Issues within the agricultural production sector, such as the pollution of soil, water and air, the risks for transmission of infectious diseases, and ethical concerns of animal welfare, have led to broad public concern for changes in agricultural practices. Since the 1980s, the Dutch government has adopted regulations, and invested in research and development programmes and given subsidies to local initiatives, with the aim of contributing to the sustainable development of the agricultural sector. Despite these numerous and promising efforts, the transition to a more sustainable agriculture is proceeding slowly. Part of the explanation for this slow progress is that adequately addressing the above issues requires structural changes which involve, among others, technical, relational, behavioural and institutional change. Achieving such far-reaching change requires an integrated, collaborative and multi-level system innovation approach.

Over the last decade, several innovation programmes have experimented with approaches to endeavour system innovations. One of these programmes, TransForum, initiated innovative projects as a way to explore novel, more sustainable agricultural businesses. In such projects farmers work together with researchers, policymakers and intermediaries to develop and implement new products, processes and technologies (i.e. ‘novelties’).

Managing innovation projects is an inherently contingent process, that is, there is no ‘recipe’ or ‘blueprint’ to follow. Moreover, since little prior experience exists on how to guide system innovations, innovation projects can be regarded as exploratory spaces in which participants experiment with ‘agricultural system innovations’. The study that is presented in this thesis opens up the ‘black box’ of innovation projects by describing and analysing the experiences of actors in innovation projects, with the intention of contributing to (i) the theoretical understanding of agricultural system innovations, and (ii) to the understanding of the guidance of agricultural system innovations.

I studied the interactions between ‘actants’ (i.e. human and non-human actors) within five innovation projects, using an ethnographic and participatory action-research approach. The five innovation projects that were studied either worked on the development and implementation of the first entrepreneurial prototype of the novelty Agropark or on the implementation and usage of the first dozen follow-up businesses of the novelty (semi) Closed Greenhouse (see box 1.1 and 1.2
Summary

on pages 36 and 37). The analysis of the interactions focused on questions that persistently emerged throughout the research. These questions are: how do actors within innovation projects progress from a vision of the future to actual implementation of a novelty (chapter 2)? How do actors within innovation projects organise inter-institutional collaboration between entrepreneurs and researchers (chapter 3)? How do actors within an innovation project respond to actors who resisted the aims of the innovation project (chapter 4)? And how do actors promote the wider diffusion of a specific novelty after the development of the prototype (chapter 5)? The key findings of each chapter are summarised below.

In chapter 2 the relation between visions of the future and the development and implementation of entrepreneurial prototypes is explored by studying the interaction of actors in four Agropark innovation projects. The analysis shows that each of the Agropark projects contextualised the Agropark vision as initially developed. Tangible local visions were developed which suited local conditions and addressed the needs and preferences of participating actors. These visions provided direction for implementation and assisted pioneers in their decision making as they included feasible technical designs, practical architectural plans, expected investments, business plans and risk analyses.

In addition, the analysis shows that published visions of the future influence innovation projects in both positive and negative ways. Visions of the future benefit innovation projects as they assist in niche formation and motivate actors to become more ambitious. Visions of the future may hamper innovation projects when actors consolidate the futuristic vision as a standard with which these innovation projects have to comply.

Furthermore, contextualisation of the vision of the future resulted in four specific configurations of Agroparks. This outcome strengthens the idea that novelties are not static but change throughout the development phase. This adaptive capacity of novelties is valuable in the sense that it diminishes path dependency and makes novelties appropriate for multiple contexts. On the downside, contextualisation may result in the removal of valuable features that were initially incorporated in the future vision. Our study shows that stakeholders and project participants play an important role in safeguarding valuable features of the novelty during the development and implementation phase. Moreover, actors within the broad network can inspire innovation project participants to add new features of value during contextualisation.
Chapter 3 compares the interactions between pioneering entrepreneurs (e.g., farmers who aspire to innovate) and participating researchers in three innovation projects to broaden our understanding of inter-institutional collaboration and learning. Theory teaches that the expertise and knowledge of entrepreneurs and researchers need to be integrated to develop novelties as innovations across diverse disciplines. How to facilitate such inter-institutional collaboration and learning, however, is not well understood.

The analysis of chapter 3 shows that it is necessary to start articulation processes within separate group settings of entrepreneurs and researchers to enable a fruitful collaboration between these groups. Furthermore, the analysis of the interaction between researchers and entrepreneurs provides insight into how researchers can assist entrepreneurs during the course of innovation. Researchers re-frame the entrepreneur’s proposal to suit the discourse of the science domain. This re-framed proposal provides feedback to the entrepreneur regarding issues of technical feasibility and opportunities. In this way researchers can assist entrepreneurs during the course of their learning. Chapter 3 also shows the importance of congruency rather than consensus. Congruency refers to the formulation of visions and questions to which each of the involved parties can assign a distinct meaning. In an inter-institutional setting, seeking congruency is recommended over consensus as it can be anticipated that formulating consensus about what is the most valuable aspect of the goals of the innovation project is a never-ending exercise. These insights were fed back into a different innovation project by devising and conducting a customised workshop to improve collaboration between practitioners and scientists.

The intermezzo, Behind the Scenes (p. 95), provides a detailed account of a workshop that was organised to improve inter-institutional collaboration and learning on a specific innovation project. This meeting demonstrated that actors can be assisted in overcoming the difficulty of abandoning deeply embedded routines by asking them explicitly to take on a different role, which is well defined.

To achieve actual change in the agricultural production system, novelties need to be locally embedded and used. Studies in the field of planning show that the implementation of novelties frequently involves controversy – even when their adoption results in a more sustainable practice. Chapter 4 sheds light on the process of implementing prototypes by analysing the interaction between
participants in an innovation project and stakeholders representing six different groups.

Chapter 4 strengthens the notion that stakeholders have diverse normative perspective on proposed novelties and that their voices play an important role in signalling potentially undesirable outcomes beforehand. To a degree, participants in an innovation project try to address the interests of the diverse stakeholder groups through functional, conceptual and relational alignment. Multiple re-alignment leads to: adjustments to the design of the novelty; modifications in how the novelty is portrayed; and changes to the broad social network of the innovation project. These adjustments may have a beneficial influence on the social acceptance of novelties.

It needs to be noted that re-alignment cannot lead to the overall acceptance of novelties. This is because opposition is not only fuelled by conflicting perspectives, but also by the fear that the novelty may be considered harmful to community members, existing businesses and the local environment. The embedding of any novelty entails change throughout the local socio-technical network, which inevitably means that some actors will benefit and others may get hurt. However, precisely because the novelty is new, it is difficult to determine in advance who will profit and who may suffer. In this respect it can be argued that system innovations always encounter resistance, inertia and lock-ins (with everybody waiting for everybody else to act).

Realising the broad adoption of novelties is an important challenge for achieving agricultural system innovations. Chapter 5 investigates the learning histories of the eight actors who first adopted a specific novelty after the development and implementation of a prototype. The analysis of these eight histories shows how actors can vary in their perception of novelties. This analysis strengthens the idea that novelties are characterised by high interpretative flexibility. Not only did initial innovators perceive the novelty differently, but each actually re-constructed the novelty. Linkages between bits and pieces of the novelty were broken down; new parts were incorporated; and new linkages were created. I introduce the term ‘re-contextualisation’ to refer to the process in which pilots and early versions of a particular novelty are re-constructed by initial innovators.

Initial innovators play an important role in the practical development of novelties, through the process of re-contextualisation, by testing diverse models in varied
settings which provides valuable feedback. However, only a limited number of actors is motivated to adopt novelties after the pilot development, as re-contextualisation creates high levels of uncertainty about the functioning of the novelties. The Dutch government tries to promote the adoption of novelties to overcome this impasse.

Chapter 5 describes a discrepancy between the needs of initial innovators and current policies aimed at stimulating the wider adoption of novelties. While these initial innovators need expert assistance in problem-solving related to the learning trajectory they are on, current policies concentrate on subsidies aimed at overcoming financial obstacles. Chapter 5 concludes with the recommendation to develop new types of innovation policies which focus on motivating the initial diffusion by offering ‘coaching’ to initial innovators.

To conclude, by studying the interaction of actants in the context of innovation projects, this thesis shows that agricultural system innovations involve contextualisation, re-alignment and re-contextualisation of novelties. Actors shape these reconfigurations through: inter-institutional collaboration and learning in niches; recurring negotiation with diverse stakeholder groups during implementation activities; and collaborative experimentation and knowledge sharing during the usage of novelties. In this way this research contributes to the theoretical understanding of agricultural system innovations. These interactions are by no means easy to establish. Monitors can assist project participants with embedding structural reflection on their applied innovation strategy to be able to improve it. This thesis is the result of the monitoring activities of the author. By closely observing and participating in the practices, it was possible to develop guiding principles for managing innovation projects. In this way this research also contributes to the understanding of the guidance of agricultural system innovations.