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TOWARDS A PARADIGM FOR INTER-ORGANIZATION E-COLLABORATION: COLLABORATIVE BUSINESS

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Abstract

As the adoption of information technologies, especially the Internet technologies, there is an increasing interest on inter-organization collaboration in e-business. The 'collaboration's in the existing literatures often mean different. These diverse views make it difficult to understand what the collaboration is and to know what have been achieved and what still needs to be done. The paradigm of e-Collaboration has yet to be established. This paper provides a framework for Inter-organization e-Collaboration. The framework identifies the heart of e-Collaboration — joint intellectual efforts, which has seldom been explored by existing studies. Moreover, existing relevant literatures are organized and are analysed using the framework and future research directions are indicated based on the analysis.

Keywords: Electronic collaboration, Collaborative business, Inter-organization, Paradigm

Introduction

Collaborative activities are common when conducting business online. E-Business in the integrative era brings together different parties in an electronic environment, manifested in the Internet, to work closely with each other to drive towards values that are beneficial to these parties in ways that are crucial to each party. How 'close' they need to work with others is often determined by the collaborating parties and business processes that are involved.

In the past e-commerce era, industries mainly focused on conducting business transactions through electronic means, particularly on the Internet. However, to facilitate and enable buying and selling products/services is only the first step to benefit from the Internet. The value created for merely fixing an exchange agreement is limited; therefore e-commerce quickly reaches its limitation. To fulfill such an exchange agreement requires coordination and cooperation between the buyer and the seller. It often requires services such as financial and logistics arrangements provided by

third party service providers. The real benefit of conducting business on the Internet would come from the ability of conducting and aligning business processes, sharing resources, or even intellectual exchange among these parties. We call these activities on the Internet, e-business.

These different types of interactions (often referred to as collaborations) among buyers, sellers, and third party service providers are the main theme in e-business study [1] [2] [3]. Many researchers use two terms, collaborative commerce and collaborative business interchangeably to describe these interactions, while in fact the term commerce often refers to buy-and-sell activities only and collaborative business emphasizes the more extensive inter-organization interactions in e-business.

There are a number of empirical studies, theories and models building, and technologies and tools development works in Information Systems research, concerning the inter-organization collaboration in electronic environments (e-collaboration). The use of the term 'collaboration' varies widely, and in some cases the meanings are not the same even within the same context. For example, collaboration in 'so and so' is enabled by electronic communications (such as emails) and the effects can be felt throughout within the organization. Such kind of collaboration could not alone facilitate 'inter-organization workflow integration or collaborative product design' as the interactions among designers in different geographical locations call for more than just electronic communications, but more of interactivity that can be achieved among the designers in an any-to-any fashion. How should we distinguish these two 'types' of collaborations and if these types are some commonality and/or differences.

These views suffer from the same underlying need where interactions are required independent of the closeness, or integration that collaboration calls for. This inconsistent and interchangeable use of the term hinders the clear research directions to enable collaborations in e-Business. We can so far as to say that collaboration is about interactions

between two or more organizations, if the interactions are the same in an electronic environment, or in the Internet.

Also, a sensible question to ask is that with the existing Internet technology, whether or not two organizations can collaborate electronically. The answer is “yes” if collaboration merely means sharing information among organizations. To many researchers who are working on inter-organization workflow integration or collaborative product design, their answer is “no.” Our next question would be what collaboration is. If we can facilitate workflow integration and/or collaborative product design, does it mean we can facilitate collaboration? Last but not the less, we would like to know what have been achieved and subsequently what still needs to be done for inter-organization e-collaboration.

To answer these questions, we need to have a clear understanding of e-collaboration. It is important for the research community to reach a consensus on the understanding for the field to continue develop. An unambiguous paradigm can serve such propose therefore is crucial for the development of a scientific field [4] [5]. In this paper, we are proposing a paradigm for e-collaboration.

The rest of the paper is organized as the follows. In section 2, a literature review on the existing views related to inter-organization electronic collaboration is provided. A framework is developed in section 3, to describe the paradigm and establish terminologies for communications and knowledge accumulations. The framework is then used to organize the existing research outcomes systematically, followed by a conclusion section.

Existing Diverse Views

Collaboration has been broadly investigated in various fields, such as corporate governance [6], organization behavior [7], and marketing research [8]. Collaboration could develop as driven from technology advances, from inter-organization research, and/or from the push of e-Business.

As the advancement of information technologies, organizations become easier to interact with others electronically. The online inter-organization activities ranges from simple data or document transmissions, information sharing to complicated virtual teamwork, knowledge sharing, or distributed joint decision making. Using the collaborative technologies to enable inter-organization collaboration has been extensively promoted by many researchers. It is believed to bring significant benefits in R&D [9], Business Process Reengineering (BPR) [10], supply chain [11] [12], logistics management [13]

[14], and so forth. However, the ‘collaboration’ in these Information Systems research often means differently. Here are some examples.

Collaborative learning. Computer-mediated collaborative learning among individuals emerged in the early 90’s [15]. It typically utilized such technologies as email, discussion board, file transfer, and chat room to enable participants learn as a group without physically meeting each other [16] [17]. The use of the technologies makes the learning process cooperative and group-oriented, resulting in enhanced student learning and evaluation of classroom experiences.

Collaborative filtering. Goldberg et al. proposed an experimental mail system, one of the early collaborative filtering applications, which allowed the people to help others by recording their comments to the documents they read [18]. Terveen et al. developed another experimental system that automatically recognizes and reuses recommendations from Usenet news messages. As more collaborative filtering systems emerge, the performance evaluation of the systems becomes important [19]. Herlocker et al. empirically examined a number of key factors that were used to evaluate the collaborative filtering recommender systems [20]. It is to note that these systems/tools feature the participants’ voluntary of providing their data or comments without constraints or expectation of direct rewards. Here, cooperation and group-orient are no long what the ‘collaboration’ stands for.

Collaborative business process. Going beyond the business document exchange between business partners, many inter-organization interactions, which are often labeled as collaborative process, have been investigated. Raghunathan and Yeh proposed an approach to determine the optimal number of retailers that a manufacturer should partner with in such a collaborative process as the continuous replenishment [21]. Furthermore, Welty and Becerra-Fernandez argue that computer-based interaction technologies (e.g. ActionsWork Metro, a so-called business collaboration software that records and manages the human interactions in a business process) can enhance the trust among supply chain partners [22]. The ‘collaboration’ in these studies implicitly means coordinating the activities of multiple business partners with their individual business interests.

Collaborative engineering or collaborative design. As production and operations becomes more specialized, there is an increasing need for organizations to form a team for joint design. Collaborative engineering allows individuals or organizations to compose a team of experts and work on a same project concurrently [23].

Computer-supported collaborative design was prompted to incorporate many interdependent design issues in the design process [24]. Typically, these systems/tools provide facilitations to the intellectual exchange among the participants involved in collaborative engineering or design. Moreover, collaborative design accentuates to reach a communal acceptable solution or design. The 'collaboration' mentioned above is endowed with diverse implicit connotations from different researchers. The 'collaboration' in *collaborative filtering* mainly means information posting by one people for other unknown people. It is in no need to actively form a group to achieve an explicit common goal. 'Collaboration' in *collaborative learning* primarily refers to working together via information sharing facilitators, which enables different kinds of interactions among parties in an electronic environment. But the prefix collaborative in *collaborative design* closely relates to the high-level intellectual interactions for joint design.

These diverse views on what the 'collaboration' should be and should do make it difficult to idea communication, theory development and knowledge accumulation within the research community of e-collaboration. Looking on the bright side, the various interpretations provide considerable insights to further conceptualize inter-organization electronic collaboration. In these studies, the involvement of multiple parties is frequently mentioned, group-oriented or working together are often required, and shared vision or a common goal are not rarely highlighted.

Developing a Framework for Inter-Organization e-Collaboration

Taylor-Powell et al. proposed a conceptual interpretation of collaboration and other related terms (e.g. coalition and cooperation) for evaluating the work of *collaboratives* (i.e. a group working together to achieve a shared vision) within educational programs [25]. The research also identified five types of relationships among parties (i.e. communication, contribution, coordination, cooperation, and collaboration, or 5-Cs) [25, p.4], and proposed some guidelines for evaluating the collaborative process of the educational programs. Using the set of terms (i.e. 5-Cs), we propose a framework for inter-organization e-collaboration (Figure 1) and identify the important features of the types of inter-organization interactions.

In our framework, *communication* is fundamental, supporting dialog and common understanding, while *contribution* benefits multiple parties by mutual support based on communication. *Coordination* further integrates parties by matching

their individual needs and adjusting activities. To achieve common goals, *cooperation*, or working together is typically necessary. Furthermore, *collaboration* comes when exchange of intellectual thinking or share of knowledge is required.

Here *e-collaboration* refers to the process of working together with joint intellectual efforts in an electronic environment. Information technologies are used to facilitate the parties to work together and to contribute with joint intellectual efforts.

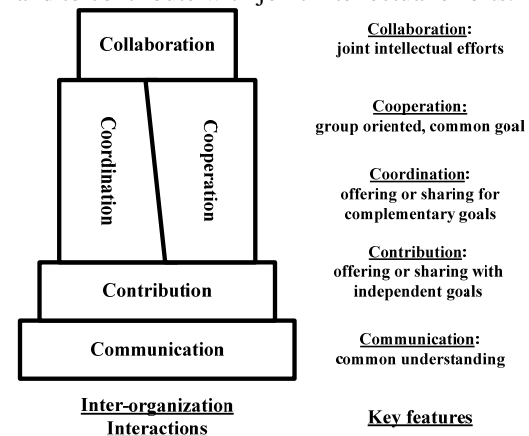


Figure 1 Types of Inter-Organization Interactions

e-Collaboration can facilitate the offering of existing or newly created common products or services with reallocation of controlled resources. With respect to each type of the interactions, different information technologies and tools are often required. For example, if an organization is going to *communicate* with others electronically, UDDI (Universal Description, Discovery & Identification) may be used to discover and identify other parties in an electronic environment, and such technologies as XML, DTD, and namespace can help establish common understanding with other parties. As two-party communication is established, SOAP may be used by an organization to *contribute* other organizations by offering information with direct rewards. With these bases, organizations may leverage such process management techniques as workflow description technologies to *coordinate* their business activities, or use such group support systems as CFPR (Collaborative Planning, Forecasting, and Replenishment) to *cooperate* with other parties and achieve a common goal as a group. Furthermore, organizations can *collaboratively* make decisions or design new products with advanced information technologies that allow them exchange intellectual thinking, and share knowledge.

Organizing Existing Literatures

In this section, we organize and analyze the existing relevant studies using the framework proposed.

Review methodology

We develop the following criteria for the types of the studies to be included in this analysis.

Given that e-collaboration emerged driven by technology advancement and the push of e-business, we limited our literature search to those studies in information systems research. We searched relevant studies in the respected journals, including *Communication of the ACM* (CACM), *Decision Support Systems* (DSS), *European Journal of Information Systems* (EJIS), *Information and Management* (I&M), *Information Systems Research* (ISR), *Journal of MIS* (JMIS), and *MIS Quarterly* (MISQ). These journals are consistently ranked as leading MIS journals [26] [27].

Secondly, we examined each issue of each volume of the journals published in the last ten years (1999-2008).

Thirdly, we conducted the search using the phases, including *electronic collaboration*, *collaborative technology*, *collaboration*, *collaborative commerce*, and *collaborative business*. Several search engines, including Science Direct, EBSCO host, IngentaConnect, and ACM Digital Library, were used to ensure we do not overlook relevant articles. We found 137 relevant articles (Table 1). These studies were reviewed from the following aspects, such as research issues, research contexts, research methodology, information technology or systems involved, and relevant findings. Subsequently, we coded each study using the framework proposed.

Table 1 Number of Relevant Articles in Seven Leading MIS Journals

Journals	CACM	DSS	EJIS	I&M	ISR	JMIS	MISQ
Number of articles	25	30	13	18	16	21	10

Some observations

In these literatures, a wide spectrum of research methodologies (listed below) has been used in examining inter-organization interactions. It indicates that electronic collaboration research grows as a cross-discipline area of Information Systems (IS), Computer Science (CS), and Organizational studies (OS).

- Empirical survey and interview
- Case study
- Experimental study
- Technology development or systems design
- Literature review study

Moreover, a large number of information technologies (listed below are some of typical ones) have been studied in different inter-organization contexts. These technologies can support respective functional requirements and business needs of types of inter-organization interactions in the framework proposed.

- fax, file sharing and transfer, and PowerPoint
- computer-mediated communication
- email conferencing and video conferencing
- groupware technology
- computer-supported cooperative work
- virtual team
- collaborative writing tool

The following themes of research issues were observed: (T.1) collaborative technologies (e.g. technology adoption and technology development), (T.2) inter-organization relationships (e.g. managing inter-organization virtual team), (T.3) intention of interactions (e.g. satisfaction of a group), (T.4) the impact of technologies on inter-organizations (e.g. the impacts of collaborative technology on inter-organization communication patterns), and (T.5) task-technology fit.

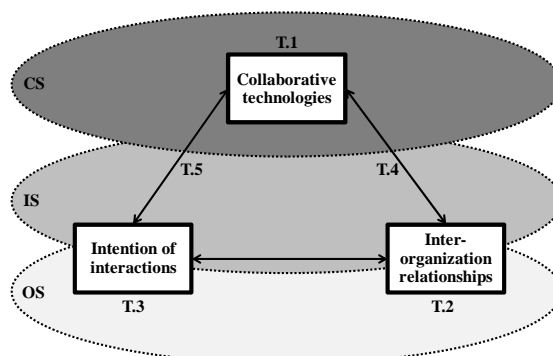


Figure 2 Research Themes of Inter-Organization e-Collaboration

Conclusions

In this paper, the diverse existing views on inter-organization electronic collaboration are reviewed. A framework is proposed to make the views cohesive for the emerging field of e-collaboration. Moreover, the framework is used to organize the relevant literatures in leading MIS journals, followed by a preliminary analysis on the literatures.

For future research, a comprehensive analysis of existing literatures should be included. It would be interesting to see a mathematical illustration of the framework. Also, the future research directions for the emerging field would be identified.

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