Does sustainability require new skills for change agents in agriculture?

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Abstract: *Sustainability is an ill-defined concept. Many actors make claims about what sustainability should be, and farmers react to such claims in different ways. How do change agents and their managers deal with this diversity of farmers' attitudes towards change and towards the future of agriculture? How do they themselves cope with change and understand their role as change agents? We chose a comprehensive, action-training approach to answer such questions. This approach enabled the agents to acknowledge their historically-built professional models and to discuss some of the dimensions of their professional situations that needed to be grasped in order to develop new skills and adjust to new audiences, i.e.: the agent's position among farmers and among the people acting to change farming practices at local level; the tension between on the one hand the agent's engagement in promoting more environmentally-friendly practices or eco-systemic services and, on the other, the lack of support of his/her management or the farmers' vision of the agent's role; and the way of combining scientific and technical knowledge with farmers' own knowledge, to enable the farmers to develop a new understanding of their unit of action (eco-agro-system versus agro-system) and, accordingly, new practices. It also highlighted the diversity of the agents' points of view on change at farm level (discontinuity versus continuity) and the way to handle it: respectively by making the discontinuity visible and manageable at farm level, or by supporting a continuous change through step-by-step management of change at cropping-system level.*

Keywords: *change agents, integrated farming, action-training approach, learning community, professional development*

Introduction

Sustainability is an ill-defined concept. Many actors nevertheless make claims about what sustainability should be and how farmers should act in order to participate in sustainable development. Farmers do not necessarily agree on how to answer to such claims. While some argue for an even more technology-push agriculture, others claim that organic farming is the best way to meet sustainability, or emphasize the eco-systemic services that agriculture can offer. Meanwhile, new regulations on the use of pesticides catalyze certain clashes of interest among farmers, many of whom remain reluctant to reduce their use of pesticides and nitrogen. The main French unions and the managers of cooperatives argue that such reductions will result in lower production and are not relevant as regards global food needs or returns on investments in infrastructures built to stock harvests at cooperative level. Farmers in water catchment areas are unwilling to comply with the restrictive regulations concerning the use of pesticides in their area and are reluctant to recognize their contribution to water pollution. Some farmers are simply afraid to embark on change without being sure of how to handle it and of the results they can expect. Others, in contrast, choose to explore new cultivation methods and practices. They hope to get more recognition for their efforts from policy makers, as well as more scientific support, while developing new professional identities.

It is well recognized in the literature that farmers who wish to manage change at farm level will seek various informational resources. While some authors point out the role of peers (Darré, 1985; Triomphe et al., 2007), others focus on the way in which advisers support farmers' learning processes (Paine et al., 2004), and yet others show how different informational resources are combined to achieve change (Lamine et al., 2009). In this paper we focus on the way in which advisers support farmers in developing farming systems that address issues of sustainability (reduction of pesticides and nitrogen pollution, production of eco-systemic services). Our aim is to understand the

development of the advisers' activity when they give such advice in various situations of change management at farm or local level. While many studies deal with this question by focusing on some methodological issues (which methods advisers should use to act as a change agent) or on the position the adviser should adopt (being a facilitator rather than an expert, for example), we wish to address it by means of a comprehensive approach, i.e. from the advisers' point of view. As some reflexive practitioners (see, for example, Mattner et al., 2004) have already provided some insight into their own professional development, our purpose here is to highlight diversity amongst the advisers and to point out some of the factors which can impede their professional development. More precisely, we want to address the following questions: How do the change agents as well as their managers deal with this diversity of attitudes towards change and towards the future of agriculture? How do they themselves cope with change and understand their role as change agents? Which resources do they build and use to support the farmers who adopt and adapt practices viewed as contributing to a more sustainable development?

As noted above, we chose a comprehensive, action-training approach to understand how change agents and their managers tackle such issues. We worked at two different places where the agents had to support farmers in developing more environmentally-friendly practices or eco-systemic services. We chose these two case studies as the agents were already involved in such work and were willing to improve their efficiency. We assumed a contrast between the two case studies regarding the way the job was conceptualized and performed. To remain anonymous, we will call these two case studies A and B[1]. In Case A, advisers previously used to support groups of farmers involved in conventional, relatively intensive agriculture, but are now urged to promote integrated farming[2]. In Case B, the agents used to act as facilitators within groups of farmers involved in the exploration of alternatives to conventional agriculture, but some of these facilitators are now urged to support farmers in experimenting with methods aimed at developing eco-systemic services. In the following section we briefly describe our theoretical framework and methodology and then present our results by specifying for each case study: (i) the way change is understood by the managers, (ii) the professional routines which prevail, (iii) the way advisers conceptualize change and, finally, (iv) their own analysis of the changes occurring in their work. We finally discuss the implications of these results on ways of supporting professional development for change agents.

Some theoretical assumptions and an action-training methodology

Ison and Russell (2000) distinguish between first-order and second-order change. They qualify first-order change as "more of the same", e.g. increasing the efficiency of a given system. Second-order change means stepping out of the existing system to see it from a different perspective or angle. The implication is that the other perspective or angle has a different rationale. We assume that moving from conventional towards sustainable agriculture, by introducing integrated farming at farm level or developing eco-systemic services development, requires this kind of second-order change. We therefore assume that being a change agent means supporting farmers in this second-order change, whereas it used to mean supporting them in a first-order change. How do the agents perceive these issues while interacting with farmers?

There is an abundant literature on how to operate as a change agent, both in the field of organizational studies and in that of personal development studies. Manuals on good practices or recommendations written by scholars or consultants are also numerous. But, as far as we know, few researchers have adopted a comprehensive approach to grasp the way change agents themselves define their role and develop their skills. Sociologists are certainly those who contribute the most to

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[1] The two case studies take place in organizations steered by farmers. These farmers define the vision of the future of agriculture that they share, and allocate the means at their disposal in order to: (i) share this vision with other farmers who seek support from these organizations; and (ii) support them in implementing it at a practical level. The agents working in such organizations have administrative or advisory jobs.
[2] Integrated farming is understood here as the combination of practices which can be used to take advantage of the biological regulations within the agro-eco-system in order to reduce the use of inputs such as nitrogen, pesticides or herbicides. The development of integrated farming in this study takes place in cash crop systems.

such a perspective (see, for example, Remy et al. 2006; Compagnone et al., 2009) but their focus is mainly on the conceptions and networks that agents develop, rather than on the way they act in given situations. Some researchers have studied how certain agents learned to operate differently (see for example Maxime et al., 2002; Cerf et al., 2005) when they were given a mandate to co-produce advice with the farmers concerned, but the researchers adopted an outsider's perspective rather than a comprehensive one. Co-production in such studies was moreover designed to support first-order change at farm level, rather than second-order change.

To understand how change agents develop their skills to support farmers in second-order change, we chose an activity theory perspective. Like many other authors who ground their developmental interventions in such a perspective (see, for example, Virkkunen, 2004), we argue for the relevance of anchoring professional development in a reflexive analysis of the current professional activity. But, as pointed out by Jobert (1998), such an analysis needs to be supported by a framework. In this study we intended to make the professionals aware of their way of conceptualizing their relationship to their professional situation. Our framework is therefore drawn from French ergonomics which has long shown that people carry out an *activity* and do not stick to the task assigned by the organisation. The task description cannot anticipate all possible working situations, and workers have to cope with the variability of these situations in order to feel efficient and to be recognized as such in the organization. Furthermore, the *activity* should be distinguished from the task as expressed by workers when answering why and how questions about their work (see Leplat, 1997). This can be likened to the distinction made by Argyris and Schön (1974) between espoused theory and theory in use. Activity is therefore defined by sticking as much as possible to what is really done. This implies various techniques, e.g. observation and debriefing with the operator, using various records (Leplat et Hoc, 1983; Pastré, 2006), or interviews to make explicit exactly what the person experienced while performing the task (Vermersch, 1994). We used a participant observation technique as well as a story-telling approach, i.e. asking the agents to recall some professional situations in which they faced difficulties in acting as they wanted to. Such a story-telling approach can be likened to the method developed by Pastré (ibid.) to support a reflexive analysis of agents' activity. This type of method aims at enabling a worker to recall the *events* that (s)he experienced in a given situation. She or he is asked to explain how (s)he interpreted them and then behaved according to this interpretation. We asked the agents to identify the key events that they remembered and the way they adapted to them.

While our first theoretical principle was to ensure that our analysis was rooted in the professional situations in which the agents operated, the second principle was that our work should support these agents in making sense of their own experiences while facing new situations. Clot (2008) acknowledges the key role of the collective of professionals while those ones analyse and develop the professional model underlying their way of acting in certain situations. While Clot (ibid.) uses "crossed self-confrontation"[3] and emphasizes the discursive activity that takes place among the professionals, we chose to use participative observations and story-telling to recall the professional situations within the collective of professionals, and invited them to compare routine and disturbed situations. To facilitate such a comparison, we suggested they explore some key dimensions in their work that we had identified through our own observations. We asked them to highlight:
- the spatial-temporal dimensions of their professional situation
- the scientific and technical knowledge that they mobilized
- their beliefs (what they considered to be true)
- the goals they had in mind while acting in the situation
- their way of mobilizing the group and the farmers within the group.

To sum up, we chose an action-training methodology to capture the way the agents conceptualize their relationship to their professional situations, both in routine situations and in situations that they experience as being new. This methodology rests on three main principles. The first one is to work with a group of agents and to offer them a space in which they can discuss their professional

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[3] Crossed self-confrontation is a method set up to allow different professionals to comment and to talk about a video which shows a given productive situation and the way a given professional operates in it.

situations together. The second one is to support these exchanges by enabling the agents to recall their activity, either by recording them during participant observations in diverse situations, or by enabling them to describe the way they experienced it in some of these situations. The third principle is to propose a framework to the agents so that they can identify any contradictions in situations in which they feel inefficient and stressed. The collectives we worked with were two groups of professionals who shared roughly the same task: in Case A, to support farmers in experimenting integrated farming practices; in Case B, to support farmers in experimenting some terms of reference for eco-systemic services.

Table 1. The main characteristics of our action-training methodology.

Meta-rules	1. Create a collective work situation which aims to give means and time for collective reflexivity.	
	2. Support the dialogue among agents to explore their diverse professional situations.	
	3. Create the agents' engagement in the collective by offering them the opportunity to improve their practices as change agents.	
Principles to co-design the action-training sessions	1. Working on professional situations: telling peers what is done in such situations.	
	2. Articulating 3 circles: researchers point out the diversity among the participants and propose some framework of analysis. Promoters act as a collective memory of the discussions. Agents bring in their experience.	
Different activities carried on during the sessions	Field visit: observation of inter-cropping plots.	Only Case A.
	Story-telling: agents recall routine and disturbed professional situations.	Case A: this was supported by *in situ* observations by the researchers.
		Case B: this was supported by a leaflet and interviews conducted by researchers, which enabled the agents to keep trace of their work.
	Researchers bring in a framework of analysis.	In both cases.
	Producing resources to act as a change agent.	Case A: building technical notes recalling the dimension on which to argue, to convince farmers to adopt a given practice.
		Case B: exploring resources given by the promoters (for example: diagnostic guides to identify room for manoeuvre at farming or cropping system levels).

To analyse our data, we paid attention to the different dimensions of a 'job' and to the relationship which is built between a professional and his (her) "professional situation". A 'job', as we understand it, combines three dimensions: the deal contracted between the agent and his/her management staff; the collective of professionals, i.e. the other agents sharing a same professional model; and the skills embedded in the professional model, which enable the agents to identify the different cues of a given situation and to operate efficiently in it. We assume that these three dimensions are intertwined coherently, so that the agents can feel comfortable and efficient when performing their work.

We consider that a 'professional situation' is two-sided. One side is the 'productive situation', i.e. in which the agents interact with farmers; the other is the 'social situation', i.e. the recognition that professionals get from peers, and the norms and habits that they share[4]. Many authors have analyzed the relationship between the individual and the situation, to understand how individuals act in situations. Researchers working from a situated action perspective (Suchman, 1987; de Fornel et al., 2000; Theureau, 2006) argue that the situation determines the individual's behaviour. Individuals adapt their behaviour to the events and resources that emerge from the situation and to which they

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[4] This professional situation should not be confused with the professional systems of reference used in the organization to describe the job. We will refer to such systems of reference by identifying the tasks assigned by the organization to the agents.

give meaning in the situation. In a pragmatic philosophy tradition (see Dewey, 1947, 1993), the situation is viewed as an opportunity for inquiry which enables individuals to build and rebuild their experience. In a more cognitive and ergonomic perspective (see Rogalski et al., 1992), the situation is characterized by the dynamics of its components, on which the individuals want to have some control in order to achieve their goals. For researchers in didactics (see Brousseau, 1997), the situation is the framework of learning, what they call "le milieu", i.e. a space built by the learner while he/she interacts with the context. In our case study, the "milieu" provides facts, data and information which the learner transforms into resources or constraints for his/her learning tasks. All these theoretical models can be considered as potentially able to account for the agents' conceptualizations of their relationship to their professional situation. But our own objective was to apprehend how agents themselves understand that relationship and to support them in dealing with situations in which they claim to experience inefficiency and stress. We therefore endeavoured primarily to analyze their discourses on their ways of conceptualizing change and acting as change agents. This enabled us to point out the diversity amongst the agents' ways of building their relationship to their professional situations.

To sum up, we chose to highlight:
- how the organizations understand their role as promoters of agriculture with a positive contribution to sustainable development, and the difficulties that this can generate at the agents' level;
- the professional model that the agents acknowledge to be the implicit one driving their action as change agents, and which they recognized as failing to encompass the diverse situations they now have to cope with;
- the diversity amongst the agents in their way of conceptualizing change and acting as change agents.

How does the organization support the agent in acting as a change agent?

Differences can be identified in the way in which the management staff supports their agents in facing new situations of change. In Case B, the managers conveyed a vision of agriculture for the future and produced dedicated resources to support the facilitators. In Case A they had a much fuzzier discourse about their vision for the future and did not really dedicate resources to support their agents.

The Case B managers had in mind to propose to policy-makers a contract that would allocate funds to farmers who developed eco-systemic services. These managers worked with some farmers to define the terms of reference of this contract. Before promoting such a contract, they decided to assess its feasibility for the farmers, along with the extent to which the farmers involved would really achieve eco-systemic services. They sought funds to develop this project, and assigned some facilitators to the following tasks:
- identify farmers who volunteer to test the feasibility of the terms of reference,
- put on contract the support available to each farmer and the data that he/she will have to deliver during the 3 years of the test,
- support farmers in adopting and adapting the terms of reference[5] to their own situation,
- assess some indicators showing the contribution to eco-systemic services.

Facilitators received some support in performing these tasks, such as training, allocation of human resources to collect data on farms, and automation of data analysis. Nevertheless, during the action-training sessions, the agents expressed some doubts about their ability to carry out a full test of the terms of reference. Rather than saying that they did not share the underlying vision, they mainly pointed out the difficulty of persuading farmers to apply some of the specifications such as buffer strips or plot sizes.

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[5] Practices in the terms of reference included, for example: reducing the use of inputs to below certain thresholds; developing practices which can be maintained, such as reducing plot sizes; and increasing the % of buffer strips.

Case A is quite different. The agents attending the action-training sessions came from different agencies, each with its own understanding of the need or the opportunity to develop integrated farming practices. A clear message was not really addressed to the agents, and the managers did not promote a distinct vision of the future for agriculture. In fact, the managers were reluctant to promote integrated farming practices and argued that more evidence should be gathered that such practices would not decrease farmers' incomes and would effectively reduce the negative impacts of current intensive practices. They were reluctant to develop such practices on a large scale.

As a result, these managers did not really support the agents who accompanied farmers willing to adopt and adapt such practices. Their main action was therefore to encourage their agents to prove, through experiments, that integrated farming practices could maintain the farmer's income while reducing the negative impacts of current farming practices. Different paths were chosen to achieve this. In one agency, an agent had to facilitate the adoption of integrated farming practices within a group of farmers who volunteered to test these practices, so that he could assess them according to various economic and environmental indicators. In others, protocols to test such practices at plot or farm level were developed. The agents had to implement them by negotiating with the farmer the adjustments needed to adapt the protocol to the farming situation.

Although the agents had little support from their agencies, most of them belonged to a national network[6]. This afforded them the opportunity to discuss and assess new farming systems, along with technical solutions to avoid the use of pesticides at farm level or to develop eco-systemic services, etc. The network was clearly a resource as well as a space in which the agents could develop a social recognition of their role in helping farmers to move towards more integrated farming practices.

Discussions among the agents during the action-training sessions distinctly showed that they seriously lacked a clear mandate and enough time to develop news skills. They felt that they had to build their own vision of the future for agriculture and to understand the extent to which it would be supported at local level, whether by their managers or by the farmers. The agents also expressed the need for more social recognition within their own agency. They acknowledged that their managers sometimes questioned their involvement in the network, i.e. their investment in collecting evidence.

Two different historically built professional models working as antecedent norms

Our interviews with the managers and the analysis we carried out with the agents enabled us to show that, in each case, there is a professional model which the agents refer to when interacting with farmers in routine and disturbed situations.

When collectively analyzing the disturbances which occurred in certain situations, the agents realized that they behaved according to routines entrenched in their professional model. Recognizing that this model might be an antecedent norm and could be inadequate to deal with these situations, they started to dissect their model and to better identify how it implicitly defined their way of identifying cues in a situation. They recognized that such a model coherently encompassed key dimensions of the situation: the agent's mandate and role, the interplay of the people during their interactions (farmers and change agent), the spatio-temporal unit in which these interactions took place, the resources used, and the way they were mobilized to reach a fairly specific goal. The coherence of the model implied that it might be difficult to reconsider it.

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[6] This network is supported by their agencies and by the Ministry of Agriculture. It consists of researchers, advisers, and trainers involved in the design, implementation and evaluation of cropping systems aimed at developing some of the eco-systemic services to which agriculture can contribute.

Table 2. The professional model that we identified in Case A and in Case B.

Dimension of the professional model	Case A	Case B
The mandate	Given by the administrative head of the team of agents and by the farmers who define the agency's orientation.	Given by the administrative managers and by a "referent" who is a farmer belonging to the group in which the agent acts as a facilitator.
The origin of the funds	The organization seeks funds, even if sometimes the agent has to sell the services proposed by the organization.	The organization seeks funds, but each agent also has to contribute to this search.
The collective of professionals	The colleagues working with groups of farmers and some specialists working in the same agency.	The network of facilitators working in the organization.
The agents' role, the core resources mobilized on the job, as expressed by the agents	The agents call themselves technicians, and say that they give technical support to farmers. The group is one way to deliver this technical support. The "technician" is viewed as an expert who can tell what is innovative for the farmers, and provide the evidence that it is relevant to them. The productive situation is mainly organized as a field visit which can take place fortnightly during the cropping season. The adviser's role is to prove to the farmers that he/she has answers to all their technical questions.	The agents call themselves facilitators and define their role as enabling farmers to set their autonomy at decision level. The farmers' group together as the relevant unit to push and discuss proposals regarding innovation in farming systems. The productive situation is mainly organized as training sessions in which experts are appealed to, to inform farmers on specific issues which they had identified as crucial. The facilitator's role is to enable the farmers to challenge the expert knowledge.
The core competency	Being an expert on crop management techniques and decision-support tools and being able to support farmers in adapting them to their own farming or cropping systems.	Being able to create fruitful dialogue among the farmers of the group so that each farmer can develop innovative practices on his/her farm.

How do agents conceptualize change?

Change agents do not speak of first- or second-order change. Rather, they conceptualize change as either a discontinuity or a continuous process, and mainly express their way of considering a certain relationship between change, experience and time. Few agents defend the idea that a move towards more environmentally-friendly practices means a clear break with former practices, and completely redesigning the whole farming system. Most of them think that this move is a progressive one: the farmers adopt new practices step by step in a long-term process.

The discussions during the action-training sessions showed that these two conceptualizations are grounded in different understandings of their own role as change agents. All the agents think that adopting integrated farming practices (Case A) or the terms of reference (Case B) means that farmers should become aware of the ecosystem (instead of the agro-system) and learn to be "in front of the process". For most of the agents, being "in front of the process" means "organizing the crops and the farming techniques to avoid the outbreak of pests or weeds, and without using pesticides or herbicides". But some will try to make farmers aware of this at plot and crop level, while others will try to do so at farm and cropping-system level. The latter mainly conceptualize change as a necessary discontinuity, while the former see it as a continuous process.

The agents differ in their way of conceptualizing change in relation to innovation. They see these two notions as intertwined, and as a key point in their ability to build a new relationship with the farmers. In Case A, most of the agents share the same image that they use to act as innovation promoters. They view innovation as knowing how to use new molecules or cultivars, and new decision-support tools. They acknowledge that farmers view integrated farming practices not as innovation but as compulsory. They also acknowledge that even for them, promoting new reasoning at system level is no longer promoting innovation. Some of the agents feel that they are losing their position as experts, without having the resources or the desire to become a facilitator. In Case B, most of the

agents express the need to have more technical expertise. In fact, they used to consider innovation as something that was in the farmers' hands. But to support the farmers in adopting the terms of reference, their role is partially changing, from facilitator to someone who reassures farmers on some agronomic and technical issues related to the terms of reference. In each case study, the former relationship to innovation is challenged by the new situations in which the agents have to act. Rebuilding this relationship is crucial for the agents, in order to rebuild their posture and role in the group of farmers.

Which change do the agents identify in their own work?

For the agents, disturbed situations are mainly those in which they work with new audiences. Most of the agents expressed first a feeling that they did not succeed in finding the right position to handle such situations. They realized that some dimensions of their relationship with farmers needed to be rethought. In Case A, the agents recognized that their position could no longer be considered as neutral: acting as an agent promoting more environmentally-friendly practices could be viewed by farmers as a kind of political activism, even if the agents themselves considered that this implicitly meant acting as a civil servant, i.e. supporting the general interest. In Case B, the agents acknowledged that they could not only act as facilitators and also had to become experts who could influence farmers' decisions and reassure them on technical issues.

In both cases the agents recognized that they needed to build a new position among all those who were also in a position to give their opinions on farmers' practices in one way or another (other farmers' advisers as well as local authorities or local environmental associations or agencies). Together, the agents discussed how to negotiate their position and, more specifically, the role of their managers in this negotiation. But they also recognized that they should first clarify their position with the other agents every time they had to deal with a shared problem (for example water quality at catchment level) in a given situation.

The agents furthermore expressed their need to build a new relationship to scientific and technical knowledge. In Case A, it seems that uncertainty on the relevant technical recommendations calls for new attitudes towards such recommendations. Advisers used to recommend techniques when they had evidence from a network of local trials that such techniques were locally relevant. But obtaining results from farming-system experiments is a long-term process and such results need to be extrapolated differently to fit to each farmer's situation. The agents therefore claimed that co-designing on-farm tests with the farmers was a way to overcome this difficulty and would require different observation skills and decision-support tools in order to check the relevant indicators at plot or cropping-system levels. In Case B, the agents feared that their lack of scientific and technical knowledge could be an impediment in supporting farmers in taking the relevant decisions regarding the terms of reference. In both case studies, they felt that a techno-economic argumentation was required to convince the farmers that developing practices oriented towards more sustainable development was a long-term but relevant strategy.

Finally, they recognized that these changes in the relationship would impact their way of mobilizing the cognitive and material resources they were used to. For example, in Case A, the agents started to explore how they could change their way of conducting field visits. They discussed the relevance of developing new approaches during intercropping periods, and saw such visits as opportunities to develop a long-term diagnosis at cropping system level. In Case B, the agents started to question the pivotal role of the training expert. They tried new tools aimed at supporting farmers in their ability to design their cropping system according to the terms of reference.

Conclusion

In this paper, we contrast two case studies to show how change agents and their managers deal with new professional situations. These situations emerge with the need to support farmers in developing practices with a positive contribution to sustainable development. In each case, our work was based

on an action-training approach which afforded an opportunity for the agents to discuss their work in routine and disturbed situations. This work allowed the agents to acknowledge their historically-built professional models and to discuss some of the dimensions of their professional situations that needed to be grasped in order to develop new skills and adjust to new audiences. It also highlighted the diversity of the agents' points of view on change at farm level (discontinuity versus continuity) and the way to handle it: respectively by making the discontinuity visible and manageable at farm level, or by supporting a continuous change through step-by-step management of change at cropping-system level. The latter result shows that the change agents do not conceptualize change as first- or second-order, as proposed by Ison and Russell (2000). Rather, they conceptualize it in relation to their mode of monitoring change and supporting farmers.

The difficulties that the agents meet in dealing with new situations and acting as change agents seem to be related not to their different conceptualizations of change, but to the respective professional models identified in the two case studies, and to the support received from their managers.

In both cases, the agents pointed out three dimensions that needed to be understood in order to develop new skills and efficiency while acting as a change agent. The first is the agent's position among farmers and among the people acting to change farming practices at local level. The second is the tension which can exist between the agent's engagement in promoting more environmentally-friendly practices or eco-systemic services, the possible lack of support of his/her management staff, and the farmers' vision of the agent's role. The third dimension is the intertwining of scientific and technical knowledge with farmers' own knowledge, in order to support the development of a new understanding of their unit of action (the ecosystem versus the agro-system) and the way to materialize it in farming practices.

Finally, our study enables us to point out that discussions on their routine and disturbed professional situations enable the change agents to build a learning community which they consider relevant to support them in developing new skills as change agents.

References

Argyris, C. and D. A. Schön (1974) Theory in Practice - Increasing Professional Perfectiveness. San Francisco, Jossey-Bass Inc.

Brousseau, G. (1997) Theories of didactical situations in Mathematics, Dordrecht Kluwer Academic Publishers.

Cerf, M. and P. Falzon (2005) Situations de service, Travailler dans l'interaction. Paris: PUF, collection Travail Humain.

Clot, Y. (2008) Travail et pouvoir d'agir. Paris : PUF, Collection Travail Humain.

Compagnone C., Auricoste C. and B. Lemery (2009) Conseil et développement en agriculture. Dijon: Quae-Educagri Editions.

Fornel de M. and L. Quéré (1999) La logique des situations. Nouveau regard sur l'écologie des activités sociales. Paris : EHESS, collection Raisons pratiques.

Dewey, J. (1947) Expérience et éducation. Paris : Bourrelier.

Dewey, J. (1993) Logique. La théorie de l'enquête. Paris: PUF.

Ison, R.L. and D.B. Russell (2000) Exploring some distinctions for the design of learning systems. Cybernetics and Human Knowing 7 (4): 43-56

Jobert, G. (1998) La compétence à vivre: contribution à une anthropologie de la reconnaissance au travail. Mémoire pour l'habilitation à diriger des recherches, Université François Rabelais de Tour. UFR Arts et Sciences humaines.

Lamine C., Meynard J.M., Perrot N. and S. Bellon (2009) Analyse des formes de transition vers des agricultures plus écologiques : les cas de l'Agriculture Biologique et de la Protection Intégrée, Innovations Agronomiques, 4, 483-493.

Leplat J. (1997) Regards sur l'activité en situation de travail, Paris : PUF, Collection Travail Humain.

Leplat J. and J.-M. Hoc (1983) Tâche et activité dans l'analyse psychologique des situations, Cahiers de psychologie cognitive, 3/1, 49-63

Mattner H., Packham R. and R. Bawden (2004) Changing our perspectives on learning to manage change, In proceedings of the 6th International Farming Systems Association European Symposium, Vila Real, Portugal, 549-559.

Maxime, F. and M. Cerf (2002) Apprendre avec l'autre : le cas de l'apprentissage d'une relation de conseil coopérative. Education Permanente, 151, 47-68.

Paine, M.S., Nettle R.A. and S. Coats (2004) *Learning and professional development in advisory services: supporting the reflective practitioner.* In proceedings of the 6th International Farming Systems Association European Symposium, Vila Real, Portugal, 653-662

Pastré, P. (2006) Apprendre et faire. In E. Bourgeois et G. Chapelle (eds) Apprendre et faire apprendre. Paris : Presses Universitaires de France.

Remy J., Brives H. and B. Lemery (2006) Conseiller en agriculture. Dijon : Educagri Editions.

Rogalski, J. and R. Samurçay (1992) Formation aux activités de gestion d'environnements dynamiques : concepts et méthodes. Education Permanente 111: 56-78.

Suchman, L. (1987) Plans and situated actions: the problem of human-machine communication New York: Cambridge University Press.

Theureau J. (2006) Le cours d'action: Méthode développée, Toulouse : Octarès Editions.

Triomphe B., Goulet F. Dreyfus F. and S. Tourdonnet de (2007) Du labour au non-labour : pratiques, innovations et enjeux du Sud au Nord. In R. Bourrigaud et F. Sigaut (Eds.), Nous Labourons. Nantes : Editions du Centre d'histoire du travail.

Vermesch,P. (1994) L'entretien d'explicitation en formation initiale et en formation continue,,Paris : ESF.

Virkkunen, J. (2004) Developmental intervention in work activities - an activity theoretical interpretation. In: T. Kontinen (Ed.) Developmental interventions, CATDWR and IDS, Helsinski University, pp. 37-66.