

A Context Approach of Social Networks

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Abstract

This paper proposes a context approach of social networks and virtual communities in the enterprise area. We point out that making context explicit it is possible to provide a global picture of the main aspects of social networks. A first result of this study is that the explicit consideration of contexts—especially shared contexts—could improve notably the collaborative-work processes in an enterprise. A second result shows the interest of simultaneously considering the paradigms of context and social network when IT is at the core of the enterprise. A third result is to point out that different types of context account for the flux of information between groups as well as inside each group. Finally, we point out that a virtual community can be considered as a contextualization of a social network.

1. INTRODUCTION

Facing rapid changes resulting from information and communication technologies (ICT), many organizations enlarge their collaborative decision-making processes. Decision makers work together but not necessarily at the same time and at the same place. They are supported by communication systems like email or by Groupware systems, which constitute a kind of electronic infrastructure superposed on hierarchical organizations..

Adam and Pomerol [1] presented the case study of XYZ Publications Ltd, a news organization which publishes two newspapers: a national morning paper and a local afternoon paper. The study was lead to understand the nature of the changes undergone by the firm and analyze the group dimension of its decision making processes. Brézillon et al. [2] present a groupware view on the case study.

In this paper, we consider the role plays by context when the enterprise is considered in term of social network. Organizations are fundamentally information-processing structures [3]. In this view, an organization is an information-processing and communication system, structured to achieve a specific set of tasks, and composed of actors that process information. Thus the enterprise is like an "information space" with information fluxes between individuals. We do not discuss here similarities and differences between social networks and virtual communities, and with respect to communities in the real life¹. An enterprise is considered such as a social network, which constitutes a complex network of data, information and

¹ This study enters the framework of a contract between France Telecom and LIP6.

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knowledge, and several virtual communities appear at the different steps of the information-management process corresponding to a series of specific focuses of attention.

There is a heterogeneity of contexts (personal context, board context, external source contexts, etc.), which are at different granularities (the firm context, the board context, the employee context, etc.). However, the key point is that the complex information fluxes circulating inside the enterprise can be understood such as information transfers between contexts at the different granularities.

Hereafter, the paper is organized in the following way. Section 2 gives the meaning given to the terms used in the paper, namely context, social network and virtual community. Section 3 discusses different aspects of context considered as important. Section 4 concludes by discussing some challenges that open new perspectives.

2. SOME TERMINOLOGICAL DEFINITIONS

2.1 External Knowledge, Contextual Knowledge and Proceduralized Context

Brézillon and Pomerol [4] consider three types of context, namely the external knowledge, the contextual knowledge and the proceduralized context.

Context

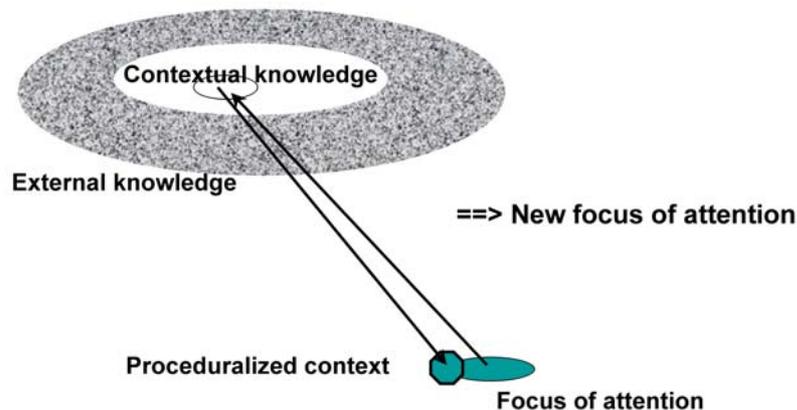


Figure 1: The three types of context

As Figure 1 shows it, at a given focus of attention, one distinguishes the part of the context that is relevant at this step and the part that is not relevant. The latter part is called **external knowledge**. The former part is called **contextual knowledge**, and obviously depends on the agent and the current focus of attention. Always for the given focus, a part of the contextual knowledge is proceduralized to be used at the focus of attention. We call it the **proceduralized context**. The proceduralized context is the part of the contextual knowledge that is invoked, assembled, structured and situated according to the given focus. Thus, the focus of attention and its associated context are strongly intertwined.

Contextual knowledge is more or less similar to what people generally have in mind about the term 'context'. Contextual knowledge is personal to an agent and it has no clear limit [5]. Contextual knowledge is evoked by situations and events, and loosely tied to a task or a goal. When the task becomes more precise, a large part of this contextual knowledge can be proceduralized according to the current focus of attention. Although the contextual knowledge exists in theory, it is actually implicit and latent, and is not usable unless a goal (or an intention) appears as a focus. When an unexpected event occurs, actor's attention is focused on it and a part of the contextual knowledge will be proceduralized accordingly in order to adapt the decision-making process to this new event.

The context is dynamic [6, 7], and the dynamic dimension corresponds to a movement between contextual knowledge and proceduralized context during the evolution of the focus of attention: From one step to the next one, a piece of contextual knowledge enters the proceduralized context or, conversely, the proceduralized context goes back in the contextual knowledge and becomes a "chunk of (contextual) knowledge" a la Schank [8] in the body of contextual knowledge and this chunk of contextual knowledge can be recalled later as a whole in a new proceduralized context. Thus, the more a person is experimented, the more the person possesses available structured knowledge (i.e. chunks of contextual knowledge).

2.2 Definition of a Social Network

A social network is the connection of people by a computer network [10], and Internet will be the larger social network that we will consider in this paper. The main point is that a social network is composed of actors and ties between them (e.g. see [9]). Ties in a social network are numerous and of different natures: familial ties, lifelong friend ties, marital ties, business partner ties, that are important for people to obtain the fundamentals of identity, affection, emotional and material support [12], i.e. the recognition of their existence by others. However, the commitment of individuals is superficial, limited to the reasons of the local interaction [11]. As a consequence, ties in a social network are "socially-oriented" like in the real life (weak ties), trust does not play an important role, and individuals generally belong to several social networks.

A discriminating factor can allow to contrast the social network with respect to its environment. Thus, a **discriminating factor** differentiates individuals in a social network and individuals in its environment. For example, registration to a mailing list on a specific topic is to enter a social network where you will find (or may provide) information on the topic, but ties with other members do not matter essentially or would suppose the development of specific interaction inside some groups of the social network. Individuals in the social network are called actors for differentiating them from individuals in the environment of the social network.

The multiplicity of ties between actors implies that the emphasis on one type of social network or another one will depend on the viewpoint chosen on the social network. Thus, the main characteristics of a social network are a flexible structure, a lack of hierarchy, and weak importance of the emotional dimension [11]. From an information point of view, any actor in a social network is a receiver/emitter of information, but generally not an information transformer.

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There exists many discriminating factors and as many social networks as discriminating factors. A discriminating factor does not imply strong ties among actors because a discriminating factor is neither a goal shared by actors of the social network nor a common focus of attention of the actors. For example, a discriminating factor is "Living in France" and all actors in this social network share some common interests on, say, French cooking and wine, but will not act collectively in the same direction for that purpose. Belonging to a social network does not suppose that actors have an active role in it.

2.3 Definition of a Virtual Community

The main difference, which is identified in the literature between a virtual community and a social network, concerns computer-mediated means. Divisibility of social networks into cooperative subgroups (virtual communities) that do not cooperate with each other is an old idea [18]. The key point is the distinction between the computer-mediated communication concerning either individuals (e-mail, chat, blogs, etc.) or collaborative work (writing, designing, etc.). Clearly the collaborative decision making is ascribed in this second realm, and then the "focus-oriented" aspect is more important than the "computer-mediated" aspect.

The Information and Communication Technology gives an electronic infrastructure on the organization, which is supposed to reinforce the coherence of the virtual community. However, there is more than a difference of infrastructure between a social network and a virtual community. A virtual community is a part of a social network to realize a collaborative work in order to satisfy a given focus of attention.

A virtual community is a group of actors who have regular contact with one another in cyberspace, with shared interests, problems or ideas (i.e. a shared focus of attention), independently of space and time. A main characteristic of virtual communities is that they are homogeneous and organized networks of individuals with similar attitudes and life-styles [13], and they are intentional formations [14]. This cohesiveness of the virtual community with respect to the rest of the social network is given by the common focus of attention of all the actors.

The focus of attention gives a structure on the virtual community by defining an organization of roles on the virtual community and a coordination of the collaborative work of actors. The focus of attention acts like an internal engine to impulse the virtual community. Actors have then a strong motivation in the realization of the focus and each actor assumes an active role to satisfy this process. Thus, actors in a virtual community are "socially interdependent" [15], not uniquely "socially-oriented" like in the social network. A parallel in the domain of decision making, would allow to say that one may observe only a diluted decision making in a social network and a collaborative decision making in a virtual community.

In a virtual community, the focus of attention affects actors as a glue force that influence ties between actors (directly connected to the focus of attention and the related roles that actors have to play and the corresponding tasks to accomplish [16]), although the virtual community stays primarily a social network and keeps all its characteristics in a context that is strongly related to the focus of attention of the virtual community.

3. SOME ASPECTS OF CONTEXT

3.1 Lessons learned in a case study

We now consider again the case study introduced at the beginning of the paper and presented in [1]. It is important to acquire the information **and** its context for a correct understanding of the information. Information and its context must be considered jointly because the information takes a meaning within its context, and, conversely, this context is identified with respect to the information.

Actors can share contextual elements of their individual contexts to build collaboratively a proceduralized context for the solution in the interaction context. Sharing elements does not mean to develop an identical view of the solution for all actors, but to make compatible actors' views on the solution [19].

An enterprise, such as the XYZ firm, is assimilated to a social network, the discriminating factor being to belong or not to the XYZ firm. However, the frontier between the social network (i.e. the XYZ firm) and its environment is porous, unpredictable events occurring generally outside the XYZ firm. An external event triggers an information management process in several successive steps. At each step of this process there is a particular focus with its context and thus a working group is organized like a virtual community for addressing this particular focus.

Although we speak about the context of the current focus, there are different contexts that are associated with elements such as the social network, the virtual communities, the actors, the enterprise, etc. These contexts can be organized in a hierarchy based on the granularity of the contexts such as presented in Figure 2. In the example of the XYZ firm, the information process management relies on such a context hierarchy because each context is associated with a particular focus.

Another lessons learned from the case study is at the level of each context. Let's consider the context of a a working group. Its context (as for other contexts) presents two aspects depending on an internal or external viewpoint. From an internal viewpoint, this "group context" contains contextual knowledge such as the general policies, roles and tasks to accomplish, rules, constraints, objectives. This contextual knowledge is proceduralized for the given focus of attention in strategies applicable by the actors (within their "individual contexts") participating in the working group. From an external viewpoint, the working group interacts with other entities and thus the group context can be considered as an "individual context" in a larger group (e.g. a market, an European project, etc.) in which proceduralized contexts are built from contextual knowledge of the larger group.

3.2 Context Granularity

As said previously, information circulates across contexts. At a general level, we distinguish the group context, the individual contexts of the actors at an intermediate level, and at the more specific level, the context of the focus of attention that corresponds to the interaction context in which actors are working collaboratively. Figure 2 illustrates the situation for the XYZ firm where the focus of attention corresponds to the project realization (and associated with the project context).

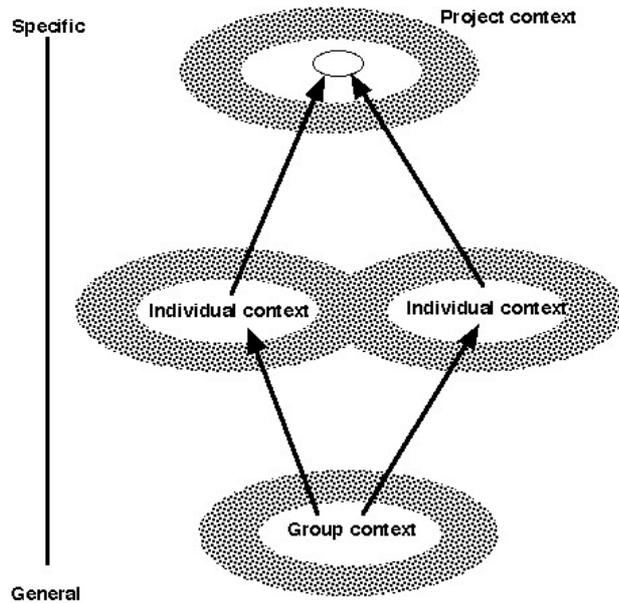


Figure 2: Granularity of contexts

According to our definition of context, the contextual knowledge at one level is transformed in a proceduralized context at the more specific level. For example, contextual information of the group context could be "find a compromise between a relevant information for the readers of the newspaper and the notoriety of the sponsors of the newspaper." This contextual knowledge in the group context will be interpreted at the individual contexts of the actors writing the article in a proceduralized context to give the information, say, without links with the sponsors.

With respect to the notion of social network, context intervenes as intertwined mainly with the virtual community, because the proceduralized context is built in a collaborative way by the actors of the virtual community that share a common focus of attention. The focus of attention leads to the construction of a proceduralized context at each step of its evolution. The saving of the proceduralized context in each actor's context implies that there is a shared part of the individual contexts developed progressively among actors. The shared context is developed along actors' interaction in the virtual community during the construction of the proceduralized context. As a consequence, actors develop ties during this construction of the proceduralized context.

The presentation of a virtual community through its focus of attention and the related context, the proceduralized context that is built, and the ties evolution that results, leads to speak of "contextualization of a social network" rather than virtual community.

3.3 Interaction Context and Proceduralized-Context Construction

When an unexpected event occurs, a focus of attention appears in a given context. Both focus **and** its context have to be considered jointly. Focus and context could concern a group of actors in a social network that have a same concern for the focus and are sensible to its context, and thus will interpret the focus with respect to this context. It appears an organization of tasks to accomplish and of roles that actors of the group have to play. The actor group becomes assembled, organized and structured like a virtual community and thus will be able to realize a real collaborative work.

The transformation of contextual knowledge in a proceduralized context supposes a process of communication between different levels. Figure 3 represents how the proceduralized context (PC) is built from contextual knowledge (CK and EK representing the external knowledge) in individual contexts of two (or more) actors during their interaction about the given focus of attention. The interaction context contains the pieces of contextual knowledge put by each actor (i.e. from their individual contexts) in the interaction context to make them visible and shared with other actors, and finally assembled and structured jointly by all the actors during their interaction to constitute the proceduralized context needs at the given focus of attention. Thus, the proceduralized context is the result of a co-construction by the actors of a virtual community. Once the proceduralized context has been exploited at the current focus of attention, it becomes a piece of actors' shared contextual knowledge. A discussion on this aspect of context can be found in [7].

Ties are managed at different levels between the actors of the virtual community during this proceduralized-context construction until its final movement into their shared contextual knowledge.

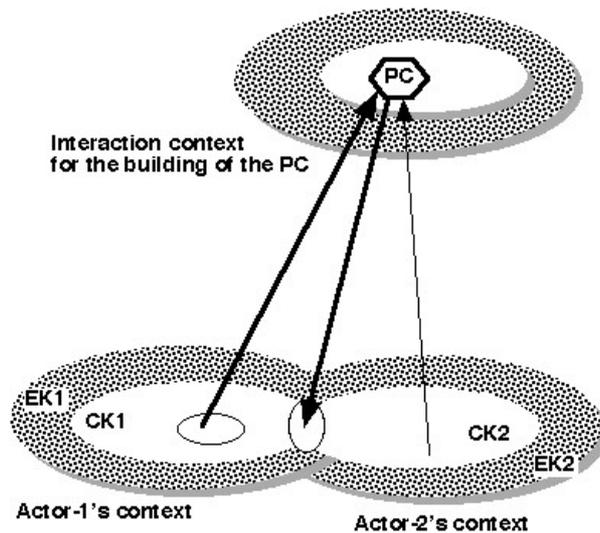


Figure 3: A representation of the proceduralized-context construction

3.4 A Context-based view of Social Networks

From previous sections, virtual communities are assimilated to contextualizations of a social network, with (1) contextualization resulting of the focus-dependent reinforcement of ties among groups of actors and (2) ties reinforcement being developed during the proceduralized-context construction.

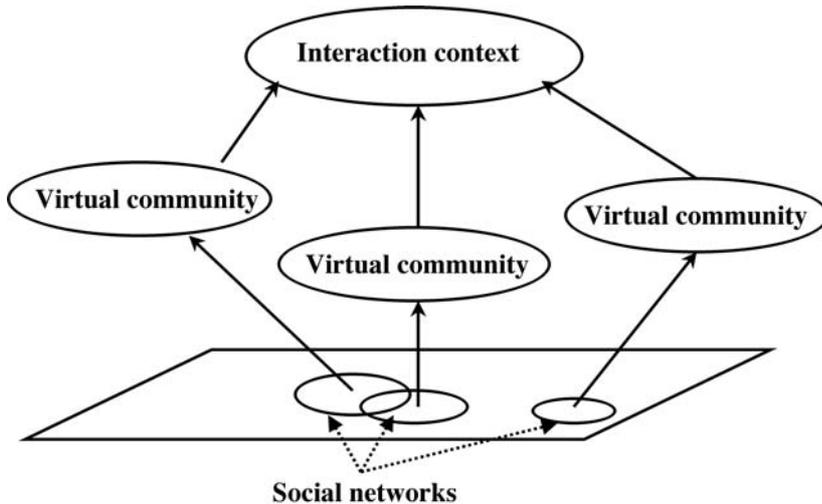


Figure 4: Parallel between social network and virtual community, and context

This leads to a parallel between both views on context and on social network. Figure 4 presents a situation for a social network and virtual community (virtual communities are represented distinctly from the original social network only for making more readable the comparison) similar to the situation describes in Figure 2 for the different types of context. The more the granularity is high, the more the entity is organized and structured. Thus, a proceduralized context (respectively a virtual community) has a higher organization than a body of contextual knowledge (respectively the social network).

Another parallel between the pairs {contextual knowledge, proceduralized context} and {social network, virtual community} is the following. In both cases, what is unstructured elements (contextual knowledge and actors) becomes at the upper level a chunk of knowledge (a proceduralized context) and a "chunk of actors" (a virtual community).

4. CONCLUSION AND PERSPECTIVES

Until now studies on collaborative work, context, social network, virtual community have been lead separately with any cross-references. In this paper we show that context plays a central role in order to, in the one hand, give a global and coherent view on social network and virtual community, and, in the other hand, replace collaborative work in a new framework providing a new insight on interrelationships between participants (all coming from a same social network): creating ties being equivalent to build a proceduralized context and the development of a large shared

context. This new insight on collaborative work comes from the choice to consider an enterprise as a structure of information fluxes. This leads to a problem of knowledge management, in which the important point is the management of all the transitions between all the different states of the knowledge such as tacit, implicit, individual, collective, etc. [20]. Putting all together, the integration of knowledge management, context management and context management seems to be a new challenge in collaborative work.

A virtual community has a life cycle with a birth, a life and an end, which is shorter than the life cycle of the social network. Maybe the most interesting difference between a social network and a virtual community is that the virtual community can be compared to a dissipative structure as discussed some times ago in the living system area [21], i.e. a structure that maintains an organization using the flux of energy (the information) that crosses it.

We introduce the notion of "chunk of actors" to lead a parallel with the notion of chunk of knowledge à la Schank [8] and introduces a dynamic dimension to collaborative work apparently not considered explicitly before. Moreover, context can be related to virtual community because the latter results of a process of contextualization in a social network corresponding to the expression "chunk of actors."

Even in the unique domain of social network and virtual community, the view presented in this paper is a challenge. First, the view of a virtual community as a contextualization of a social network to address a given focus of attention is not usual in the literature. This is shown in another domain [6] with practices representing contextualizations of the procedures established by the enterprise in order to address the specificity of the contextual cues of the situation (the focus of attention). Second, the evolution of a focus of attention is described as a series of contextualizations of a social network for dealing with different steps of the global focus of attention. Third, a large project (e.g. an European project) can lead simultaneously to the birth of several virtual communities acting in parallel on parts of the problem to solve (e.g. the work packages).

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