



Workshop 1.4: **Design methods, system approaches and co-innovation – System analysis and design regimes**

Convenors: **Bram Bos and Onno van Eijk**

Combining plot-scale indicators and farm-scale simulation to support the design of novel grassland-based beef systems

Guillaume Martin, Jean-Pierre Theau, Olivier Therond, Marie-Angéline Magne, Roger Martin-Clouaire, and Michel Duru

UMR 1248 AGIR, INRA, France

An approach tailored to support the design of novel grassland-based beef systems capable of coping with climate variability is presented. This approach combines plot-scale diagnosis and farm-scale simulation. The diagnosis informs about the opportunity of grassland use and suggests adjustments, enabling to design novel systems. Simulations of current and novel systems provide daily variation of standing herbage, forage stocks and animal performance for different weather series. In an application, simulations reveal that improvement of forage self-sufficiency pinpointed by the plot-scale diagnosis was unexploitable at the farm scale, due to weather and management constraints. Approach is discussed as learning support tool.

Approaches to adoption of innovation as an adaptive measure to climate change

Mila Sell

University of Helsinki, Finland

A key mitigation measure to climate change is adoption of new innovative technologies and practices by small-scale farmers. To support this, the barriers to adoption need to be identified. Combining qualitative farm-life-span interview with cost-benefit analysis, tackling questions arising from the qualitative research, gives both a local and a general perspective. Together the approaches give a holistic picture of the individual farmer's problems, as part of a farming system. Intervention activities need to be developed in collaboration with local stakeholders; the experts on local society and issues such as religion, gender roles and family structure and possible windows of opportunity.

Renewing collaborative design in the management of animal genetic resources

Julie Labatut, N. Girard, J.-M. Astruc, F. Barillet, B. Bibe and C. Soulas

UMR 1248 AGIR, INRA, France

The dominant mode of animal genetic resources management for agriculture in France relies on the participation of farmers in the definition of breeding objectives and in the production of genetic data thanks to on-farm milk recording. However, this mode of collaborative design is currently questioned by cooperative failures and critics from farmers on the mode of knowledge production involved. After a literature review of actual theories and methods of collaborative and participatory design, we use an intervention-research project to analyse how two initiatives of new modes of collaborative design can renew collective capacities for the management of local genetic resources.



Workshop 1.4: Design methods, system approaches and co-innovation – Co-design and learning

Convenors: **Bram Bos** and **Onno van Eijk**

Co-design as a distributed learning design

Pascal Béguin, Marianne Cerf,
and Lorène Prost

UR 1326 SenS, INRA, France

We discuss and illustrate with three examples four key assumptions to analyze design processes involving users. 1) Users redesign the designers' novelty by using it. Thus the coupling between the novelty and the users' new activity should focus the process. 2) Based on distributed skills of various people, the process should be organized to enable people to become aware of their interdependence. 3) Developing both the novelty and the activities implies various levels of dialogue that we precise referring to Bakhtin's work. 4) Revealing the different ways the participants "capture the real" in relation to action reinforces learning processes.

Project design and management based on a co-innovation framework: Towards more effective research intervention for sustainable development of farming systems

Walter A.H. Rossing, Santiago
Dogliotti, Gian-Franca Bacigalupe,
Eduardo Cittadini, Claudia Mundet,
Boru Douthwaite, Sophie Álvarez,
Katherine Tehelen, Mark Lundy,
Conny Almekinders

Biological Farming Systems group, Wageningen
University, the Netherlands

We describe the co-innovation approach developed in three cases in Latin America, focused on breaking the spiral of unsustainability on smallholder farms (www.eulacias.org). Co-innovation consists of three interacting domains: 1. systems approaches; 2. social learning; 3. dynamic project monitoring and self-evaluation. Co-innovation is a specific approach to participatory change methodologies. The unique character of co-innovation is its emphasis on systems approaches throughout and the importance attributed to dynamic feedback from progress monitoring and self-evaluation for planning. We illustrate the need for more attention for project design and management to make research for supporting farm innovation more effective.

Co-innovation in sustainable laying hen husbandry systems: Investigating the interactive framing of sustainability

Joyce Zwartkruis, Laurens Klerkx,
Ellen Moors, Jacco Farla and
Ruud Smits

Utrecht University, The Netherlands

Many different actors, like businesses, farmers, the government, societal organizations, consultants and research institutes, are involved in the design and implementation of "the Roundel", which is a Dutch sustainable laying hen husbandry system. It is assumed that interactions between these different actors are important to articulate common ideas of which aspects are important for a sustainable husbandry system. The main research question addressed in this paper is how different actors frame (aspects of) sustainable egg production and how interactions between all actors involved in the project resulted in the re-framing of sustainability and adaptation of the husbandry system over time.



Workshop 1.4: **Design methods, system approaches and co-innovation – Redesign of systems in practice**

Convenors: **Bram Bos and Onno van Eijk**

Supporting co-development of water management options within an interdisciplinary research project

Sonya Love, Ruth Nettle,
and Roger Wrigley

Melbourne School of Land and Environment,
University of Melbourne, Australia

The 'Farms, Rivers and Markets' project is an interdisciplinary research project that aims to create opportunities to 'do more with less water', within a context of drought, climate change and intensified competition for access to irrigation water. We discuss the challenge of supporting knowledge co-development within this research project. We explore how an understanding of different types of communities, and of different types of engagement, can provide a conceptual framework for the design of community engagement processes for knowledge co-development. We conclude by highlighting some of the research questions emerging as we engage in the practice of community engagement.

Deliberateness and serendipity of innovation agency: Analysing effective navigability in agricultural innovation systems

Laurens Klerkx, Noelle Aarts,
and Cees Leeuwis

Communication and Innovation Studies Group,
Wageningen University, The Netherlands

This paper analyzes how innovating actors deploy strategies to create changes in the institutional environment of projects in order to make these favorable for their projects. The paper identifies several such effective reformism strategies: framing novelties within existing rules, bypassing the current institutional context, or seeking outright confrontation in which pressure is gradually built up at different economic and political levels. Tangible visions and actors that fulfill boundary spanning roles are essential here. Innovation project actors need to continuously re-interpret the contexts in which they move, although they can only partly influence the institutional environment.

Purposeful design of boundary objects as useful management tools? The case of the design of the Dutch animal friendly poultry husbandry system 'Rondeel'

Séverine van Bommel, Bram Bos,
Laurens Klerkx, Noelle Aarts and
Cees Leeuwis

Communication and Innovation Studies Group,
Wageningen University, The Netherlands

Boundary objects enable different communities to jointly solve problems by providing a common lexicon. We ask how "effective" boundary objects are created, and present the results of a case study on the design of a Dutch animal friendly poultry system: the 'Rondeel'. The vision behind the 'Rondeel' functioned as a successful boundary object, but continuously morphed as well as actors entered or left. Content and success of the vision were dependent on choices of the actors involved, and their specific identity. Although a certain degree of interpretative flexibility remained, the vision kept its basic stability throughout the process.



Workshop 1.4: Design methods, system approaches and co-innovation – Modelling and participation

Convenors: **Bram Bos** and **Onno van Eijk**

How participatory design works as an approach for provoking system innovations towards sustainable pig production in the Netherlands

Onno van Eijk, Carolien de Lauwere,
Hanneke Miedema, Ellen van
Weeghel, Lucia Kaal-Lansbergen

Livestock Research, Wageningen University,
The Netherlands

Design is increasingly seen and tried as a vehicle for system innovative sustainable development. In a system innovative design project on pig production, called 'Porkunities', the hypothesis was tested that apart from the designs themselves, the design process is an important factor to provoke initiatives from stakeholders., and secondly that transdisciplinarity of the design team will increase the plausibility of designs for entrepreneurial parties. Preliminary results confirm that a participatory design approach a) increases design plausibility; b) does not decrease their innovative character; c) triggers participants to take initiative; and d) creates ownership and ambassadorship for the designs.

Using modelling in a participatory approach to accompany redesign processes of livestock farming systems

Lucie Gouttenoire, Sylvie Cournut,
and Stéphane Ingrand

UMR Métafort, INRA, France

To be more sustainable, farmers may decide to redesign their livestock farming systems. Converting to organic farming is one example of such dramatic change. Assuming that modelling farming systems can support such redesign processes, we conceived and tested a modelling methodology that involved farmers. 15 cattle dairy farmers converting to organic farming (or already converted) took part in our program that consisted in meetings, surveys and participatory workshops during which farmers expressed their views about their systems' operation. Such views were synthesised in causal maps. Possible uses of such maps are discussed, as well as the benefits of farmers' participation.

Involving stakeholders in the exploration of sustainability perspectives and innovations of farming systems: A case study from Latin America

Caterina Contini, Manuela Gabbai,
Luigi Omodei Zorini and Belén Pugh

University of Florence, Italy

This paper describes a study aimed at constructing scenarios based on narrative to complement models in the exploration of long-range future of cherry production in South Patagonia. The study is part of European EULACIAS project on Co-innovation of farming systems in Latin America. Our approach involves stakeholders in the analysis of present states and the identification of driving forces; finally, the impact of drivers on the farming sector is projected through the Delphi technique which enables structured elicitation of experts' judgment. The results describe three possible scenarios for the next 10 years: "Opening to new markets", "Quality" and "Regional market".

Exploring options for sustainable farming systems development for vegetable family farmers in Uruguay using a modelling toolkit

Marion Casagrande,
Santiago Dogliotti, Jeroen Groot,
Verónica Aguerre, Ahmed Abbas,
Alfredo Albín, Pablo Chilbroste,
and Walter Rossing

Biological Farming Systems Group, Wageningen
University, The Netherlands

Economic and environmental sustainability of family-based vegetable production systems in south Uruguay are seriously compromised after two decades of net decreasing prices and strategies based on specialization and intensification. This paper presents a model-based exploration of alternative livelihood strategies in terms of income generation and resource use, under three different future scenarios defined by local experts. We designed new production activities (rotation and animal productions), evaluated them with economical and environmental indicators and finally combined them at farm-scale to elucidate win-win situations and trade-offs. Results were used for defining policy briefs to support ongoing local innovation processes.



Joint discussion session

Workshop 1.4: Design methods, system approaches and co-innovation

Convenors: **Bram Bos** and **Onno van Eijk**

and

Workshop 5.3: Systems approach in technology-oriented farming system design

Convenors: **Shi-ming Luo**, **Peter Carberry**, **Helena Gómez Macpherson**, **Wei-li Liang** and **Santiago Lopez-Ridaura**

Discussion: Shared perspectives on design methods, system approaches and co-innovation in farming design

Onno van Eijk, Wei-li Liang,
and Bram Bos (convenors)

Livestock Research, Wageningen University,
The Netherlands
Faculty of Agronomy, Agricultural University of
Hebei, China

Joint harvesting! During this last session we want to reap the fruits of Workshop 1.4 on 'Design methods, system approaches and co-innovation' and of Workshop 5.3 on 'Systems approaches in technology-oriented farming system design'. What did we learn? Which interconnections exist between the different contributions, and between the two workshops? What are the most important questions for further research? We will explore the possibilities to either publish together, or jointly write a programmatic paper to strengthen connections between the different approaches presented. All contributors to workshop 1.4 and 5.3 are especially invited to join this session.