Socially-Aware Informal Learning Support: Potentials and Challenges of the Social Dimension

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Abstract. With increasingly conceiving learning as a social activity, technological support must become more aware of the social context of the individual in order to be able to provide adequate support. But many issues related to making systems socially aware are subject to ongoing research, e.g., the description and mining social relationships, and especially privacy preservation. This paper wants to give a brief overview which possibilities social awareness can offer, and to present a research agenda for realizing these potentials.

1. Introduction

E-Learning is currently undergoing a paradigm shift, from formal, organized, and certifiable towards informal, spontaneously networked, and intangible—and many label it with the striking "2.0" tag. Learning Management Systems, courses, reusable learning objects—everything having to do with formality and content was yesterday. If content was king, then now "context is king" (as Peter Baumgartner put it in [1]): decontextualized and standardized courses are being replaced by in-context learning on demand, especially in workplace learning [2].

However, this shift towards context does not imply that systems are becoming more context-*aware* so that they can respond to contextual needs; rather they provide content *in context* and the possibility of "networking" in a "Social Web". This Social Web offers networking of people (as successful networking platforms like openBC[1] show), of information artifacts (as novel learning theories like connectivism [3] stress) and of tools and services ("mashups" in which technologies like RSS play a prominent role). For this Social Web, which is basically a global loosely coupled platform for continuous learning, fostering the interactions of people in manifold forms is the ultimate goal.

But does this social software understand a person's social context and how it affects the "learning by networking"? It is commonsense that it draws a distinction from whom you learn, whom you help and from whom you receive a message because it affects your willingness, your receptiveness, whether you overcome barriers etc. Leaving all this up to the user may help to build lightweight applications and may be in line with the Web 2.0 idea of man as a self-determined master of a

[1] https://www.openbc.com/

globalized web, but it definitely neglects the affective dimension of information seeking [4] and inter-human communication [5] and their implications on system usability and denies the importance of guidance.

In this paper, we want to introduce the concept of socially-aware applications—understood as applications knowing about the user's social context and adapting to it. In section 2, we present potentials of this concept in the form of three sample applications. In section 3, we discuss the challenges we have to face when realizing these applications before we conclude the paper in section 4.

2. Potentials of Socially-Aware Learning Support

Social relationships do have a huge impact on human behavior, and they do so especially for learning activities. But does this mean that systems should adapt to the social relationships of its user? In this section we want to have a closer look where socially-aware system behavior is strongly needed or at least a promising perspective.

2.1 Social People Finder

Although much attention has been given to formal and semi-formal learning situations the majority of learning activities are informal, especially in workplace learning. One typical learning situation is that one employee asks another (who shall become the "informal teacher") about a problem at hand. In order to support this form of learning, knowledge management solutions usually have an "expert finder" component that tries to locate experts for specific subjects (e.g. [6]).

But do employees always want to ask experts? And doesn't it matter if we know this expert and get along well with her? We have to acknowledge that asking for help always requires admitting a weakness, exposing vulnerability. If there are tensions in the relationship, we will do anything but appear vulnerable. This means that expert finder applications have to balance the "expert status" with the quality of the social relationship towards the potential "expert" in order to provide *relevant* results. As a consequence, a colleague and good friend next door, who is somewhat competent in the area, could be a much better result than the ultimate expert, who is viewed as a rival. This type of scenario can be easily generalized to any form of people finding, e.g., looking for cooperation partners for projects where you have to balance the objective relevance with the social dimension to achieve "subjective relevance" [19].

2.2 Socially-aware Mediation of Communication

If we stick to the expert finder example from the last section, then we will discover an ongoing problem of these "expert finders": usually the expert's side (who is actually an informal teacher) is not appropriately considered. Listed experts get overloaded and distracted from their own work, which leads to annoyance. Often it is not only objective overload and bad timing, but also missing consideration of how the designated informal teacher views her relationship to the learner. For instance, there

are always colleagues to whom you will answer even though you are in a hurry, while there are others you will never allow for disturbing you.

In [5] a method was presented that mediates the communication between an informal teacher and an informal learner, taking into account the context of both sides. Each communicative action is assigned a degree of efficiency based on multiple criteria (like current task and its characteristics, urgency, but also the quality of the social relationship). That way, we can reduce annoying forms of communication.

2.3 Socially-aware Opinion Sharing and Resource Ranking

As the success of social bookmarking systems shows, users are willing to rely on explicit opinions of other users, as these opinions represent a form of guidance. Especially when you are new in a certain subject area, it is extremely helpful to get links to "good" resources instead of just receiving resources matching your query. But how do you know if you want to have yourself guided by another user's opinion or assessment? And beyond: how do you know if you want to guide others, especially if they are potential competitors?

An analysis of scientific work within the project *Im Wissensnetz*[2] ("in the knowledge web") has shown that social bookmarking services like Bibsonomy[3] would be used if there was better control with whom to share your findings, e.g., they do not want to share the result of their literature study with competing institute as such, but possibly with individuals within those institutes to whom they have a relationship of trust (cf. [7] and [8] examining the social and cultural impact on knowledge sharing). This means that if systems offered a socially-aware sharing policy, this would overcome classical knowledge management barriers.

3. Challenges of Socially-Aware Learning Support

The previous section has shown that socially aware system behavior can improve the relevance of results, reduce annoying forms of social interaction, and foster collaborative behavior by overcoming trust-related barriers. But realizing such systems poses severe challenges, which shall be briefly summarized in this section.

3.1 Describing the Social Context

Before we can start exploiting the social context, we need a model with focus on qualifying relationships in an appropriate way. Representing only formal relationships like family relationships or organizational relationships is insufficient. Rather we have to consider informal relationships, which can be distinguished along multiple criteria; among the most popular are trust [9], loyalty, expectancy of reciprocity, reliability etc (see, e.g., [10]).

[2] http://www.im-wissensnetz.de
[3] http://www.bibsonomy.org

An important insight for developing this ontology is that we primarily do not need to model objective relationships, but rather subjective opinions about the quality of the relationships, because usually our behavior only depends on how we regard the relationships (and not how it "is").

Approaches towards a social relationship ontology are rather scarce. Research in sociology does not concentrate on well-defined, universal definition of relationships. There are some first steps with FOAF[4] in the Semantic Web community like [11] and [12], but their level of differentiation is still too low because of their focus on objective (and often symmetric) relationships.

3.2 Acquiring the Social Context

Having a model for social relationships is quite useless if we do not have methods to fill it. Social network analysis (SNA) is currently quite popular for a wide range of application scenarios. Usually its results are visualized as graphs with weighted edges where the weight represents communication intensity, frequency or importance (e.g. [13]). The work of [18] examines searching algorithms for expertise location by the use of such social network graphs. In [15] and [16] social network analysis is used for improving information retrieval.

Because of their focus on objective relationships ("whole-networks"), the importance of these approaches to our problem is only limited. Especially, they the quality of the relationships is neglected. There, relying on so-called egocentric networks is more promising (e.g., [17]) because they are capable of representing subjective relationships.

3.3 Methodological Framework for Socially-Aware Learning Support

In section 2, we have presented commonsense arguments on how social relationships affect what is to be considered good, relevant, and appropriate. But the world is hardly ever mono-causal. So we need to find out (a) how each type of social relationship and (b) to which degree the social dimension (together with other criteria) affects subjective relevance. Empirical studies will be needed to establish a sound theoretical basis, combined with results from pedagogical research on the role of the social dimension in learning activities. First steps based on a trust-based concepts have been done e.g. in [14].

3.4 Preserving Privacy

Privacy is always an issue when dealing with personal data, but qualified social relationships belong to the most critical data items. Even in the "objective" case of social network analysis visualizing existing social relationships within a group of people can have unexpected side-effects by making explicit who is the hub, who is the outsider etc. This is even truer for subjective assessments of social relationships

[4] **F**riend **o**f **a** **F**riend: http://www.foaf-project.org/

because these subjective relationships are sometimes not symmetric, and it would be disillusioning if this asymmetry was actually revealed.

The problem with socially-aware systems is not only that they have to store this critical data—here we can think of technical solutions for data protection—but their adaptation behavior can sometimes disclose the underlying social relationships.

Let's take the case of the mediated communication where we have to take into account both perspectives on the social relationship between them: What if you never receive a certain person as a recommended communication partner although you assume a good relationship to that person and you discover that she knows about what you need? Another example is if we consider contacts of contacts for people finders: even if the system does not present explicitly how your contact assesses her contacts, the way the results are presented can reveal it to you. Therefore, the system behavior has to be carefully checked so that these sensitive data are not exposed or could not only be traced back to one's subjective view on the relationship.

4. Conclusions and Outlook

Within the movement towards context-aware systems—particularly in the domain of learning support—social awareness appears to be the next frontier of user-adaptive learning support. It is especially promising for addressing informal learning scenarios, as the presented scenarios and preliminary research results in these areas have shown. But even more than other aspects of the user context, the social context has several hard challenges associated with it, which can be traced back to the subjectiveness and the damage of exposition to existing relationships.

The Web 2.0 (and with it eLearning 2.0) has discovered the social dimension, and with the focus on social processes, the distinction knowledge management and (informal) e-learning becomes less and less important. But this is only the first part of the story. Before real-world applications, which currently confine themselves to a very shallow consideration of the social context at best, can be made *socially aware*, a lot of interdisciplinary research questions must be answered. But in the end, applications and services can become a little bit more adaptive to human peculiarities.

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