INNOVATION 3.0: EMBEDDING INTO COMMUNITY KNOWLEDGE - COLLABORATIVE ORGANIZATIONAL LEARNING BEYOND OPEN INNOVATION

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De Boeck Université | *Journal of Innovation Economics*

2011/1 - n°7
pages 55 à 92

ISSN 2032-5355

Article disponible en ligne à l'adresse:

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http://www.cairn.info/revue-journal-of-innovation-economics-2011-1-page-55.htm

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Pour citer cet article :

Hafkesbrink Joachim et Schroll Markus , « Innovation 3.0: embedding into community knowledge - collaborative organizational learning beyond open innovation » ,
Journal of Innovation Economics, 2011/1 n°7, p. 55-92. DOI : 10.3917/jie.007.0055

INNOVATION 3.0: EMBEDDING INTO COMMUNITY KNOWLEDGE - COLLABORATIVE ORGANIZATIONAL LEARNING BEYOND OPEN INNOVATION

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This paper describes a conceptual approach for a next-generation innovation paradigm in the Digital Economy called "*Embedded Innovation*" (Innovation 3.0). The approach is based on the observation that, in order to survive, SMEs – especially those operating in an increasing dynamic and digitalized environment, with knowledge being the most indispensable and important resource for innovation – need to establish trusted relations to aligned communities, networks and stakeholders (Hafkesbrink, Evers, 2010). The notion of "*embeddedness*" is introduced to mark the increasing challenge of substantially *integrating firms into their surrounding communities* so as to assure the absorption of their exploitable knowledge. The approach of a network based social embeddedness has already been marked by Granovetter (1985) and supported the discussion in the new economic sociology substantially. In this context, Innovation 3.0 goes beyond Open Innovation (defined as "Innovation 2.0") and clearly beyond Closed Innovation (defined as "Innovation 1.0"). It does so as it conceptually embraces specific ambidextrous organizational capabilities (O'Reilly and Tushman, 2008) of using dedicated institutional arrangements to accomplish the embedding process. These arrangements may be implicit (e.g. trust culture; see Hafkesbrink and Evers, 2010) or explicit (e.g. formal contracts), explorative or exploitative, organic or mechanic (Tushman et al., 2002), depending on the nature and phase of the innovation process and the characteristics of relationships.

Our empirical basis is the Digital Economy with its numerous small and medium sized companies. Open Innovation to date is mainly discussed in large-scale companies which display numerous examples of successful strategies of knowledge absorption from external sources, as well as inside-out technology transfer and knowledge exploitation (Chesbrough, 2003; Chesbrough, 2004). In contrast, the new Innovation 3.0 paradigm relates to experiences from in-depth case studies on Open Innovation in SMEs of the Digital Economy (see Hafkesbrink, Stark and Schmucker, 2010; Hafkesbrink and Scholl, 2010; Hafkesbrink, Krause and Westermaier, 2010). These SMEs are, by nature, more open to collaborate in innovation processes, because knowledge is widely distributed and knowledge cycles are extremely dynamic. There is no "big player" like the well known examples of Intel, BP, Lego, Nike, P&C, IBM etc, who is able to sophisticatedly 'manage the open innovation process', by, for example, applying "Lead-user approaches", or by using "Open Innovation toolkits", or by organizing "Innovation contests" (Diener, Piller, 2010) to develop enough gravitational force to attract additional knowledge providers. Instead, the generation of innovation in this sector is based on multiple interactions. However, individual and decentralized SMEs which share (pre-competitive) knowledge have to maintain multiple relationships with communities to create innovation. From a bird's eye perspective, these SMEs act like a swarm, searching for a positive-sum game since they successfully exploit knowledge collectively in networks, communities etc. Thus, in the Digital Economy, "Open Innovation" (aka Innovation 2.0) appears to be a more or less natural procedure, and an evolutionary intermediate step towards the new "Innovation 3.0" paradigm. This establishes collaborative SME clusters/networks with communities which are sufficiently flexible and stable enough to embed knowledge, and to make use of, and exploit, collective learning in multi-agent systems.

This paper is organized as follows: first we conduct a focused literature review of the theoretical framework for our new approach of "embedded innovation" tackling relevant aspects of the new Quadruple Helix Model of innovation, multi-actor organizational learning, the social embeddedness of knowledge, the denotation of crowdsourcing for open innovation, and on organizational ambidexterity to link with communities. Next we present the underlying research methodology which is based on a series of longitudinal case studies in the Digital Econom.[1] Then we will develop our new Innovation 3.0 paradigm, describing first the evolutionary steps from Closed via Open to Embedded Innovation in SME networks of the Digital Economy following the development of its most distinguished enabling technology – the Internet. After that, we will sketch the firm's different relationships and knowledge flows in the Digital Economy with respect to its surrounding

communities. Finally, we will illustrate the collective learning process in embedded communities with 12 case studies and describe a more in-depth example from our ongoing research which provides empirical evidence on the new Innovation 3.0 paradigm.

THEORETICAL BACKGROUND

The Quadruple Helix Model and Open Innovation

The recent innovation debate is centred around the shift from linear to systemic, open and user-centric innovation models and on the question of how knowledge production evolves under new and different innovation paradigms (Arnkil et. al., 2010; Carayannis, Campbell, 2010). Thus, the so called Quadruple Helix Model (QHM) of Innovation (ibid) suggests that knowledge production and exploitation happens in a variety of multi-actor innovation networks, in highly interactive and non-linear modes, not limited on the universities – industry – government collaboration but also involving users and the broader civil society to play an increasingly important role in the innovation process.

An important contribution to the new way of thinking innovation processes was made by Henry Chesbrough. He stresses that, in short, Open Innovation focuses on how to combine different competences or technological capabilities, whether they are inside or outside the firm, and apply them to commercial ends (Chesbrough, 2003 and 2004, Lazzarotti, Manzin, 2009). In addition research especially conducted by Reichwald and Piller (2009) suggests that in the Open Innovation paradigm more and more intermediate organizations act successfully as knowledge flow enablers exploiting a much greater variety of knowledge sources apart from universities, research organizations etc. and including the wisdom of the crowd, individual experts and freelancers etc. Good examples for these intermediate organizations are NineSigma, InnoCentive etc. as important mechanisms also for crowdsourcing. [2]

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1. The research underlying this paper relates to several R&D projects, supported by the German Ministry for Education and Research (BMBF), the State Chancellery of North-Rhine-Westphalia and the EU: 'Organizational Attentiveness as a Basis for Corporate Innovativeness (ACHTINNO); 'Competence Development and Process Support in Open-Innovation Networks of the IT-Industry through Knowledge Modelling and Analysis (KOPIWA)'; 'Integrated Tools to Enhance the Innovative Capabilities of Publishing and New Media Companies' (FLEXMEDIA)'; 'Local.mobile.NRW – Development of Smart Location Based Services for Mobile Devices'; 'Locally-based-TV: Development of an Intelligent Regional IPTV Platform in the Münsterland'.
2. For an overview of open innovation platforms see Diener and Piller 2010.

Mulit-Actor Organizational Learning and Communities

Moreover, in the context of Open Innovation our own recent empirical research (Hafkesbrink, Hoppe, Schlichter, 2010) reveals that the status of the organization and organizational learning act as decisive levers for open innovation in connecting technology and people from different firms and the surrounding innovation eco-system towards new products and services (Hafkesbrink, Schroll, 2010). This throws light on different facets of organizational learning:

First, it seems obvious that in the context of Open Innovation the organization must learn both incremental and radical (Perkins et al., 2007, p. 306). Even in the opening up process it has to rely on existing structures that determine e.g. the borderlines and self-organization capabilities of the organization, on cultures that rule e.g. open-mindedness, reputation and trust and the knowledge friendliness of the organization. But Open Innovation also requires radical learning in terms of changing the rules of the game: intellectual property rights, non-disclosure principles, historically evolved hierarchies etc. may be in need for change radically if an organization would like to benefit from open knowledge collaboration.

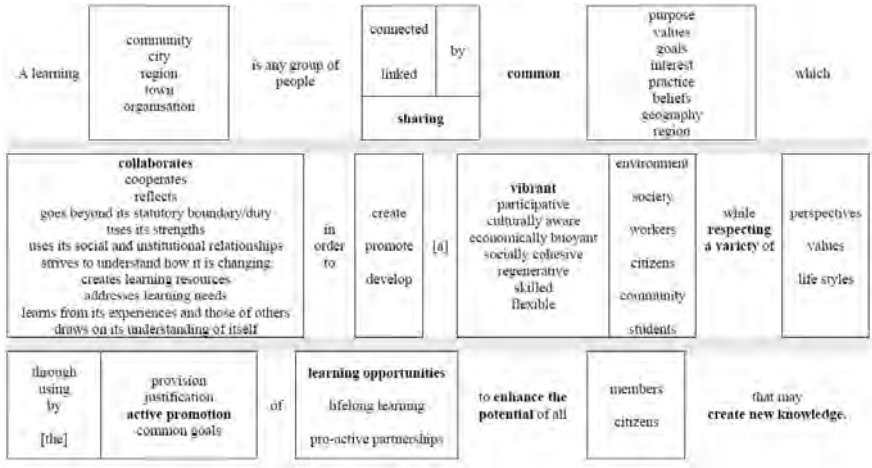
Second, it appears quite clear that in Open Innovation organizations also have to learn both on an individual/cognitive and a social/cultural level (Perkins et al. ibid). There are important links between the learning of organization members when solving problems and learning on the superior organizational level, understood as the capacity of an organization to transform its underlying structures, cultural values, and objectives in response to, or in anticipation of, changing environmental demands (Argyris, Schon, 1996). "Hence, a learning organization depends on openness to new ideas and change at both the individual and organizational level" (Perkins et al., 2007, p. 307).

Third, being part of a wider innovation eco-system, organizations are as well part of a learning community (Kilpatrick, Barrett and Jones, 2003) where individual and organizational learning takes place through participation in "communities of common purpose" (ibid, p. 2). The main incentive for successful knowledge production and exploitation in these learning communities is a common interest as their members work towards sharing understandings, skills and knowledge for shared purposes (ibid, p. 3). In the Digital Economy with borderless communication these "communities of common interest" are not limited to a geographical region but may constitute themselves from remote corners of the globe. However, looking on the Helix Model, learning cycles and modes may vary according to the cultures, rules and other properties that are evolving in these different communities. A very

instructive composite definition of a learning community is given in the following figure which will help us later in the development of our "Embedded Innovation" approach to analyze the community specific learning cycles and modes (see figure 1).

Given that definition, organizational learning obviously strongly relates to knowledge creation. Moreover, organizational learning through communities (especially "Communities of Practice" – CoP) can be seen as one of the most prominent approaches within the organizational learning discourse (Lämsä, 2008; Perkins et.al., 2007; Allee, 2000; Sharp and Moller, 2001; Brown and Duguid, 1991). The reason for this field of attention is the perception that much knowledge is embedded in practice, especially when it comes to tacit knowledge (Lämsä, 2008, p. 3). The most interesting aspect of this research is, however, that – opposite to previous findings stressing that explicit knowledge flows more easily than tacit knowledge (Polanyi, 1985) – it is especially the socially embedded knowledge that flows easily in CoP, even if it is deeply rooted in practice, and thus organizations that embed CoP learn much more effective and efficient (Lämsä, 2008, p. 192). However, this research so far is especially focused on the discussion about organizational learning and knowledge creation in CoP (Lämsä, 2008). We will look at this research as a starting point for our model on organizational learning in multi-actor systems embracing different kinds of communities, like "Communities of Affinity" (CoA), "Communities of Interest" (CoI) and "Communities of Science" (CoS) (see chapter 4).

Figure 1 – Definition of Learning Communities



Source: Kilpatrick, Barret, Jones, 2003, p. 5

Crowdsourcing in Open Innovation

The communities mentioned also indicate the main anchors for using new knowledge sources and improve knowledge transfer in innovation processes. The existing literature on open innovation however concentrates especially on the issue of "crowdsourcing" as a specific way of collecting knowledge from Communities of Affinity. According to Howe (2006) crowdsourcing is defined as "the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call" (Howe, 2006, p. 135), i.e. leveraging the collective intelligence of crowds, where groups of people outperform individual experts (Howe, 2008, p. 132). In that sense, crowdsourcing is collective interaction leading to collective intelligence. Of course, crowdsourcing is by no means a unidirectional top-down approach assigning tasks to external knowledge owners. In contrast there are many Web 2.0 platforms that evolved from scratch providing "wisdom of crowds" (e.g. products and services) spontaneously and thus bottom-up. For our model of Embedded Innovation the "crowdsourcing perspective" is one of the elements to be included in active Innovation 3.0 management procedures, whereas we feel that this concepts is not suitable for all communities a firm has to deal with to absorb relevant knowledge. For instance – as we will see later on - it may be not appropriate to 'crowdsource' Communities of Interest, since the mechanisms of knowledge creation and knowledge sharing are totally different in CoI as compared to CoP and CoA (see chapter 4 for more information).

Social Embeddedness of Knowledge

The next pillar of our theoretical framework is the notion of "social embeddedness" of knowledge. Embeddedness, as used by Granovetter (1985), refers to how (economic) behaviour and institutions are affected by networks of social relations (Lam, 1998, p. 11). More specifically: in our previous argument we noted that socially embedded knowledge may flow more easily than explicit knowledge. We also stated that according to specific rules, cultures etc. of different communities, the creation, flow and exploitation of knowledge may differ in and in between these communities with the result that embedding and absorption of knowledge may be more or less successful. This refers to previous research on relationships between societal culture and institutions, codification of knowledge and its diffusion (Nonaka and Takeuchi, 1995; Boisot, 1995). According to this research, the way explicit and tacit knowledge is shared depends to a large extent on the diversity of knowledge, organizational systems and their social embeddedness. Thus, in the Japanese world, due to the way knowledge and skills are formed and utilized, knowl-

edge sharing is primarily human-network based and directed to tacit knowledge whereas in the Western world it is primarily document-based and directed to codified knowledge (Lam, 1998, p. 15). For our "Embedded Innovation" approach this research helps to keep an eye on the different conditions in terms of institutional arrangements, culture, work-context, etc. in different communities to explain how knowledge sharing and embedding between an organization (a firm) and another organization (a community) may function. Since a firm may contain multiple communities (Ferlie, Fitzgerald, Wood, Hawkins, 2005) which are usually exceeding the defined organizational boundaries, the learning processes, knowledge sharing and the overall knowledge management process take place on different levels (inter-organizational, organizational, inter-individual, individual), in different community related conditions and therefore is supposed to be complex in itself.

An important issue for our "Embedded Innovation" approach is also the question how (online) communities may support knowledge creation, knowledge sharing and knowledge transfer. According to Cranefield (2009) there is little understanding in this area but yet "a number of themes of potential relevance". These include the apparent suitability of new *conversational technologies* for supporting social interactions and therefore knowledge transfer, the suggestion that online CoP may promote embedding through *reflective practice*, the possibility that differentiated social online contexts have a differing influence on knowledge transfer, and the suggestion that knowledge transfer and embedding are more likely to occur during the middle and late stages of a CoP's development (Cranefield, 2009, p. 53).

In our research context – the Digital Economy – new conversational technologies are not only widespread used, they are even developed in that sector providing numerous services for online video, audio and textual communication. Thus, we may expect that social interactions in that sector are supported extensively, with the result that possibilities are expanding faster than the evidence of their impacts on learning.

Reflective practice may be addressed as a specific way of creating and sharing tacit knowledge. Here the literature addresses some well known problems which can be summarized as follows (Hemmecke, Stary, 2004, p. 3):

- Knowledge moves differently within than between communities (Brown and Duguid, 1999). Within organizations like communities or in well functioning teams the sharing of tacit knowledge occurs through the establishment of shared understanding (Becerra-Fernandez, Sabherwal, 2001, p. 21) and through practice itself (Brown, Duguid, 1999). Thus it happens through "participation" (i.e. practicing) (Lave, Wenger, 1991; Wenger, 2000).

> • "When separated from practice, which is the case when tacit knowledge has to be exchanged *between* different communities, sharing becomes more difficult (Brown, Duguid, 1999). Knowledge sharing *between* communities has to occur partly decontextualized from the actual practice and background of the involved communities… Knowledge sharing between communities…can only happen when the socially embedded tacit knowledge is – at least partly – converted into explicit knowledge" (Hemmecke, Stary, 2004, p. 3).

Absorptive Capacity as Organizational Antecedent for Open Innovation

'Absorptive Capacity' was first introduced by Cohen and Levinthal (1990) with the notion of "a new perspective on learning and innovation – Technology, Organizations, and Innovation". This paper may be characterized as path-breaking insofar as it first broached the issue of outside-in antecedents in the innovation process. Cohen and Levinthal argue that "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends is critical to its innovative capabilities" (ibid).

Thus, absorptive capacity and the effectiveness of knowledge valorization are treated by many authors as the key for Open Innovation (Boscherini et al., 2009; Lazzarotti, Manzin, 2009; Mortara et al., 2009; Staudt et al., 1997; Svesson, Eriksson, 2009). The literature usually follows a process-view on the knowledge management process, divided into

- "*identification of technological opportunities*" (Mortara et al., 2009)
- "*elicitation and assimilation*", including the ability to recognize compatibility of external and internal knowledge/ technologies (Boscherini et al., 2009; Cohen, Levinthal, 1990; Mortara et al., 2009; Schreyögg, Kliesch, 2002; Schroll, 2009)
- "*understanding / transforming*", including the ability to acquire, adjust and integrate external knowledge/technology into the product development (Lazzarotti, Manzin, 2009; Mortara et al., 2009; Schroll, 2009)
- "*sharing / disseminating / exploitation*", including the ability to valorise integrated knowledge towards the market (Boscherini et al., 2009).

The first two phases are usually called "*Potential absorptive capacity*", the latter two phases "Realized absorptive capacity". "Potential absorptive capacity, which includes knowledge acquisition and assimilation, captures efforts expended in identifying and acquiring new external knowledge and in assimilating knowledge obtained from external sources ... Realized

absorptive capacity, which includes knowledge transformation and exploitation, encompasses deriving new insights and consequences from the combination of existing and newly acquired knowledge, and incorporating transformed knowledge into operations…" (Jansen, Van Den Bosch, Volberda, 2005).

A pre-condition for effective knowledge transfer is also to understand internal and external competencies (Mortara et al., 2009), as well as the identification of gaps in internal competencies and the ability to balance external and internal knowledge (Vanhaverbeke, Cloodt, Van de Vrande, 2008), and (intra-firm) knowledge dissemination capabilities (Mortara et al., 2009).

With respect to the "potential and realized absorptive capacity", Jansen et. al. developed empirical evidence "…that organizational mechanisms associated with coordination capabilities (i.e. cross-functional interfaces, participation, and job-rotation) primarily enhance potential absorptive capacity while organizational mechanisms associated with socialization capabilities (connectedness and socialization tactics) primarily strengthen realized absorptive capacity" (Jansen, Van Den Bosch, Volberda, 2005).

Ambidexterity in Open Innovation

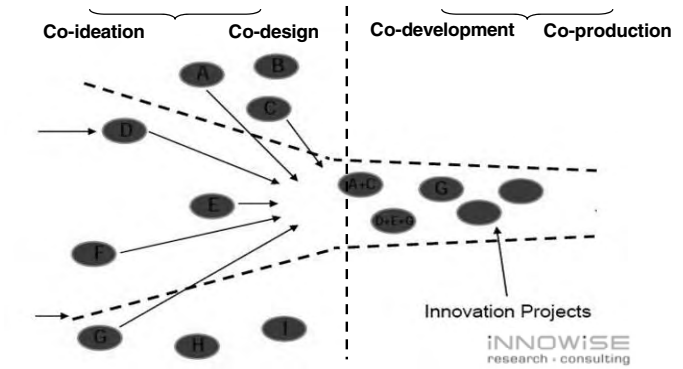
Finally: A relatively new issue in organizational adaption research is the notion of an "ambidextrous organization" (Güttel, Konlechner, 2007; Tushman et al., 2002), which is defined as an "organization's ability to reconcile explorative and exploitative activities simultaneously". Ambidexterity is more or less a re-conceptualization of the discourse on 'dynamic capabilities' explicitly considering the necessity of flexibility and stability modes of an organization. The core question that ambidexterity seeks to answer is: *"How are dynamic capabilities – the organization's learning mechanisms – shaped in ambidextrous organizations in order to cope with contradictory environmental demands?"* (Güttel, Konlechner, 2007).

If we transform this question to the management of business model innovation, we may ask: What are the different dynamic organizational capabilities and modes of the organization (with respect to infrastructure, policy and culture) that ensure flexibility and stability, and enable it to adjust business models successfully to changing environments?

The following figure shows the open innovation funnel, in terms of several opposite pairs following the notion of an "ambidextrous organizations":

Figure 2 – Characteristics of Ambidextrous Organizations

Implementation Mode	explorative	exploitative
Structural Mode	organic	mechanistic
Adaptation Condition	flexible	stable
Rules	heuristical	routinized
Decision Making	implicit leadership	explicit leadership
Communication	lateral	vertical
Governance	advice and learning	desicions by superiors
Control and Authority	network and trust	hierarchy



According to figure 2, empirical evidence in the literature reveals that organizations which can manage both modes of organizational design, are able to adapt more effectively and efficiently to changing environments (Güttel, Konlechner, 2007; Tushman et al., 2002). Obviously, ambidexterity produces relevant trade-offs between those phases of an innovation process where flexible adaptation to new ideas, designs, moods etc. ("De-compressive Openness") is necessary with those phases of the innovation process that need straight-forward management ("Compression Mode") (Eisenhardt, Tabrizzi, 1995). Figure 6 suggests that there is a strict line separating explorative from exploitative modes, organic from mechanistic structures, stable from flexible phases, heuristics from routines etc. Of course in reality, we may experience a specific composition of these ambidextrous modes depending on the single innovation case, sector, environmental dynamics, community communication channels, learning requirements etc. We will return later to the underlying hypotheses on ambidextrous designs as the appropriate organizational adaptation mechanism when describing the business modelling cases investigated in this paper (see chapter 5).

RESEARCH METHODOLOGY

The research methodology underlying this paper is based on a longitudinal case study (Hamel et al., 1993; Yin, 1993 and 1994) and implementation research (Bhattacharyya, Reeves and Zwarenstein, 2010; Fixsen et al., 2005) approach.

Yin (1994) identified five components to be important for a case study research approach:

- The study's research questions.
- Its propositions, if any.
- Its unit(s) of analysis.
- The logic linking the data to the research questions and/or propositions.
- The criteria for interpreting the findings (Yin, 1994, p. 20).

In this paper we will present twelve case studies, for which we will present some basic information on how the innovation process, more specific how knowledge creation and knowledge transfer is organized in linking the firm to its surrounding communities. In addition we will give in-depth information for one case study out of the twelve to be more illustrative in describing the knowledge embedding process in the Innovation 3.0 paradigm.

The basic *research questions* for the case studies are:

- What are the most important types of communities to be considered in the Digital Economy and how do firms depend on these communities in their innovation efforts?
- What are the most important community patterns with respect to learning cycles, knowledge creation and knowledge transfer?
- What are the stakeholders' impetuses for knowledge artefacts and how do they contribute to the innovation process?
- Is there empirical evidence on the new Innovation 3.0 paradigm of embedding into knowledge communities along selected business and innovation cases in the Digital Economy?

Since our case study approach is of explorative nature, we did not develop explicit *hypotheses* to test with data from the research process. In fact, our theoretical background on multi-actor organizational learning, social embeddedness of knowledge, crowdsourcing for open innovation, and on organizational ambidexterity, provided a rich sample of heuristic questions along our four basic research questions mentioned above. Empirical *data were linked* to these heuristic questions by conducting interviews with companies' representatives from different levels of the organization along the research and

implementation process of the twelve cases. This included face-to-face interviews with top managers, departmental managers, project managers, R&D-managers and operational employees as well as group-interviews in implementation workshops to put innovation research results into practice. The *units of analysis* were SMEs (small and medium sized enterprises) of the Digital Economy and accordingly – if any – departments of research and innovation, the business strategy units, the marketing and product/service development units. Special attention has been paid to the cross-lateral questions of organizational antecedents and knowledge transfer mechanisms within each of the innovation processes on the firm's level.

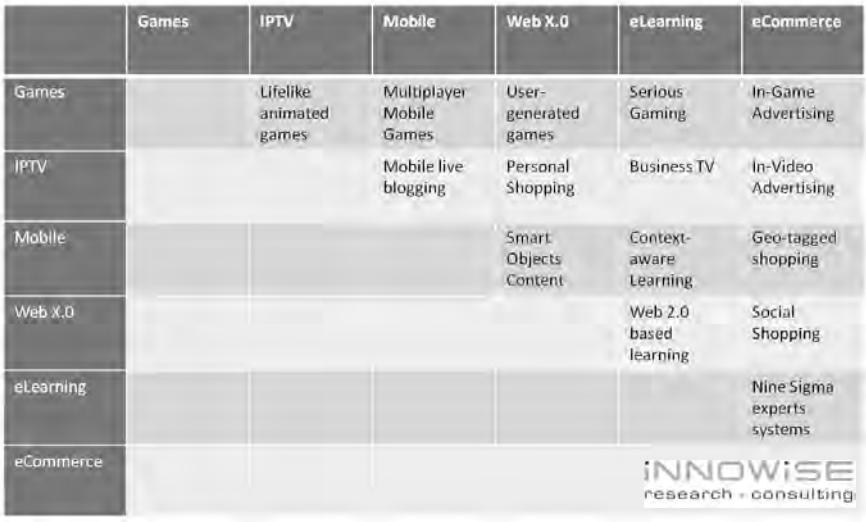
In the business cases which have been investigated a special focus was directed to the aspects of community orchestration (Hurmellina-Laukkanen, 2009), i.e. finding empirical evidence on the question of what are the relevant communities and how do they link to the firms innovation processes. The *criteria for interpreting the findings* have been defined as (a) relevance for the knowledge creation (b) relevance for knowledge transfer (c) relevance for the implementation of innovation processes and new business models in the Digital Economy.

According to the notion of 'implementation research', our case studies serve as "process implementation" examples (Fixsen et al., 2005, p. 6) where an organizational change program is implemented into a firm to transform its structure and culture into a new institutional arrangement to fit best possible to dynamic and changing environmental conditions, more specific to link to their surrounding knowledge communities. As far as it matters, our research is not passive and observing but pro-active, oriented towards intervention and evaluation of implementation efforts and results, thus it may be described as a field study combined with an experimental organizational change attitude.

INNOVATION 3.0: A NEW PARADIGM FOR MULTI-ACTOR LEARNING VIA EMBEDDING INTO KNOWLEDGE COMMUNITIES

The so-called 'Digital Economy' embraces all actors in digital value creation processes and includes multi-media agencies, e-commerce, interactive online marketing and mobile solutions providers, games developers, social media providers etc. The Digital Economy had to open up its innovation processes very early, when faced with, first, the high velocity of on-going technology and media convergence processes (see figure 3), and, second, a broad distribution and variety of specialized knowledge throughout industry and society.

Figure 3 – Technology-/Media Convergence in the Digital Economy



Drivers for the development of Embedded Innovation

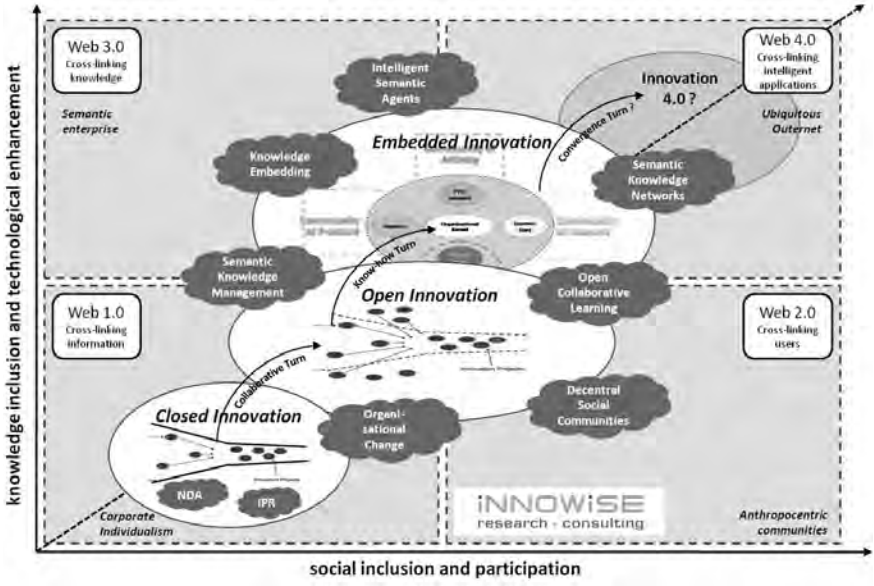
The main enabling technology for the Digital Economy is the Internet (see forthcoming figure 4[3]) providing a huge potential for different business models, new products and services (see chapter 5). From 1990 onwards, based on Web 1.0, new digital services were developed as industry discovered the Internet to be primarily an additional resource for providing marketing information (as an "information web"). Later the first ecommerce business models introduced interaction and transaction into the Web ("transaction web"). The main properties of Web 1.0 were initially static – and later – dynamic information. The prevailing innovation paradigm was 'Closed Innovation' (= Innovation 1.0) based on an internal accumulation of IT, media and ecommerce competences, protection of Intellectual Property Rights (IPR) and formal/explicit contracts such as Non-Disclosure Agreements (*NDA*s).

With the emergence of Web 2.0 around 2004, a "*collaborative turn*" occurred with new, interactive web-based tools that facilitated collaboration with consumers (B2C), between end-consumers (C2C), and in business-to-business (B2B) contexts. Since then '*Open Innovation*' (= Innovation 2.0),

3. *Terms in Italic* serve as a comment to the following Figures.

has been on the agenda, with specific characteristics in the Digital Economy complementing the old Innovation 1.0 paradigm.

Figure 4 – The Emergence of Innovation 3.0



While Web 1.0 more or less *cross-linked information* and concentrated on *"corporate individualism"*, Web 2.0 (the 'Collaboration Web') *cross-links users*, promotes *social inclusion and participation* (see the horizontal axis in figure 4) and has an *anthropocentric* nature. It strongly supports one of the famous 95 theses of the early days of the Internet's Cluetrain Manifesto [4] that "markets are conversations". *Decentralized social communities* emerged that already turned some conventional marketing strategies and business models upside-down. On the one hand, firms had to listen to the voice of their clients more intensively. On the other hand, they began to make use of their complaints, ideas etc. to improve products and services. The term 'crowd-sourcing' was born, one of the essential ingredients of 'Open Innovation'.

In contrast to the anthropocentric nature of Web 2.0, a more techno-centric matter additionally drives the innovation landscape of the Digital Economy, the so-called "Semantic Technologies" (Stark, Schroll and Hafkesbrink, 2010). Web 3.0 (the "Semantic Web") is based on the attempt to capture

4. See http://www.cluetrain.de.

the meaning (semantics) of information and to *cross-link knowledge* by using so called meta-data (context-data) making it possible for the Web to "understand" and satisfy the requests of people and machines to use its content [5] (see Stark, Schroll and Hafkesbrink, 2010). Semantic Technologies are the most prominent enablers for the transition from data and information to knowledge.

The next evolutionary step in Web development (again see figure 4) already becomes apparent when observing the technological and business model trends of the so-called "Outernet" (http://www.trendone.de/outernet.pdf). Innovation 4.0 will further leverage the convergence between technologies and will bring the Internet into the real world, which is called 'Internet of Services' and 'Internet of Things' (see Haller, Karanouskos, Schroth, 2009; Stark, Schroll, Hafkesbrink, 2010). We call this *"Convergence Turn"*, since technologies, the media, markets and actors' configurations will fuse together beyond the already fuzzy sector boundaries of the Digital Economy, and thereby integrate most parts of the conventional "Analogous Industries". Thus Web 4.0 will *cross-link intelligent applications* with products, services, locations etc. of the real world in transforming the Internet to – what is called – a *"Ubiquitous Outernet"*.

Defining embedded innovation

At the heart of Open Innovation is *"Open Collaborative Learning"*. This is an essential component of 'dynamic capabilities for organizational change', which we define as interleaved, entangled loops to acquire new knowledge, behaviours, skills, values or preferences within and between a minimum of two entities, i.e. persons or institutions, and which constitutes an on-going feedback mechanism between an open business case and its organizational consequences (Hafkesbrink, Scholl, 2010). At the same time, 'Open Collaborative Learning' marks the bridge to what we call *"Embedded Innovation"*.

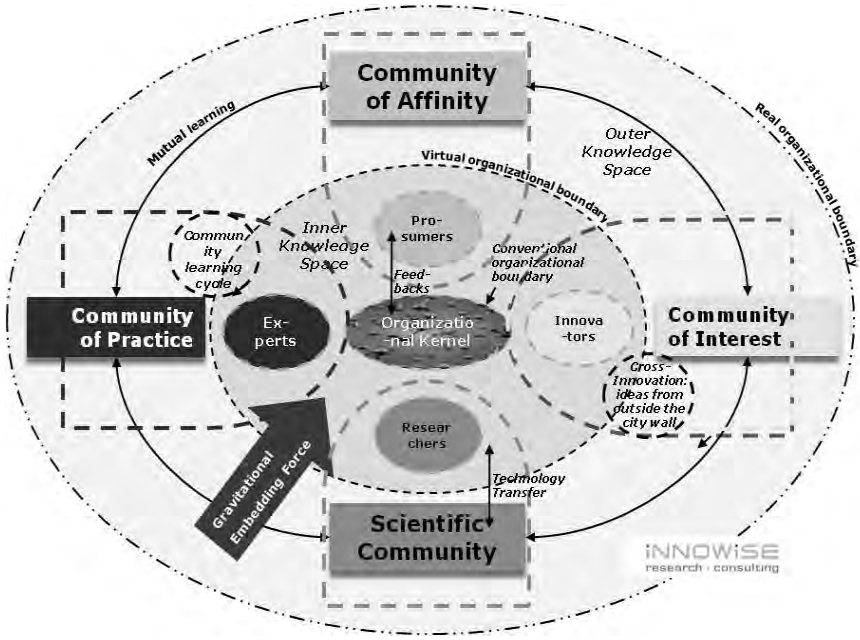
We define "Embedded Innovation" (Innovation 3.0) as the fundamental ability of a firm to synchronize organizational structures, processes and culture with open collaborative learning processes in surrounding communities, networks and stakeholder groups so as to ensure the integration of different external and internal knowledge, i.e. competences or technological capabilities, and to exploit this knowledge to commercial ends.

With this definition of *"Embedded Innovation"* (Innovation 3.0), we extend the common definition of 'Open Innovation' (Lazzarotti, Manzin, 2009; Svesson, Eriksson, 2009) by introducing the notion of integrating the

5. See 'Semantic Web'. In: Wikipedia, the free encyclopedia.

organization into communities to ensure knowledge absorption instead of just managing inside-out and outside-in processes. The decisive difference between Innovation 3.0 and the Open Innovation paradigm is the new modelling of learning processes. This differentiates *Embedded Innovation* from its predecessors with respect to the transition from single-agent to multi-agent based innovation processes in relation to different communities of knowledge (see figure 5):

Figure 5 – Embedding into 'Communities of Knowledge' for collaborative learning (inspired by Konstapel, H., n.d.)



Characteristics of relevant communities

As already discussed, knowledge generation and knowledge flows in the Digital Economy are widely distributed throughout the entire innovation system. Corporate innovation and long-term competitiveness depend on the ability to integrate these knowledge flows into an organization. Knowledge generation usually takes place in different communities throughout the innovation system. Supported by new interactive Web 2.0 based tools, knowledge, behavioural attitudes, skills, values and/or preferences are articulated and

shaped continuously as a result of human interaction, whether in a working or leisure context. We call this *'Community based learning'*, as the social interaction delivers a mutual progress in knowledge accumulation within the social community (Hafkesbrink, Scholl, 2010). Four different archetypes of communities are important for embedding the firm for a successful implementation of the Innovation 3.0 paradigm:

- *Communities of Affinity (CoA)*: continuous dialogue with prosumers and end-consumers (B2C) to catch up with new (design) ideas, demands, moods, fashions and business opportunities;
- *Communities of Practice (CoP)*: collaboration with each other (B2B), and with micro firms or freelancers to flexibly enhance knowledge flows, primarily for design and co-development;
- *Communities of Interest (CoI)*: experience exchange with innovating firms from the same and other sectors to benefit from crossover ideas and complementary knowledge,
- *Communities of Science (CoS)*: dialogue with scientists to absorb new technologies.

In *Communities of Affinity* (CoA), cohesion between agents is motivated by a similar inherent attitude towards a firm's products and services. Consumers are typical members of these Communities, expressing their values and beliefs in social networks by giving feedback such as reviewing products, exchanging experiences about using the services, or chatting on social forums about related, even peripheral, matters. The new species of *"Prosumers"* are of special interest for an innovating firm, since these agents provide substantial contributions to alter or improve the firm's products and services. They *pro*duce and con*sume* at the same time. Thus, co-production involves a continuous process of semi-automatic, seamless revising of resources through feedback. This mode of 'swarm intelligence' provides the ground for numerous ideas, both for incremental improvements in existing product/service portfolios and for new product and service development (NPSD) processes. Learning within the CoA is an intensive process. By using services and products, and by exchanging experiences, consumers and prosumers learn from interaction and can initiate collective learning through *Community Learning Cycles*. Since easy communication is enabled by digital connectivity, the magnitude of learning is theoretically endless and potentially global (Komoski, 2007). Modern forums or blogs in the Web 2.0 Internet are global operating platforms with contributions from all over the world. Knowledge generation in these social communities follows an exponential function (Reed, 1999) creating a demand for, amongst other things, new evaluation methods for trend spotting (Harrer, Zeini, Ziebarth, 2009). Learning in CoA

needs to be supported by the use of interactive tools to maintain customer relationships, as well as the transition of customer contributions into the organization and into the innovation funnel.

Communities of Practice (CoP) are pooled by agents having mutual interests in problem solving (Wenger, 1998). "CoP consist of practitioners who work as a community in a certain domain undertaking similar work" (Fischer, 2001). The similarity of agents emerges because they are facing similar tasks. The agents are usually called "*Experts*". They act in a more or less self-organized manner, and exchange knowledge, behavioural attitudes, skills, and values in ways similar to the already mentioned "*prosumers*" (e.g. Burmann and Arnhold, 2008; Hellmann, 2010), although their social background is different (Wenger, 1998). Typical characteristics of CoP are, they:

- share historical roots,
- have related enterprises,
- serve a cause or belong to an institution,
- face similar conditions and artefacts,
- have members in common,
- have geographical relations of proximity or interaction,
- have overlapping styles or discourses,
- compete for the same resources,
- sustain mutual relationships – harmonious or conflictual,
- have an absence of introductory preambles, as if conversations and interactions were merely the continuation of an ongoing process,
- can very quickly set up the discussion of a problem,
- know what others know, what they can do, and how they can contribute to an enterprise,
- have specific tools, representations, and other artefacts,
- share a local lore, shared stories, inside jokes, jargon and shortcuts to communication as well as the ease of producing new ones (Wenger, 1998, p. 127).

For firms, learning in, and from CoP is different from those learning in CoA, since the anchor of exchanging knowledge, behaviour, skills, values and/or preferences varies substantially, depending on the respective Community. Looking at the open innovation funnel, *prosumers* in CoA usually play a decisive role downstream in giving feedback to products and services already placed on the market, and upstream in the design of new products and services (Piller, 2008) as a result of ideas coming from user panels, etc. The collaboration is narrow, less embedded, and more or less non-technical, but is nevertheless invaluable for marketing purposes in learning about the

needs of the market. Thus, the gravitational force to be cultivated in order to attract *prosumers* in CoA follows dedicated - but easy to implement - incentive-systems like a "reward for the best idea". Of course some *prosumers* may be 'experts' as they are specialists in a certain domain of interest for the firm. As such, experts probably play additional roles in CoP as they are able to have more in-depth engagement in the new product and service development-process.

In CoP the situation is different. Here we find technical experts who usually deliver substantial contributions (e.g. in software programming, ontology design etc.) that are based on specific expert communities. A significant number of CoP agents are freelancers or consultants, and are self-employed or partners/members of a micro-enterprise. In the Digital Economy, these freelancers play a decisive role in the innovation system, since they deliver indispensable complementary knowledge in innovation processes (Hafkesbrink, 2009). To attract freelancers, firms may use different incentive systems than in CoA relations, including flexible, temporary employment to maintain at least weak ties to (re-) activate relevant complementary knowledge when needed. As an act of embedding into CoP, members of the firm are usually seconded as CoP agents or they act as CoP agents based on intrinsic motivation. In the latter case, knowledge – or even know-how and expertise – (see figure 3 again) from CoP for innovation is supposed to easily match with the internal competences of the firm, since the knowledge-bridge is based on inter-personal transfer. However, knowledge streams from CoP are expected to be far more applicable to technical new product and service development steps than from CoA agents, since the level of resolution is more tailored to the level of innovation problems.

In contrast to a CoP, members of *Communities of Interest* (CoI) are under no compulsion to solve a common problem, although they may in practice do so. They have common interests, such as how to develop standards or how to innovate. "CoI bring together stakeholders from different CoP to solve a particular (design) problem of common concern. They can be thought of as "communities-of-communities"… or a community of representatives of communities. CoI are characterized by their shared interest in the framing and resolution of a (design) problem. CoI are often more temporary than CoP: they come together in the context of a specific project, and dissolve after that project has ended. CoI have great potential to be more innovative and more transformative than a single CoP if they can exploit the "symmetry of ignorance" as a source of collective creativity. Fundamental challenges facing CoI are found in building a shared understanding of the task at hand, which often does not exist at the beginning, but evolves incrementally and collaboratively and emerges in people's minds and in external

artefacts. Members of CoI must learn to communicate with and learn from others…who have different perspectives and perhaps a different vocabulary for describing their ideas. Learning within CoI is more complex and multi-faceted than *legitimate peripheral participation […]* in CoP, which assumes that there is a single knowledge system, in which newcomers move toward the center over time" (Fischer, 2001).

In the Digital Economy, CoI are initiated especially by the sector's professional association, in Germany by the Bundesverband Digitale Wirtschaft (BVDW). The association is organized by different sector-specific CoI which address innovation problems. Members of CoI usually exchange experiences in a pre-competitive way. Knowledge that is generated in CoI can usually be exploited for innovation purposes very effectively, since a lot of cross-fertilization takes place ('*cross-innovation*' or: "innovations come from outside the city wall") (Fischer, 2001). Thus, learning in CoI can be characterized as "learning from heterogeneous experiences".

In *Communities of Science* (CoS) reliable knowledge is expected to emerge continuously. "The scientific community consists of the total body of scientists, its relationships and interactions. It is normally divided into "sub-communities" each working on a particular field within science […] Membership of the community is generally, but not exclusively, a function of education, employment status and institutional affiliation" [6]. Knowledge generation usually follows the paradigm of "technology push", i.e. that inventions in the scientific community are pushed forward to business, subsequently leaving the commercial exploitation and market launch of inventions to firms (see figure 6).

Though the description of pitfalls and problems in technology transfer is endless (Krause, 2003), knowledge from CoS is an increasingly important source for the development of innovative products and services for SMEs in the Digital Economy. In view of a multitude of technologies serving the digital infrastructure (telecommunication, media, IT, electronics etc.), and a complex melting and convergence process from vertical supply-chains to horizontal markets (TIME-markets: Telecommunication, Information, Media, Entertainment), knowledge streams from CoS can offer SMEs manifold options to extend the upstream innovation process to technology knowledge sources (see figure 6). While the Digital Economy is at the heart of the melting process, CoS have to ensure a steady knowledge flow along the upstream technology supply-chain to gain momentum in exploiting technology driven innovation more downstream on the different sectors of TIME markets

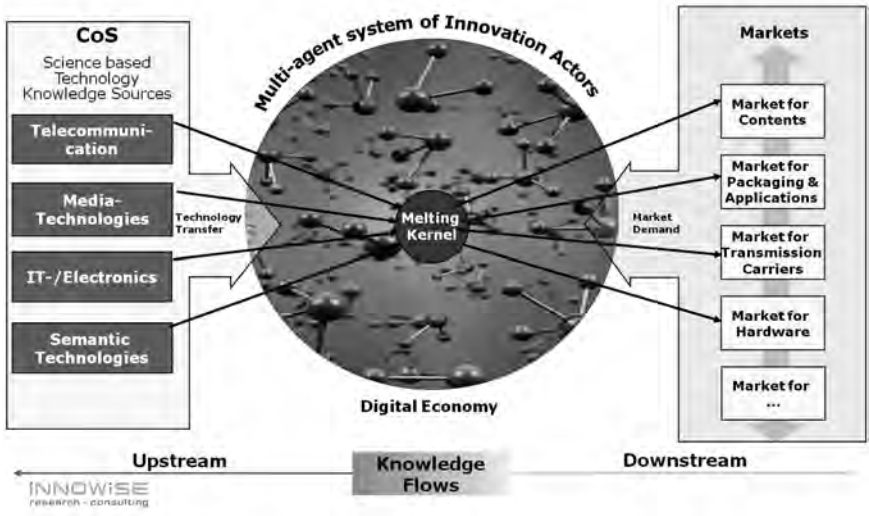
6. Scientific Community, in: Wikipedia, the free encyclopedia.

(content markets, packaging & application markets, carrier markets, hardware markets etc).

Thus, learning from CoS may be characterized as "Learning from Technology Transfer". CoS-learning, however, follows different paths and rules compared to CoA-, CoP- and CoI-learning. While learning in CoA and CoI requires little structural organizational adaptation, learning in CoP and CoS needs a synchronization of processes, an integration in organizational structures, and a culture that fits with the CoP/CoS properties. However, the organizational adjustments for being embedded in CoS need to overcome the semantic misfits between scientific results and SME requirements for applicable knowledge. These are deeply rooted in the following problems:

- technology transfer is usually in the hands of people whose skills, knowledge and priorities are R&D and scientific perception, not business opportunities, product innovation and marketing etc.
- because of the need to invest time, personnel and money - which they typically do not have - SMEs are sceptical about adopting the results of R&D projects, and need practical advice to meet their operational needs.
- lack of professionalism in disseminating R&D results to SMEs in a way that they can be easily read, understood and exploited.

Figure 6 – Knowledge Flows from Science to Markets



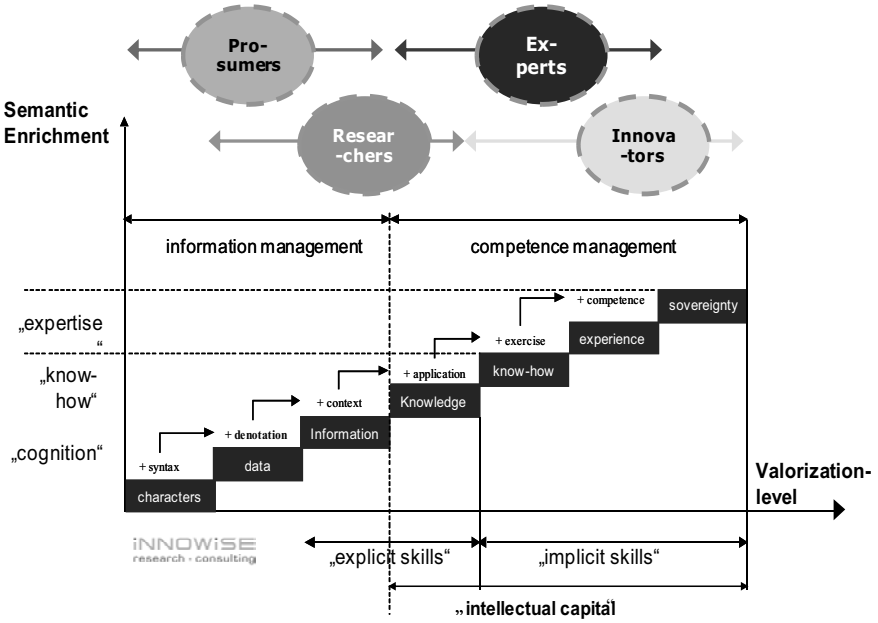
Thus, learning in CoS is – in contrast to learning in CoP – usually an exhausting and troublesome exercise which needs specific organizational antecedents and personal competences to bridge the semantic gap between science and business, so as to transform scientific knowledge into applicable knowledge that can be exploited (Güttel and Konlechner, 2007). From experience, we may say that incoherent information search and exchange (e.g. browsing scientific papers, interacting in case of need) and occasional CoS-interaction (e.g. visiting conferences) will have little, if any, synergetic effect on innovation. On the other hand, joint R&D collaboration – from small-scale heuristic trials via project-based collaboration to regular, routinised cooperation – may raise a firm's intellectual capital significantly, and provide the ground for numerous product and service innovations.

Community orchestration for knowledge creation and innovation

If we now shift the relationships between a firm and its surroundings in one of the four Communities described so far on a rather static level to the dynamic context of its social environment, we may experience additional reciprocal relationships between the different Communities (e.g. '*mutual learning*') as there are heterarchical links based on agents acting therein (see above for the example between CoP and CoI). This introduces specific incentive mechanisms concerning the preconditions of embedding knowledge substantially into an SME's organizational structure and its processes. The main task within the management of this "multi-agent system" is how to develop a substantial amount of "*gravitational embedding force*" to significantly absorb and exploit knowledge for commercial ends (see again figure 5).

To gain maximum effectiveness in terms of knowledge transfer, the innovating firm has to balance what is called "the community orchestration" (Hurmelinna-Laukkanen, 2009), because different stakeholders (like "prosumers", "experts", "innovators", and "researchers" as representatives of the surrounding communities of knowledge) usually only cover certain knowledge artefacts exploitable for the firm (see figure 7). For example, "Innovators" from Communities of Interest typically dispose of in-depth know-how and experiences in their business domain, as well as of implicit skills in running domain-related business models. "Experts" from Communities of Practice are linked through the mutual interest of solving certain problems.

Figure 7 – Stakeholders' impetus with respect to Artefacts of Knowledge

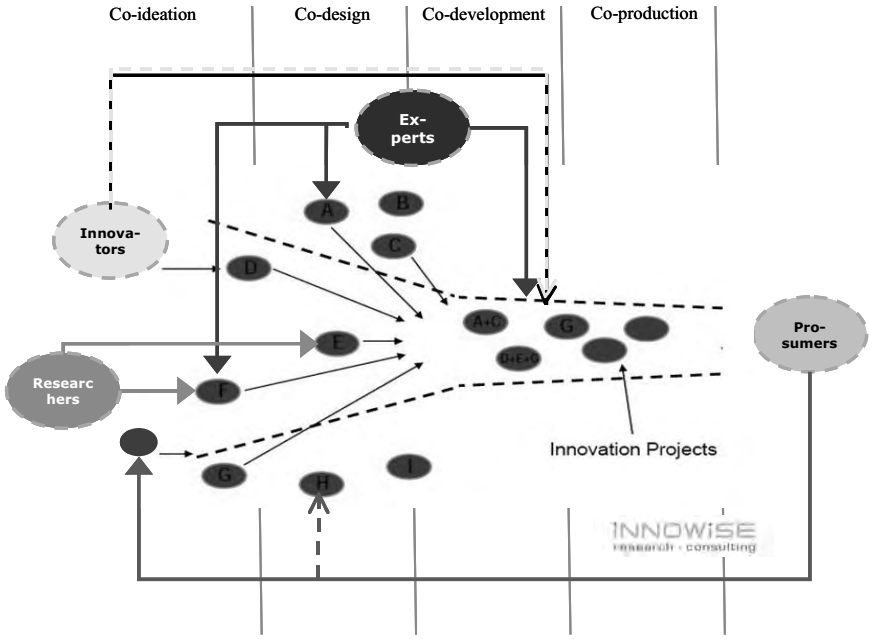


Source: inspired by Auer-Consulting (n.d.)

These "Experts" typically embrace specialized knowledge artefacts and know-how in applying this knowledge to defined problems and experiences from related application cases. Thus they usually do not have competences in running decisive business models, since they remain upstream in the "knowledge supply chain", and provide in-depth technical expertise. "Researchers" generally collect data and information and transform these artefacts into knowledge. Of course, many "Researchers" from Communities of Science also dispose of extensive know-how, especially those working in applied joint research projects with industry. Finally, "Prosumers" from Communities of Affinity usually participate in producing ideas or design artefacts in an open innovation process: they give information on product or service usage by providing feedback or they engage in idea contests. Here as well, we increasingly find "Experts" who dispose of decisive know-how in product/service usage and 'content production', which has to be considered as an important external source of knowledge.

To enable collaborative learning as the main feature of corporate innovation policy, the organization has to adapt to changing environments on a continuous basis. Community orchestration in this sense means establishing organizational anchors into surrounding communities so as to ensure a balanced knowledge transfer and absorption. Since stakeholders from surrounding communities usually have different impetuses on knowledge (see again figure 7), they are also involved differently in the innovation process of co-ideation, co-design, co-development and co-production (see figure 8). 'Prosumers' predominantly provide information on product usage from the market perspective and thus new ideas that enter the innovation funnel more upstream.

Figure 8 – Involvement of Stakeholders in the (Open) Innovation Process



'Researchers' are usually involved in ideation and design, in pre-competitive joint research, and also in the development of innovation projects. 'Innovators' usually are engaged in the phase of development and production as co-operation partners. 'Experts' are – depending from their asset specifities – participating throughout the innovation process, predominantly from ideation to development.

To gain a proper "community orchestration", the organization has to develop sufficient gravitational embedding force to establish effective and efficient relationships to knowledge communities. Thus, for a long time organizational change has been described as an important source of competitive advantage (Kesting, Smolinski, 2006). In the recent debate about 'organizational renewal', the main focus has been on "dynamic capabilities" (Teece, Pisano, Shuen, 1997) and "ambidextrous organizations" (Tushman et al., 2002). Accordingly, Teece et al. define the dynamic capabilities of a firm as 'its ability to integrate, build, and re-configure, internal and external competences to address rapidly changing environments' (Teece, Pisano, Shuen, 1997). In more detail, the different attributes or pre-dispositions of organizational renewal capacities are discussed as "the ability to overcome established routines by self-organization and organizational renewal" (Antonacopoulou et al., 2008), and being able "to organize for constant change and to establish collective organizational learning to continuously reinvent the company's core business processes" (Schneckenberg, 2009). In this context, "Organizational Learning" is recognized as the "ability to maintain a continuous process of adjustment of search rules, attention rules, and goals of the organization" (Antonacopoulou et al., 2008), or the "ability to undergo a continuous process of experimentation, adaptation and learning to pro-actively define the business environment" (Boscherini et al., 2009).

INNOVATION 3.0 – EMPIRICAL EVIDENCE FROM BUSINESS CASE STUDIES

Networks of companies acting as 'multi-agent systems' and related communities define the dynamic context of innovation processes in the Digital Economy. The notion of "embeddedness" clearly stresses the point that setting up new products and services is an ongoing task. For instance, if we look at most of the innovative Internet services that have emerged in the past years, we recognize that the initial business models behind them have been altered over time in many ways – in terms of changing the functionality for customers ("value proposition"); modifying the usability for, and interaction with, customers ("CRM"); or in terms of amending the basic financing mode (e.g. "ad-financing" versus "pay per transaction").

In order to be as illustrative as possible, we will outline a set of twelve case studies on Innovation 3.0, including one in more detail (highlighted in Table 1). The following table shows the business cases which we have investigated and their constitutive community pillars:

Table 1 – Innovation 3.0 and related "Community of Knowledge" pillars

Type of firm	Value Proposition	Orchestration of Knowledge Communities			
		CoA	**CoP**	**CoI**	**CoS**
Publishing house (books and job printing)	Community platform for book recommendations	User Generated Content – UGC (book recommendations)	Professional Generated Content - PGC (book recommendations)	ECommerce platform for other publishers (co-opetition)	Recommendation engine based on semantic technologies
IT-Services	Provision of data security and filter systems for youth endangering contents	Blacklistings based on UGC	Semantic technologies for semi-automated pattern recognition	Professional associations against youth endangering contents support	Text recognition and comprehension based on mathematical algorithms
Documentary Film Production	Edutainment 3.0 platform to deliver HD educational content	UGC	PGC from teachers and further education institutions	Associations of further education support	Semi-automated annotation of videos
Publishing house (periodicals)	Interactive guide from pregnancy to young families	UGC from fora and blogs	PGC - Medical advice	Medical associations support	Trend monitoring based on IT-supported Social Networking Analyses
Full Service Internet Agency	Visualization of hyperlocal information	End-users of web 3-D and LBS services	Web 3-D repositories for virtual worlds based on Open Source	Cooperation with eLearning and serious games providers	Fame Mirror Concepts to intrinsically motivate participants
Internet Platform Service Provider	The Best Doctor for your health problem	UGC – evaluations from patients	Semantically enhanced ontology based on Open Source	Medical associations support	Semantic Technologies for search and annotation

Type of firm	Value Proposition	Orchestration of Knowledge Communities			
		CoA	CoP	CoI	CoS
Publishing house (newspaper)	Regional IPTV to complement printed content	UGC – regional and local content (non-professional journalism)	PGC – professional produced regional and local content	Co-competition with other publishers in the region	Semantic technologies for context-related ads-targeting
Web-analytics	Interactive online engine to ensure compliance with data laws	End-user comments as source of compliance information	PGC (interactive guide for compliance management)	Professional association of the Digital Economy	—
Full Service Internet Agency	Interactive mobile Guide with location based events & gaming services	UGC – evaluations of events, restaurants, etc.	Tourist information based on professional writings, special technology solution providers	B2B cooperation with ad-partners, local trade-, tourism & event marketing organizations	Enhanced GPS technology for mobile devices
Learning Management system provider	Web 2.0 based learning and competences monitoring	UGC from learners	PGC from training experts	Professional association of further education institutions	Competences ontology
CMS provider	Mobile CMS system to deliver content effectively to mobile devices	UGC from mobile device users (usability feedbacks)	Link to mobile CMS based on Open Source	Professional association of the Digital Economy	iNNOWiSE research · consulting

Table 2 – Terms of reference for the mobile guide business case

Issue	Description
Cross-Media Publishing	the new service is only marketable with a strong cross-media component. For a rich user experience, text, video and audio information has to be merged; dynamic content has to be provided connecting users locally in an immersive game context.
Mass-Customization	personalized information has to be provided that follows the demands and the preferences of users (tour guides' recommendations, depending on choices of restaurants, cultural events etc.) and depending on the time-of-day (breakfast, lunch, dinner) etc.
Location Based Services (LBS)	information about events and cultural artefacts has to be contextualized with geo-data to allow for instant information services depending on the geo-position of the user.
Sector Convergence	in this case, a mobile game provider is part of the business model architecture to boost user interaction in a C2C context.
Usability	an important driver for a broad diffusion and acceptance in B2C-market
Digital Natives	this customer segment is supposed to use LBS and personalized services extensively.
Participation	user interaction (C2C) plays an important role in mobilizing a huge Community of Affinity for the new service, since these customers usually identify with each other through similar interests (e.g. night life, rock concerts). In addition, feedback tools are necessary to integrate User Generated Content.
Dynamic Web Development	the new business model should make extensive use of Web 2.0 tools to enhance participation and user feedback (see above). The 'anthropocentric touch' of the service strongly supports incentives to join the community. Web 3.0 technologies have to be integrated in terms of "Semantic Search and Ontologies" to allow flexible displaying of cross-linked data. Web 4.0 tools then could be the next step to further develop the local service towards a hyperlocality 'web of things' [7].
E-payment systems	have to provide options for micro-payment, since more flexibility in designing the operational cash-streams has to be implemented.
Demographic Change and New Life-styles	the business model also needs to adjust usability and services also to the user behaviour of elderly people.
Globalization	in cities with a high tourist turnover, the service should always deliver up-to date information.
Legal framework	technically, the service has to provide an opt-in procedure, since the use of, for example, geo-data is only allowed under certain legal pre-requisitions which vary from country to country.

7. The Web of Things is a kind of Outernet where information embodied in articles of daily use is meshed up with information in the Internet. This is also called Web 4.0 (Hafkesbrink, Evers, 2010).

As can be seen from table 1, each innovation process includes relevant, and indispensable, contributions from different knowledge communities that are decisive for the running of the new business model.

Using the highlighted case study 10, *"Interactive Mobile Guide with Location Based Events&Gaming Services"*, we now will describe the community orchestration within a practical example of the new approach of Embedded Innovation. In order to be able to fully understand the Innovation 3.0 approach, we will first present the crucial terms of reference for the mobile guide.

Embedding into knowledge communities

In the LBS case study we have to consider four relevant communities (see again figure 5) as being of crucial importance for the performance of the new business model:

Communities of Affinity (CoA): as already expressed, without User Generated Content, Web 2.0 tools for feedback and C2C interaction, there is no 'lively system' to attract users. The operating business architecture has to imply a strong "community engineering" unit to develop appropriate incentive systems for the mobilization of the community. The 'basic settings' of such a unit should comprise, "constant stimulating market conversation", "perpetual monitoring of trends in market conversation to identify new user needs", and "application of purposeful incentive systems" to stimulate affinity and identification-based trust amongst the community (e.g. by introducing a 'fame-mirror'", Groh, Brocco, Asikin, 2010). Thus the organizational anchors into the community may be implemented with advanced social media tools and intelligent incentive systems to stimulate further user identification. These tools have to be designed on the basis of strict and reliable rules enhancing the confidence of users to participate.

Communities of Practice (CoP): the value-network has to sustain strong ties to surrounding value-partners who dispose of different types of data, information and knowledge. On the 'content-side', value-partners from, firstly, local and regional tourist information institutions, and, secondly, from event marketers, have to be involved to ensure content flows from professionally established content sources. Thus, links to experts and intermediaries that are engaged in the 'knowledge space' of tourism marketing, event marketing etc., have to be established carefully. Also weak ties to pools of professional authors of tourist information have to be developed to enable the flexible inclusion of professionally generated content into the application when needed. On the 'technology side", experts on multimedia data-integration, and the linking of different geo-data (including, for example,

collaborative ontology-design engineering) have to be approached to ensure constant technology transfer and the provision of technical solutions to operate and further develop the business model. For organizational anchors to be embedded in these communities, we may at first consider developing a "transactive knowledge management system", containing information on "Who knows what in tourism and event marketing?", e.g. members and experts of regional tourism and event communities. A second implementation measure should be "membership of marketing and technology people from the value-network in selected communities of experts" to ensure knowledge transfer.

Communities of Interests (CoI): the value network has to extend its virtual organizational boundary along working groups of selected professional associations, (a) in the Digital and New Media Economy to include advertising agencies and online-marketing as well as search-engine optimizers, (b) in the tourism and event marketing sector to ensure support for the business model and links to B2B partners (e.g. shops and restaurants), and (c) in the local trade associations. The latter is an indispensable measure to connect to local trade partners as potential B2B-partners for the LBS application. Organizational anchors into these communities are clearly of the institutional kind, e.g. firms becoming members of the associations mentioned. Other paths into the CoI involve recruiting freelancers who have formerly worked in the tourism and event marketing sectors as an initial step, and further networking along their personal relationships into the CoI.

Communities of Science (CoS): One important aspect, already mentioned in the context of CoP, is to establish strong ties to the Scientific Community on "Semantic Technologies and GPS technologies". This is important in selecting personalized and geo-data contextualized information - on the basis of time-of-day and life situation - for an immersive user experience. Thus conference visits, as means of loose ties to specialized scientific groups etc. are an appropriate organizational adaptation measure.

Organizational Adaptation with Ambidextrous Design

Looking at the criteria of 'ambidextrous design" (see again figure 2), we may say in a nutshell that the value-networks needed to establish different adaptation mechanisms and to link them to relevant Communities of Knowledge can be summarized as shown in the following table:

Table 3 – Organizational Adaptation: Ambidexterity Criteria for the Business Case "Location Based Services"

LBS Business Case	CoA	CoP	CoI	CoS
Implementation Mode	explorative	explorative	exploitative	exploitative
Structural Mode	mechanistic	organic	mechanistic	organic
Adaptation Condition	stable	flexible	stable	stable
Rules	routinized	heuristical	routinized	heuristical
Decision Making	explicit	implicit	explicit	implicit
Communication	lateral	lateral	vertical	lateral
Governance	learning	learning	advice	learning
Control and Authority	trust	hierarchy	hierarchy	hierarchy

To embed into the Community of Affinity, the LBS value network needs to establish reliable social media tools that stimulate identification-based trust amongst the community members. The required structural approach tends to be more 'mechanistic' at first glance, since it needs stable adaptation and reliable rules for feedback and market conversation. Decision making processes on, for example, how to display and exploit User Generated Content should be transparent and explicit, following equal rules of feedback and exploitation for all participants. At the same time, the organizational link to the CoA needs to enhance exploration and learning to ensure the exploitation of knowledge flows, especially UGC.

For the Communities of Practice, the LBS value-network needs to be embedded more organically into the communities by engaging in working groups, establishing communication channels to different key stakeholders with specific knowledge etc. Thus, the adaptation mode should be more flexible, reaching from occasional participation to strong ties e.g. as an official member of special CoP. The rules of embedding should be more heuristical, e.g. opening up organizational borderlines, including experience exchange with experts, and for inquiries from outside the firm. At the same time, there could be a need for controlling outside-in and inside-out flows of knowledge hierarchically. These should be agreed upon in the value-network, since the proper functioning of certain technological interfaces etc. is critical for the entire business model.

In order to be embedded in Communities of Interest, the LBS value network may implement institutional engagements to install stable conditions for knowledge flows. Since the main aims are to exploit relevant knowledge from CoI and to gain support for the business model, rules and decision models should be explicit, formalized, and stable over time.

Finally, in order to link to Communities of Science, the LBS value-network needs to establish both strong and weak ties to certain technology providers, depending on the role and enabling potential of the technology. Thus, the principal mode should be exploitative ("What is the best technology, and how can I use it?"), and modes of participation may be organic (occasional participation in conference) etc.

CONCLUSION

The business cases demonstrate empirical evidence on specific requirements for community embedding and orchestration in Innovation 3.0 processes. However, SMEs have to consider "community orchestration" in a way that the organization cannot "manage" the collaboration processes hierarchically: "the traditional forms of (top down) management (where one alternative can be relatively easily chosen over another) may be poorly applicable in relation to innovation networks, and instead, orchestration may provide the necessary tools" (Hurmellina-Laukkanen, 2009).

Different cultures influence the application of governance mechanisms and orchestration modes between organizations and their surrounding communities. A linkage of the organizational with the communities´ culture, via appropriate organizational mechanisms, is necessary to generate the desired "gravitational embedding force" to attract and absorb knowledge. Thus, building a framework embracing embedding mechanisms supported by formal and informal institutional arrangements advances the stability of knowledge transfer and collaborative learning between the organization and the communities. The critical success factor for community orchestration may be to establish a specific trust culture with respect to different communities (Hafkesbrink and Evers 2010). By establishing reliable cooperation structures and conditions for the communities, trust can grow and stabilize community links for collaborative learning and innovation processes beyond Open Innovation.

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