

Working methodologically on system innovations

Dutch agriculture is facing the challenge to develop into a sustainable sector. To achieve this goal, innovations are needed which force breaks with past trends and speed up the tempo of sustainable development. The System Innovation Programmes developed by Wageningen UR contribute with new, future-oriented business concepts and integral strategies for sustainable agriculture. This is realized using various systematic approaches, which can be implemented either individually or in conjunction with one another.

Agrarian entrepreneurs are faced with major choices relating to the future course of their businesses. Working from an idea of what the future might hold, they need to determine what they want, what they are able to do and how to translate this into concrete action. All these choices are made in an environment that is currently subject to dramatic changes. Think of rapid technological developments, globalising of our economy and society's demand for more sustainable production processes. The current economic crisis places business profitability heavily under pressure but that can also prove to be a strong incentive for sustainable innovations.

This is because innovations that lead to a reduction in use of natural resources or energy cut costs at the same time. Innovations that have a positive effect on the "p" of planet and/or people, but that are also profitable, are economically sustainable choices for businesses.

>> The transition assignment

The search for innovations that force a break in trends and speed up sustainable development is the focus of the transition assignment for entrepreneurs. The Dutch Ministry of Economic



Regional initiative the **Betuwse Bloem** presents the results of innovations and network set-ups in an orchard in the River area of the province of Gelderland. Provincial representative, Harry Keereweer is speaking to participants in the network which is made up of civic leaders, businesses partners and representatives from knowledge institutions.

Affairs, Agriculture and Innovation (EL&I) supports entrepreneurs in this endeavour. It backs measures which stimulate the economy and contribute to sustainable development in agriculture. The extra investment goes towards sustainable stalls, the development of bio based materials, and ingenious logistic solutions that reduce CO₂ emissions. These subsidies tie in with the Ministry's transition and innovation policy. Regional authorities and development organisations back the stimulation of sustainable innovations with increasing vigour. They see opportunities to further strengthen Dutch agribusinesses not only from an economic perspective, but also from the viewpoint of the intrinsic value of this sector and the possibility that agriculture could contribute to quality of life. Examples of Dutch regions that have placed the agrarian sector as spearhead in policy are the *Zuidelijke Westerkwartier* in the north of the Netherlands, *AgriBoard* in the north of the province of North Holland, *Betuwse Bloem* in Gelderland (see box Innovation Agendas), *Greenport Venlo* in Limburg (see box Innovation Agendas) and the *Zuidwestelijke Delta* in Zeeland. Sustainability and innovation are also high priorities for policy in the three regional agrarian branch organisations in the Netherlands (*LTO Noord*, *ZLTO* and *LLTB*). They have chosen to take an active role in forming the agenda for regional and national knowledge and innovation programmes, together with other stakeholders (*Platform Agro kennis*, see box Innovation Agendas).

>> Collective agenda forming

Since 2001, the Ministry of EL&I has implemented policies directed towards fostering the transition to sustainable agriculture. The System Innovation Programmes fall into this category and work on realizing new, future-oriented business concepts and integral strategies for sustainable agriculture (see box System Innovation). A vision on transition and innovation using two complementary transition pathways has been developed by the platform of programme leaders during the process of implementing this cluster of programmes (see box Transition Pathways, Wijnands and

Vogelezang, 2009). In the path from future to practice, future visions are being developed and on the basis of these visions ground-breaking innovation experiments are being carried out to bring the future closer by. In the path from practice to future, pioneering entrepreneurs receive support for their ambitions to achieve more sustainable business practice. Both transition pathways are based on the forming of networks (see examples, p.18 & 22). For current practice, both developments are significant for the middle long term.

National and regional authorities choose increasingly for a facilitating role when stimulating sustainable innovations, by making funds available under certain conditions. They push the innovation process by taking the initiative in forming network organisations and to ensure that initiatives for activities are based on addressing business needs. Both organised business and private business take up their role in this process. Research and educational institutions are viewed by government and business as strategic partners and are invited to participate in a collective agenda forming process. In this way a new innovation structure has arisen with a strong collaboration between the three O's (*Ondernemers*, *Overheden en Onderzoek- en onderwijsinstelling*) [Entrepreneurs, Governmental authorities and Research and education institutions]. There are now various national and regional innovation programmes being implemented (see box Innovation Agendas).

>> Innovation Agenda

These developments in practice have led to new insights for innovation and transition within the System Innovation Programmes, and have in turn resulted in elaborations to the transition pathways model. Two elements have been added. The stakeholders' innovation agenda has been given a central role in steering the activities in both transition pathways. The activities in both transition pathways have been linked to each other through the innovation agenda, which could lead to a further acceleration in realizing innovations.

System innovation

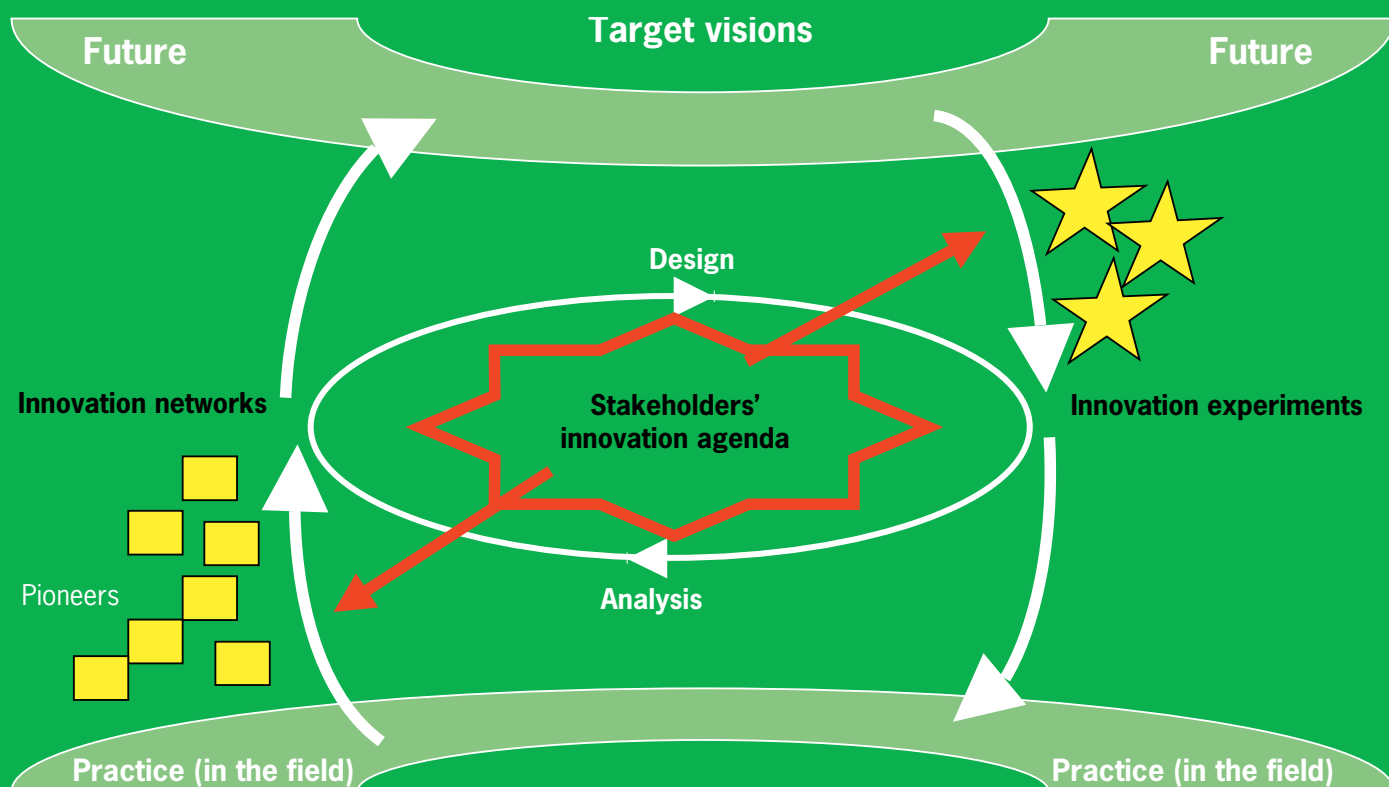
System innovations are changes that transcend individual businesses. They are needed for the change in agriculture to sustainable, socially acceptable production systems. System innovations can only be successful in the larger context of collaboration with all vested interests: agrarian entrepreneurs, parties involved in the supply and production chains, agricultural branch organisations, national and regional governments and social organisations. Wageningen UR works together with these partners in System Innovation Programmes to realize new, future-oriented business concepts and integral strategies for sustainable agriculture. There are System Innovation Programmes for different clusters of animal and plant production sectors.

The two transition pathways

The first transition pathway runs from the target visions of the future to current practice in the field. This pathway begins with an inventory of visualized future visions. They are not blueprints but a direction for development. They are also called target visions or design sketches. The most important transition points which block the route towards the future are traced by *backcasting*. An agenda of transition points emerges that fall under either *hardware* (new technology), *orgware* (new collaborations, regulations) or *software* (new routines). Next, innovation experiments are set up and implemented and actions are taken to tackle these transition points. Networks of interested stakeholders are built up around these transition points. Concepts that are developed (or certain parts of them) will find their way into the field via these networks.

The second transition pathway runs from practice to the future. This pathway puts all its energy into supporting innovations by pioneering entrepreneurs. They form the *avant-garde* in the field and are the first to meet up with all sorts of (system) limitations. Their experiences and problems constitute an important source of input for the innovation agenda. New knowledge is developed in co-creation with these entrepreneurs.

Connecting innovators and innovative experiments brings together all the available experience and expertise. A continuous reflection on progress ensures that the innovation agenda is based on progressive insights. In this way promoting system innovations that are necessary for the transition to sustainable agriculture can be worked on more rapidly and more accurately.





The network Farming with a future (p.18) enters into a dialogue with both growers and other parties such as suppliers and business consultants. The cooperative effort is aimed at improving the quality of surface water. A demonstration of mechanical weed removal in the tree cultivation sector is seen here, which is an alternative for the use of chemical crop protection.

Pioneering entrepreneurs in the pathway leading from practice to the future can be inspired by future visions and innovation experiments from the pathway leading from the future to practice. At the same time it is precisely these innovators who can indicate where new insights or breakthroughs are needed for the middle long-term from their own experience in the field. This interplay between inspiring future concepts and realisable steps in practice gives the innovation agenda direction for the short and the long term. We are convinced that it is precisely this coherent use of activities in both pathways that leads to a faster and sharper focus on promising development routes for the future.

>> Learning cycle

A second, new element in the transition pathways model is the continuous learning cycle of analysis and design. It has become apparent that it is important to reflect on the process and the results, and discuss this with participants, in order to get a better view of progress in the innovation process (*Systematic approaches and methods for monitoring and evaluation*, see p.31; *Networks in Animal Husbandry*, see p.34). Monitoring and evaluation can make a significant contribution to that learning process and ensures that the innovation agenda is based on progressive insights. Monitoring and evaluation can also contribute to changes in the organisation and methods used by the stakeholder network. Stakeholders are not only concerned with the content of the innovation agenda, but

they also focus on the transition assignment itself and what consequences that has for the way in which things are organised now. After the collapse of the Dutch OVO triptych (*Onderzoek, Voorlichting en Onderwijs*) [Research, Extension services and Education] in the 90s of the previous century, the parties involved have embarked on a search for a new, contemporary entrepreneur-driven innovation structure. The various innovation agendas that have grown out of national and regional networks seem to give form to that interpretation of the new collaboration between the three "O"s.

In the last few years, many projects have been carried out by System Innovation Programmes which contribute to the transition towards a more sustainable agriculture. In these projects, there is a large degree of collaboration with stakeholders in networks. Depending on the goals that are set for the project, there are different methodological approaches (see box *Methodological approaches*). A number of essential elements emerge from this wide variety of methodological approaches, which can make a large contribution to the success of these projects. These will be elaborated on below: the development of a common vision for the future; working in networks in which participants inspire one another; a continuous dialogue with stakeholders to create a support base; and regarding short term applications as a step towards realization of long term goals.

>> Vision for the future

It has become apparent that it is very important to develop and visualize future visions in a collaborative process with stakeholders. This creates a common perspective and ownership that transcends the individual vested interests of the parties. It determines the follow-up steps for routes leading to solutions. The effectiveness of visuals has been confirmed recently in the project *Cow Power* (see p.10) in the publicity around a visit by former Agriculture Minister, Mrs. Verburg to Wageningen UR to see how this project is working on the ambition to realise a sustainable animal husbandry sector by the year 2023. The project *Agromere*, which works to create a support base for the idea of developing agriculture within the city limits of Almere, has also used visualised future visions as an important source of inspiration to mobilize and bind stakeholders. The result was a well-supported concept for a city expansion with 60,000 new homes whereby agriculture plays a prominent role (Visser *et al.*, 2009).

Networks benefit from a shared vision for the future. Future visions appeared to be an essential step for developing a shared vision in

the innovation network *Waardewerken* [Value Works], a network of agricultural businesses with a side line in things such as health support, conservation, mini camp ground, child-minding or farm shop. They were the starting point for setting up a break-through agenda which indicated which changes were necessary in order to allow multifunctional agriculture to become a fully fledged branch of business (see www.waardewerken.nl).

>> Learning networks

Time and again it turned out that working with heterogeneous networks of interested parties has been a key to triggering change. In the act of exchanging different visions and perceptions with each other, a learning process gets underway that can lead to a shift in perspectives (enlarging strategic space, reframing). In this way a larger space for solutions is created, with new, surprising solutions and a greater stakeholder commitment to actually contribute to the realization of solution pathways (Vogelezang *et al.*, 2009). Heterogeneous networks can come about by bringing parties together who have never previously collaborated, for example around a new concept like Agropark Flevoland, a cluster of diverse

Methodological approaches

The System Innovation Programmes use various methodologies which can be applied in projects either on their own or in conjunction with one another. They are grouped according to the function below:

Inspiring	<ul style="list-style-type: none">- by identifying trends and opportunities- by creating future visions (design)
Agendizing	<ul style="list-style-type: none">- by following developments from other sectors, branches and internationally- of prioritized, future oriented directions for development- of conditions for an optimal innovation climate- of transition points (necessary break-throughs, dilemmas)
Innovating	<ul style="list-style-type: none">- by generating new insights (<i>proof of principle</i>)- by removing obstructions- by cleverly combining existing knowledge in new situations
Connecting	<ul style="list-style-type: none">- by creating places to meet (innovation cafés, workshops)- by mediating and connecting (alliances, coalitions)- by forming networks around innovations
Stimulating	<ul style="list-style-type: none">- through individual coaching- through supervision of networks- through developing competencies (inspiring learning environments)
Expanding	<ul style="list-style-type: none">- through organising meetings- through presenting appealing examples (demonstrations)- through bundling of information in virtual (www) and physical knowledge centres.

businesses with agro-functions or related industries at a specific location (TU Delft, 2009; Wolf, 2011). Another example is “new agriculture” whereby the sector fulfils a new role in, for example, conservation, recreation and vitality in rural areas.

Networks of pioneering entrepreneurs also benefit by heterogeneity and regular renewal. Entrepreneurs say that they find these networks inspiring. The participants should come from different backgrounds that are diverse enough to learn from each other, but not as diverse as to cause them to no longer understand each other (Heymann and Wals, 2002; Wals and Heymann, 2004). Examples of these sorts of heterogeneous networks are *Waardewerken* [Value works], where multi-functional agrarian entrepreneurs work together

on professionalizing their sector, and *Innovation Network Energy Systems* (INES) in North Limburg for greenhouse growers with diverse crops (p.22).

>> Support base for renewal

System innovations mostly transcend individual businesses and they demand new relationships and strategic collaborations in the chain or region. A support base, commitment and dedication from a large group of diverse stakeholders is needed to achieve this. The projects *Farming with a future* (p.18) and *Agromere* both use stakeholder management to this end. The *Farming with a future* project enters into dialogue with suppliers and other intermediaries to motivate them to advise growers to use sustainable crop protec-

Innovation agendas

In the past few years, various national and regional network organisations in the Netherlands have been formed that together fulfil the role of motor behind knowledge and innovation. Below are a number of examples:

>> **Bioconnect** is a national network in organic farming where entrepreneurs determine themselves which knowledge projects need to be pursued. Knowledge projects can relate to research, advice and publicity and education. The network has a market-oriented structure. Farmers and growers are not the only members; there is always collaboration with processors, suppliers, distributors and social organisations. The practical expertise is bundled in *product and theme project groups*. This market-oriented structure has been developed together with the Ministry of EL&I. The methodology of Bioconnect is in this way an example of the ministry’s policy “from caring for, to ensuring that” the market gets more responsibility and government merely facilitates.

>> **Betuwe Bloem** [Flourishing Betuwe] directs its effort towards strengthening the position of the five horticultural clusters in the river area of Gelderland (de Betuwe). The entrepreneurs form *pacts* within the horticultural clusters with all relevant parties in their region and implement their own innovation programme. An umbrella entrepreneurs’ platform functions as sounding board for horticultural developments in the whole area and forms the driving force behind *Betuwe Bloem*. A key team which transcends the pacts, initiates and coordinates an umbrella programme with a number of strategic projects in strengthening business skills, sustainability and regional profiling.

>> Innovations in the region of North Limburg take place under the collective name, **Greenport Venlo**, with the aim of making it the most prominent fresh food region in Europe. Their ambition is to realise a growth in turnover from one to two billion added value within a period of 10 years. The development in Greenport Venlo is based on four pillars: *creation of value* (economy), *learning how to learn* (knowledge), *basics* (regional development) and *quality of life* (lifestyle). To promote focus, growth and connectedness, a new entrepreneur-driven innovation structure was presented in May 2009 with six *programme lines*. A new (to be built) InnovaTower will function as landmark and meeting place.

>> **Platform Agro Kennis** [Platform for Agro-knowledge] is a recent initiative from ZLTO and Wageningen UR to be strategic partners in realising a renewed knowledge infrastructure in the south of the Netherlands. HAS Den Bosch [a technical college] and EL&I have joined them. To set up this platform, the named parties want to form *knowledge networks*, comprised of contributing parties from the sector who have a shared vision. An important objective for the knowledge network is to achieve a knowledge agenda set by the businesses themselves, whereby research issues, educational issues and innovation assignments for the long term are specified.



There is a network of farmers, environmentalists, government authorities in the region Zuidelijke Westerkwartier (in the north of the Netherlands) who are tackling regional issues relating to the development of agriculture, conservation and quality of life.

tion strategies. By determining what all the vested interests are, and everyone's conditions and criteria to be able or willing to take part, win-win-situations can be created whereby the participants work to achieve the communal ambitions and still stay true to their own vested interests. The project is successful with this. Currently there are 230 stakeholders from various sectors active in this network. In the *Agromere* project, integrating suburban and agrarian functions, it was crucial to connect the right *movers* in the initial stages to get the process underway.

Entering into dialogue with stakeholders also indicates whenever new directions for solutions, initiated from the perspective of a future vision, are not feasible. Using current growing methods, it has been shown that nutrient losses in sandy, leaching-prone soils are not sufficiently manageable even with tested new innovative routes for solutions. As well as that, these routes for solutions enjoy very little support from future end-users. A transfer to more radical routes for solutions is needed, for example by taking horticultural crops out of the soil and cultivating them in troughs, pots or tubs instead (*Techniques from greenhouse cultivation*).

>> Connecting to future end-users

In most cases, it is not possible to implement a radical innovation in one hit. Results en route to the desired future are mostly achieved step-by-step. This means that when future visions are being designed, allowances have to be made in order to translate ideas into a design for individual business situations. In the presentation of the designs for sustainable dairy farming in the *Cow Power* project, this led to the design of concepts for different business situations to increase entrepreneurs' identification with the plans (p.10). During implementation of system innovation projects, it became apparent that paying enough attention to short term successes to maintain support for the desired long term objectives was an important factor. This can be done by, for example, also concentrating on short term questions and to explicate the possible intermediate steps in the greater process of change. In this way, the knife cuts both ways: the implementation of spin-offs in the short term, increases the support base for the development of the longer term perspective and makes a concrete contribution to bringing the future closer by.