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# **The Evolution of Interorganization Systems: Identifying the Stages**

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## **Abstract**

*Interorganization systems, as an element of electronic commerce, are rapidly becoming an essential resource for competitive success. At the same time, the capabilities of such systems are evolving themselves, coincident with augmented trading partner responsibilities and new organization strategies. This paper reports the results of a field study conducted to understand the way in which interorganization systems are advancing. Four stages of systems were identified. While each encompasses the capabilities of the preceding stage, their characteristics and the manner in which they are deployed are highly distinctive.*

## **Introduction**

The close coupling of buyers and sellers, a nearly essential element of effective business strategy, is increasingly intertwined with the capabilities and technologies of electronic commerce. Yet electronic commerce itself is changing, in the process stimulating new business models and competitive strategies.

A field study was conducted to better understand the use of electronic commerce and the evolution of interorganization systems in leading firms. The results reveal four distinct, but cumulative, stages of interorganization systems. Each stage expands the interdependencies between firms and more closely intertwines their business strategies.

## **The Foundation of Interorganization Systems**

Electronic commerce can be viewed as consisting of interorganization systems (IOS) and electronic markets [7]. The interorganizational impact of information technology has been a topic of vigorous research dating from the 1970s [2]. An abundance of scholarly work has addressed the rationale underlying this aspect of electronic commerce and its influence on competitive strategy [e.g., 1,5]. Similarly, much has been written about the supporting information technologies, especially electronic data interchange (EDI) [4]. Today there is also intense focus on the Internet [3] for both business and consumer-related commerce in the marketplace and the marketplace [6].

Another body of knowledge concerning the structure of IOS is emerging. Applegate and Gogan identified a continuum of interorganization relationships consisting of transactions, contracts, and partnerships [1]. Others have described the partnership forms used in practice [4]. Yet little has been published to explain how interorganization systems evolve within companies and industries, or to describe the manner in which related business strategies evolve. Extending the theories developed for the earliest stages of interorganization systems so they encompass the advanced forms is an important next step. The research reported here is a component of a larger project aimed at linking emergent practices and advancing theory.

## **Research Method**

Nineteen different companies participated in this research effort. Each firm was selected because of its verifiable record as a high performing enterprise that has successfully integrated IOS with its business strategies. Moreover, each has been a leader in advancing electronic commerce practices.

Senior executives and functional managers in each firm responded to a structured set of interview questions that probed the firm's use of IOS in the following areas:

1. Reason for initially undertaking electronic commerce
2. Process of implementation
3. Trading partners involved
4. Nature of information exchange
5. Relationship with trading partners
6. Responsibilities of each partner
7. Characteristics of the information technology
8. Changes in practices and responsibilities over time

At the end of the structured portion of the interview, the investigator engaged each person in a candid, conversational discussion of both the firm's electronic commerce experiences and intentions. The research also included a review of company histories with respect to interorganization systems.

## Findings

While there is widespread awareness that new technologies and new rules of business competition are rapidly advancing the forms of electronic commerce in use, there is less awareness of how these advances occur. This investigation identified an evolutionary pattern and key factors of IOS success. Four stages of IOS were found in practice (Table 1).

**Table 1. The Stages of Inteorganization Systems**

Stage	Description	Enabling Information Technology
1. <b>Receive and React</b> (Document exchange)	Exchange of standard formatted business documents; recipient responds to requirements of dominant partner.	<ul style="list-style-type: none"> <li>• EDI</li> <li>• VAN</li> </ul>
2. <b>Sense and Respond</b> (Self organizing)	Exchange of performance/status information; recipient interprets information to determine appropriate actions.	<ul style="list-style-type: none"> <li>• POS</li> <li>• UPC</li> </ul>
3. <b>Embedded Business Systems</b> (Transparency)	Elements of one partner's business systems are embedded within those of the other partner (i.e., behind firewalls); one action triggers a series of related activities.	<ul style="list-style-type: none"> <li>• Extranets</li> <li>• IP networks</li> </ul>
4. <b>Community Systems</b> (Coopetition)	Community members share systems and information to achieve a specific business objective; members may compete and cooperate at the same time.	<ul style="list-style-type: none"> <li>• Virtual databases</li> <li>• Joint industry data warehouses</li> </ul>

### *Stage 1—Receive and React*

This stage is characterized by the electronic exchange of standard business documents according to a structured format that parties agree to in advance. Typically two parties participate in the exchange, with one seeking to control the reactive actions of the other (e.g., "Fill this P.O.!"). The extent of electronic interaction of the partner varies from few to many. A dominant partner may interact with a large number of other companies (primarily for marketing, fulfillment, or logistics purposes). The underlying information technology is typically electronic data interchange (EDI), although structured forms of e-mail are also used. Principles and practices for functioning within this stage are well understood and highly documented. Virtual systems and industry platform systems [4] have traditionally been organized around this form of IOS.

### *Stage 2—Sense and Respond*

Instead of standard business documents, companies in this IOS stage exchange information records (e.g., database records) or respond to electronic queries from trading partners. As in Stage 1, some implementations of category 2 systems call for the supplier to receive information in pre-specified intervals (e.g., hourly or daily). Other implementations call for the vendor to extract information directly from the trading partner's system during known periods of the day. In category 2, the sender (e.g., customer) does not direct the actions of the receiving partner (e.g., vendor). Rather, the recipient determines (senses) the necessary action (response) and its timing (e.g., when and how to replenish stock). These relationships are thus termed *self-organizing*.

### *Stage 3—Embedded Business Systems*

In Stage 3 interorganization systems, elements of the business systems of one partner are embedded within the business systems of the other. Firms consider it beneficial and feasible for both supplier and customer to have a portion of the appropriate information system installed *behind* the other's firewall. The application is thus integrated into the information systems and business processes of both companies. Intranets and extranets technology frequently serves as the conduit for interconnecting shared systems. Because each other's business systems are closely intertwined, the exchange of information and subsequent actions are typically transparent: One activity automatically triggers other actions, including the transmission of information through intercompany systems.

### *Stage 4—Community Systems*

This form of IOS consists of many interacting firms that routinely share information. In this stage, firms also share multiple dependencies. Community relationships extend the one-to-one and one-to-many buyer/seller structure of the other forms to many-to-many. Each firm depends on other community members and agrees to common information sources and exchange capabilities. The distinguishing characteristic in this category is *coopetition*: firms compete on one commerce dimension, yet

collaborate on another (e.g., to advance the entire industry). Among the most important information technology resources are virtual databases and joint industry data warehouses.

## Discussion

As companies move through the stages, they not only encompass and augment the capabilities of the preceding stages, but encounter new requirements for success. Getting as many trading partners on line as possible becomes essential. First mover advantages may still occur, but stimulating the existence of a critical mass of participants—in the industry and in the channel—may provide even greater advantages.

During the advanced IOS stages, electronic commerce can no longer be thought of as a project between 2 partners. (Participants indicated this is often the case with firms installing Stage 1 document exchange systems.) Rather the characteristics and uses of interorganization systems must be incorporated into an overall business strategy that considers market presence and competitive alternatives. Similarly, revenue generation becomes as important as cost savings. A premium is placed on reliability and predictability.

It is consistently evident that the philosophies underlying strategic thinking also shift across the stages. The tendency to apply win/lose thinking (“Our firm can only gain if your firm concedes something”) gives way to a win/win philosophy (“We can all benefit if we share information, insights, and responsibilities”).

The stages of interorganization systems identified in this research will undoubtedly continue to evolve, and so it is evident that the way in which companies and industries interact with one another will also evolve. As they do, new business models will also be implemented to capitalize on valuable insights and shrewd innovations in the face of heightened competitive requirements. Each of the participants in this research indicated, in their own way, that electronic commerce is and will continue to become evermore ingrained in the processes, people, culture, and partnerships of their firms. The new models that are resulting make it clear that electronic commerce is just not a tool, but rather a philosophy of business.

## Acknowledgements

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