Chapter 12
Ontological Collaboration Engineering

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ABSTRACT

This chapter gives a comprehensive overview of ongoing research about semantic approaches for Collaboration Engineering. The authors present a new ontology-based approach, where each concept of the ontology corresponds to a specific collaboration step or a resource, to collect, manage, and share collaborative knowledge. The chapter discusses the utility of the proposed ontology in the context of a real-world example where the authors explain how collaboration can be modelled and applied using their ontology in order to improve the collaboration process. Furthermore, they discuss how well-known ontologies, such as FOAF, can be linked to their ontology and extend it. While the focus of the chapter is on semantic Collaboration Engineering, the authors additionally present methods of reasoning and machine learning to derive new knowledge about the collaboration process as a further research direction.

INTRODUCTION AND MOTIVATION

Collaboration is very important in many aspects of our lives. When we work together, we can reach goals faster, yield better results and inspire each other during our collaboration activities. The synergy effects can boost all kinds of endeavours tremendously. However, there are also collaboration efforts that do not work well. Thus, it is very important to be able to assist, analyse and support collaboration with technological means. Despite its iniquitousness, we introduce into the topic by considering collaboration in organizations.

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Nowadays, both profit and non-profit organizations have to be innovative to maintain their competitive position. This is due to a number of factors, including globalization and liberalization of markets, geographical development and an ever growing number of new technologies. To be innovative, organizations may implement a multi-stage process that combines a variety of techniques and methods to analyse the market situation, define strategic goals, and generate and implement ideas, yielding new products and market strategies. In order to obtain synergy effects, collaboration is used during these processes to combine the expertise and knowledge of employees with complementary skills.

Terveen (Terveen, 1995) defines collaboration as the process of a group where participants work together to achieve a shared goal. Over the years, the research focus on collaboration has changed from groups whose members work in a same place to geographically distributed virtual groups. This results to the fact that virtual groups which use temporary technical support for collaboration comprise an important structural component of many multinational organizations (Nunamaker Jr., Reinig, & Briggs, 2009), who use virtual groups to lower travel and facility costs.

The collaboration process and its outcomes are affected by different internal and external factors like the characteristics of the individuals, the task, the context, and the technology used (Dennis, George, Jessup, Nunamaker, & Vogel, 1988; Nunamaker, Dennis, Valacich, Vogel, & George, 1991). Different theories exist that describe and predict the influence of these factors on group behaviours and performances in relation to group communication (Poole & Hollingshead, 2005), group participation (Diehl & Stroebe, 1991; Karau & Williams, 1993; Csikszentmihalyi, 1997) and group cohesiveness (Janis, 1982; Edmondson, 1999). However, most of the influencing factors cannot be generalized for collaboration in general. Depending on the given process characteristics, need for support can be necessary for organizations to handle negative group behaviours and support group performance.

Collaboration support can consist of tools, processes and services that support groups during the design and execution of collaboration. Technical support is given by groupware technologies which offer a variety of local and web-based applications to structure collaborative activities and improve group communication (DeSanctis & Gallupe, 1987; Dennis, Haley, & Vandenberg, 1996; Nunamaker et al., 1991; Vreede, Vogel, Kolfschoten, & Wien, 2003). Today, a huge amount of web-based applications exist that can be adapted in different ways to implement different collaboration processes (Mittleman, Briggs, Murphy, & Davis, 2008).

Considering the possible complexity of a collaboration process, the faithful appropriation of a groupware technology is fundamental to design predictable and efficient collaboration (DeSanctis & Poole, 1994; Dennis, Wixom, & Vandenberg, 2001). With regard to the Technology Transition Model (Briggs et al., 1999), using technological support for collaboration can lead to a high conceptual and perceptual load if the practitioners misunderstand the use of groupware technology for collaboration. To ensure faithful appropriation of groupware technology, organizations can use professional facilitators who have expertise in design and execution of collaboration involving technological support. However, economic and political factors can prevent organizations to hire external skilled facilitators. As a result, existing collaboration knowledge cannot be used and the efficiency of collaboration is not guaranteed. This situation leads to challenges in collaboration research:

- How can a faithful appropriation of groupware technology be supported?
- How can collaboration knowledge be transferred to reduce needed experience?