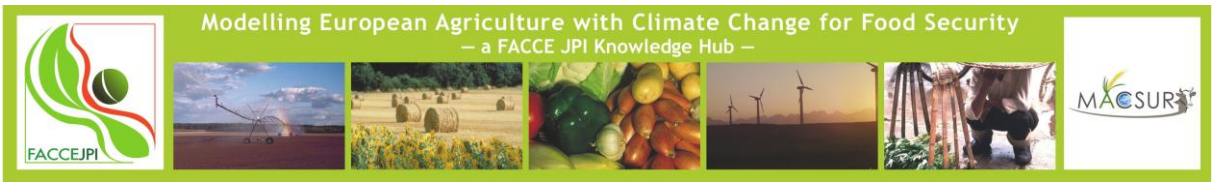

FACCE-MACSUR

D-L4.2: Report on Stakeholder Engagement Methodologies

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Abstract/Executive summary

Stakeholder engagement in research projects can take a number of forms according to the scope of the project and the purpose of the interaction. L4.2. has focused on comparing different approaches to stakeholder engagement in collaborative projects. This report presents a synthesis of the experiences and lessons learnt through the stakeholder engagement activities of LiveM researchers within MACSUR, within an Italian (Oristano) case study, and within the SOLID (Sustainable, Organic and Low Input Dairying) project. An overview of these examples, and some of the lessons drawn from them, can also be found in the MACSUR paper on stakeholder engagement methods being developed by researchers from all three MACSUR themes (Koenig et al. under production).

The first part of this report describes the stakeholder engagement strategy within the SOLID project. Stakeholder engagement methods are analysed through observations of activities and using semi-structured interviews with researchers and stakeholders. Two aspects of the SOLID approach are described – the stakeholder panel and the Future Dairying workshop. Transcripts of the workshop and the contribution of the stakeholder panel to the SOLID annual meeting in Helsinki are included (Appendices 1 and 2), as a contribution to the analysis of workshop outcomes being undertaken within the SOLID project. As part of a wider suite of stakeholder engagement activities, the SOLID stakeholder panel provided an example of how ongoing oversight of scientific outputs and direction by stakeholders can be effective in identifying weaknesses in approach and communication, and in suggesting relevant and effective directions for research activities. The stakeholder workshop demonstrated a useful structure for the exploration of stakeholder concerns, their view of ideal states and their solutions for reaching them. Low participation levels demonstrated the need to understand the motivations that drive stakeholders to engage in such projects, and highlighted the value of developing long-term relationships between stakeholders and researchers that allow scientific research to become an accepted part of practical problem-solving.

The second part of the report describes stakeholder engagement activities carried out in the context of one of the MACSUR regional pilot studies (Oristanese case study in Sardinia, Italy). The Oristanese case study demonstrates the potentialities and constraints of participatory methodologies in relation to the different categories of stakeholder involved. It highlights the importance of creating new spaces for dialogue between farmers, researchers and policy makers in order to promote the generation of “hybrid knowledge” (Nguyen et al. 2013) for the emergence of more sustainable and longer-lasting strategies to adapt to CC. This would require the promotion of open knowledge generation platforms where multiple stakeholders are encouraged to participate and make their views heard. These approaches are designed in order to overcome the misalignment between scientists' suggestions and policy implementation.

In the third part of the report, the outcomes of a "learning event" held in Sassari (MACSUR mid-term meeting) with decision makers from different EU countries, are discussed.

Finally, some reflections are presented on the importance of involving local stakeholders and decision makers in research projects, of sharing views and knowledge between scientists and stakeholders, and on the pros and cons of different methodologies at the different scales of stakeholder engagement, drawing on all three examples of practice. The research approach analysed includes two important components, which are represented by “transdisciplinarity” (to be included in the macro area of “scientific knowledge”) and “local knowledge”, as fundamental elements to fill the Science and Policy Gap.

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1. Introduction

Since the 1990s the importance of integrated, interdisciplinary (Hedelin 2007; Pahl-Wostl 2009; Godden et al. 2011; Darnhofer et al. 2012) and transdisciplinary approaches (Parkes et al. 2010) has been emphasized by many scholars (see for example Chambers et al. 1989; Bawden and Ison 1992; Röling 1994; Röling 1997; Röling and Jiggins 1998; Röling and Wagemakers 1998) as a prerequisite for studying "social-ecological systems" (Folke et al. 2005; Ostrom 2009; Parkes et al. 2010; Wiek and Larson 2012) in order to understand the practices, perceptions and values of stakeholders. Biophysical and social elements of farming systems should be studied as a "platform of inquiry" (Röling 1994), in which systems are constantly questioned, and outcomes are continuously redefined.

Climate Change has been widely explored from bio-physic, economic, technical, ecological, but also sociological points of view (Paschen and Ison 2014; Ager et al. 2009), and a number of theoretical frameworks and participatory integrated methods (see Salter et al. 2010; Larsen et al. 2011) have been addressed; however, they have limited applications (Hage et al. 2010). In studying climate change adaptation, few scholars simultaneously adopt empirical multi-disciplinarity approaches that focus on the mutual process of communication (and collaboration) between scientific and "local" knowledge (Scheraga and Furlow 2001; Kok et al. 2006; Bizikova et al. 2009; Hage et al. 2010; Nguyen et al. 2013), and between scientific and political levels (Cohen 1997; Scheraga and Furlow 2001; Salter et al. 2010: Serrao-Neumann et al. 2013). This complex issue is also strongly connected to the lack of an interactive (effective and understandable) process of communication about potentially useful tools produced for solving those practical problems that policy makers, people and organizations have to deal with (Tickell 2002). This leads to reflection on the issues of scalar dimension, horizontal governance approaches (Moss and Newig 2010), and the need to shift the "action-research schemes" from a purposive system to a purposeful system (Bawden and Ison 1992; Pahl-Wostl et al. 2010). In other words, there is a need to move from a top-down approach (both in political and scientific fields) to a participatory management to investigate the complexity of agro-environmental issues (Russell and Ison 2000). This approach responds also to the definition of participatory action research (Kindon et al., 2009), which aims to involve stakeholders' perspectives in order to create new spaces for a multilevel dialogue. The discussion is here related to the awareness that controversies between the top and bottom levels may be solved through the adoption of the integration of views and knowledge of scientists, policy makers and local stakeholders. In this vein, researchers, together with all stakeholders, at the same time co-construct knowledge and define the boundaries of the system and its constitutive elements. The constructivist approach regards the way people perceive and construct/reconstruct their system, but also how they cope with the problems and uncertainty in relation to their experiences and usual practices. This is also related to the capacity of stakeholders to create networks, how strong they are motivated to collaborate with other stakeholders and possibly change their habits.

In relation to the lack of an effective translation of "hybrid knowledge" (Thomas and Twyman 2004; Nguyen et al. 2013) into practice (Pahl-Wostl et al. 2011), we aim to focus on a potential "win-win decision-theoretical framework" to facilitate an interactive process of communication among different fields of science, and among these fields, policy makers and local stakeholders.

2. Stakeholder Engagement Strategy in the SOLID project

Two aspects of the SOLID stakeholder engagement approach are described here – the stakeholder panel and the Future Dairying workshop. Interviews with workshop participants, stakeholder panel members, and researchers from SOLID were carried out, in

order to evaluate the effectiveness of the SOLID approach, and the results of these interviews are presented, along with analysis of transcripts of workshop and stakeholder panel discussions.

2.1. The Stakeholder Panel: Description

The SOLID stakeholder panel was formed at the start of the project, and consists of four members (one farm advisor a farming organisation representative, a dairy farmer and an organic research organisation).

The panel give their views of project progress, based on information received through the year and results presented at the annual meeting. A formal session of the annual meeting is set aside for their report, which consists of an assessment of progress in each work-package, with advice and questions for researchers. Here, observations were made of the stakeholder panel session at the 2014 SOLID Annual Meeting in Finland.

2.2. Stakeholder Panel: Evaluation

Notes taken during the stakeholder panel session (Appendix 1) were used to assess the benefits of the panel to the project. The panel provided a concise evaluation of project progress from the point of view of 'real world' actors in OLI (Organic and Low Input) dairying, farm advisors etc. As the stakeholder group is part of the project throughout its life, it is able to highlight problems in the direction, communication or delivery of research from the standpoint of a knowledgeable and concerned non-academic. This can enable important questions to be raised that might otherwise be overlooked, and alert researchers when their approaches and communication are (or appear to be) becoming less applicable to the real world. The panel in SOLID also expressed constructive opinions and suggestions for ways forward, so that it acted not just as a tool for evaluation, but also as a positive driver of the project. Specifically, the panel raised concerns about i) the communication of outputs beyond the project, ii) suggested practical applications for research findings in terms of their knowledge of stakeholder priorities (for example, the creation of a usable decision support tool), iii) suggested future research priorities and iv) questioned aspects of research where the purpose and validity of approach were felt to be unclear. If a stakeholder panel is engaged, representative and knowledgeable (as here) it can provide a useful model of how stakeholders can add value and relevance to a research project, acting as an indicator of the relevance of research and the quality of its communication.

2.3. SOLID Stakeholder Event: Description

The workshop was based on the concept that stakeholders have to make choices about the future – to decide their objectives and how to reach them (Sajeva and Latvala 2014). The workshop brought together scientists and stakeholders to discuss choices for the future in relation to supply chain management in the OLI dairy supply chain. In summary, the event addressed the following questions in order:

- Where are we now?
- What is the ideal future (5-20 years)?
- What solutions could take us there?
- Are these solutions feasible?
- How can these solutions be applied in practice?

Participants were divided into three groups, based on geographical location. Group A (Swedish and Finnish stakeholders), Group B (eastern and southern European stakeholders (from Romania, Estonia, Greece and Romania) and Group C (Italian and UK stakeholders).

Within each group of stakeholders, individuals were invited to write down the main challenges to the OLI dairy sector, using 'post-it' notes which were added to a notice board. After a discussion of these challenges (including rationalising related issues into broad categories) the group was asked to define the ideal situation in each area, and these ideals were added to the board opposite each challenge. Groups were asked to indicate on a line between the challenge and the ideal situations, how far the sector was towards solving the problems, and then how far it could go towards the ideal if known strategies were applied to address each one. There was then a discussion of those strategies for solving the identified problems, with the solutions added to the board on 'post-it' notes. Finally, the groups voted for the strategies they saw as most important (each had ten stickers to allocate between the solutions identified). At the end of the day, groups were asked to produce a presentation highlighting the key points from the discussions of the day.

The second day was made up of the presentation of more detailed stories from each group to the whole workshop, and a subsequent open discussion on the way forward for the sector. Each group contained 3 to 4 stakeholders, a facilitator and note-taker. Further details and the theoretical underpinning of the 'Futures Workshop' method are described in Sajeva and Latvala (2014).

2.4. SOLID Stakeholder Event: Method of Evaluation

In order to evaluate the effectiveness of the workshop approach, notes were made of the discussions of two of the three work groups; Group A (Sweden and Finland – notes by Şeyda Özkan, NMBU) and Group B (Estonia, Romania and Greece – notes by Richard Kipling, Aberystwyth University) (Appendix 2). These notes were analysed to understand the types of information gained from the exercise, and the strengths and weaknesses of the workshop approach.

In order to understand the motivations of stakeholders who had chosen to take part in the workshop and to obtain their views of the event, semi-structured interviews were used (Appendix 3). Stakeholders were drawn from the organic and low input dairy supply chain from across Europe (see Sajeva and Latvala (2014) for details of how stakeholders were selected for the workshop). Interviews were completed with 11 of the 13 stakeholders present, and the information provided was analysed to draw out common themes.

Informal interviews and a questionnaire were used to gather the views of workshop organisers and SOLID WP leaders on stakeholder engagement. Due to time constraints during the meeting, only one SOLID researcher was interviewed in person. The interview was informal, addressing topics such as the reasons for stakeholder engagement and the best timing for such activities. Responses from other researchers were via a questionnaire emailed after the Helsinki workshop. The questionnaire asked five questions and invited free-text responses:

1) What is the purpose of researchers engaging with stakeholders?
2) Where should stakeholder engagement activities be placed in research projects on agriculture and climate change, and why (e.g., during research planning, during research phase, when disseminating outcomes etc.)?

3) What are the strengths and weaknesses of the stakeholder engagement approaches used in SOLID? (the workshop approach and the project stakeholder panel)
4) Did the workshop achieve its expected aims? In what ways?
5) What challenges are there in engaging with stakeholders?

The views of the three organising researchers (Appendix 4) were analysed and the main themes drawn out.

2.5. SOLID Stakeholder Event: Results and Discussion

2.5.1. Evaluation of workshop approach

Observations of group discussions and the final workshop debate, indicated that the 'Futures Workshop' approach (Sajeva and Latvala, 2014) was effective in facilitating structured debates, producing a logical and analytically useful progression of discussions: prioritisation of challenges, identification of ideal scenarios, assessments of how far reality is from the ideal system, identification of strategies for moving towards the ideal (including prioritisation of these), and sharing of ideas within the larger group. At first (when challenges were being listed) there was some curtailing of debate in order to keep activities moving, but in fact freer conversations occurred later in the process, and the management of the discussion early on allowed a reasonable focus to be maintained. The method gave a sense of progression and prevented too much repetition of points, and in looking at solutions it forced innovative thought. At several points in the debate it was clear that stakeholders were learning from each other, and gaining useful practical information (for example, in Group B the idea of liquid yoghurt as a value-added product from milk was communicated from the Greek stakeholder to others).

Two challenges to the effectiveness of the method were: 1) dividing people into small groups by region perhaps lost some of the advantages of comparing notes between very different systems (see also views under 2.5.2 below). However, there is a potential trade-off between gaining from exchanges between diverse systems, and finding the commonality required to achieve coherent outcomes. 2) Small group size (3-5 people - the workshop as a whole was designed for 25 stakeholders, but only 13 were available) meant that exchanges were limited and that the conclusions arrived at might not have been very representative of broader stakeholder opinion (see also views under 2.5.2 and 2.5.3 below).

The recording of views using 'post-it' notes to create charts showing challenges, ideals and strategies, provided effective summaries of views that could easily be re-formatted for future use, for example as recommendations for research priorities.

2.5.2. Stakeholder motivations and views of workshop

Four main themes emerged from interviews with stakeholders (Table 1). These themes displayed a balance between self-interested, competitive, and more cooperative motivations for participation. Most stakeholders gave more than one reason for attending the workshop. The motivational themes can be viewed as two pairs (1 & 2 and 3 & 4) in which the same type of interaction can be viewed from a self-interested or cooperative perspective. Linking up and discussing issues with other stakeholders provides an opportunity to gain competitive advantage over others (1), because their plans, concerns, problems and solutions are revealed. But at the same time, this process can be seen as an opportunity to support others in the same or similar sectors, and to share information that can benefit everyone (2). Similarly, some stakeholders talked about the opportunity to use the workshop to find solutions to their own problems (3), while others were keen to help

solve problems in the sector (and beyond – for one stakeholder, European unity and peace was an important reason to engage in discussions with stakeholders from other countries) (3).

Table 1: The motivations of stakeholders taking part in the SOLID stakeholder workshop

Theme reference	Motivational theme description	Number of stakeholders expressing motivation
1	To gain information about competitors	4
2	To link up with other stakeholders to exchange information	7
3	To find solutions to their own problems	6
4	To help solve problems in the sector (and beyond)	3

The mixture of competition and cooperation found in the motivations of stakeholders is consistent with the idea of 'coopetition' (Brandenburger and Nalebuff 1996) which describes how better outcomes can be achieved for a company if it cooperates (strategically) with its competitors in certain circumstances. However, the tone and content of the interviews, and the atmosphere within the workshops, suggested that stakeholders were also drawing on deeper values (Compton 2010) when engaging with others. For example, one stakeholder, who framed his involvement in terms of his own self-interest (1), spontaneously used his mobile phone to share information about a new dairy product with other stakeholders, during group discussions about 'value-added' dairy products.

Overall, interviews with stakeholders indicated that they had found the workshop worthwhile in terms of their goals, and also enjoyable. This latter point is important given that lack of interest (consultation fatigue) can undermine attempts by researchers to engage with stakeholders who may be approached by several different projects over time (Hayward et al. 2004). In practical terms, some stakeholders felt that larger discussion groups would have been better (there were around four stakeholders to a group); this highlights the potential difficulty of attracting stakeholder interest – 25 participants were envisaged while only 13 took part. In this respect, it is important that organisers of stakeholder engagement events frame their invitations to stakeholders in terms of their motivations for engagement. Some stakeholders also expressed a view that mixing participants from different regions (rather than having 'regional' discussion groups) might have allowed a more valuable exchange of views between stakeholders working in contrasting systems.

2.5.3. Researchers' motivations and views on stakeholder engagement

Three SOLID researchers (two of whom were engaged in the organisation of the stakeholder workshop) were able to provide information in response to the survey questions above. Three objectives for stakeholder engagement were identified:

1) To expose researchers to other viewpoints, increasing their understanding and helping them to make their work more relevant to the needs of stakeholders (mentioned by all three researchers)
2) To find new solutions (mentioned by one researcher)
3) To determine whether chosen research priorities have relevance in the real world (mentioned by all three researchers)

A number of challenges to engagement with stakeholders were mentioned. All interviewees considered that it was important to involve stakeholders from early in the life of a project right through to the end, but this type of involvement is restricted by the amount of stakeholder time required, and the expense entailed. Linked to these problems, the main weakness of the Helsinki workshop was perceived to be low numbers of participants (see also Sections 2.5.1, 2.5.2). Making time to listen and to analyse the views of stakeholders was viewed as challenging, as was ensuring that all viewpoints were treated respectfully. Management of the expectations of those concerned was also seen as an issue by one researcher, reflecting the potential damage caused if stakeholder expectations are not met, not least in terms of future levels of engagement in other projects (Reed 2008).

One interviewee highlighted the fact that workshop structure and the types of questions asked of stakeholders were likely to have an effect on the opinions and priorities expressed. In the Future Dairying workshop, participants were not directed by questions to address any particular challenges; rather, they were encouraged to define the challenges that were most important to them. This removes potential bias, but could focus discussions on current issues (uppermost in their thoughts due to their immediate relevance) with future potential problems not featuring because they have either, not been considered or are less pressing. A more directive approach (proposing different future scenarios for comment) could focus debate on future issues such as climate change that at present are not serious everyday problems for stakeholders. Both approaches may be useful.

2.6. Overview of SOLID Stakeholder Engagement

Brandt et al. (2013) use a scale to define the level of stakeholder participation: information (one way flow, not much influence), consultation (one way flow using questionnaires, interviews etc.), collaboration (participants have influence on process and outcome) and empowerment (ultimate decision making lies with stakeholders). Using this scale and from examination of stakeholder involvement in SOLID and researcher perceptions of it, it seems that SOLID engages with stakeholders at either a consultative or collaborative level. The stakeholder panel influences research direction and knowledge exchange through their verbal reports at annual project meetings, while workshops seek to both understand stakeholder perspectives and to assess the suitability of research objectives. Whether consultation or collaboration best describes stakeholder engagement in SOLID will be determined by how the interactions with stakeholders actually feeds through to subsequent actions, which was not measured in this report.

The stakeholder panel appears to be a useful tool for ensuring that researchers produce and effectively communicate relevant outputs. The panel explicitly highlighted the need for better communication, as well as this being indicated implicitly by their reactions (for example to progress in modelling activities). Previous studies suggest that scientists' own belief in the effectiveness of their communication may not reflect their actual effectiveness (Baram-Tsabari and Lewenstein 2013), so that using stakeholders as 'critical friends' to assess the quality of explanations, justifications and dissemination materials, is vital. Stakeholders on the panel were also observed to raise questions about the practicality of research-driven solutions, and the 'real-life' application of modelling outputs on-farm. Again, these inputs can be important in grounding research findings in reality, and of demonstrating to scientists the types of outputs that stakeholders require, as well as their likely concerns.

The 'Futures Workshop' appeared to provide an effective tool for identifying industrial challenges, ideal conditions and the solutions that might help to achieve them, from the point of view of various stakeholders. Limitations arose from the actual rate of stakeholder participation. In the context of 'consultation fatigue', and limited resources (monetary

and time available for participation), research is required into how stakeholder interest and commitment can be effectively gained and maintained. This may be based on analyses of the motivations for involvement indicated by those stakeholders that do engage with projects (Section 2.5.2). Such engagement is important if stakeholders are to be involved throughout the lifetime of projects, in order to reach higher levels of participation quality (Brandt et al. 2013). Previous work suggests that stakeholder engagement can be increased through the use of "socio-technical objects" which are highly relevant to stakeholders (Toderi et al., 2007; Colvin et al., 2014). A socio-technical object is an object that brings different interests and meanings into a common social space, enabling participants to re-define their interests and build on them. For example it may be a set of regulations that provide a tangible focus for interest and discussion. Climate change per se is often not considered an interesting issue for stakeholders at local scale, and the broad remit of the SOLID workshop might not have fully captured the interest of potential participants.

This report has focused on the Helsinki stakeholder workshop and the role of the stakeholder platform in the SOLID project. As highlighted by one interviewee, SOLID also engages with stakeholders through participatory surveys, dissemination activities and SME partners. Consideration of these additional activities would be required to gain a more comprehensive understanding of stakeholder engagement in SOLID, although the approaches covered here represent an important part of these efforts. All three researchers interviewed recognised the need to engage stakeholders throughout a project, but resources available to both scientists (money, time) and stakeholders (time) were acknowledged as limitations to this process. Problems in communication arose where stakeholders were presented with complex scientific information arising from processes (in this case mathematical modelling) in which they were not involved. This suggests that devoting resources to increased stakeholder engagement throughout a research project, as well as in providing researchers with the skills required to communicate more effectively with non-experts, would provide benefits in terms of the relevance and uptake of scientific outputs. When stakeholders were successfully engaged in discussions, as in the stakeholder workshop, valuable insights were gained by researchers and stakeholders with potential benefits for both groups.

3. Regional pilot approaches: the Oristanese case study (Sardinia, Italy)

Water and climate change issues can be explored by adopting an interdisciplinary approach in order to produce comprehensive, multi-perspective, and multi-level knowledge. With this objective, the Nucleo Ricerca Desertificazione (NRD) team is developing a synergic integration of the activities run in the MACSUR Oristanese case study (Sardinia, Italy) in the context of different projects. In fact, the case study is connected to a number of projects carried out in the area, in addition to MACSUR (the Ichnusa Bubula project[1], Agroscenari - Adaptation strategies to climate change of Italian agriculture[2]; Climate Change Adaptation

[1] The Ichnusa Bubula project (PSR 2007/2013 - Misura 124, "Cooperazione per lo sviluppo di nuovi prodotti, processi e tecnologie nei settori agricolo e alimentare, nonché in quello forestale" - "Cooperation for development of new products, processes and technologies in the agriculture, food, and forestry sectors") involves the University of Sassari, the Arborea Farmers' Cooperative, and a partnership of four farmers breeding beef cattle in the extensive grazing systems of Northern Sardinia. It aims to integrate the intensive dairy cattle farming system in Arborea with the low-input beef production systems in Sardinia, and to create a new brand ("Carni bovine di Sardegna") for the beef production, implemented through the Arborea's centre of beef cattle fattening.

2 Agroscenari (www.agroscenari.it) is a national interdisciplinary project funded by the Italian Ministry of Agricultural Food And Forestry Policies which is focused on the assessment of the impact of climate change on cropping systems. One of the six case studies of Agroscenari is located in the Oristanese area. The results from Agroscenari, which includes an integrated scenario analysis on near future climatic changes, are ideal inputs for the Cadwago activities.

and Water Governance - CADWAGO[3]). All of these projects refer to a participatory research framework that is based on the involvement of different kind of stakeholders at diverse scales. Each category of stakeholders has been involved through specific methodologies and approaches (as described in the next paragraphs), which aim to produce integrated knowledge about the agro-social-ecological issues investigated in the case study. In fact, it is supposed that the process of involvement of different stakeholders contributes both to producing shared knowledge, and to defining concerted long-lasting strategies of action.
The main goals and activities of the participatory research process at case study scale (for details see also Nguyen et al., 2013) could be summarized as follows:

- Continuous collaborative and informal relationships including the participation of researchers in local events helped promoting trust among stakeholders, especially between researchers, farmers and technical advisors.
- The use of semi-structured interviews to document stakeholders' interests and their socio-political and agro-ecological frames.
- Participatory field experiments to generate new options towards concerted actions facilitating a more sustainable management of natural resources. Field experiments (spring 2009 to spring 2012) were co-designed and jointly implemented with voluntary dairy farmers and sited on their farm. The objective was to assess the effect of EU Nitrate Directive prescriptions on crop productivity and nitrate concentrations in surface and ground water for irrigated silage maize – Italian ryegrass cropped in a double rotation.
- Participatory scenario development through the integration of cropping system and economic modeling approaches and the analysis of stakeholders' perspectives. These activities aimed to create some shared potential future scenarios of climate change that were context-dependent as well as being meaningful to farmers and scientifically grounded; thus, they are likely to be more effective and sustainable.
- Interactive workshops designed to promote the exchange of information and knowledge among stakeholders and to create spaces for dialogue and trust building.

The participatory field experiments and the interactive workshops aimed to create a shared interpretation of the research results. These helped local stakeholders to find their own way of identifying sustainable management options. The co-design and co-conduct of the field experiment with farmers provided an opportunity to jointly reflect and learn in practical ways the effects of livestock effluent management on crop productivity and nitrate pollution. During these social processes, the participants acted both as direct users of the scientific experimental results and as providers of local knowledge and viewpoints. The interpretations of farmers and technical advisors were mainly based on their practical experiences and tacit knowledge, while the interpretations of researchers came from their experimental observations and their underlying scientific knowledge. The process of 'learning together' facilitated the emergence of new and integrated viewpoints on the issues at stake and more desirable agricultural management options.
Active participation in local events and activities organised by different local actors (Cooperatives, Local Committees, Council etc.) was used both to widely disseminate scientific findings, and to contextualize and better frame the research scheme. On one hand, the constant participation in public events allowed researchers to "observe" the "community" from the inside; on the other, these events represented important opportunities to apply a bidirectional scheme of communication. In fact, while farmers

3 The CADWAGO project (http://www.cadwago.net/) aims to improve water governance by developing a robust knowledge base and enhancing capacity to adapt to climate change. The three year project is led by Sweden and brings together 10 partners from Europe, Australasia and North America with extensive experience in climate change adaptation and water governance issues.

and the community were informed about scientific findings, researchers got new information by involving them in an informal way.

4. MACSUR mid-term conference, 1-4th April 2014

In the FACCE MACSUR MID-TERM SCIENTIFIC CONFERENCE (1-4 April, 2014) researchers and policy makers from across Europe were engaged in a social learning process, in order to improve the science-policy interface around the role of science in supporting effective responses to climate change in terms of governance and policy implementation.

A series of stakeholder engagement activities were carried out prior and during the conference:

- A number of stakeholders were interviewed in order to investigate their perceptions of climate change, the impacts generated by their activities on this change and *vice versa*. Two kinds of interview were undertaken, with relevant stakeholders (experts, technicians, professionals etc.) and "ordinary people", in order to provide the scientific meeting with a variety of perceptions, opinions, and concerns about the environment and climate change, including their expectations of action by scientific and political communities. These interviews were synthesized in video clips that were broadcasted during the conference.
- During the conference an interactive performance (after a social dinner) aimed to capture participants' attention in order to push them to reflect on their role in formulating responses to cope with CC in terms of policies and research findings. The interactive performance was integrated with a questionnaire (presented as a joke and located at the back of the dinner menu): participants had to guess the ingredients of some foods eaten during the dinner. This joke aimed to push people to reflect on the importance of climate impacts on food quality and the opportunity to see food quality and security as a potential "win-win strategy" of adaptation to climate change.
- A “stakeholder learning event” (see also next paragraph) was organized during the mid-term conference with the aim to engage the JPI FACCE governing board, MACSUR scientists and other institutional stakeholders involved in the regional pilot studies in a social learning experience on climate change adaptation strategies. The event was structured into three phases: (1) three “narratives” linked to the three regional pilot case studies were explored from the point of view of MACSUR scientists through a carousel approach; (2) institutional stakeholders were invited to share their personal and professional experiences around climate change adaptation issues, included those grounded in the regional pilots; (3) small group sessions to identify common issues, priorities and possible future strategies to be addressed and developed at research and governance level.

4.1. Stakeholder learning session

During the Learning Session, two posters per case study were located in three corners of the room: the first poster reported the main features of each case study; the second one reported some questions in order to stimulate the discussion between researchers and policy makers. After 15 minutes of discussion, each participant was invited to write down some suggestions in order to reply to the questions and improve the research project. This

session aimed to illustrate to decision makers how climate will affect regional farming systems and food production in Europe.

In relation to the complexity of the translation process of scientific models into understandable and practical results, the Learning Session was designed to facilitate a direct dialogue between stakeholders and researchers, in order to discover how much of the information communicated to stakeholders had actually been understood (this followed a plenary session in which some models were illustrated in relation to the case studies involved) and what they really need in order to translate such findings into practice. This was also an opportunity to share experiences and knowledge with other colleagues and to improve understanding of the "governance of climate change".

Researchers and policy makers were asked about the kinds of change needed at all levels (farm scale, normative level, institutional level, and policy-science interface level). The questions participants were asked may be summarized in four macro-areas: a) kinds of change needed at farm, normative, institutional and policy-science interface levels in order to facilitate the creation of a common understanding about climate change-environment-welfare; b) kinds of stakeholder, timescales and strategies needed to improve participation processes; c) role of researchers; d) kind of knowledge required in order to develop comprehensive scientific models.

5. Resulting priorities from local stakeholders' engagement in the Oristanese case study and from the Learning session in the MACSUR mid-term meeting

A number of priorities for adapting to climate and, in general, to environmental changes emerged (Table 2).

Table 2: Summary of priorities for different stakeholder groups emerging from the Oristanese case study and the stakeholder learning session.

<table>
<tr><th>Essential elements for adapting to changes</th><th>Local stakeholders (economic bodies, local policy makers, civil society and local technicians)</th><th>Researchers</th><th>Policy makers</th></tr>
<tr><td rowspan="4">Changes needed at the local, and institutional scale</td><td>Stronger integration between farmers and researchers</td><td>Participation of local actors in training activities</td><td>Exchanges between researchers and policy makers</td></tr>
<tr><td>Funding for rural development and EU funding aimed at diversifying production systems.</td><td>Networks between policy makers, researchers and local actors</td><td>Combination of farmers' production activities with other kind of activities(e.g. tourism)</td></tr>
<tr><td rowspan="2">Effective technical support for economic organizations and regional extension services</td><td>EU intervention in promoting participatory research approaches</td><td>Upscaling of scientific results and need for reaching the wider public (through dissemination activities)</td></tr>
<tr><td>Implementation of policies that take into account scientific results</td><td>Dissemination of scientific results through understandable language and effective strategies of communication (e.g. maps, graphics)</td></tr>
<tr><td rowspan="4">Knowledge required</td><td>knowledge+training</td><td>Knowledge/training based on local competences and attitudes</td><td>Awareness of critical aspects related to the complex relationships between climate, production activities, and economic and political assets</td></tr>
<tr><td>Translation of scientific results into "understandable language"</td><td>Technical training for farmers</td><td>Effects of CAP reform on climate change (Common Agricultural Policy)</td></tr>
<tr><td rowspan="2">Implementation of new policies based on local needs</td><td>Integration of scientific knowledge with local knowledge</td><td>Research outputs integrated with local needs</td></tr>
<tr><td>Interdisciplinarity</td><td>Sharing of criticisms and responsibilities</td></tr>
<tr><td>Actors to be involved</td><td colspan="3">Platform of dialogue among stakeholders from different levels:
- Recognition about each one's role;
- Sharing of knowledge;
- Creation of favorable conditions for effective decision-making and policy implementation at the local scale.</td></tr>
</table>

With regard to the first macro-area (**Changes needed at the local, institutional scale**), the suggestions expressed by the three categories of stakeholders (local stakeholders, researchers and policy makers) converge in identifying the need for an effective integration of farmers and researchers; a stronger connection between policy makers and

researchers; a stronger integration of farming with other kinds of economic activity (e.g. tourism); a need to develop regional extension services.

In the second macro-area (**Knowledge required**) discussions suggested the need to develop training systems simultaneously involving farmers, shepherds, growers associations and young farmers (to create an established farmers' platform), industry (to improve technologies), researchers and policy makers (to act and guide); a need to translate research results for farmers and policy makers in order to overcome potential conflicts among Climatic-Economic-Political areas; the need to include farmers and shepherds in the Entrepreneurship and Innovation Programme (EIP), in order to support innovation and small and medium enterprises (http://ec.europa.eu/cip/eip/index_en.htm) and the CAP reform (Common Agricultural Policy) (http://ec.europa.eu/agriculture/cap-post-2013/).

Discussions of the third macro-area (**Actors to be involved**) emphasized the need to create a platform for dialogue among stakeholders, which should be based on a participative governance approach.

These findings show agreement between local stakeholders, researchers and policy makers about the need for a stronger integration of their knowledge and a more comprehensible translation of scientific results for the wider public. The big issue is, however, related to policy makers' scepticism about mathematical models that try to describe possible future scenarios. On one hand, policymakers ask for specific knowledge, which can be immediately translated into actions; on the other, scientific knowledge about climate change is still very uncertain. This means that it is only possible to suggest hypothesis about future scenarios, based on the consideration of all variables that should be included in scientific and conceptual models (from physical and climatic conditions to social, cultural, economic and human variables).

6. Concluding remarks on strategies for stakeholders' involvement

The Oristanese case study shows a number of potentialities and constraints of participatory methodologies in relation to each category of stakeholders involved. First, it shows the importance of creating new spaces for dialogue between farmers, researchers and policy makers in order to promote the generation of "hybrid knowledge"(Nguyen et al. 2013) for the emergence of more sustainable and longer-lasting strategies. This would require the promotion of open knowledge generation platforms where multiple stakeholders are encouraged to participate and make their views heard. The example of the SOLID stakeholder panel (Sections 2.1-2.2) shows how a small group of stakeholders can provide new perspectives, suggest new directions for research and highlight problems in the communication and relevance of outputs, when given a free and ongoing role to critique scientific research. Policy decisions should be based on "hybrid knowledge" and not on biased, power-related perspectives. Not only farmers and researchers, but also politicians and administrative organizations should then participate in the knowledge co-generation process. Finally, farmers should be encouraged to participate in the learning processes with researchers in order to identify long-term adaptation strategies, to comply with agro-environmental policies and at the same time to achieve sustainability in terms of farm income. In the SOLID workshop (Sections 2.3-2.5), a range of strategies that would enable OLI dairy supply chains to reach an ideal state were identified by stakeholders, providing information and suggesting priorities for researchers, but in addition stakeholders themselves were able to use the workshop to share best practice and discuss new ideas, potentially increasing their capacity to adapt to future change.

It is important to highlight the necessity of involving different categories of stakeholders in appropriate ways, in order to create the best conditions for dialogue. In the Oristanese

case study, and in the SOLID project, stakeholders such as farmers have been involved in interactive workshops, interviews, field-experiments, formal and informal meetings. In Oristano, local technical advisors and governors have been approached through “private” formal meetings and interviews. Civil society has been involved in activities (such as artistic performance, “group games”; presentations, dissemination activities) organised in the context of public meetings and local events. EU policy makers have been invited to take part in formal public meetings (in which scientific results were presented), but also in smaller workshops, which were designed to engage them in dialogue in a more “informal” and interactive way. These activities highlight the need for accurately designing the interactive process in order to engage and empower stakeholders. As described (Section 2.5.1-2.5.3) engaging stakeholders in such processes can be problematic, and attempts to stimulate such involvement should take account of the motivations that different groups of stakeholders have for taking part (Appendix 3).

An in-depth reflection is needed to overcome the misalignment between scientists' suggestions and policy implementations. At the same time, such a scheme of analysis should include two important components, which are represented by “trans-disciplinarity” (to be included in the macro area of “scientific knowledge”) and “local knowledge”, as fundamental elements to fill the Science and Policy Gap.

Referring to the literature on climate change, it is possible to offer a representation of the current connections between scientific, local knowledge and policy implementation (Fig. 1): a little connection between Scientific Knowledge and Policy implementation can be identified, which is even weaker between Scientific and Local knowledge. This means that, even though a number of models and theories about climate change (and, in particular, about climate change adaptation) have been produced on the base of rigorous fieldwork, they do not always consider local knowledge as a solid source of information. This happens, in particular when scientists develop models about future scenarios without involving local stakeholders, and then fail to translate their findings in a "common and understandable language". In the SOLID project this problem of engagement and communication was demonstrated during the stakeholder panel feedback, when members expressed concern and confusion about the development of models and the usefulness of their outputs. In fact, even though the literature highlights that the combination of local and scientific knowledge is a successful approach to environmental issues (Chiotti et al. 1995; Orlove et al. 2000; Smit and Skinner, 2002; Berman and Kofinas 2004; Kok et al. 2006; Salter et al. 2010; Nguyen et al. 2013), the majority of scientific modelling approaches tends not to adequately consider qualitative changes in social, cultural and institutional terms (Salter et al. 2010), only referring to a quantitative approach which tends to focus on exogenous forces and to ignore (or minimally consider) local knowledge.

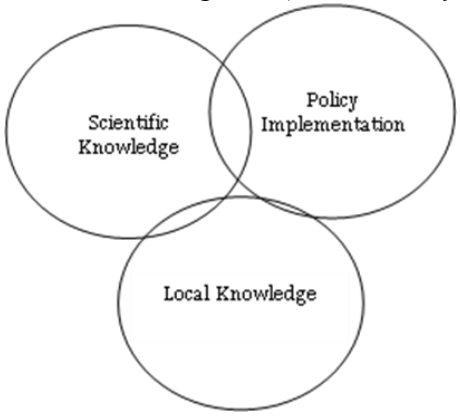

Fig 1: Connections between Scientific, Local Knowledge and Policy implementation

The actual situation has to be considered in a more complex framework that takes into account the relations among different levels. Policy implementation should be a result of the translation of scientific knowledge, which is, at the same time, inclusive of multi-level and multi-perspective approaches (Fig. 2). The proposed framework adopts a real and effective transdisciplinary approach which considers existing policies at all levels, endogenous forces (such as social-economic-cultural backgrounds which converge in local knowledge), and exogenous forces (structural and biophysical constraints).

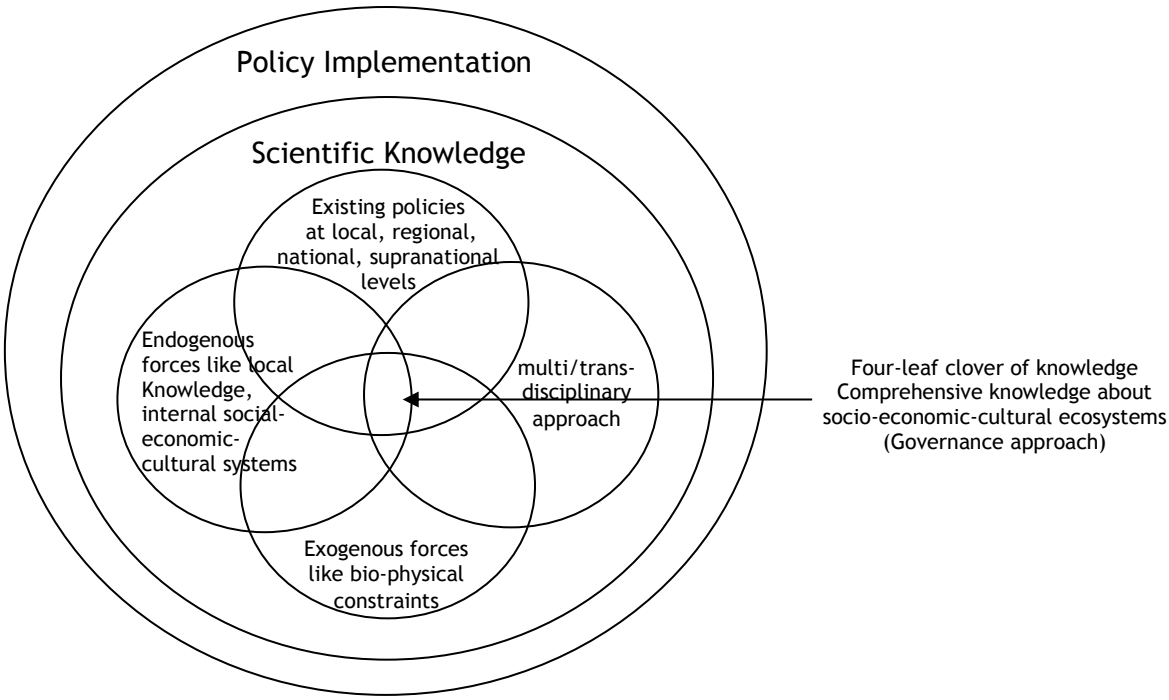

Fig. 2: Comprehensive knowledge about socio-economic-cultural ecosystems (Governance approach)

The centre of the "Four-leaf clover of knowledge" represents the meeting point of the "governance of climate change" in which different sources of knowledge, including stakeholders, meet each other. At this point, the scheme of research described here creates a "win-win decision-theoretical framework" that follows the process described in Table 3. The proposed approach considers social and individual factors as a possible limit to adaptation actions (Adger et al. 2009): this is why it promotes stakeholder participation in order to overcome potential "conflicts" between new adaptation policies (implemented by local, regional, national and supranational levels) and local experience. In fact, we assume that considering climate adaptation models and strategies, also means taking into account several factors such as the organisation of societies, their culture, knowledge, system of thinking and values, perception and attitudes, and how they relate to and trust institutions.

This type of scheme, which is based on the definition of research as a participatory process, is presented as a simple way of structuring research steps as followed in the Oristanese case study. This framework, (the opportunities and limitations of which are summarized in Table 2), focuses on a governance approach, which is interactive and iterative by definition. The governance-based research approach should firstly identify all the actors involved in the considered issue, using a deep stakeholder analysis (for the Oristanese case study see Nguyen et al. 2013); secondly quantitative primary and/or secondary data, and qualitative information (obtained through participatory field experiments which involve stakeholders) have to be collected. All quantitative and qualitative data are then integrated with the aim of developing potential future scenarios (in economic, social and climatic terms). These scenarios are again calibrated with local

knowledge by involving local stakeholders through interactive and communicative activities. Approaches such as the SOLID 'Futures' workshop (Sajeva and Latvala 2014) provide useful examples of methods for integrating stakeholder ideals, priorities and preferred strategies in this iterative process. Furthermore, it is supposed that the process of exchange between researchers and local actors is developed over an extended period, with the aim of producing a solid mutual trust. In SOLID the stakeholder panel and the use of participatory research provide examples of how these long term relationships can be nurtured. Difficulties in communication between modelling teams and the stakeholder panel in SOLID also highlighted the problems that can arise when scientific approaches have been developed away from the research-stakeholder interface. Especially in geographically specific projects, relationships with stakeholders can be deepened, as in Oristano, through the involvement of local researchers in local events (for example by organising interactive and communicative activities). This type of long term integration of research and stakeholder communities may be one approach to addressing the problem of low stakeholder engagement in projects, by making scientific research more a part of everyday life and problem-solving.

As in the case of several case studies (e.g. the MACSUR project), all researchers are expected to compare the results obtained through such interactive research processes, in order to develop a "common" narrative of the scientific results produced by interdisciplinarity, scientific models and local insights. These narratives have to be shared with decision makers by organising formal (e.g. conferences) and informal events (interactive activities, field visits, etc.). At these events, policy makers are involved in collaboration with scientists through the discussion of issues (including challenging the potential "uncertainty" of the scenarios designed by researchers), and the formulation of possible strategies and actions to deal with predicted change. Finally, when policies are implemented, the process should be restarted in order to monitor the effects and to gradually reduce levels of uncertainty.

Table 3: Process for a 'win-win decision-theoretical framework' of research

Governance Phase	Actors involved	Opportunities	Limits
Stakeholder analysis	Researchers, policy makers, farmers	Identification of all potential stakeholders to be involved in the research process	Length of the process (very long process to be fully exhaustive); Risk of excluding some relevant stakeholders
Participatory field experiments (Social-economic-agro-ecological systems)	Researchers, local stakeholders	Qualitative information obtained from local stakeholders about a specific socio-economic and agro-ecological framework to better frame the issue; Possibility of integrating quantitative models with qualitative information and local knowledge	Difficulty in involving all potential stakeholders; Difficulty in creating a well-balanced process of participation (in relation to stakeholders' interests and goals, and their "power" to influence others); Difficulty in negotiation among stakeholders; Urgency in adapting to crucial changes;
Field experiments (Bio-physical constraints)	Researchers	Primary data and quantitative information about bio-physical structure and constraints	Economic and human resources available
Secondary data	Researchers	Secondary data can be integrated to fill potential gaps	Availability of data
Scientific multi/trans-	Researchers	Production of exhaustive	Effective collaboration

disciplinary models about local contexts	(different disciplines)	models which can better address climate change issues using a multi-perspective approach	among different fields of science; Difficulty in communicating due to the use of different scientific languages
Potential future scenarios	Researchers, policy makers, local stakeholders	Opportunity to discuss specific consequences of future changes; Possibility for researchers and stakeholders to co-construct new potential future scenarios; Opportunity to discuss and de-construct potential stakeholders' *utopian and dystopian thinking* about future scenarios (Hjerpe and Linnér 2009)	The uncertainty related to climate change issues can lead to a loss of trust between stakeholders and researchers; Cultural influences; Contextual factors might affect stakeholders' expectations
Communication of scientific results to local stakeholders	Researchers, local stakeholders, Communication experts	Communication strategies (GIS mapping, visual stimulation, narratives stories, interactive workshops etc.) to understand complex problems and interact with stakeholders; Communication activities and constant presence of researchers within "local events" in order to increase the degree of trust between researchers and stakeholders	Economic resources and capabilities available within research teams; Implementation of unidirectional communication processes which can limit stakeholders understanding about the issue and their active participation; Dissatisfaction among participants
Calibration with local knowledge	Researchers, local stakeholders	Possibility to "correct" models thanks to the local knowledge and experience	Usually scientific models cannot take into account social and cultural issues (they have to be calibrated subsequently)
Comparison between case studies	Researchers	Comparison can produce new stimuli and help to correct potential mistakes in the process	Difficulty in comparing different situations characterized by very different bio-physical, social, economic, cultural features
Development of a common narrative of multi/trans-disciplinary scientific results	Researchers (different disciplines)	Narratives shared between stakeholders and researchers and among different fields of science	Difficulty in negotiating and translating the results in a "common language"
Communication of scientific results to higher political levels	Researchers, policy-makers	Communication strategies (GIS mapping, visual stimulation, narratives stories, interactive workshops etc.) to interact with political levels	Uncertainty of climate science, despite the development of "comprehensive" scenarios
Political involvement	Researchers, policy-makers	Scientific results as useful tools; Co-construction of	Difficulty in achieving broader policy makers' participation;

		strategies based on scenarios which are as comprehensive as possible	Willingness of policymakers to hold a dialogue with other kinds of stakeholder; Their willingness to invest in terms of money, time and engagement
Policy implementation	Policy makers, local, researchers, stakeholders	Production of policies based on local needs; Strengthening of governance processes; Policy makers awareness of all steps of the process; Policies based on scientific results; Possibility to generate a steady collaboration between researchers and policy makers.	Lack of use of scientific results in any case; Lack of willingness to invest money, time and engagement in a very long process; Difficulty in creating long-term collaboration between researchers and policy makers.

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Appendix 1: Notes from Stakeholder Panel presentations

The panel presented their views of project progress as follows:
WP1 (Innovation through participatory research): The outputs produced so far are on the internet, all countries are involved and there is on-going work with farmers. A link has been made between overall aims and applied farm aims. Continuing communication with WP7 (dissemination) is important.

WP2 (Adapted breeds for productivity, quality, health and welfare in organic and low input dairy systems): The panel liked the scoring system for animal welfare. It may be interesting to carry out the welfare assessment in all project research activities as it provides extra, relevant and simple information.

Comments on work on metabolic and genetic variation in dairy cow productivity: the feed amounts used (400 and 600kg) were both very low, so there will be a potential impact on animals and results if there is a variation in forage quality (the feeding regime is already close to the lower limit before variation). If the Holstein strain being used can function on 300 kg this would be a very interesting finding that would be very useful to disseminate. Findings from studies in Ireland (health and longevity in cross breeds and Holsteins) and in Finland (why did low input regime cows have lower fertility?) address interesting issues for farmers. Farmers often avoid non-Holstein breeds because they feel they are less efficient, so findings that question this are potentially important. Biomarkers for risk of disease etc. would be a great tool.

WP3 (Forages for productivity, quality, animal health and welfare in organic and low input dairy systems): Forage – getting good quality forage is one of the biggest issues in dairy systems, and a big problem in the UK which needs to be tackled. It would be good to know the relative costs of the alternative feeds being considered, as this is very important for their application. Mean figures were given in presentations, but what was the range of values in each case? Another issue is whether novel feeds impact the taste of the product.
Agroforestry research showed good data, but surveys showed that farmers are not very interested in the system. Promoting it as a stock rearing system (calves have shelter etc.) may be a way to encourage uptake, as many farmers already put calves into woodland to keep them protected from the elements.

The development of a decision support tool is considered a vital outcome.

WP4 (Environmental assessment: For improvements and communication in organic and low input dairy systems): The incorporation of CSR (Corporate Social Responsibility) measurements (qualitative) in addition to LCA was seen as a positive move to capture the wider outputs of OLI (Organic and Low Input) systems. But there was concern about the computer capacity required to run such analyses on-farm as a tool.

WP5 (Competitiveness of organic and low input dairy sector: Supply chain and consumer analyses): Results, including the workshop outcomes earlier in the week (see below) were positive, but there were some reservations about the clarity of wording in the proposed surveys for customers and suppliers. The survey results shown appear to indicate a willingness to adopt new innovations. Overall, better communication of outputs and methods is required from the work-package.

WP6 (Socio-economic evaluation of novel strategies in organic and low-input dairy farming/modelling club): Concerns were expressed about the different models being used and how their outputs are relevant. The link to MACSUR was viewed as positive, but there

were concerns about how outputs could be up-scaled, and about the capabilities of CAPRI which seemed unclear. There was an issue about understanding the working of the models, which made the panel concerned about, for example, the idea of mixing parametric and non-parametric approaches (combining approaches was seen (from a lay-person's viewpoint) as conceptually risky). The stakeholder panel recommended meeting with modellers in other projects – there was a view of the modellers as insular in their approach – they need to coordinate activities and show relevance of outcomes.

WP7 (Knowledge exchange, training and dissemination): The website and newsletters were good, but communication of outputs could still improve (for example, providing a list of all papers produced).The presentations at the meeting often varied in quality – people need to use fewer slides and talk around them more, keep to time and give a clear message. The panel would like more information about progress throughout the year. E-learning idea is a good one, but the technical ability of farmers (and their access to high speed internet etc.) needs to be considered when designing the courses.

It was considered important that there should be more input from early career researchers, enabling them to broaden their career development, and build new networks of contacts – WP leaders should consider how to develop this.

The importance of getting research work to stakeholders was emphasized, instead of it being buried and not taken up. How can the outputs of the project be linked together in a coherent tool for stakeholders? The Superherd Plus tool is good, but it is not user-friendly – the outputs are pages of data. Communication is important, and farmers need incentives to change behaviour.

One suggestion was that modelling outputs could be converted into a simple 'dendogram' design, with each farm management objectives as a point on a star (GHG emissions, profit etc.). Moving the value of each input to the system up or down would then alter the shape of the star, pulling some points outwards (increase in GHG emissions for example) and at the same time pulling in others (illustrating the strength and nature of trade-offs and complementary objectives in making management choices).

Appendix 2: Notes on group discussion sessions

Group A (Sweden and Finland)

The group were asked to identify the main challenges for OLI dairy farming in their region:

1) High capital costs to starting a dairy farm, what profits will be returned – price of milk and competition when quotas end
2) The search for protein rich feeds in Europe, how to get enough home-grown feed, use of fava beans, peas
3) Falls in the consumption of liquid milk due to competition with big drinks companies
4) Heavy use of grains in intensive feeding strategies – high productivity. Feed efficiency – are cows being fed properly, what feed should be given, should there be dietary differences between breeds?
5) Lack of options (few processors, retailers).Dairies not taking organic production seriously. There are few new farms and few new products – advertising will be important.
6) Separation of dairy and crop farms causes problems in terms of nutrient cycling

Ideal futures relating to each of the challenges were discussed:

1) Profitable, low cost production, transparent production and value chain with equitably shared profits.
2) Plenty of protein feed
3) Innovative product development
4) Less concentrates in diet and more roughage
5) Several dairies, several new products and more competition
6) Regional self sufficiency

The group then considered how close to the defined ideals we are:

1) Dairy farming is relatively profitable, but the situation is far from ideal as costs are high and there is little transparency in the supply chain.
2) Few sources of protein feed are available
3) Innovative products such as savoury milk, new yoghurt flavours etc. are produced on conventional farms, not organic – there is a problem with product innovation in organics.
4) In terms of decreasing the use of concentrates in the diet, Scandinavia is doing much better than many other parts of Europe.
5) The situation in terms of choice and competition is a long way from the ideal
6) Regional self-sufficiency has not been achieved and the situation is far from the ideal

Political commitment was also viewed as an important factor in moving towards the ideal situations in the areas discussed.

The group then discussed the points above, assessing whether the extremes represented by the ideals suggested were really desirable? For example, in terms of profit, costs should not be completely minimised because other factors, such as animal welfare, are also

important and should not be jeopardised. If profitability is high enough for all, does transparency in the supply chain really matter (division of profits)? If there is too much competition, might there be a negative impact on prices [*race to the bottom – my phrase added on write-up, RPK*]

Potential strategies were considered for reaching the ideals above:

Prolonged maternal feeding might help to address feed issues (reliance on concentrates). Agroforestry could also be of interest in this respect, but would require political commitment.
Profitability can be addressed through better management and pricing strategies. Transparent production can be achieved through farm visits, and raising awareness of connection between organic production and natural systems. Innovative product development can increase the value-added through organic branding. Could also look at the link with GHG emissions – is it better to look at GHG impact in terms of kg/protein produced instead of kg/milk? To improve dietary balance new and better quality forage varieties are required. Regional self-sufficiency requires more cooperation and networking. More processing of milk into more varied value-added products can increase competition and product range and draw in more dairies to the sector.

Votes were given to each type of solution (numbers on the right), based on its practicality, acceptability and effectiveness:

Cooperation and networking	4
More dairy processors	1
More products	3
Pricing the whole supply chain / better supply chain management	4
Alternative protein sources	7
Value added organic products	3
Prolonged maternal feeding	2
Product diversity	2
Better branding	3
Connect GHG emissions with nutrients in products	2
Better quality and variety of forages	3
Connect 'nature' with milk brand	1
Transparency of production	2
Long term commitment by policy-makers etc.	3

The group looked at the next steps required to implement the solutions suggested, including policy changes and the roles of actors and stakeholders in the supply chain. The first list shows the ideal situation (as listed above), the second list describes the strategies to achieve each.

List 1: Ideal conditions:

1) Profitable, low cost production, transparent production and value chain with equitably shared profits.
2) Plenty of protein feed
3) Innovative product development
4) Less concentrates in diet and more roughage
5) Several dairies, several new products and more competition
6) Regional self sufficiency

List 2: Strategies to achieve the ideals above:

1) Transparency indicators developed, through the farmers union, consumer associations – use of a fair trade label
2) For Finland rapeseed plus peas are the best protein feed mix, making excellent quality silage. Organic dairying in Finland is soy-free. Developing new alternative protein sources will require input from researchers, farm advisors and extension workers and breeding companies. Soya-free production may be easier in Finland compared to Scandinavian countries which still rely on imports of soy due to a lack of alternative protein feeds
3) Added value branding will require consumer research and the involvement/cooperation of processors and retailers
4) Advisors, farmers and researchers need to be involved in this, including for example the Pro Agria advice centre.
5) Dairies and the farmer's association need to support this (also link to 3) in terms of new products
6) Support from state is required, providing access to money for investment.

As one of the strategies identified at project level for investigation, Agro-forestry was discussed – the group suggested that this strategy would require support from the government, the EU and farmers in order to be viable.

Group B (Romania, Estonia and Greece)

The group thought about the challenges to the OLI dairy industry in their countries. One participant emphasized the need to have better access to home-grown feed, problems selling calves from the dairy system, the need for technology to decrease costs and the challenge of getting good prices for products.

The view was expressed that there were challenges in the current choices of consumers (preference for low fat milk, in the waste of products by supermarkets, and in dealing with and using surplus products (in his case left-over raw milk – managing supply and demand). Stavros said that in the Greek dairy industry, pasteurised milk has a 6 day expiry date – after research showing that most milk is not sold when it gets within 2 days of expiry the industry now takes back surplus milk and uses it to produce cheese etc.

One participant emphasized problems with transport of products to market when there are many small farmers each producing small amounts of milk. Keeping milk cool along the supply chain is expensive, especially for small producers. The cost of organic production can be too high, especially in Greece where organic products do not attract high prices as a result of economic conditions. These views were collated into categories by the group Facilitator:

1) Home grown feed in the EU (price and availability
2) Selling male calves from dairy system (they consume milk but can only be sold at low prices)
3) Cost of technology (Investment) (labour is cheaper but less reliable)
4) Farm profitability (costs and prices)
5) Consumer choice (type of milk consumed)
6) Many small producers so supply chain issues
7) Low consumption of organics

8) Trust in organic product (in Greece organic milk often sold as non-organic once demand for organic has been fulfilled. People often do not feel that there is a real difference between the two products, and do not trust the organic logo)
9) Keeping the cold supply chain
10) Price of products (too low at present) (in Greece, profits going to supermarkets, not benefitting customers)

The ideal situations were discussed for each of the topics above, and the group assessed how far we were from these ideals, and how far we might expect to go in the next few years:

1) Local feeds available at good price (we are not close to this, but the group considered good progress was possible)
2) Ideally male cows would be in greater demand (we are not close to this, it was felt that some progress was possible)
3) New technology is used effectively (we are a long way from this, good progress is possible)
4) Highly profitable farms (we are far from this but good progress is possible)
5) There was a debate here – should the ideal be to meet consumer demand, or to educate people to change their demand (for example, whole milk is healthy if you have a more balanced and less fatty diet in general). Two ideals were decided upon – 1) more whole milk is consumed and 2) all milk produced is used (range of products). (we are far from this, reasonable progress can be made)
6) All milk can be collected (a long way from this, but we can feasibly get close to this ideal)
7) People buy a lot of organic products (a long way from this, good progress possible)
8) High trust in the organic label (a long way from this, but it can be achieved)
9) Cold supply chain kept (can achieve this)
10) Consumers willing to pay a fair price for products (good progress can be made on this) and farmers receive a fair price for product (progress can be made, but less progress likely)

[*RPK note: the method gave good, focussed outputs, but some more general points were sometimes curtailed (quantification of each factor valued more than broader discussion which might have led to interesting insights). But at this stage the focus was on gathering individual views rather than on discussion*]

The group was next asked to put forward solutions that could move the industry towards the ideal situation for each area listed above, including practical steps and who should make them. Solutions were then voted on (numbers in brackets for those options that received votes):

1) Production of more organic feed, connections improved between arable and dairy farmers and research into novel feeds (3)
2) Can use breeds with a higher meat (as well as milk) value to increased prices (1).Sex separated insemination can also avoid production of unwanted male calves (1).
3) Low price new technology is required so that people can work with higher added value per person

4) Genetic and other research outputs can increase productivity, as can good management which requires education and training in farming (4). Cooperatives can increase the strength of producers to influence product prices (2).
5) More information on the benefits of organic milk are needed (1) (although it was suggested that it was best to follow demand and be innovative in using all of the product given that demand). Information and advice to consumers, needs to come from doctors, researchers etc. (those with an objective viewpoint – not just producers or industry funded scientists) (1). In terms of using everything produced and minimising waste, shops need to develop better tools to predict demand and to share information and strategies relating to waste (1). Big supermarkets are often not involved in these discussions, but have to be. Farmers also have to be willing to promote their own product, and not rely on supermarkets. People need to be informed of the cost of waste etc. (1). Regulations can be applied to reduce waste in shops, and shopkeepers should be motivated themselves to act (to avoid the loss of potential revenue). On the supply side, unused products can be made into new products (e.g. cheese from milk) (3).
6) Cooperation is needed between suppliers
7) Good promotion and advertisement on TV etc. is important, promoting (and defining) the benefits of organic products (2). Farmers and farm associations should pay for this, with potential role for the government
8) Better checks are required on production to build trust (2), as well as chances for people to check all the steps in the productive process (transparency) (1). More research is also required into the qualities of organic food (2).
9) Increase efficiency of cold supply chain (method not elaborated)
10) Explain the value of organic products to consumers (**6**). Selling products direct to customers is one way to avoid supermarkets taking all profits. Changes in milk prices are complex, and producers must be better at 'playing the game' in terms of predicting and reacting to these changes. Price transparency through supply chain is important (1).

A more general discussion then ensued: In Greece and Romania, cooperatives are hard to form because there is a culture of opposition to such ventures. If there are not good connections between organic suppliers and their buyers, organic milk can end up being sold as ordinary milk, and suppliers leave the sector as a result. Longer organic contracts (2-3 years) would help reduce this problem.

Producers need to be linked better to consumers and to researchers. Need to answer questions that people might ask – for example, in conventional systems soy is used as feed in milk production – why is this not as good as using organic and local inputs? This could be a basis for promoting organics. Also, who should pay for the promotion of organics – government of the producers? If it is the government then there is a problem, because they will want to support the whole farming community, not just the organic sector. If organics was seen as good for the public, then the government should promote it, changing incentives so that conventional farming becomes more expensive, not less.

Organic labelling is good as it shows you do not use GM inputs etc.

Milk vending machines in shops allow direct access to consumers, control over price, and the opportunity to communicate organic values etc. to consumers. This also happens in Greece. Machines are expensive (15,000 Euros) there is some risk. Some raw milk could be

sold from farms, depending on location. One milk producer sells direct from a cool truck to housing estates and gets better prices this way. Making a range of dairy products on farm can be positive, (although prices would fall if everyone did this). Cooperative arrangements could help.

Education of farmers can be a problem and higher education courses on farming, better training provision etc. would be good (including on benefits and working of cooperatives etc. to change cultures)

One participant felt that we know enough about the benefits of organics but are not getting the message across – (we need a clear statement to work around). Group discussed the idea of campaigning about the negative aspects of conventional systems, but people thought this could turn against the sector. There was agreement that TV shows etc. could help, for example showing a famous person being persuaded of the value of organics – using the fact that people follow prominent examples. The EU could have a role in expensive advertising that would not otherwise occur, for example organic product placement in films etc. Money for adverts is not available within the sector, so this role is important, although word of mouth and personal experience can ripple out to people. Tourist visits to organic farms can also help.

There was a suggestion that the EU could also subsidise the growth of crops required in organics, to decrease prices and increase stability of supply (Facilitator: this already happens)

Many poorer countries cannot afford organics. They don't have processed foods either – these types of problem come with development, when food becomes less valued.

Dairy farm education is by commercial reps in many cases, and so is not objective and fixes conventional thought processes. We need schools to offer more training. You could require a license given at the end of a course in order to run a farm). Universities need to provide vocational courses (exist in some countries but not others). Farming related groups can push for this, and funding of short courses on specific farming systems would also be valuable. Organic farmers can be used to teach others.
At present farmers can also learn from each other, perhaps through a learning centre that provides information. SP summed up as need for benchmarking, organic apprenticeships and knowledge centres.

Animal feed: Research needs to be made available to farmers about new feeds – how much to feed etc. – otherwise they will not buy them due to uncertainty. He advises farmers but does not have knowledge of the whole range of products – a knowledge centre is needed to access this kind of information.

Use of excess products: in Greece milk used for yellow cheese and yoghurt. Also liquid yoghurt for drinking is a popular product in Greece – bulked by water so good profits to be made.

[RPK note: *Here knowledge was exchanged – one participant checked the product name online and gave the information to the rest of the group, who wanted to explore the possibilities around this liquid yoghurt product*]

Day 2 - Group Presentations of Findings
Each of the three groups of stakeholders presented their findings to the whole workshop, and these were discussed in open debate. The transcript below details that debate:

Group A: The marketing of organics needs to improve, linking it to other value-added issues. 40% of consumers would buy organics if they knew that there was a fair return to farmers, according to a survey. Transparency indicators are important to increase consumer ability to make choices, including, for example, the marketing of 'soy-free' milk. Indicating that products meet 'fair trade' standards (the farmers got a fair deal) could provide a market advantage, but not all farmers are interested in this type of labelling.

Product development is important; in Finland there are only three types of organic yoghurt and little choice for consumers. Feed is also important – for example feeding clover can produce products with health benefits for consumers. Cooperation between farmers can help with home-grown feeding systems, for example a group of farmers will together have more land (and demand) for home-grown crops and be able to exchange land to optimise cropping areas. Slurry can be applied to these larger land parcels with more flexibility than for a single farmer. Related to feed, silage quality is also vital.

Prolonged feeding can increase costs, so that the benefits would have to be well communicated to consumers (to allow a premium to be charged).People often know little about farming and go on the image presented to them – at the moment, conventional farming has 'stolen' much of the imagery of organics.

Transparency and fairness: The processors set the terms of contracts – farmers could collaborate to discuss prices beforehand, creating a board to support their viewpoint. Longer term contracts are also important as subsidies are reduced.

Could direct selling of products to consumers be arranged better, as long distances make it hard for consumers to access products. There are also problems related to a recent raw milk health scare. Are there problems with organic indicators?
One participant said that people in Greece do not trust organic branding so that transparency and good checks are important – but there will be a cost to this.

In Finland, Fava beans and cooked fava silage are used instead of soy (as a result of a salmonella risk from soy as well as for sustainability).There is a national effort to keep the country free of soy, and now there is concern about GM also. Soy is still used for monogastrics (but only 20% with GM).

One stakeholder emphasized that organic yields in Finland were not too different from conventional (8000 versus 9000 litres).They use good silage; rapeseed and peas have been shown as the best soy alternative. Research needs to identify fava bean varieties suitable for monogastrics.

Group B: The price of organics is high for consumers, and we need to tell them why through the communication of existing knowledge and information on benefits.TV adverts etc. can spread the message with high profile champions. Political support (for example from the EU) is required to finance this type of advertising.

Regarding low farm profitability, the education of farmers is important; providing independent knowledge centres, developing interest groups of farmers to communicate ideas, and pressing for the development of vocational courses. Benchmarking of farms can also be a driver to improve practice.

High feed prices and low availability of protein feeds is a problem, and EU support for growing organic protein feeds is important. Research to find better crops is needed, and must be communicated well to farmers. Using unwanted products by converting it into value-added products (e.g. milk into liquid yoghurt is very interesting.

Can organic farmers build the governance of the sector themselves, without waiting for the EU. One response suggested it was possible with education and the formation of farmers' groups.

There was a question as to whether the consensus in issues visible at the workshop was true in reality, given the diversity of farming systems and countries in Europe. Specific solutions for specific circumstances, not broad brush approaches, are required. It was emphasized that common understanding was also important to develop.

Group C: In the UK the climate is suitable for grassland production. There were big performance differences in forage-based systems, so that big improvements can be made through knowledge transfer between farmers and systems, and benchmarking of performance to raise standards and production efficiency / robustness. This will require financial and specialist advisors to help farmers improve performance and to encourage knowledge transfer. At present there is a disconnect between research finding and farming practices. There is also a spectrum of management ability on farms, which emphasizes the need to share knowledge, to benchmark etc.

People often buy organic for their own health, so quality of product is essential – minimum quality standards are required with consideration of nutritional value (Omega 3, trace elements etc.) and the absence of antibiotic residue. Increasing quality is important to guarantee quality to consumers – research linking animal diets to health properties of product is also important. In some cases there may be a yield/quality trade-off, for example lower Omega 3 levels in diet with higher maize concentrates. Increasing forage quality is a good way to decrease the need for concentrates and to improve products. Taste of product should not be forgotten, and requires farmers to be engaged with the rest of the supply chain. Health benefits and quality can be affected by homogenisation, and consumer education on this in the UK (to increase acceptance of homogenisation) is important (e.g. non-homogenised milk can be better for those intolerant to lactose).

There are differences between the UK and Italy in terms of climate. Transnational rules might be common but their impact and application varies with system and conditions. Knowledge exchange is important between countries and some issues (e.g. optimising forage quality) are important for all. Perceptions can vary between countries, for example in the public perception of poor welfare in UK systems which is not an issue in Italy or Finland where the population is more rural, and where there have not been issues relating to mega-dairies etc. So health and welfare management can be important (in efficiency as well as perception).

In UK there are specific issues not found elsewhere, for example big retailers not wanting to buy promote organics because they do not think there is demand, while in Finland there is little promotion because of worries about supply in Italy and the UK. Advertising regulation in the UK also mean that claims have to be very carefully worded, and there are people who do not agree with organics that will notice any mistakes. In Finland, in contrast, people value the idea of fairness to farmers much more, and more than fairness to animals. In some places there are increases in veganism in teenage age groups, so some people have skipped organic animal products and gone straight to vegetarianism.

Facilitator – can we aim for readiness – have good supply that leads to demand as society becomes more 'ready' for healthy and sustainable products. Government readiness and support is also important and required, and in turn power is needed in the OLI sector to influence the approach of government. The issue of retailer power is also a problem – even though one company in the UK buys 70% of organic milk, it has little power over retailers.

Direct selling can bypass such issues, but (for example) the idea of machines or organic 'shops within shops' relies on support by retailers (and consumers).

Facilitator introduced the topic of rules for organic systems. One participant pointed out that there is often little difference between organic and conventional production (in Finland). So what is the most important difference? One stakeholder wanted to see higher standards in organic farming. Benchmarking can be an important motivator, rather than regulation. Consumers can benefit from more informative labelling. Regulation is required but should not be the primary way to increase standards – this should be driven by farmers.

Facilitator: Are overarching limits needed? Debate – better understanding should drive change, but stricter standards might also achieve this – without this, organic and conventional systems can be seen as very similar, decreasing the motivation to buy organic. Current standards may be sufficient to maintain differences between the sectors.

Supermarkets often reduce supply of organic products in a recession, as they feel demand will fall, creating a self-fulfilling prophecy. Another stakeholder pointed out that supermarket power also has an impact on the non-organic sector, for example with milk used as a loss leader. There can be other problems – for example when Finnish supermarkets took on organics, the number of small retailers fell because they lost the market.

Facilitator asked if the lessons from the workshop could be applied in different countries to those covered – the group thought that the extent to which this was possible would vary between different issues.

Appendix 3: The views of stakeholders

1. Represents farmers and wants to ensure that the project does not go completely towards organic production, but maintains a balanced interest in low input systems also. One important motivation for attending the stakeholder event was to see how other stakeholders and (competing) producers are thinking, and to find out what direction they might take in the future. He said that steering the direction of the project could be difficult in practice, because of the different outlooks of stakeholders and academics. He thought that the method used in the workshop was a good one, and that the debates included a variety of values and approaches. He felt that slightly larger groups would have helped in providing greater diversity of views.

2. Has a background in the city rather than the countryside – he supplies raw milk direct to customers using vending machines in supermarkets, and then collects unsold milk to make value added products (yoghurt, cheese etc.).His motivation for attending the workshop was to help find solutions to problems in the OLI sector, and in general to link up with other stakeholders across Europe. He felt that this kind of interaction helped to foster wider societal union and peace.

3. A farmer who also produces value added products to sell direct to consumers. He wanted to attend in order to develop new contacts in the sector and to find solutions to problems. This was an opportunity to apply new technology and techniques and to make his business more solid. He felt the future seemed positive for his business, perhaps more positive than for those in the UK and western Europe.

4. Motivation for attending was to focus his own thoughts and ideas about solutions to problems in the sector. He also attends conferences etc. in this subject area, and is involved in applied research. As a result, he did not expect to hear too many novel ideas, but to refresh and focus his thinking. He thought that the method used in the workshop was good, but that the group sizes were too small for a good debate (there were only 3 people in the northern European group that he was a part of).

5. A farmer but also involved in selling additives/drugs/semen to farmers in Greece. His interest in attending was to understand likely future trends in dairying, especially in the context of quota changes. He found the discussions useful even though he is not as focussed on organics as other stakeholders. He gained new knowledge about the sector in Estonia and Romania, and as Romania in particular is a major competitor for Greece he has a particular interest in understanding their views and likely future direction. During the group discussions, information on products and innovation was communicated between Stavros and the Romanian and Estonian stakeholders – see notes above.

6. Attended in response to an invite, and did not come with any pre-conceived expectations for the session. Because of the amount of funding for the project, he considered that it must be important. He thought that those in the organic sector were often more idealistic than realistic. He was interested in finding out about the different views of stakeholders around Europe and enjoyed the discussion. He had come with a stereotyped view that the Finnish were very adept at adjusting their actions to attract funding, and found that the Finnish thought exactly the same about the Swedish!

7. His motivation for attending the workshop was to learn from stakeholders in other parts of Europe, to learn what was happening elsewhere and to use the information to help find solutions to the problems he was facing. He found that the workshop was a good learning

experience, and he felt that he might be able to apply some of the ideas discussed in Georgia.

8. Attended the workshop because she is a stakeholder on the SOLID project stakeholder panel. She is a dairy farmer and has some knowledge of the sector to share, and she was previously involved in an organic dairy although this went out of business. Her motivation in accepting the invitation to the workshop was to understand how stakeholders in other countries viewed the future of the sector, and to learn from this. The invitation gave a positive impression of the content of the workshop and encouraged her to attend. She knows researchers in MTT and wanted to hear the Finnish perspective of things also. She felt that she learnt from the session, and from her involvement in SOLID in general. She enjoyed the group discussions, but felt that it would have been nice for stakeholders from the different European regions to have been mixed in the groups. However, she noted that there was probably a trade-off between achieving focussed outcomes from groups of people from one region, and sharing wider ideas between regions.

9. From a group promoting organics in Finland. They were interested in learning from the experiences of others working in this area in different parts of Europe. They think that there is an important issue around consumer communication – processors need to understand that there is a demand for organic products. Product innovation is important in promoting organics – this happens in the conventional sector (new ways of branding products, new flavours and formats etc.) but little in the organic sector. They were interested in learning how organic products are marketed in different parts of Europe. Their interest was in finding ways to develop long term demand for organic products – at present, organic farming in Finland is profitable, but they want to make sure that demand is not just the result of a short-term 'fashion' for organics.

10. Attended because she thought that it was important to find ways to better differentiate organic and conventional systems and products – it is hard to find a good, clear message for consumers, especially as standards in many conventional systems improve – there are more clear-cut examples to use in monogastric systems (welfare etc.). In Italy they are ready for stricter organic standards, to push organic innovation forward and use it as an example for conventional farmers (a carrot of potential new strategies).So she wanted to have a good exchange of views at the workshop, and she learnt from the experience, especially around the importance of improving forage and grassland quality for increased milk yield/quality.

Appendix 4: The views of researchers

Notes describing the questionnaire and interview responses of three SOLID researchers:

1. Stakeholder engagement is important in order to hear different voices, to give different views to researchers and to find new outlooks and solutions. Specifically within SOLID, there has been an initial decision to focus on three specific potential supply chain innovations. Stakeholder engagement in the Futures Workshop will help to show whether these three innovations emerge as priorities 'in the real world'. It is important to involve stakeholders not just at the end but throughout the project.

2. The purpose of stakeholder engagement is to better understand their perspective and how they perceive problems, challenges and potential solutions to their business. Stakeholders should be involved throughout the life-cycle of a research project. Emphasised the range of stakeholder engagement approaches in SOLID:

- SME partner in the consortium
- Stakeholder platform
- Involving stakeholders in research priority consultations (farm visits and national workshops)
- Participatory research (various kinds)
- Surveys of supply chain stakeholders
- Range of dissemination activities

[*RPK note: in this report the activities of the stakeholder platform and the 'Futures Workshop' method have been described*]

Feeling that the SOLID workshop achieved its expected aims: The outcome confirmed some of the suggestion that had been gathered previously, and some new insights were gained. Regarding the challenges of engaging with stakeholders she identified: making time to listen, respect for different perspectives, the analysis of responses, managing expectations on all sides.

3. In the SOLID project we have a separate stakeholder group, but also a group of SME representatives. It is important to have opinion from the field, so that our research is meaningful from the stakeholders' viewpoint. Also it is important to share ideas and recognize problems from the producers' and manufacturers' perspective. We also wanted to test three pre-chosen innovations and how stakeholders view the importance of these.

It is difficult to know the best timing for involving stakeholders in research projects, since a lot of stakeholders lack the time or other resources to contribute all the way through. This means that if we really want them to take part, all their costs should be covered. So this leads us to the finding that the earlier stakeholders commit to a project and the greater the extent to which their costs can be covered, the more involvement they are likely to have. Therefore, the best way is to include expectations about stakeholder contributions in the project proposal, so that plans can be made early and resources made available to support their involvement.

The stakeholder group who attended the workshop were committed to sharing their views and engaging with discussions. However, it would have been better if more stakeholders had attended.

During the workshop I think that there were good discussions about what stakeholders considered to be the most important challenges to the organic and low input dairy supply

chain. There was not so much discussion on climate change specifically. In the Nordic Group only one comment was about the bad reputation of ruminants as regards to their environmental footprint. It seems that the challenges that farmers face and considered in the workshop are more concrete than that. The way the workshop was organised obviously has an effect on the outcomes: if we had started, for example, by giving participants a vision of future challenges, including climate change as one of these, then we could obviously get more discussion about it.

The workshop would have been even better if all the stakeholders expected had attended - six cancelled their participation so late that we as organisers could not do anything.