Inducing change
towards sustainable agriculture

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1. ROUTES FOR CHANGE

Before turning to the main findings from the papers, let us repeat some starting points from the introduction.

To tackle the problems of modern agriculture, two broad visions have emerged. In the first, based on the Knowledge-Based Bio-Economy (KBBE) paradigm, Life Sciences for techno-scientific development should provide the means to use renewable resources more efficiently. In the second vision, based on the Agricultural Knowledge Systems (AKS) paradigm, the way forward is to develop co-research relationships among all relevant knowledge-producers, including farmers.

The first paradigm is by far the dominant one. Although this is likely to lead to sustainability gains, it potentially turns agriculture (further) into a factory-like undertaking using capital-intensive inputs, while effectively marginalising farmers’ knowledge and innovations. This may lead to a variety of new problems in connection with new ownership relations, new health hazards because of new micro-organisms or new routes for the spread of such organisms, changing North-South relationships, etc.

For these reasons, and also not ‘to bet on one horse only’, wise policy would be to put more emphasis on the AKS paradigm. This means that there should be more support for research programmes, projects and sector initiatives based on such approaches.

The differences between the KBBE and KBS paradigms reflect a distinction between two different patterns of innovation. The first relies heavily on technical

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change whereas in the second, organisational and institutional changes have also a large part to play. In innovation research these two different patterns are known as system optimisation and system innovation. A significant difference between these two paradigms is that system optimisation produces results more quickly while system innovation has a much larger problem-solving potential but takes longer to yield results. It is also more difficult to govern and there is still a considerable lack of knowledge on how to do this.

To tackle the challenges of modern agriculture most emphasis is on system optimisation whereas the nature of these challenges would require a system innovation. To achieve near-term results it may indeed be wise to take the optimisation route but to work towards an integrally sustainable agriculture in the longer term, with efforts aimed at system innovation also being made here and now. This is where the largest challenge lies and, to support this, the workshop focused on system innovation.

Historical studies on system innovation show that radically new developments initially meet resistance from an existing system. The so-called multi-level perspective (MLP) has proven to be a useful tool to analyse such dynamics. In the MLP, the meso-level of ‘socio-technical regime’ refers to the system of interest (e.g. the animal production regime). The macro-level of ‘socio-technical landscape’ relates to broader factors that may exert pressure on a variety of regimes for change, e.g. the pressure to curb CO₂ emissions. At the micro-level we find ‘technological niches’, a breeding ground for alternatives to an existing system. Initially these niches do not fit the system (e.g. because the alternative is too expensive, creates new problems, etc.) but through development in the niche the actors involved learn about how it can be made to work. Eventually, such niche developments may link up to the regime (i.e. the existing system) and gradually start to transform it.

2. INTELLIGENCE FOR CHANGE

On the basis of this model there are two crucial processes: (1) learning on radical innovation in niches and (2) the linking of niches to the regime and the resulting transformation process. The chapters of the present proceedings are discussed below in two sections corresponding to these two processes.

Learning in niche development

Focusing on niche development, the following three processes can be distinguished:

- **Network building**: the establishment of social networks with the necessary stakeholders.
• **Learning processes**: the actors involved learn about how they can make the novelty work, not only in technical terms but also by fostering relations with a variety of key stakeholders in order to develop and promote their activities, e.g. to develop markets for their products.

• **Alignment**: the development and alignment of strategies and expectations between involved actors. A variety of different stakeholders have to tune their efforts in order to make a new development work in practice.

Network building requires that actors from various backgrounds become engaged in the process, e.g. farmers, other stakeholders, researchers. These actors can have very different views on the direction in which to move. A project leader or facilitator will then have a very difficult task. One of the papers suggests that the facilitator can choose one of two different attitudes to carry out this task: (1) a responsive, serviceable attitude, through which the facilitator seeks to connect with participants and be responsive to their needs and wishes (the ‘learning approach’), and (2) an attitude of leadership, through which the facilitator decides more or less unilaterally on how to move forward (the ‘leading approach’). The approach taken usually depends upon the facilitator’s character.

Each of these approaches has its pros and cons, and the most successful attitude usually contains elements of both, applied according to the situation at hand. The general lesson is that stakeholder management is a critical success factor but this is insufficiently acknowledged in current policies and strategies. The lesson for governance is that policy makers should promote procedures such as stakeholder management, along with ‘traditional’ instruments like taxes, incentives, etc. The key issue to be addressed in further work (i.e. in research as well as projects) is how to find the right balance in using these different instruments in various specific circumstances.

System innovation projects in niches typically start with great ambitions, i.e. to explore radically different alternatives to the existing system. Experience shows that because of resistance and scepticism encountered from the prevailing regime, project developments tend to move closer towards the incumbent system and lose some (or much) of the original innovative ambitions. A monitoring and evaluation scheme can then be instrumental in supporting project managers and innovation networks to keep the ambition high by stimulating reflection on project goals, activities and results in light of developments in the project and in the existing system. The lesson for governance and funders is that they should require project managers to set up a monitoring and evaluation scheme to help them keep their innovative ambition.

Governance of innovation for sustainability typically focuses on organised projects as the way to learn about possible alternatives to an existing system. This ‘top-down’ process is indeed important but it neglects another, bottom-up process through which a broad variety of stakeholders in practice also try to develop new solutions to the challenges that they encounter. Such activities usually are not encouraged or taken up by the incumbent regime, the
stakeholders, or policy makers. As a result, a lot of ‘local learning’ is lost. What is missing is a general attitude of wanting to learn from what has been learned elsewhere. There are many such networks around a variety of solutions, but little clarity on which ones will eventually prevail. A robust policy should then promote diversity instead of promoting individual niches. Furthermore, the assessment of what has been learned should combine results from organised projects (top-down) and results from learning by practitioners (bottom-up).

**Linking niches and regime: towards necessary changes**

Learning in niches is crucial to an exploration of how a variety of agricultural practices can be made more sustainable in various dimensions. Eventually, however, learning is only one step in changing these practices on a larger scale. In terms of the MLP this means that niche developments have to be linked to regime developments. This, of course, results in transformation processes that clearly challenge “business as usual”.

Several of the papers discussed showed that to increase the chances of successful linking it is important to engage a variety of stakeholders, including farmers, consumers and NGOs. At first this may seem to complicate things and often it does. A critical step in this direction is to build trust among stakeholders. The importance of this may seem trivial but in practice it is often overlooked in projects and change processes. If trust is lacking, actors may talk at length about issues of content but they will never find the common ground that allows them to move forward. Building trust is critical in the initial stages of a change process and should receive all the attention it warrants.

Transforming a socio-technical regime is a long-term process. This process is much more complicated than the diffusion process described by classical, linear innovation models. In a transition, initially small parts of a regime start to change. With further growth, new actors become involved, which leads to further changes and adaptations. These often require an additional step in a learning process. The result is a process of gradual transformation and it may take a long time before the novelty is able to survive without external support. This implies that governing transitions should also last a long time, providing various types of support, depending upon the issues at stake. This is not always recognised in current policies. The general view is still that government support should be given only in the initial stages until a novelty is ‘proven’, often only in a technical sense, and that thereafter it should be able to stand on its own feet. This, however, is not the way system innovation processes work. Longer-term policy support is required, although the type of support may change over time. As there is little experience in how to actually do this, it requires further investigation, often in a process of ‘learning by doing’.

Standards can play an important role in defining markets for sustainable innovations. But they are usually enacted on the basis of ‘proven’ novelties rather than on what may be needed from a sustainability perspective. There is...
consequently a risk that standards become a barrier to further innovation, which makes it important for them to be flexible and ‘progressive’, so that there is a premium on further innovation beyond the level of the standard. This is possible because, contrary to widely held views, standards do not standardise practices but organise them. The trick then becomes to implement standards that reward further innovation.

Developments towards sustainable agriculture should be guided by some sort of vision of a direction in which to move. But different stakeholders tend to have very different opinions on what constitutes desirable directions for development. This raises the question of whether it is possible to build some sort of shared vision between stakeholders, one that would allow a form of tuning of efforts. While shared understanding is required to envision a common future, the development and empowerment of processes of change is a pragmatic and dialogic problem for those who seek to stimulate system innovation. It calls for methodological thinking in action, at the heart of transition processes. Such reflection should be a basic requirement for both researchers and facilitators. Many of the discussions at our workshop highlighted this necessity to elaborate scientific views and methodological requirement concerning the sense and practicality of action for researchers. The notion of co-design was thus considered as a property of the design of socio-technical devices for transitions to sustainable development.

3. CO-DESIGN IN TRANSITIONS

The RIO methodology provides one way of form of co-design. Applied to the domain of animal production, this method led to radically new designs for husbandry systems. One of its key features is that new designs are an intermediate step between broad future visions and concrete novelties. They make the visions tangible, so to speak. The method also supports one of the conclusions drawn above, that it is important to engage a variety of stakeholders in transition processes, which is also corroborated by another paper on design processes. Since these approaches involve multi-stakeholder dialogue, the result is that whatever radically new design the process renders, it has broad support, which enhances the chances of implementing it successfully in practice.

At the workshop, two co-design approaches were presented and discussed. Although they have been applied for rather different purposes, they share a fundamental starting point in seeing design as a dialogical process. A recommendation for policy is that it is important that both approaches be applied in a variety of situations to gain more experience on their strengths and weaknesses in different situations.

To overcome the problems of modern agriculture, the development of new knowledge is required. It is commonly believed that researchers develop this new knowledge, which is subsequently implemented in practice. Various papers have
shown, however, that a transition also has to be based on local, tacit knowledge and to engage innovative farmers who are working on new solutions.

But although important, such local knowledge can provide only part of the answer. This is evident when looking at the various dimensions of sustainability. Local stakeholders will bring in the local issues but some sustainability issues go (far) beyond local borders. How to bring this into the process is an open question. There are, as yet, no proven methodologies on how to find the right balance between ‘the local’ and ‘the global’.

The purpose of stimulating niche developments is that, eventually, they influence regime developments and start a transformation towards sustainable agriculture. There is a risk, however, if this happens too soon, i.e. if the innovations become widely used before they have been adequately explored and tested. This was illustrated in a paper on the use of meat and bone meal as animal feed. While it seemed attractive as a way of recycling waste, it later came to be seen as highly problematical in connection with BSE. The problem, of course, is that such errors easily appear with hindsight but are difficult to anticipate as part of the ‘full picture’ of an innovation and its potential consequences. No fool-proof methods exist to carry out such assessments, but this case points to at least one possible improvement. The fact of relying on too narrow a circle of actors is likely to result in a myopic view that is blind to a possibly broader spectrum of issues. It is therefore important to engage a wider range of actors who look at sustainability from a variety of different angles.

4. FINAL CUT

In the general discussion covering a range of papers, several participants felt that the agricultural sectors were more open for innovation than, say, a decade ago. This probably is largely due to, in the MLP terminology, the landscape pressure for sustainability that has increased significantly and is likely to continue to do so in the foreseeable future. But at the same time, changes towards sustainability are still modest. Openness to innovation largely comes from a rather small group of pioneers that are willing to explore new ways while the vast majority still resists change. This reflects that system innovation is a long-term process and the growth of the number of pioneers is an important step in the initial phases of this process. The pioneers represent an important channel through which niches link up to a regime. This may mark the beginning of a process, which may eventually result in the transformation of a regime.

Policy makers, however, press for urgency and stress that change is required in the near term. This puts pressure on niche actors to create early links with regime actors – with a risk of losing the radicalness of the innovation. Policy makers should be aware that this may jeopardise the longer-term potential of such innovations to lead to more fundamental changes with larger sustainability benefits. It is important to create clarity in such situations, on the objectives of a project. It should be clear whether it is intended to lead to near-term
improvements on a specific issue or to contribute to a longer-term process of fundamental change leading to an integrally sustainable agriculture.

Regime change (or system innovation) cannot be predicted and pinpointed exactly. This implies that it is not possible either to develop fail-proof policies to stimulate regime change. The best one can do is to influence a variety of factors that might be advantageous for a regime change. Historical analysis may give some clues on how to achieve this, but only indirectly so because past transitions were rarely the result of deliberately governed transition processes. Therefore, we cannot draw on work that shows how it must be done. If one wants to govern or work on processes towards system innovation, one has to do it from the perspective of the here and now, and try to look for ways towards this promising future. We have to acknowledge that we are in a messy situation of trying to find out what could be effective ways to contribute to a transition towards sustainability.

What complicates the situation is that there are various concepts of sustainability. We are dealing with different people who work on this challenge from different angles. Transition analysis can give us some clues on what might be done but from there on we are exploring unknown territory and have to engage in a process of learning by doing.