

RAAKS' TOOLS

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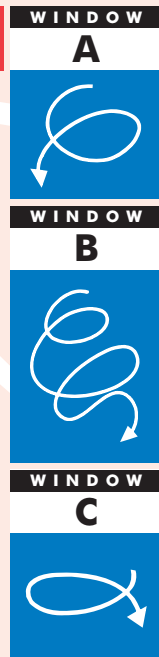
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Tools help a RAAKS team to gather information systematically and to process it. To some extent, each tool represents a practical way to address a particular window: it provides specific questions and working procedures. Although some tools are more encompassing than others, a tool generally limits the analysis to a narrower range of issues than the corresponding window. There is also some overlap among them. In addition to being used in the analysis, the information collected can also become input for a focused discussion with actors, giving a clear view of 'how actors see this element of the system.'

RAAKS teams often begin by using the tools provided here. As you become more familiar with the approach and methodology, however, you may see aspects of the situation that you would like to explore in more detail. In this case, teams should feel free to adapt the tools (perhaps by combining or extending them) or to develop new tools of your own.

Reading through the tools is also a good way to begin becoming familiar with RAAKS. Each tool begins with *expected outputs*: what can we expect it to produce? What is it supposed to add to our analysis? The *relevant questions* suggest topics for the team to work through: areas to think about and types of information to collect to help in understanding the social organization of the system. *Working procedures* provide more details; in some cases *examples* of the use of the tool or its results are also given. Some Tools (A5, Approximation exercise II; B8/b, Understanding the social organization of innovation; C3/a, Defining possible actions; and C3/b, Strategic commitments) can be used to sum up the preceding phase or phases and prepare to move on. Each tool bears the number of one or more related windows. If a tool is numbered, for example, 'A5/B6' it is relevant to both Windows – A5 and B6. The Glossary mentioned in the cards is Appendix 4 in the manual *Networking for innovation*.



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TOOL

WINDOW

A1**Problem definition exercise****Expected outputs**

- A concise description of the area of human activity (see Glossary) the team is studying.
- A first listing of relevant or possibly relevant actors (see Glossary) and/or target groups.
- A specification of the problems as perceived by these actors and target groups, and identification of preliminary problems and objectives for RAKS.

Relevant questions

- ❓ Which area of human activity are you looking at?
- ❓ How diverse is this area (with respect to farming systems, agroecological zones, social groups, etc.) ?
- ❓ What actors are involved in this area?
- ❓ What general problem or problems can you identify?
- ❓ Who thinks there is a problem? What characterizes these actors?
- ❓ Who is affected by the problem? What characterizes these actors/constituencies?
- ❓ What is the history of the problem?
- ❓ What are possible causes of the problem?
- ❓ What problems or aspects are seen as urgent? By whom?
- ❓ Do you think there is a problem?

Working procedure

The team works through the list of questions above, beginning with identifying the areas of human activity involved, relevant actors, and problems or possible problems. One way of generating a list of problems is for the team to have a 'brainstorming' session. The rules for such a session are simple: all ideas are acceptable; and, during brainstorming, participants are not allowed to discuss or criticize each other's ideas. The idea is to generate a list with lots of ideas, on a flip chart or overhead sheet. Next, the team narrows the list by discussing the importance of the problems and the extent to which they can be grouped – for example, several items on the list may all be the result of one underlying problem.

Each of the sets of problems selected then needs to be explored by the team in more detail, using the questions on the above list. A separate flip chart page or overhead sheet should be used for each problem, to keep a record of the results. If necessary, easy-to-read summary sheets should be prepared for later use.

At this time, it is less important to focus on finding the best possible problem statement or diagnostic objective than to think about how to *fit together* the elements of the problem in one statement. An important point to remember is that this definition of problems is preliminary – the team’s view may change over time, especially when discussions with actors begin! However, this tool gives a starting point and a means to explore team members’ ideas.

Among the considerations in choosing the problem on which the team will focus are the terms of reference of the team, the interests of the team members, and of course feasibility – including the time and resources you have available. A broad problem statement requires involving more actors (which takes more time for interviews and analysis); also, team members may find it hard to relate a broad statement to their own interests. On the other hand, it may be hard to motivate people to work on a problem that is too narrow. Further, narrowing the problem too early makes it easy to miss vital information: it is important to make sure women, landless farmers, recent immigrants and other sometimes forgotten groups are considered. The team must also decide whether to accept the problem as stated (or implied) in its terms of reference, or to redefine the problem. Either decision may create a necessity to negotiate with sponsors of the RAAKS effort: for example, a problem statement based on a very specific TOR may not provide enough context to reach a real answer.

Some problem statements are listed in the example. Which of these do you think would provide the best basis for a useful study? Why? (Additional examples of problem statements can be found in Case 2 in Chapter 2 of *Networking for innovation*.)

Sample diagnostic objectives

In a study related to dairy farming, the following possible objectives for the RAAKS diagnosis were identified:

- To identify the factors limiting the success of the dairy knowledge system.
- To formulate recommendations to increase the development and use of ecologically sound technologies by small dairy farmers in the south of the country concerned.
- To identify factors that hold the national dairy knowledge system back from developing adequate solutions to environmental problems in the intensive dairy industry, and what can be done to remedy this situation.

TOOL

WINDOW

A2**Actor identification exercise****Expected outputs**

- A general list of system actors and possible actors, which is as complete as possible given the information available at this stage.
- A first general diagnosis of the relative importance of each actor for the functioning of the system.
- A list of arguments to support this diagnosis.

Relevant questions

- ? For the area of human activity defined by the team (Tool A1), which actors play a role? Try to be as specific as possible. ‘Farmers’ for example are often not a homogenous category but need to be specified as small/large scale, female/male, young/old, remote or not, or by ethnic group, etc.
- ? Which actors play a significant role in technological innovation, policymaking, research, or exchange or utilization of new or existing knowledge? Why and how? Be sure to include gender aspects.
- ? Who else could make an important contribution? Why and how?
- ? What do the various actors contribute? Is there a difference between mandatory and ‘de facto’ contributions? Why?
- ? Which actors can be seen as key actors? Why?
- ? What subsets of actors can be distinguished?

Working procedure

The actor identification sheet (see below) can be drawn on a flip chart or on overhead sheets, so that the team can keep the information. The team then has a brainstorming session (see Tool A1) to generate a list of actors in the system – again, these might be either individuals or organizations. After making a list of ideas, the team discusses which of the actors listed are truly relevant, and which are to be considered key actors. Reasons for the choices regarding key actors should be written on the sheet.

In Phase B the team may find it necessary to go into more detail on actors (the Actor analysis checklist, Tool B2, will help at that time). This is relevant, for example, if the system needs to adjust to changing conditions, and actors are seeking new partnerships.

Actor identification sheet

System actors	Do you see this person/ organization as a key actor? (yes/no)	Why or why not?
1.		
2.		
3.		
.		
n		

Resettlement project for youngsters in the Congo

The National Volunteers Organization for Development (ONVD) was founded in Congo in 1987. The objective was to offer unemployed urban youngsters new possibilities in rural areas. Starting capital was provided by UNDP, a private French institute, and the Dutch Ministry for Development Cooperation. In 1994 this Congolese NGO provided housing, education and work in agriculture for thirty male and three female youngsters. During a RAAKS study, the listing of key actors given below was made by the team.

Key actors – Congo-Brazzaville project

Actors	Key actors?	In what way?
ONVD	yes	Provides housing, training and work for youngsters
Village Chief	yes	Provides access to village life
Youngsters female male	yes yes	
Parents of youngsters from the village from elsewhere	yes no	Provide social network for youngsters In effect, absent: group is small in number
Landowners parents state farms	yes yes	Provide access to land Determines availability of land
Consumers	yes	Provide market opportunities
Village farmers	yes	Compete with new farmers
Transporters	yes	Provide distribution to market
UNDP	yes	Provided initial funding
French private institute	yes	Provided initial funding
Dutch development cooperation	yes	Provided initial funding
Banks	yes	Provide loans for future investment
Congo Ministry of Agriculture	yes	Designs national agricultural policy
Congo Ministry of Cooperatives	yes	Designs national policy on coöperatives
Traders	yes	Determine market opportunities
Bakers	yes	Customer of bread
Subdistrict administration	yes	Implements government policy
Research	yes	Provide production technology for manioc, bananas, beans

Source: Congo case discussion at the International Workshop on Agricultural Extension in Africa,
Yaoundé, Cameroon 24–28 January 1994

TOOL

WINDOW

A3**Actor objective sheet****Expected outputs**

- Statements of the objectives/mission statements of a number of actors, which will be used and further developed during the RAAKS study.
- An overview of the arguments actors put forward and the criteria they apply in rating the degree of importance of each of their objectives with respect to the direction agricultural development should take.
- A first assessment of the driving force(s) and actor(s) behind each of the different objectives.

Relevant questions

- ? What do the relevant actors see as their objectives?
- ? How does each of these actors perceive their contribution to the development of the process?
- ? Who are the real beneficiaries of each of these objectives?
- ? What technologies and/or activities are being developed or implemented as a result of each objective?
- ? Which actors are crucial to implementing each objective?
- ? Is there a *shared* objective?

Working procedure

Each team member will be able to think of several possible actor objectives, based on their own perception of the system, and/or the information they have gathered. Sources might include documents (annual reports, articles, speeches) as well as interviews with relevant actors. Generally no one objective can adequately reflect the visions of the many different actors involved in the system. Therefore the team creates a large variety of possible objectives, even including ‘unrealistic’ ones, to explore the boundaries of the system. These objectives are discussed, compared, and evaluated by the team. One or several actor objectives are then selected as the most relevant to use in beginning the RAAKS study. In the course of the diagnosis, the team will develop a clearer picture of shared or conflicting objectives which may stimulate or hamper system performance.

Sample mission statements

The following examples are from (or suggested by) discussions with different parts of the horse husbandry sector in the Netherlands. (See Chapter 8 in *The social organization of innovation* for more information on this example.)

Those with different client groups may perceive themselves as having different missions:

- To meet the knowledge and information needs of professional horsekeepers.
- To meet the knowledge and information needs of professional and semi-professional horsekeepers.
- To meet the knowledge and information needs of professional, semi-professional and recreational horsekeepers.

The area of concern can also lead to differences in mission statements:

- To provide professional horsekeepers with technical knowledge and information.
- To provide professional horsekeepers with knowledge and information concerning legislation relevant to rural areas.
- To provide professional horsekeepers with knowledge and information on the horseback riding market and the related consumer preferences.

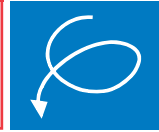
Also, the problem addressed may vary:

- To prevent maltreatment of horses by amateur horsekeepers, by providing knowledge and information on handling and treatment.
- To inform the public about the recreational possibilities of riding.
- To extend the infrastructure for horseback riding by informing municipalities of the number of their citizens who ride, to encourage provision of facilities.

Each of these statements suggests a particular perception and emphasis. Each has specific implications, in terms of the actors who are to be considered a part of the system, the roles they might play, the knowledge products they might develop and the linkages they will find important. Clearly some statements are compatible, and might be combined; others may even be mutually exclusive!

TOOL

WINDOW

A4**Environmental limits checklist****Expected outputs**

- More clearly distinguished internal and external actors and factors; identification of external agroecological and socioeconomic environmental factors – that is, factors in the ‘environment’ of the system – that influence the problem situation.
- An inventory of resources and services external to the situation.
- An improved understanding of which environmental factors the actors in the system can or cannot influence.

Relevant questions

- ? Which factors (agroecological, cultural, socioeconomic, political, etc. – see the checklist below) play an important role in determining the pre-conditions for developing technologies and/or services?
- ? Which actors can influence such factors?
- ? Which external actors put direct pressure – either positive or negative – on the actors within the system with respect to developing technology and/or supplying services? How?
- ? What relationships with the environment are seen as crucial to adequate performance of the system (or those that need to be created)?
- ? How complex is the environment within which the system must perform? Is it subject to rapid change?

Working procedure

The team brainstorms (see Tool A1) regarding the questions above. Answers are written on flip charts or overhead sheets. If the team wants to go into detail on the first question, all or part of the checklist below can be used. Throughout this tool, look for ways to make the results of team discussion visible – e.g. by making drawings that show the relationships being discussed.

External factor checklist

Environmental complexity

- Degree of agroecological and production system diversity the system must deal with.
- Degree of cultural and socioeconomic diversity among the technology users included in the system.
- How stable or subject to change is the environment?

Available technology

- Degree to which the information needed within the system is already held by some of its actors. Does their knowledge stay up to date? Do they generate new knowledge?
- The availability and accessibility of technologies that are relevant and can be adapted or modified for use within the system.

External pressures

- Dominant types of policy pressures exerted upon the system.
- Degree of direct exposure to market demands.

External resource base

- Types of external resources used by the system and how these are acquired; degree of dependence upon external resources.

Adequacy of agricultural services, marketing, inputs and communications infrastructure

- To what extent do agricultural services, marketing, inputs and communications infrastructure serve the needs of the system?

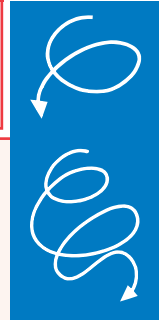
Source: Adapted from Engel and Seegers, Towards a design and management of effective linkage strategies: a diagnostic tool. ISNAR R/TTL synthesis working paper. The Hague, ISNAR, 1992

TOOL

WINDOW

A5/B6**Prime mover septagram****Expected outputs**

- Identification, based on actors' perceptions, of the 'prime movers' – those who give the leadership and have the most influence on what happens within the system.
- A picture, in the form of several septagrams (see example), of the influence and/or leadership of each of the prime movers as seen by different subgroups/actors.

**Relevant questions**

- ? Who do different actors see as the prime movers in the system?
- ? Which of these prime movers exert the strongest influence?
- ? Who could change the situation and would be interested in doing so? Why?

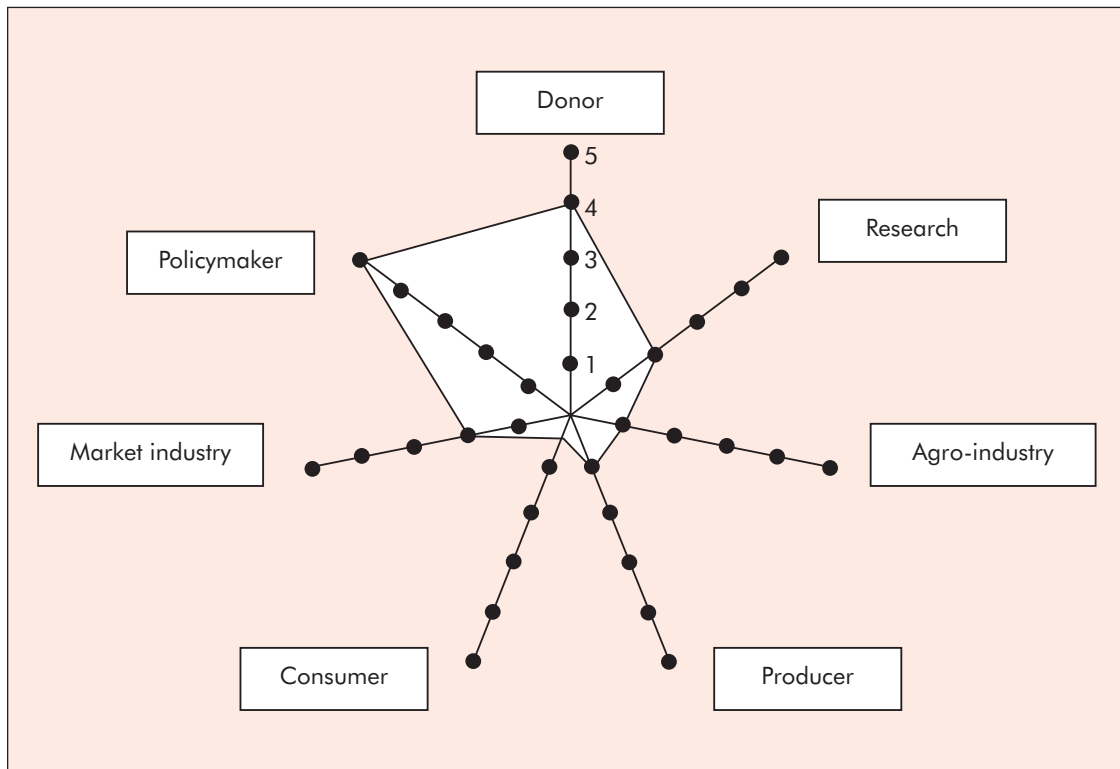
Working procedure

Actors influence interactions within the system in different ways. For example, policymakers design and implement policies and regulations, market actors influence prices, donors finance certain programmes, research stations offer certain technological solutions, consumers choose certain products, agro-industries favour relationships with particular producers and producers may favour specific techniques. Each actor therefore has their own influence on the social interactions within the system. However, some actors may exert more influence than others, so that coalitions appear around these 'prime movers'. They may exert strong leadership on the way the knowledge system functions, and hence on the type of outputs and impact the system achieves. This tool focuses on identifying these prime movers and the degree to which they effectively 'steer' the system in a given direction.

To use this tool, the team asks each actor or group of actors to say how strong an influence each different type of actor (internal or external) exerts upon the functioning of the knowledge system. This discussion can be made visible by asking the interviewee to fill in a blank 'septagram sheet' (see example) consisting of a circle and one line for each type of actor in the system. (There may be fewer lines than in the example – or more.) Each type of actor is assigned a line; the group or individual being questioned is asked about each actor separately. They decide where to place a sticker on the line representing this particular type of actors. The stronger (the more 'controlling') the influence of this type of actor, the further away from the centre the sticker is placed. The weaker (the more 'following') the influence, the closer it is put to the centre. There may be more than one prime mover in the centre. The use of a septagram in an interview is a good way of discussing and coming to understand the perceptions of the person being interviewed.

Septagrams help to give the team a coherent picture of the system: actors may have similar or very different perceptions (as shown in their drawings), which can have major implications for the knowledge system. The team and other actors can work to put together a single picture that applies to the system as a whole. Further, the team's attempt to sum all of this information up in one septagram is a good discussion starter for a workshop!

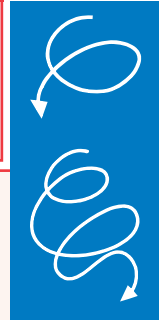
Septagram of a policy and donor-driven knowledge system



Scoring
5 = 100% controlling
1 = 100% following

TOOL**WINDOW
A5/B8****Approximation exercise I:
Leadership and coordination****Expected outputs**

- A tentative system model, graphically displayed.

**Relevant questions**

- ? Are all key actors involved in the RAAKS study? (Results from the actor identification sheet, Tool A2, and the Actor objective sheet, Tool A3, can be used.)
- ? Which ‘prime movers’ can be identified? ‘Prime movers’ are internal and external actors who take the decisions that are most important to the system, and whose influence is important to other actors. Prime movers may include investors, policymakers, suppliers of services and technology, users of technology and services and consumers of final products. (Use the results from Tool A5/B6, the Prime mover septagram.)
- ? What actors desire change similar to that desired by the prime movers?
- ? If the system is to function well, what should be its objective? (Use the results from the Actor objective sheet, Tool A3.)
- ? Is one basic configuration prominent? Otherwise, which combination of basic configurations best describes the coordination of the system? Use the results from Tool A5/B6, the Prime mover septagram, and the definitions or results from Basic configurations, Tool B6.)

Working procedure

Drawing pictures – ‘approximation models’ – such as the one below (and the coconut tree in Chapter 2 of *Networking for innovation*) is a way for a team to work as a group to sum up the way they visualize the system they are working to understand. The results from the questions and tools mentioned above can be used to produce several possible approximations. This makes it easier to decide what elements of the current situation make a positive contribution to meeting the objectives of the system, and which do not. In Phase A this can be very general, even metaphorical: in a study of the dairy industry, perhaps the industry will be represented by a cow, surrounded by combatants labelled ‘extension’, ‘research’, ‘feed suppliers’ and so forth! The important thing is to try and include the important actors (heavy arrows, stars or other marks could indicate which are *most* important, or maybe each prime mover will wear a crown or cowboy hat...). Critical external factors need to be in the picture too. What really determines the performance of the system?

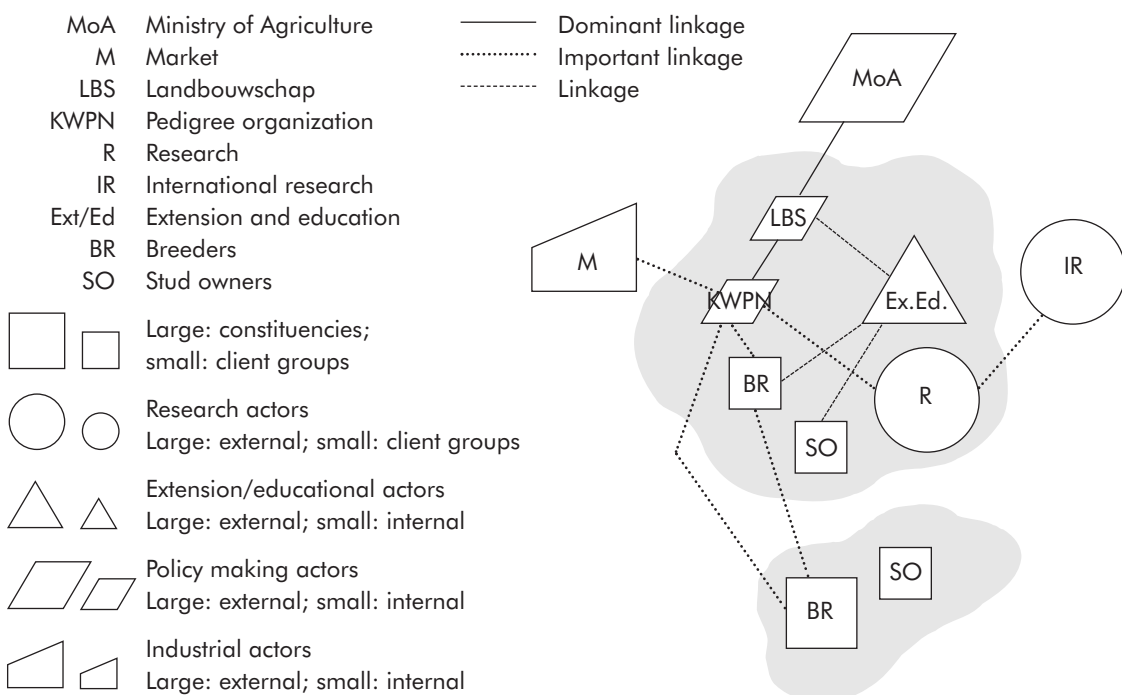
Each model is discussed by the team to see how well it explains the phenomena you have observed. The model or models that most closely resemble team perceptions are chosen. They can be used as a starting point for Phase B of the RAAKS study (see Chapter 2 in *Networking for innovation*); also, they are useful in workshops to get responses and see if the audience agrees with the team. In choosing one or more models, the team does not have to achieve a consensus. It does, however, have to achieve clarity about the nature of the differences between the models.

Finally the models that appear most useful are compared to the *objective* of the diagnosis: what sort of performance can be expected from a system that conforms to the one or more tentative models? How does this compare to the 'desired' state of affairs suggested by the objective? This discussion can yield important insights that help to establish study priorities for Phase B, and 'set the tone' for the choice of windows in that phase.

Phase B covers more specific aspects of the KIS. In Approximation exercise I, the system may be pictured in much more detail (depending on the windows addressed) than in Phase A. The aim is to make the tasks, the hierarchy within which they are carried out and the 'power relationships' in the system more visible, so these can be compared to the objectives of the system. One way to do this is to make cards of different shapes for the actors and main external influences in the system. These can be stuck or pinned to a board (in such a way that they can be moved easily during the discussion). Using the name cards, team members again construct several possible models of the system, taking into account the actor objectives, their assessment of external factors and actors that make up the environment, and the importance of each of these to system performance. As above, discussion then centres on comparing the models, asking how well they fit the system and what they imply about its functioning.

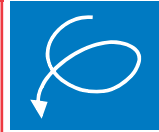
The example below shows a first approximation to a drawing of one subsector (the breeding subsystem) in Phase B, using cards. (This study of the horse husbandry sector in the Netherlands is discussed in Chapter 8 of *The social organization of innovation*.) One important feature of knowledge systems that comes out in this phase are the linkages among actors. Linkages – especially the most dominant, important, and problematic ones – are drawn here as lines. Different sorts of lines are used to show different types of linkages, while the squares, circles and so forth indicate the type of actor. The important role of the pedigree organization (KWPN) shows up clearly, as does the limited role played by extension and education. The *landbouwschap* (an organization that protects the interests of farmers) has an important policymaking role, since it acts as an intermediary between the breeding subsystem and the policymaking bodies of the state.

An approximation model: The horse husbandry sector



TOOL

WINDOW

A5**Approximation exercise II:
Problems and diversities****Expected outputs**

- Synthesis of results from windows addressed in Phase A.
- A drawing of the knowledge system you are studying.

Relevant questions

Findings based on analysis of the material collected using Phase A windows

- ? How would you formulate the diagnostic objective? Think especially about the area of human activity that is being studied: how would you describe it?
- ? What are the objectives of the most important actors? Is there some agreement among them that could be seen as a shared objective? If not, why not? What key words or issues characterize actors' primary long-term objectives? Why are these useful descriptions? Give arguments!
- ? Make a drawing of the knowledge system as you see it; use for example Approximation exercise I (Tool A5/B8) and/or the Basic configurations (Tool B6). Give arguments for the connections you draw.

Preliminary conclusions regarding the knowledge system as a whole

- ? What are, as far as you can see now, three important problems that actors will have to deal with before you can speak of the knowledge system as one that is functioning optimally? Why or in what way are these particularly important?

Implications for the RAAKS study: do the results so far suggest a need for revisions in procedures?

- ? Is the team getting the information it needs? Does this include information from and about women and other groups that are sometimes forgotten?
- ? What windows should be chosen for use in Phase B? Why?
- ? Should any additional actors be included in the team, or in the interviews?
- ? Exercise 4 in Appendix 2 of *Networking for innovation* can be used to check whether the team is making the best possible use of its members' individual styles of learning.
- ? How does the problem look in comparison to the team's terms of reference (TOR)? Does the team need to attempt to negotiate amendments?

Working procedure

The team analyses the material collected from the literature and the interviews carried out using the windows chosen for the first phase, with the questions above as a starting point. Results are discussed and written down in a brief report.

TOOL

WINDOW

B1**Impact analysis sheet****Expected outputs**

- An inventory of outputs that different actors or clusters of actors expect to be available from the system.
- An assessment of the impact of the current system on the outputs listed.
- Identification of actors and factors that promote or hold back the achievement of the desired impact.

Relevant questions

- ? How similar are the views of different actors or clusters of actors regarding what the system must achieve? Are they very different or even incompatible? (See also Window/Tool A3, on mission statements, and B2, Actor analysis.)
- ? How effectively is the system organized to respond to the demands of various actors or clusters of actors?
- ? How well do the outputs of the system meet the expectations of the different actors or clusters?
- ? Is some form of evaluation built into the system?
- ? Are there particular client groups whose needs do not receive attention?
- ? Does the system generate any negative socioeconomic or ecological effects?
- ? Is the system flexible enough to respond to changes in its environment, including the market, policy targets, users and/or consumer demands?
- ? Could the system be reduced (in size or in resources) and still retain its impact – that is, still meet the objectives of the actors?

Working procedure

First, the team compares the actor objectives identified in Window/Tool A3 on tracing mission statements: what are the differences among the actors? Do their objectives overlap? Do actors cluster around overlapping or even similar objectives? Second, the team addresses the questions above. This provides an assessment of the outputs expected by the actors or clusters of actors, as well as the actual impact of the system. Answers can be summed up on an Impact analysis sheet.

Impact analysis sheet

Actors' objectives	Clusters of actors	Expected outputs	Impact

To assess impact, the team needs to decide what standard (what 'measuring stick') will be used in defining 'high' or 'low' impact. In the example below, the degree to which knowledge is generated and exchanged within the system is the standard. Actors' ratings of impact of a particular sort might be another possible standard; so would for example 'the degree to which the system supports ecologically sound agriculture'.

Note: in the case below, Tool B3/c, the Source–intermediary–user sheet, would be used before applying the Impact analysis Tool (B1).

The horse husbandry sector in the Netherlands

Within the horse breeding sector in the Netherlands, seven client groups and ten knowledge types were distinguished during the RAAKS study. A question mark after an item on the list indicates a type of knowledge that seems to be needed, but appears not to be offered by any of the actors – it is not currently available within the system. The types of knowledge identified were:

- 1a Basic knowledge related to veterinary care for horses
- 1b Advanced knowledge related to veterinary care for horses
- 2 Knowledge of horseback riding
- 3 Knowledge of horse breeding
- 4 Knowledge of training
- 5 Knowledge of entrepreneurship
- 6 Knowledge of consumer preferences (?)
- 7 Knowledge of knowledge transfer mechanisms (?)
- 8 Knowledge of public relations
- 9 Knowledge of regulations
- 10 Knowledge of legislation

The knowledge and information needs of the various client groups are shown in the following table. For example, horse breeders need knowledge of types 1a, 1b, 3, 9 and 10. The extent to which the needed types of knowledge are available within the system is shown for each type of knowledge; an indication of the extent to which each client group is reached by the system is also given.

Types of knowledge needed versus those available

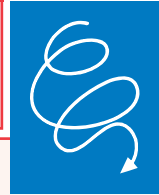
Client groups	1	2	3	4	5	6	7	8	9	10	Client groups reached by system
Knowledge types	a	b									
Horse breeders	*	*		*					*	*	±
Horse trainers	*	*	*		*						+
Riding school owners	*	*	*		*	*	*	*	*	*	+
Horse traders	*	*	*		*	*	*			*	-
Horsemen/horsewomen	*		*						*	*	-
Stud owners	*	*		*	*				*	*	+
Trotting and racing	*	*	*		*	*	*	*	*	*	±
Sportsmen											
Knowledge types offered by system	+	+	+	+	±	-	-	±	±	+	+

This table suggests the conclusion that, in the horse breeding sector studied, there is a discrepancy between the types of knowledge needed by several client groups and the knowledge available within the system. In this example, the most important ones not available are knowledge concerning entrepreneurship and knowledge with respect to market/consumer preferences. That is, the knowledge system does not make available all of the types of knowledge that are relevant to its client groups.

Further, the knowledge system does not make knowledge available to every client group to the same extent. In particular, semi-professional (e.g. breeders and traders) and recreational client groups (recreational horsemen and -women) are less well served by the knowledge system. This also is an indication that the system is not very responsive to its resource-poor clients. (More information on this example can be found in *The social organization of innovation*, Chapter 8.)

TOOL

WINDOW

B2**Actor analysis checklist****Expected outputs**

- Descriptions of the relevant actors (individuals or organizations), summarizing their most important features in relation to the way they function within the knowledge system – in short, *why* they are relevant. See the working procedure below regarding who is ‘relevant’.
- A more profound understanding of the functioning of particular actors, from their own point of view.

Relevant questions*Primary activities*

- ? What primary activities are carried out by individual key actors? Include both knowledge-related activities and other activities.
- ? What resources are controlled by each key actor? This might include human resources – (wo)manpower and qualifications; market share; budget; capital and/or land.
- ? What is the knowledge base of each of the key actors? Include experience within the knowledge system being covered, qualified (wo)manpower, staff skills, knowledge and information about the problems to be addressed, contacts with complementary sources of knowledge and information.
- ? How would you describe each key actor in terms of organizational capacity? This refers for example to efficiency, effectiveness, flexibility, task orientation, bureaucracy, and transparency of policies/mandates.

Positioning within the knowledge system

- ? How does each key actor define their primary function and mandate? If this actor has executives and field staff, how do they perceive the function and mandate?
- ? To what extent do the key actors consider themselves part of a ‘system’? Do they recognize that they and other actors are mutually dependent? With whom?
- ? In general terms, how does each key actor perceive the objective of the system?
- ? Does the actor have policies related to their role in the knowledge system? Are these formally established and agreed upon? With whom?
- ? To what extent do the key actors know what other actors have to offer with respect to knowledge, skills and technology/resources?

Impact on system performance

- ? How relevant is the knowledge base of each actor to meeting the needs of the system’s various client groups?
- ? How would you describe each key actor in terms of their status, influence, and power within the knowledge system?
- ? In general, what would you list as strong and weak points of each actor in terms of their contribution to achieving each objective of the knowledge system?
- ? Is any key actor capable of exerting effective leadership in the system? Does this occur at present?
- ? What type of innovation is favoured by each key actor?

Working procedure

This tool helps in assessing which actors are most important to the system, describing them and their place in the system in some detail. *Note* that often those like farmers or villagers – sometimes seen as simply ‘beneficiaries’ or ‘target groups’ rather than actors – may be highly relevant to the functioning of the system; therefore they must be included in the assessment. See the section on ‘The team and supporting groups’ in Chapter 3 of *Networking for innovation*.

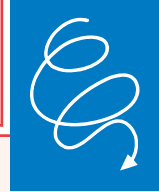
First, the team should attempt to answer the questions above, based on the information that has already been collected. If additional information is needed, can it be collected from the sources you have already found, or is a further search needed? For some questions, quantitative data can be collected, e.g. numbers of professional and technical staff, operational and personnel budgets, and financial allocations to relevant lines of research. Other questions, such as the capability of actors for effective leadership, require that the team and the actors involved use their best judgement to provide answers. A summary sheet such as the one below can be used to record your results.

Actors: Summary sheet

Actor	Primary activity	Position in the knowledge system	Impact on system performance

TOOL

WINDOW

B3/a**Info-source-use exercise****Expected outputs**

- Matrices showing most-used information sources, for each type of information and actor; these suggest the comparative relevance of these sources in providing information to clients.
- An indication of the relevance of the information available.
- An indication of the extent to which each source reaches relevant users.

Relevant questions

- ? What sources of information (actors, products, media, etc.) do the various actors use regularly?
- ? What types of information (e.g. strategic, operational, technical, policy or market information) do they obtain from these sources?
- ? In what ways do they put it to use (such as shaping their corporate image, determination of client's needs, comparison of alternative possibilities, and/or implementation of solutions)?
- ? For each type of information, what are the 'top five' most important sources used by each actor?

Working procedure

In using this tool, the team identifies the value actors place on the services of those who provide knowledge within the system. This process shows which sources are the most frequently used, and which are considered the most important. The outcome is often very revealing, showing differences among the actors involved, whether the services provided reach the intended target groups, the extent to which these target value the services, and what improvements are needed.

Agricultural producers in Asten, the Netherlands

Tables such as those below can be used to summarize the information collected. The categories used in both of these tables can of course be revised by the team to fit your own situation. These examples come from a case in Asten, the Netherlands, involving the agricultural communication network (see Case B, Chapter 2 in *The social organization of innovation* for more information). The first table shows that these farmers use a widespread, diverse network of sources to get the information they need to manage the farm. Actors engage in different types of relationships, each offering distinct types of support, including information. The table gives the frequency with which farmers use priority sources, for several types of information. *Strategic* information has direct relevance to questions or issues of a strategic or tactical nature; *operational* information has immediate relevance to the daily management of the farm business; *technical* information relates to technical and scientific developments; *policy* information has to do with rules and regulations affecting farm operations; and *market* information concerns the development of prices, consumer demand, and national and international developments.

Frequency of use of sources, by type of information

Type of information \ Source	Strategic	Operational	Technical	Policy	Market
Farm journals	4	3	1	1	1
Product extension ^a	1	2			5
Independent extension ^b	5	5		5	
Colleagues ^c		4	5	5	
Accounting bureau	1			5	
Service extension ^d		1			
Agricultural bank	3				
Research institute			1		
Agricultural exposition			4		
Manufacturers ^e			3		
Government agencies				1	
Farmers' organizations				4	
Daily newspapers				3	4
Buyers ^f					1
Teletext					3

^a 'Product' extension is provided by the personnel of companies that sell inputs such as animal feed, chemicals etc. to farmers and at the same time provide technical advice

^b 'Independent' extension comes from the recently privatized former government extension service

^c Includes informal and formal contacts via study clubs

^d 'Service' extension comes from people like veterinary doctors, who provide a service as well as technical advice to farmers

^e Includes manufacturers and sellers of equipment

^f Includes auctions and others who buy agricultural outputs

Source: van Dijk, Engel and Leeuwis, *Evaluatie AGROCOM proefproject*. Wageningen, Vakgroep Voorlichtingskunde LUW, 1991

The second table shows how farmers use information from the sources identified in the table above. One remarkable feature to be observed in this table is the broad influence of product and service-related advice. These advisers seem to be tied into all of the major decision making processes at farm level. Colleagues and independent extension advisers, as well as the accounting bureau and the manufacturers of farm technology are consulted in a more limited, more specific manner. Again, the role of the farm journals is evident. Although they do not appear to play a role in other forms of information use, their role in general opinion formation, in maintaining a vision of what is going on, is pivotal. Farmers rely on these journals, with their broad coverage of issues, to keep up with current developments that may affect their operations.

The four categories that appear across the top of the second table relate to this particular RAAKS study: information used in 'image formation' helps the farmer to keep up with what others are doing; determination of client's needs deals with the identification of problems or need for specific interventions; information in the third category is used for comparison of alternative solutions or interventions; finally there is information used for implementation of a selected solution or intervention.

Use made of most important information sources

Type of information use \ Source	Image formation	Determination of needs	Comparison of alternatives	Implementation of solutions
Service extension ^a	2	1	3	1
Product extension	5	2	2	2
Colleagues	3		5	
Accounting bureau		3	4	
Independent extension		4		4
Manufacturers		4	1	
Farm journals	1			
Dailies/mass media	4			
Buyers		4		
Government				3
Farmers' organization				5

^a For explanation of this and other terms, see the notes under the preceding table

TOOL

WINDOW

B3/b**Communication network sheet****Expected output**

- A communication network (see Glossary) for each actor.
- Insight into the positions actors have within different communication networks.
- Increased understanding of the relevance of actors to each other.

Relevant questions

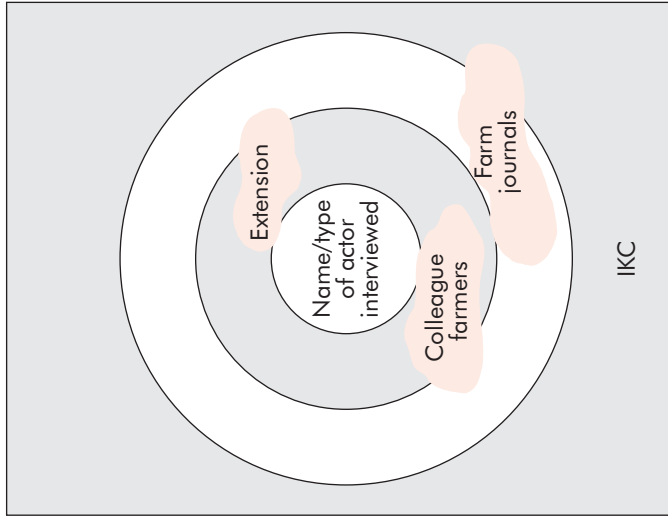
- ? For the actors and information services identified in Tool B3/a, how close is the information source to the user?
- ? What value does the recipient put on the information provided by the source?
- ? If providing information is the mission of the source, is this being achieved?

Working procedure

A communication network sheet – the concentric circles shown in the examples – is used to make actors' relevance to each other visible. The information gathered can be used to construct a picture of the communications network of a given actor or type of actor. It should be filled in on circles drawn on a flip chart or on overhead sheets, so that it can be kept. These sheets show how actors position other actors in their networks, what types of information are available to whom and which actors are prominent in all networks. The type of actor being interviewed is put in the centre; the team decides where to place other actors in the diagram, depending on their relationship to the actor in the middle; other aspects can be shown by the area an actor occupies and so forth.

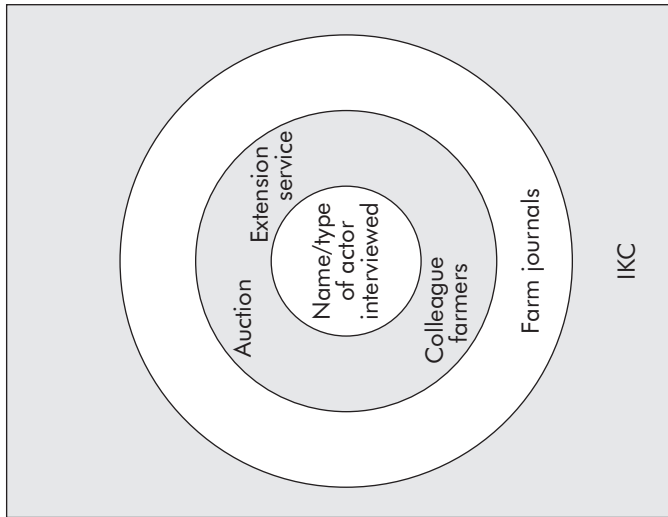
This tool can be used in various ways; it could also be used more than one way for a given actor. In the second drawing below, the positions of actors in networks is being explored using questions about who provides advice, information via various media, or 'documentation' on specialized topics (such as technical innovations, rules and regulations, or financing). More information about Example 1 can be found in Case B, Chapter 2, in *The social organization of innovation*. (The other examples are simply for purposes of illustration, to show various ways to use this sheet.) In Example 2, information about actors relates to their 'closeness'. For example, for farmers, does a particular actor visit farms, or not? Example 3 on the other hand is based on the degree of relevance: one actor may be quite relevant (or not) to another, without being 'close.' If such alternatives are used, the team needs to have a clear definition for itself of words like 'closeness' or 'relevance,' such as those given in the examples.

Communication network sheets

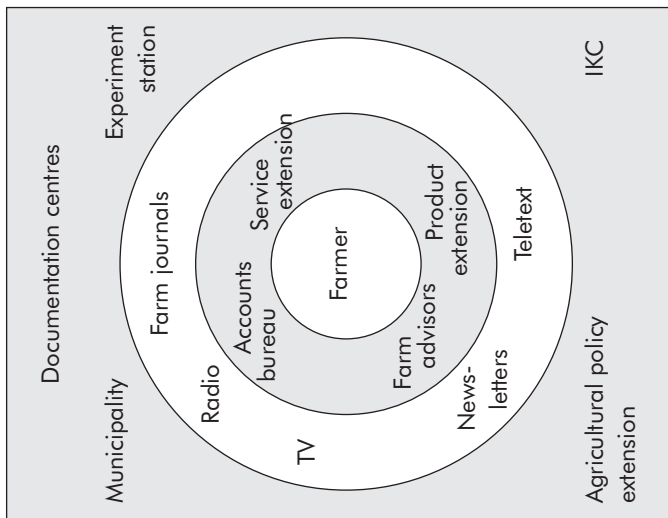


Example 1 Positions of actors drawn to show the type of information they provide to the actor interviewed

(Figure shows the agricultural product communication network in Asten, the Netherlands)



Example 2 Positions of actors drawn to show their closeness to the actor interviewed



Example 3 Positions of actors drawn to show their relevance/importance and closeness to the actor interviewed

Closeness can be defined in various ways – for example, frequency of visits or other interactions:

- inner circle = frequent contact
- outer circle = few or no contacts

Relevance/importance is indicated by size of the shaded space:

- big = very relevant/important
- small = not so relevant/important
- closeness to actor interviewed is indicated by position, as in Example 2

TOOL

WINDOW

B3/c**Source–intermediary–user sheet****Expected outputs**

- One set of actors for each type of knowledge that has been defined.
- Insight into gaps and overlapping among knowledge networks.
- Insight into the quality of the networks supporting the generation, use, and transformation of particular types of knowledge and information within the system.
- Insights into reasons that the system serves some client groups more adequately than others.
- Observations concerning the ways scientific, technical, and practical knowledge can be integrated to produce workable solutions.
- Observations concerning the emphasis particular types of knowledge and information receive within the system.

Relevant questions

- ? How does the fact that particular products are developed by particular actors affect the availability and relevance of these knowledge products for specific client groups?
- ? Which actors could be integrated in the network to improve linkages and thus increase availability and relevance for a particular client group?
- ? Does the composition and integration of the networks contribute to over- or underrating the importance of some types of knowledge? Does this work against achieving one or more of the objectives of the system?

Working procedure

The name of this tool emphasizes that farmers and other actors may be not only users of knowledge; they may at the same time be *sources* of knowledge or *intermediaries* – actors who channel knowledge or knowledge products from one or several actors, so that they reach other actors. Making use of the information gathered to answer the questions above, the team fills in a Source–intermediary–user sheet. For each type of knowledge, this identifies a set of actors related to its production, transformation, and use: *the knowledge network* for this particular type of knowledge. ‘Sources’ of information are filled in, along with their ‘knowledge products’; intermediaries, with the information (knowledge products) they pass along; and the users of this information.

The next step is to compare these networks, to see if there are gaps between the information offered and the information needed. On the other hand, there may be bridges between the

Source–intermediary–user sheet

Knowledge type	Sources	Knowledge product	Intermediaries	Knowledge product	User

networks – actors who participate in more than one network (‘gatekeepers’). Some networks may overlap to such a degree that they can be combined. The transformations that occur within a network – for example, making it possible to put more theoretical knowledge to practical use – can be studied by comparing the products actors receive with those they pass on to others.

Looking at these networks also may provide some insight as to reasons some client groups are served better than others by the system. Comparisons with information gathered in an Actor analysis (Tool B2) may provide insights into the limitations (whether inherent or self-imposed) actors deal with while performing their roles in the system. Furthermore, in cases like the one below, information gathered about networks can be used for Impact analysis (Window and Tool B1).

A knowledge network in the Netherlands horse husbandry sector

The table shows the information that might be filled in on the Source–intermediary–user sheet for just one of the knowledge types (knowledge of breeding) identified in the example given for Tool B1, Impact analysis – the horse husbandry sector in the Netherlands (see Chapter 8 in *The social organization of innovation*). This gives the team a way to analyse the knowledge network. As can be seen in the table, the pedigree organizations (especially the largest ones) play an important role in the breeding knowledge network. They are active not only as a source of knowledge but also through their magazines, which are another example of an intermediary. These magazines seem to have a great deal of importance or potential importance, because they are often the only communication channel between breeders and institutional actors. Also, the magazines reach large numbers of people in a sector that is characterized by its diversity.

Breeders’ networks related to breeding: A knowledge network analysis

Knowledge type	Sources	Products	Intermediary /ies	Products	User
Knowledge of breeding	- Pedigree organization	Management info. system	- Pedigree org.	Breeding recommendations	- Members of pedigree org.
	- Breeders	Practical experience	- Pedigree org. - Breeders - Extension	Contributions in meetings, evaluations, etc.	- Members - Breeders - Breeders visited
	- Universities	Research results	- Extension	Visits, written articles, etc.	
	- Research station	Research results, publications	- Pedigree org. - Research station	Articles, other publications	- Members - Horse keepers
	- Landbouwschap ^a	Integration of knowledge on e.g. venereal diseases	- Landbouwschap - Pedigree org.	Visits, articles	- Members of pedigree org.

^a An organization that works to protect the interests of farmers

TOOL

WINDOW

B4/a**Linkage matrix¹****Expected outputs**

- A linkage matrix, summarizing information on the existence, frequency and intensity of contacts between pairs of system actors.
- Visible clusters of actors – very intensely linked to each other (system segmentation).
- Insights into the degree to which system segmentation stands in the way of optimum performance of the system.

Relevant questions

- ? What contacts are there among actors?
- ? Who initiated these contacts?
- ? How relevant are they (frequency, intensity, value)?
- ? Is the linkage one-way or two-way?
- ? Are contacts formal or informal?
- ? What resources are available to maintain these contacts?
- ? What clusters can be identified?
- ? Do these clusters coincide with those seen while using other windows and tools? (Such as Actor objectives, Window/Tool A3; Network analysis, Window B3 and Tools B3/b and B3/c; and the Prime mover septagram, Tool A5/B6.)

Working procedure

The linkage matrix helps in making a systematic description of the linkages or interfaces that can be seen between pairs of actors. Differences between actors with respect to their linkages can be described with respect to intensity (tightness of the connection) or frequency of contacts or other factors. This focuses attention on the degree of integration within the system: how much do the actors have to do with each other? The main aims in using the linkage matrix are to identify clusters of actors, missing linkages (what additional linkages would change the way the system functions, and in what way?) and overlapping.

The matrixes are a way of summarizing and analysing information collected during interviews

1. The linkage matrix was developed as a tool by several knowledge system researchers, including Peter G.H. van Beek (1989), Charles Frempong (unpublished), and Paul G.H. Engel (1990). This tool resembles the 'connectedness' matrix used in social network analysis.

with actors. You will not be able to predict exactly which actors will be listed in the matrix beforehand. Instead, 'who has contact with whom' comes out in the interviews. If you learn of additional important but unexpected contacts, more interviews may be necessary.

Two examples illustrate this process. One shows the use of a linkage matrix in considering a quite varied group of actors; the other is specific to linkages among institutions. In the example from Kenya, the team simply filled in an X wherever those associated with an actor reported in interviews that they had contact with another actor (for example, financial institutions reported contact with coops, chemical companies, farmers and extension workers). If possible, you can 'score' these responses, as in the example from Columbia. Even a simple scoring system like this makes it possible to summarize more information in the matrix, so that it is more useful. The matrix in the second example also reports on two time periods, so they can be easily compared.

If a scoring system is to be used with this tool, the team must define the scores. Often a scale of 1 to 5 is used, with 1 indicating for example 'very frequent, formal and informal contacts sought' and 5, 'hardly any contacts sought – neither informal nor formal'. Or, if scores are to be based on the importance of linkages, scores could range from 1 (most important) to 5 (least important).

Rural development institutions in Nariño, Colombia

Institutional integration among core institutions within the agricultural knowledge system was studied in the periods 1975–1978 and 1978–1985 in the Nariño Highlands of Colombia. Matrix 2 shows two linkage matrixes – one for each period.

The matrix on the left relates to the situation before an integrated rural development project was undertaken in the Nariño Highlands (1975–1978), while that on the right covers the situation after the intervention (1978–1985). As can be seen in these matrixes, integration between the institutional actors increased during the project. During this period of higher institutional integration, other results (not shown) indicate that yields of wheat, guinea pigs (*curies*) and dairy cattle (key project activities) increased, while those of two other activities (maize and beans) stagnated. In the three successful activities, a number of specific linkage mechanisms (such as collaborative task groups, subject matter specialists and on-farm trials) were observed to be operating: these were absent with respect to maize and beans.

Here again, the matrix is a way of summing up the statements made by the actors in interviews. A simple scoring system was used: if actors reported strong formal and informal inter-institutional linkages, a '1' was entered in the matrix; if there were only informal linkages, a '2' was used. Looking across the matrix from left to right, the number refers to what the actor on the left said about contacts with other actors. Thus above the diagonal in the matrix for 1975–1978, we see that extension did not mention contacts with research; under the diagonal, however, research is seen to report limited contacts. In 1978–1985 limited contacts were reported by both. Overall, the matrixes suggest that with a change in mandate, activities and thus contacts also changed.

Source: Engel, P.G.H. *The impact of improved coordination on agricultural performance. The case of the Nariño Highlands in Columbia. The Hague, ISNAR, 1990*

Matrix 2

Integration of core institutions – Nariño

	1975 – 1978					1978 – 1985				
	Extension	Rural development programme	Bank	Foreign project	Research	Extension	Rural development programme	Bank	Foreign project	Research
Extension		1	1	2			1	1	1	2
Rural development programme	1		1			1		1	1	
Bank	1	1				1	1		1	
Foreign project					1	1	1	1		1
Research	2			1		2			1	

1 = Strong formal and informal inter-institutional linkages

2 = Limited informal inter-institutional linkages

TOOL

WINDOW

B4/b**Linkage mechanism checklist****Expected outputs**

- Descriptions of individual linkage mechanisms in terms of a list of attributes.
- Comparisons of linkage mechanisms with respect to these attributes.

Relevant questions*A linkage mechanism checklist*

- ? Origin of the mechanism: was it initiated by a particular actor or cluster of actors?
- ? Who are the participants in the mechanism?
- ? Describe their activities.
- ? When was the linkage used? What task did it carry out?
- ? Specific outputs?
- ? Impact of the mechanism on performance?
- ? Is it a facilitative or a control mechanism?
- ? Does it have an officially mandated purpose? What?
- ? Degree of formality?
- ? Type and quantity of resources exchanged among actors, if any?
- ? Type, quantity and source of resources required for the linkage mechanism to function?
- ? Who provides/controls these resources?
- ? What is the relative importance of the resources exchanged?
- ? What is the frequency, duration and permanence of the exchange?
- ? Administrative level at which the mechanism operates?
- ? Evidence and perceptions about the competence of participants in fulfilling their functions?
- ? What, if any, decision making powers are attached to the linkage mechanism under examination?

Working procedure

Linkage mechanisms are arrangements that help to link up the parts of the system. They may do this by contributing to communication (meetings among farmers, with extension workers or liaison offices would be examples of such mechanisms), coordination (e.g. mutual adjustment of activities, or water distribution) or resource transfers (perhaps credit, salary payments, or sharing labour). The team can begin with the information from Tool B4/a – what sorts of mechanisms support the linkages identified there? The checklist above should be filled in for each linkage mechanism. Comparisons can then be made among the mechanisms. In both cases, team discussion should be used to help clarify the mechanisms; they can then be summarized for future use.

TOOL

WINDOW

B5**Task analysis sheet****Expected outputs**

- A task diagram for the knowledge system under consideration.
- Insight into gaps and overlapping in the functions of actors in the system.
- Greater understanding of linkages between actors who perform different but complementary tasks.
- Insight related to the effect of system segmentation (clustering of actors) on the implementation of tasks and functions in the system (in combination with the Linkage matrix, Tool B4/a).
- Increased clarity on the quality of knowledge and information generation, transformation, and use by various parts of the system (in combination with Impact analysis – Window and Tool B1).

Relevant questions

- ❓ Which tasks/functions are performed by which actors?
- ❓ What activities do the actors carry out in the process of performing these tasks? How effective is this?
- ❓ What gaps are there between tasks? Is there some overlapping?
- ❓ Do the tasks/functions that are carried out match actors' expectations for the system?
- ❓ Do actors who are within the same system or subsystem see themselves as interdependent? As complementary?
- ❓ Is there a coordinated effort among the most relevant actors to integrate their tasks?
- ❓ Which subsystems, networks or clusters exhibit high performance in terms of matching and integrating tasks among actors?
- ❓ What factors within the system have a positive or negative influence on task performance?
- ❓ In the context where the system is found, what factors help or hinder optimum performance of tasks?

Working procedure

This tool helps a team to identify and visualize the tasks carried out within the system. The coordinating linkages can then be seen in the patterns of contacts. In the Coconut KIS example here, the tasks explored are the knowledge tasks of the continuum that connects policy–science–practice. During interviews, the team writes down the tasks that actors say they carry out. These are then summarized in a matrix: the procedure is to list tasks on the X-axis, and the actors who perform these tasks on the Y-axis. The tasks carried out by particular actors can then be plotted. (See the example; the coconut system case in Chapter 2 of *Networking for innovation* gives more background information.)

The resulting matrix produces information about gaps and overlapping among essential tasks various actors say they carry out. Here for example GTZ reported tasks related to finance, programme management and evaluation. (See Tool B4/a, for more information on reading a matrix.) The task matrix does not, however, give information about the performance of tasks or how well they are carried out. To obtain this sort of information, use the Impact analysis sheet (Tool B1): it provides an analysis of the performance of the system. The results of the analysis from the Source–intermediary–user sheet, Tool B3/c, add information about the functional linkages among tasks. Actor analysis (Tool B2) may provide additional information that makes it possible to deduce the tasks of specific actors.

A task analysis can be used in discussing which additional tasks will be needed to have the system function better. It can also be used to sum up this information. Further, a task analysis can also be used in interviews or in workshops, to check whether various actors can identify tasks that have been missed.

Coconut knowledge and information system in Tanzania^a

Tasks \ Actors	Policy	Research	Finance	Technology	Programme management	Practice implementation	Evaluation
IDA			x				
GTZ			x		x		x
MALD	x	x		x	x		
NCDP						x	
CES						x	
Farmers						x	

^a This example was produced by students at Wageningen Agricultural University, the Netherlands, during a course on RAAKS in 1993. Abbreviations:

- IDA International Development Agency
- GTZ German Technical Development Cooperation
- MALD Ministry of Agriculture and Livestock Development
- NCDP National Coconut Development Programme
- CES Coconut Extension Service

Sources: Lupanga, I.J., 'The Tanzania case study'. Paper prepared for the research-technology transfer linkages case studies workshop. February 28–March 3. The Hague, ISNAR, 1989a; Lupanga, I.J., 'The national coconut development. Subsystem Draft Report'. Paper presented at workshop on research technology transfer linkages, the Hague, the Netherlands, 25–30 September, 1989. The Hague, ISNAR, 1989b

TOOL

WINDOW

B6**Basic configurations****Expected outputs**

- A multiple-system model, reflecting the coordinating mechanisms that are dominant in the system and the influence of different types of prime movers (see the Prime mover septagram, Tool A5/B6); together, these suggest the basic configurations that are present.
- Possibilities for intervention by the actors involved in the way coordination is achieved within the system. These one or more potential interventions are intended to improve performance with respect to their most important objectives.

Relevant questions

- ? What patterns of relationships can be seen among the actors, and especially the prime movers, in the system?
- ? Which actors are dominant?
- ? What sorts of coordination occur now? What gaps and overlapping can be seen with respect to coordination?

Working procedure

The team uses cards or drawings such as those made during Approximation exercise I (Tool A5/B8), plus the septagram sheets (Tool A5/B6) and/or the ‘tree’ shown in Case 2 (Chapter 2 of *Networking for innovation*) to create a picture of the system being studied. This identifies the prime movers and dominant relationships. For each system, subsystem or network, the team may also choose to make a separate analysis.

There may be several types of prime movers – for example:

- donors
- policymakers
- marketing or processing industries
- international research
- users (for example, farmers).

When prime movers have been identified, it becomes possible to show their interrelationships graphically. Such a picture helps to identify the relatively stable patterns of institutional relationships among actors and the balance of power among them. These patterns are related to the ways the system is coordinated – how the actors coordinate among themselves to reach their objectives. Some of the coordination mechanisms found in organizations are outlined below.

Coordination mechanisms found in organizations

Direct supervision

A boss or supervisor takes responsibility for coordinating the work of others.

Standardization of skills

The need for coordination is reduced by specifying the skills needed to perform the work, either by training or by hiring workers who have these skills. (Example: nurses in a hospital.)

Standardization of work processes

The need for coordination is decreased by specifying ahead of time the activities that are to be performed. Requires little or no communication, but is useful only for routine tasks.

Standardization of outputs

The need for coordination is decreased by specifying the results that must be achieved (setting standards), leaving the method up to the worker.

Mutual adjustment

Coordination through simple informal observation or communication; appropriate to small groups of people working side by side. However, when the situation is complex and the tasks at hand cannot be standardized, mutual adjustment again becomes the preferred method of coordination. Perhaps you have experienced this in your team!

Standardization of norms and/or behaviour

Coordination is achieved as a result of a shared organizational ideology.

Source: Adapted from Mintzberg, H., *Structure in fives*. Englewood Cliffs, New Jersey, USA, Prentice-Hall, Inc., 1983

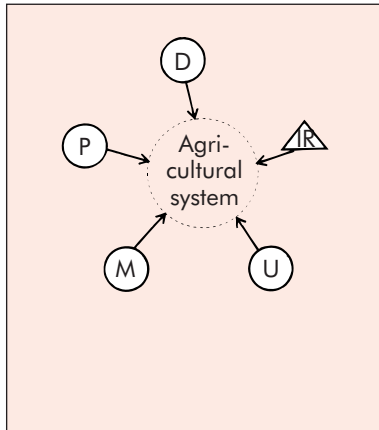
Basic configurations

The basic configurations shown below will help as you look for a model to describe the situation you are studying. These configurations are patterns of institutional relationships. They are 'pure' forms, each with one dominant actor and one dominant coordination mechanism, as stated in the table and illustrated in the figures. In reality, you will almost always find a mixture of several basic configurations and several types of coordination mechanisms, with much less distinct boundaries. Furthermore, different subsystems may be coordinated in different ways. This often gives rise to a multiple system, as shown. There is no need to attempt to find one configuration that fits the system exactly; instead, the question is which configuration or configurations are dominant, and help the most in explaining the behaviour of the system. (Configurations are discussed and basic configurations are described further in Chapter 4 of *The social organization of innovation*.)

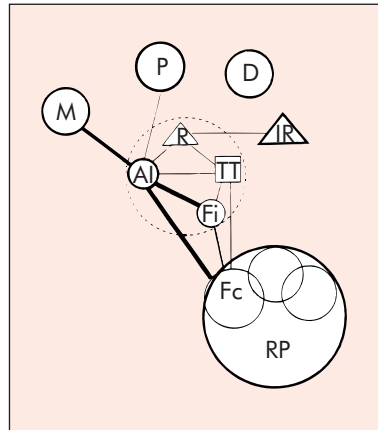
Basic configurations and dominant coordination mechanisms

Industry-driven knowledge system	Standardization of outputs/work processes
Central policy-driven knowledge system	Direct supervision/standardization of norms/behaviour
User-driven knowledge system	Ideological adjustment/standardization of norms
Technology-driven knowledge system	Standardization of work processes/skills
Donor-driven knowledge system	Standardization of outputs/mutual adjustment

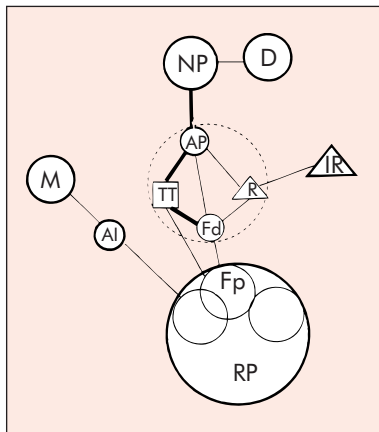
Basic configurations in agricultural technology systems



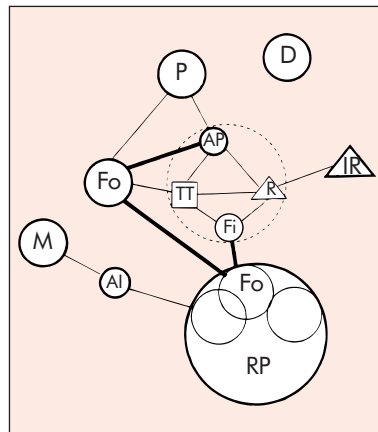
System driven by external forces



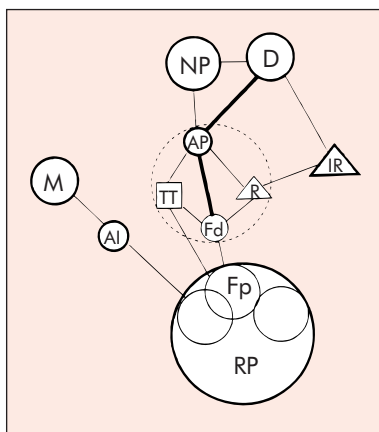
Industry-driven system



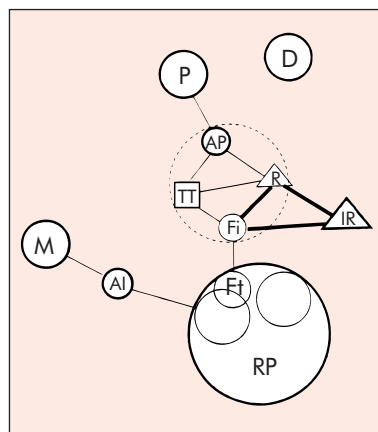
National policy-driven system



User-driven system



Donor-driven system



Research and development-driven system

- D = donor
- P = policymakers
- M = markets/industry
- U = users
- IR = international research
- AP = agricultural policy/policymakers
- R = research
- TT = technology transfer
- AI = agro-industry
- Fi = innovative farmers
- Fc = commercial farmers
- Fd = demonstration farmers
- Fo = organized farmers
- Ft = technological farmers
- RP = rural population
- NP = national policy
- dominant relationship
- important relationship

Source: Engel, P.G.H. and S. Seegers, 'Basic configurations in agricultural technology systems.' Summary. In: Proceedings of the international workshop on agricultural knowledge systems and the role of extension. Bad Boll, Germany: 21-24th May 1991, pp. 353-358.

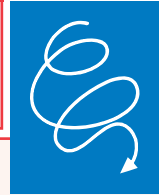
There is also no ideal type of configuration for a given situation. The configurations you see in practice have historical roots in the countries and organizations where they have developed. When a system does not work well under the present circumstances, this should be taken as a challenge to modify, rather than replace, the existing coordination mechanisms. The aim is to find a solution that achieves coordination in a manner more appropriate to the objective(s) of the system. For example, the design or re-design of a project intervention could encourage the use of direct supervision as a coordinating mechanism (as in early T&V project designs). On the other hand, as seen from the list in the table, there are other options. Coordination could also be achieved by putting more emphasis on the standardization of outputs (e.g. by introducing packaging technologies) or through particular work processes (such as FSR/E – farming systems research/extension), or by encouraging mutual adjustment between professionals and farmers (using techniques such as functional groups or other people-centred approaches).

Figures such as those shown can be used to picture and discuss many factors. For example, in the industry-driven model, key relationships are commercial farmers–consumer markets and commercial farmers–agro-industries. Key actors are these farmers, marketing agencies and agro-industries. The farmers are also the primary client group; standardization of work processes/outputs serves as the coordination mechanism. In this case, the extension approach favoured is specific to relevant commodities.

The team can begin its discussions by attempting to apply one of the basic configuration models to the system being studied, then evaluating the pros and cons of this kind of simplification – does it help to explain how the system functions? Often you will find that different subsystems are coordinated in different ways. Such discussions allow the team to work towards a multiple image of the knowledge system. This is more apt to resemble the much ‘fuzzier’ picture in Figure 4 of *Networking for innovation* than the neat models here! The result is a picture that reflects the team’s perception of how coordination actually takes place within the system. In addition, the team tries to formulate ways to improve coordination: how can a closer fit between the current situation and the coordination needed to improve system performance with respect to its different actor objectives be achieved? It is useful to state action possibilities in terms of strengthening one or more coordinating mechanisms in relation to others.

TOOL

WINDOW

B7**Communication analysis exercise****Expected outputs**

- Identification of social and cultural differences among actors, as well as differences in their knowledge and perceptions.
- Identification of constraints and opportunities related to communication among the actors.

Relevant questions

- ? Do the actors have similar or different opinions on the nature of the problem, and on the objective to be achieved by the knowledge system?
- ? Do the world views, ways of reasoning, social circumstances, languages and/or ideologies of the actors differ?
- ? How do these differences influence communication among actors and/or between actors and prime movers?

Working procedure

The team tries to assess whether there are fundamental differences of opinion among actors or groups of actors regarding the nature of the problem situation and the objective to be achieved by the knowledge system, or if there are differences in their world views (or in other ways listed above). In this case, the analysis focuses particularly on differences among the actors in their assumptions about the nature of development and the problems of the knowledge system. Can those with very different backgrounds or social positions understand each other sufficiently to communicate? If there are problems, are they technical or social? Even if no fundamental differences are identified, discrepancies in perception and reasoning between system actors are worth exploring. What themes do they consider important – for example, is ecological sustainability seen as more essential than safeguarding income, or the reverse? How do they view the need to maintain a position in the international market? Such considerations should include the specific meaning assigned to key words by particular subgroups, even when both parties speak the same language. Finally, the third question regarding the impact of these factors on communication within the system can be addressed.

Actor differences

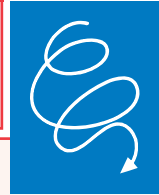
Doing collaborative research with farmers requires that researchers and farmers learn to understand each other! Not only language but also ways of reasoning are important. Nitsch, for example, contrasts the adaptive rationality of farmers with the formal rationality often recommended to them by scientists. In an adaptive rationality, decisions 'grow out of a synthesis of information and the owner-manager's own experiences and aspirations'.^a This can be contrasted with the formal decision making or problem-solving process that is often the basis for the decision support systems developed by scientists.

Less obvious, but potentially no less damaging, are the differences in 'culture' between 'blue collar' field staff and 'white collar' management, between women and men, researchers and extension workers, or government and non-government workers.

^a Nitsch, U., 'Computers and the nature of farm management'. In: D. Kuiper en N.G. Röling (eds.), *The edited proceedings of the European seminar on knowledge management and information technology*. Wageningen, Wageningen Agricultural University, 1991.

TOOL

WINDOW

B8/a**Window reporting sheet****Expected outputs**

- An overview of the contribution of the windows used, and their results, to understanding the performance of the system.
- Identification of constraints and opportunities met in applying the windows.

Relevant questions

- ? **Relevance:** why was this window chosen? What is its relevance or expected relevance to deepening our understanding of the problem situation?
- ? **Main issues:** what main issues were addressed? Or: how was the window designed or redesigned for use in this particular situation?
- ? **Information gathered:** most important findings or information obtained.
- ? **Preliminary conclusions:** what conclusions has the team or subteam suggested, based on its analysis from the point of view of this window? This might for example include:
 - conclusions on the network in general;
 - conclusions on the problem situation, constraints and opportunities for action.
- ? **Evaluation:** did the analysis yield interesting ideas or insights? Were these in accord with the results expected beforehand? Did it yield any unexpected insights? What sorts of insights did it help to generate that differ from ideas generated by using other windows?

Working procedure

The team evaluates each window used during Phases A and B of the RAAKS study. This can be done by discussing the questions and/or writing a brief report (maximum two pages). If a report is written, it can become a part of the team's final report.

TOOL

WINDOW

B8/b**Understanding the social organization of innovation: Constraints and opportunities****Expected outputs**

- Synthesis of results from windows addressed in Phases A and B.
- Identification of the constraints and opportunities of the knowledge system.
- Preliminary identification of possible solutions.

Relevant questions

Findings based on analysis (e.g. from Tool B8/a, the Window reporting sheet) of each window used

- ?** What convergences, resource coalitions and communication networks can be identified? Include often-forgotten groups e.g. women's networks. (See also 'Understanding the social organization of innovation' in Chapter 1 of *Networking for innovation*.)
- ?** What are some possible constraints to the optimal functioning of the knowledge system, as seen from the standpoint of different windows? Why are these important? Give arguments!

Preliminary conclusions regarding the system as a whole

- ?** What are the objectives of the most important actors in the knowledge system? Is there some agreement on a shared objective? Are there marked differences in the objectives of women and men, or between other often-forgotten groups and other stakeholders?
- ?** What are the three most important problems the actors will have to deal with before it will be possible to speak of an optimally functioning knowledge system? Why?
- ?** Looking back at the figures in Tool B6, do you see a 'pure' basic configuration in operation?
- ?** What possibilities do you see for improving the functioning of the knowledge system? Why would this help?
- ?** What can be done to achieve such improvements? By whom?

Implications for the RAAKS study: as you look forward to Phase C, where you will work on making recommendations and achieving commitment to a plan for the future, do the results so far suggest a need for revisions in procedures, or a need for further work before moving on?

- ?** Is the team getting the information it needs, including information about 'forgotten' stakeholders?
- ?** Should any additional actors be included in the interviews, workshops and so forth?
- ?** Is there a need to work through additional Phase B windows or tools?
- ?** Is any other preparation needed before moving on to Phase C? Why?

Working procedure

The team analyses the material collected from the literature and the interviews carried out using the windows chosen for the first phase, with the questions as a starting point. Results are discussed and written down in a brief report. Note: if you feel that vital information is missing, consider using additional windows/tools; also see the section on workshops in Chapter 3 of *Networking for innovation*.

Complementarity among tools

In analysing your material and answering the questions above, look for ways to compare, combine and contrast the information you have gathered by using various windows and tools. This can help the team to see how the system is connected, and whether any new structural forms, such as convergences, coalitions, linkages and so forth, are emerging – or missing! For example, the results from the linkage matrix can be used in combination with results from the Task matrix/task analysis sheet, Tool B5 and the knowledge network analysis achieved by using the Source–intermediary–user sheet, Tool B3/c. Also, combining the linkage matrix with the results of task analysis allows an evaluation of the linkages among the essential tasks in the system. Using the linkage matrix in combination with a knowledge network analysis, clusters of contacts can be compared with the networks of actors supporting the generation, transformation and use of certain types of knowledge. This allows the team to ask whether the knowledge networks do in fact show integrated clusters – or whether there are significant barriers within the networks identified earlier as being important to the performance of the system with respect to a specific type of knowledge.

TOOL	WINDOW
Knowledge management analysis exercise	C1
	
<p>Expected outputs</p> <ul style="list-style-type: none"> ● Explicit identification of opportunities ‘knowledge managers’ can use to improve system performance. 	

Relevant questions

- ? Which persons (whether they are actors themselves, or a part of an institutional actor in the system) carry out knowledge management tasks (e.g. those of policymakers, project designers, managers or liaison officers)?
- ? Which knowledge management tasks do they fulfil? (See checklist below.)
- ? What is/are the explicit or implicit aim(s) of these knowledge management tasks?
- ? Do these knowledge management tasks influence the interactions within the system in a way that maximizes the performance of the system and/or changes its direction?
- ? What opportunities do the ‘knowledge managers’ have to improve the generation, exchange and utilization of knowledge and information in the system?

Working procedure

The process of analysis includes at least two steps: first, with an eye on the objective of diagnosis and further insights gained during the diagnosis, the team tentatively selects the individuals/units who hold key positions in the system with respect to knowledge management. Second, the team works further on defining potentially positive interventions by these actors, keeping the constraints and opportunities formulated previously in mind.

One aspect that is particularly relevant here is the possibility that different actors will define the objective of the system differently. From the point of view of knowledge management, this may or may not be a problem. The team will need to consider this point, and, if necessary, outline a path that will encourage negotiations among actors, aimed at increasing the convergences between them.

Complementarity with other tools

The basic configurations in Tool B6 can be helpful in discussing the feasibility of different possible actions. The dominance of a particular basic configuration within the system implies that particular coordination mechanisms are also dominant. Proposing changes in knowledge management may imply fundamental shifts in the balance of power and influence in the system. If, for instance, interventions are intended to shift an ‘industrial’ agricultural knowledge and information system towards target groups that are relatively ‘resource poor’, such as farmers, a shift from a market-driven system towards one that is more policy-driven will be required. Such a shift can only be realized if and when policymakers are committed to the change and have the resources available to actually make it happen.

A knowledge management checklist

When the team wants to go into the details of existing or potential knowledge management in the system, the following checklist can be used. It can suggest questions to ask to bring out the positive and negative aspects of the way knowledge is handled by the system. It can also be used in thinking of recommendations toward the end of a RAAKS study, to suggest possibilities for new elements that are needed. The questions – or recommendations for developing these elements – can be applied to either subsystems or to the system as a whole.

- Does the system or subsystem have a shared culture, policy and purpose?
- Is there a shared language, to facilitate exchanging experiences and information?
- Does the system or subsystem have ways to minimize blocks to formal and informal communication, such as large social differences?
- Are linkages at strategic interfaces between organizations encouraged?
- Is the use of informal networks encouraged (by any means from social events to availability of electronic media)?
- Are the existing information systems within the AKIS linked (e.g. by computer systems or other data sharing)?
- Is strategic cooperation – that related to achieving the aims of the system – encouraged among actors?
- Are mechanisms to enhance user control operating (e.g. political, market or technical means that help to coordinate user needs with information delivery)?
- Are there mechanisms to strengthen the responsiveness of the system to the objectives of the society, changes in the environment of the system, and market opportunities?
- Does the system avoid becoming isolated from external sources of knowledge and information, including that from non-traditional target groups?
- Does the system make strategic investments in physical infrastructure and human resources? Is there flexibility in funding?
- Have key parts of the system been identified? Does resource allocation among them match their requirements?
- Has a KIS management information system been developed?

TOOL

WINDOW

C2**Actor potential checklist****Expected outputs**

- An assessment of the potential of internal and external actors for a positive effect on the performance of all or part of the system.
- Identification of the resources various actors have that could help to achieve positive changes.

Relevant questions

- ? Do the proposed interventions fall within the scope of the current activities of the actors?
- ? Does a relative consensus exist concerning the need to intervene and the need to carry out the interventions proposed by the team and the participating actors?
- ? Do the relevant key actors see the interventions as being in their interest?
- ? Whose perceived interests might be negatively affected by the intervention(s)?
- ? Which of the key actors share a need for the perceived interventions? If they work alone, could they make changes?
- ? Do the relevant key actors have the resources needed to implement the proposed interventions (financial, human, knowledge base, leadership, organizational capacities)?
- ? Which of the key actors has actually expressed willingness to implement some or all of the proposed interventions?

Working procedure

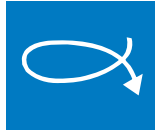
This tool can be used within the team and/or in a workshop with other actors, for example, in discussing the potential for change and who can do what to accomplish it.

It is important to realize that such meetings do not imply pushing all actors into one mould or 'unified system'. Successful knowledge and information systems are often diverse and segmented – there may not be much contact among different clusters of actors. In fact, successful systems generally need both this diversity and a certain degree of redundancy to perform well.

When subsystems have fundamentally different objectives, conditions, or requirements, 'knowledge management' should be approached separately within each subsystem. For example, the team will need to look at the objectives set, and decide whether commercial farmers and peasant farmers will be best served by designing a single knowledge system, or by subsystems with fundamentally different objectives, prime movers and coordinating mechanisms.

TOOL

WINDOW

C3/a**Defining possible actions:
Moving towards improvement****Expected outputs**

- Synthesis of results from windows addressed in Phases A, B and C.
- Identification of the constraints and opportunities within the knowledge system.
- Background material to use in preparing a draft report.

Relevant questions*Findings related to problem definition or redefinition in the earlier phases*

- ? What are the most important problems to solve, to achieve optimum functioning of the knowledge system? Why do you see these as the most important? Give arguments!
- ? Compare these conclusions with those reached using Tools A5, Approximation exercise II and B8/b, Understanding the social organization of innovation.

Findings related to the analysis of constraints and opportunities in the second phase

- ? What windows did you use and which gave you the most insight?
- ? What opportunities or potential do you see for improving the functioning of the knowledge system? In what way?
- ? What constraints need to be taken into account in preparing interventions? Why?
- ? Are any of the constraints/opportunities related to the way the system takes (or does not take) account of information related to groups such as women, who are sometimes ignored?
- ? What windows would you choose if you were to start over again? Why?

Possibilities for improving the innovation process (third phase)

- ? Who could do something that would help to realize the possibilities mentioned in the second 'Expected output' above?
- ? What could he/she/they do?
- ? Who should take the lead or the initiative?
- ? What potential obstacles or problems do you foresee?
- ? Can you see any side effects (positive or negative) the proposed intervention might have on the system as a whole? On related systems? On specific groups (women, older people, farmers etc.) within the system?

Working procedure

The team analyses the material from literature and interviews collected in the first, second and third phases, using the questions above as a starting point. They discuss the results and prepare a report. See the working procedure and the section on 'Complementarity among tools' in Tool B8/b for more information.

TOOL

WINDOW

C3/b

Strategic commitments: Action planning**Expected outputs**

- A forum where key actors can discuss and negotiate alternatives, reaching agreements concerning the actions to be taken.
- An assessment of the resources needed to carry out the proposed actions.
- An action plan/strategy for achieving a solution to the problem.
- Strategic commitments among the actors who are essential to realizing the objectives of the action plan.

Relevant questions

What? Defining the preconditions for formulation and implementation of an action plan

- ❓ What are the specific activities that will be needed to formulate a plan?
- ❓ What actions are needed?
- ❓ What are the objectives that an action plan must achieve?
- ❓ What broad general strategies will be followed?
- ❓ What are the main areas to be included in the action plan?

Who and how?

- ❓ What actors will need to be involved in the action plan?
- ❓ Who will write a draft work plan?
- ❓ Who will write each of the separate parts of the action plan?
- ❓ Who will carry out each of the activities needed for implementation?

When?

- ❓ What are the deadlines for completion of the final action plan?
- ❓ When will the action outlined in the plan take place (deadlines for implementation)?
- ❓ At what points will there be monitoring and evaluation of the implementation?

Working procedure

To the extent that the team and the key actors involved have been able create a forum for discussion and negotiation, you have already achieved a great deal. Window C3 and its tools move further along this path. At this time, it is necessary to reach more formal agreements, and to get a plan – including agreements about implementation – down on paper.

It may be useful to begin with a brief review of previous work, including for example the agreed-upon objectives of the system, and the work done related to needed coordinating mechanisms. Strategies for action plan interventions that stimulate actors to work more closely together should certainly be considered. Teams can also move beyond this, seeking strategies to broaden the system – to involve new actors who are essential to the desired impact. In either case, it may be necessary to improve the mechanisms that encourage consultation within the system. Policy measures, such as regulations and subsidies, project activities that facilitate desired changes, or improvements to information infrastructure are additional possibilities, as are collaborative activities such as training or lobbying to influence external actors or factors.

The questions above outline an approach to planning action and achieving strategic commitments. However, in reality the ‘what’, ‘who’ and ‘when’ questions cannot be quite so easily separated. Moreover, the constraints and opportunities identified during the entire RAAKS study serve as a basis for later strategic commitments among key actors. Designing an action plan together builds and solidifies commitment. To assure smooth implementation, the team can think throughout the study, and during action planning in particular, about the activities that are apt to be needed, and whether additional actors will be needed to carry out these actions. These actors or their representatives need to be included in the process. Further, anyone who is involved needs clear permission from their parent organization to devote time, attention or other resources to the planning process (and later to the activities specified in the action plan).

The results of a RAAKS study depend heavily on the willingness of autonomous actors to arrive at practical promises. The results of the process should either be practical enough for quick implementation, or transparent enough that they can become an input into a continuation of the process, in the form of negotiations among key actors. During action planning, the number of meetings and their content depend on the degree of agreement within the group. One or more preliminary meetings may be necessary to discuss the outlines of a plan and to identify other important actors who should be involved in planning and implementation. On the other hand, if actors are already committed, it may be possible to discuss the topics and activities to be included in an action plan briefly. Next, group members can be assigned to write up each topic for the plan, and activity groups can be assigned to discuss each of the needed activities and write up that element of the draft work plan. In either case, the table below provides a framework for the discussions; the example outlines the outcome of one such process. Another example is that of action planning among actors in the Basic Grains programme in Central America, discussed in detail in *The social organization of innovation*, Chapter 8 (see ‘Strengthening agricultural institutions...’).

Action planning sheet

What? (action needed)	Who? (who will participate)	When? (timing for this action)

An action plan for the perennial plant sector in the Netherlands

A RAAKS exercise was carried out covering the perennial plant sector in the Netherlands. Two subsystems were identified: one non-governmental and one governmental. These were in effect separated by a barrier that hampered the capacity of actors (including government, research, extension and growers) in both subsystems to adjust to emerging environmental problems and changes in the market. External pressures were making it necessary to produce in a more sustainable way, so that the two subsystems needed to link up. The team suggested that linkage mechanisms should be installed and/or strengthened between research and growers, growers' organizations and policymakers, and growers and extension workers. They also proposed the formation of a regional environmental forum. A meeting was organized with key actors, in which the findings and recommendations were presented and discussed. The team's proposal for an environmental forum was very much in line with ideas already developing among some actors. Also, the Community Board for Horticultural Products had planned to implement a system for monitoring plant production on environmental aspects, which could feed information into the system. The Agricultural Extension Service, suffering from its image as the bringer of 'bad news from the government', took the results of the meeting to heart. As a result, they designed a special unit of extension workers to provide strategic advice to growers to help them cope with the rapid changing environmental regulations. The approach used in this solution might be called a system management strategy, in which various key actors planned to act in ways that would facilitate linkages.

Source: RAAKS seminar 1993