Category: Electronic Business

Challenges of Interoperability in an Ecosystem

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INTRODUCTION

True e-enabled collaboration has been assessed for many years. With the growing reach of companies' business and cross-border trade, the entire ecosystem enterprises are embedded in is playing a crucial role to succeed. As ICT is a key driver for deploying true interoperability and integration among the participants of the ecosystem, actors with a lack of ICT knowledge, equipment, and implementation represent the vulnerable parts within the ecosystem. This article aims at providing an overview of challenges limiting business partners in an ecosystem to truly e-collaborate. Furthermore, it describes the key elements of e-enabled collaboration and interoperability ranging from the technical and business oriented to cross-organizational and cultural aspects.

BACKGROUND

There are two main directions that have been the basis for extensive research over the last decades to touch the ground for successful electronic collaboration (e-enabled collaboration). One direction led researchers to the field of organizational development. The other direction led to the field of ICT support and solutions initiating and facilitating collaboration models. An example of the initiation of collaboration models is the commencement of the e-commerce hype in the 1990s.

The magnifying glass that allows the focus on e-enabled collaboration is the set of key characteristics in these fields that are relevant to facilitate, change, or extend the level of e-enabled collaboration. The following paragraphs are focusing on what we explore by applying the magnifying glass.

Collaborative Environments

The point of origin that leads to the foundation of any ecosystem varies. We are assuming that the ecosystem is formed because of a common interest in conducting business successfully, competitively, and innovatively. Business transactions are executed to request, support, deliver, and exchange goods, services, and data. Each of the participants in the ecosystem contributes actively to the business purpose. They are ordering, delivering, supporting, producing, assembling, and selling goods, services, and data based on their roles and capabilities. Thus, the foundation of an ecosystem is related neither to a specific sector or region nor to the means that are required to run an ecosystem.

The ecological ecosystem is providing extensive research opportunities to analyze interactions, relationship building, and the evolution of organisms. The history of ecosystem research started with Sir Arthur Tansley (1935) when he introduced the term *ecosystem* based on Phillips' studies on complex organisms and the common term of *biotic communities* valuing similarities and boundaries of communities. He is comparing these terms to his own view of describing the changing vegetation, participants, and relationships.

Ritter, Wilkinson, and Johnston (2004) are focusing on the managerial value-related competences of organizations to steer, interact, and cooperate in a business-related network. Referring to Håkansson and Snehota's (1993) role of relationship building, any enterprise needs to broaden its business role by interacting and actively building relationships with its environment (Ritter et al.). In the work of Ritter et al., the environment of an enterprise is comprised of customers, "complementors," competitors and suppliers. Besides the given terms customer, competitor, and supplier, complementors are defined as "types of firms whose outputs or functions increase the value of their own outputs" (Ritter et al., p. 3). On the value side, Brandenburger and Nalebuff (1996) introduced the value net as a term to symbolize the dedicated purpose of realizing value in any given or created relationship among business partners.

Network-related research led to comparing studies. An extensive study conducted by Changizi, McDannald, and Widders (2002) examines the relevance of network size and the capability to grow in different networks such as ecological, technical, human-being, and urban networks. The number of participants joining the network is one of the positive effects that networks participants experience according to Farrell and Saloner (1985) and Reimers and Li (2005). We cautiously draft the analogy of ecological and business-oriented networks to ecosystems due to the fact that the capability to power play and act in a competi-

tive environment is determining the capability to grow and extend the given network from within. Networks that are not business-purpose driven like the Lego network in the case of Changizi et al. are excluded from that assumption.

Collaborating Participants

Further down the exploration of the ecosystem, the decomposition of the ecosystem requires a greater analysis of its relationships and participants. First, we are amplifying in the following the most relevant details of the participants of the ecosystem, representing enterprises, business partners, governmental institutions, and any other involved entity.

The success of any participant in an ecosystem is founded in the capability of the participants themselves in relation to the underlying purpose of establishing the ecosystem. Capability is determined by the level of activity of any participant, its interaction intensity within the ecosystem with one or various intentionally or unintentionally selected participants, the role and responsibility any participant is administering compared to the other participants, and the capabilities participants are offering to the ecosystem. Eisenhardt and Santos (2005) elaborate the key elements of organizational types that are relevant to conceptualize the boundaries of an organization. They distinguish four conceptions of boundaries: efficiency, power, competence, and capability. All four conceptions are main determinants relevant to an ecosystem.

Enlarging the view of the concept of boundaries, it is also relevant to the interaction capability of an organization with its participants in the ecosystem and with other ecosystems. However, efficiency and competence are the most important assets organizations need to enrich and increase the collaboration capability. According to Eisenhardt and Santos (2005), efficiency is required to minimize governance costs, including costs of conducting exchange with other ecosystem participants and those within the individual organization. Competence allows the organization to align its resources, skills, products, and services to outperform external opportunities and market expectations (Eisenhardt & Santos). Thus, five main characteristics of the ecosystem have been elaborated: (a) the ability to individually assign the purpose of an ecosystem to its components (participants), (b) the interactions (among and between participants), (c) the development process within an ecosystem (influencing the ongoing evolution), (d) the maturity and stability of an ecosystem and its components, and (e) the effects an ecosystem is causing in terms of results, measurements, changes in size, and composition.

Coming back to the initial details that are relevant to assess the entire reach of an ecosystem, in the second part of this article we focus on the relationships within an ecosystem. These are comprised of the flow of goods, services, and data. Matutinovíc (2002) applies the concept of flow networks, elaborating on ecological ecosystems and common patterns that address the flows and needs of organizational ecosystems. According to Matutinovíc, the purpose of any existing or planned relationship is based on the following parameters: competition, cooperation, and selection, creating feedback to the participants and positively forcing each to optimize its relationships. Given the fact that resources as outlined by Eisenhardt and Santos (2005) are one of the key parameters, organizations are constrained to keep their competency level high. Any resource optimization, including ICT and process optimization, is a key determinant of successful collaboration. The choreography of ICT solutions and processes will be outlined in the next section.

Role of ICT in E-Enabled Collaboration

The second direction researchers are concentrating on is the field of ICT support and solutions initiating and facilitating collaboration models. Various e-business and e-government initiatives have been formed to get a closer view on e-enabling. Those encompass nearly any business process and collaboration scenario in nearly any industry sector, optimizing any kind of organizational types such as multinational companies as well as small and medium-sized enterprises.

As outlined above, the ecosystem research in many cases does not take governmental institutions into account explicitly, excluding Eisenhardt and Santos' (2005) conception of power, whereas ICT-related research has been including the need of governmental support and e-enabling collaboration with governmental institutions. The dimension of ICT focuses on the technical understanding of collaboration, the applicability of applications, and the key concepts of interoperability according to Theling, Zwicker, Loos, and Vanderhaeghen (2005). There is a number of studies, such as *The European E-Business Report* (European Commission, 2005) and the UN report on e-government and e-inclusion (United Nations, 2005), that point out the need and urge of focusing on the core roles of ICT. ICT should strengthen the collaborative environments with more than Web site publishing or providing electronic media to enhance paper-based documents and business processes. One example supporting the need of ICT in the form of interorganizational systems and business integration is reflected in the case of Denmark (Bjørn-Andersen & Andersen, 2004). Another example is given in the U.S. residential mortgage industry where Markus, Minton, Steinfield, and Wigand (2006) call for the development and adoption of standardized business semantics and business processes to further enhance collaboration and accomplish further benefits.