Learning in personal networks: Collaborative knowledge production in virtual forums

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The starting point: the shifting locus of knowledge production and innovation

The more recent debates on innovation and learning have indicated a remarkable shift in the *locus* of knowledge production. Up until the early 1990s, innovation research focused mainly on knowledge production and learning in *formal organizational* arrangements. The prime focus, in other words, was on firms, their ties with clients, suppliers, and research institutions. During the 1990s, however, this focus was extended and interest increasingly shifted to *informal* and *personal* networks as effective vehicles for producing, storing, and disseminating knowledge. The debate on "communities of practice" epitomizes this shift towards informal and personal networks as means for interactive learning most prominently.

The notion of the communities of practice was introduced by *Lave* and *Wenger* (1991) referring to groups of persons engaged in the same practice who are interested in enhancing individual competencies, communicate regularly, and share a common repertoire of resources (*Wenger* 1998). The increasing number of empirical studies on communities of practice [1] has yielded important insights into the inner workings of these self-organizing networks that are tied together by a common interest or joint professional background. In general, this literature has stressed the complementarity of informal networks with the formal organizational networks.

Although we regard, of course, the notion of communities of practice as a very useful concept to explore learning in informal networks, previous em-

[1] *Lave/Wenger* 1991; *Brown/Duguid* 1991; 1998; 2000; 2001; *Wenger* 1998; *Wenger/Snyder* 2000; *Huysman/Wenger/Wulf* 2003; *Amin/Cohendet* 2004.

pirical research has indicated limitations of this concept. Particularly in the highly volatile and transient organizational context of project-based industries such as the cultural industries or the software business, for example, learning takes place in a diverse range of personal networks that adhere to different social logics and display different relational architectures [2]. We start from the assumption that these different personal networks cannot simply be subsumed under the single notion of the community of practice. Rather we propose a differentiation of personal networks into the three distinct types of *project networks*, *sociality networks*, and *connectivity networks*. Moreover, we presume that these networks are no longer sustained by face-to-face interactions but increasingly by sophisticated combinations of various types of virtual forums.

In this paper we first elucidate some limitations of the communities of practice debates, highlight the importance of weak-tie networks for innovation processes, and suggest an increasing combination of various virtual tools into ecologies of virtual forums. Subsequently we wish to present our differentiation of personal networks along the dimensions of duration, focus, contents, and governance of ties. Finally, we sketch some research questions our research seeks to answer.

Aims and approach of the study

Moving beyond the 'community of practice'

The notion of the 'community of practice' [3] stresses the self-organizing character of networks that are tied together by a joint interest. The prime motivation for membership in these informal networks is the advancement of competencies by sharing practical experience in a rather informal setting (*Wenger* 1998). Communities produce knowledge by combining individual experiences shaped by heterogeneous backgrounds (see *Créplet/Dupouet/Vaast* 2003: 46).

Our research aims to push the debate on knowledge production and innovation further in two directions. First, the very notion of 'community' connotes with a level of persistence, homogeneity, and familiarity that appears rather alien in the current context of a relentless reshuffling of organizational arrangements and personal affiliations. The notion of community evokes a sense of or-

[2] *Sydow/Staber* 2002; *Grabher* 2004a; 2004b; *Grabher/Ibert* 2006; *Obstfeld* 2005; *Haythornthwaite* 2005.

[3] *Lave/Wenger* 1991; *Brown/Duguid* 1991; 1998; 2000; 2001; *Wenger* 1998; *Wenger/Snyder* 2000; *Huysman/Wenger/Wulf* 2003; *Amin/Cohendet* 2004.

der and coherence that particularly seems absent in industries which are driven by the short cycles of temporary projects (see *Lindkvist* 2005). In the organizational environments of project-driven industries, organizational arrangements and personal networks are unremittingly rewired and hardly display the degree of homogeneity and harmony that the concept of very notion of 'community' evokes.

Second, the concept of community of practice is mainly presented as an informal complement to formal organizational arrangements. Communities, in other words, compensate structural shortcomings of formal organizations in capturing and distributing knowledge that is produced in the context of application. The literature on communities of practice in general "has trumpeted their positive role in organizational innovation" (*Swan/Scarbrough/Robertson* 2002: 480). This celebration of communities obviously glances over that they have 'a life of their own' and indeed might be formed exactly to circumvent formal organizational arrangements and practices. We seek to appreciate that networks not only might compensate but also might compete or conflict with formal organizational arrangements (see *Grabher/Ibert* 2006). Conflicts, in fact, might not necessarily impede innovation but rather to the contrary trigger innovative sparks or generate what *Leonard-Barton* (1993; 1995) calls 'creative abrasion'.

Appreciating innovation in weak-tie networks

In a similar vein, recent debates on learning seem to privilege the 'strong tie'-end of *Granovetter's* (1973) paradigmatic dichotomy and use networks as a shorthand for enduring, robust, and coherent ties. Networks in this view afford the cohesive and stable social underpinnings of trust (see *Nooteboom* 2000) and social capital (see *Putnam* 2000) that promote interactive learning and innovation processes. However, *Granovetter* (1973: 1366) demonstrated the elegant simplicity of the 'strength of weak ties':

> "[W]hatever is to be diffused can reach a larger number of people, and traverse greater social distance (i.e., path length), when passed through weak ties rather than strong."

Conversely, the information received in the strong-tie networks is likely to be stale information, already received from other members of the own network.

It is rather through the weak ties and sporadic contacts that cross and link different coherent social groups that new and useful information becomes available (see *Constant/Sproull/ Kiesler* 1996; *Reagans/McEvily* 2003). Weak ties can also accommodate greater cognitive distance than homogeneous

strong ties and thus afford important stimuli for innovation. Innovation, in other words, not only occurs from trustful collaboration but also from the confrontation with novel and unexpected perspectives (*Nooteboom* 2000; *Grabher* 2004b: 1495). Moreover, weak ties and relationships that bridge different networks afford room for arbitrage and competition and thus might fuel innovation processes (*Burt* 1995; 2004). We appreciate these learning dynamics by venturing into the largely neglected terrain of learning at the weak-tie end of the spectrum.

From the single technology to ecologies of virtual forums

Our exploration of personal learning networks thirdly seeks to appreciate the increasing utilization of sophisticated virtual forums and software tools in sustaining and extending these relationships. We assume that networking, in other words, no longer is left to occasional encounters and accidental meetings but instead has become a business activity in its own right (see *Wittel* 2001); that more and more is supported by specialized software tools. Our approach is aimed at examining how members in networks combine the utilization of these virtual forums. In other words, we are not interested in the study of a singular communication technology. Rather we seek to shed light on the movements of network members in this rich ecology of available tools.

During the last decade, the virtual sharing of knowledge between individuals engaged in similar or dissimilar practices, in and between organizations, has attracted increasing interest.[4] The proliferation of the Web-based communication, without doubt, has produced a rich body of research that yielded crucial insights into the inner workings of "virtual communities" (see *Rheingold* 2000). However, this field of research has also attracted critique. First, by overemphasizing the role of technology as the driving force (the "ICT pitfall"; *Huysman/De Wit* 2002; *Weggeman* 2000), many studies have failed to appreciate the interdependencies between the new technological opportunities and organizational and social dimensions, which shape virtual collaborative interactions (see *Roberts* 2000; *Scarbrough/Swan* 2001). A second line of critique refers to the fact that empirical research frequently focuses on the impacts of a particular new communication technology. Such a limited approach inevitably glances over the interdependencies in the increasingly complex ecology of virtual forums (see *Haythornthwaite* 2005: 126).

[4] *Roberts* 2000; *Huysman/De Wit* 2002; *Huysman/Van Baalen* 2001; *Scarbrough/Swan* 2001; *Zack* 1999.

We wish to overcome these limitations. First, we seek to respond to the claims for an integrated approach to study the role of technology by acknowledging the interdependencies between new technological opportunities and social dimensions of interaction.[5] This is reflected in our differentiation of personal networks. This conceptualisation combines social dimensions of networks with utilization patterns and interaction styles of the particular virtual forums that underpin these different personal networks. Second, our approach is deliberately aimed at examining, how members in networks combine the utilization of different virtual forums. In other words, instead of examining a single technology, we are primarily interested in the interdependencies in the utilization of different forums in an increasingly rich ecology of available tools.

The conceptual framework: a typology of personal learning networks

The basic conceptual tool for attaining our analytical objectives is a differentiation of personal networks into the three distinct types of *project networks*, *sociality networks*, and *connectivity networks*. This typology is organized around a differentiation of the duration, focus, contents, and governance of personal networks (*Grabher* 2004a; 2004b; *Grabher/Ibert* 2006; see fig. 1).

Project networks: collaborative workspaces

A project network is temporally formed around a particular project task (*Goodman/Goodman* 1976; *Lundin/Söderholm* 1995). The composition of the project team is driven by the complementarity of skills, which are necessary to complete the project task. The limited duration of projects hardly allows the evolution of enduring and strong ties (*Meyerson* et al. 1996), project networks rather operate in weak tie-milieu (*Grabher* 2004a). Project networks are governed by a common procedural authority that also defines the 'know-what' for the individual project member.

The project networks we study use virtual collaborative workspaces as environments for information exchange and collaboration. Interaction processes and information exchange are digitally documented in these forums and stay accessible for synchronous and asynchronous users. More specifically, we study project networks within Microsoft and SAP that utilize enterprise

[5] *Huysman/De Wit* 2002; *Weggeman* 2000; see also *Van den Hooff* et al. 2003.

Type of ties	Project networks	Sociality networks	Connectivity networks
Duration	limited (project)	lasting (biography)	sporadic (theme)
Focus	Task oriented	career oriented	theme oriented
Contents	know-what	know-whom	know-how
Governance	procedural authority	networked reputation	professional ethos
Virtual forum	collaborative workspace	social networking software	weblog; online discussion forum
Virtual interaction style	synchronous and asynchronous many-to-many	asynchronous one-to-one	asynchronous one-to-many; many-to-many

Figure 1: Nature of ties in personal learning networks.

collaboration software for project-related communication in order to support business processes. Microsoft SharePoint affords information sharing, shared document collaboration and meeting-specific workspaces for group appointments including communication in real-time. SAP Collaboration Room software, based on mySAP Enterprise Portal, offers information sharing, virtual project rooms for work groups or teams, news forums for all team members, and the option to navigate between different collaboration rooms.

The virtual workspaces provide the opportunity for co-present group collaboration (many-to-many). Interaction in co-presence, understood as synchronous and asynchronous communication in the same virtual environment, is an increasingly emphasized feature in the production of virtual collaboration tools [6]. Co-presence is considered as an essential element of learning and problem solving processes. We however suppose that the role of face-to-face meetings in strengthening inter-personal ties cannot fully be substituted by virtual forms of interaction (as emphasized in the concept of "meetingness", for example, *Urry* 2003).

[6] *Pickering/Wynn* 2004; *Sorokal/Jacovi* 2003; *Sorokal/Jacovi/Ur* 2003.

We selected SAP and Microsoft project networks since they not only represent most influential precursors in the development of the respective tools and techniques, but also permanently reflect the adoption and use of these technologies in a systematic way. Studying virtual collaboration systems in the dominant enterprise software companies thus not only yields insights into the use of established cutting edge technologies (see *Pickering/Wynn* 2004). Moreover, our focus on SAP and Microsoft project networks provides insights into major future trends and trajectories in the development of team-based learning tools for distributed actors.

Sociality networks: social networking software

We conceive sociality networks as career-oriented relationships. Whereas project networks are focused on a particular task, the prime aim of sociality networks is to widen the individual personal networks, that is to acquire the 'know-whom' to approach other network members for referrals, for inquiring up-coming jobs or potential business opportunities. Sociality networks are tied together by lasting relationships that are aimed at supporting the personal professional biography. In the absence of personal experience with a particular person or firm, network members rely on networked reputation, that is basically the word-of-mouth judgments of friends-of-friends (*Granovetter* 1985: 490; *Glückler/Armbruster* 2003). Whereas project and connectivity networks are relatively distant from the private realm, sociality networks instrumentalize the private dimension of relationships (such as personal sympathy or joint acquaintances) to advance professional interests.

This sort of networking amalgamates professional and private dimensions and can potentially be enhanced by the use of social networking software like LinkedIn or Spoke. Social networking software systematizes the maintenance and extension of personal networks through electronic contact management. Social networking software compiles strategic information on corporations and the career of individual network members by Web crawling and the use of information, which is accessible through the software users' personal networks. The friend-of-friend principle, that is *Granovetter's* (1985) proverbial "weak ties", enables to electronically trace a link from a user who intends to address a targeted person through her own personal network. Sociality networks are characterized by asynchronous one-to-one interactions and communication is taking place through relational chains (i.e. the forwarding of requests through network members).

The number of users using the second generation of social networking-ware has been growing exponentially since 2002. Few academic studies have been conducted on the use of social networking software so far[7]. Discussion on products and the utilization of social networking software is to date mostly taking place in weblogs and white papers of software companies (e.g. *Akella/Interrante/Granovetter* 2004). The proposed research will analyze interaction logics based on two of the most influential software products for professional networking: LinkedIn and Spoke. These two are selected on the basis of their relatively high sophistication regarding privacy issues. This contributes to the attractiveness of LinkedIn and Spoke for users since information about the personal network is regarded a rather confidential issue.

Connectivity networks: weblogs and online discussion forums

We construe connectivity networks as theme-oriented networks characterized by sporadic interaction. Whereas sociality networks are about accumulating the 'know-whom' of personal contacts and referrals, connectivity networks are all about sharing 'know-whom' and specific information around a particular theme, such as specific software like Linux, for example. Since this exchange of know-how and collaborative problem solving is distant from the personal realm, the socially rather thin connectivity networks are primarily governed by the particular professional norms and ethos (see also *Orlikowski* 2002: 264; *Brenner* 2003). Easy access to information is decisive for the ephemeral and weak-tie character of connectivity networks.

We first analyze connectivity networks formed by developer weblogs hosted by Microsoft and SAP experts. These weblogs are integral parts of the Web-based Microsoft and SAP developer community portals and are accessible on the community websites.

"Weblogs, or blogs for short, are frequently updated websites, with relatively short time-stamped posts, most recent on top. They are highly cited with links to source material" (*Rodi* 2004: 1).

Weblogs are theme-oriented discussion forums hosted by one or more persons. Distributed discussants accessing the site can post answers or comments.

[7] For exceptions, see studies by the Sociable Media Group, Media Lab, Massachusetts Institute of Technology: *Donath/Boyd* 2004; and the Information Management Section of the University of California, Berkeley: *Boyd* 2004.

The second type of connectivity networks we analyze are Usenet online discussion forums for software developers. Whereas discussion topics and contributions to weblogs are administered by the persons who host them, group discussion forums (e.g. Usenet) sustain the collective ownership and control of contents. Contributions either remain uncensored or they are reviewed by a moderator often appointed by the group. In contrast to weblogs, which embody hierarchical principles of content development, online group discussion forums epitomize a heterarchical governance of knowledge exchange and group dynamics. Connectivity networks are consequently shaped by collaborative asynchronous one-to-many or many-to-many interactions.

These network types, of course, neither signify 'arithmomorphic' concepts with sharp boundaries nor do they remain unchanged over time. In fact, they more typically overlap and alter their character over time. We assume that members in sociality and connectivity networks collaboratively produce different types of knowledge that are instrumental for the project networks formally established around a particular task. Cross-network movements from connectivity networks to project networks might take place due to theme-related expertise obtained through connectivity network interactions. Networked reputation established within sociality networks can lead to involvement in project networks. Conversely actors involved in project networks might join specific sociality and connectivity networks.

Expected contributions: key research questions and hypotheses

This research seeks to provide an empirically robust differentiation of personal learning networks. The differentiation between project, sociality, and connectivity networks will yield insights into the inner workings, the relational architectures, and the specific contribution of these networks to the production of different types of knowledge. We assume that the three types of networks convey three different types of strategic knowledge, know-what, know-how, and know-whom. In addition to observing the combination and recombination of these types of knowledge, we also focus on its implementation by network members. Particularly in the case of sociality networks, strategic information involves information about people, their experience, and their availability for the implementation of ideas. We also examine the overlap and the movement of information and members between the different types of networks.

More specifically, we expect that our research will provide empirical material to evaluate the following hypotheses.

1. The strategic use of contacts can electronically be enhanced by means of social networking software in professional networking. When using contacts in this systemized form, the number of contacts in the individual network rises, whereas the nature of ties becomes less personal and reliable (see *Donath/Boyd* 2004: 78–80; *Boyd* 2004: 2).
2. Rich get richer (*Powell* et al. 2005: 1137), poor stay poor. Personal connections are multipliers of connections in two respects:
   i) The more influential the position of an individual in a network (as documented in strategic positions and the quantity of ties), the higher the preferential attachment of others to this person's network (see *Powell* et al. 2005: 1137).
   ii) Individuals without a sufficient contact base that they can feed into their contact management software, or who are not prepared to systematically develop their network, will lose their networked reputation.
3. Social networking software leads to an increase in the amount of time spent for personal networking (see *Donath/Boyd* 2004: 81). Electronic communication forums in general lead to an enhanced time span dedicated to personal networking in comparison to face-to-face interaction patterns.
4. Although especially virtual co-presence is an important factor in rationalizing work-flow processes and significantly reduces the time spent for face-to-face encounters, it cannot completely substitute face-to-face meetings in building up reliable ties.[8] We assume face-to-face and virtual co-presence to mutually reinforce each other in terms of intensifying personal relations.
5. Sociality and connectivity networks as self–organized and informal webs can only to a certain degree be integrated into formal processes of knowledge production. Strategic instrumentalization will undermine the innovative potential of networks that are based on an ethos of informal self-organization.[9]
6. We expect the observed networks to overlap in network activities (see *Østerlund/Carlile* 2003). We assume that sociality and connectivity networks provide potential actor constellations for future project networks. Members of project networks on their part will strategically use sociality

[8] See *Urry* 2003: 171; *Maskell/Bathelt/Malmberg* 2004.

[9] See *Swan/Scarbrough/Robertson* 2002; on the role of autonomy and identity of communities, see *Dibiaggio* 1998; *Wenger* 1998.

and connectivity networks for extending their know-whom and know-how (see *DeFillippi/Arthur* 1998; *Sydow/Staber* 2002).

7. The personal learning networks overlap and mutually support each other, but we expect that they also generate tensions and conflicts (*Grabher/Ibert* 2006; see also *Ibert* 2004: section 5). In particular members will maintain sociality and connectivity networks at the expense of project networks (see *Alvesson* 2000).
8. The conceptual designs of the social software supporting the three types of learning networks predetermine the structural development of personal networks. In the case of software for professional networking, for instance, structure affects agency through the logic of connection chains. Similarly, the growth of the personal network tends to unfold in connections, which serve as multipliers of new connections. This conceptual design thus is expected to influence the trajectories of the evolution of personal networks.

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