



# PURE

## Pesticide Use-and-risk Reduction in European farming systems with Integrated Pest Management

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## Summary

Workpackage 13 (WP13), ‘Co-innovation of IPM’, develops, implements and evaluates an overarching co-innovation methodology which combines innovation systems analysis and learning to reduce the dependence of European farming systems on pesticides. WP13 facilitates and tests how formal knowledge can be combined with farmer knowledge to arrive at effective new methods of pest management for selected crops on selected farms. WP13 focuses on four pilots in four different countries: Denmark, France, Germany and The Netherlands.

The objective of this deliverable (D13.2) is to compare co-innovation approach per pilot across pilots, demonstrating efficiencies and trade-offs. The deliverable is shaped as a scientific publication-in-the-making, and is hence **under embargo until the paper has been accepted**. The analysis has been carried out by Dr. P. Seuneke, supported by Dr. L. Klerkx, Ir. P. de Wolf and Dr. W.A.H. Rossing.

The results of analysis can be summarized as follows:

The involvement of farmers in research processes is widely seen as an essential aspect to foster the success of research for sustainable agriculture. This analysis focuses on such farmer participatory research projects carried out in the domain of Integrated Pest Management (IPM). Over the past few decades, much work has been done on farmer participatory research in agriculture. One of the returning messages in this extensive body of literature is the importance of the institutional context to understand the dynamics and ‘success’ of such projects. The responsiveness of researchers’ specific contexts greatly matters to the room they have and take to involve farmers in their research.

Despite the widely accepted importance of the institutional context to understand the unfolding of farmer participatory research projects, still surprisingly little research has actually looked into its role in greater detail. By studying how a set of farmer participatory principles and methods were applied by researchers/advisers operating under different institutional conditions, this paper aims to fill this gap in literature. More specifically, it identifies major institutional dimensions which have played a role in the project and seeks to find out what factors in these dimensions governed the researchers/advisers’ behaviour in doing farmer participatory research.

This paper draws on a comparative analysis of four pilots that are part of the EU PURE-IPM-project (Pesticide Use and risk Reduction in European farming systems with Integrated Pest Management: [www.pure-ipm.eu](http://www.pure-ipm.eu)) and its work package on ‘co-innovation’, which is based on a farmer participatory research model. The four ‘co-innovation’ pilots took place in Denmark, France, Germany and the Netherlands, involved different national researchers – researcher/adviser-teams, farmer groups and focused on promoting IPM in different crops and farming systems. Although the pilots were part of the same project and had been guided by the authors of this paper with similar concepts and approaches, they showed their own dynamics, problems and successes. This makes them interesting cases to study the role of the institutional context. Each pilot’s key events, dynamics and institutional context were reconstructed based on project reports, pilot team members’ self-reflection documents and purposefully designed reflexive video meetings. Additional in-depth interviews were carried out with all members of the national researcher/adviser pilot teams in the final year of the project.

Based on a qualitative comparative analysis, this paper identifies eight major institutional dynamics and subsequent factors and illustrates their influence on the unfolding of the co-innovation approach applied in the four cases, distinguishing between 1) the personal, 2) pilot team, 3) organisational, 4) pilot basis, 5) work package, 6) the PURE-IPM project, 7) country AKIS<sup>1</sup> level and 8) country specific cultural norms.

More knowledge about the institutional factors and their specific effects is theoretically relevant for our understanding of complex farmer participatory research processes and practically salient to promote successful approaches in different innovation contexts.

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<sup>1</sup> Agricultural Knowledge and Innovation System

**DRAFT: NOT FOR CITING**

**Using one recipe in different kitchens: The role of the institutional context on the implementation of farmer participatory research projects for sustainable agriculture**

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**1. Introduction**

It has widely been acknowledged that classical ‘transfer of technology’ approaches are inadequate in fostering the development of more sustainable agricultural practices (Pretty, 1995). Lilja and Bellon (2008) put it as follows: *‘Conventional research tends to package intervention methods and programmes into one-size-fits-all, off-the-shelf approaches, based on a notion of universal best practices. Participatory methods address the drawbacks inherent in that approach by actively involving end-users in the research process, incorporating their views and representation into the prioritisation, review, conduct, and dissemination of scientific research. This fosters trust in agricultural research, increases research participation, addresses issues of greatest importance to the communities, and aids the translation of research results into useful practice’* (p. 479).

Over the past few decades, much work has been done on such farmer participatory research in agriculture (Hoffmann et al., 2007; Neef and Neubert, 2011). One of the returning messages in this extensive body of literature is the importance of the institutional context in which the research is being carried out. Many studies have shown that the characteristics of researchers’ specific institutional context is a crucial factor to understand the dynamics and ‘success’ of farmer participatory research (Hall and Nahdy, 1999; Martin and Sherington, 1997; Neef and Neubert, 2011; Reed, 2008). In a paper studying farmer participatory research processes in Ugandan agriculture, Hall and Nahdy (1999) argue for instance that the behaviour of researchers in participatory processes is not only an issue of individual personalities, values and skills but rather more a matter of conditioned responses to the wider

institutional contexts in which they operate. In their own words: *‘because agricultural research (including participatory approaches) must take place within the framework of the NARS [National Agricultural Research System], the research process is invariably conditioned by this institutional context. New research methods are unlikely to be as pervasive as more deeply embedded factors as historical patterns of scientific research practice, institutional politics, personalities, professional aspirations and the quality of human resources – all of which will be embodied in institutional arrangements of organised science. The behaviour of scientists will also, to varying degrees, be influenced by country specific cultural norms’* (p. 1).

Despite the widely accepted importance of the institutional context to understand the unfolding of farmer participatory research projects (Hall and Nahdy, 1999; Martin and Sherington, 1997; Neef and Neubert, 2011), still surprisingly little research has been done to examine the role of the institutional context on farmer participatory research in greater detail. By studying how a set of farmer participatory principles and methods were applied by researchers/advisers operating under different institutional conditions, this paper aims to fill this gap in literature.

This paper is based on a qualitative comparative analysis of four different farmer participatory research processes. The four ‘pilots’ were initiated and supervised from a rather uniform and overarching starting point but carried out by four different researcher/adviser teams operating in four different European countries. Together, the country pilots formed the core of a work package which studied ‘co-innovation’ processes in the context of a European research project on Integrated Pest Management (IPM) innovations in European agriculture (more about the project, see section 3: Research design).

The following research questions were guiding this study:

1. What are the major institutional dimensions in the context of the European research project?
2. Which major factors – part of the researchers’/advisers’ institutional dimensions – have affected their behaviour and thus indirectly the unfolding of the four different farmer participatory research pilots?
3. What are the most important lessons in this respect with regard to the implementation of such farmer participatory research processes in the future?

More knowledge about the application and dynamics of farmer participatory research projects under different institutional conditions is highly relevant in the light of the increasing popularity of such approaches to innovation and their subsequent use in different contexts in

Europe and all around the world. Farmer participatory research methods and approaches however, cannot simply be ‘transplanted’ from one context into another. Indeed, it has clearly been shown that the responsiveness to participation of particular institutional setting is a key factor to explain the success of any participatory innovation process (Hall and Nahdy, 1999; Klerkx and Nettle, 2013; Nettle et al., 2013). Taking this into account, a better understanding of the role of the institutional contexts is in great need.

## **2. Farmer participatory research and the role of the institutional context**

### **2.1. Farmer participatory research and its institutional context**

Central in this study is the cooperation or joint learning process between researchers and farmers for innovations towards a more sustainable agriculture. In our case, such cooperation deals with researchers and farmers working closely together to minimise the use of pesticides in European agriculture. We approach this cooperation as a process of ‘farmer participatory research’ (Neef and Neubert, 2011).

Central in farmer participatory research is the degree of participation of farmers in research. Over the past few decades, much work has therefore been focusing on providing scales of participation. Amongst the others, Lambrou (2001) introduced seven grades of participation including: 1) *positivist theoretical research*, 2) *passive information sharing*, 3) *consultation*, 4) *on-farm testing*, 5) *evaluation*, 6) *collaborative planning* and 7) *partnership*. These frameworks or ‘ladders’ of participation do not come without criticism. Despite bringing more understanding to the different levels of participation, Neef and Neubert (2011) argued recently that these early and rather ‘linear’ typologies fall short in describing the *diversity* and *dynamics* of co-innovation processes. The authors state that the degree of participation is not a static reality but something which often changes during the course of the project. Whereas in some project situations full farmer participation is possible and desirable, others require a more ‘transfer of technology’ approach. In our paper, we follow this line of reasoning by conceptualising farmer participatory research as a diverse but foremost a highly dynamic process of cooperation and mutual learning.

In contrast to the earlier ladders of participation, Neef and Neubert (2011) provide a rich framework which discusses a large number of key dimensions of farmer participatory research and subsequent factors affecting such projects in time. The dimensions part of the framework are: 1) *the type of the project*, 2) *its approach to research*, 3) *researchers’ characteristics*, 4) *researcher-stakeholder interaction*, 5) *stakeholders’ characteristics* and 6)

*stakeholders' benefits*. For each of these dimensions, key factors are distinguished and explained. For the full framework, see Neef and Neubert (2011).

An important factor part of the first dimension 'project type' is d) *the institutional context of the research project*. Here, the responsiveness of institutional contexts to the involvement of farmers in the research is argued to be crucial for the participatory potential of a project. The power of the institutional context is considered strong; if the project is carried out in contexts less conducive to the participation of farmers, it is less likely that researchers will have the freedom to adopt participatory approaches into their work. Hall and Nahdy (1999) point at the importance of the institutional context in more explicit ways. The authors argue that the particular institutional context (such as the specific organisation of the national agricultural research system (NARS)), *conditions* researchers' behaviours which then affects the way how they work on farmer participatory research.

What do we mean with 'institutions' and the 'institutional context'? In this paper, we use the 'rules of the game' approach to institutions (Hall et al., 2003). We see institutions therefore as the sets of norms, rules, routines or shared expectations that govern the behaviour of actors (Hall et al., 2001). Although institutions tend to be rather fixed, they can change under certain conditions. Institutions are therefore considered as dynamic rather than static phenomena.

Departing from this approach and definition, the 'institutional context' hence refers in this paper to the environment in which these sets of norms, rules, routines or shared expectations are present and in which they govern the behaviour of the actors who operate in them. In our case, the institutional context can be seen in more *explicit* as well as more *implicit* ways (Hall et al., 2001). Either in terms of the more physical organisations such as the research organisations researchers operate in, or the networks or communities such as the work package and pilot teams central in the European research project studied.

## **2.2. The role of the institutional context and its effects on farmer participatory research**

Hall and Nahdy (1999) as well as Neef and Neubert (2011) provide valuable insights into how – on different levels – the institutional context can affect the behaviour of researchers/advisers and therewith indirectly the implementation of participatory approaches. In both papers, the authors point at the institutional context as an important source of powers which affect essential aspects such as researchers' professional identities, their experiences, skills and their views, interpretation, attitudes, norms and values towards farmer participatory

research. Together, the characteristics of a researcher's/advisers' institutional context or the responsiveness to participation determines the participatory potential one has.

Important to note here is that human beings are however not complete 'victims' of their institutional contexts. In this paper we believe that although the power of social structures, institutions, can be rather strong, individuals still have a certain degree of freedom to act. Key here is the notion of 'human agency' or the individual's power to act independently of their social structures (Elder-Vass, 2010). In the context of this paper this means that some contexts can be rather uncondusive to do farmer participatory research, yet, the researchers/advisers can still have a strong will to make it work and find flexibility or niches to do so.

Institutions have a strong power on a personal level. Due to their education, professional background and current work in often rather classical 'transfer of technology' minded contexts, researchers/advisers can for instance be found rather unequipped and moreover reluctant to play a different role and to involve farmers into their work. Hall and Nahdy (1999) found for instance that, although using more participatory methods, researchers often still have a strong compulsion to play up to the role of 'the expert' and use their insights to tell farmers what to do. Farmers are at the other hand conditioned by their institutional context as well. At the same time, they often expect the researchers playing this role and telling them what would be best for them (references). With regard to researchers'/advisers' attitudes towards participation and the role of farmers in research, Neef and Neubert (2011) argue that *'while some researchers may see participation as the guiding paradigm for agricultural research, many scientists tend to regard participatory approaches as non-scientific, impressionistic, and unreliable and therefore irrelevant for formal agricultural research'* (p.186). Also, whereas some researchers/advisers see farmers as equal partners in research, others may perceive them as backwards and inferior (Neef and Neubert, 2011). Off course all of this is not written in stone as researchers and advisers may change their attitudes, norms and values while undertaking participatory projects, in a positive as well as a negative sense.

Prominent sources of institutional power which govern the behaviour of researchers/advisers in doing farmer participatory research are the communities or the physical organisations they are operating in (Hall et al., 2001; Neef and Neubert, 2011). Important here are norms, values and shared expectations of researchers'/advisers' peer groups and those present in their professional organisations (research organisations/advisory services). More specifically: norms with regard to be a 'good' researcher or adviser, the

organisation of research projects advisory work, dominant reward systems, and value of farmers' knowledge in innovation at large (Hall and Nahdy, 1999; Neef and Neubert, 2011).

With regard to research contexts, the rigid organisation of research institutes and the dominant reward system based on high impact publications is for instance often seen as an obstacle to the implementation of farmer participatory research. These contexts are not particularly conducive to the multidisciplinary and 'fuzzy' participatory processes with not seldom unexpected turns and outcomes. Neef and Neubert (2011) point at the fact that participatory approaches generally require more openness and flexibility which is often in conflict with the conventions regarding doing 'good science' and moreover not accepted by funding organisations that require a detailed work plan, time schedule and deliverables during the course of a project. Hall and Nahdy (1999) finally point at the problems with regard to the perceived validity of participatory research. In contexts where 'good research' is predominantly considered as involving quantitative methods providing 'hard data', the often qualitative methods generating 'soft data' used in participatory research are sometimes considered as less scientific.

On a higher level, we also need to point at the role of the researchers'/advisers' country specific agricultural knowledge and information system (AKIS) (Hall and Nahdy, 1999; Nettle et al., 2013; Thi Minh et al., 2010). In the context of this paper, the AKIS can be seen as the larger overarching institutional dimension from which much of the problems, already mentioned earlier in this section, originate. The specific organisation of the AKIS, the fixed roles which certain organisations and actors have in it and more implicit norms and rules with regard to research and advice are not always compatible with farmer participatory research. Hall and Nahdy (1999) conclude that despite its broad application, farmer participatory research has largely failed in its attempt to improve the efficiency of agricultural research by bridging the distance between research and farmers. The many institutional difficulties faced by researchers/advisers would according to the authors be caused by a 'systems problem'. In the authors' words: researchers and advisers work with new methods but fail as they face old institutions. Although it is rather difficult to fundamentally change the institutional landscape of the AKIS on a short term, nevertheless, sufficient flexibility should be offered to allow new structures more compatible with farmer participatory research to develop (Hall and Nahdy, 1999).

Finally, in their paper, Hall and Nahdy (1999) also refer to country specific cultural norms as a factor which would affect researchers'/advisers' behaviour in doing farmer participatory research. Indeed, more egalitarian societies would potentially form contexts

more responsive to farmer participatory research than those with more hierarchical traditions. However, although country specific cultural norms are frequently mentioned as a factor affecting researchers'/advisers' behaviour, concrete evidence of its role is still lacking. The challenges of cross cultural differences are becoming an increasing issue in the context of the increasingly globalising domain of research and innovation (Chen et al., 2013; De Prato and Nepelski, 2012; Mortara and Minshall, 2011).

### **2.3. Using participatory approaches in different contexts**

This paper studies how the application of a rather uniform method worked out in different institutional settings. The literature reviewed in the last paragraph above teaches that institutional contexts have a great impact in the dynamics of farmer participatory research processes. This suggests that there is no such thing as a uniform approach or a 'recipe' of farmer participatory research. Indeed, there are many examples of studies suggesting that farmer participatory research methods and approaches cannot simply being 'transplanted' from one context into another (Hall and Nahdy, 1999; Klerkx and Nettle, 2013; Schewe and Stuart, 2014; Tödling and Trippel, 2005). In a their work studying the adoption of innovations in automated milking systems by smallholders in the US, the Netherlands and Denmark, Schewe and Stuart (2014) come to similar conclusions. Rather than a uniform adoption and impact of innovations, they point at the diversity of trajectories and the importance of different (institutional) contexts.

## **3. Research design**

### **3.1. Empirical basis: the PURE-IPM project**

This study aimed to gain more about the role of the institutional context on farmer participatory research. More specifically, it aimed to identify institutional factors which are key in governing the researchers'/advisers' behaviour in shaping the farmer participatory research projects they work on. The role of the institutional context was studied in the context of the FP7 European research project 'Pesticide Use-and-Risk reduction in European Farming systems with Integrated Pest Management (PURE-IPM)' (see [www.pure-ipm.eu](http://www.pure-ipm.eu)). The project is summarised in table 1.

**Table 1:** summary of the PURE-IPM-project

<b>The EU PURE-IPM-project</b>	
Pesticide Use and Risk reduction in European farming systems with Integrated Pest Management (See also: <a href="http://www.pure-ipm.eu">www.pure-ipm.eu</a> )	
<b>General objective:</b>	
The PURE-IPM-project aimed to provide Integrated Pest Management (IPM) solutions and a practical toolbox for their implementation to reduce the dependence on pesticides in selected major cropping systems in Europe.	
<b>The project consists of fourteen work packages (WP's):</b>	
<b>WP</b>	<b>Title</b>
1.	IPM design and assessment methodology
2. – 7.	Innovative IPM solutions for 2) winter-wheat, 3) maize, 4) field vegetables, 5) pomefruit, 6) grapevine and 7) protected vegetables
8.	Pest evolution and enhancement of the durability of IPM
9.	Plant-pest-enemies interactions
10.	Ecological engineering for IPM: from field to landscape
11.	Emerging technologies
12.	Knowledge interaction, dissemination, training and technology transfer
13.	<b>Co-innovation of IPM</b>
14.	Management of the project

The PURE-IPM-project was carried out between March 2011 and February 2015<sup>2</sup>. The project consortium consisted of 25 organisations (fifteen research organisations, two advisory services and eight companies), based in eleven different European countries. PURE's general objective was to provide Integrated Pest Management (IPM) solutions and methods for their implementation to reduce the dependence on pesticides in a selection of major cropping systems in Europe (see table 1). IPM was the central concept in the project and refers to a specific approach to crop production and protection in which minimising the use of pesticides is central. There are many definitions of IPM. We follow the one used by the United Nations' Food and Agriculture Organisation (FAO). The FAO defines IPM as followed:

*“Integrated Pest Management (IPM) means the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimise risks to human health and the environment. IPM emphasises the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms.”* (FAO, 2014).

The PURE-IPM- project consisted of fourteen sub-projects or work packages which

<sup>2</sup> The PURE-IPM-project was a follow up of the EU FP7 ENDURE-project which ran from 2007-2010. ENDURE was a European project in which agricultural researchers and advisers got together to helping European farmers to deal with the challenges brought by the then new European regulatory framework on crop protection ([www.endure-network.eu](http://www.endure-network.eu)).

had their own focus and were ran by different partners (see table 1).

### 3.2. Work package thirteen: ‘Co-innovation of IPM’

**(WP 13)** This paper draws on the work done in work package thirteen entitled: ‘Co-innovation of IPM’. This work package aimed to develop, implement and evaluate an overarching farmer participatory or ‘co-innovation’ methodology to work on IPM and hence contribute to a reduction of the dependence of European farming systems on pesticides. The farmer participatory research method was developed, implemented and evaluated by four pilot teams affiliated with research/advisory organisations based in 1) Denmark, 2) France, 3) Germany and 4) the Netherlands. The pilot teams consisted of either solely researchers or a combination of researchers and advisers, involved different farmer groups and focused on the promotion of IPM in different cropping and farming systems. The ‘co-innovation experiments’ carried out by the four national teams were supervised by a supervising team of researchers based in the Netherlands. In addition to their involvement in work package 13, all researchers/advisers were also part of the ‘content’ or ‘cop-based’ work packages in the project (see table 1: work package 2 – 7).

**(Mutual learning)** Work package 13 was characterised by a strongly developed learning culture. In informal conversations about the project, work package thirteen was often described as a ‘playground’ for farmer participatory research. Indeed, the work package provided a context in which the strongly motivated but rather unexperienced pilot teams were offered room to ‘experiment’ with the implementation of a new and more participatory approach to their work. The two researchers who were leading the work package (see table 1) were at the same time supporting and guiding the researcher/adviser teams by backing them up with concepts and tools to ‘do co-innovation’. In the start-up phase of the project, there was a basic ‘training’, which provided the researchers/advisers the necessary tools to start a co-innovative process. Regular reflexion or coaching moments (either physically/virtually and/or on work package/pilot/individual level) were organised subsequently by the supervising team to inform about and reflect upon the proceedings of the pilots, to support in case of problems and to guide the individuals/teams through the co-innovation process (see table 1). Important to note is that the supervising team only provided support and guidance, the four pilot teams were left free to work on co-innovation as they thought would be best.

**Table 2:** summary of work package 13

<b>Work package 13</b>
<b>What?</b>
Work package 13, ‘Co-innovation of IPM’, aimed to develop, implement and evaluate an overarching co-innovation methodology to reduce the dependence of European farming systems on pesticides.
<b>How?</b>
The co-innovation work package of PURE-IPM provided concepts, tools, training and joint learning opportunities to researchers/advisers who were responsible for an IPM innovation pilot project in their country.
<b>Who?</b>
<b>1) An overarching supervising team (work package level) (the Netherlands)</b>
<ul style="list-style-type: none"> <li>• Senior researcher (Dutch university)</li> <li>• Senior researcher (Dutch applied research centre)</li> <li>• Junior researcher (Dutch applied research centre), year 1-3</li> </ul>
<b>2) Four co-innovation pilots, led by four different researcher – researcher/adviser teams based in four different EU countries (pilot level)</b>
<ul style="list-style-type: none"> <li>• Denmark</li> <li>• France</li> <li>• Germany</li> <li>• The Netherlands</li> </ul>

In addition to these activities organised by the supervising team, the work package members have met regularly during the EU PURE-IPM-project conferences and during the four work package meetings organised during the course of the project. These four work package meetings were important moments to learn about the specific country pilots and their specific successes and challenges.

In short, the specific architecture of and approach used in the work package – starting from one general approach which was then ‘transplanted’ and operationalised into four different institutional contexts – makes the work package and the pilots an interesting case to study the role of the institutional context on farmers participatory research. In the following section, we will elaborate on the four pilots and the way how they were studied for the focus of this paper.

### 3.3. The four country pilots

**(The four pilots)** The four country co-innovation pilots which were central in work package 13 and studied for the purpose of this paper, are summarised in Table 3 and explained in further detail below.

**Table 3:** summary of the four country pilots

<p><b>I Denmark (DK)</b></p> <ul style="list-style-type: none"> <li>• Led by two advisers from the crop protection group of the national agricultural advisory service (based on the same location) Lukas and Ingrid</li> <li>• Both advisers are crop protection specialists</li> <li>• Co-innovation pilot based on the interactions with three farmers part of a (pre-existing) national IPM-demo-farm network</li> <li>• Based on weed-based cropping systems</li> </ul>
<p><b>II France (FR)</b></p> <ul style="list-style-type: none"> <li>• Led by a researcher (Yann) and an adviser (Laurent) from respectively the national agronomic research institute and a local agricultural chamber</li> <li>• The researcher and adviser are agronomists</li> <li>• An additional adviser from a regional agricultural chamber (formally not part of the PURE-IPM-project) (Valentine)</li> <li>• Co-innovation pilot based on a pre-existing regional farmer innovation network consisting of (25) farmers</li> <li>• Based on weed-based cropping systems</li> </ul>
<p><b>III Germany (DE)</b></p> <ul style="list-style-type: none"> <li>• Led by three researchers from a national agronomic research institute: one senior researcher/group leader (Carl), a PhD student (Gitta) and an additional senior researcher (Katja) (located on a different location)</li> <li>• The researchers are crop protection experts</li> <li>• Co-innovation pilot based on a for the pilot’s purpose formed farmers’ network consisting of three farmers</li> <li>• Based on field vegetables (cabbage-based cropping systems)</li> </ul>
<p><b>IV The Netherlands (NL)</b></p> <ul style="list-style-type: none"> <li>• Led by two researchers from a national applied agricultural research institute (based on two different locations) (Ellen and Frank)</li> <li>• Both researchers are field agronomists</li> <li>• Co-innovation pilot (eventually) based on a regional group of a national farmer innovation network consisting of 12 farmers</li> <li>• Based on field vegetables and arable crops</li> </ul>

## Denmark

The Danish pilot was managed by two advisers from the national Danish advisory service. The co-innovation ‘experiments’ were based on a pre-existing relationship the advisers had with three farmers who were part of a national IPM-demo-farmer network. The farmers were located throughout the country. The co-innovation work carried out in the Danish case focused on IPM in wheat-based cropping systems. Co-innovation was very new to the advisers, until the PURE-IPM-project, they had always operated as traditional (crop protection) ‘experts’ instead of innovation process ‘facilitators’. During the course of the project, the two advisers facilitated several meetings with the three farmers from the network.

The first meetings were very open, the farmers were able to come up with some concrete actions which were strongly related to the pressure felt from the then recent introduction of nitrogen quota's and regulations to reduce the use of pesticides by the Danish government. Concrete actions proposed were 1) experiments with wheat cultivation on wider rows to facilitate mechanical weed control (25 instead of 12.5 cm rows), 2) the introduction of crop variety mixtures to reduce farmers' reliance on fungicides and 3) direct application of slurry to optimise the uptake of nutrients in the system. Experimentation with regard to row-width and mechanical weed control were taken on as a central issue and ultimately all farmers started experiments on their farms. Interesting mutual learning occurred with regard to the lack of equipment and skills in mechanical weed control. After a failed cooperation with a machinery dealer, which afforded them to use some equipment for promotional purposes, they started cooperating with a neighbouring organic farmer who owned necessary equipment and had the skills and willingness to help one of the farmers out during the trials. The synergy created between conventional and organic farming 'know-how' was one of the most remarkable outcomes of this pilot. Although the results of the pilot are modest, the advisers were very enthusiastic about their experiences to working with a new more participatory approach and keen on giving co-innovation a place in their future work as well.

## **France**

The French pilot was managed by a team consisting of one researcher from the French national agricultural research institute, one adviser from a local chamber of agriculture. The latter one participated in the facilitation of the co-innovation process, but formally was not part of the PURE-IPM-project. The French pilot was based on the relationship the local adviser already had with five farmers from a pre-existing farmer learning group (25 farmers, cattle breeders and arable farmers) who had already been exchanging technical and economic knowledge for over twenty years. In fact, some of the members' parents had already been members of the network. The researcher and advisers initial plan was to use the work package to implement a certain method on wheat management (hardy wheat management). Very soon this plan was however rejected by the farmers as they found it not fitting their most urgent problems. To identify a common problem, the researcher and advisers therefore organised some brainstorm sessions. Although it was not easy to identify a common problem initially, one was found eventually in the increasing weed problems in the wheat-based cropping systems (e.g. black grass). As re-designing crop rotations was known by the advisers to be effective in fighting the weed without an increase in the use of herbicides, the pilot team

proposed to jointly re-design each other's cropping systems. The proposal was accepted and eventually five successful 'co-design' workshops were organised on every farm. The co-design workshops were based on the cropping system simulation model DEXiPM which was developed by the French national agronomic institute<sup>3</sup>. This model helped the pilot members and farmers to redesign the cropping system and assess its performances according to economic, social and environmental criteria. The work package was quite successful as four out of five farmers were not afraid to also implement their re-designed cropping systems. Apart from the implementation, the changes in cropping systems had good results with regard to their impact to weed control as well. Finally, the pilot had opened the pilot team's eyes that 'co-innovation' can be a very effective method to facilitate behavioural change. After PURE-IPM, the pilot team stayed together and the co-innovation approach was taken on again in the design of a new project focusing on innovations in wheat-based cropping systems.

### **Germany**

The German pilot was managed by three researchers working for the federal agricultural research institute. The team consisted of a junior researcher (PhD-student), a senior researcher/group leader and a senior researcher based on a different location of the institute. The latter one was not directly involved in the actual facilitation of the co-innovation but more as an 'external' observant. The co-innovation work was based on a partnership with three cabbage farmers located in the north of the country (two conventional and one organic grower). The engagement with these farmers started as they were already hosting field trials in the context of work package four (field vegetables). The main aim of the German team was to introduce IPM-methods to the farmers, especially the monitoring of pests in the cabbage crops (e.g. trips, caterpillars). The organic grower was part of the group to create synergy between the conventional and organic cultures. Whereas the other country pilots were more based on joint meetings, the German researchers worked more strongly together with farmers on an individual basis. Early in the process, the researchers realised that – for the co-innovation work – the farmer group was however not very well chosen. The geographical distance (a four hours' drive) challenged them to develop a good relationship with the farmers, something which is essential for co-innovation. Much trouble was caused in the spring of 2014 when they invited a journalist to write an article about the co-innovation pilot

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<sup>3</sup> For more details about DEXiPM see: <http://www.inra.fr/en/Scientists-Students/Agricultural-systems/All-reports/Modelling-and-agrosystems/DEXiPM/%28key%29/2>.

of the researchers. When it got published in the growers' magazine, the researchers got much negative feedback, from the farmers and particularly from their local adviser who felt the opinion of the researchers were harming his interests with the farmers. The article-incident formed a very severe setback for the pilot as it took them a lot of time to get everyone on board again. Eventually, one of the two conventional growers withdrew from the pilot because of the article. The only conventional farmer left in the pilot argued that the collaboration with the researchers opened his eyes about pests in his crops. Whereas he formally strongly relied on his adviser regarding pest infestations and control, he was increasingly inspecting his crops himself as well as forming his own opinion about pest control. The researchers were very positive about their experiences as well. They used their experiences in the pilot to design the meetings and interactions they had with a then new German demo-farm network.

### **The Netherlands**

The Dutch pilot was managed by two researchers from a Dutch applied agricultural research centre. They were part of the same organisation, yet based on two different locations. Like the researchers from the German pilot, the Dutch researchers did not start with a network already familiar to them (unlike the Danish and the French). Instead, they challenged themselves to find a new one. Eventually, two different groups could not be motivated for 'co-innovation'. After these two failed attempts, they found one in the context of a national farmer innovation project where one of the researchers was working on. In this project, arable farmers and the industry worked together for a more sustainable food production. The adviser is managing eleven of these innovation groups. The two failed attempts were a great setback for the pilot team with regard to their proceedings in the work package. Close to the end of the PURE-IPM-project, the co-innovation process was therefore still in a rather immature state, focusing on finding common ground. In contrast, at this stage, the Danish and French cases were already able to reflect on the results of their IPM-field trials. The Dutch pilot managed to find common ground in the first meeting with the strategic question: how to grow healthy crops in a situation in which the use of pesticides is not allowed anymore? Next to the meeting held with the farmers, the researchers organised a similar one with the industrial partners part of the project. Although the first meetings were considered a success, the researchers were rather worried how they could keep the group's motivation up as well as how to stimulate concrete actions.

### 3.4. Data and analysis

For the purpose of this study, each pilot's key events, dynamics and institutional contexts were reconstructed based on the available project reports, pilot team members' self-reflection documents and recorded reflexive video meetings. During the summer of 2014, all four cases were visited and additional in-depth interviews were held with all the researchers/advisers of the four pilot teams (ten interviews in total). To generate unique personal accounts, each pilot team member was interviewed individually. In Denmark, France and Germany, some farmers were visited as well to also take their site of the story into account. The farmers in the Dutch case were not visited during the summer of 2014 as the process was still rather immature during this period.

The in-depth interviews held with the researchers/advisers of the country pilots were based on a semi-structured interview guideline. The questions stimulated the researchers/advisers to reflect on the institutional dimensions and subsequent factors which, according to them, had governed their co-innovation work during the project. The interviews with the Dutch researchers were done in Dutch<sup>4</sup>, the other ones in English. The conversations were audio-recorded and fully transcribed by the first author of this study.

This study aimed to find out how the researchers'/advisers' institutional contexts governs their behaviours in doing co-innovation. The main data used for this purpose were generated during the additional round of interviews with the researchers/advisers. The transcripts made from the interviews held with the individual researchers and advisers thus were the main subject of our analysis. Our analysis was carried out in three phases. 1) The analysis was started by first identifying the main institutional dimensions in the case of the PURE-IPM-project (see figure 1). This was done based on our literature, our knowledge about the project and the rough data. The dimensions identified served as the main structuring framework for the second phase of the analysis. 2) In the second phase, the transcribed interviews were studied intensively and (manually) scanned on fragments containing potential factors for each identified dimension. Each of these parts were structured under the framework of dimensions. During several rounds, the factors were studied again and if needed restructured and –defined until a saturation point was reached. 3) In the third and final phase, the dimensions and the factors were 'fine-tuned' again and structured into a concrete table

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<sup>4</sup> The interviews with the Dutch pilot team members were done in Dutch as this was the mother tongue of the researcher who conducted the interviews. This researcher is the first author of this study.

with the preliminary findings.

To allow an objective analysis, the work for the three analytical phases was mainly done by the first author of this paper. As the first author became part of the supervising team only during the last year of the project, he was in possession of a pair of relatively ‘fresh eyes’ to do the analysis (compared to the supervising team who had been part of the project and the process from the very beginning). The supervising team did however played an important role with regard to the validation of the preliminary findings. To validate the preliminary findings, the table was discussed and (where needed) revised in individual meetings with the two members of the supervising team. An additional and more joint validation was done during the autumn of 2014, during the final joint work package meeting organised by the German work package team<sup>5</sup>. Here, the framework – with its dimensions and factors – was intensively discussed during an interactive meeting with the supervising team as well as all the work package’s pilot partners. The dimensions and factors were all presented and stuck to a wall for the participants to comment/complete and amend. Although no profound changes were necessary, the interactive meeting formed a valuable validation moment for our findings.

## 4. Findings

### 4.1. PURE-IPM’s institutional dimensions

This study aimed to 1) unravel the institutional context of the PURE-IPM-project and 2) to identify key factors governing researchers’/advisers’ behaviour in ‘doing co-innovation’. We will first go into the eight institutional dimensions identified in the PURE-IPM-project case.

The reconstruction of the four country-pilots and the additional interviews held with the researchers/advisers unveiled eight institutional dimensions. The dimensions are listed and explained below in table 4.

**(Explain the different institutional dimensions)** Table 4 shows that the institutional dimensions of the four co-innovation pilots were found as forming a strongly multi-dimensional social structure. In their attempt to ‘do co-innovation’, the researchers/advisers are subject to institutional forces playing a role in eight different dimensions: 1) personal, 2) organisational, 3) pilot team, 4) pilot basis, 5) PURE-IPM, 6) work package, 7) country AKIS

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<sup>5</sup> During the course of the project, each of the work package’s pilots were visited by the whole work package 13 team to exchange their experiences (see also paragraph 3.2.).

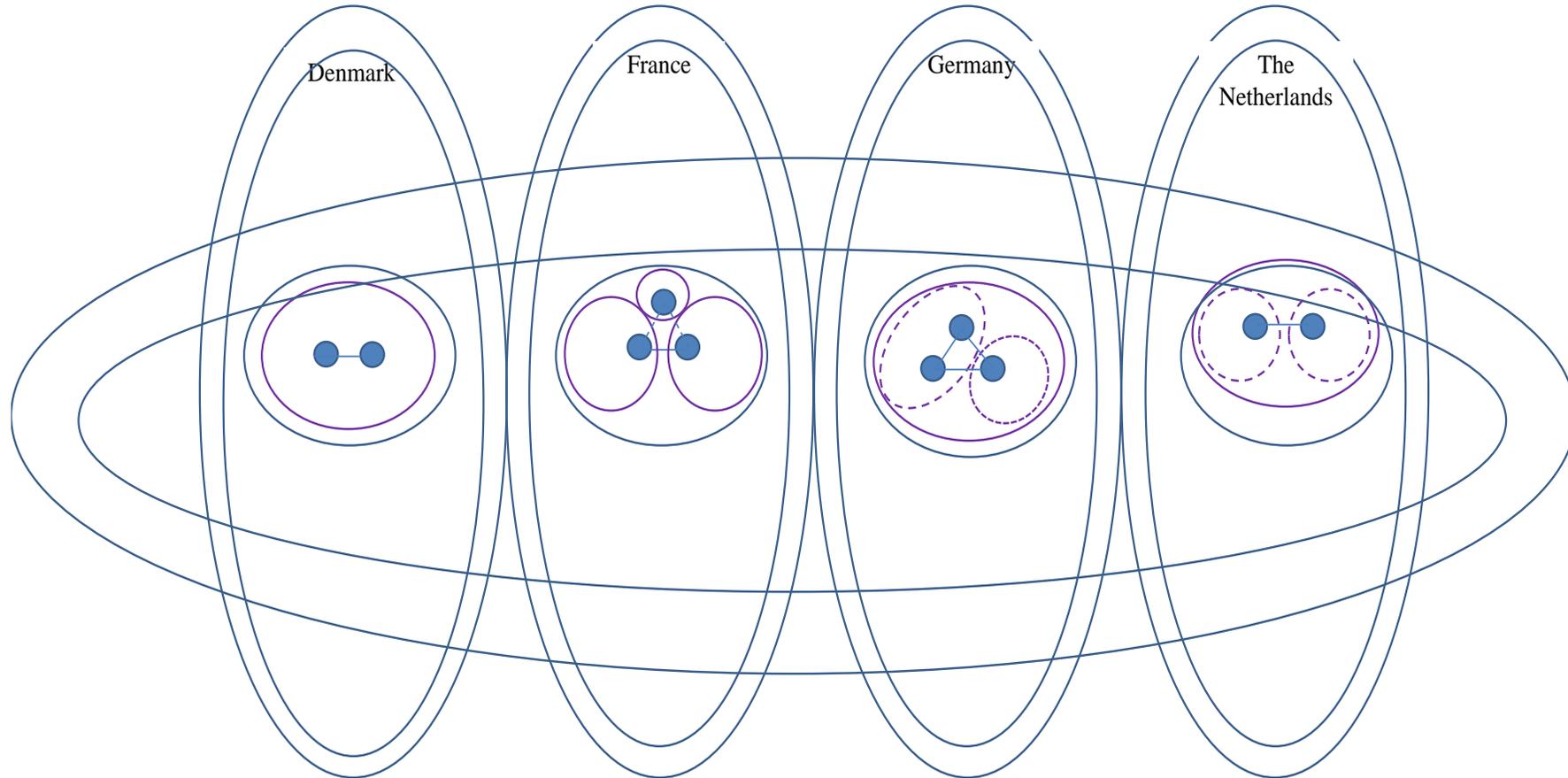
**Table 4:** the identified institutional context dimensions and their explanation

<b>Institutional context dimensions</b>	<b>Explanation</b>
1. Personal	The individual researcher’s/adviser’s personal ‘baggage’, their norms values, the way how they deal with institutions
2. Pilot team	The group of researchers/advisers leading the country pilot
3. Organisational	The organisations with which the researchers/advisers are affiliated with
4. Pilot basis	The projects on which the pilot is based
5. WP13	The context embodied by work package 13
6. The PURE-IPM-project	The larger PURE-IPM-project embedding work package 13
7. Country AKIS	The country pilot’s Agricultural Knowledge and Innovation System as forming the wider stage of the co-innovation work
8. Country level	The country with its specific cultural norms, rules and regulations

and finally, 8) country level. Dimension five and six – norms, values and shared expectations on 5) work package 13 and 6) PURE-IPM level, grey in table 4 – are different as they are shared by all four country pilots. In contrast, the other dimensions (1-4 and 7 and 8) are country-pilot specific. The dimensions are ordered starting from a small scale (personal level) to a large scale (country level).

For more understanding, the four country pilots and the eight institutional context dimensions are visualised by figure 1. Aside from visualising the different institutional dimensions, figure 1 also displays the differences between the four country pilots very well.

**Figure1:** The country pilot teams and the dimensions of the institutional context



In figure 1, the blue dots symbolise the researchers/advisers in charge of the co-innovation pilots (dimension 1). The dots are connected with lines symbolising their cooperation and the pilot teams (dimension 2). In the case of the French pilot, the lines to the upper dot are dashed as the adviser (Valentine) played an important role in the pilot, yet formally she was not part of the PURE-IPM-project.

The pilot teams (or the grouped blue dots), are all part of certain purple organisational dimensions (dimension 3). In the case of the French, the partners are all part of different organisations. In contrast, the Danish, German and Dutch researchers/advisers are part of similar organisations, yet the latter two are operating in separate organisational units (hence the dashed lines).

The larger blue circles containing the purple ones symbolise the projects on which the pilots are based (dimension 4). Taking all this together, the country pilots are horizontally grouped in two shared dimensions which are formed by 5) work package 13 and 6) the PURE-IPM-project.

Finally, vertically again, all four pilots are part of their separate 7) country-specific AKIS and 8) country dimensions.

To close, in this paper, the institutional dimensions are presented as eight rather exclusive layers. In reality these layers are off course strongly interconnected. Institutions on an AKIS-level are for example connected to those on organisational level which then govern the behaviour of the researchers/advisers. This dimensional interconnectedness is therefore the reason that some of the factors found in the analysis could be discussed under more than one dimension.

## 4.2. Institutional factors

For each of the institutional dimensions, one institutional factor was identified which was found to be affecting the researchers'/advisers' behaviour in doing co-innovation. The factors are listed below in table 5. Again, the shared dimensions (5-6) – similar to all four country pilots – are marked in grey.

As described in the theoretical framework of this paper, we see the researchers'/advisers' individual behaviour as a product of and subject to certain institutional forces or factors, in past and present times. These factors can be seen as 'operating' in different dimensions. In the following paragraphs, each of the eight factors is explained in detail. The discussion is structured around the eight institutional context dimensions found

(table 4). Our findings are supported and illustrated with (translated) fragments from the interviews held with the researchers/advisers. We will start with the dimension and factor on the ‘lowest’ level (personal) and end with the one on the ‘highest’ level (country specific norms).

**Table 5:** institutional context dimensions and key factors affecting researcher’s/advisers’ behaviour in doing co-innovation

Institutional context dimensions	Key factors
1. Personal	<ul style="list-style-type: none"> <li>• ‘Fixed’ professional identities, roles and routines</li> </ul>
2. Pilot team	<ul style="list-style-type: none"> <li>• Composition of country-pilot teams</li> </ul>
3. Organisational	<ul style="list-style-type: none"> <li>• ‘Fixed’ institutional roles and objectives</li> </ul>
4. Pilot basis	<ul style="list-style-type: none"> <li>• The specific projects on which the pilots are based</li> </ul>
5. WP13	<ul style="list-style-type: none"> <li>• Institutions within the work package</li> </ul>
6. The PURE-IPM-project	<ul style="list-style-type: none"> <li>• Institutionalisation of co-innovation within the PURE-IPM-project</li> </ul>
7. Country AKIS	<ul style="list-style-type: none"> <li>• The institutional landscape of the Agricultural Knowledge and Innovation System (AKIS)</li> </ul>
8. Country level	<ul style="list-style-type: none"> <li>• Country-specific cultural norms</li> </ul>

#### 4.2.1. Personal

##### ‘Fixed’ professional identities, roles and routines

In relation to researchers’/advisers’ taken for granted positions and roles in research and advice, co-innovation is a new game with new rules. In order to be successful, researchers/advisers need to develop new identities, roles, routines and subsequent skills.

According to the French researcher and a Danish adviser:

*“[...] [co-innovation] it’s not so easy because each one of us [the pilot team members] has its routines.”*  
(FR-Yann)<sup>6</sup>

*“Well [co-innovation is a] bit different, yes, a lot of what we do as advisers and particularly here, is the traditional linear approach to advising, you collect some knowledge, you do your best to digest it with the eyes of advisers of farmers and you try to think: ‘how can I best convey it to the end-users?’ So yes, that’s a very linear approach to me.”* (DK-Lukas)

<sup>6</sup> Every interview fragment is marked with a country-pilot code (DK, FR, GER, NL) and the name of the respondent.

Despite some personal differences, the researchers/advisers have generally felt rather uncomfortable and under skilled in doing co-innovation. The researchers/advisers are no facilitators, nor social scientists but mere technical specialists (in agronomy, crop protection). They are moreover used to play up to the role of ‘the expert’ in doing research or in advising farmers.

Aside from the shared challenge to step out of their trusted and expert roles, researchers and advisers were found to be faced with some more rather specific challenges.

To start with the advisers, they seemed to be conditioned in their role of ‘the adviser’ which means: providing their customers (farmers) with solutions to practical farming problems such as rotations and crop protection.

In the following fragments, advisers (name) and (name) articulated very well their challenge of stepping back from their advising role:

*“[...] some advisers find it very hard not to give the world of knowledge when they are being exposed to farmers and other advisers, I think that’s probably the traditional role, the way how we were supposed to work in the beginning [before more participatory methods were introduced] [...].” (DK-Lukas)*

*“[...] we asked Laurent and Jean-Claude to stay on the chairs and to say nothing for three hours. This was very difficult for them but very useful for the process [...]” (FR-Valentine)*

The researchers on the other hand, seemed to be caught in their role of desk and lab scientists. Apart from the challenge to involve farmers into their work, they were found to have particularly been struggling with getting in touch with the farmers in the first place:

*“Anyway, basically, we are researchers, so we don’t do these things very often [interacting with farmers, facilitate meetings].” (NL-Frank)*

*“Yes it is [co-innovation as something very different from your normal practices], I mean, normally you don’t have so much exchange in advising farmers, therefore it’s a new method and something new in my scientific life [...]” (DE-Katja)*

Interestingly, although researchers as well as the advisers were found to have experienced their profession specific challenges, the researchers generally considered the advisers as being more advantaged. The advisers were generally seen by the researchers as being better connected to farmers and often also better able to act as facilitators of interactive processes.

In short, in contrast to their taken for granted roles of ‘the scientist’ and ‘the adviser’, co-innovation was seen as a very different job by all the researchers/advisers. Co-innovation assumes the researchers/advisers to develop different identities, roles and routines as well as new knowledge and skills. Nevertheless, researchers and advisers experience their challenges in doing co-innovation in rather different ways. The researchers generally considered the advisers as better equipped for doing co-innovation than themselves.

#### 4.2.2. Pilot team

##### Composition of country pilot teams

The pilot team in which the individual researchers/advisers were operating in during the project was identified as the second institutional dimension affecting researchers/advisers behaviour.

On this level, the specific composition of the pilot team – whether consisting either of researchers or advisers or a combination of both – was found to be a very important factor to understand the success of each pilot. Key seems to be a diverse pilot team, which includes researchers as well as advisers.

In the words of the French adviser Laurent:

*“It’s a package; the chambre d’agriculture, the research institute and the method [provided by the departmental chamber of agriculture]. We [the local chamber] are in the interface of the farmers, the research institute and the Chambre Régionale [the regional chamber of agriculture] provides the methods.” (FR-Laurent)*

As mentioned earlier in this paper, the **researchers** in the project particularly see the involvement of advisers as a key to success. Again, the advisers’ link to practice and farmers is considered as a valuable asset for doing co-innovation in the PURE-IPM-project. In some of the researchers’ own words:

*“Well, I think that it’s a clear advantage if you have an adviser in your pilot group as a permanent member. They have a better link to the farmers.” (DE-Katja)*

*“I think that one main thing, in the cases of Denmark and France, that the advisers are involved, they are real advisers, they are working every day more or less with the farmers, that was not our case. That makes it a little bit more complicated. If I were an adviser for the cabbage growers, it would be... [a lot*

*easier]. Do you see the difference? It is advisers' main task, I'm more or less a researcher, administrator, so we're not that close and do not have contact [with farmers] every week like the other pilots do.” (DE-Carl)*

*“It seems to me, the German team is not so close to practice. That's quite a point: if you want to implement something in practice, you should have a good connection to this practice, that's quite a point. In Denmark, that [connection] is much stronger, in Denmark they are [the pilot is done by] advisors and in Germany they are researchers, I mean real researchers. That's something in my view. In France they have a combination of advisor and researcher, that's why it goes so easy there, in my view. To me, that's playing quite a role.”*

*(NL-Ellen)*

The diversity of the pilot teams – or the inclusion of researchers – was however also found to be valued by the advisers. Initially, one of the French advisers considered his new role in doing co-innovation for instance as hazardous to his position as an expert adviser. The involvement of the other parties – and especially a researcher of the by farmers highly esteemed national agricultural research institute – was considered as a way to stay respected in his new role. The composition of the team provided him with a “safety net”. In his own words:

*“It's not easy to change your role because finally this system [Michael points at the flip-over on which he drew the traditional linear approach to innovation] worked very well, the farmers agreed with that, this system is implemented since twenty years or more so for the farmers, what's the reason to change that, so it's very comfortable for the farmer and for me to stay in this situation, but in this situation [points at another flip-over with a drawing of co-innovation] it's a little more dangerous for me because you're going on an adventure finally, when we started the first workshop, the first meeting with the group, we didn't know which direction we would finally go with the group [...] the difficulty is, when you're here [points at the traditional linear approach again] you have a good image for the group, for example, he's a good adviser, very good, when you try something new, and you fail, it could be dangerous for you because after, when you come back to the group, they could say: 'well, what he proposed for us, it was not very interesting', so it could be dangerous for me too. The fact to be helped by the national research institute and the Chambre Régionale could be something like a 'filet de sécurité' [a safety net]” (FR-Laurent)*

### **4.2.3. Organisational**

#### **‘Fixed’ institutional roles and objectives**

The third dimension is related to the organisations within which the

researchers/advisers are operating. Research organisations and advisory services clearly form contexts providing specific opportunities and challenges to do co-innovation.

Compared to research organisations, advisory services were seen to form institutional contexts which are more conducive to co-innovation. In general, supporting farmers is a key mission of advisory services. Although co-innovation was still very new to the project's advisers and their organisations, it fits their organisational culture.

One of the Danish advisers:

*“[Co-innovation] is very much in line with what we [his organisation] want to engage in for the future. As an advisory service, owned, ran and paid by farmers, you know, we really need to address their needs [...]” (DK-Lukas)*

*“[...] it is not [a problem], I need to do what I need to do, I can do this [co-innovation] very easily because, this is a way to do some ‘terrain’ as we say in French [to go out into the field].” (FR-Valentine)*

In contrast, the researchers considered doing co-innovation generally as much more problematic. The prevailing ‘publish or perish’ norms in research were seen as creating organisational climates not very conducive to adopting co-innovation. This was especially experienced by the German researchers as their organisational ambitions were increasingly being based on publishing high impact scientific papers. According to one of the German pilot's researchers:

*“Yes, it's a little bit of a problem [co-innovation], we have to do more fundamental research, looking for good papers, high scientific impact, I think with the co-innovation project, you cannot have such high scientific publications.” (DE-Carl)*

Another and very specific challenge brought forward by all researchers is the disciplinary focus and structure of their organisation and departments. Generally the researchers are specialist in technical domains (such as agronomy or entomology) and operate in departments ordered on a similar disciplinary basis (see also personal level, section 4.1.). The researcher in the French pilot was very explicit about this challenge. Working increasingly on co-innovation – and strongly motivated to do even more so in the near future – he felt increasingly out of context in his mono-disciplinary and theory-minded department:

*“I'm struggling because [my institute] is mainly dominated by not social disciplines but by technical,*

*bio-physical disciplines. There are very few social scientists in my institute. [...] when we speak about IPM for instance, IPM is not dominated by social scientists, policy and so on but by the specialist of pesticides [in my organisation], we have a hard debate on this subject [...]"*

*"[...] it will be easier for me to work in the other department [the more action-research oriented department of his institute], it's a question also how to work between disciplines, I'm from a technical discipline but it might be better for me to be in a social department [...]"*

*"[...] the organisational structure [ of his institute] is from time to time an obstacle to this kind of interdisciplinary activities [such as co-innovation]. It is also an obstacle to transversal activity between advise and research and so on [...]" (FR-Yann)*

Next to the disciplinary challenges, Yann also experienced some doubt with regard to the involvement of farmers in his research. In his institution there are different opinions about the actual value of farmers' knowledge. Some researchers seem to think that *"[...] the only good knowledge or 'noble' knowledge is scientific knowledge"*.

Another concrete challenge on an organisational level was found to be the norms with regard to accountability. To different degrees researchers and advisers were found to have struggled with their organisation's performance requirements, particularly related to acquisition of new projects during the PURE-IPM-project. Co-innovation is a labour intensive process and there is no guarantee that it will actually generate 'results'. In all cases, these characteristics are at odds with the researchers'/advisers' organisational norms on accountability.

Particularly faced by accountability norms were the Dutch researchers. As their research institute had become strongly market driven more recently, accountability norms were felt as relatively strong. Consequently, all of the researchers' worked hours need to be covered by a financed project. Both researchers perceived their organisation's accountability norms as conflicting with the room for manoeuvre required by co-innovation. Co-innovation can take a lot of time. Extra complicating factor in the case was the tight budget of work package 13 within the PURE-IPM-project (more about that in paragraph 4.6.). The Dutch researchers were particularly challenged in this context as it took them quite some time to form a suitable network for their pilot (see the summary of the Dutch country pilot in paragraph 3.3.). In the following fragments, the Dutch researchers articulate their struggle between taking time for co-innovation and being accountable:

*"[...] yes, at some time, we face also the practical issue that we are a project organisation, so we can't*

*facilitate a group or do research without any limits, that might be different for a facilitator of a group. That's something we come up with quite often, I do realise that it should not be a reason against, I agree with partially [...] anyway, look, it's easy to say no time is budgeted so I can't do that, but you have to be very critical how to spend time. That determines that we have to be critical if there is energy [in a group or project].” (NL-Frank)*

*“What we say is basically, we need a project for this, we can only do things if they are paid. That's why we face that we want to do something when there is no budget in the beginning, because we don't know which parties could be approached, because we don't know what will be the outcome. You'll understand, that's something that...” (NL-Ellen)*

#### **4.2.4. Pilot basis**

##### **The specific projects or farmer groups on which the pilots are based.**

A fourth dimension distinguished in the case of PURE-IPM is ‘the pilot basis’ or, in other words, the existing projects or groups on which some of the pilots were based. The institutions present in these existing projects or groups form an important dimension governing the behaviour of the researchers/advisers. The projects/groups are also key in explaining the successes and/or challenges of the four country pilots.

In contrast to the Dutch and the German pilots – which first had to form a suitable farmer group before they could start the work – the Danish and the French teams based their co-innovation experiments on pre-existing and to them familiar farmer groups. These farmer groups were found to be communities providing institutional context very conducive to co-innovation.

The Danish team was clearly relatively advantaged as they used a demo-farmers network for their co-innovation experiment with which they had been working with for many years:

*“No it was a challenge [experimenting with co-innovation] but, think from the beginning, the farmers were very positive, they did not reject the idea, there is this guy and he is enrolled in this EU project and I'll do this just to please him because he thinks this is important, I think the attitude from those we asked to participate was very positive from the beginning and that also helps you to..., it's easy to get started, because I thought getting started was one of the most difficult things [...]” (DK-Lukas)*

Below, the Dutch researcher points at the fact that they did not have such a ‘ready-to-go’ group, like the Danish and the French teams had. The lack of an existing group was

clearly considered as a cause of their start-up problems. In addition, he also pointed at the fact discussed earlier in this section (paragraph 4.1.) that with their access to farmers, advisers are better equipped to do co-innovation:

*“We did not have an existing group in the beginning of the project. The advisory organisations in PURE did already have a group which they facilitated, so they started working with them. For us, firstly we wanted to start quite from scratch: let’s try to identify a topic that generates energy and form a group around it, instead of taking a group and find out on what topic they have energy.” (NL-Frank)*

In contrast to the German and the Dutch, the Danish and the French teams thus had access to ‘ready-to-go’ communities of practice or groups of farmers which have a strong sense of belonging and identities as well as ambitions towards innovation and change. Also relevant in the context of the institutions in this dimension is the fact that the Danish and French were dealing with farmer groups with relative ‘open agenda’s’ which provided a conducive context for the fuzziness co-innovation. In contrast, in the last phase of the PURE-IPM-project, the Dutch finally managed to base their co-innovation work on a group of farmers united for a clear project. However, as this project had a clear agenda, objectives and methods, it provided a context with rather specific opportunities and challenges with regard to co-innovation.

#### **4.2.5. Work package 13**

##### **Institutions within WP13**

The work package 13 on itself was found to be an important institutional dimension too. Together with the PURE-IPM-project (paragraph 4.2.6), this dimension forms one of the two dimensions shared by all of the four country pilots.

Important in this dimension are the shared norms with regard to co-innovation as an alternative to the more ‘traditional’ linear approaches. Within the work package, the four country pilots and the two ‘supervising’ researchers formed a close community with a strong belief in the value of co-innovation. This joint belief was found to generate much positive energy to experiment with it. This, in our eyes positively affected the behaviour of the individual researchers/advisers as well as the country pilot teams to make co-innovation work and to demonstrate its value to the whole PURE-IPM-project community.

Aside from a source of energy, the work packages’ strong belief also caused some frustration among the researchers/advisers. Although the work package formed an inspiring

environment, reality was often less conducive to co-innovation.

As mentioned above, the researchers/advisers united by the work package can be seen as a community of practice, a stimulating community which offered a ‘playground’ for farmer participatory research. Indeed, the work package provided a context in which the strongly motivated but rather unexperienced pilot teams were offered room to ‘experiment’ with the implementation of a new and more participatory approach to their work. Together with the shared belief, this learning culture was found to provide a very conducive context for co-innovation (for more details about the learning culture see paragraph 3.2). In the following fragment, one of the Danish advisers reflects on the learning culture in work package 13:

*“Well I think we all benefitted from each other’s experience and applied, well we didn’t apply so much from the others but there was at least to hear and to listen about their processes and other pilots that was very interesting and I think it also actually shows that it’s more about the process than the results and that it’s always one step forward and sometimes two steps backwards and again one step forwards so that it is not such a straight process as probably all of us has thought in the beginning.” (DE-Katja)*

Apart from stimulating reflection, learning and action, the work package’s learning culture was also found to stimulate a certain degree of competitiveness among the four pilot teams. Indeed, the relative successful Danish and French pilots seemed to have set high standards especially sensed by the Dutch. In one of the researcher’s own words:

*“[...] from a project is expected to deliver some result. I believe you can’t just say we had very good discussions and we have good plans together, we listened to each other, but we did not do anything, that’s not what you want.” (NL-Frank)*

Apart from work package specific norms, this issue could also be related to more general professional institutions with regard to generate concrete results. It can be uneasy for researchers/advisers to accept the fact that co-innovation processes do not always generate concrete results such as scientific papers.

#### **4.2.6. The PURE-IPM-project**

##### **Institutionalisation of co-innovation within the PURE-IPM-project**

Next to work package 13, the sixth – and second shared institutional dimension – is formed by the PURE-IPM-project itself. The structure and architecture of the PURE-IPM-

project as well as the norms, rules and regulations were found to have shaped the behaviour of the researchers/advisers in doing co-innovation.

Although work package 13 provided the researchers/advisers with a context conducive to co-innovation (see previous paragraph), their ‘co-innovation playground’ was embedded in a rather technical oriented, conventionally structured and minded project context.

A mismatch between the objectives and methods of the different work packages for instance provided some tensions for the researchers during the start of the project. Already in an early phase it became clear that the original plan to use the ‘content’ or ‘crop-based’ work packages (see table 1: work package 2 – 7) as a basis for work package 13’s co-innovation ‘experiments’ did not work. Hit particularly by this mismatch was the PhD project of one of the German researchers [Gitta]. It proved to be a great challenge to combine her work for the cabbage work package (WP4) and the co-innovation experiment (WP13) as her PhD. During the course of the project, the co-innovation work package stayed a bit of ‘the odd man out’.

Another issue related to the architecture of the PURE-IPM-project was the fact that – in terms of financial resources – the co-innovation work package was a very minor aspect of the project. Within PURE-IPM, the financial emphasis was on the content work packages (see table 1: work packages 1 – 11). Co-innovation formed a minor aspect of the project, absorbing 2% of the budget. The tight budget formed a challenging context for the researchers/advisers to work on co-innovation, which can take a lot of time.

Whereas the Danish and the French team found ways to spend the required time on co-innovation, the Dutch and German teams struggled a lot more to find the financial legitimacy in their organisations to fully devote themselves to co-innovation. These challenges are also partly related to the fact that the Danish and the French teams are advisers and compared to the researchers (the Dutch and Germans) are considered to have better access to farmers. In addition, compared to the researchers’, their organisational cultures are also more conducive to co-innovation. An extra handicap for the Dutch and the Germans was that they started from scratch which needed them to spend even more time on co-innovation.

In the following fragments, first a German and then a Dutch researcher reflect on their financial challenges:

*“We have no budget for this co-innovation package so..., we have to do it extra more of less” (DE- Ingrid)*

The Dutch researcher feels particularly challenged as there are strong norms with

regard to accountability in his organisation.

*“[...] you must have budget for it, otherwise we are not allowed to do anything, or let’s say, almost nothing, and in this project there is only very little budget anyway, like for really this action...” (NL- Ellen)*

Finally, the architecture of PURE-IPM however does not only provide the researchers/advisers with challenges. Although, indeed the tight budgets seem to be challenging some of the pilot’s researchers/advisers greatly, the relative minor position of work package 13 did provide the researchers/advisers on the other hand with relatively more room for manoeuvre. The ‘strangeness’ of co-innovation and separateness of the work package within the largely conventional minded and shaped PURE-IPM-project, added to the learning culture referred to earlier in this paper (see paragraph 3.2. and 4.5). The researchers/advisers had room to ‘experiment’ with the implementation of a new and more participatory approach to their work. It was allowed to make mistakes.

#### **4.2.7. Country AKIS**

##### **The country pilots and the institutionalisation of the country’s Agricultural Knowledge and Innovation Systems (AKIS)**

In practice, participatory research, or in our case co-innovation, means a new game with new rules. In the case of all four country pilots, the existing Agricultural Knowledge and Innovation System (AKIS) was found to be not compatible with this new game. The incompatibility was found in all four cases, however with some country specific differences.

In the case of Denmark, Germany and France, the researchers/advisers were struggling as they perceived their positions and roles in the AKIS as very fixed. In Denmark for instance, the advisers were well aware of their position in the field. The Danish agricultural advisory system is based on two layers: advisers working on a national level and those working locally. As operating on a national level, the advisers in the pilot felt they needed to respect the system and to avoid too much trespassing on the local level. In fact, they experienced that bypassing local advisers does not benefit the co-innovation process:

*“[...] the local advisers, they have their territory, if we try to interfere their business [as national advisers] we are already out of how we should normally work, we need to respect the two layered system [with general and local advisers]. [...] there are some restrictions to the system, you know, if a*

*local adviser is really keen on something he can be a real blocker in the process of co-innovation.”*  
(DK-Lukas)

The challenges with regard to fixed roles were also found in the French case. Like the Danish advisers, the French team experienced that some actors in the AKIS were not particularly fond of them ‘trespassing’ on their domain:

*“[...] for decades, the main way to work was, researchers find things, the technical institute translates, and the advisers of the chamber of agriculture brought it to the farmers, this is how things have always been done”.*

*“Our design workshop activities, have completely changed the roles of and relations between the actors in the landscape [the AKIS]. In this case, new knowledge is not only produced by scientists but increasingly in cooperation with farmers. These changes can disturb some actors: what’s their role in this new landscape? [...] we have some struggles with certain persons in the landscape because they don’t think it should go like this.”*

Similar findings with regard to fixed roles were done for the researchers in Germany. As they are researchers, their challenges were however more related to their role and position in research. According to a German researcher, the AKIS is characterised by fixed roles:

*“I think we have a culture of working in very fixed roles, so if you are an adviser, you talk to farmers, if you are a scientist, you stay in your lab and do whatever crazy thing comes into your head but don’t interfere with or try to be an adviser. I think that’s general of the system.”* (DE-Katja)

In the case of Germany – being a federal state – the roles have also been organised based on different state-levels. These structures are also important with regard to institutions governing the actions of the German researchers on AKIS level:

*“[...] we have the split between the federal activities and the activities of the Bundesländer [state-level]. It is clearly defined that the Bundesländer are in charge of advising and teaching and these kind of things, that’s part of the work that the Länder do. Federal institutions, like us, we are responsible for the scientific work. Our clearly defined roles are a challenge when you start mixing and if you go and try to do some work which is actually a Bundesländer domain. You should not go and interfere”.* (DE-Katja)

*“[...] it is laid down in the German plant protection law. The different states are responsible for advice, the federal research [like his organisation] has nothing to do with this. We can do it but only together with the Plant protection service of the different countries [the Bundesländer].”* (DK-Ingrid)

Interestingly, in contrast to the challenges with the fixed roles experienced by the Danish, French and Germans, the Dutch pilot team members argued that their AKIS could benefit from some more structure. They argue that the AKIS was ready for more participatory approaches but to make it work they need a better cooperation in the field. In addition, strong competition between the players in the field due to the recent liberalisations of the AKIS, make cooperation not very easy.

*“Globally, it’s ready, the elements are there to create a success [with co-innovation], but what’s necessary is a constructive cooperation between parties [in the knowledge and innovation system]. Comparing the Netherlands with France, in France it’s a common agreement about who does what, that’s the role of the Chambre d’Agriculture, that’s more the domain of the national research institute... In the Netherlands, it’s more up to the market, that means that we are competing, means that the advisory service now also conducts research. Within a subsidy scheme like praktijknetwerken (innovative networks), you would expect cooperation between research and advisory services, because advisors often have their networks in practice. They know what’s going on in practice and they know that research could bring in the content, and there is some overlap. Currently, this overlap is much bigger, but we [research] don’t have the tentacles in practice and the advisory service does not have access to fundamental and strategic research. With this overlap there is a competitive situation and this is very difficult to realise cooperation.” (NL-Frank)*

#### **4.2.8. Country level**

##### **Country-specific cultural norms**

The final dimension identified in our case are country-specific institutions or cultural norms. In the following interview fragments, a Danish adviser and a German researcher compare the different country pilots from a cultural perspective and argue that some contexts are more likely to provide fertile grounds for co-innovation than the other:

*“[...] Denmark is a very egalitarian society, hierarchies are never big and with many levels, so generally people in the bottom of the hierarchy are still empowered to do things and show initiative with a reasonable degree of freedom [...] in Denmark you know we very much have a culture in which everybody can discuss with experts all the time and challenge what they say.” (DK-Lukas)*

*“I think in France the situation is very similar to ours [the German situation] because they also have this clear division of roles and I think science is also sometimes not very much linked to practice, practical farming, so that’s very similar. I think in the Netherlands and Denmark, you do have more of*

*this culture to develop things together". (DE-Katja)*

Compared with the French and the German, the Danish and the Dutch were often seen as having access to a culture more compatible to co-innovation. Although these fragments confirm that country specific cultural norms seem to have also played a role in our case, any harder claims with regard to the effects in the four cases cannot be made. In fact, the successes of the French team seem to suggest that factors on other dimensions – such as personality or the composition of the pilot teams – are more powerful determinants for successful co-innovation than a culturally conducive context.

## 5. Discussion

This paper has contributed to the current literature on the role of the institutional context on farmer participatory research by unravelling the different institutional dimensions of a research project. Although much work points at the importance of the institutional context to understand the unfolding of farmer participatory research projects (Hall and Nahdy, 1999; Martin and Sherington, 1997; Neef and Neubert, 2011), still surprisingly little research has examined the role of the institutional context on farmer participatory research in greater detail.

Our study even goes further by identifying and exploring which institutional factors in these dimensions affect researchers/advisers in doing farmer participatory research. Apart from the institutional dimensions such as *the organisation* and the *Agricultural Knowledge and Innovation System (AKIS)*, our research has also pointed at the research project itself as embodying a number of important institutional dimensions. Whereas the institutional dimensions in the project and its community can be very stimulating for doing co-innovation, back in their day-to-day contexts the researchers/advisers are often confronted with the reality of a very unconducive institutional landscape.

However, although the institutional contexts were found to be rather challenging and powerful in governing researchers'/advisers' behaviours in doing farmer participatory research, some of them demonstrated rather strong degrees of agency by finding and creating niches as well as flexibility and room for manoeuvre to work on farmer participatory research. Others also were less powerful or for some reason choose to do not. An important message of our work is hence that although institutions are rather strong, we do not need to underestimate the power of human agency.

This paper studied how the application of a rather uniform method worked out in different institutional settings. Our findings show that – although the pilots were part of the same project and had been guided by the authors of this paper with similar concepts and approaches – they showed their own dynamics, problems and successes in different contexts. In other words, farmer participatory research methods and approaches cannot simply being ‘transplanted’ from one context into another (Hall and Nahdy, 1999; Klerkx and Nettle, 2013; Tödling and Tripl, 2005). This is an important message as farmer participatory research methods are becoming increasingly popular and are increasingly being applied by large international research consortia working on innovation in different contexts.

As described in paragraph 3.2, the work package 13 was characterised by a strongly developed learning culture. Indeed, the work package provided a context in which the strongly motivated but rather unexperienced pilot teams were offered room to ‘experiment’ with the implementation of a new and more participatory approach to their work. In the context of the PURE-IPM-project, such reflexivity, flexibility and room for manoeuvre had a very positive impact on the process as well as the outcomes of the pilots. The observations of our study show that for many researchers – and in our case also advisers – participation is a learning process as well (Arkesteijn and Mierlo, 2015). Methods such as ‘horizontal evaluation’ as described by Thiele et al. (2007) could for instance be an interesting way to build in reflexivity, foster knowledge exchange in research teams and networks and ultimately improve the research project.

Our study has some important implications for the design and management of future farmer participatory research projects. Researchers first of all need to increasingly take the importance of the institutional contexts into account while designing their farmer participatory research projects. This study teaches us that not giving too much thought about issues such as the selection of project team members or the composition of the teams, will have great implications for the course and the actual results of the participatory research project. Indeed, projects will always have unexpected turns and one sometimes just have to deal with uncondusive contexts, however, we believe that though careful project building a lot of problems can be prevented.

A second message focuses on the role of funders of farmer participatory research projects. This study has shown that farmer participatory research processes are ‘fussy’ and that the researchers – in this case together with advisers – need to grow into their new role. The ‘co-innovation’ work package in the PURE-IPM-project formed a conducive context by providing the researchers and advisers flexibility and room to learn. The importance of room

for manoeuvre is however often at odds with the structure required by funders in terms of detailed work plans, time planning and deliverables during the course of a project. To make farmer participatory research projects work, more flexibility and thus room for manoeuvre is needed. Researchers at the other hand also need to realise the importance of ‘room for manoeuvre’ and create it for themselves in the projects they design.

## 6. Conclusion

Based on a qualitative comparative analysis of four different farmer participatory research ‘experiments’ taking place in four different institutional contexts, this paper ‘peeled off the institutional union’ and identified seven major institutional dimensions.

The institutional dimensions distinguished in the PURE-IPM-project are 1) *the personal*, 2) *the pilot team*, 3) *the organisation*, 4) *the pilot basis*, 5) *the work package*, 6) *the PURE-IPM project as a whole*, 7) *the country’s Agricultural Knowledge and Innovation System (AKIS) level* and finally, 8) *country specific cultural norms*. Within these dimensions, eight factors were moreover identified which were found to govern the behaviour of the advisers/researchers in shaping farmer participatory research in the four country pilots (for a detailed overview, see table 5).

More knowledge about the institutional factors and their specific effects is theoretically relevant for our understanding of complex farmer participatory research processes and practically salient to promote successful approaches in different innovation contexts.

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## Appendices

### Questionnaire Researchers/advisers

#### (1) The PURE wp13 pilot team

1. Who are part of the wp13 pilot team?
2. Who in the wp13 pilot team is responsible for what? Why?
3. What specific role do you play in the wp13 pilot team? Why?
4. Why have you initially decided to take part in wp13? Would you do it again? Why, why not?

#### (2) Researchers'/advisers' characteristics

5. How would you define co-innovation at this very moment?
  - a. Has your definition changed in the course of the project?
  - b. Why, why not?
6. Before you became part of the co-innovation work package, have you had any previous experiences with more participatory approaches? If yes, how?
  - a. Does this type of method suit you? Explain.
7. Do you think co-innovation (the interaction with farmers) is a useful method, does it really contribute to more sustainable agricultural practices?
  - a. Why, why not?
  - b. Has your opinion about its value changed in the course of the project? Why, why not? In what way?
8. How have you experienced applying the project methodology of wp13?
  - a. Is it different from your 'normal practices'?
  - b. Was it easy or challenging, why?
  - c. What made it easy/challenging for you?
  - d. Are you going to use the approach in your further work? Why, why not?

#### (3) The shaping of the co-innovation process

9. How have you shaped the co-innovation process in the course of the pilot?
  - a. Can you elaborate on some key moments?  
(What did you do? When, why and how did it work out?)

10. Can you describe the development of your and the farmers' role in the process until now? Explain.
11. What is your personal opinion about the dynamics and outcomes of your pilot? Do you find it satisfactory/dissatisfactory? Explain.
12. What do you think about the interaction with the other wp13 pilots, the teams?
- Have you learned something from the others? Explain.
  - Have you copied some aspects from the other pilots? Why, why not?
13. Are there any differences/similarities in approach, dynamics and outcomes between your pilot and the other ones? Explain.
- What factors do you think would explain these differences/similarities?

#### **(4) The(role of the) institutional context**

##### **(4.1.) The PURE context**

14. Experimenting with co-innovation; how did it work out in the context of the PURE project?
15. With regard to the guidance by Walter and Pieter; was the methodology clear? Why, why not?
16. Did/does the guidance by Walter and Pieter play a role in the way how you have shaped the process? Why, why not, how?
17. Until now, were you free enough to shape the process as you thought would be best? Why, why not?
18. How do you experience operating in different contexts and on different levels? (PURE – country – your organisation – other organisations – the pilots etc.) Explain. **(tensions?)**
- Do you think the co-innovation approach – as used in PURE – can be easily 'transplanted' in several contexts?

##### **(4.2.) Wp13 pilot team colleagues (e.g. Jens Erik - Marianne)**

19. How is the cooperation with your wp13 pilot colleague(s) going?
- Are there any differences in the definition, interpretation, values, norms with regard to co-innovation between you?
  - Are there any differences between you with regard to the extent to which you **can**

implement co-innovation? (**IMPORTANT in case of a pilot team combining persons from different organisations!**)

- c. Have both aspects affected your pilot in any way?

#### **(4.3.) The organisation**

20. Is co-innovation a new approach in **your organisation**? Explain.

21. What do your direct colleagues (within the organisation) think about the co-innovation approach you use in your work?

- a. Do you get recognition for your work? Why, why not?
- b. Do they give you any feedback? If yes, give examples.
- c. Has their perception of co-innovation and of your role and activities affected the way how you have shaped the participatory process?
- d. Why/why not?

22. Participatory approaches may be very different from your more conventional practices; do you have the freedom to apply more participatory approaches in your work?

- a. Have you encountered any restrictions in your organisation while undertaking the more participatory approach? (e.g. with regard to accountability, administration, reporting, funding, ‘doing good science’...)

#### **(4.4.) The agricultural knowledge and info system**

23. Do you think the agricultural knowledge and info system in **your country** is ready for more participatory approaches?

- a. Why/why not?
- b. Can you give some examples on which you draw this conclusion?
- c. Has this affected your work? Explain.

24. How did the farmers involved in the pilot experience the co-innovation process?

- a. Have they given you any feedback about the approach? Explain.
- b. Has this affected the implementation of co-innovation? Explain.

#### **(4.5.) Country specific institutions**

25. What about the cultural context in your country, do you think this approach suits the cultural norms and values of your country? Explain.

**(5) Institutional context in general**

26. In general, do you think your institutional context (as a whole) is compatible with and conducive to more participatory approaches? Why, why not? (**summarising/checking question!**)
- a. Has this affected your work? Explain.
  - b. What factors in your context particularly trouble/enable the application of more participatory approaches? Explain why.
  - c. Should something change to enable the application of more participation? If yes what, why and how?
27. What about the institutional context of the other wp13 pilots...
- a. What are the main differences/similarities with regard to the institutional context between your and the other wp13 pilots?
  - b. What institutional factors do you think troubles/enables the implementation of co-innovation there? Why and how?

## Questionnaire Farmers

### (1) Farmers' involvement

1. In the context of which project are you involved with ... [name researcher/adviser]?
2. How have you been involved? Explain.
3. What do you think about this involvement?

### (2) Farmers' experiences with co-innovation

4. Have you ever been involved in projects in such a way before?
5. If yes, when, where and how?
6. Was the involvement different from this project? If yes, in what way?

### (3) Farmers' perception of their involvement

7. What do you think about the project?
8. Do you think this project contributes to better practices? Why?

### (4) Farmers' perception of the researchers/advisers

9. What do you think about the work of ... [name researcher(s)/adviser(s)]?
  - a. The way how they facilitate the process? Explain.
  - b. Does their work pay off? Explain.
  - c. Do you think they are good at it? Explain.
  - d. Do you think they have enough 'room for manoeuvre' to implement this type of projects involving stakeholders? Explain.

### (5) Farmers' scope for action (supportive institutional context?)

10. Do you consider yourself powerful enough to make a change? To contribute to more sustainable agricultural practices? Do you have enough 'room for manoeuvre'? Explain.

### (6) Improved practices, farmers' benefits

11. Do you think the project has led to innovation or better practices? In other words: are you involved in new and innovative things, have you changed your practices and will you carry on like this in the future? Explain your answer.
12. Has the project encouraged you to take part in more ways in the future, to be more pro-active?  
(empowerment)

13. Have you and the other farmers involved learned something due to the project? (**new knowledge, awareness, skills**) Explain.

Has the project contributed to your social network? In other words: due to the project, did you meet new people, did it enlarge your (professional social) network?