Deliverable 1.1

Support to Innovation Processes: a Theoretical Point of Departure

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Content

1 Conceptual grounds and research framework for AgriSPIN

1.1 Preface

This AgriSPIN deliverable 'Conceptual Grounds and Research Framework' serves as a guide to the understanding and analysis of innovations, innovation processes and related concepts with a specific focus on innovation support services. These are key issues that are studied during the Cross Visits of the project. Therefore, it summarizes the broad understanding of 'innovations in agriculture' and is specific about concepts and theories which will form the basis for an analytical frame to guide the AgriSPIN cross visits.

The objective of AgriSPIN is to systematically explore innovation intermediaries' practices and support services in agriculture and rural development across Europe. The overall goal is to create a stimulating environment for innovations. Hence, the conceptual framework presented here aims to consistently facilitate the exchange of existing knowledge on innovative approaches in agriculture, agricultural supply chains and rural areas first within the research team and also between and among the research team and the practice-oriented actors in AgriSPIN. In this regard, the conceptual framework document provides transparency about the assumptions underlying the researchers' approaches to the field. By summarizing and drawing conclusions from the reviewed literature, the document proposes operational definitions and understanding of terms and concepts relevant for AgriSPIN.

With regard to the other partners in AgriSPIN this document should be seen as an explanation of backgrounds rather than as a guide for common work. As dialogue and learning among all project partners are at the heart of what we want to pursue in AgriSPIN, this deliverable will on the one hand help us to link our practical experiences in AgriSPIN to theory in general, and on the other, to communicate in a coherent way throughout the Cross Visits. We acknowledge that once we adopt concepts they have consequences in the sense that they will guide our research questions and focus of investigation. However, although the scientific team agrees to have a common framework for the project this doesn't imply that other project partners need to use terms in the way described here or that people have to 'learn these concepts'! On the contrary, it is our conviction that we can best explore and learn about the ideas of other actors once we have made our own ideas explicit. Practitioners also have multiple understandings of concepts and we mutually appreciate and make value of this during the research.

1.2 Organisation of the paper

The literature on innovations and innovation processes in agriculture is too vast to allow a comprehensive review. We took a pragmatic approach based on identifying words, concepts and topics that we as a research team believe will form the core of the exchanges among AgriSPIN partners during the Cross Visits and organising them into three sections that highlight: (a) a structural perspective on innovation components (chapter 3), (b) a dynamic perspective on innovation components (chapter 4) and (c) a selection of concepts related to innovation support services (chapter 5). Chapter 2 first presents a succinct overview of the two perspectives in a graphical way. We close the document with reflections on its making, use and possible refinement in the course of the project (epilogue).

We would like to thank Kevin Heanue for proof reading. Nevertheless the authors are responsible for the contents of this report and any remaining inconsistencies.

2 Innovations in agriculture – the structural and the dynamic perspective

Nowadays it is widely accepted that innovations emerge from social systems and in this regard we commonly speak of 'agricultural innovation systems'. However, this term is rather unspecific and subsumes a broad range of theories and concepts. Therefore, we briefly introduce this general agricultural innovation system idea before presenting key concepts and topics from the innovation systems literature that were identified as critical for the project by the AgriSPIN science group. Pre-empting the discussion in Chapters 3, 4 and 5, tables 1 and 2 below present a succinct overview of these key concepts and topics, collected into the structural and dynamic perspectives which the science group identified as a useful way to structure understanding of innovation processes. In the sections 2.2 and 2.3, we propose two graphs that visualise the components of the structural and the dynamic perspective of innovations and demonstrate of how these concepts can be related to each other in a logical way, reflecting linkages and interdependencies.

Table 1: The Structural Perspective

The innovation(s) (*there can be more than one in a case*) • Description, definition(s), type(s), category, • Scale of innovation(s)
The Actors involved or concerned: • Stakeholders, actors, initiators, intermediation actors • Roles, mandates, objectives • Values, interests, attitudes • Innovation support service providers (AGRISPIN specific focus)
Actors' capacities • Knowledge, learning, … • Cooperation, networking
The innovation structures • Platforms, networks, clusters, alliances, partnerships • The system' (= the Innovation system?) • Formal and informal interactions (structures, habits, modalities)
The environment / landscape • Policies / polity • Cultural and socio-economic contexts • Natural conditions • Characteristics of agric. sector or sub-sector

Table 2: The Dynamic Perspective

The innovation process • Underlying model / concept • Steps / phases • Scales at which innovation unfolds
Driving forces and obstacles: • Problems, opportunities • Risks, conflicts, tensions • Interaction, learning, discovering, inventing • Triggers and drivers (internal to the process, external linked to the environment)
Critical mass, tipping point • Scaling out, networking, clustering, supporting
Results and impacts • Outputs, outcomes • Effects, impacts, impact pathways • Scaling out, scaling up
The environment / landscape • Similar to structural picture, as the process is embedded in an environment

2.1 The Innovation system approach

The AgriSPIN systems of innovations (SoI) approach conceives innovation in a systemic and interactive way, i.e. that innovation emerges from networks of actors as a nonlinear social (and institutional) as well as a technical process, where interactive learning takes place around a common concern or impulse of change. Therefore, while classical features of innovation will not remain neglected, the main focus will be on processes, with knowledge considered as being constructed through social interaction – i.e., not unproblematically transferred but instead continuously created and recreated. Thus particular attention is given to (social) exchange, co-ordinated action and networking. Moreover, in order to avoid or overcome gaps (cognitive, information, managerial or system) resulting in network and institutional failures (for a review see: Klerkx and Leeuwis, 2009) growing attention is given to various types of (process) 'intermediaries/facilitators'.

In the context of AgriSPIN and related to the current orientation of rural policies we conceive innovations as emerging from Agricultural Knowledge and Innovation Systems (AKIS) which comprise multiple actor groups interactively engaged in the phases of innovation processes along value chains, related to specific products or regions or jointly addressing a cross-cutting challenge or problem (EU SCAR 2013; World Bank 2006). The AKIS concept has developed as a critical response to the linear technology transfer model exemplified in the National Agricultural Research Systems (NARS) paradigm. In its current use it builds upon the Agricultural Knowledge and Information System (AKIS) concept (Röling 1991) and sometimes includes the Agricultural Innovation System (AIS) idea (Worldbank 2006). A recent literature overview shows that although there are differences between the concepts with regard to, for example, the actor groups included and the functions of the system focused upon, there are nevertheless many overlaps between the concepts so that no unambiguous distinction can be based upon the acronyms only (Labarthe et al. 2013). While in an EU context, the concept was especially useful in identifying and understanding the infrastructural complexity of knowledge systems, its ability to support the analysis of knowledge flows was less apparent (Knierim et al. 2015). In AgriSPIN, the term AKIS will be used with reference to the understanding developed by the SCAR collaborative working group (EU SCAR 2011; 2013).

According to the World Bank (2012), AKIS is defined as a concept that links people and organizations to promote mutual learning and to generate, share, and use agriculture-related technology, knowledge, and information. It integrates farmers, agricultural educators, researchers and extension staff to harness knowledge and information from various sources for improved livelihoods. Farmers are at the heart of the knowledge triangle formed by education, research, and extension with a focus on knowledge or information exchange. On the other hand, the AIS concept recognizes learning and innovation as an interactive process. The focus of the latter is on the fact that multiple stakeholders and sources of knowledge contribute to agricultural innovation and hence AIS gives attention to developing channels of communication between them. Its emphasis on innovation as a social process of learning broadens the scope of agricultural research and extension to include developing local capacities. It clearly recognizes that education improves farmers' ability to engage in innovation processes (Lundvall 2004; Mytelka 2000; World Bank 2006). Because the innovation systems concept includes broader sets of relationships between actors and contexts, it therefore provides a suitable framework for embedding innovation capacities in the rapidly changing market, technological, social, and political environment of contemporary agriculture (World Bank 2006). The World Bank (2012) and (2006) further defines an innovation system as a network of organizations focused on bringing new products, new processes, and new forms of organization into economic use, together with the institutions and policies that affect their behaviour and performance. In an innovation systems perspective, several actors are seen as relevant to agricultural innovation, including entrepreneurs, researchers, consultants, policy makers, suppliers, processing industries, retailers and customers (Klerkx and Leeuwis 2009).

From this innovation system approach, we analyse innovation processes through structural and dynamic perspectives. Therefore, it is necessary to differentiate the analysis of the elements that underlie the structures of the system from those which create interactions between these elements that govern the innovation process (Laperche et al. 2013).

2.2 The picture of the innovation structural components

Figure 1 is a schematic of the structural factors influencing any innovation situation. The objective of this picture is to give an overview of the major influencing factors so that they can be identified and addressed systematically when describing and trying to understand any innovation situation. The size of the component in this figure could increase or decrease depending on the innovation we want to describe.

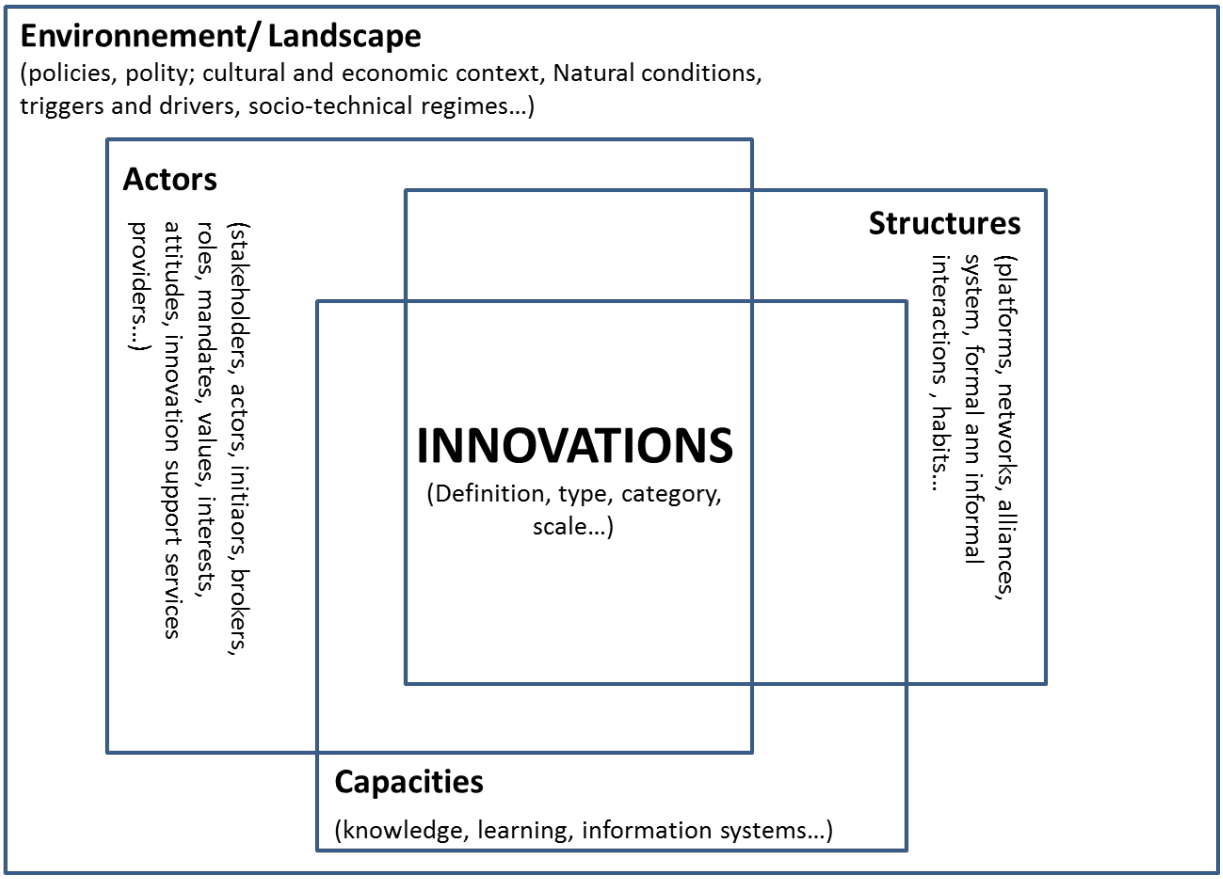

Figure 1: The structural component of innovation view

Figure 1 clarifies that innovations are developed by actors with the help of specific capacities, skills and knowledge and within structures operating in a multi-faceted environment.

2.3 The dynamic components that foster ‘process of an innovation’

The innovation process should be described as an iterative cycle or a line with several loops that repeat and adjust over time. Hence the picture below (figure 2) is still only the initial part of the figure and can be further developed and improved.

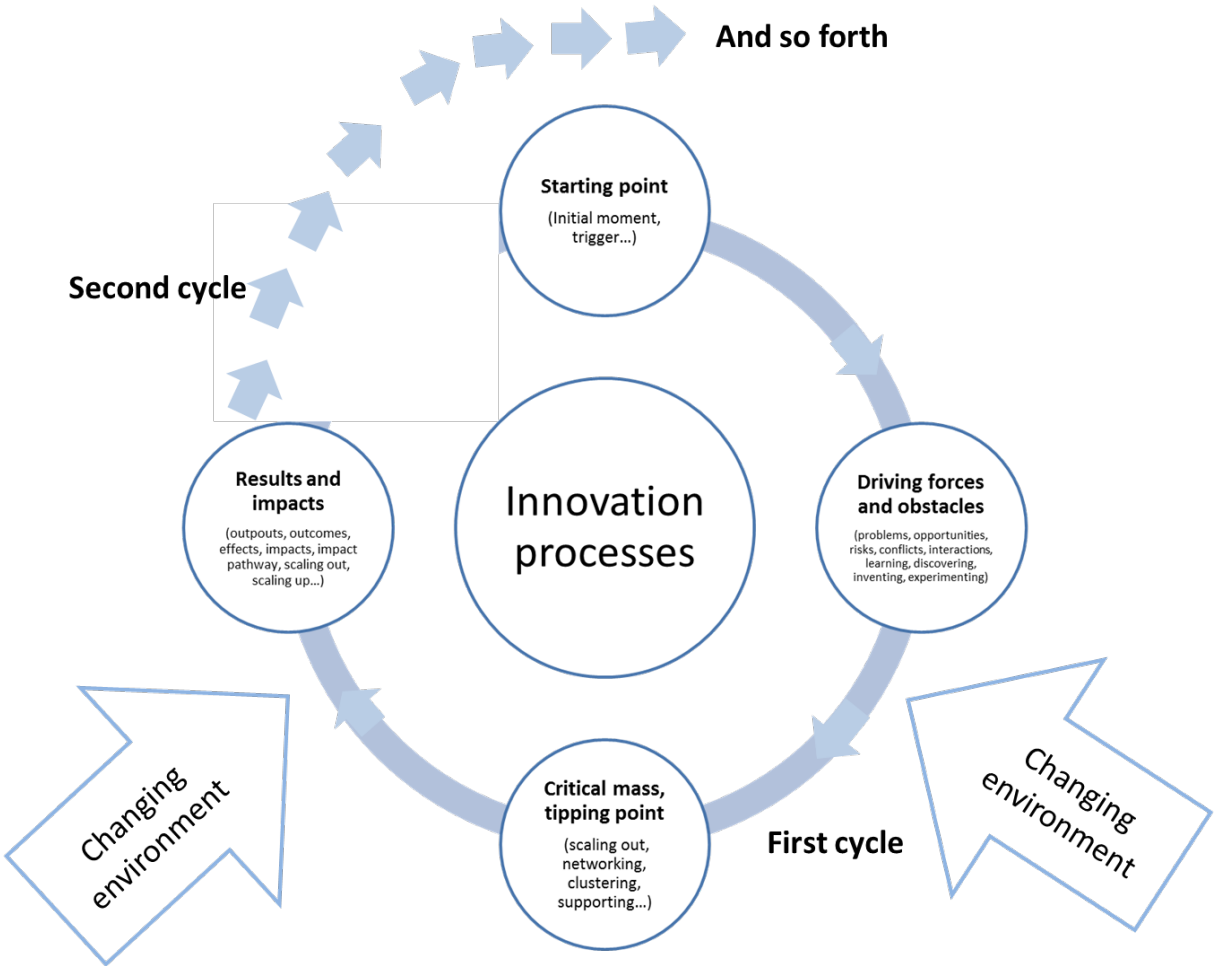

Figure 2: The dynamic process of innovation development

We are aware that this dynamic perspective disregards the specifying of certain aspects e.g. the actors driving this process although they should be part of an analytical approach. Hence, this is one example of how both perspective need to be applied in combination to concrete cases, revealing e.g. various subjective perspectives towards a given situation or dynamics.

3 Concepts related to a structural perspective

This chapter highlights concepts, terms and understandings related to an innovation event from a structural perspective. It concentrates on structures, forms and qualities, and hence on factors stable over a given time or for a certain setting. These factors are schematically represented in fig. 1. The order of the subsections does not prescribe any inherent logic.

3.1 The innovation

3.1.1 Definition of innovations

Innovations are defined as everything that is new for an individual; a community or something that someone has not yet known or received that may help in doing things better, making things easier or solving problems etc. Adopting an innovation means change but it must be noted that not everything that is new is good, or that not everything that is old is bad, or that innovation does not necessarily imply progress. The OECD (1997) and Eurostat (2009) further define innovation as the implementation of a new or significantly improved product (good, service or practice), a new marketing method or a new organisational method in business practices, workplace organisation or external relations, while Rogers (2003) sees an innovation as an idea, practice, or object perceived as new by an individual or other unit of adoption. The adoption of an innovation is considered as a mental process by an individual or of a group and it starts with becoming aware of the innovation and ends with its practice (Planck and Ziche 1979:342).

Innovation can be characterized in various ways: as a product or a process, incremental or radical, technical or organizational. The first approach relates innovations to the novelty change in the domains of new production combinations, new markets, products, services and organizations. Another definition of innovation links its origin with an invention or a discovery that is used by an individual actor or a group of actors. This definition emphasizes the technological dimension of innovation. Invention could be related with a research activity developed by scientists or entrepreneurs. This definition implies the elicitation of innovation models that explain process of change from invention to innovations (Boutillier et al. 2014. A third group of authors (Lundvall, 1992, Edquist, 1997) considers innovation as the result of socially constructed activities that aim at providing a response to needs or overcoming constraints. This definition emphasizes the role of institutions (norms, rules, values, habits) and organizations (firms; networks, trade-unions) in innovation processes. These institutions and organizations frame interactions among actors and set up conditions that articulate resource use and creation.

3.1.2 Taxonomy of innovations

Tracing back to the works of J. Schumpeter in the 1930s, most early works on innovation related to the industry or firm. Schumpeter introduced the concept of “creative destruction”, emphasising how a whole market can be restructured in favour of those that grasp discontinuities fastest. He relates a “company’s ability to innovate to its size (WordPress 2015). Challenged by the lack of empirical grounding of Schumpeter’s work, other economist such as Abernathy in the 1970s differentiated incremental from radical innovation, while Porter in 1986 illustrated a similar concept called continuous and discontinuous technological changes. Other characterisations include “Incremental vs. Breakthrough” innovations (Tushman and Anderson 1986) and Conservative vs. Radical innovations (see Abernathy and Clark in: WordPress 2015). These diverse views reflect the difficulty of unanimously deciding and agreeing on the nature, categories and scales of innovation even today and can be related to what Edquist (1997) called “taxonomy of innovation”. From this, we suggest three angles (business-related, institutions-related and degree of innovation newness) to propose a practical basis for differentiation in AgriSPIN.

Business related angle

The above definitions cover four forms of innovation (for measurement purposes) (Inventta 2015):

- Product innovation**:** This involves the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics.
- Process innovation: This has to do with the implementation of a new or significantly improved production or delivery method. This might be significant changes in techniques, equipment, and/or software.
- Marketing innovation: This involves the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.
- Organisational innovation: This deals with the implementation of a new organisational method in a firm's or another collective's practices, collaboration organisation or external relations.

Institutional angle

Institutional innovation includes norms, value and mechanisms of coordination among actors. In the context of collective change we consider institutions as 'prescriptions that humans use to organise all forms of repetitive and structured interactions' (Ostrom 2005:3). Successful innovations are often the result of synergy among three dimensions: technical, organizational and institutional. In a similar sense, Leeuwis and Aarts (2011) highlight that innovations are a combined implementation of new technologies and practices (hardware), new knowledge and ways of thinking (software) and new institutions or organization (orgware). Hence, innovations can be considered as sociotechnical hybrids (Flichy 2008).

Degree of innovation newness angle

An innovation can consist of the implementation of a single significant change (= radical) or of a series of smaller changes (incremental) that together constitute a significant change. And, an innovation can affect single components of an object, a production process or an organisation (modular), or it transforms it thoroughly and structurally (architectural). This introduces us to the four different categories or levels of innovations proposed in the Henderson – Clark Model (WordPress 2015) (Fig 3).

While incremental innovations focuses on making modest improvements to existing processes, products or services, radical or transformational innovation involves creating a completely new process or product in response to a market need or opportunity. Radical innovations tend to come about as a result of careful research and development into a specific issue or problem, and frequently make use of new technology to solve them. These kinds of innovations are often seen as 'breakthrough' innovations, some of which can change the entire way an organisation operates and, on occasion, can result in a new product or service that impacts an entire market sector (Gov. 2015).

Henderson and Clark noticed that the Incremental – Radical dichotomy alone was not sufficient to explain which particular company would be in a better position to innovate and under what circumstances. Their investigation led them to divide the technological knowledge required to develop new products, and consequently to introduce innovations, along two new dimensions: knowledge of the components and knowledge of the linkage between them - called architectural knowledge.

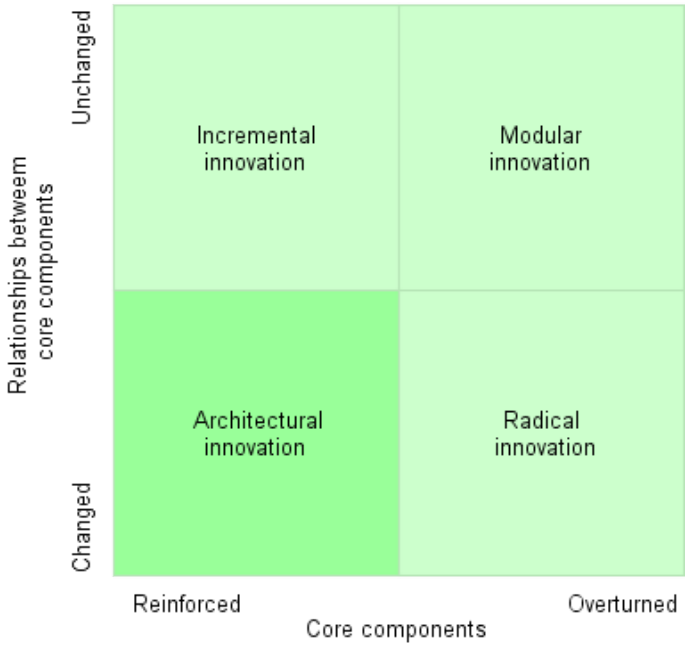

Figure 3: Matrix of core components and component relationships as affected by innovations
Source: adapted from WordPress (2015)

The second possible case identified by Henderson and Clark (1990) is component innovation. Component innovations require new knowledge for one or more components, but the system knowledge remains unchanged. For instance, around the 1980s most hard disk manufacturers substituted the ferrite read/write heads with thin-metal heads; this is a clear example of component innovation. This type of innovation has a great impact upon the linkage of components, but the knowledge of single system remain the same (WordPress 2015).

The figure 4 below presents some examples for each category of innovation.

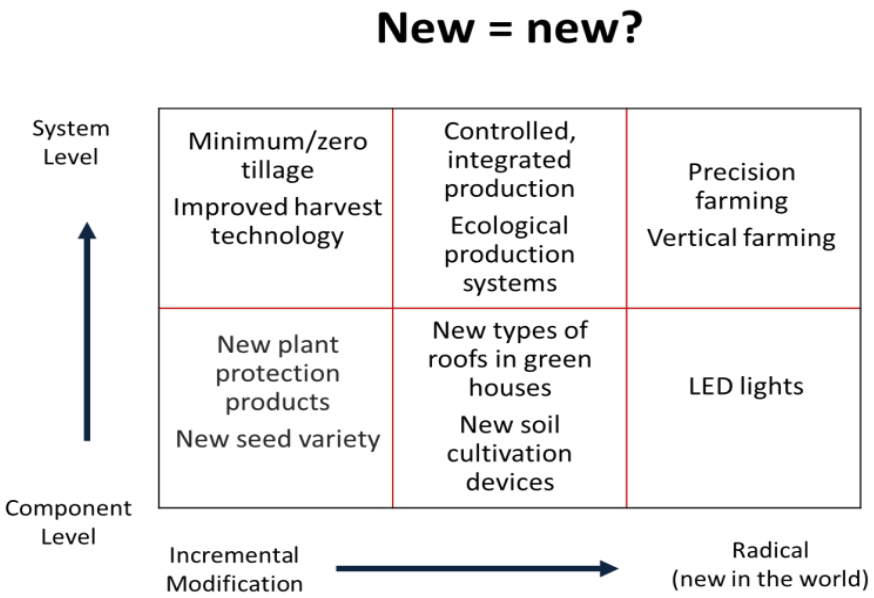

Figure 4: Examples of incremental and radical innovations along the Henderson-Clark Model

3.1.3 The scale of innovation

'Scale' is considered in innovation studies in two ways. It can be expressed through the analytical frame that is applied on the innovation or when framing the innovation process in terms of scaling out and up (Pachico and Fujisaka 2004). In the first sense, scale can be addressed at territorial or organizational level. The territorial level helps to distinguish innovations according to type and where resources are mobilised (e.g. through the terroir, the supply area, agro-ecological systems etc.). The organizational level helps to address the decision making and governance level relevant to where the innovation takes place (enterprise or non-profit organisation, value chain, branch or sector etc.). The choice of the relevant scale of observation depends of the nature of the innovation being considered and also of the system that support an innovation process.

The change of scale helps to identify mechanisms of innovation appropriation and adoption. This change of scale could concern geographical or governance scales. In this case innovation goes from local to regional scale, with multiplication of users, diffusion to other areas and access to new markets. This is a horizontal change or scaling-out. Change of scale could be also at an organizational level with new actors being involved in the process (e.g. new producers, new communities, intermediaries, decision makers) or new way of collaboration among actors, new rules and policy support that foster innovation impacts. This is vertical change or scaling-up.

Innovations could emerge from niches, where a favourable context, new markets, and innovative firms prevail, called enabling environment. The latter promotes innovation maturity and dissemination at large scale (with the original design of innovation or in another form). These niches could modify the dominant socio-technical regime (Geels, 2007). The institutional environment plays an important role through rules, norms, and values that support the dominant socio-technical regime or allows the emergence of niche innovations through scale change processes.

3.2 The Actors

As innovations are always conceived and perceived by human beings we emphasise the need to develop an understanding of the actors engaged in innovations. Therefore, one approach to understanding the innovation situation is through the involved actors' perspectives. Actors can comprise individuals, groups or corporate actors.

Terms like 'actors' and 'stakeholders' are frequently used interchangeably (Reeds 2008), although there are differences in the original meanings. While 'actor' directly refers to the agency of a person or entity (Long 1992), 'stakeholder' emphasises more the interest or the concern someone represents in a given situation ('stakes') and indicates additionally that s/he may represent interests of a larger group. In the context of AgriSPIN, we propose to use 'actor' where we speak of people or entities in general (a farmer, an advisory organisation, a regional government) and 'stakeholder' in cases where interests are explicitly represented (e.g. a mayor, a delegate from a network etc.).

People decide and act according to their perceived interests, belief systems and needs, guided by values, goals, routines and conventions which are part of a person's experiences, knowledge, skills and capacities. In our understanding of human behaviour, we largely follow the *humanistic psychology* approach (C. Rogers; A. Maslow) which centres the attention and the explanatory factors for decision making on the '*here and now*'. Accordingly, it is people's subjectively perceived inner psychic field and perceived external environment that offers possibilities and presents obstacles and hindering factors for meaningful action (Lewin; Hoffmann et al 2009). For the investigation of an innovation situation, this means that the subjectively perceived factors as evoked by the actors involved need to be taken into account. More concretely, we agree with Joas (1996) who emphasised the situational conditions of human action that is shaped by the actors' intentions, their physical involvement and their societal relatedness with others which makes every situation unique.

‘Roles’ are socially constructed partial identities related to expectations about one’s behaviour (König and Schattenhofer 2008). They evolve in a social system where several people share a common endeavour. Most conversant to everyone are family roles, however any social system implies the differentiation into various roles. If a role is explicitly accorded and accepted as e.g. a facilitating or leading role, we may also speak of a mandate, which frequently is related to a professional context. Here, we see that ‘roles’ and ‘mandates’ link actors with structures, as a role is frequently derived from a given pre-described organisational form. For example, a working team implies the existence of a team leader and an association or an assembly needs a chairperson and a secretary.

3.3 Capacities: knowledge, learning and information systems

Capacities for innovation can be attributes of individual, collective and corporate actors. We use the terms ‘knowledge and skills’ when we refer to individual actors’ capacities while we designate collective knowledge of organisations such as networks or firms as ‘information systems’. In the following, emphasis is given to knowledge and learning of individuals as the core element and initial step with regard to innovation capacities. (Details on knowledge and learning in social systems are given in annex 1).

First, it is important to underline that knowledge is fallible; people tend to see only some aspects of reality and are blind of others. Furthermore, in every epoch certain (societal) assumptions seem unshakeable and any human project reflects a particular worldview (Joseph, 2004). Knowledge is therefore produced within a collective human history and is subject to processes of verification, capitalization and dissemination. This socially constructed knowledge is the information that someone ‘assimilates’ or internalises. It follows that knowledge itself is a relationship. It concerns the relationship of the knowledgeable subject with his/her world, the product of the interaction of the subject and his/her world and the result of such an interaction (Lewin 1943). There is no knowledge independent of or not inscribed in knowledge relationships (Koutsouris & Papadopoulos 2003). For de-personalised content transmitted in books and journals, we use the term ‘information’.

- Knowledge is packaged in various and, at the same time, specifically bounded forms. On the one hand, it is common to label knowledge in various ways, e.g. practical, theoretical, procedural, scientific, occupational and operational. These ‘packages’, however, are not the special forms of an ‘object’ called ‘knowledge’ but signify specific relationships with the world, because as mentioned previously, knowledge itself is a relationship. In this respect, for example, knowledge per se is not practical or scientific; rather knowledge is used in the framework of a practical or scientific relationship with the world (Koutsouris & Papadopoulos 2003).
- On the other hand, our ways of knowing are, as already indicated, guided by the rationalities within which individuals, groups, organisations and societies operate. Thus indigenous/local knowledge, citizen knowledge, scientific knowledge become categories of ways of knowing by particular communities of actors, each of which has a varying degree of social and cultural significance (scientific knowledge in our present society, for example).
- Science is conceived as a distinct, very powerful knowledge system taken as definitional of knowledge, rationality or objectivity (Watson-Verran and Turnbull 1995).
- However, it should be noted that here non-expert, 'lay' or 'local' knowledges (also often described as 'practical', 'traditional' or 'folk' knowledges), is not understood as a cognitive 'deficit' or 'default'. 'Local knowledge' is a knowledge characterised primarily by local situations, embedded within and generated out of the problem-solving interests of specific groups of people in specific local settings.
- Therefore, the components of 'local knowledge' can be identified as: (i) knowledge from their own experience, held by rural producers and resource users; (ii) knowledge that has been transmitted to them from earlier practitioners in local production processes (seen as of similar quality to knowledge derived from their own experience), and (iii) knowledge that rural actors and inhabitants receive from 'external' sources (e.g. mass media, scientists, extension) but which they use in specific locally-adapted ways.

It is through the interpenetration of the life-worlds and projects of actors (Long 1992a), i.e. interaction, negotiation and accommodation to each other's world, that existing knowledge is either reinforced or somehow transformed or deconstructed thus leading to the emergence of new forms and a 'fusion of horizons' (Leeuwis et al. 1990). Knowledge emerges as a product of the interaction and dialogue between different actors and networks (Scoones and Thompson 1994). Networking is a capacity and it is commonly seen as a way of co-ordinating a shared activity (van Veldhuizen *et al.* 1997). Networking is also seen as an effective way to cross boundaries, disciplines, organisations, hierarchies, and scales (Lipnack and Stamps 1993). It can increase the number of actors (individuals and groups) who share power and directly contribute to the formulation of projects and policies (Lipnack and Stamps 1993, Wheatley 1992, Slocum *et al.* 1995).

Learning and knowledge do not concern the result of transmission of pieces of information by an authoritative mechanism addressing pathetic subjects but, instead, the result of self-conscious and purposeful action of individuals, led by their own (sometimes, a common) vision. The learning subjects participate in a process in which participants are activated in a holistic manner; human learning is both an experiential and a cognitive process (Freire 1972 and 1973). A typology of learning theories was presented in Ison et al. 2000. The authors underline the fact that many of the theories included in this typology are not as distinct as it might be suggested and outline three theories (1) Social Leaning, (2) Situated Learning Theory and (3) Epistemic Learning. The 'social (or societal) learning' (SL) approach draws, among others, on the work of Habermas, Giddens and White (Woodhill 1993), Bandura (Webler, Kastenholz and Renn 1995) as well as on adult learning theory (Merizow, 1990; 1991) and the organizational theories of Argyris and Schon (1978). In sum, the aforementioned learning theories converge in that they theorise learning as being an active process on the part of the learner which is non-deterministic, path-dependent and situated (associated with socialization and communication practices). In this sense, practice and learning are emergent properties of people's actions; practice and learning are constitutive of each other (Blackmore et al. 2012).

Furthermore, practitioners learn when they are in a reflexive stance towards their own situation in the process of change. Reflexivity aims at challenging conventional thinking, at problematizing aspects and developing novel interpretations (Darnhofer et al. 2012). It means bringing in alternative perspectives, representations, interpretations, framings and showing the difference it would make if these are taken into consideration (Alvesson and Sköldberg 2009:313). According to Ison (2012), reflexivity starts to operate when actors move beyond reflection and interpretation (first-order processes) to reflection on reflection or interpretation of interpretation (second-order processes). Reflexivity is important in that it contributes to developing the capacity of individuals to face and effect change. It affects one's own approach in attempting to influence a situation as well as the way individuals face change (reflecting upon one's adaptive capacity) or learn (to build new worldviews). Thus, reflexivity is essential with respect to the involvement of individuals in the process of innovation.

'Information systems' within innovation process includes all support that supplies any information that influences the process (e.g. database, media, reports, observatory, SIG). It can be formal or informal. Usually it is related to structures (see next section).

3.4 The innovation structures

Innovations refer to changes. People take initiatives for change, they try to influence others to move, and this movement has effects on the system. But initiatives do not come out of thin air: they are responses to what was happening in the system that is constantly changing. Some structures make it easy to take initiatives and to make them successful, while others put high risks on deviating from what is known and normal. In order to communicate about innovation processes, we need language to distinguish the system, structures, the people who act within this system and the configurations in which these people influence each other in relation to innovations.

3.4.1 Systems and structures

In its most basic description, a system is a collection of components that are structurally coupled by interaction patterns. Because of these patterns, the system has properties that cannot be attributed to its constituting components. Take for example a school class: while each pupil might individually be very pleasant and cooperative, the class can become monstrous when they are all together in interaction with their teacher. In this case, we look at the class and teacher as a system. For innovation processes it is relevant to observe those components of a system and patterns of interaction between those components that allow us to understand what induces initiatives and what effects they have on the system.

Systems do not exist in isolation. Each system is a component in a larger system and each component of a system is a system in itself. What counts for us are the system properties that affect a certain innovation process. So, the components that contribute most to the interaction patterns that cause those properties constitute the system we are interested in. If, in the example of the class, we want to understand what goes wrong and how this could be changed, we have to take the pupils and their teacher as the system. Putting the boundaries around the class of pupils itself is not enough, because another teacher might have no problems with these kids.

However, this system is also part of a larger system of the school, with a certain culture, the presence (or absence) of a system for guidance for teachers in trouble, and so on. In turn, the school is part of a larger system of the neighbourhood with certain cultures, socio-economic circumstances, tensions and history. Nevertheless, it is useful to determine what does and does not belong to a certain system, when we try to understand what is going on. By defining the boundaries of an innovation system, we try to distinguish what is inside and outside of this system, in order to understand what effects of actions are due to the internal dynamics of the system, and what is caused by the world outside. Boundaries between systems are most interesting when it comes to innovation processes. Because of differences in the properties of systems, people operating on the edge often have to abide by conflicting rules and expectations. They also see opportunities which are hidden from others living within the comfort zone of their system. Such persons are often the source of new initiatives.

Systems have properties that emerge from the interaction between the components that belong to the inside world of this system. Structures are constructions that channel this interaction, such as agreements, contracts, explicit or implicit rules, forms of organisation, institutions, and also physical facilities such as buildings, meeting rooms, roads, infrastructure for internet, and so on. Language and culture are structures as well. Even concepts and philosophies can be considered as mental constructions that include certain ways of interaction and exclude others. Structures provide the bedding for interaction patterns while the flow is in the actions and interactions themselves. Together they can lead to more or less stable systems with their specific properties and characteristics.

People take action to innovate, to change their practices or implement changes in structures that make it easier for others to change behaviour. Good initiatives are everywhere at any time, but the environment selects. The AgriSPIN project aims to create an environment that is stimulating sustainable innovations at farm level. This means we are interested in those structures that influence the thresholds for people to take initiatives for innovations and to take action for implementing them. The interaction between the partners in the project is expected to result in initiatives for changes in existing structures, which ultimately will lead to changes in the systems these partners are part of.

3.4.2 Networks

Networks are, as aforementioned, spaces where social learning takes place through the links and interactions between actors. Therefore, “creating a purposefully designed ‘space’ or ‘platform’ which brings together experiences of those involved in purpose-driven learning and knowing processes allows for the creation of synergies and meaningful working linkages” (Hubert et al., 2012, p. 180).

Literally, a network is a collection of knots that are interconnected. A human network is commonly seen as a collection of individuals who have a reason for interacting more or less regularly with each other. They might share an interest, a background, an ambition, etc. Some see their network as the collection of contacts they can turn to in case they need them. Some networks are institutionalised. This means a structure has been created with objectives, a task division, rules and more. In that case, the difference with an organisation is minimal: organisations are more permanent structures than networks which are supposed to dissolve when they are no longer functional.

The concept of networks is an important addition to organisation theories when it comes to change and more specifically: innovations. The dynamics of such processes cannot be understood within the boundaries of an organisation as a system. People with initiatives do not follow the formal hierarchy of an organisation. They seek support in informal networks and create movement with others. Such informal networks are not limited to the boundaries of an organisation. Looking at innovations at farm level, there are practically always different stakeholders involved who are not linked to each other in a hierarchical way.

While trying to understand the dynamics of innovation processes, common descriptions of networks as mentioned above are not adequate. They refer to social networks where members recognise each other as being part of this network with its particular identity. What we would like to distinguish are the people in different positions regarding the process: the ones who promote and assist the change, the ones who are supposed to be influenced in order to make the changes possible, and the once who should notice the effects. Who are the allies, who are the ones that are supposed to move, and who are out there in the system who cannot be influenced directly? By using the concept of social networks, we are confined to the first category only.

The theory of Living Networks (Wielinga, 2001, 2008) identifies three networks related to a process of change:

1. The core network: This network consists of actors who share the ambition of making a change. These actors develop strategies to influence others for making this change possible, and they act accordingly.

2. The horizontal network: This is the collection of actors who should make a move for making the change possible. Note that this network is defined by the core network, and that these actors do not recognise themselves as being part of the network for change. This will change when the core network is effective.

3. The vertical network: The innovation will have effects that go beyond the core network and the horizontal network. Actors in this larger network might be the ultimate beneficiaries of the innovation, but they might also notice negative effects.

The distinction between these three networks involved in an innovation process helps to identify which actors matter, and how effective strategies for change might be. When, for example, a group of farmers is engaged in developing a new product for the market, this group forms the core network. Maybe they have an advisor who is really committed to the case. Then this advisor is part of the core network too. This network needs the collaboration of other actors in the system: other technicians, investors, suppliers, actors in the value chain, and maybe also administrators, before their new product is ready to enter the market and finds access. These actors are part of the horizontal network. The core network needs to identify which persons they have to approach and in what order. Ultimately they target a certain segment of the market. These consumers are part of the vertical network. But villagers around the farms who might not be happy with the increase of big trucks passing their homes are part of the vertical network too.

There are various concepts in use for describing configurations of actors who join forces for getting things done. These are networks, network organisations, platforms, clusters, alliances, and partnerships. We will have to keep on explaining to each other what we mean while using such concepts. A first description is given in Annex 2.

3.5 The environment

3.5.1 Definition

The environment plays a key role in innovation process. In innovation literature, various terms are used to describe the environment: institutions (Malerba 2005), socio-technical landscape or exogenous context (Geels and Schot 2007), institutional context (Hall et al. 2003, Hounkonnou et al. 2012), technological paradigm (Dosi 1982) or socio-technical regime (Geels and Schot 2007). *Institutions* are negotiated agreements among actors about some social purpose. They are dynamic and constantly reproduced or adapted through interaction in networks. They include norms, routines, common habits, established practices, rules, laws, standards, and policies. They can be exclusive or inclusive, extractive or wealth creating, oppressive or liberating. At best, they provide historically evolved checks and balances that define an equitable civil society, limit corruption, level the playing field, and create sustainable opportunities. A lot of institutions are national (such as the patent system), while others may be specific to sectoral systems, such as sectoral labour markets or sector-specific financial institutions. In this respect, the relationships between national institutions and sectoral systems become quite important in several respects (Malerba 2005). Institutions may range from the ones that bind or impose enforcements on agents to the ones that are created by the interaction among agents (such as contracts); from more binding to less binding; from formal to informal[1] (such as patent laws or specific regulations vs. traditions and conventions). *Landscape* is defined as an exogenous context including macro-economics, deep cultural patterns, macro-political developments (Geels and Schot 2007). The institutional context concerns the rules and norms that govern research and development as a social process of learning. In practice this means the rules and norms governing the emergence, promotion and execution of research priorities, behaviors of actors involved in the production, transfer and use of knowledge and their interrelations, the knowledge building, use and sharing and the way of organizations' learning (Hall et al. 2003). *Technological paradigm* is considered as an "'outlook", a set of procedures which define the relevant problems and the specific knowledge related to their solution. The technological paradigm defines the boundaries within which 'technological trajectories' evolve (Dosi 1982). The sociotechnical regime referred to shared cognitive routines in an engineering community and explained patterned development along 'technological trajectories'. The *sociotechnical regime* concept accommodates this broader community of social groups and their alignment of activities (Geels and Schot 2007). These various terms are related to the multi-level characteristics of an environment. In fact, the environment includes global, national, as local levels and economic, social, technical, political and environmental dimensions. According to Hall et al. (2003), *institutional context* affects the way national cultures embed in the norms of individuals and organisations and the way this affects how they operate, interact and relate to each other and how they learn and use knowledge. Therefore, there can be different national cultures of science, with norms of acceptable behavior, review and validation. There are also different organisational cultures and traditions in different sectors. The agriculture sector is embedded in a global/general environment but also in a specific environment due to its particularities. Touzard et al. (2015) underline seven specificities of agriculture: 1) configurations of particular actors and organizations, 2) actors are part of sectoral institutional mechanisms which have existed for a long time, with clearly identified agricultural policies, as well as specific forms of organization of production (family labour, pluriactivity, etc.), trade (long vs. short supply chains, certifications, geographical indications, etc.) and consumption, 3) the sector is characterized by a diversity of agrifood models or systems and their hybrid forms, 4) direct relationships of agricultural and agrifood activities and products with natural environment of (biological systems, links to the land and ecosystems, food intake, etc.), 5) contribution (positive or negative) to the production of public goods, 6) involvement of the knowledge base in productive and innovative agriculture and agrifood processes and 7) agriculture and agrifood systems are confronted by a revival of issues that call for the consideration of agricultural innovations

[1] Informal: based on social frame as culture, tradition, habits… ; Formal : based on legal frame as rules, laws…

in a long-term perspective (adaptations to climate change, the rise of food security worries, long-term commitments to processes of managing biodiversity and natural resources, structural review of the role of the State (regionalization) and redefinition of public/private relationships).

We define environment as the context in which innovation processes evolve. This environment includes formal as informal institutions, market (particularly with demand) institutions, political context and natural conditions particularly with the specificities of agriculture sector (technological paradigm). This environment is multi-level and it includes local, as well as national and international levels. It directly or indirectly affects the innovation process. Also, new components of environment could emerge from innovation processes (Cf. 4.5).

3.5.2 Role of environment on innovation processes

The evolutionary economic approach (Dosi 1982, Nelson and Winter 1982) emphasizes the strong role of environment in the emergence of innovations. The environment is one of the determinants of successful innovations because it influences the selection of the innovation. The selected innovation is not necessarily the best but it is the best because it successfully emerges in a given environment (Paulré 2004). Environment could play positive (enabling environment) or negative roles on innovation processes. The environment could stabilize existing technological trajectories (Geels and Schot 2007) through cognitive routines that blind engineers to developments outside their focus, regulations and standards, adaptation of lifestyles to technical systems, sunk investments in machines, infrastructures and competencies. The institutional context could be dominated by a top-down bureaucracy or flatter management. This context impacts the way decisions are made, whose voice is heard and the dynamics of relationships with partners. These are all factors that impinge on the direction and outcome of R&D (Hall et al. 2003). The environment plays a role at two levels: 1) the selection of mutations in the sense of Darwin and 2) the selection of the direction in which the future mutations will go. Selection dynamic process exerted on companies or innovations whose behavior and/or characteristics are varied with different rules of decision can change under pressure of their environment, their rules of behavior or functioning (Nelson and Winter 1982). Innovative firms or activities are part of a paradigm. The socio-technical regime determines the corridor inside of which technology trajectories could exit. This paradigm could create lock-in effects due to path dependency. This situation happens when a set of conditions are present that make it impossible or very unattractive for the system to stray too far from the state in which it is (e.g. high cost, performance yield). The consequence is that innovations are constrained to evolve within a narrow corridor.

4 Concepts related to the dynamic process of innovation

As introduced in Figure 2 above, we understand “innovation processes’ as a series of consecutive phases or steps that evolve in cycles or in a spiral. Hence, the model of an innovation process could be conceived in both a linear or non-linear way. To highlight the various forms of understanding we present in the first section a number of models for innovation processes (4.1). The second section comprises driving forces and obstacles to such processes (4.2), while the third part elaborates on the results and impacts (4.3) beyond the insights presented in section 3.1.3. A section is added on the critical mass in innovation processes (4.4) and the chapter is closed with the appraisal of the changing environment (4.5).

4.1 The Innovation process – selected models and concepts

We very briefly present a selection of innovation process models in order to show the variety of conceptual ideas that have been developed in the course of the time. We do not claim to be exhaustive with regard to neither the models in general nor with respect to the models’ descriptions in particular. Interested readers might refer to the mentioned references.

4.1.1 Theory of psychological field (Lewin 1943)

As an innovation is something new undertaken by one or several people we start this section with a look at 'change of individual behaviour'. According to Lewin (1943) human behaviour takes place as a result of the interplay of diverse forces that create a set of circumstances through the dynamic interaction of a person and her/his environment. Hence, Lewin (1943) states that the interaction of situational forces with the perceived environment can be described as a field of forces, a system in tension or a psychological field. Human behaviour can be described as follows: A person (P) in her/his subjectively perceived environment feels something is worth striving for; s/he then mobilizes their personal powers to achieve this goal.

b = f (P, Esubj.)

where;

behaviour (b) is a function of an individual's subjectively perceived environment (P, Esubj.)

When something negative or undesirable occurs, s/he activates personal powers in the same way to avoid the negative situation. Ways of reaching targets and avoiding negative situations can be blocked or impeded by barriers or inhibiting forces (for instance; lack of knowledge, uncertainty about outcome, insufficient capital, cultural practices, lack of opportunities for scaling etc.).

4.1.2 The TOT model

While Lewin's model represents human's individual behavior, the classical model for induced behavior change in extension science is the linear three-component model of 'research (generation), extension (transfer), farmers (adoption), commonly recognized as the the "*Transfer of technology (TOT) or transfer of knowledge model"* as highlighted by Nagel (1997). The ToT model reduces the innovation adoption process to a pure three step sequence of generating, operationalising and applying knowledge. Although this model has been widely criticised and rejected it is still frequently applied in public and private extension programs.

However, this 'linear' model has limitations when issues are complex - such as the increasingly complex modern agricultural systems as well as the shift to sustainable development implying trade-offs between environmental, social and economic sustainability. There are many reasons why such a 'traditional linear' approach fails to respond to complex challenges and rapidly changing contexts (Nitch, 1982; Chambers and Jiggins, 1986; Röling, 1988; Röling and Jiggins 1998, Röling et al., 1998). Firstly, extension does not acknowledge farmers' experience and knowledge. Secondly, general advice given on a regional scale often does not match individual farm conditions and the socio-economic context of farmers. Thirdly, advice is often seen to come out of a 'black box', since the reasoning behind it is not transparent. By this, it tends to neglect psychological and social-psychological aspects of human behaviour and is less applicable in the context of farmers' behavioural change towards uptake of innovations.

4.1.3 Theory of behavior modification

Hruschka (1994) built upon Lewin's and his scholars' work when she visualised the theory of behaviour modification and operationalised it for the agricultural context. The theory refers to those forces conducive to or facilitating the goal or target attainment as driving forces (DF) while those negatively influential to target attainment are described as inhibiting forces (IF). Inhibiting forces for technology adoption might include for instance, lack of subsidies, limited liquidity (for labour hiring, buying herbicides, legumes seeds for soil coverage, etc.), lack of machinery, and limited knowledge. On the other hand, driving forces or forces conducive to positive target might include, for example,

financial assistance, technical advice, training, provision of inputs, linkage with market outlets, etc. Similar to Lewin (1943), Hruschka (1994) confirmed that behaviour (in this case adoption) results from the psychological field of inhibiting and driving forces. These forces are therefore always present in a state of equilibrium or dis-equilibrium with varying degrees of tension between them.

4.1.4 Diffusion of innovation theory (Rogers 2003)

The 'diffusion of innovation' theory is probably the most prominent and widespread description of agricultural innovation currently in use. Over several decades, E.M. Rogers and colleagues studied agriculture-related innovation processes and compiled manifold empirical insights, finally resumed and repeatedly updated by Rogers (2003).

Starting with the standpoint of individuals, or single units of adoption, he links the process of first knowledge of an innovation through adoption, diffusion and confirmation to "an innovation decision process". This is specifically summarised in five steps as follows:

I. First knowledge – this occurs when a potential adopter is exposed to the innovation's existence and gains some understanding of how it functions,
II. Persuasion – this occurs when a person forms a favourable or unfavourable attitude toward the innovation,
III. Decision – this occurs when a person engages in activities that lead to a choice to adopt or reject the innovation,
IV. Implementation – this occurs when an individual puts an innovation into use. Re-invention is especially likely to occur at the implementation stage.
V. Confirmation – this occurs when an individual seeks reinforcement of an innovation decision that has already been made, but he or she may reverse this previous decision if exposed to conflicting messages about the innovation.

Further building upon studies from the 1940s on the diffusion of hybrid maize in the US, he developed the now well-known, bell-shaped curve depicting the following categories of adopters:

- The first category called "innovators, described as risk-takers and pioneers who lead the way, frequently venturesome and educated persons.

- The second group are "early adopters", who climb on board of the train early and help to spread the word about the innovation to others. Frequently, they include social leaders and popular and educated persons.

- The third group called "early majority" are those who make a deliberate attempt to adopt the innovation and have acquired information through the many informal social contacts at their disposal.

- The fourth group comprises the so-called "late majority", individuals with are highly sceptical attitude who wait to make sure that the innovation is in their best interests.

- The final group is called the "laggards" and members of this group are highly sceptical and in many cases they never adopt the innovation.

Together with the characterisation of innovations by a number of adoption influencing attributes (such as comparative advantage, complexity, trialability, observability and compatibility), this categorisation of adopters according to adoption behaviour in the course of time has been applied to many empirical cases and promulgated widely in the literature.

4.1.5 Modifications on the diffusion of innovation theory

The Hohenheim school of extension criticised the S-shaped curve as being too ideal and simplistic with regard to the complexity of influencing factors. Especially the social system dimension seems to be weakly reflected in this model. Hence Albrecht (1964) and Hoffmann et al. (2006) concentrated on the role of the complex interactions and interdependencies between individuals and the social system and rephrased the phases differently as follows:

I. The innovator as a troublemaker: The first person to practise an innovation in a social system is called an innovator (Hoffmann 2005). Hoffmann (2006) further qualifies the innovator at this early stage as one who experiences a problem for which he will like to find a solution. For his peers, his activity is not only seen as strange, but an indication that their methods are old fashioned and outdated so that they might put up defence mechanism rejecting the innovation regard the innovator as a troublemaker (Hoffmann 2005)

II. The critical phase: Hoffmann (2006) stresses that not everybody reacts negatively to the innovator. Some peers keep contact and refrain from mistrust and rejection. Some see themselves in a comparable situation with the innovator.

III. Transition to self-sustaining process: At this phase, what is currently new is going to be the future norm. While the first few adopters make the activity attractive, adoption by influential persons bring in a new dynamism into the process. A deviant behaviour on the part of the innovator as initially regarded is now felt to be a new approach. At this stage, farmers may no longer adequately check whether the innovation is beneficial or not hence there is increased risk of misguided adoption of the innovation.

IV. Final phase of the wave: What Rogers (2003) separates into the *Late majority* and the *Laggards* groups, Hoffmann (2005) terms the *Final phase of the wave*. He mentions that if the innovation is assumed not to be equally appropriate and advantageous for all concerned, the adoption rate sinks slowly and gradually after reaching the peak. Just as the innovator from the onset was closest to the innovation and the first to adopt, there are now people for whom inhibiting forces are far stronger than the driving forces.

If classified according to their pattern of psychological forces in relation to the decision on adoption, the adoption curve for all potential adopters will form approximately a normal distribution but with *four phases* in the diffusion process as opposed to *five phases* in the case of Rogers (2003). This has similarities with the phases of an innovation process and scaling-up such as those proposed by the EU IN-Sight project (www.insightproject.net).

4.1.6 The “Tourbillonaire” process (Akrich et al. 1988)

The “tourbillonaire” process introduced by Akrich et al. (1988) is related to the idea that actors are associated along the innovation process and are more numerous, and as a consequence introduce more and more unpredictability in the management of innovation. The size of the sociotechnical network, the number of associated actors are a measure of innovation success (Akrich et al. 1988). The “tourbillonaire” model enables us to follow the multiple socio-technical negotiation that drives innovation and it highlights how the design of innovation changes continuously through obstacles it meets, e.g through experimentations. This model is essentially oriented on innovation based on academic research activities. Akrich et al. (1988) consider that the researcher has the capacity to change the rules and introduce new resources and realities. The researcher through negotiation has to bring on board a variety of representative actors by raising their interests. This model is considered as a complementary model with the linear one which cannot integrate socio-technical change and all trade-off and adaptation capacity needed by innovation processes.

Innovations are complex process. They could be identified as “tourbillonaire” and unpredictable processes whose management is uncertain or impossible (Akrich et al., 1988, Leeuwis 2004). Innovations processes cross various phases of acceleration, slowing down and crisis. Innovations are not indefinitely sustainable due to the selection process (Nelson, 1993). In this perspective, innovations are not only the result of scientific activities. They could be firstly the result of a long process of interactions between research and firms activities. Secondly, they could come from firms only. And research could be involved late in the process. Also territorial innovation could be considered as a sub-category of institutional innovations.

4.1.7 The critical mass and tipping points concept

Wielinga (2001; 2008) compares an innovation process to change processes that characterise living systems in general where systems can be more or less stable, or go through periods of turbulence and disruption. Assuming that human systems do not basically differ from ecological systems the stabilizing mechanisms are in-built. We talk about resilience when systems are able to counteract disruptive influences from outside or internal failures and keep on functioning in more or less the same way as before. However, as the environment in which a system is functioning is always changing, solutions that proved their value yesterday possibly do not work as well tomorrow. The ability to respond to such changes depends on the capacity of the system to learn. Senge (1990) defined the ability of organisations to learn as the fifth discipline. Healthy systems are able to learn and to find new solutions to new challenges in a changing environment. Responsive capacity (Wielinga 2001, 2008) is more than resilience: it is the capacity to reinvent itself when need arises.

Any stable system develops a structure. When the environment changes structures need to change too. But structures are full of mechanisms that promote stability: resistance to change is in-built too. The more established a structure has become, the more difficult it becomes to respond to changes. In living organisms like plants and animals this is the aging process. Over time the capacity of self-renewal gets and the organism eventually will die, because it cannot cope anymore with the challenges from outside. In structures like organisations something similar can be observed: patterns become rigid, and actors with vested interests fear loss of gains and power when structures get challenged. The first actors who feel the need for change are usually at the boundaries of a system. People with many contacts outside the system, or those who are most confronted with the mismatch between the system and the changing environment. This is why initiatives for change often start in niches. People create a safe environment for themselves to experiment with new approaches or practices by looking for allies first. They have to draw beyond the lines of the structure which is the cause of the problems for which they search solutions. These initiators (or change agents) often take considerable risks.

The first spark for change should not be expected from managers, or from representatives who meet each other at negotiation tables. Their status and position depends on their ability to keep the structure stable. Usually their ability to run risks is limited.

A critical mass develops when more and more people start to believe that new solutions are possible and existing structures should give way. When they form a movement that cannot be ignored by actors who bear responsibility for the structure we can call it a critical mass. In an ideal situation this leads to a dialogue between initiators and managers about ways to change the conditions in the existing structure that allow for new solutions and practices. These new conditions lower the threshold for many others to contribute to the change, whereas they could not run the risk to do so in the old situation.

A process of change can reach a tipping point, which is a point of no return. The concept of tipping points was introduced by Morton Grodzins (1957) studying the segregation of blacks and whites in the USA. Schelling (1990) elaborated the concept further, and Malcom Gladwell (2000) popularised it in his book; “The Tipping Point, how little things can make big difference.” In stable systems, constructive and destructive mechanisms balance each other. When this balance is disturbed by external factors, this can reach a point in which the system becomes too unstable to maintain itself.

Structures fall apart and a new situation emerges. Typical for such tipping points is that for a long period the situation seems to be stable, while all of a sudden radical changes occur. Of course, the movement was already going on under the surface for quite some time, but it remained unnoticed in the mainstream. Hoffmann, (2006) equally refers to this as a “critical phase (end or turning point). He sees it as a point where the adoption process is assumed to at least begin. Here the innovator formerly regarded as a trouble maker becomes the centre of admiration while his innovation or practice gradually becomes the norm for many.

4.2 Driving forces and obstacles

Two main key elements play a role in triggering innovation processes. The first one is the degree of participation and involvement of actors. The second is the scaling processes that could be due to spill-over effects from knowledge externalities. Externalities are inter-sectoral or territorial consequences at various scales that are generated by innovation resources. The use of these resources modifies the environment and produces retroaction on the conditions for the appropriation of innovation. These spill-over effects are key elements that explain innovation trajectories and their impacts on development.

Spill-over effects lead to the creation of increasing returns on adoption, which means, they occur in situations where a certain threshold of adoption creates a sudden economic efficiency promoting an exponential evolution of innovation adoption. Sometimes these returns are created at later stages of the value chain than the initial one.

4.3 Innovation impacts

Impacts are positive or negative, intended or not, long term effects, produced by an action (project / program) for development. The impact is what remains once the action is achieved. The action may have impacts on the actors at different levels: individuals, professional groups, institutions, political representations. There can be different types of impact: economic, social, territorial, environmental, political, health. These impacts can be measured by quantitative or qualitative indicators.

The concept of impact pathway is the result of a logical framework for ex-ante assessment used to enhance the effectiveness of development and research actions (Douthwaite et al., 2003). This framework helps to understand the relationship between the research products (outputs), their use by actors (resources generated / outcomes) and impacts generated. This framework is based on theoretical models that analyze how to build and disseminate innovations. It can be used with a linear and hierarchical model of the relationship between research and development such as the diffusion model of Rogers et al., (1995). This impact pathway approach uses "theory of change" and tools to assist in the programming of research projects seeking to identify opportunities and avoid failures (Springer-Heinze et al, 2003). The recent work on agricultural impacts assessment methodologies distinguish impacts at two levels (Barret et al. 2015). First-level impacts are measured on the actors who interact directly with research and/or the key innovation actors. Second level impacts measure the scaling effects.

4.4 The changing environment

The changing environment includes two situations that influence innovation processes. The environment change is due to 1) external or exogenous factors and 2) internal or endogenous factors. The last situation means that new components of the environment are created within the process. This change could be voluntary or not.

How far does this 'changing environment' concept apply to the AgriSPIN focus? To our understanding, these 'changes at landscape level' fall out of our scope while institutional change as described in 3.3 and 3.5 remain within.

- Geels and Schot (2007) work involves both situations. The environment evolves but certain levels of the environment are more stable than others. The most stable part is the socio-technical landscape following by the socio-technical regime and the less stable is at the level of the niche. Landscape and socio-technical regimes could evolve. Changes at the landscape level create pressure on the regime and destabilisation of the regime creates windows of opportunity for niche innovations. Suarez and Oliva's (2005) cited by Geels and Schot (2007) distinguish four dimensions of external change: (1) *frequency*: number of environmental disturbances per unit of time, (2) *amplitude*: magnitude of deviation from initial conditions caused by a disturbance, (3) *speed*: rate of change of disturbance and (4) *scope*: number of environmental dimensions that are affected by simultaneous disturbances. They combine these four attributes into five types of environmental change (Table 1): The elements in the right hand side column are defined as follows:

1. *Regular change* corresponds to environments that regularly experience a low intensity, gradual change.
2. *Hyperturbulence* corresponds to environments that feature a high frequency of high-speed change in one dimension, e.g. 'hyper-competition'.
3. *Specific shock* corresponds to environmental changes that are rapid and high in intensity, come rarely and are relatively narrow in scope. A specific shock may dissipate and disappear after a while, returning to base line, or it may lead to a structural stepwise.
4. *Disruptive change* corresponds to changes that occur infrequently, develop gradually, but have a high-intensity effect in one dimension.
5. *Avalanche change* occurs very infrequently, but is of high intensity, of high speed, and simultaneously affects multiple dimensions of the environment. Avalanche change leads to permanent changes in the environment.

Table 1
Attributes of change and resulting typology (Suarez and Oliva, 2005, p. 1022)

Frequency	Amplitude	Speed	Scope	Type of environmental change
Low	Low	Low	Low	Regular
High	Low	High	Low	Hyperturbulence
Low	High	High	Low	Specific shock
Low	High	Low	Low	Disruptive
Low	High	High	High	Avalanche

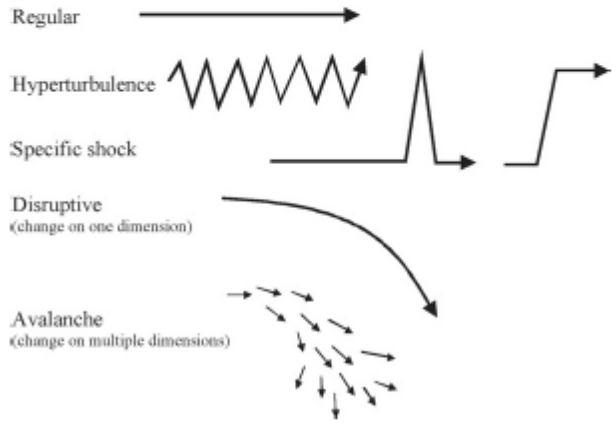

Fig. 4. Types of environmental change (based on Suarez and Oliva, 2005).

Figure 5: The concept of the changing environment

Source : Geels and Schot (2007)

The emergence of radically new technological paradigms cannot be explained by economic factors alone. The emergence is related to the complex interplay between scientific progress (exogenous), institutional mechanisms, political and economic factors (Dosi 1982, Geels and Schot 2007). Hall et al. (2003) researched institutional change as an aim in the innovation process. Institutional change is expected to emerge from interaction between actors particularly within innovation platforms. In fact, institutions cannot be transferred like technologies. Institutional transformation is fraught with political pitfalls because it directly affects the distribution of value among stakeholders.

5 Supporting and accompanying innovation processes

5.1 Innovation services and intermediaries

The complexity and context-dependency of innovation processes leads to the belief there is no single and universal method to support innovation. More clearly, there is no unique solution but "best fit" solutions (Birner et al 2009). An actual example for the support of innovation processes at a macro-governance level is the European Innovation Partnership (EIP) Network. The EIP network adheres to the 'interactive innovation model', which focuses on forming partnerships. Such an approach not only helps the co-creation of innovation, but it also speeds up the introduction of innovative ideas, and it will help targeting the research agenda as well as relevant research to switch to a problem-solving mode (van Oost, 2015).

Over the last decade, by realising the importance and usefulness of the innovation systems approach (Lundvall 2004; Mytelka 2000; World Bank 2006), and innovation and scientific networks concepts (Law and Hassard 1999), a group of actors in the system referred to as intermediaries, brokers or facilitators has gained specific attention (Howells 2006; Klerkx and Leeuwis 2008). Such 'intermediation services' are increasingly discussed in the literature as third parties, (knowledge/technology) brokers, bridging organizations, intermediaries, boundary organizations and so on (see: Howells, 2006). Their involvement takes an independent systemic role, in process facilitation rather than in the production (i.e., source) or dissemination (i.e., carrier) of innovation (Van Lente et al., 2003). Alternatively, according to Haga (2005) they are involved in 'indirect' innovation processes (i.e. in enabling individuals and enterprises) rather than in direct ones (i.e. on actual innovation projects. Heemsesrk et al. (2011) identify and discuss a number of brokering functions: facilitation, linking and strategic networking, technical backstopping, mediation, advocacy, capacity building, management, documenting learning and championing. Brokers thus provide three lines of support, i.e. developing a common vision and articulating related demands; scoping, scanning, filtering and strategic networking; and innovation process management. Notwithstanding the identification of a number of training instances for brokers, the authors stress that a good broker goes beyond training and that it takes time and interaction for brokers to develop their skills. They also underline that brokering is a time-demanding and costly job, thus concluding that the brokering is "[E]asier said than done" (p. 52). Furthermore, Klerkx and Gildemacher (2012) provide a typology of innovation brokers while also identifying key policy issues and providing a number of recommendations for practitioners, policy makers and project leaders. Nevertheless, it is quite clear that the broker role is still very new. The main responsibility of this group of actors is to assist agricultural entrepreneurs in coping with challenges such as articulating their innovation needs, contracting appropriate services to support their innovation projects and successfully executing these projects. So, from a cognition perspective, it is obvious that for all actors involved these activities are linked to complex social learning necessities.

Recently, the innovation intermediation or support process has been coined as a Knowledge Intensive Business Service (KIBS) (e.g. Klerx and Leeuwis 2009). While traditional, 'conventional' extension identified with the linear model of innovation, has to do with 'exploitation', i.e. with the capturing, transfer and deployment of knowledge, and thus belongs to the old type of KIBS, nowadays new KIBS are operating on a systems perspective and aim at enhancing the interaction between a variety of

actors, focusing on 'exploration', i.e. with the sharing and synthesising thus with the creation of new knowledge (see Levinthal and March, 1993; Murray and Blackman, 2006). A major role of the new KIBS is that of the co-learning facilitator (usually found in literature as 'facilitators' or 'brokers') aiming at the development of shared meaning and language between dialogue partners in order to stimulate change and develop solutions and innovation. The engagement of stakeholders in dialogue, despite its difficulties and its time consuming nature (since (social) learning and change are gradual), is necessary in order to achieve a critical self-inquiry and collaboration.

At several stages during the innovation process and in varying modes and intensities, research interacts with other stakeholders (mainly advisory services, NGOs or farmers' organizations) in order to foster technical and social design, appropriation and the use of innovations. Such interactions involve several types of learning processes (formal, informal, through networks, for individuals, groups, etc.); they contribute to strengthening the capacity of stakeholders in different dimensions related to the innovations being developed and adopted, including generating a stronger capacity to innovate (Leeuwis et al., 2014). The latter could be individual or collective. Strengthening capacity to innovate, at these two levels, fosters the effectiveness of the process in terms of impact on development (Casadella et al. 2015). These capacities to innovate structure the processes of technological change (Lundvall and Nielsen 2007) generating cognitive, institutional resources that permit adaptation of invention to local context and practices.

5.2 Accompanying innovation processes through action-research.

Top-down approaches to innovation support are still dominant in many circles. However such approach ceased to be the only paradigm to design and manage innovation process with farmers. During the 1970s, farming system approaches were developed and were followed by the emergence of participatory approaches. The evolution form Participatory Rural Appraisal (PAR) to Participatory Learning and Action Research (PLAR) reflected the growing researcher awareness to better involve the farmers in the research process. Action research in partnership combines knowledge production, transformation of social realities and the building up of individual and collective skills. Four principles inform action research (Hocdé et al. 2008):

1. An equilibrium between a will to change and a research purpose
2. A dual objective aimed at resolving a problem and producing knowledge
3. Collaborative work in a mutual learning process
4. An ethical framework devised by all participants

Another principle is the importance of involving multiple stakeholders in the research action process. The key intermediate steps and milestones of the approach are (Faure et al. 2014):

- The initial step consists of defining the problem and structuring the team that brings together all stakeholders. This step is crucial to the success of subsequent activities.
- The processes and methods that allow all stakeholders to be actively involved in the design, planning, monitoring and evaluation of results are described, as are those related to assessing the relevance of the results in terms of knowledge produced, capacity building of the actors or problem solving.

6 Epilogue

This document is a working paper for the purpose of enhancing and focusing the exchange within the AgriSPIN project in order to dispose of ideas and concepts that relate the transdisciplinary empirical field of the Cross Visits to the multi-faceted strand of social research on agricultural innovation. As such, it is ‘work in progress meant to encourage discussion and to be further elaborated and detailed in the course of the project. Beside the common learning interests of all AgriSPIN partners, the authors of this document also pursue interests of systematically exploring innovation support features across all innovation cases with the aim to produce scientifically reliable data. Therefore, a number of cross-cutting questions has been elaborated which is presented in the Annex 3.

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8 ANNEXE

Annex 1: Knowledge and learning in social systems and networks

Definition of knowledge and assumptions

Maturana and Varela (1992) and Capra (1996) define knowledge as effective action in the domain of existence. On their part, Cook and Brawn (1999) identify what they call the "generative dance between knowledge and knowing". The first regards knowledge as a stable element that can be formalised and transported, and that can therefore be accumulated and owned ("epistemology of possession"). The second regards Knowing as a continuous process of knowledge creation intrinsically associated with action, where knowing is regarded as that part of the practice which involves carrying out an epistemic effort ("action epistemology"). A body of knowledge therefore is a way in which people construct and interpret their world (Arce and Long 1992).

Forms of knowledge – define from different ways of knowing

Our ways of knowing are guided by the rationalities within which individuals, groups, organisations and societies operate. Thus indigenous/local knowledge, citizen knowledge, scientific knowledge become categories of ways of knowing by particular communities of actors, each of which has a varying degree of social and cultural significance (scientific knowledge in our present society, for example).

Science is conceived of as a distinct, very powerful knowledge system, taken as definitional of knowledge, rationality or objectivity (Watson-Verran and Turnbull 1995). On the other hand, rural people's knowledge is situated and differs in its modes of experimentation and learning, and the validity of its contents is locally restricted (Institute of Development Studies 1979). Such characteristics make the relationship between scientific/expert and local/lay knowledge asymmetrical in terms of power, truth claims and communication (Chambers 1994).

It should be noted that here non-expert, 'lay' or 'local' knowledge (also often described as 'practical', 'traditional' or 'folk' knowledge), is not understood as a cognitive 'deficit' or 'default'. 'Local knowledge' is a knowledge characterised primarily by local situations, embedded within and generated out of the problem-solving interests of specific groups of people in specific local settings.

The components of 'local knowledge' can be identified as: (i) knowledge from their own experience, held by rural producers and resource users; (ii) knowledge that has been transmitted to them from earlier practitioners in local production processes (seen as of similar quality to knowledge derived from their own experience), and (iii) knowledge that rural actors and inhabitants receive from 'external' sources (mass media, scientists, extension, etc) but which they use in specific locally-adapted ways. Development agencies are becoming aware that such knowledge, whether it be of biodiversity and ecology, natural resources management, health and disease, education and urbanisation, is far more sophisticated than previously assumed". It is thus "an immensely valuable resource" which offers a foundation for new participatory approaches to development, even if the terms of its use in conjunction with science and other 'expert' knowledge remains a contentious issue.

Knowledge acquisition and social learning as a process

Learning and knowledge do not concern the result of transmission of pieces of information by an authoritative mechanism addressing pathetic subjects but, instead, the result of self-conscious and purposeful action of individuals, led by their own (sometimes, a common) vision. The learning subjects participate in a process in which participants are activated in a holistic manner; human learning is both an experiential and a cognitive process (Freire 1972 and 1973).

A typology of learning theories, have been presented in Ison et al. 2000. The authors underline the fact that many of the theories included in this typology are not as distinct as it might be suggested and outline three theories viz: 1) Social Leaning, 2) Situated Learning Theory and, 3) Epistemic Learning.

Here attention is paid as well to the work of Checkland (1990) on Soft Systems Methodology (SSM) which follows four steps:

1. finding out about a problem situation, including culturally/politically components;
2. formulating some relevant purposeful activity models;
3. debating the situation, using the models, seeking from that debate both
    a. changes which would improve the situation and are regarded as both desirable and (culturally) feasible, and
    b. accommodations between conflicting interests which will enable action-to-improve to be taken;
4. taking action to bring about improvement.

The '**social (or societal) learning'** (SL), draws among others, on the work of Habermas, Giddens and White (Woodhill 1993), Bandura (Webler, Kastenholz and Renn 1995) as well as on adult learning theory (Merizow, 1990; 1991) and the organizational theories of Argyris and Schon (1978). It has been defined as "when citizens become involved in working out a mutually acceptable solution to a problem that affects their community and their personal lives" (Webler et al., 1985). Social Learning appears at the confluence of three complementary standpoints: as a process; as a part of governance mechanisms in a knowledge-based society; and, as both a social and a cognitive phenomenon leading to innovation.

Situated learning theories (Lave, 1998; Fox, 1998; Wenger, 1998) are regarded as an alternative of the experiential leaning model developed by Kolb (see, for example, Luckett and Luckett 1999). While experiential learning make reflection and the handling of information an explicit component of a learning cycle, SLT stressed the importance of activity as well as of the appreciation of the local understanding of practitioners. SLT thus offers an understanding of learning as a collective experience (Lave and Wenger, 1991) with activity (not the individual) being the unit of analysis; learning has a fundamental dependence on activity (which is situated) and is about making sense of events or phenomena. Collective learning relies on the ability of people to share their concepts of activity, appreciate the need for ongoing learning with regard to the rules guiding the performance of their activities and thus the need to critically reflect on these activities amid their routine work. Hence, situated learning is a way of acting in the world and as such a type of social practice.

Finally, **epistemic learning** involves the deliberate breaking down and restructuring of mental models that support worldviews (Salner 1986). This is indeed challenging since not only does it require awareness on the part of the actors but the ability to grasp systemic concepts (such as non-linear processes, or self-reflexive structures) and thus the ability to manage complexity; concurrently, settings such as families and communities in which learners are members may preclude the types of conversations which further trigger the necessary ways of knowing and learning that lead to changes in the learner's worldview. Nevertheless, personal change in epistemic assumptions is absolutely essential to any major breakthroughs (Pretty, 1981; Salner, 1975, 1986).

In sum, the aforementioned learning theories converge in that they theorise learning as being an active process on the part of the learner which is non-deterministic, path-dependent and situated (associated with socialization and communication practices). In this sense, practice and learning are emergent properties of people's actions; practice and learning are constitutive of each other (Blackmore et al. 2012). It follows that, learning and knowing can be understood as emergent processes rooted in relations (to another person or object) and interaction - without a relation there is no action and thus no knowing (Barbier & Lemery, 2000, p. 383). These theories are therefore more in line with action research - a research approach that enable knowledge to be created from concrete experience through a process of active experimentation and reflective observation. (see next section on reflexivity)

'Building' knowledge, developing networks

Networking is a capacity and it is commonly seen as a way of co-ordinating a shared activity (van Veldhuizen et al. 1997). Networking is also seen as an effective way to cross boundaries, disciplines, organisations, hierarchies, and scales (Lipnack and Stamps 1993). It can increase the number of actors (individuals and groups) who share power and directly contribute to the formulation of projects and policies (Lipnack and Stamps 1993, Wheatley 1992, Slocum et al. 1995).

While networks are of paramount importance in facilitating innovation, nevertheless, the construction of networks is a demanding task. The role of the network manager/ alignment actor (Rip 1995) is extremely important in disseminating information, extending the network and setting up experiments. This actor will have to manage the whole process, provide a space secure enough for partners to voice their expectations, identify the frame of thinking that drives actors as well as to orchestrate the participation of outsiders whose participation may have both advantages and pitfalls.

In sum, Proost and Roling (2000) underline that emphasis should be given (i) to experiential learning where participants share in deciding what to learn or inquire, and how they will allocate their resources; (ii) to situated learning, such that participants are immersed periodically in the 'messy situations' they are trying to understand and develop the competence to deal with; (iii) to the co-development of knowledge; (iv) to the development of perspectives on what the theory and action is for, what capabilities actors are together trying to bring about; (iv) to the provision of space and encouragement for participants to reflect together on the development of collective cognitive process and on the process of facilitation that helps bring this about; and (v) to methods that develop competence in the facilitation and communication skills needed for fostering communicative rationality and the management of multi-stakeholder decision-making and action.

Methodological capacities in social systems: facilitation and reflexivity

As aforementioned through our Knowledge and Learning review, contemporary approaches build on networks, as social processes encouraging the sharing of knowledge (i.e. interrelating and sense making), and notably as preconditions for innovation. Therefore, they focus on processes, particularly on co-ordination. Networks are, as aforementioned, spaces where (social) learning takes place through the links and interactions between actors.

Therefore, "creating a purposefully designed 'space' or 'platform' which brings together experiences of those involved in purpose-driven learning and knowing processes allows for the creation of synergies and meaningful working linkages" (Hubert et al., 2012, p. 180). Nevertheless, the attempts for such concerted action to be established and negotiated, amid confusing situations of change among complementary/diverse actors, may well result in conflict. Additionally, in the face of defensive routines, there needs to be an environment where mismatches can be faced with reduced anxiety, or where greater anxiety necessitates recognizing mismatches. The creation of trust (personal, institutional, social) is thus a further crucial factor which helps to bridge barriers and to link actors – hence the need for facilitation in effectively establishing this atmosphere arises.

'Facilitation', for Auvine et al. (2002) "is designed to help make groups perform more effectively" and "a facilitator's job is to focus on how well people work together"; although a facilitator "can fulfil different kinds of needs in working with a group" his/her actual role depends on "the group's purpose for coming together and by what is expected … of the facilitator". Savage and Hilton (2001) distinguish between facilitation, mediation and persuasion and note that a facilitator affects the orientation of a group and its relationships; they add that a facilitator's intervention affects both internal (direct and indirect) and external (inward and outward) group processes. Thompson et al. (2006) in their comparison between 'opinion leaders, facilitators, champions, linking agents and change agents' point out that facilitators' overarching role is "to assist (individuals or groups) through the process of implementing a change in practice"; their distinctive role relates to the use of "the dynamics of a group and their skills to assist persons to move towards change". For Murray and Blackman (2006) facilitation aims at "supporting the work of different types of teams in solving mostly complex problems and in developing decision solutions. The point is that facilitation enablers allow learners to be confronted with different kinds of participation." Finally, Leeuwis (2004)

summarises the facilitator's tasks as a) to facilitate the group process, b) to teach and c) to be an expert on technical aspects of farming. Such approaches to facilitation relate to Habermas' (1984) perspective, in the sense that "a facilitator tries to create an ideal speech situation and through the appropriate intervention strategies helps the participants to engage in a communicative dialogue that results in consensual decision-making" (Savage and Hilton, 2001). Facilitation formalizes and organizes the learning environment and learning processes. It allows critical discussion among participants around an activity or experience they share and by the time, deeper levels of understanding, inquiry, and innovation can be created within the participant network; it thus produces more effective learning in participants' domains of existence.

In addition, practitioners learn when they are in a reflexive stance towards their own situation in the process of change. Reflexivity aims at challenging conventional thinking, at problematizing aspects and developing a novel interpretations (Darnhofer et al. 2012); it means bringing in alternative perspectives, representations, interpretations, framings and showing the difference it would make if these are taken into consideration (Alvesson and Sköldberg 2009:313). According to Ison (2012), reflexivity starts to operate when actors move beyond reflection and interpretation (first-order processes) to reflection on reflection or interpretation of interpretation (second-order processes). Reflexivity is important in that it contributes to developing the capacity of individuals to face and effect change. It affects one's own approach in attempting to influence a situation as well as the way individuals face change (reflecting upon one's adaptive capacity) or learn (to build new worldviews). Thus, reflexivity is essential with respect to the involvement of individuals in the process of innovation.

Annex 2: Various actor configurations

What do we mean, when we speak of networks, platforms, clusters, alliances or partnerships?

There are many concepts in use for describing configurations of actors who join forces for getting things done. We will have to keep on explaining to each other what we mean while using such concepts. Nevertheless, some concepts have been described in literature more extensively than others. The following overview might be helpful:

- *Networks* are covering all forms of connection in varying degrees of organisation. An organisation can be considered as a specific form of a network too. But also a community, a family, a single issue action group, etcetera, is a network, in which similar network dynamics can be identified. Actually, looking at social configurations as networks is a specific way of understanding the world around us.
- *Network organisations* are organisations in which the different sections or business units have a high degree of self-control. Amongst each other they exchange services and goods just like in the market outside. This approach became popular when organisations became too big for hierarchal control in line organisations, and when also the matrix organisation, with vertical line units and horizontal units serving all lines, appeared hard to manage.
- *Platforms* are networks of stakeholders who are supposed to find agreement on solutions for problems that are affecting them all. They all have a stake in the matter. This concept was introduced by Röling et al (1994) as an approach for solving conflicts in land use issues. Expert solutions were not enough to make stakeholders move. A social learning process was required in which opinions on problems and solutions would converge into accepted knowledge (as opposed to objective knowledge). Usually, the persons who meet at the platform are representatives of stakeholder groups.
- *Clusters* are networks of actors that interact easily because they are located close to each other. Silicon Valley is the most prominent example. The term was coined by Porter (1998). Because of the frequent contacts actors influence each other, inspire each other, challenge each other and seek complementarity. This leads to synergy. Usually, clusters consist of enterprises and/or other organisations. Business centres, science centres and trade centres are based on this concept.
- *Alliances* are networks of actors (businesses, institutions) who seek collaboration for a common goal. They make agreements on shared activities and a fair distribution of costs and gains. However, alliances lack the hierarchy which is characteristic for organisations: each actor keeps its own authority and independence. Most often the actors in an alliance are engaged in the same type of activities, and they join forces to become stronger in their outside world.
- *Partnerships* are networks of actors who seek collaboration based on complementarity. Entrepreneurs, researchers and other knowledge workers, civil society groups, consumer representatives, administrators and so on: they all have their specific contribution to processes of change and innovation. In a network based on partnership the actors treat each other as equal partners. The Operational Groups, as promoted by the European Innovation Partnership programme (EIP/EU) are partnerships in which research operates as an equal partner between others in developing new solutions.

Annex 3: Cross cutting questions AgriSPIN Cross Visits

Introduction and purpose

It is the wish of the AgriSPIN Science Group (SG), to capture generic and possible cross compared information with regards to innovation support services studied/visited within this project - revealing the different innovation support services, possibilities of enhancing these services, and relationship between these services with the contextual environment in which they evolve.

Questions and explanations

Question1: Innovation support Services

a) What innovation support services do you observe for this innovation? b) How did the innovator benefit from the Support Service?

Explanation/expectation for Q1: The purpose of this question is to capture the observed Innovation Support Service(s) for the cases visited. During the visit, you will observe varied arrays of external support services received for different innovation cases. These services may be observed at any stage of the innovation process ("objective behavioural change process") (i.e. starting phase, on-going phase and or stabilisation phase) or through the various stages in the value chain process of the innovation (i.e. production, processing or marketing). With this question, you will be expected to highlight the observed innovation service(s) received by each case visited and if possible specifying the type of service and how the innovator benefited from it.

Question 2: Environmental influences

How did the environment/landscape[i] influence a) the innovation support service, b) the innovation process?

Explanation /expectation for Q2: Like the case with support services above, during the visit, you will observe varied arrays of immediate environment/landscape[2] influence(s) on the cases to be visited. While in some cases, there will be a clear distinction between the innovation and the support service, in others, this distinction might not be clearly obvious and it might happen that the actions of the support service may be treated as an innovation process itself. However, in either case, with this question you will be expected to highlight the observed aspects of the context/environment/landscape (as indicated in D1.2 above) which have been influential if possible both for a) the observed support service above and/or b) the innovation process. It will be much clearer if you further highlight the "how" of this observed influence.

Question 3: Critical moments

What have been the critical moments in the innovation process?

Explanation/expectation : With this question you are expected to indicate what has been the observed critical/crucial moment in the innovation process for the innovator. This could be either a critical/crucial moment in a positive sense (e.g. see critical mass, tipping point in D1.2 above) which actually led to a final decision to fully engage in the process. On the other hand, it can be a critical/crucial moment in a negative sense i.e. a situation, or an incident that affected the innovator

[2] Environment/landscape: policies, politics, cultural & economic context, natural conditions, triggers and drivers, the sector

negatively then caused her/him to almost give up the process or actually gave up the innovation completely.

Question 4: Pearls and Puzzles

What is striking you about this case? What are the pearls? And what are the puzzles?

Explanation/expectation : Here you are expected to highlight what you found particularly interesting or special about the innovation case. This is could be the special thing you observed for this case which you particularly liked so much (Pearls). On the other hand, you will be expected to as well balance with what left you wondering or what you doubted about this case which left you with a question mark (?) (Puzzle)

Question 5: Suggestion(s) for improvement

From your perception, how can the observed innovation support service(s) be enhanced and/or encouraged? And what ideas do you take home for your own organisation?

Explanation/expectation: This gives a chance for you to suggest what you think needs to be improved with regards to the innovation support services offered. Specific input here might be drawn from your experience back in your home country and where you feel the lessons based on your home experience could be directly helpful. It's really important as this is the only opportunity to directly input on the work of the host saying how or what you think and feel could be done in an alternative way. Your suggestion here could be directly built on the puzzle you highlight in Q 5 above but not exclusively.

In order not to come across as only teaching, you are expected here to equally say a few words on what you learnt or better still what you will be taking home with you as a lesson learnt from this particular case visited.

Question 6: Other observations

Any other observations/comments (about the cases or the cross-visit dynamic)?

Explanation/expectation : You are expected here to say a few general words regarding the case and the approach of the host partner. In addition, some general observations specifically on the methods used and general Cross Visit dynamics. Observation here therefore may not be strictly limited to the single case under consideration but spans across the entire cross visit from the first to the last day and all embedding activities you have been actively involved in.