charter is the product of a decade long, worldwide, cross-cultural dialogue about common goals and shared values, starting after the 1992 UN conference in Rio. The drafting of the Earth Charter has involved the most open and participatory consultation process ever conducted in connection with an international document. Thousands of individuals and hundreds of organisations from all regions of the world, different cultures, and diverse sectors of society have participated. The Charter has been shaped by experts as well as representatives of grassroots communities. It is a declaration of fundamental principles for building a just, sustainable and peaceful global society in the 21st century. It seeks to inspire people with a new sense of global interdependence and shared responsibility for the well-being of the human family and the larger living world. It is an expression of hope and a call to help create a global partnership at a critical juncture in history: that of the emerging global civil society.

Cocreation as a science has an inclusive nature since it embraces experiential, intuitive and appreciative forms of knowing ('wholebody science') and circulates between individual and inter-subjective group learning processes. In 1997, together with our network 'Spirit in Science', we formulated our principles for this inclusive way of knowing (see Figure 3). The transdisciplinary field of Cocreation and Cocreation Sciences transcends current natural and humanistic sciences. The idea of 'transdisciplinary research' refers to a range of research practices in which knowledge from different social and academic actors is integrated. It can be seen as a new form

of learning and problem solving that helps in meeting the complex challenges of society today. In the Charter of Transdisciplinarity, as it was adapted at the First World Congress of Transdisciplinarity in Portugal in 1994, and modified in 2002, the principles of transdisciplinarity are further elaborated (http://perso.club-internet.fr/nicol/ciret/).

Principles of Triple I-S

Further development of inclusive science specifically involves the promotion of:

- *Broadening of the epistemological and ontological basis of science:*
  to be *open* to new perceptions, insights and experiences; to be *critical;* and to conscientiously evaluate ideas and output in terms of their contribution to the quality of life.
- *A broad social basis:*
  to develop both within a discipline, interdisciplinarily as well as transdiciplinarily; and, as far as possible, to assess theories and their applications, which derive from science, to ensure that cognitive, experiential, emotional, intuitive, and spiritual aspects play an equivalent role. This involves creating a climate within science and society whereby the indicated inspirational and anomalistic practice of science and its applications are recognised and encouraged.
- *Expansion of the methodological foundation of science*
  the discovery and development of the philosophy of science and the design of methodological insights, which can support the relevant theories and applications.
- *Attention to ethics*
  responsibility for the maintenance of the highest possible scientific and ethical standards, so that science serves the quality of life of the individual and society.
- *Respect for people and nature*
  serving the developmental process of the individual and society in an atmosphere of equality, connection and respect for the other and the environment. This involves being open and sensitive to the views of others and the prerequisites of our natural environment.

Figure 3 Basic principles of Spirit in Science/Triple I-S (1997)

Cocreation Sciences are a value-driven design-science in context, that originates from the constructivist notion that reality as it is to us is the result of *conscious* creation processes in the past, by (human) nature, and allows for change and re-design by conscious individuals and societal actors for future generations. These creation processes can be sustainable and peaceful by nature, adopting the guidelines of biomimicry (no beat, heat or treat methods, as described by Janine Benyus, 1997) as well as the values of cultural creatives (Ray & Anderson, 2000), following the developmental (consciousness) stages in man and organisation, as described in Spiral Dynamics (Don Beck & Christopher Cowan, 1996), in the principles of living systems (Elisabet Sahtouris, 2000), in the learning organisation (Peter Senge et al, 1995, 2004), and in Spiritual Capital (Zohar & Marshall 2004; about using our rational, emotional, and spiritual intelligence to transform ourselves and corporate culture).

As a practical science, Cocreation Sciences not only include experiential, intuitive and appreciative ways of knowing, combined with inter-subjective group learning (as in inclusive science in general), but also include experiential ways of

creating, individually or as a group: cocreation alternated through reflection. Keys in this process – besides implementing and taking responsibility for this ever-growing consciousness – which in itself is *consciousness* and especially *self-consciousness*, at the individual as well as group level, and how this can be developed at the level of giving meaning to one's life and communication about this meaning, are: 'Who am I?', 'What are basic values for me?' and 'What is my contribution to you, my environment and this world at this time?' Emotionally charged topics, such as making transparent the views on 'God as Creator' and 'Cocreation with the invisible world', are also open to be included and to be embedded in e.g. (trans-)religion studies, as well as in old wisdom traditions.

System borders between cooperation and cocreation will be highlighted and elaborated. Also, the notion of 'glocal' (a word coined by Elisabet Sahtouris that expresses a permanent switch between the scale levels of global and local) will play a role, combined with a search for the reciprocal bottom-up and top-down route. We also take into account Ashby's law: only variety beats variety. In addition, the biologists Maturana and Varela (1987) have emphasised in The Tree of Knowledge a central cocreative principle on living systems as autopoietic systems that self-organise into being, where the organism as a whole creates and transforms its own being and differentiates itself from its surrounding environment on a continual basis.

One of the pillars of Cocreation Sciences is *Transition sciences,* and is about moving within a system from dynamic stability into a crisis where the same system could die, fall short, or stabilise at the next level. Rotmans (2001) describes these transitions as *'transformation processes in which society changes in a fundamental way: transition management involves sensitivity to existing dynamics and regular adjustments of goals to overcome the conflict between long-term ambition and short-term concerns'*. Learning by doing and doing by learning how to work… What remains is learning by learning and this is the very thing that we explored in depth with the students and participants for the programme in Cocreation and Cocreation Sciences in their practical projects (see Verschuur & Stijkel, 2006; Bosman 2006).

Ervin Laszlo (2002) describes in Figure 4 the risks and potentials in transition processes. Periods of relatively dynamic stability will necessarily alternated with crises that could lead to a higher order, a new period of relatively dynamic stability, but could also lead to death, sooner or later, because of inadequate coping strategies. And coping strategies require alert consciousness.

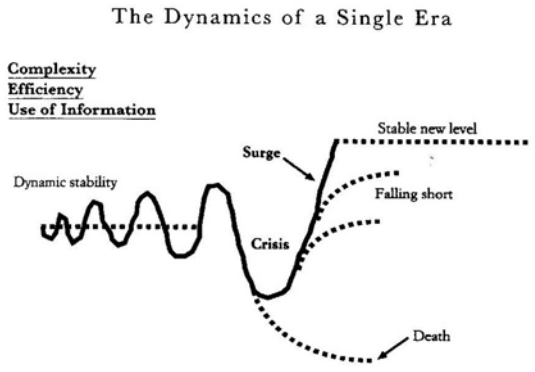

Figure 4 The Dynamics of a Single Era (Ervin Laszlo, 2002)

Consciousness research is the other pillar of Cocreation Sciences, and is done through the three eyes of knowledge, those of matter, mind and spirit, as done by the integral philosopher Ken Wilber (and described in Visser, 2001):

- *the eye of matter* (the world through our senses; natural sciences);
- *the eye of mind* (the world through the intellectual: sense-making, interpretation, logistics; social sciences);
- *the contemplative eye of spirit* (the transcendence; opening through meditative education; spiritual science).

According to Wilber, spiritual science has its own domain of experience with its own forms of research methodologies, own rules and own exactness. The virtue of Wilber is that, besides distinction, he also always recognises the unity in those three approaches. The (common) *essence of the scientific procedure* in all these three forms is according to him:

(1) meet the prescriptions; (2) observe what happens; (3) check the outcome with other well-qualified researchers. Ken Wilber considers those three domains of knowledge essentially also as three domains of individual evolution: everyone starts his or her development in the physical-sensorial domain, then goes to the mental domain, and finally, for example by meditation, enters the spiritual/transcendental domain. All people have more or less access to these three knowledge spheres, three spheres of being. These three spheres are referred to using various terms, including subconscious/conscious/supraconscious; prerational/rational/transrational; prepersonal/personal/transpersonal. In this way, Wilber tries to come to an all-inclusive worldview in which science and mysticism or science and religion will be reconciled.

In fact, Wilber is not new with his idea about reconciliation of science and religion. Einstein also stressed the importance of 'cosmic religiosity' in doing science (New York Times Magazine, 7 November 1930): 'to encourage the experience of Oneness, to allow the mystery of the overwhelming unfolding order in nature and environment; to maintain this experience, and to pass this experience and knowledge on people who are able to learn that.'

Summarising, in our postgraduate training we integrate knowledge from those three eyes of knowledge, but focus on experiencing the third eye of knowledge [see the parallel in the name of our institute (Triple I-S)], the eye of spirit. In doing that, we make use of old and new wisdom traditions and practices, and exercise new forms of knowing by meditation, silence, sound and art, but also for example, by inviting a medium and trying to look at that information with fresh eyes, with an attitude of alternating openness and (respectful) critical sense. Figure 5 summarises the characteristics of Cocreation Sciences.

Cocreation Sciences

- Whole body science
- Focus on consciousness at all levels
- Value driven: 'sustainability /quality of life'
- Design in context, transdisciplinary
- Process oriented – goal searching
- Peaceful – rebalancing feminine values
- Including new forms of knowing, with an open and critical attitude

(From: Stijkel, 2003)

Figure 5 The characteristics of Cocreation Sciences

Self-inquiry: diving into your driving forces

Who am I, and what is my gift to the world? What are my basic values? What is my contribution to you, my environment and this world at this time? Creating without knowing who you are and why you are doing what you are doing is a dangerous enterprise. The risk of being driven by your emotional reactions or by projections is always there. So, the transformative inner journey from reaction to creation can sometimes be felt as an alchemistic process, looking with 'the eye of spirit' deeply inside.

Let me take you into my (dynamic and transforming) driving forces. When I was a teenager I recognised our society in the poster/image on the left in Figure 6: 'If we have to pollute our amniotic fluid for our economy, we would do that'; I promised the environment that I would help to stop that development. After years of scientific and (participative) social action work in 1995 I defended my transdisciplinary thesis, 'On managing reproductive risks of occupational exposure to chemicals'. In the thesis I questioned the current way of standard-setting for the workplace, discussed the interpretative space in several standards systems, and proposed more transparent and sound procedures based on two principles from the 1992 Earth Summit with its Agenda 21: (1) *the precautionary principle,* and (2) *the principle of equal rights and equal opportunities* (the middle image in Figure 6), thus making it explicit that natural sciences are also necessarily value-driven.

Later on, I realised that not only the world outside needs to be taken into account, but also the world within us. As long as we are not aware of our Pain, Passion, Peace, Pleasure and Power, we are unconscious creators of our outer world. A more conscious attitude concerning *in*vironmental issues would be more appropriate to deal with environmental issues. Our presuppositions about ourselves, the other and our environment influence the way we solve the problems we encounter. Is there only the Darwinian notion of 'survival of the fittest', in self-interesting beings, *homo economicus*, or do we also believe in the potential of an interdependent, harmonious world in which we are more and more conscious participant and evolving cocreators? And so I came to the right-hand image in Figure 6. For the last ten years I have followed that inner path and have come to the

conclusion that it is important to make contact with our deeper driving forces and to communicate about that, in scientific as well as in societal contexts. And this is what we did in our postgraduate programme, with our dialogue on our five individual, *personal Ps*: Passion, Pain, Peace, Power and Pleasure.

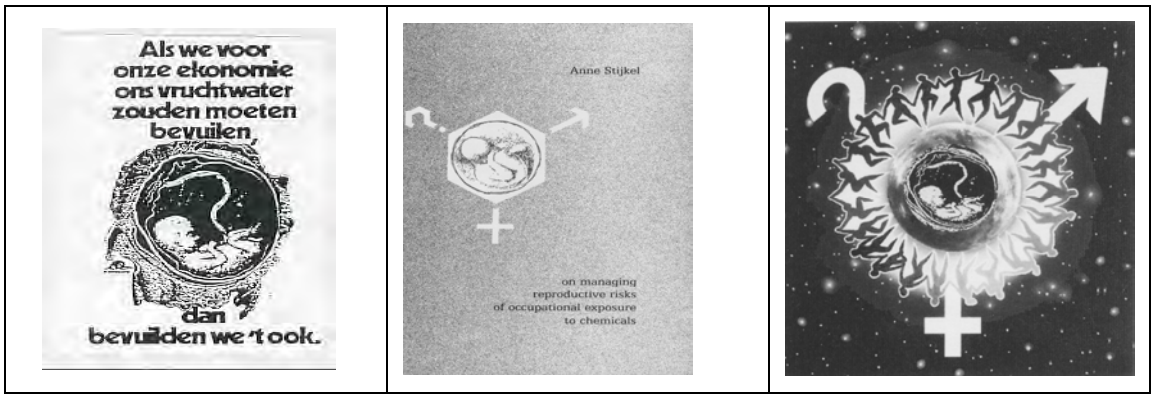

Figure 6 My own journey through science and society, expressed in three metaphors

In the process of societal innovation and design, starting from the notion that man is above all also a social being, we recognised five new '*We' key-words*, in Dutch all starting with a V: Vrijheid (freedom), Verbinding (connection), Veiligheid (safety), Vertrouwen (trust), Verantwoordelijkheid (responsibility). New practices are necessarily embedded in old practices and for that reason we have seen, more than once, how important it is in these emergent new practices to work with clearly established social commitments and social contracts, besides inspiring 'Cocreators Agreements', as developed by the Geneva Group Agreements, in Boulder Colorado, in 1985. These are nineteen agreements that all begin with the word 'I', for example about 'deep listening': I agree to listen respectfully to the communication of others and tune into their deepest meaning. They are also about 'taking responsibility': I agree to take responsibility for my creations, my reactions, my experience and my relationships.

Summarising: self-inquiry, diving into your driving forces, not only opens us up to (1) *inclusionality* (being aware not only of light sides but also of dark sides), or to (2) *rebalancing* (for example between doing and being), but also opens us up to (3) *transformation* (as Zajonc also describes in his contribution to Moving Worldviews). The transformation from 'reaction' to 'creation' is a huge one, the result of a deep diving process. For example, typical human or animal instinctive reactions or responses such as the 3Fs: *fight* – *freeze* – *flight*, absolutely helpful in survival or competitive situations, can be transformed through deep inner work (insight and/or healing; more or less alchemistic in nature; e.g. by methods such as unwinding, or EMDR) into a more intelligent 3F-response, coming from 'higher' emotions: *fire* – *free* – *fly*. These are responses that are more helpful in cooperative and cocreative contexts. Thus there is a shift from a narrow focus on 'needs' based on self-interest towards a broader focus on inclusionality, with sacred 'seeds' (see Figure 7), in which self-interest and common interest are rebalanced.

REACTION	CREATION
Fight	**Fire** Sacrificing our ego systems Creating space *Dying*
Freeze	**Free** Cultivating a YES, a welcome in my front yard Filling the space *Living*
Flight	**Fly** Going for the sacred searching for a culture for living and loving Fulfilling the space *Loving*

Figure 7 A 3F-Transformation process

And thus we learned: the journey of consciousness will never end, nor the field of consciousness research. But it was, and it will be, a sacred, healing journey; and we learned above all that the role of consciousness (development) will need to grow more and more, in order to meet the huge challenges of the current era. Let's make that quantum leap together...

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Climate change, lifestyles and social learning through computer games

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Post-normal science, conviviality

The scientific community first brought climate change to light at the end of the 1980s, and it became an item on the political agenda in the middle of that decade. A large number of stakeholders have since then been included and involved in designing strategies and policy instruments to cope with the potential impacts of climate change (CC). Some examples of broad societal involvement arose after the United Nations Conference on Environment and Development, back in 1992. In fact, an increasing number of local initiatives have developed, with varying degrees of sophistication, strategies to reduce greenhouse emissions, in harmony with national policies (many can be found on websites).

Climate change (CC) is a good example of an environmental policy where there has to be a dramatically different approach at the interface between the relevant sciences, policy and society. One of the greatest sources of uncertainty in current CC research is how societal actors are likely to respond to it. Whatever those responses and decisions are, they will certainly have consequences for the ways impacts develop at several geographical scales. Moreover, concepts such as CC and global warming can be hard to relate to everyday individual and household actions. But it is an undeniable fact that for the past few years there has been an increasing tendency to relate frequent weather extreme episodes and weather unreliability to CC. Hence, besides the policy agendas and strategies, there is probably momentum to promote closer co-operation with the public in order to tackle the challenges posed by CC, including behavioural and social changes.

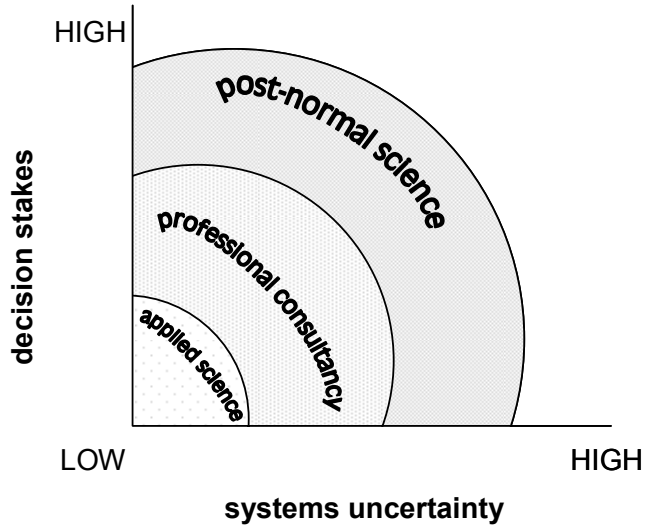

Figure 1 Three types of problem solving strategies by Funtowicz & Ravetz (1985; 1990; 1992)

The complexity of CC relevant phenomena and possible impacts (involving different types of uncertainty, a plurality of legitimate perspectives) as well as the consequences for a broad spectrum of policy issues call for a different approach in which such issues can be addressed.

'The insight leading to Post-Normal Science is that in the sorts of issue-driven science relating to environmental debates, typically facts are uncertain, values in dispute, stakes high, and decisions urgent […] In post-normal conditions, such products the goal of achievement of truth or at least of factual knowledge may be a luxury, indeed an irrelevance. Here, the guiding principle is a more robust one, that of ***quality****.' (Funtowicz & Ravetz, 1990b)*

Funtowicz & Ravetz (1985; 1990a; 1992) have represented through the diagram in Figure 1 how different types of problem solving strategies and practice correspond to different sorts of uncertainty (namely technical, methodological, epistemological) as well as, how they relate to the world of policy: *decision stakes* included 'costs, benefits, and commitments of any kind by the parties involved'.

'In post-normal science, when global environmental issues are involved, the stakes can become the survival of civilization as we know it or even of life in the planet' Funtowicz & Ravetz (1985; 1990; 1992) .

Funtowicz & Ravetz's 'post-normal science' framework (Funtowicz & Ravetz, 1990b; 1992; 1993; http://www.nusap.net), and its guiding principle, quality, requires the participation of an 'extended peer community' (Funtowicz & Ravetz, 1990b) engaged in dialogue and the resolution of the issues at stake. An 'extended peer community' consists not merely of persons with some form or other of institutional accreditation, but rather of all those with a desire to participate in 'extended peer review' processes for the resolution of the issue (Funtowicz & Ravetz, 1990b).

These 'communities' are increasing in number, organised for different purposes and involved in different ways and at different steps in policy-making processes. They are called 'citizens juries', 'focus groups', 'consensus conferences', etc. They may be engaged through regulated participatory processes or they may be the initiative of specific interests or even develop into formal settings, resulting from social mobilisation. Their relevance and influence will depend on the context where they operate, the eventual aim of the involvement and the flexibility of or instrumental use by institutional 'ears' that could benefit from their inputs.

The assessment of the *quality* of the knowledge inputs to policy issues by those 'extended communities' are in many ways different from the review processes of research science, professional practice or industrial development (Funtowicz, 2001). Each of those has its established means for quality-assurance of the products of the work, be they peer review, professional associations, or the market. However, for new controversial problems, the maintenance of quality depends on open dialogue between all those affected.

New forms of dialogue and new mechanisms for introducing scientific issues to non-scientific contexts calls for radical changes in the design of interfaces between the scientific processes and products and the audiences to be engaged.

This extension requires new forms of *integration* and *conviviality* of different types of knowledge and possible justifications. On one hand the extended peer review process of *knowledge* scrutiny, may improve the knowledge database; yet, a different sort justification can be sought for such extended peer processes: *the building of a convivial society*. This view of the 'integration' process – considered as an interactive

(participatory, deliberative, etc.) social process with political, as well as cognitive and scientific dimensions – is, in itself, a way of generating high(er) quality policy evaluation, decisions and outcomes (Guimarães Pereira & O'Connor, 1999). Conviviality is the opposite of technocratic production, is the concept that recognises that *'people can do more than relinquishing the task of envisaging the future to a professional elite'* (Illich, 1973).

Box 1 In case of local risk management much relevant knowledge can be drawn everyday experience gained personally by dealing with real world problems as well as encapsulated in social folklore and mores, about the nature of the hazards, thus providing invaluable insights for effective risk management. In the case of long-term future considerations, even if there is a consensus about plausibility of experts' scenarios indicating severity of a future problem (e.g. climate change) the willingness and ability of people to act for a common future depends a lot on the framing of options in terms that are meaningful for themselves in their social scene, and that are in conformity with the realities of past experience and practicable future initiatives (O'Connor in De Marchi et al., 1998).

In these new forms of dialogue there are two contrasting notions of *integration* concerning *knowledge reconciliation*: on the one hand integration can be conceived as the *reconciliation* of all knowledge within the terms of a single and internally consistent conceptual framework; on the other hand it can be seen as the *reconciliation* of perspectives and understanding as co-existing in society in their irreducible plurality (O'Connor in De Marchi et al., 1998).

In this argumentation, trans-disciplinary practice (or vision) becomes also relevant. Trans-disciplinary practise arose as a response to the increasing complexity of scientific knowledge production, and the need to re-establish an active dialogue among a plurality of disciplines and forms of knowledge (Nicolescu, 1999). This requirement now extends beyond the inter-operability of methods and techniques coming from different scientific disciplines; it is in fact a quest for quality, not (just) excellence in scientific terms, but robustness also in societal terms (Gibbons, 1999). The aim of knowledge quality assurance by extended peer review is precisely to open processes and products of policy relevant science to those who can legitimately verify its relevance, fitness for purpose and applicability in societal contexts, contributing with 'extended insights and knowledge'.

Trans-disciplinary practice and extended peer review face common challenges such as, for example, resistances and closure of institutional or established practice in research and policy, different conceptual and operational framings, knowledge representations and mediation (Guimarães Pereira & Funtowicz, 2005). Both require processes of knowledge representation and mediation as the means to actually reconcile different types of knowledge, enhance the quality of policy processes.

The conceptual framework outlined above lies behind the development of VGAS©, a computer game designed with the aim of setting up a convivial 'place' for debate, self-reflection, and more importantly, for individuals to be empowered both about individual decisions and for enhancing the relations with the rest of the community about climate change implications and responses (mitigation, adaptation and behavioural/social changes). The VGAS© game introduces CC scientific knowledge into extended peer review processes, regarding options and response to aspects of the CC *problematique*.

In the remainder of this paper, we will first describe the VGAS© game, specifying the contexts in which it is being used and then explain its conception in the framework of knowledge mediation. In the final section we will then reconsider the brief conceptual framework developed above and explore how VGAS© and similar games can be devices of 'convivial world-views'.

VGAS©, lifestyles and climate change

What is VGAS©?

VGAS (http://alba.jrc.it/vgas; Guimarães Pereira & De Sousa Pedrosa, 2004; De Sousa Pedrosa & Guimarães Pereira, 2005; De Sousa Pedrosa et al., 2005) is a computer game that consists of a set of models that relate lifestyles to emissions of three greenhouse gases, carbon dioxide, methane and nitrous oxide (see Guimarães Pereira, 2001a; Guimarães Pereira, 2001b). The V GAS core engine consists of three main sections:

- a greenhouse gases calculator
- a generator of policy and natural events with implications for the greenhouse gases emissions
- a digital library, an A-Z guide to climate change related issues

This core functionality is available in the four main features offered by VGAS©:

- A 'personal barometer' – the VGAS BUILD PROFILE – that aims at accounting personal emissions of the three greenhouse gases considered in this product, based on personal consumption patterns and regional or national energy and other situations.
- A 'WHAT IF' explorer – The VGAS Explorer – that aims at exploring alternative *lifestyle scenarios* and visualises their possible implications and trade-offs.
- A game – The VGAS Game – whose objective is to attain a better 'sustainable score' by adjusting lifestyles after a *launcher of surprises* triggers some events that could unbalance the 'sustainability situation'. The game may be played by a single user or in competition with others where the scores are given according to overall performance of the strategy adopted after each event. Playing in multi-player allows players to adapt the game to set the context for thematic or focused discussions since the master can establish rules and events to be deployed (see Figure 2).
- A Virtual Library – The VGAS Virtual Library – that aims at showing further information about climate change related issues, namely scenarios developed by institutions such as the Intergovernmental Panel on Climate Change. This library is a multi-media tool, whose design follows the Principle of Progressive Disclosure of Information, i.e. the information is provided in a multi-layer fashion from simple to more detailed, disclosed upon users' demand. The information is displayed not only through text, but also through images, charts, animations and films.

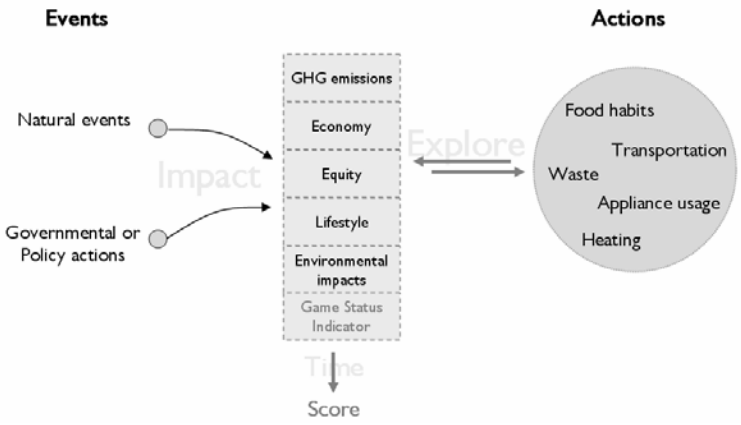

Figure 2 General scheme of VGAS Game Events

The source categories considered in VGAS© are those related to activities of everyday life; only few industrial processes are taken into account in VGAS© when a production process implies the emission of a greenhouse gas (GHG), e.g. power generation. The following are the greenhouse gas sources considered: fuel combustion from energy industry and transport; fugitive emissions from solid fuels; enteric fermentation and manure management; rice cultivation; agricultural soil; solid waste disposal on land and waste incineration.

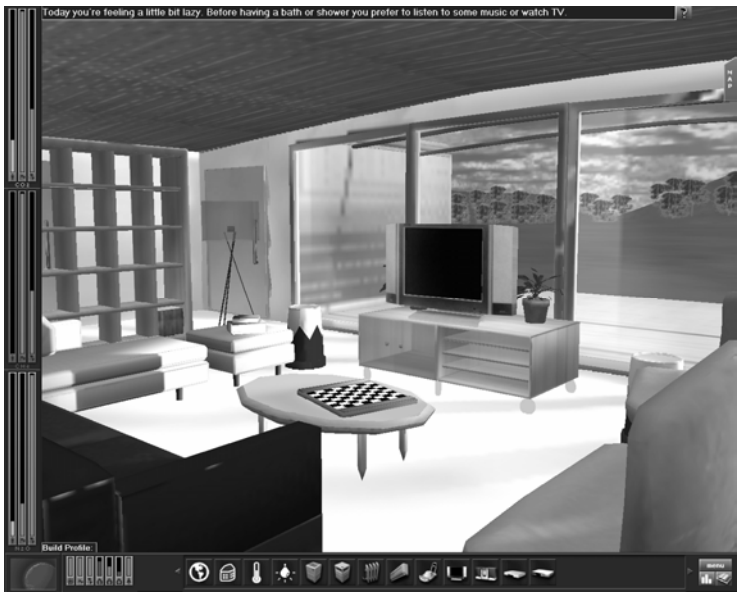

Figure 3 The virtual Living room in VGAS©, showing several output graphs and objects to characterise the player's house

The three gases' emission values are calculated, i.e. the quantity of gas emitted to the atmosphere is calculated in year basis relating to activities chosen by the player.

It is designed and implemented based on modern concepts of software engineering and new information and communication technology (ICT). A highly interactive and intuitive 3D user interface (see Figure 3), allows it to be used by the general public, NGOs and other social actors who wish to investigate their contributions to a global issue and explore alternative pathways to reduce their burden. VGAS© was customised for five countries: England, France, Italy, Portugal and Spain.

The main interface consists of a virtual house designed futuristically (so that no one gets hurt about the design) with a range of optional objects with which the 'player' fills his or her home according to their own home and lifestyle. Among other things, there are appliances, light, transport, food, etc. The user may visualise the 'impacts' in terms of several types of indicators:

- Individual emissions of CO_2, CH_4, N_2O; comparison with national and world averages;
- Five-star scale for home comfort and functionality;
- Home budget in units of cost;
- Other environmental indicators proportional to the emissions;
- Sustainability indicator: CO_2 current emissions compared with 2010 target.

The user may explore what the impact of using public transportation is compared with that of using private transport in terms of CO_2 emissions. It also helps the user to explore routes to what is currently sustainable by playing with alternative lifestyles, exploring trade-offs between new choices, e.g. 'what are the trade-offs if I stop eating meat?'. These kinds of choices can be motivated by events generated in the game module of VGAS, e.g. 'car restrictions due to high levels of O_3' or 'a wave of cold during winter'. To cope with these events the user must consider not only the emissions and environmental impacts but also the home economy, functionality and comfort. If playing in a multi-player fashion the user must consider the equity with the rest of the group, hopefully engaging in a debate of strategies and possibly negotiating to cope with the situations presented. With these types of indicators, a wider view of the *problematique* is brought to the users, connecting environmental and social impacts of lifestyles, eventually triggering issues that were not considered by the developers of VGAS© .

Road experience

The audience for which VGAS is intended is the individual, any citizen or a group of individuals. It may be used individually for developing awareness or in the context of debate about lifestyle strategies to cope with policies on climate change, energy, sustainable development, etc. In the end, it is at the micro level in family, community and public context that individuals decide how to respond to the several policy options (Rayner & Malone, 1998). VGAS© may also be used in educational contexts, as a tool to raise issues and initiate discussions. Being a game, it represents complex issues in a playful way, contributing to a positive attitude towards learning (Papa et al., 1998; Given, 2002). It is also used by children and young people. Children and young people are good vehicles for enhancing environmental awareness within their communities and induce behavioural changes in adults. This was observed throughout our groups with young and adult participants – see Box 2, which summarises the quality assurance phase VGAS has undergone.

Through VGAS several CC environmental and social dimensions, scales and perspectives of the *problematique* are illustrated, promoting awareness and, responsibility and agency among those who have used it. More particularly — this is the distinctive inter-subjective dimension – '*there is established a sort of 'forum' or social space where – formally or informally – there is expression and sharing of personal views, sentiments, concerns, thoughts by the participating persons about the whole problematique of lifestyles, energy consumption, environmental quality, global and local climate change'* (Guimarães Pereira & O'Connor, 1999).

Box 2 Quality assurance of VGAS©

The prototypes underwent several phases of quality assurance, the first being dedicated to software testing, following known procedures (Corral Quintana et al*.,* 2002). The VGAS© prototype was proposed in different settings, all aiming at tuning it according to quality criteria established in a protocol for quality assurance. The quality assurance of software tools such as VGAS© is done by setting up what we called 'tuning contexts' (De Marchi et al., 1998; Guimarães Pereira, 2001a; Guimarães Pereira et al., 2001). 'Tuning contexts' are contexts in which products and processes of research are scrutinised by those concerned, the participants to these evaluation processes being relevant for the evaluation of the tools. Indeed, a process of 'extended peer review' deploying Information Technologies based social research, a combination of group participatory methods and Information Technologies. This is important where the use is intended to be social learning, decision or policy formulation situations.

In practice, during group sessions (e.g. focus groups, see Morgan, 1998) participants are invited to evaluate the ICT tools they are interacting with, based on a set of criteria given by the moderators. Furthermore, the concept of 'tuning context' can be extended to the very process of debate and deliberation, where convivial tools are proposed to debate a particular societal-policy issue.

Eight focus groups were organised with participants pertaining to the following groups: Students, Educators, NGOs and Policy makers (related to education). A total of more than 70 people were involved throughout all its phases of implementation, from 3 countries: Italy, Portugal and Spain.

VGAS© is being distributed to schools and it is being requested by many educators and NGOs around the world, as a fun tool to communicate and debate issues that concern citizenry, policy and science spheres. Its usage is also very much linked with pedagogic aims, namely through requests of electricity companies and the Directorate General for Energy of the European Commission. It is available from some European Commission sites and it is being further updated and extended to other European countries.

Knowledge mediation and representation in social learning – interfaces

New forms of dialogue and new mechanisms for introducing scientific issues to non-scientific audiences call for radical design of interfaces between the scientific processes and products and the audiences. VGAS© explores the use of 'convivial interfaces', deploying ICT to pursue the building of a convivial society.

VGAS© is a device for mediating relevant knowledge about CC in social processes of debate, awareness and agency development. In policy-relevant science, the ways in which scientific information is communicated to the relevant social actors becomes a primary task for those involved in promoting such contexts. Neither marketing solutions nor science education approaches are appropriate, because the objective is not to engage people in the product of the research but rather making them part of the process (Guimarães Pereira et al*.,* 2001). Tools like VGAS© are seen,

in this situation, as interfaces to facilitate the creation of a virtual context for shared ground, facilitating the assemblage of concerted actions, decisions and choices.

In practice the process consists of the identification in each case of elements that make CC related scientific information a valuable instrument for carrying out useful debates about climate change, lifestyles and sustainable development with different publics. This implies the design of interfaces tailored for each audience: interfaces for meaning, interfaces that promote familiarity with the instrument so that the audience can adopt and trust it – in order to focus the participant on the discussion topics and not on the workings of the instrument itself. This entails a process from design to implementation of:

- The visualisation of the issues (using for instance ICT);
- Mechanisms to access further information;
- An effective organisation of the debates by means of focused questions.

Thus, this process of creating interfaces between scientific issues and society is the process that enables effective and meaningful participation of the civil society in public issues, such as the debate on climate change.

The basic principle that assists our developments, especially the design of ICT based products is the feature of progressive disclosure of information. This should allow different types of audiences to gradually explore information especially in terms of content specialisation and interface or presentation format (for instance, presenting a multimedia video explaining the greenhouse gases phenomena would not exclude access to controversy regarding CC or to a model's estimation outputs).

By adopting a progressive disclosure of information approach, the pitfalls of changes in semantics contents may also be avoided, since the full stories are consistently provided. Hence, the first issue addressed when designing tools like VGAS©, is the issue of the audience. The audiences envisaged for VGAS© are different from what can be called an expert audience (in CC science, that is) or the scientific community. That brings us to the issue of interpretation and language. What is meaningful for a scientific audience is not necessarily understandable for or even recognised by a non-scientific one. Therefore, when designing an interface to a scientific issue, we are talking about interfaces to meaning, jargon-free or rather, jargon-explained. In VGAS©, certain elements of 'integrated models' have, so to speak, been 'translated' into presentation formats (cartoons, everyday images, vernacular language, animations, etc.) that are intuitively friendly, understandable, accessible and appealing to a non-expert public. The message shall be as clear as possible, not blurred by banal or baroque elements; alien concepts for lay audiences shall be explained in a tangible form, maybe using analogies or metaphors. In this case, ICT may prove very valuable since it provides interactive frameworks – not just contemplative – through which many 'tangible' *languages* (words, images, sound, clips, etc.) help unfolding meanings of any narrative because of the visualisation potential and of the access to virtual worlds (e.g. representations of metaphorical concepts). That is, by re-presenting them, by exploring and querying, by making understandable relationships of issues inherent to a *problematique*: hence, by gathering and creating knowledge.

Apart from the issue related to expertise, which already poses a great deal of specifications in the design of tools like VGAS©, the issue of participants' skills and their 'digital culture' (what suits or attracts one audience may not suit or attract

another) is also taken into account. Children are most of the time more attracted to multi-media movies than to reading, whereas policy makers only have time for summarised 'concentrated' information. Clearly, the usage setting also determines the design of interface: as mentioned earlier, VGAS© is primarily to be used in participatory (convivial) contexts, where it is expected that through the game a sense of community develops in discussing the issues raised by those who moderate such events (whether it be used in single or multi-player fashion) and hence, interface design has to take this into account.

De Marchi *et al.* (1998) have outlined some suggestions for communicating scientific issues within participatory contexts. These refer primarily to CC computer models, yet they can be adapted to other types of scientific information:

- **Justifications**: provide **sources** of information in the sense that people do not have the impression of information generated by a **black box**; uncover the process through which the information has been generated; provide information that is **credible** enough not to divert people from the focus of the discussion. → People need to trust.
- **Resonance**: provides **tangible elements** so that people can transpose global concerns to their own, implying a necessary personal and regional geographical dimension. → People need congruency.
- **Modesty**: addresses **problems** in accessing to information, such as **data gathering**, **uncertainty** of model simulations and predictions, **modelling complex issues**, **ignorance**, etc. → People have knowledge.
- **Creativity & Interactivity**: having **fun** in dealing with these issues without missing the point; having a **playful, interactive exchange** of information between the technology and the user.
- **Added-value**: having **novelty** elements.

VGAS© and social learning opportunities

On social learning

There are several concepts of Social Learning (Liberatore, 1999). Woodhill and Röling (2000) described 'social learning' as an

'approach and a philosophy which focuses on participatory processes of social change. It encompasses a positive belief in the potential for social transformation based on:

- *Critical self reflection*
- *The development of participatory multi layered democratic processes*
- *The reflexive capabilities of human individuals and societies and*

The capacity for social movements to change political and economic frameworks for the better.'

We use the expression 'social learning' in the sense of inter-subjective communication: as a process of mutually learning about others' experiences and sense of reality, and perceptions, prospects and projections change as a consequence of the communication process itself. Such a process permanently disrupts and transforms the information base (O'Connor in De Marchi *et al.*, 1998).

In both senses, individuals become agents of change, participating in a democratic transformation of society (Diduck, 1999), in this case in order to achieve a sustainable future, by adopting lifestyles changes that are more compatible with general CC targets. This empowerment is often a key element in social reform (Nauen, 1999).

VGAS© is a Convivial Social Learning Tool

With VGAS© we have explored specifically a new concept for information tools aimed at mediating the relevant knowledge in processes of social learning and debate strongly based on games, fiction and metaphors. We have called these, **CSLoTs** – **C**onvivial **S**ocial **L**earning **To**ol**s** (Guimarães Pereira & De Sousa Pedrosa, 2004).

CSLoTS rely heavily on the potential of new ICT. The concept of games helps with functionalities' design; it eases discovery of information, making relations, responding to challenges, querying and may even help with individual and social learning. This interactivity is seen as means of sharing experiences, views, discoveries and conjectures, maintaining the ludic, literary and media aspects of the game.

The tools' design and implementation are as important as the kinds of processes that emerge from their usage, especially the idea of creating 'virtual worlds', metaphors of our lifestyles, tangible and intangible enough so that self-reflection, learning and thoughts are not bounded by the interfaces themselves (see the section on interfaces). In the case of VGAS©, this was specifically aided by the type of technology chosen, 3D virtual reality and learning context based on single and multi-player computer games.

The distinctive feature of the VGAS© game is the way that it has been conceived and implemented with a multi-agent perspective on design. It is not merely a set of algorithms (from data to results); it has been designed with a view to convivial use of the software in participatory processes. This means, that information both solicited (lifestyle information) and furnished (emissions figures, relative to local, national and world averages, etc.) takes on a real social significance. The game promotes both instrumental and non-instrumental dimensions of social learning: it is designed to encourage people to explore how different lifestyles (including their own) may contribute to the emission of greenhouse gases and, more normatively, to create a situation where people may spontaneously reflect on justifications and possibilities for personal decisions regarding potential reduction of gases (Guimarães Pereira & O'Connor, 1999).

Prospects for framing and promoting sustainability policy choices as collective and 'concerted' actions are enhanced through extended dialogues supported by CSLoTs, through bringing different scales of information and different publics' perspectives into constructive dialogue with each other – understanding the contrasting perspectives and preoccupations in order to search for points of shared ground. The significance of CSLoTs like tools in this communication process is not just in order to 'summarise' or to 'transfer' knowledge and performance-evaluation information, nor simply to 'inform' policy makers, citizens so that they know better the roles they can and might be expected to play (O'Connor in De Marchi et al., 1998). Rather, CSLoTs are like stage props in an inter-subjective communication process that helps to 'socialise' and make real the many dimensions of climate policy problems (Guimarães Pereira et al., 1999).

Final reflections

There is a general 'feeling' among the publics that responses to climate change or other complex issues alike encompass different relationships between what is known and unknown in the framework of science and what is known and unknown in other societal spheres. Climate change is bound up with uncertainties, ignorance and a myriad of values and interests, being instrumental for so many policies; it is being dealt with at policy and at technology levels with strategies that require behavioural and social changes. Those sometimes radical changes cannot be implemented through regulatory mechanisms alone; they require civil society involvement and commitment: sustainability is primarily a matter of responsibility (a tangible concept that people are usually raised on!). Hence, there is a firm need that those proposed changes in technology and policy are dealt with also with the publics. Recently, the review of several sustainability research programmes around the world has shown that the success stories were those that *a priori* engaged the relevant communities in the definition of research objectives, priorities and actual work (Guimarães Pereira & Lonza Ricci, 2005).

Our worldview is a dialogical one, which recognises that inter-subjective dialogue is necessary to operate major transformations in current ways of dealing with complex issues. VGAS© is yet another attempt to seek through tangible objects like games, opportunities to start collective processes of societal appropriation of the climate change issue in particular and others alike.

Tools like VGAS© are also an attempt to change scientific practice; through such 'virtual places', scientific enquiry goes beyond desk conjecture and social field research to justify that. When we use VGAS© (or tools alike) we start social processes; in so far, it has been useful with raising awareness, exchange of *knowledges* and for debating concerted actions and behavioural changes. Its usage has also indicated that strategies to cope with CC cannot depend on technology or scientific inputs alone; they have to be combined with other legitimate insights, resources and skills of the publics they address.

CC scientific work, requires a great deal of 'foresight' and 'futuring' activities. These are inherently bound by uncertainties and ignorance, especially when we talk about 50-year time scales. Hence, any narrative and paths to embrace it can potentially be legitimate: that is where a 'post-normal science' framework is mostly desirable because from within it operates on the creation of interfaces at all relevant societal spheres. As we illustrated with VGAS, the tools to create such interfaces have to be different from those built in the framework of 'normal science'.

Finally, '*[at] its best, the interactive computer technology works to create spaces for awareness and discussion about urban lifestyles, sustainability and climate change, and, more broadly, to facilitate the creation of community. It is a support for the communication process, which builds, re-builds, moulds and transforms social life as a voyage-in-common'* (Guimarães Pereira & O'Connor, 1999).

Acknowledgement

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Humane endogenous development

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'To be free is not merely to cast off one's chains, but to live in a way that respects and enhances the freedom of others.'
Nelson Mandela

Introduction

I approach the question of worldviews and endogenous development as a teacher, and as one who, like so many, is moved by widespread global violence and economic inequities. What is it about worldviews that results in the identity politics of Iraq where Shiites, Sunnis and Kurds all vote along ethnic or religious lines? Or in Darfur where issues of identity cut deeper leading to Arabs (Janjaweed and Sudanese leaders) perpetrating mass killing and rape against their Muslim brothers and sisters who are 'black Africans' from non-Arab tribes (Kristof, 2006). Or what is it about worldviews that has led to such a large and growing divide between the rich and the poor? The economist Joseph Stiglitz, among many others, has repeatedly emphasised 'market failures' that have led to a decrease of median income in the face of increasing per capita GDP, and to 100 million more in poverty than ten years ago (Stiglitz, 2005). What can I, as an educator, offer in the face of these tragic realities of today's world? I will not offer an alternative or 'better' worldview, but rather I would like to articulate here a larger perspective from which we can understand the role of worldviews in human life, and especially how one can learn to move between them, to transcend particular worldviews while simultaneously honouring each of them. I believe only in this way will the crises I have mentioned be addressed at their root.

When I turn to the task of education, I am aware that the view I have of the maturing human being profoundly affects my educational philosophy and its objectives. If I hold an impoverished view of the human and of human relations, then the education I offer will reflect that limitation. If my worldview is one-sided and static, my way of meeting the student, as well as the interpretation I give of history, politics and even science will mirror my biases. Perhaps most important of all, what view of human development do I hold? Do I allow for cognitive, social, and spiritual development as well as physical growth and information acquisition? The cognitive and social sciences have researched human development and we have much to learn from their results. In what follows I will suggest that what we now understand concerning human development and transformation can also be of great value in understanding the endogenous development of peoples and nations.

One senses that the conceptual underpinnings of international development are inadequate to guide policy properly. As in education, I believe that at its core this deficiency is a reflection of the impoverished view international development

institutions have of the human being and her or his potential. This impacts the development not only of the individual but of human societies as well. Our conventional conception of the human today focuses almost exclusively on the physical development and health of the individual, together with other material factors affecting their life; likewise the analysis of human society gives short shrift to the non-material and non-economic factors. As a result, too often policy is likewise driven by entirely material concerns resulting in interventions aimed at increasing GDP, technology transfer and the like. While few would argue against economic or physical development, far too little attention has been paid to an integrated development concept that attends to the social, environmental, cultural and spiritual dimensions of the local populations. Even within the recent World Bank Comprehensive Development Framework the factors with which I am concerned make little appearance. My interest here will be to suggest that an adequate and humane conception of endogenous development can and should be built on a more comprehensive understanding of human and societal development generally. To this end I will consider research-based contemporary understandings of psychological development of the individual, as well as recent advances in the new area of transformational learning. Against this background I ask, what might be the relevance of these insights to the understanding of international development?

Beyond puberty, adult human development is frequently ignored. The great exception to this is the contemplative spiritual traditions, which have seen the full unfolding of the human being as their perennial goal. For thousands of years these traditions have had a transformational view of humanity's development, and they have evolved many practices that promote this development. These traditional views have received support from current research in neuroscience, developmental psychology and educational studies. Neuroscience has discovered that the nervous system is capable of remarkable change, even in adult life. Such 'neuroplasticity' allows profound adaptation of the human mind. Studies of violinists and London taxi drivers both show enormous development in the regions of the brain associated with their respective vocational 'practices.' Tibetan Buddhist monks have been studied and that research convincingly demonstrates that long-term meditation can lead to remarkable changes in the activation of particular regions of the pre-frontal cortex. These are only outer reflections of inner changes that take place at a soul-spiritual level, but they do indicate that the human being is open to transformation at every level of their nature. Transformative education works with this reality.

Paralleling the idea of transformative education is the research of developmental psychologists such as Jean Piaget, Lawrence Kohlberg, Howard Gardner and Robert Kegan. They have done extensive research into cognitive and emotional development, moral reasoning, and identity formation. In what follows I will use Robert Kegan's formulation of five increasingly complex 'epistemologies' as a framework for my discussion of both human and societal development (Kegan, 1982, 1994, 2000). Then when we return to the idea of transformation we will better appreciate what is transforming.

I first propose to sketch the contours of an epistemology of intimacy and participation, that is, an epistemology of love, which extends scientific and scholarly inquiry in ways that need not be viewed as problematic to academic teaching or to our research disciplines. I would then like to describe some of the main elements of a

course I have taught with an art historian, Joel Upton, at Amherst College. Entitled 'Eros and Insight,' it attempts to embody something of this way of knowing, and to take up the challenge Rilke presents to us all: the challenge of learning to love.

Content versus form

The content of education is vast, indeed infinite. Everyday more information is available, new research, political changes, and business news. All demand our attention. Education is largely comprised of acquiring this information, and in schooling the skills needed to take up and transmit information through reading, writing and mathematics. However, supporting all this content is a 'form' or structure to our cognitive and emotional life that goes largely unobserved. I am anxious to turn our attention to this hidden container or 'frame of reference,' as Jack Mezirow termed it, because I am convinced that the solutions to Darfur and economic inequality (among many problems) lie at this level of human nature and not at the level of skills or information.

A frame of reference is a way of knowing or making meaning of the world. Enormous amounts of sensorial and mental data stream into human consciousness, but somehow that stream is brought into a coherent meaningful whole. At first sight it may seem that such meaning-making is an entirely natural and universal process, and to some degree it certainly is. Evolution has incorporated reflexes and drives deep into the human psyche. But the way we make sense of the world is also conditioned profoundly by societal forces; that is we are socialised into a worldview that operates largely unconsciously and behind the scenes, but which profoundly affects the way we understand what we see, hear and feel. According to the Leo Apostel Centre for Interdisciplinary Studies (CLEA) Belgium, 'a worldview is a map that people use to orient and explain the world, and from which they evaluate and act, and put forward prognosis and visions of the future.' In the course of a lifetime we may shed one worldview and adopt another. For example, we may be born in Asia and learn to find meaning with a Taoist-Confucian society, and then move to Europe where we change our worldview fundamentally. In other words we can change the structure that makes meaning for us.

In addition to this, however, is a second process is also at work, one that is more subtle and, for us, important. Kegan calls it a 'metaprocess that affects the very terms of our meaning-constructing. We do not only form meaning, and we do not only change our meanings; we change the very form by which we are making our meanings. We change our epistemologies.' (Kegan, 2000: 52-53) Constructive developmental psychology shines the light of self-consciousness on these changes in epistemology.

As young people, we are often completely unaware that we live within a particular, culturally-bound way of knowing. A sudden change, for example by moving to live within an alien culture, can be an awakening experience. We discover that people within the new culture 'do not think like we do.' Whether or not we adopt the alien culture as our own is not the issue, but we become aware of the existence of alternate ways of making meaning, and these alternatives are as coherent as our own. What Kegan and other research psychologists have discovered is that there are several

stages in the way we construct meaning. That is, the very types of epistemologies we use and our self-consciousness of them can change profoundly. What is meant by this formal language will be made clear by speaking more concretely.

Kegan distinguishes five levels of 'epistemological complexity.' Our interest lies with the top three:

- The Socialised Mind
- The Self-Authoring Mind
- The Self-Transforming Mind.

The child operates from a concrete, personal point of view (stage 2). Sometime around late adolescence most youth begin to internalise the values and ideals of their surrounding milieu. They learn to think more abstractly and logically; they learn that they carry responsibilities that endure in the absence of their parents, and that may be in conflict with the values of others. In short, they become well-adjusted responsible young adults. At this point they have attained the stage of 'socialised mind.' This epistemology comes with established roles. These may include man is the breadwinner and the wife is the home maker, etc. (or the opposite).The basis of meaning-making is authored not by the individual but by society, thus the name of this level. It is essential to note that it is of no consequence to us *what* the values or mores of the society are. In a second society, the wife may be the breadwinner. What matters is that the youth has been psychologically shaped by the actions and words of his elders so that his interpersonal relations, his values, his very understanding of the world are coherent with that of those around him.

The worldview of fundamentalist Islam provides a clear basis for a meaningful life. It may well be in deep conflict with the worldview of most Americans. Both societies bring up their children to be good members of that society, that is, they are socialised to the values and views of the Islamic community. Especially in the case of fundamentalists, the values and views of the community are held to be superior to all others, even to the point of violent suppression of the worldviews held by others. All actors in the 'clash of civilisations' (or of worldviews) are at the same stage of epistemological complexity, in Kegan's language. The answer to ethnic or ideological conflict is, therefore, not to replace one worldview with another, but instead to add to it another often missing element, *empathetic understanding*. When we become self-conscious of both our own worldview and that of the other, as different as the two may be, we can awaken in us the fire of compassionate and empathetic understanding. This requires a great deal, but it is always possible. Through such a process we come to appreciate, even if we do not adopt, the worldview of the other. Later in this paper I will describe the characteristic features of an epistemology that includes within it genuine empathy, and I will relate this to the contemplative and transformative traditions of learning. Before turning to that subject, we need to take up levels four and five because self-consciousness and empathetic understanding often drive a shift in epistemological complexity.

Identity and individuality

In his powerful little book, *In the Name of Identity,* the Lebanese-born French writer Amin Maalouf examines the question of identity in our time. He is well-aware of the polar dangers of two extremes. One appears when one's identity is derived from race, ethnicity, or religion, and can all too frequently lead to intolerant fundamentalist attitudes toward those outside of one's own identity group. The consequences of this for politics, economic inequity and even violence were a tragic part of Maalouf's childhood in Lebanon. He is, however, also simultaneously mindful of the bankruptcy of the opposite extreme in which one's identity is lost entirely and society fragments. A force of social cohesion is required, but one that is not based on intolerance. He writes, 'in the age of globalisation and of the ever-accelerating intermingling of elements in which we are all caught up, a new concept of identity is needed, and needed urgently. We cannot be satisfied with forcing billions of bewildered human beings to choose between excessive assertion of their identity and the loss of their identity altogether, between fundamentalism and disintegration.' (Maalouf, 2003: 35) The basis for addressing this dilemma can be found in ourselves.

None of us is pure stock. We are all racially, ethnically and religiously mongrels – mixed breeds. My father was born speaking Polish to an illiterate mother in a working class family; my mother was a Daughter of the American Revolution from Virginia and a graduate of the elite William and Mary College. The increasing diversity within ourselves mirrors the global community of which we are more and more a part. If we can learn to live with ourselves, and I mean *all* parts of ourselves, then we can learn to live with all members of our global community. Rather than hide the interior diversity we all carry with us, Maalouf suggests that we accept it and, indeed, even use it as the basis for defining our unique identity.

This strategy dovetails with Kegan's stage of Self-Authoring Mind. The individual steps back from the collective, becomes self-aware, notices the incongruities between his or her birth culture and the particular values held by him or her now. He or she 'thinks differently' from the others. In fact one notices that no one thinks quite like I do; the values held are my values alone, my path through life and the meaning I derive from it are not captured by one formula or tradition. Success in life is different for each and every person. Each individual has their own changing worldview. Kegan connects self-authorship with modernism; it is a natural part of mature adult development today, although not all attain it. Yet self-authorship brings with it the problem which Rainer Maria Rilke and Rudolf Steiner saw as the main characteristic of our age, 'solitude' or *Einsamkeit*. In his letters to the young poet Franz Kappus, Rilke wrote,

To speak of solitude again, it becomes always clearer that this is at bottom not something that one can take or leave. We are *solitary. We may delude ourselves and act as though this were not so. That is all. But how much better it is to realise that we are so, yes, even to begin by assuming it.(Rilke, 1954: 50)*

Here too, as individuation and self-authorship appear, a second countervailing impulse is required, namely the empathetic understanding we associate with love. Without this force, the individuation of consciousness (which I take to be a boon) can lead to the atomisation of society into disconnected, selfish monads. We need to learn how to simultaneously respect and even, in Rilke's language, 'stand guard over the

solitude of the other' as an act of love. This can become the basis for what Maalouf seeks when he writes, '… a new approach to identity… seen as the sum of all our allegiances, and within it, allegiance to the human community itself would become increasingly important… without destroying our many individual affiliations.' (Maalouf, 2003)

The moving actions of Nelson Mandela were remarkable not because of his efforts to free his black brothers and sisters from apartheid, but that even after decades of brutality and discrimination he sought to protect the freedoms of all peoples of South Africa. This was for him the true measure of freedom; not my freedom but our freedom. In his autobiography he wrote, 'Freedom is indivisible; the chains on any one of my people were the chains on all of them, the chains on all of my people were the chains on me…To be free is not merely to cast off one's chains, but to live in a way that respects and enhances the freedom of others.' (Mandela, 1994: 624) Only this sentiment grants reality to the words spoken by Mandela at his inauguration. His past nemesis de Klerk was on the stage with him, sworn in as second deputy president. Against the vivid background of historical and continued racism, Mandela could declare, 'Never, never, and never again shall it be that this beautiful land will again experience the oppression of one by another…' (Mandela, 1994: 620) With these words a country turned away from revenge and reprisal killings, and towards the patient and painful search for truth and reconciliation. This was an act of empathetic understanding, an act of love. Mandela's epistemology, his way of making meaning supported freedom for blacks and whites in South Africa.

Circles of affection

Adam Smith, the father of modern economics, not only wrote the *Wealth of Nations* (1776) but also an earlier work, a *Theory of Moral Sentiments* (1759).[1] In the latter he considers, among other things, the views concerning moral development advanced by ancient Stoic philosophers such as the first-century philosopher Hierocles. Of interest to us is the Stoic idea of *oikeiōsis* or circles of natural affection. The word *oikeiōsis* stems from the Greek root *oikos,* which referred to the private realm of the household, and stood in contrast to the public realm of the *polis*. The moral view represented by the word *oikeiōsis* holds that our greatest affections are for those closest to us, namely ourselves and our immediate family. As one moves out from this centre to ever wider circles, our natural affections become less and less strong. We are closer to those in our city or extended family, for example, than to those who are only citizens of the same nation. We can imagine concentric circles of natural affection with ourselves at the centre, our family within the second circle, and with all of humanity represented by the largest circle. The Stoics argued that by the use of reason alone, it should be possible to collapse the circles into one another, or equivalently we could extend to the outermost circles the strength of affections normally reserved only for the innermost one. Hierocles writes, 'The task of a well tempered man, in his proper

[1] I am indebted to Fonna Forman-Brazilai's paper, 'Adam Smith as Globalization Theorist' *Critical Review*, vol. 14, (2000), no. 4, pp. 391-419.

treatment of each group, is to draw the circles together somehow towards the centre, and to keep zealously transferring those from the enclosing circles into the enclosed ones… The right point will be reached if, through our own initiative, we reduce the distance of the relationship with each person.'(Hierocles, 1987: 57G) That is, through reason we gradually come to feel for all of humanity as we feel for our mother and sister becoming thereby a 'citizen of the world' or Cosmopolitan.

Adam Smith admired the view offered by *oikeiōsis*, but he thought reason incapable of the mighty transformation required to convert the stubbornly selfish individual into a cosmopolitan. Accepting the Stoic arrangement of concentric circles of human affection, Smith emphasised the purely physical or geographic separation between actors over factors such as kinship ('the force of blood'), religion and racial identity, and he viewed commerce as the primary practical means of promoting cosmopolitanism. For Smith spatial distance translated into psychological distance. We are closest in social feelings to those with whom we interact most frequently and, at least in Smith's day, that meant with those geographically most proximate. Social capital, to use a modern term, is generated by social intimacy, and therefore physical proximity leads to the trust on which simple social contracts are grounded. I will not follow Smith's argument further, but only say that in the absence of other means of extending our affections to larger circles, he argued that commercial self-interest, not affection, might knit together a world into a globalised economy.

Adam Smith is largely right, I feel, in his negative assessment of the powers of reason over our affections. Reasoned argument might show us the logic of moral development, but its force is too weak by far to transform us into Stoic cosmopolitans. Today, however, is not the 18th century and Smith's emphasis on geography is no longer valid. What motivated 50,000 or more people to descend on Seattle in 1999 to protest the meeting of the WTO? CNN interviewed street marcher Carmen Nogales, who said, 'World Trade Organization policies harm her friends in South America.' Indeed, the protest was as much about the sufferings of distant workers in garment factories in Asia as it was about threatened environmental laws in California. Our geography of concern had changed dramatically in two hundred years. With the development of global media, the internet and inexpensive international air travel, the plight of the world is graphically brought home to us on a daily basis. International conflicts, starvation, Aids, and economic injustices are as evident to us as is our town politics, maybe even more so. I know more about the violence in Iraq than in my capital city of Boston. Psychological distance is no longer equivalent to physical distance; a better measure would be the air-time and column inches given by major media to the issue regardless of location. This raises the thorny issue of 'spin.' Media, government, advocacy groups and even the internet are not neutral brokers of information. Our affections and moral sentiments are open to manipulation by all of these agencies. Be that as it may, the new circles of affection have become distinctly non-geographical. My closest research colleagues are more likely to be in Europe that in Amherst, Massachusetts. The events and issues I care about most may be in Africa or the Middle East. The implications of this for the global economy and for a global ethics are enormous.

I would argue that Adam Smith's hope for a 'commercial cosmopolitanism' has failed. The global economy has indeed brought us closer together as an interconnected and diverse community of nations and peoples, but the trust or social capital that

underlies all economic and human transactions will only be as strong as the circles of affection that we cultivate. The massive economic inequities and corruption so prevalent today will only be redressed on the basis of something akin to the Stoic ideal of *oikeiōsis*. If reason is too weak a force to effect the transformation, what measures are left to us? This is the point at which the idea of transformative and contemplative education can make a real contribution.[2]

Transformative and contemplative learning

The way we know today is largely based on a scientific worldview that sees the objects of knowledge as separate from the knower and as open to reasoned analysis. We usually frame ideal knowing as objective, that is to say, without the involvement of the human subject. Such framing has consequences. In a 1993 talk at Berea College, the prominent American educator Parker Palmer pointed out that 'every way of knowing becomes a way of living, every epistemology becomes an ethic.' He argued that the current epistemology has spawned an associated ethic of violence. Surely, science has brought enormous advances, but we cannot turn away from the central fact that the modern emphasis on objectification predisposes us to an instrumental and manipulative way of being in the world. As Parker suggested in Berea, our way of knowing does, indeed, grow into a way of living. The implications of this position are large. While I am emphatically *not* calling for a roll-back of science, I am calling for resituating it within a greater vision of what knowing and living are really all about. Adam Smith may well have been correct, but in addition to rational analysis of my moral situation, a deeper and more contemplative approach exists that can work profound transformations on the human being. This re-imagination of knowing will have deep consequences for education, consequences that give a prominent place to contemplative pedagogies. Indeed, I hope to show that contemplative practice can become contemplative inquiry, which *is* the practice of an epistemology of love in place of objectification and separation. Such contemplative inquiry not only yields insight (*veritas*) but also transforms the knower through his or her intimate (one could say loving) participation into the subject of one's contemplative attention. Contemplative education is transformative education, and I believe the transformation leads precisely to the Stoic ideal of a collapse of the circles of affection.

I view the scientific stance as a symptom of the more general psychological and spiritual malaise I have earlier called solitude. Solitude is the mirror side or inevitable correlate of an increasingly strong development of self and personal identity. As individuals separate from ethnic groups, and as women gradually become authentic individuals, so also does the force and comfort of the collective diminish. Our search for individual identity has the accompanying downside that we dis-identify with other people, groups and with nature.

[2] The following section is based on a paper given at the Columbia University conference 'Making Peace in Ourselves and Peace in the World,' February 2005, and is forthcoming in Columbia's *Teachers College Record*.

While much has been gained through this process of individuation, achievements which we should not lose, if left to go on indefinitely, we logically end up with a collection of selfish monads. I am convinced that the countervailing force to such fragmentation is not mutual self-interest or rational economic action that maximises utility (as Adam Smith and the economists would have it); rather I believe that genuine empathetic relationships can be and are established between and among us. Increasingly these connections are not between tribes or ethnic and religious groups; they are between self-authoring individuals. Healthy human relationships do not happen automatically; each of us must cultivate them intentionally. Nothing in this realm is given for free.

The same logic holds true for our relationship to the environment. We no longer grow up grooming horses and harnessing draft animals on the farm. In New York City you can go for days without ever walking on the earth. Our relationship to nature must likewise be intentional. The practice of contemplation is an important part of that intentional stance, one which can lead to sustained empathetic relationships.

Having made the intentional turn from isolation to empathetic connection, we are prepared for a contemplative way of knowing, one whose relationship to love will, I think, grow increasingly obvious. What are the features or stages of contemplative inquiry?

- **Respect** – When approaching the object of our contemplative attention, we do so with respect and restraint. Concerning the relationship to the beloved, Rilke maintained that 'a togetherness between two people is an impossibility.' (Rilke, 1975: 28) Instead of an easy fusion with the beloved, Rilke insisted that 'love consists in this, that two solitudes protect and border and salute each other.' (Rilke, 1954: 45) Likewise, I feel that the first stage of contemplative inquiry is to respect the integrity of the other, to stand guard over its nature, over its solitude, whether the *other* is a poem, a novel, a phenomenon of nature, or the person sitting before us. We need to allow it to speak its truth without our projection or correction.
- **Gentleness** – Contemplative inquiry is gentle or delicate. In his own scientific investigations, Goethe sought to practice what he called a 'gentle empiricism (*zarte Empirie*).' (Goethe, 1988: 307) If we wish to approach the object of our attention without distorting it, then we must be gentle. By contrast, the empiricism of Francis Bacon spoke of extracting nature's secrets under extreme conditions, putting her to the rack.
- **Intimacy** – Conventional science distances itself from nature and, to use Erwin Schrödinger's (1956/1967) term, *objectifies* nature. Ideally, science disengages itself from phenomena for the sake of objectivity. Contemplative inquiry, by contrast, approaches the phenomenon, delicately and respectfully, but it does nonetheless seek to become intimate with that to which it attends. One can still retain clarity and balanced judgment close-up, if we remember to exercise restraint and gentleness.
- **Vulnerability** – In order to move with the other, in order to be gentle in the sense meant here, in order to participate in the other truly, we must be confident enough to be vulnerable, secure enough to resign ourselves to the course of

things. A dominating arrogance will not serve. We must learn to be comfortable with *not* knowing, with ambiguity and uncertainty. Only from what may appear to be weakness and ignorance can the new and unknown arise.

- **Participation** – Gentle intimacy and vulnerability lead to participation by the contemplative inquirer in the unfolding phenomenon before one. Outer characteristics invite us to go deeper. We are open and so move and feel with the natural phenomenon, text, painting or person before us; living out of ourselves and into the other. Respectfully and delicately, in meditation we join with the other, while maintaining full awareness and clarity of mind. In other words, contemplative inquiry is experientially centred in the other, not in ourselves. Our usual preoccupations, fears, and cravings work against authentic participation.
- **Transformation** – The last two, participation and vulnerability, lead to a patterning of ourselves on the other. What was outside us is now internalised. Inwardly we assume the shape, dynamic, and meaning of the contemplative object. We are, in a word, transformed by contemplative experience in accord with the object of contemplation.
- ***Bildung*** – **Education as formation**. The individual develops, or we could say is sculpted through contemplative practice. In German, education is both *Erziehung* and *Bildung*. The later stems from the root meaning 'to form.' The lineage of education as formation dates back at least as far as the Greeks. In his book *What is Ancient Philosophy?*, the French philosopher Pierre Hadot writes of the ancient philosopher, 'the goal was to develop a *habitus*, or new capacity to judge or criticise, and to transform – that is, to change people's way of living and seeing the world.' (p. 274) Simplicius asked, 'What place shall the philosopher occupy in the city? That of a sculptor of men.' (Hadot: xiii). Or as Merleau-Ponty put it, we need to relearn how to see the world. In an essay on science, Goethe declared that, 'every object well-contemplated creates an organ of perception in us.' (Goethe, 1988: 39) Parker Palmer's important work also centres on education as formation.
- **Insight** – The ultimate result of contemplative engagement as outlined here is organic formation, which leads to insight born of an intimate participation in the course of things. In the Buddhist epistemology this was called 'direct perception,' among the Greeks it was called *episteme,* and was contrasted to inferential reasoning or *dianoia*. Knowing of this type is experienced as a kind of seeing or direct apprehension, rather than as an intellectual reasoning to a result.

Finally, contemplative inquiry is neither dispassionate analysis nor disembodied asceticism. Throughout all its stages there moves a lively, open excitement, a calm longing that animates our interest and keeps us attentive and engaged.

To help us understand the features of contemplative inquiry, I would like to use two citations, one from Goethe, a second from Emerson.

There is a delicate empiricism which makes itself utterly identical with the object, thereby becoming true theory. But this enhancement of our mental powers belongs to a highly evolved age. (Goethe, 1988: 307)

In this passage Goethe highlights for us several features of contemplative learning. First, it is experiential learning. What Goethe terms a 'delicate empiricism' is also deeply participatory; it makes 'itself utterly identical with the object.' Theory (from the Greek root meaning 'to behold') is not understood here as ratiocination, as deductive logic, but as I have already stated, as a high form of seeing, what Goethe elsewhere terms 'aperçu.' We know by virtue of connection, not disconnection, because we are identical with the object of our attention. Goethe fully recognises that such non-dual awareness is far distant from where we begin, but education is concerned with precisely the enhancement of our mental powers in this direction, with the journey from blindness to seeing.

The second citation comes from Emerson's essay: 'The Poet' where he writes,
This insight, which expresses itself by what is called Imagination, is a very high sort of seeing, which does not come by study, but by the intellect being where and what it sees, by sharing the path, or circuit of things through forms, and so making them translucid to others. The path of things is silent. Will they suffer a speaker to go with them? A spy they will not suffer; a lover, a poet, is the transcendency of their own nature – him they will suffer. The condition of true naming, on the poet's part, is his resigning himself to the divine aura which breathes through forms, and accompanying that. (Emerson, 1926: 278-279)

In Emerson's universe, the poet is a lover who is capable of 'resigning himself' to that which breathes through the forms of nature. He possesses what I have called the capacity for vulnerability, which leads to insight as a high form of seeing called Imagination. In this way the poet distinguishes himself from the spy, and nature consequently permits the poet to give voice to her nature: true naming.

These then are the features of contemplative inquiry and transformative learning. Such an education brings nearer that which had been remote to us, and that which had been alien is now familiar, that is like family. By these means we have taken a significant step towards the Stoic ideal of *oikeiōsis*. The epistemology of separation reinforces our disconnection from the natural environment and from our fellow human beings (especially if they do not look like us). An epistemology of love draws us towards one another, involves us in the other's world, we participate in their experience, we suffer their suffering and so know compassion not only as an sentiment but as a potent force of moral insight.

The Buddha and the Christ both taught and modelled a spiritual practice that extended the circle of affection normally reserved for family to all humanity, even to one's enemies. In his sermon on the mount Christ said,
You have heard that it was said, 'You shall love your neighbour and hate your enemy.' But I say to you, Love your enemies and pray for those who persecute you, so that you may be sons of your Father who is in heaven; for he makes his sun rise on the evil and on the good, and sends rain on the just and on the unjust. For if you love those who love you, what reward have you? Do not even the tax collectors do the same? And if your salute only your brethren, what more are you doing than others? Do not even the Gentiles do the same?
Extend your circle of affection beyond brethren even to your enemies, says Christ.

Within the Buddhist tradition the practice of *metta* or 'loving kindness' puts into the form of a meditative exercise a comparable demand of the Buddha. In the Metta Sutra, the Buddha is reported as saying that we should wish for all sentient beings that which we wish for those closest to us.

Wishing: In gladness and in safety,
May all beings be at well.
Whatever living beings there may be;
Whether they are weak or strong, omitting none,
The great or the mighty, medium, short or small,
The seen and the unseen,
Those living near and far away,
Those born and to-be-born,
May all beings be at well!

In the loving-kindness or *metta* meditation we begin with ourselves, and meditate the phrase, 'May I be happy, joyful, loving and peaceful.' This phrase is repeated and attended to with an open heart directed toward our self. After a time, a second person is called to mind; it should be someone close to us, a family member or dear friend. With them in mind we likewise meditate the phrase, 'May you be happy, joyful, loving and peaceful.' Having held them in mind for some minutes, repeating the meditation, we turn to a third person. In this case it is someone to whom we have a neutral relationship. To this relative stranger we also wish wellness, meditating the phrase, 'May you be happy, joyful, loving and peaceful.' Finally, we select someone who is difficult for us, an enemy. With open heart and generous attitude, we strive to offer them also the blessing, 'May you be happy, joyful, loving and peaceful.' To do this final part of the meditation can be extremely difficult. As difficult as it may be for us, we can remind ourselves of other situations far more demanding. In his Truth and Reconciliation Commission the Rev. Desmond Tutu asked those who had suffered horrible crimes against them to listen to the confessions of the perpetrators and to find it in their hearts not to forget but to forgive. Many, many were able to do so.

Whether Stoic philosopher, Asian teacher or Jesus, the goal is identical, to love one another. Indeed, conventional reasoning is too weak to do the work of expanding our circles of affection, as is conventional education of the intellect. Neither go deep enough to effect a genuine transformation of the human being, one that is capable of bringing about empathetic understanding of others, much less love. Our very ways of knowing, our epistemologies must shift, and this requires a contemplative and transformative form of education. When we consider what the world needs now, when we ask what can we do to meet the horrors of Dafur, and to redress the economic inequities between North and South, I think nothing is more urgently called for than this transformation. Education, peace-building, environmental research, health care, and economics, are practical fields of action that can either be shaped by an epistemology of separation or by one of connection and love. As should be clear, in this instance the so-called developed countries of the North have as much to learn as those of the South. Indeed, if we look at recent history it is in Asia, Africa and South America that we find the leaders in the transformative work I have described: Rigoberta Menchú Tum of Guatemala, Aung San Suu Kyi of Burma, José Ramos-Horta of East Timor, the Dalai Lama of Tibet… The leaders of this revolution in human consciousness seem to emerge wherever suffering is greatest. Perhaps it is exactly the unbearable suffering they have endured that breaks them open, dispels fear, and sheds a healing light on everything they touch.

Eros and insight

The art historian Joel Upton and I have twice taught a course at Amherst College that attempts to explore the relations between love, knowledge and contemplation. The course is secular with little reference to techniques of meditation that are taken from religious tradition. Two of the readings are from the Western spiritual traditions (the Beguine Marguerite Porete (d. 1310) and the Trappist monk Thomas Merton), but the remainder are from scientific, philosophic, artistic and literary sources. Last year's group was a class of 30 first-year students from surprisingly diverse backgrounds, racially and economically.

We learned from experience to start with the knowledge pole of the course. Discussions concerning love require trust as well as sophistication, both of which take time to engender in a class. We adopted a slower, more reflective pace for the course. Readings were short and powerful; we asked students to spend time with them and appreciate their force. Papers were very brief (one-page, except for the final paper which was longer), and we required the students to turn in three drafts. Directly and indirectly, we asked them to live the class materials, all of it: the readings, the lectures, our many conversations, the meditations, and their writing. Step-by-step, and one-by-one, we asked them to become increasingly vulnerable to the content of the course and to participate fully. Parallel with the course material, we also engaged students in a series of contemplative exercises. I would like to spend the remainder of my time on these exercises.

I should mention that students quickly realised that Eros and Insight was like *no* other course at Amherst. Several students told us that they had given up on education, becoming cynical about it in high school. They learned to perform whatever was asked, even if it failed to connect to their lives, their deepest questions and most intense longings. Big jobs with big salaries were the material carrots for high performance, and Amherst was merely a means to that end. Set the bar anywhere, and they would jump over it, not out of sincere interest, but because they were smart and well-trained. It took time to win them over, to reawaken in them the root aspiration they all have, which is not primarily about education as an instrument for wealth acquisition. Instead, it is about transformation, development and becoming all they can be. In my 25 years of teaching, Eros and Insight was the most gratifying teaching experience I have ever had. I am especially grateful to the students who trusted us to lead them into new territory and experiences.

The first class

We told them, 'This is the first day of your new life. You have gotten into Amherst College; you are no longer at home; what will you make of this precious life which you begin today?' Then we handed out passages from Henry David Thoreau's *Walden* (1854/1966) and Simone Weil's *Gravity and Grace* (1947/1987).

- 'I went to the woods because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach, and not, when I came to die, discover that I had not lived.' (p. 61) Here an initial theme of

the course is introduced. What does it mean to go to the woods? Thoreau sought a place apart, in order to live mindfully and deliberately. We will do likewise, setting apart times to be mindful and deliberate, in order that we too can learn to discern the essential facts of life. In the rush of our lives we too often pass them by. As part of the class we will periodically pause, be silent, reflect, and in this patient, quiet way we will learn.

- In Thoreau's (1854/1966) description of the morning we met a second essential theme of the course: becoming awake. 'The millions are awake enough for physical labour; but only one in a million is awake enough for effective intellectual exertion, only one in a hundred millions to a poetic or divine life. To be awake is to be alive. I have never yet met a man who was quite awake. How could I have looked him in the face?' (pp. 60-61) The students had been admitted to Amherst because they proved they could handle intellectual exertion, and what more remained? By the end of the hour, many longed to waken to a poetic or divine life, and so truly be alive.
- Simone Weil (1947/1987) writes of the ubiquitous power of gravity, which is everywhere and orders all things – except grace. Grace alone defies gravity's grasp, but it requires special conditions in order to appear. Weil says, 'Grace fills empty spaces but it can only enter where there is a void to receive it.' (p. 55) Simone Weil evokes the powerful importance of silence, emptiness, openness, the Void. Meditation helps us enter the space of silence and to foster the openness into which grace can appear.
- Quite naturally our conversation with the students moved to a final series of slides showing a Zen garden and a pond with ripples: Basho's (1686/1967) haiku, and their first meditation exercise of five minutes of silence, ended the class.
  Breaking the silence
  Of an ancient pond
  A frog jumped into the water –
  A deep resonance.
- The students were to continue the exercise with silence on their own. We assigned a single one-page paper of pure description on the stages and experience of meditating silence. No flights of imagination, or sophisticated scientific or philosophical analysis – only simple, attentive, deliberate, and descriptive prose.

Sustained attention

The second exercise is on sustained attention and the cultivation of the so-called 'afterimage.' Any sense object will do, but take a bell sound. The meditation has three phases which we perform, and a fourth that is grace.

- Sound the bell three times. Listen intently to its form and timbre.
- Even after the bell sound has died away to outer silence, we possess the memory of the bell sound. We can re-sound the bell inwardly. Do so. Listen to its inner reverberation, again and again.
- The third phase is that of silence. Allow the memory of the bell sound to fade, releasing all sound, and opening the attention wide. The appropriate mood for

this state is wonderfully characterised in Lao-Tzu's (c. 500 B.C.E./1988) *Tao Te Ching*
The Master doesn't seek fulfilment.
Not seeking, not expecting
She is present, and can welcome all things. (p.15)

- The fourth phase is not enacted by us, but may presence itself in the silent space thus prepared and sustained. In Buddhaghosa's (AD 350/1975: 143-204) description of the so-called ten *kasinas* or devices (earth, water, air, fire, four colours…) this is called the 'afterimage' phase. During this phase the inner aspect of the bell sound, or other sense experiences used in the same way, arise in the silence or void.

Maintaining openness

True single-pointed attention is, by definition, oblivious to everything outside the immediate field of attention. Contemplative inquiry moves out from sustained, focused attention to open attention. When we release the bell sound we already are approaching this stage of practice. However, it can become the main feature of the exercise by using relationship as the focus of attention. Any comparison will do, but one we have used is the simplest value-scale exercise common to artistic training. Giving the students paper, brush, and black and white acrylic paints, we ask them to make a graded sequence of grey squares that move evenly from white to black.

We use this and other comparison exercises to cultivate a sense for relationship and the inner discernment of difference, which we see as the first feature of contemplative *cognition*. One moves from single states of awareness to the direct perception of differences and similarities. This is a key moment. If we intend to connect contemplation to knowing, to *veritas*, then we must articulate an understanding of contemplative practice that moves from the psychological and health benefits of meditation (which are great) to its cognitive dimensions.

Sustaining contradiction

The fourth stage of contemplative inquiry proved especially challenging for our bright Amherst students. Whenever they have been thrown a problem, they want to solve it. If they encounter a contradiction, they resolve it. Reality is often resistant to this approach, and for good reasons. I lectured them about wave-particle duality in physics and Joel spoke about the artistic tension produced by antagonistic elements in great works of art. We sent them to the art museum in pairs to look at particular portraits

which had the strange habit of looking back. We put one student on one side of the gallery and another on the opposite side. The painting looks at each; it looks in two directions simultaneously. Impossible. The 15th century cardinal Nicolas of Cusa (1453/1960), who recommended this exercise to his monks, called this and similar phenomena a coincidence of opposites. Think about it, hold the contradiction and instead of resolving it, sustain it – practice sustaining contradiction!

But the deep significance of cultivating a consciousness that can sustain contradiction was appreciated only when it came home to our students during one of our informal evening conversations. Several of our racially mixed and ethnically diverse students began to speak about the irreconcilable complexity of their own lives that had caused them great uncertainty and personal suffering for years. Were they Chinese or American, how did the Haitian home they had just left (so full of life, spoken Kréyol and deep religiosity) relate to the life of the pristine mind and raucous campus life they were pursuing here at Amherst? Were they betraying their lineage? Did they need to decide between their contradictory identities? How could they? Their very lives required them to sustain a huge contradiction. As the Lebanese-French writer Amin Maalouf (2003) has put it, it is precisely through the irreconcilable complexities of our lives that our identity emerges. When we deny that complexity, as a society we quickly decompose into warring ethnic and religious factions vying for dominance.

Developing self-love

Only when we reached this turning point were we and the class ready to speak of love explicitly, because the architecture and life of love is animated by impossible contradictions. We long to be one with the beloved without in the least damaging or distorting her. We study the troubadours and their *chansons* which repeatedly sing of love's contradictory nature, as these lines from Arnaut Daniel (n.d.) of the thirteenth century show.

I never held but it holds me
all the time in its bail Love
and makes me glad in anger, fool in wisdom
as one that never can fight back,
because a man that loves well, cannot defend himself.

Love is at once painful and joyful, a 'sweet sorrow.' Love can begin with ourselves, accepting and even delighting in the contradictory elements out of which we are composed. Am I a scientist, a poet, or a spiritual seeker? Yes, to all of them. The structures of our institutions of higher education belie this complexity. At best they struggle to capture it through interdisciplinary conversations between representatives from different disciplines. These often play out like negotiations between nations or ethnic groups at the UN. More is required, much more, if we are to integrate these diverse elements without dissolving them, and it starts by leveraging the contradictions in ourselves. This can only happen if we love the contradictions, and so love ourselves.

Developing love of others

The well-known Buddhist loving-kindness meditation allows one to gradually widen the circle of one's compassionate and loving attention. Starting from oneself, we then go on to someone close (a friend, relative, spouse). We wish them peace, joy, well-being.… We continue to widen the circle of our loving attention still further to those we do not know well, wishing them also peace, joy and well-being. And finally we choose someone who is troublesome and difficult in our life. Even to them, we wish peace, joy and well-being.

By this time we are reading Plato's *Symposium*, his great dialogue on love. Love, as taught to Socrates by Diotima, is not only practised toward other persons, but also toward beauty in nature and toward the great institutions that embody our highest ideals. Ultimately we love the ideal forms that are reflected everywhere throughout the beautiful in both natural and human creations. The 'ladder of love,' however, leads not only up to the realm of pure forms, but it also descends to the mundane. The closing pages of the dialogue in which the drunken Alcibiades describes in love of Socrates, and dares to speak of the noble life of Socrates, these are testimony to a life lived in love for his students and for his fellow Athenians, as well as the eternal ideals of truth, beauty and goodness, a love which was repaid with a glass of hemlock.

Love of the deed

An important figure in our course at this point is the Beguine Marguerite Porete who lived and died around 1310. In her book the *Mirror of Simple Souls,* Porete (1290/1993) used the new language of *fin amor* as sung by the troubadours in Old Provençal to describe her *amor de loing,* her 'love from afar.' In her case her distant love was not for an earthly companion but for God. Through the intensity of her love for her beloved, she realised that true moral action was not guided by the rules of what she called 'the church of the little,' but by the great church of love. In place of the theological Virtues, from which she declared herself free, she espoused action guided by love alone, quoting St Augustine (A.D. 416/2004): 'Love, love and do what you will.' Her espousal of love as the true guide for action brought her into conflict with certain bishops within the Catholic Church of France. As a result she was arrested, imprisoned, and tried before the Inquisition in Paris. She refused to recant her love and views, and was thus condemned to die by fire for 'The Heresy of the Free Spirit.' At her execution all cried when they saw with what quiet nobility she met her death.

Students are deeply moved by Porete's valiant, though tragic life. We ask them to meditate on Augustine's line, 'Love, love and do what you will,' which was at the heart of Porete's life, and to write on how Eros and insight are here raised to a form of contemplative knowing. After all, Marguerite Porete knew something so surely that she could stand silently and confidently before the greatest scholars of the Paris Inquisition without wavering. Loving love had granted her an insight or *aperçu* for which she was willing to die. To do otherwise would have been to betray her beloved.

Re-imagine your education

Our final assignment to our students was to re-imagine their Amherst College education in light of Eros and insight. They had studied Kepler and Rembrandt; they had read Oliver Sacks, Niels Bohr, Barbara McClintock, Albert Einstein and Werner Heisenberg. They had read the troubadours, Merton, Rilke, T. S. Eliot, and Plato on love. In addition they had meditated on silence, attention, openness, contradiction, self-love, love of others, and love of the deed. What, we asked, should education – their education – be in light of all this? This was their final paper assignment: redesign your Amherst education in light of Eros and insight, in light of the relationship between love and knowledge.

Upton and I ended Eros and Insight with an image suggested to us by a pair of students in our initial offering of the course. In is simplest form, the visual metaphor is a doorway or entry composed of two posts with a lintel spanning the space between them. The two posts are a visual metaphor for the course's two parts: Eros and insight. As our students pointedly recognised, Eros can quickly be debased to lust, but insight can also be diminished to instrumental reasoning alone. Yet Eros can also be enhanced to become the lintel of love, which seems to imply that the enhancement of insight becomes love as well, a knowing that is also a loving, an epistemology of love.

In this manner, as it turns out, the task first put to us by Rilke, learning to love, is also the task of learning to know in its fullest sense. Karl Jaspers (1957/1974) quotes Nicolas of Cusa concerning the highest form of human knowing, saying: 'knowledge is here identical with love and love identical with knowledge.' (p. 51) An epistemology of love is not a flight from reason to sentiment. The academy has nothing to fear from contemplative inquiry; indeed, such inquiry is in some measure already part of a covert curriculum that educates for discovery, creativity, and social conscience.

As contemplative educators, I believe that we are all engaged in an important project, one with a long tradition. The project of ancient philosophy was to live a right life, to embody virtue not only legislate it, to engender creativity and the capacities for insight, not only memorise formulae and works of art. As Hadot (1995/2002) puts it, the ancients' education was 'a course of training which would make them simultaneously contemplatives and men of actions – since knowledge and virtue imply each other.' (p. 90)

In his final paper for Eros and Insight, Rajiv (not his real name) confessed that he was now unsure what to tell his parents about his career plans. His mother was a nuclear physicist and his father was a neurosurgeon. They expected a six-figure salary for him immediately upon graduation, and prior to the course he had gone along with their expectations. In his final paper he wrote, 'How do I tell them that now the only thing I want to be in life is a lover?' Given his formidable talents, I feel confident that Rajiv will succeed outwardly, but I hope he remembers to live deliberately, to cultivate silence, attention, and relational awareness, and even to sustain contradictions. Then he will be vulnerable to and participate in the mysteries that are everywhere around him. He will move from being a spy to being a lover whom nature will accept. In the process, he will reform himself, shaping organs for cognition, for a high kind of seeing that can constitute true theory. The ethic associated with this epistemology is one he can live by. Since at this highest level, which is the level of deep contemplation,

knowing and loving are one, his actions will be virtuous and his words true. He will, in some measure, have accomplished the greatest and most difficult task of all, that for which everything else is but a preparation: he will have learned to love.

The course I have described is but one of hundreds now being taught around the United States in which a wide range of contemplative practices are being used to explore the benefits to students of a more contemplative pedagogy. The Center for Contemplative Mind in Society's Academic Program has acted as a leader in this important work for the last ten years. For details see www.contemplativemind.org.

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Glossary

Anthropocentrism: the practice of regarding the existence and/or concerns of human beings as the centre of the universe. In anthropocentrism, all things in the universe are to be judged in their relationship to man.

Anthroposophy: an attempt to investigate and describe spiritual phenomena with the same precision and clarity with which natural science investigates and describes the physical world. It is also called spiritual science by its founder Rudolf Steiner.

Biodiversity: the variety, distribution and abundance of different plants, animals and micro-organisms, the ecological functions and processes they perform, and the genetic resources they contain in a certain locality, region or landscape.

Cocreation: the act of engaging in a conscious creative partnership, with the innate impulse of creation, the intelligence of nature and natural systems design, the intuitive collective consciousness of humanity.

Co-evolution: process in which a number of different systems evolve simultaneously, partly on the basis of their own dynamics, and partly as a response to their interaction with other systems.

Constructivism: views all of our knowledge as 'constructed', because it does not reflect any external 'transcendent' realities; it is contingent on convention, human perception and social experience. Constructivists believe that representations of physical and biological reality, including race, sexuality and gender are socially constructed. The common thread between all forms of constructivism is that they do not focus on an ontological reality, but instead on the constructed reality.

Determinism: the proposition that every event, including human cognition and action, is causally determined by an unbroken chain of prior occurrences. No mysterious miracles or wholly random events occur. Determinism is associated with, and relies upon, the ideas of materialism and causality.

Disenchantment refers to the devaluation of mysticism. The concept was introduced by Max Weber to describe the character of modernised, secularised society, where scientific understanding is valued more than plain belief.

Dualism: the existence of two fundamental classes of things, or principles, often in opposition to each other. In philosophy of mind, dualism refers to the views that mind and matter are two ontologically separate entities.

Nondualistic perspective: the position that there is no fundamental distinction between mind and matter. Many traditions state that the true *condition* or *nature of reality*

is non-dualistic, and that these dichotomies are either unreal or (at best) inaccurate conveniences.

Endogenous development: development based mainly, though not exclusively, on locally available resources, local knowledge, culture and leadership, with openness to integrating traditional as well as outside knowledges and practices. It has mechanisms for local learning and experimenting, building local economies and retention of benefits in the local area.

Epistemology: the study of the theoretical background and dynamics of a knowledge system, including its nature, origin and scope. Epistemologists analyse the standards of justification for knowledge claims, that is, the grounds on which one can claim to know a particular fact.

Globalisation: the growing economic, social and political interdependence of countries worldwide through increasing volume and variety of cross-border transactions in goods and services, international capital flows, and more rapid and widespread diffusion of technology and communication systems.

Global knowledge: knowledge that has resulted from global processes of knowledge and technology generation, processes of regional specialisation and global integration of communication, production and trade. This knowledge cannot claim exclusive regional origins. An example of global knowledge is information and communication technology (ICT).

Gnoseology: the study of the way to come to a deep understanding of reality. It includes direct observation, direct experience, intuition, or insight and the belief that such experience is an important source of knowledge or understanding. It may involve a belief in the existence of realities beyond immediate perceptual apprehension, or a belief that true perception of the world goes beyond intellectual understanding.

Hermeneutics: a philosophical technique concerned with the interpretation and understanding of texts.

Heurism: the approach to deriving knowledge from empirical study and practical adoption of experience.

Holism: the idea that all the properties of a given system (biological, chemical, social, economic, mental, linguistic, etc.) cannot be determined or explained by the sum of its component parts alone. Instead, the system as a whole determines in an important way how the parts behave.

Indigenous or **local knowledge:** knowledge generated, used and developed by people in a certain area. It is not limited to indigenous peoples and can include knowledge originating from elsewhere that has been internalised by local people through local processes of learning, testing and adaptation. It forms the basis of the art of identifying, combining, unfolding and protecting local resources. It is rooted in

and stems from local practices, hence it is specific to the local context and often gender specific.

Inter-cultural dialogue: exchange of experiences, ideas and values by representatives of different cultures, with the aim of mutual learning and enhancing the co-evolution of a diversity of cultures.

Intra-cultural dialogue: exchange of experiences, ideas and values by persons within a particular culture, with the aim of mutual learning and enhancing the same culture.

Inter-scientific dialogue: exchange of ideas, experiences and concepts related to different scientific paradigms and knowledge systems, with the aim of joint learning and the co-evolution of the diversity of sciences.

Learning: the process of sense making and acquiring knowledge, skills, attitudes or values, that causes a change of behaviour, perceptions, attitudes, self-image or values. Learning can take place through copying behaviour, study, introspection, reasoning, experience or teaching.

Materialism: the position that the only thing that can truly be said to exist is matter; that fundamentally, all things are composed of *material* and all phenomena are the result of material interactions. In terms of singular explanations of the phenomenal reality, materialism stands in sharp contrast to vitalism.

Modern knowledge: knowledge that results from a systematic process of fact-finding and understanding, based on methods that use sensory experience and quantification. Predictability and control are important goals. It uses mechanistic models and follows the principles of Descartes, and is therefore often labelled as Cartesian. This knowledge is developed further in formal research centres and taught at formal educational institutes.

Monotheism: in theology, the belief in the existence of one deity or God, or in the oneness of God.

Objectivism: states that there is a reality or realm of objects existing independent of the mind. Metaphysical objectivism, opposed to subjectivism, thus believes in the existence of an objective reality.

Ontology is the study of being or existence. This most fundamental branch of metaphysics theorises on the basic categories and relationships of being or existence to define entities. Ontology has one basic question: 'What actually exists?' Different worldviews provide different answers to this question.

Paradigm: a compact outline of the major concepts, assumptions, theories, methods, procedures and propositions used in a particular scientific school.

Participatory Action Research: Research which involves all relevant parties in actively examining together current action in order to change and improve it. They do this by critically reflecting on the historical, political, cultural, economic, geographic and other contexts that make sense of it and by designing and testing methods of development and development support.

Polylogue: the word polylogue comes from the words poly (many) and dialogue. A number of dialogues occurring simultaneously.

Post-modern knowledge: knowledge resulting from a diversity of concepts that aims for an organic, holistic and ecological understanding of reality. As a reaction to modern knowledge, it integrates insights from various scientific sources. It accepts uncertainty, lack of control and limitations, as well as the complementarity of different knowledge systems.

Rationalism: a philosophical doctrine that asserts that the truth can best be discovered by reason and factual analysis.

Reductionism: the theory that asserts that the nature of complex things can always be reduced to (or explained by) simpler or more fundamental things. Reductionism in science says that a complex system can be explained by *reduction* to its fundamental parts. Essentially, chemistry is reducible to physics, biology is reducible to chemistry and physics, and psychology and sociology are reducible to biology, etc.

Relativism: the view that the meaning and value of human beliefs and behaviours have no absolute reference. Relativists claim that humans understand and evaluate beliefs and behaviours only in terms of, for example, their historical or cultural context.

Transdisciplinarity: is a principle of scientific research that describes the application of scientific approaches to problems that transcend the boundaries of conventional academic disciplines. Such phenomena, such as the environment, energy and health, are referred to as **transdisciplinary**.

Scientific knowledge: knowledge that results from systematic processes that include observation, understanding, description, explanation, fact-finding and experimentation. Abstract concepts and symbols are linked with reality through experimentation. Traditional, indigenous, modern and post-modern knowledge can all be considered scientific if they respond to this definition.

Vitalism: the doctrine that 'vital forces' are active in living organisms, so that life cannot be explained solely by mechanism. This element is often referred to as the 'vital spark' or 'energy', which some equate with the 'soul'.

Worldview: (or cosmovision) the way a certain population perceives the world (or cosmos). It includes assumed relationships between the human world, the natural world and the spiritual world. It describes the perceived role of supernatural powers, the relationship between humans and nature, and the way natural processes take place. It embodies the premises on which people organise themselves, and determines the moral and scientific basis for intervention in nature.

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