



A social interaction analysis methodology for improving E-collaboration over the Internet

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Abstract

Collaborative projects are relatively complex and are therefore difficult to handle. The effective management of the distributed processes and knowledge is essential to enhancing the electronic collaboration over the Internet. This paper presents a systematic approach to support online collaboration by modeling and analyzing stakeholders' knowledge perspectives within their social interactions. By investigating the key issues relating to cooperative activities, it obtains deep understandings of stakeholders' perspective and its impacts to collaboration. This research develops a computational knowledge perspective model and a perspective analysis methodology, which can provide the basis for collaboration support based on the social construction theory. It also introduces a Web-based information system to improve the collaboration by providing perspective analysis function.

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1. Introduction

The development of electronic commerce allows companies to leverage the powers of the Internet to co-ordinate their efforts. They can collaborate on projects, make joint decisions, and focus on adding value for their customers. These usually require various stakeholders from different disciplines to work cooperatively over the distance

and time boundaries. The effective management of the distributed processes and knowledge is critical to enhancing the group productivity. Current developments of Internet technologies and E-business models have provided workable infrastructures for group communication and information processing. To effectively utilize these technologies to support collaboration, it is necessary to gain more fundamental understandings of the knowledge integration process and to generate mechanisms to collect, represent, and analyze the distribution of stakeholders' expertise, intentions,

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and circumstances. Information systems can be developed accordingly to provide mechanisms for efficiently supporting stakeholders' collaboration over the Internet.

Published studies have shown that besides technologies, the social aspects are essential to the success of collaboration [4,9,10]. One of the essential social factors is the cognitive interaction process during the collaboration. Collaborative activity over the Internet is more than an online data accessing and information sharing process. Stakeholders' preferences, environments, and knowledge are dynamically changing during the interactions. As the perspectives of stakeholders are adaptive to the contexts and can evolve during their interactions, it is important to systematically model and analyze stakeholders' evolving perspectives and therefore to improve their collaborations. A collaborative system should not only manipulate shared data, but also facilitate perspective reconciliation. This paper presents a methodology for improving electronic collaboration by modeling and analyzing the stakeholders' social interactions. The methodologies to depict and control the evolution of distributed knowledge are introduced. This paper also describes a prototype collaboration support system developed for a US government research institute. It implements the methodology and uses the advanced network computing techniques to facilitate stakeholders' interaction within their work practice.

2. Challenges of managing collaborative projects

2.1. Understanding the social aspects of collaborative projects

When many heterogeneous groups work together on large projects over a long period of time, their knowledge toward the system, the product, and other people will keep on evolving [8,15]. Within this knowledge integration process, knowledge is more than written scientific theories or the product documents [1]. The professional expertise in particular is framed by a person's conceptualization of multiple, ongoing activities, which are essentially identities, comprising intentions, norms, and choreographies [5,10,16]. Although

the collaboration process might appear relatively technical, it is essentially a social construction process when different persons perform their tasks within various adaptive situations [3,6,7]. The situations will eventually impact the changing of participants' roles. When stakeholders (i.e., all of the human participants who have influences on the collaboration process and the result) play their roles within a collaborative work, special education or experience enable a stakeholder to make particular decisions and make a contribution to the process. Traditional process models usually define specific roles within which stakeholders use or apply their technical expertise. However, even within well-defined technical roles, every stakeholder makes the role "his own" by adapting or executing the role based on his conceptions and circumstances. It is the social interaction that determines the variation or adaptability of these roles in a particular application context. As the roles evolving, the ways that stakeholders participate the project and their learning customs will vary, which will directly or indirectly affect stakeholders' internal knowledge. The deficiency in the social interactions among the group is one of the major sources of conflicts. Hence, to understand the social aspects of collaboration is indispensable for managing the conflict and improving the quality of tasks. It is necessary to have well-developed methodologies for describing and analyzing the social interactions in collaborative contexts.

2.2. Coordination with context realization

Understanding the nature of collaborative projects requires understanding the interaction and negotiation process among different stakeholders in the contexts of the emerging practice. During the collaboration the communication breakdowns are often experienced because the stakeholders belonging to different cultures use different norms, symbols, and representations [2]. To facilitate their coordination, the information requirements for each stakeholder must capture its domain expertise, as well as the particular viewpoints and perspectives toward the problem and the community involved with the decision campaign. Coordination in collaboration has to be achieved through not only sharing

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