Online Social Networks for Knowledge Exchange across Distance and Diversity

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"A fool can learn from his own experience; the wise learn from experience of others"

- Democritus

1. Introduction

The emergence of Online Social Network Sites such as Facebook, MySpace and Twitter has dramatically changed the way in which users of such networks interact with their social environment. They share, more or less consciously, a large portion of their social life with millions of other users and, reciprocally, gain insight to the social activities of their friends, friends-of-friends and complete strangers. Online Social Network Sites became platforms for gossip and matchmaking, channels for personal and mass communication, mediators of preferences, opinions and lifestyles. They extended the social sphere form the physical to the virtual and consolidated millions of fragmented lives in networks that cross many - if not all - cultural, professional, political and geographical boundaries.

While social uses and users have catalysed the proliferation of Online Social Network Sites and still dominate their content and traffic, there is also considerable potential for a wide range of professional applications. The typical Online Social Network infrastructure has the capacity to facilitate and coordinate work processes in a globalised world and enhance communication and governance mechanisms across geographical distance, cultural and professional diversity (Faraj & Wasko, 2001). Online networks can provide a platform not only for social exchange, but for exchange of knowledge, experience and expertise in a professional context.

This paper is structured around Piotr Sztompka's theory of social change and his concept of social becoming (1994) visualized in Figure 1. After a brief section with definitions and disambiguation of important terms and concepts, Section 3 will provide an overview of the scientific literature dealing with the theoretical background and potentialities of Online Social Network-mediated knowledge exchange. Section 4 will then turn to actualities and empirical findings in scientific literature of pragmatic applications, before Section 5 will contrast these insights with some observations of the HELP Forum, an Online Social Network Site which aims at facilitating knowledge exchange among the members of UNESCO´s Hydrology for the Environment, Life and Policy (HELP) programme. Finally, some lessons and best practices for the management and use of the HELP Forum will be drawn together with the hope of incubating the HELP community with a better understanding of the potentialities of online cooperation and exchange.

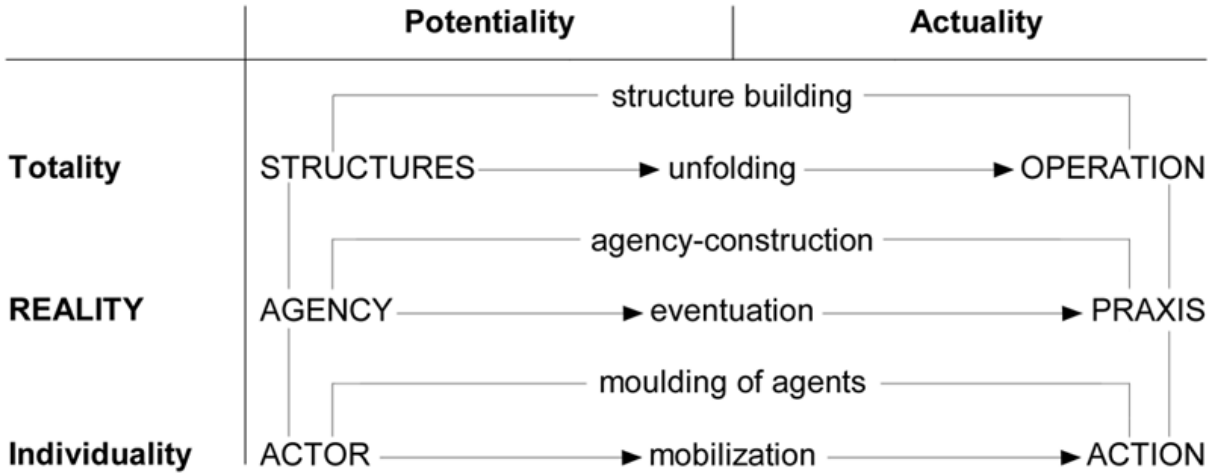

Figure 1: The concept of social becoming, adopted from Sztompka (1994)[1]

2. Definitions and Disambiguation

In order to avoid confusion with ambiguous terms, it is necessary to first define and clarify some concepts of knowledge exchange and Social Networks.

2.1 Concepts of Information, Knowledge and Expertise

There is much confusion in scientific literature about the distinction of knowledge, information, expertise and other related concepts. Many different definitions of knowledge exist and for the purpose of this paper we will build upon the work of Makowski and Wierzbicki who define knowledge as “a synthesis of information aimed at a selected field of applications, testable in practice and presented in a communicable form” (2002, p. 2). Knowledge can thus be distinguished from information by its compounding, integrating and synoptic nature, whereas the condition of communicability differentiates knowledge from wisdom which is more intuitive and personal, transferable only by shared experience, not through mere communication (Makowski & Wierzbicki, 2002). Faraj and Wasko stressed that knowledge often tends to be abstract, theoretical and decontextualized (2001), characteristics that separate it from the concept of expertise, which in turn can be defined as domain- and context-specific procedural knowledge (Chi, 1988).

Exchange entails the transfer of a resource form one person or organization to another. As we move from information to knowledge to expertise, we observe an increase in the

1 Please note that for the purpose of this paper, the term 'Actor' is used instead of Sztompka's 'Agent' in order to make the terminology coherent with the conventional vocabulary of Social Network Analysis .

complexity and context-dependency of the resource and exchange consequently becomes more and more difficult.

2.2 Concepts of Social Networks

While nowadays the term 'Social Networks' is mainly associated with online Social Network Sites[2] such as Facebook, MySpace and Twitter, it originated 'offline' as a term to define the network structure of social interactions. In this paper, the term 'Social Networks' will be used to refer to offline networks with social actors (individuals or groups) as nodes and some form of social interaction as connectors between the nodes. Offline networks exist everywhere and do not need to serve a specific purpose - they just describe regular patterns of social relationships and interactions in the real world.

Online Social Networks are the virtual alter egos of offline networks, visualized by and accessible through Online Social Network Sites. Every node, here occupied by virtual actors, is visualized by a profile page that displays the links to the physical world and the node's connections (e.g. friendship, kinship, business relationship, etc...) within the same network. Other typical elements of Social Network Sites are public and private messaging features, comments and ratings, photo- and video-sharing, blogging, instant messaging and mobile interactions. Online Social Network Sites target various audiences (e.g. a specific geographical or linguistic region or other aspects that typically segment society) and can further be differentiated by their “structural variations around visibility and access” (Boyd & Ellison, 2007, p. 2).

3. Potentialities: Theoretical Background

Theory is potential and idealized reality – this becomes particularly evident in the study of knowledge exchange in Online Social Networks. A huge body of scientific literature deals with various aspects of this problem and generally praises the potential of virtual communication and collaboration tools for disseminating knowledge across temporal and spatial distance, cultural and professional diversity. But, as noted by Sztompka (1994), different levels of social realities have different manifestations in potentiality and actuality, in theory and in practice. This section will review scientific literature about potentialities,

2 The terms 'Social Network Sites' and 'Social Networking Sites' are often used as synonyms, but 'networking' will not be used in this paper because it puts too much emphasis on the establishment of new relationships, often with strangers. Social Network Sites are primarily translations of already existing relationships form the physical (offline) to the virtual (online) world.

Section 4 with deal with literature on actualities.

3.1 Social Network Analysis

Networks are complex systems composed of nodes and connections. In order to characterize and empirically analyse their structure and the individual's position within the network, social scientists refer to a discipline called 'Social Network Analysis'. Caroline Haythornthwaite, an influential scholar in the field, defines it as “an approach and set of techniques used to study the exchange of resources among actors” of a social network, be it online or offline (1996, p. 1). These empirical observations put the focus on relational contents and patterns of exchange relationships that ultimately bring social networks to life.

Social Networks can be examined from two perspectives; either from that of an individual, looking at egocentric networks, or from that of the totality, the whole network community (Haythornthwaite, 1996). These two perspectives coincide with the two levels of social reality identified by Sztompka (1994) and the researcher is caught in the dilemma of this dichotomy in that neither perspective can be understood without taking into account the other. The totality appears to be more than the sum of the individuals and the individuals prove to be more than the division of the whole. The choice of perspective (that nevertheless has to be made) depends on the research interest. An egocentric approach reveals important details of how a typical individual behaves and is embedded in the network. The researcher can decide how many degrees of separation to consider and thereby defines the extent of the egocentric network under consideration. Whole network approaches, on the other hand, allow us to get the bigger picture and identify different groups and activities within the network. Because they take into consideration the ties of every actor with every other actor in the network, the holistic approach can only be applied empirically to small network communities (Haythornthwaite, 1996).

Social reality, as noted by Sztompka, lies somewhere between the totality and the individuality but can not be directly grasped by the researcher (1994). In this paper, the potentialities of social reality (agency of knowledge exchange in Online Social Networks) will be approached by first analysing the structure of Social Networks (Section 3.1.1) and then turning to their actors in Section 3.1.2.

3.1.1 The Structure of Social Networks

The structure of a Social Network is associated on one hand with its relational properties, such as network cohesion and subgroups of highly connected actors and on the other hand with its positional properties that define niches of comparative advantages and positional opportunities within the networks. These structural elements of whole networks can be examined by referring to some of the following concepts (adapted from Haythornthwaite, 1996):

- *Network Cohesion*: density and centralization indicate to what extent the network is cohesive. Density relates the numbers of connections to the numbers of nodes - the higher this ratio, the higher the network density. Obviously, density is not homogeneously distributed within the network and sub-groups emerge in highly interconnected areas (Monge, 1987). Centralization, on the other hand, indicates the extent to which a set of actors is grouped and organized around a central point in the network.
- *Structural Equivalence*: two actors are said to be structurally equivalent if they have “identical ties to and from all other actors in the network” (Wasserman & Faust, 1994, p. 356). This concept helps to identify actors with similar roles. An example of structural equivalent actors could be two teachers who teach the same class.
- *Prominence*: defines the centrality of actors within the network. Central actors are highly interconnected nodes and have, in a relative way, the shortest paths to connect with every other actor in the network. Centralization of a network and centrality of actors are not the same thing. The former refers to the overall structure of the whole network, the latter to the position that individuals take within this structure.
- *Network Range*: refers to the number of connections of the individual actors. It is important to note that this is a purely quantitative measure. The actors' centrality, by contrast, takes into account the quality of their linkages (actors who are connected to many isolated, peripheral actors might have a high range but a low centrality).
- *Network Brokerage*: if actors convey information and mediate exchange between disconnected nodes they play the role of network brokers. The mediation can happen between different networks as well as within a non- single network structure. The concept of network brokerage relates to Granovetter's theory of weak

ties that will be discussed in the next section.

Summing up these concepts an putting them in relation with each other allows for an overall apprehension of the structure of Social Networks and comparison between different networks. It helps us understand how the network structures influence behaviour and behavioural opportunities of its individual members.

3.1.2 The Actors in Social Networks

The last section has highlighted the influence of some important structural elements of Social Networks on the actors' degrees of freedom using a top-down perspective. This section will take the opposite approach and relate micro-level interactions to macro-level patterns in Social Networks.

Mark Granovetter has probably made the most important contribution in this field of research with his investigations on the strength of weak ties. He observed that “at the micro level, a large and increasing body of data and theory offers useful and illuminating ideas about what transpires within the confines of the small group. But how interaction in small groups aggregates to form large-scale patterns eludes us in most cases” (Granovetter, 1973, p. 1361). His work on the strength of weak ties clarifies a lot in this respect.

There are three attributes of connections in a Social Network: content, direction and strength (Haythornthwaite, 1996). Content refers to the resource that is exchanged between the actors. It can flow asymmetrically, meaning that the transfer is directed only from one actor to the other (e.g. information), or it can be undirected (e.g. kinship). Tie strength, finally, deals with the intensity of a relationship. It is “the combination of the amount of time, the emotional intensity, the intimacy and the reciprocal services which characterize the tie” (Granovetter, 1973, p. 1362). Obviously, the stronger the tie between two actors, the bigger the overlap of their respective friendship networks, thus the larger the proportion of people that they are both strongly connected with. Granovetter predicted that “the overlap in friendship circles is […] least when [the] tie is absent, most when it is strong, and intermediate when it is weak” (1973, p. 1363). He further introduced the concept of 'bridges' to refer to ties that provide the only connection between two nodes in the network (which therefore are necessarily weak ties). At both ends of such bridges, the nodes are occupied by network brokers (see Section 3.1.1) who, through their access to different resources and their gate keeping functions, have comparative advantages over

actors who hold only strong ties.

From a microscopic point of view, then, “weak ties are an important resource in making possible mobility opportunity. Seen from a more macroscopic vantage, weak ties play a role in effecting social cohesion” (Granovetter, 1973, p. 1374), since they bridge otherwise disconnected actors and networks and play an important role in resource diffusion.

3.2. Knowledge Exchange

For the purpose of this paper, the resource that has constantly been alluded to in the previous sections and that is known to circulate in Social Networks will be knowledge - but before we can jump to the examination of knowledge exchange in Social Networks, it is useful to review the scientific literature on knowledge exchange in more general terms. There is a huge body of literature dealing with knowledge management and exchange and providing a comprehensive overview would exceed the scope of this paper. The focus will therefore be placed on two important aspects, namely the conditions (ability) and incentives (motivations) for knowledge exchange. Again, Sztompka's two levels of social reality can be identified, with conditions provided by the social structures and incentives provided to the individual actors.

3.2.1 Conditions for Knowledge Exchange

Knowledge exchange is known to take place under certain enabling conditions and to be oppressed in the presence of inhibiting factors (Hall, 2001). The focus in this section will be on enabling conditions from an organizational / whole network perspective, situated on Sztompka's 'totality' level of social reality.

Some scholars have brought the theory of social capital in relation with knowledge exchange processes since it allows for explanation of observed pro-social behaviours and differential social achievements that other forms of capital (e.g. human, financial) are not able to explain (Faraj & Wasko, 2001; Nahapiet & Ghoshal, 1998). Social capital resides in the fabric of relations between individuals and lies within whole networks, not within individual actors. The study of enabling conditions for knowledge exchange thus comes down to the factors that build up social capital. Below is a list of some overlapping constructs that build relational social capital and provide enabling conditions for knowledge exchange (adapted from Faraj & Wasko, 2001):

- *Obligation*: knowledge sharing can be made an explicit responsibility for members

of an organization or a network. Clearly defined rights and duties as well as formal commitments for sharing knowledge are known to create enabling conditions for knowledge exchange (Constant, Kiesler, & Sproull, 1994; Hall, 2001).

- *Norms*: rules and standards of conduct play an important role in guiding and regulating knowledge exchange as they inhibit impulses of selfish behaviour (Banks, 1997). Openness to experimentation, allowance of failure and controversial ideas, valuation of all contributions and support of local initiatives are among the enabling norms identified by Hall (2001).
- *Trust*: mutual trust is a central asset in interpersonal knowledge exchange and cooperation (Hsu, Ju, Yen, & Chang, 2007; Tsai & Ghoshal, 1998). Two types of trust can be distinguished: trust in individuals (the other actors in the network) and institutional trust (trust in the whole network). Both are seen to be preconditions for effective knowledge exchange (Ardichvili, Page, & Wentling, 2003).
- *Identification*: feelings of belonging and ownership have proven to enhance the frequency of cooperation (see Lewicki & Bunker in Faraj & Wasko, 2001). But at the same time it is important to assure that community identification does not lead to homogenization of the group since the loss of diversity can impede the creation of intellectual capital (Leonard-Barton, 1995).
- *Capacity building*: besides providing information and communication technologies (ICTs) that are often required to participate in knowledge exchange, organizations and networks also have to assure the ease of use of the employed communication infrastructure. Moreover, they have to provide a critical mass of actors and activity in order to sustain knowledge exchange processes (Hall, 2001). Faraj and Wasko further point out the importance of shared meaning and a common language for discourse (2001).

3.2.2 Incentives for Knowledge Exchange

Boisot and Griffiths observed that “the capture of knowledge involves more than simply making it easier for employees to articulate their idiosyncratic experiences and know how. It involves creating an incentive structure making it worth their while to do so” (1999). Having discussed in the previous section the preconditions for knowledge exchange that reside within whole network structures, this section will be concerned with the individual

actors' motivations for participating in exchange processes. The theoretical background is provided by Social Exchange Theory which relies heavily on economics' Theory of Rational Choice. An individual's decision to participate in knowledge exchange is regarded to be based on a simple cost-benefit calculation. Participation is said to happen only if it brings (from an individual vantage) the maximum benefits with the lowest costs.

Individuals' motivations for knowledge exchange arise from both social and professional affiliations that can be translated to individual benefits (Bartol & Srivastava, 2002; Hall, 2001). Self-actualization, learning, increased work-efficiency, access to new knowledge, organizational citizenship, staying abreast of new ideas and innovations, access to funding sources and general participation in a professional community are among the reasons for participation identified by different scholars (Bartol & Srivastava, 2002; Constant, et al., 1994; Faraj & Wasko, 2001). The benefits are manifested through comparative advantages, increased self-esteem, feelings of commitment, enhanced reputation and identification with the collective (Bartol & Srivastava, 2002; Hall, 2001).

Some scholars have examined different incentive systems that have been put in place in order to catalyze exchange processes and increase frequency of participation. Below is a list with suggested incentives, their advantages and disadvantages:

- *Financial Rewards*: monetary rewards are given either to individuals or the whole community based on their / its performance. These incentives are very effective in the short run and are particularly useful to get projects and exchange networks started (Beer & Nohria, 2000). There are, however, several problems associated with this incentive system. First, we need to be able to measure quantity and quality of contributions in order to determine their financial value, but the personal and tacit quality of knowledge make it very hard to measure this exchange (Bartol & Srivastava, 2002; Olson, 2009). Wasko and Faraj also stressed the point that ”systems based on extrinsic rewards quickly turn moral obligation into acts of self-interest, and could potentially destroy the open provision of knowledge in a community” (2000, p. 170).
- *Career Rewards*: intra-organizational knowledge exchange can be fostered by making it an explicit condition for career advancement or a potential insurance for job security (Hall, 2001). The issues of measurability and self-interest discussed above, however, remain true for these kinds of rewards.

- *Access Rewards*: access to knowledge and information within an exchange community can be reserved to contributors. Even though there might be no immediate reward for sharing their knowledge, contributors can count on the community to help them in future times, when their knowledge and expertise is needed (see Faraj & Wasko, 2001).
- *Soft Rewards*: if the organization can develop a culture of good citizenship, soft rewards can be seen as an exchange good for knowledge (Jarvenpaa & Staples, 2000). They target the personal satisfaction of contributors such as enhanced reputation, recognition, feeling of competence and community status (Bartol & Srivastava, 2002; Constant, et al., 1994). This form of community building is seen to be the most beneficial intervention in the long run, inducing the least market distortions (Constant, et al., 1994; Snowden, 2000; Wasko & Faraj, 2000).

While network conditions for knowledge exchange can be managed, incentives can only be provided to the actors. In the end, it is up to them to decide whether they want to share their knowledge or not. Drucker's obervation that in the knowledge economy “all staff are volunteers, but our managers are trained to manage conscripts” (in Hall, 2001, p. 15) illustrates well the tendency to over-manage communal incentive systems.

3.3 Network Aspects of Knowledge Exchange

After having examined network structures and knowledge exchange processes in a fragmented approach, these concepts will now be brought together to examine the steering mechanisms of knowledge flows in Offline Social Networks.

Granovetter's theory of weak ties has again inspired many scholars in this field who have put it in relation with knowledge exchange processes. While Wellman and Wortley found that knowledge exchange was positively related to strong ties (1990), Weening and Midden saw the need to draw a more nuanced picture. Their research lead to the conclusions that on one hand knowledge received from strong ties was more influential and was given greater weight by receiving actors but that on the other hand knowledge contributed by weak ties was more widely disseminated in the network and between different networks (Weenig & Midden, 1991).

Knowledge exchange in offline environments was also found to be positively correlated to spatial proximity, demographic and status similarity as well as preexisting social relations

(see Faraj & Wasko, 2001, p. 7). The challenge with knowledge exchange in Online Social Networks will be to overcome the absence of these beneficial factors and to enable exchange across spacial distance as well as demographic and status diversity.

3.4 Knowledge Exchange in Online Social Networks

The previous sections dealt exclusively with offline aspects of Social Networks and knowledge exchange. This section will now translate these insights to online environments. There are, however, many similarities between online and offline knowledge exchange networks and most offline theories will also be applicable to online environments.

3.4.1 Online Network Communities

“Community as a social phenomenon deals with establishing and working with meaningful connections between people” (Mynatt, Adler, Ito, & O´Day, 1997, p. 210). Not every network is built around communities but it is obvious that meaningful connections are more likely to produce meaningful outcomes – hence the interest in examining knowledge exchange from a network community perspective. Communities can be seen as micro societies where individuality and totality mutually influence each other to form aggregates located on Sztompka's level of social reality.

Information and Communication Technologies (ICT) are enabling new organizational forms that break out of traditional constraints of spatial proximity and temporal coincidence and cross conventional authoritative borders resulting in a shift of focus from groups to networks and organizations to communities (see Boyd & Ellison, 2007; Faraj & Wasko, 2001). Such network communities, as observed by Mynatt et al., “emerge form the intertwining of sociality and technology in ways that make it difficult, if not impossible, to cleanly separate these individual influences” (1997, p. 211). This hybrid construct, however, has interesting potential in both catalyzing knowledge exchange processes and facilitating a sense of community among the network members (Boas, Dunning, & Bussell, 2005).

Several scholars have discussed the importance of the Community of Practice (CoP) in the emergence of virtual communities engaged in knowledge exchange (Ardichvili, et al., 2003; Davenport & Hall, 2002; Egger, Glueck, Buchholz, Rana, & Arhidani, 2006; Faraj & Wasko, 2001; Sharratt & Usoro, 2003). CoPs are social collectives of individuals that work

on similar problems and help each other by sharing perspectives about their work practice. Participants in such a community are aware of the fact that its utility and viability depends on their contributions and that their exchange will ultimately result in learning and innovation within the community (Hall, 2001). Thriving online communities, as observed by Boyd and Ellison, often emerge from preexisting offline CoPs (2007) but have, through the technological mediation, their own dynamics and properties.

Faraj and Wasko observed that most online CoPs were divided between a core group of knowledge providers who are long-time members of very high expertise and a peripheral group of less involved knowledge seekers. This fragmentation also lead them to conclude that novices learn more than experts from participating in CoPs (2001). The most powerful asset of online CoPs that is to the benefit of both core and peripheral members is their ability to grow organically and allow for informal interactions by being emancipated from the constraints of hierarchy, status and local rules. These conditions are favorable for the creation of trust and relational social capital which ultimately generate positive economic outcomes in online CoPs (Boas, et al., 2005; Faraj & Wasko, 2001). On this fertile soil, Communities of Practice are said to not only motivate exchange of existing knowledge but also generate new knowledge (Ardichvili, et al., 2003).

3.4.2 Technology Design for Network Communities

Having already examined the structural preconditions for knowledge exchange in a general network setting, this discussion will now be continued to focus on technological design issues for knowledge exchange in Online Social Networks.

Online exchange environments need to be designed in a way that allows them to properly host and accommodate a wide cultural and professional diversity. Harrison and Dourish describe this as a task that reflects the “conscious arrangement of elements to create a space that accommodates activity and the interplay of reflective design and happenstance to give expression to the values of the occupants and their wider community” (1996). Three dimensions of network design can be isolated from this description:

First, the conscious arrangement of elements reflects what Mynatt et al. called the boundary tensions between the real and the virtual world (1997). Online knowledge exchange and other social interactions in the virtual world emerge from preexisting Social Networks and social conventions in the physical world (Boyd & Ellison, 2007; Mynatt, et al., 1997). There is constant exchange between the physical and the virtual parallel

universes and both realities contain elements and information that resides in the other. This implies that virtual environments need to be designed around and coherent with physical realities (Harrison & Dourish, 1996). There are indeed many examples of 'real' elements in virtual realities: chat 'rooms', discussion 'fora', comment 'walls'. 'guest books', event 'calendars', 'mailboxes', photo 'albums' etc... The reference to these familiar objects and concepts greatly increases the ease of use of Online Social Network Sites. Moreover, the integration of audio, video and textual information increases the sensory richness of virtual environments and thereby "creates a sense of transparency between the real and the virtual, where online activity more closely reproduces conventionally [i.e. physically] embodied action" (Mynatt, et al., 1997, p. 5).

Second, the creation of a space alludes to the need of attributing to Online Social Network Sites a persistent sense of location - a virtual geography. Interactions in Online Social Networks are supported and defined by spatial boundaries that make the setting more comfortable. Spaces in Online Social Network Sites are partitioned in order to allow for different levels of interaction and awareness (Mynatt, et al., 1997). Log-in and log-out functions, for example, delineate the 'inside' from the 'outside' and protect the exclusivity of the community as well as the privacy of individual actors. Moreover, online exchange spaces can be designed to filter out situational cues and interactional cues. The former refer to aspects of gender, race, nationality and status while the latter relate to voice intonation, eye contact, body gesture and facial expressions (Faraj & Wasko, 2001). This fragmentation and delineation generates a space behind and one in front of the curtain and thereby defines ideal conditions for knowledge exchange in Social Networks (see Section 3.2.1).

The third design dimension refers to the expression of the community's values. Online spaces need to be designed to fit the current social activity and have to be flexible enough to adapt to the community evolution over time. Demographics of online communities change as new members join and previously active members retire, hence the need to adapt network designs to new practices, abilities and expectations. Mynatt et al. stress that technology design must be understood as one ingredient within the field of relationships between social, technical, material, historical and environmental factors that shape Online Social Networks and influence their dynamics (1997).

4. Actualities: Practical Applications

Having discussed the theoretical backgrounds for knowledge exchange in Online Social Networks it is now time to move from potentialities to actualities, from actors, structures and agency to action, operation and praxis. From an operational point of view, Section 4.1 will deal with geographical and societal whole network exclusions by examining the Digital Divide. The actor level will be covered by Section 4.2 with the study of motivational barriers to network action and finally, Section 4.3 will be concerned with the practicability of online communities.

4.1 Operation – The Digital Divide

Information and Communication are fundamental human rights, explicitly mentioned in article 19 of the Universal Declaration of Human Rights: “Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers”. One of the aspects that separates potentiality and actuality in this case is called the Digital Divide. The concept emerged from the realization that, even though the network society is a global phenomena in terms of its extension, it is also “a society characterized by polarization and structural inequality” (Fuchs & Horak, 2008, p. 106).

As mentioned before, access to ICTs and ease of use of the provided communication infrastructure is a structural precondition for knowledge exchange in Online Social Networks. However, access and ease of use alone can not explain many issues of accessibility and usage. Van Dijk and Hacker (2003) have identified four barriers to access and use of Online Social Network Sites:

- *Mental access*: the lack of elementary digital experience impedes mental access to Online Social Network Sites. Differences in mental access are found along educational gaps, age gaps, gender gaps and ethnical divides (Castells, in Fuchs & Horak, 2008).
- *Material access*: the lack of computers and network connections creates material barriers to access. Income gaps are seen to be the biggest issue here and most attempts to close the digital divide have focused disproportionally on material aspects.

- *Skill access*: the lack of digital skills (software and hardware usage) is closely related to mental access barriers and consequently evolves around the same social gaps.
- *Usage access*: there is often a lack of meaningful and beneficial usage opportunities and common language for discourse.

In addition to the above-mentioned access barriers, some authors have found political aspects (e.g. censorship in China) to be relevant as well (Boas, et al., 2005; Wilson, in Fuchs & Horak, 2008) .

It is important to note that the digital divide does not necessarily follow traditional north-south development gradients but also fragments societies in the developed world. Saxenian even found that “the digital revolution may be helping to reduce stratification between North and South more than it reduces stratification within countries” (see Boas, et al., 2005, p. 97). Similarly, Van Dijk and Hacker built upon the Marxist class concept to claim a tripartite class structure of the network society, distinguishing between the information elite (controlling information), a participating majority (consuming information) and the disconnected and excluded (2003).

4.2 Action – Motivational Barriers

Constant et al. observed that literature “often refers to information as a general desirable resource and information sharing as a general desirable behavior” (Constant, et al., 1994, p. 418). But this is not always the case. Beneficial conditions and incentives alone are often not enough to remove motivational barriers to online knowledge exchange.

One persistent disincentive identified by Boyd and Ellison is the (perceived) presence of 'faksters' (virtual actors with no physical existence) and the realization that “profiles can never be real” (2007, p. 218). Some actors do not believe that the real world can be faithfully reflected in Online Social Networks and therefore do not engage in virtual exchange practices. Constant et al. also observed an ownership issue with knowledge exchange. Organizations, they argue, do not own their members and since knowledge is a private good residing in the individuals, common ownership of knowledge and expertise is problematic. They detected a public goods problem with knowledge exchange in which “those especially productive might be inundated with requests and eventually refuse to help“ (Constant, et al., 1994, p. 419).

4.3 Praxis – Community Realities

Even though CoPs seem to thrive in virtual environments, some authors have also pointed to different issues that these online communities are confronted with. Weisband et al., for example, demonstrated that differences in status sometimes persisted in online interactions and that not every contribution is automatically regarded as equally valuable (Weisband, Schneider, & Connolly, 1995). Others have argued that membership in CoPs needs to be limited and controlled so that community expertise is not diluted with too many marginal users (Snowden, 2000; Wasko & Faraj, 2000). Nahapiet even argued that relational social capital can often not be transferred to and does not develop in online environments (Nahapiet & Ghoshal, 1998). These empirical findings, however, can not be generalized easily since they always depende on a particular social and technological context.

In more general terms, Cummings and Kiesler found that the number of institutions involved in the CoPs was a major indicator for lower success (2005). Olson further identified a key tension between diversity and scale. Both large scale and great diversity are beneficial for the formation of social capital and knowledge exchange in CoPs, but the greater the diversity, he argued, the less common ground and trust and the larger the scale, the greater the overhead coordination efforts (Olson, 2009).

5. Lessons for the HELP Forum

After reviewing the scientific literature and some theoretical concepts of knowledge exchange in Online Social Networks and contrasting these theories with global social realities, Section 5 will use these findings to examine the case of the HELP Forum, an Online Social Network Site that has the goal of facilitating knowledge exchange in a very diverse global Community of Practice. The insights of this section will hopefully incubate the HELP community with a better understanding of Online Social Networks and their potentialities for practical applications within the HELP programme.

5.1 Introduction to the HELP Forum

The Hydrology for the Environment, Life and Policy Programme (HELP) is a cross cutting and transdisciplinary initiative led by the International Hydrological Programme (IHP) of the United Nations Educational, Scientific and Cultural Organization (UNESCO). HELP is

creating a new approach to integrated catchment management through the creation of a framework for water law and policy experts, water resource managers and water scientists to work together on water-related problems. The global HELP network currently consists of 91 basins spread over 67 countries and hundreds of organizations and individual members that are grouped around these basins.

The means to achieve the goal of improving the links between hydrology and the needs of society are manifold. HELP is assisting its members by providing guidance, issuing scientific publications, organizing conferences and facilitating exchange of knowledge and expertise. In the geographically dispersed, culturally and professionally diverse HELP community, knowledge exchange, communication and networking traditionally happened through mediation by the global programme coordinator at the HELP secretariat in Paris. This bottleneck clearly inhibited a free flow of information and did not allow the HELP community to interact in a real network structure.

Not surprisingly, communication and cooperation across so many professional and cultural fields is a huge challenge but at the same time crucial to the success of the HELP programme. In order to facilitate these important processes, an Online Social Network Site called 'HELP Forum' (see www.helpforum.ning.com) has been set up and tailored to the specific needs of the programme. It intends to consolidate the existing basin network and provide an open platform to catalyse communication and knowledge exchange among the members. While some interaction is taking place, the full potential of this collaboration and networking tool has not yet been exhausted.

5.2 Observations from the HELP Forum

As noted in Section 3.2.1, a critical mass of actors and activity is needed to get cooperation and knowledge exchange in Online Social Networks running. Following the kick-off on September 21, 2009, membership in the HELP Forum rapidly increased to about 100 and thereafter grew very slowly to reach the current population of around 140 members[3]. The critical mass of membership was achieved in due time but this did not automatically generate sufficient and self-sustained network activity. Even the numerous and continuous moderation and animation efforts did not succeed in motivating a critical mass of actors to sustainably contribute to the forum.

3 All statistical data about the HELP Forum presented in this paper are based on the membership population as of December 22, 2009. With the courtesy of the HELP Secretariat.

The insights from the literature review will be used for an attempt to explain potentiality-actuality tensions in the HELP Forum and the network dynamics that evolved around them. Again, the explanations will be sought on the individual (actor-action) and the total (whole network structures-operation) level of social reality in order to allow for conclusions on the social reality level (agency-praxis).

5.2.1 Potentiality

Actors (Potential of Individuals)

The HELP Forum is a cultural, professional and demographical melting pot. The network is composed of members from over 40 countries spread over all continents and the only common denominator in the wide diversity of their professional backgrounds, ranging from scientists to community workers, practitioners, managers, policy and decision makers, is their common interest in water-related issues.

The relatively high average age in the HELP Forum community is 45 years and 30% of the members are female.

Structures (Potential of the Totality)

The HELP Forum is built on a typical Online Social Network infrastructure provided by Ning[4], a service that allows everyone to build web 2.0 powered Online Social Network Sites for free. The integrated discussion, chat, event, photo, friendship, commenting and messaging features allow for multiple interaction styles. The whole network content and all profile pages can be accessed through a user-friendly interface and the integrated search engine. The log-in and friendship functions determine the network visibility and interaction permissions and also protect the members' privacy.

Agency (Reality Potential)

The members of UNESCO's HELP Programme form, through their common professional interest in water-related issues and their commitment to cooperation, a Community of Practice (CoP) as defined in Section 3.4.1. The great diversity within the community presents the opportunity for the creation intellectual capital within the network (Leonard-Barton, 1995, see Section 3.2.1) and the HELP Forum, as an online platform for communication and knowledge exchange, enables the community technologically and thus

4 See www.ning.com

gives it the potential to form online relational capital (see Wasko & Faraj, 2005).

The geographical fragmentation of - and the plurality of cultural and professional backgrounds within the HELP CoP allows for the assumption that most ties in the HELP Online Social Network are weak. Moreover, since “actors do not belong to just one network” (see Haythornthwaite, 1996, p. 325), most members of the HELP Forum will play brokerage roles and bridge the HELP community to other water-related networks.

Information and knowledge disseminated through the HELP Forum has, through this particular constitution and the nature of the network ties, the potential to be very valuable to its members.

5.2.2 Actuality

Action (Individual Actuality)

There is no formal incentive structure in place to motivate contributions from the community. As noted by Beer and Nohria (2000) and discussed in Section 3.2.2, hard rewards could be very useful to achieve a critical mass of contributions that would generate a positive feedback loop and get the network running. The absence of such incentives might explain the action inertia observed in the HELP Forum. Nevertheless, there are some highly motivated actors in this Online Social Network and their contributions can be seen to have arisen out of perceived soft benefits such as enhanced reputation, recognition, feeling of competence and community status, etc (see Section 3.2.2).

Other than the lack of formal incentive structures to motivate individual contributions, the low level of activity can also be explained on an individual level by the presence of some disincentives and inhibiting factors:

- *Language:* the platform infrastructure is only available in English and most of the contributions are also written in English (although contributions in other languages are permitted and actually present). English proficiency within the community varies greatly and insufficient language skills certainly inhibit participation across the whole linguistic spectrum of the community.
- *Digital Divide*: the global HELP community is digitally divided and many actors are confronted with mental, material, skill and usage barriers to online network access (see Section 4.1). The age gap is particularly prominent since most members

belong to the generation that did not grow up using computers and the internet on a regular basis, even less so Online Social Networks for professional cooperation and knowledge exchange.

- *Path Dependency*: most HELP members probably did not communicate with other members on a regular basis before the introduction of the HELP Forum and the immediate and permanent presence of the online platform might have overwhelmed many of them.

Operation (Actuality of the Totality)

The formation of a core group of knowledge providers and a peripheral group of knowledge seekers that has been described by Faraj and Wasko (2001) and discussed in Section 3.4.1, can also be observed in the HELP community. The core is made up of roughly a dozen members who, to a certain extent and with some exceptions, also hold stronger ties within the community.

The whole network, from an operational point of view, seems to be rather strongly centralized around the HELP secretariat and the global programme coordinator who holds 'friendship' connections to half of the members and claims to have met most members in person (personal conversation, 2009). This structural feature is also path dependent and inherited from pre-forum interaction patterns.

Praxis (Actual Reality)

The actualities from network action and operation merge to generate network praxis on the reality level. It has already been mentioned that it is very hard to measure activity in Online Social Networks and the observation that activity in the HELP Forum is well below its potential (an observation that emerges from the reality level) is based more on gut feeling and unfulfilled expectations than on sound empirical analysis.

While some core actors actively and regularly contribute to the Forum, the majority of members are passive consumers or “lurkers” as Faraj and Wasko (2001, p. 8) call this peripheral group. Website statistics further indicate that members only account for a small proportion of page views, suggesting that visitors (i.e. non members) are also interested in the HELP Forum. This is neither surprising nor should it be disappointing if the observation that novices and outsiders learn most from knowledge exchange in online CoPs (see Section 3.4.1) is kept in mind.

While there are still great discrepancies between potentialities and actualities in the HELP Forum, it can be said that the platform increases the transparency of exchange processes within the community and urges the members to come to grips with the HELP programme. While the visible and measurable praxis (i.e. actual reality) is still far from making the HELP Forum a lively exchange platform, it might be outweighed by the indirect benefits, the invisible praxis. The HELP Forum might have inspired many users to adopt similar technologies for exchange processes in other networks and it exposed them to new virtual potentialities of Online Social Networks. Maybe the forum is ahead of its time and the process of translating social capital from the physical to the virtual reality is slower and more difficult than expected. Nevertheless, the insights from the literature review can be used for the benefit of the HELP CoP and the next section will try to summarize some lessons learned and show a possible way forward for the HELP Forum.

5.3 Lessons Learned (potentially)

Contrasting the insights from the literature review with the observations about the HELP Forum allows for drawing some conclusions and identifying best practices for the management of the Online Social Network.

- *Management aspects*: network administrators should be careful not to over manage and patronize the community but rather focus on presenting the right incentives for actors to participate. Since there are at present no financial resources available for the HELP Forum, the efforts should concentrate on the formation of a good citizenship culture that can stimulate self-sustained activity with soft rewards (see Section 3.2.2).
- *Structural flexibility*: the network administrators need to be open to changes within the community and the HELP Forum needs to be flexible enough to accommodate these changes. Interaction styles that are not being used sufficiently should be eliminated and popular interaction channels reinforced in order to limit discrepancies between interactional potentialities and actualities.
- *Hybrid presence*: the existing and relatively strong physical presence of the HELP community at workshops and conferences could be used to discuss strategies for expansion in the virtual space. A workshop on online cooperation and knowledge exchange could increase the members' understanding of the matter and their ability

to successfully balance their professional lives between these two worlds. The hybrid presence is a strong asset of the HELP programme and should be fostered accordingly.

6. Conclusions

Communicating, cooperating and exchanging knowledge across spatial distance, cultural and professional diversity is increasing in importance in times where local and indigenous knowledge gain new recognition in decision making processes on global issues. Social Networks with widely dispersed actors migrate from the physical to the virtual space and thereby increase their potential to overcome spacial, temporal and cultural barriers.

The literature review in Section 3 and 4 revealed considerable discrepancies between potentialities and actualities of knowledge exchange in Online Social Networks. While knowledge exchange in offline environments is already a very complicated and unsteady process, ICT mediation adds an additional level of complexity and brings along a new set of issues. The intertwining of technology and sociology as well as the tensions between the different levels of social realities call for interdisciplinary research approaches.

Section 5 contrasted the insights from the literature review with some observations from the HELP Forum, an Online Social Networking Site with the aim of facilitating knowledge exchange in the HELP Community of Practice. Insights from this paper can serve as a cornerstone for incubating the HELP community with a deeper and more critical understanding of online knowledge exchange and the potentialities of using Online Social Networks in their professional lives.

7. References

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