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## Information Morphing for Sharing Information with Partners!

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Does greater information sharing always leads to greater efficiency in operations? While information sharing within firms may lead to improved operational planning, manufacturers such as Toyota and Honda have realized that a deeper understanding of the process of information sharing is necessary for companies to reap the benefits of sharing information with their suppliers. Information sharing as a process calls for receiving firms to effectively assimilate what might be proprietary and tacit information, at the same time exposing the sharing firm to the risk of that information falling into the hands of competitors or other parties. This article introduces the concept of "information morphing," a practice that allows firms to more effectively reap the benefits of sharing information while simultaneously curtailing the threat of leakage of information to competitive networks.



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### Introduction

As firms adopt and assimilate advanced information technologies as ERP, RMI, Web services and Internet 2, they are able to seamlessly connect with their partners in the supply chain. These technologies help firms lower external and internal coordination costs and hence realize value (Gurbaxani & Whang, 1991). More importantly, the benefits of shared information include increased efficiency in demand and inventory management. As the firms gain visibility into the supply chains of upstream and downstream partners, they are able to more effectively forecast future demands and hence guard against excess inventory build up or stock outs

which lead to loss of value. The distortions in demand planning and management due to a lack of visibility are more commonly termed the "bullwhip effect" (Lee et al., 1997). Supply chains have been shown to be between 2.2 percent to 12.1 percent more cost efficient when fully sharing information (Cachon & Fisher, 2000).

With the growth of IT infrastructure within and between firms there has been a growth of the networked organization (Nohria & Eccles, 1992). In the new "networked economy" firms compete as networks of partners to respond to the changing market conditions and consumer demands. The firms gain competencies in structuring, coordinating, and better managing their relationships and transactions with partners. Information sharing gains even more relevance and is the sine quo non in this new paradigm of managing the networked supply chain. With the exhaustion of opportunities to enhance productivity by digitizing the internal operations of the firm, firms are gaining efficiency by exchanging information with their network of partners. Firms such as Wal-Mart share weekly sales information with their suppliers which in turn manage the inventory of their products at the Wal-Mart stores. The information that earlier used to be considered proprietary is now being seamlessly shared, through advanced information technologies, across the network of partners (Lee & Whang, 1999). While the information sharing is a must and the downside of not sharing information is well documented (for example, see Lee et al., 1997), the greater information sharing in these networks

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poses new challenges to supply chain professionals.

### Issues in Information Sharing

Supply chain researchers have identified two important issues that arise while sharing information. First, as the firms receive information from different partner firms across the networks, they have to grapple with the increased requirement for processing capabilities to transform this information into actionable knowledge. Noted researcher Herbert Simon (1973) in his discourse on organizational design identified information processing capability as a scarce resource, the conservation of which, is the goal for the design of organizations. The disparity between the informational requirements of one partner and the information provided by the other partner during information sharing hinders the process of combination, internalization, socialization, and externalization required on the part of the receiving firm to assimilate and apply the information to their own business processes (Nonaka, 1994). In the automobile industry, Liker and Choi (2004) found this disparity, due to the abundant and irrelevant information being shared, as the key reason for the inefficiency of supplier operations. Realizing this, Honda and Toyota are structuring the information exchanged with suppliers in a form that is more meaningful and easily usable so that the information required by their suppliers is available to them not only at the right time but in the right form. This transformation of the shared information into a form that is more meaningful or useable for the partner is a key attribute of effective information sharing.

The second issue faced by the supply chain organization in sharing information is the sensitivity of the shared information. Lee and Whang (1999) suggest that shared information such as production yields or parts pricing can be used by the suppliers or customers to negotiate lower prices, eroding the profitability of the firm. Similarly the leakage of information that could occur because one supplier is a part of two

competing networks is a key concern for manufacturers in sharing information with their suppliers (Li, 2002). Supply chain organizations are thus faced with the tradeoff—while greater information sharing with suppliers leads to operational efficiencies, it also threatens the position of the firm due to the possibility of unfair negotiation or information leakage. Thus, a second key attribute of information sharing is the ability of information provider to mask or hide proprietary elements of the information transfer while still providing information that is meaningful and useable for the partner.

### Information Morphing

The two key attributes of information sharing delineated above lead to the definition of a new concept called “information morphing”. Information morphing is the transformation of shared information into a form that readily meets the specific needs of the trading partner but at the same time allows proprietary or sensitive elements of information transferred to be masked or hidden. Information morphing can involve a transformation of the form, content, granularity or timeliness of information being shared by trading partners. Information morphing arises from the recognition that it is not just the amount of information that is shared with a trading partner, but the usefulness of the form of that shared information to the partner and the protection it may provide to the information provider, that creates value for both enterprises.

An intuitive example of information morphing is the process followed by online bookstores such as Amazon.com to inform their customers of the delivery date of an order. The information shared with the customers is the transformed version of organizational information concerning inventory levels, safety stocks, order processing times and delivery times, amongst others. While the bookstore may hold several of these informational elements proprietary, through information morphing they are able to trans-

form these inputs into an output statistic (i.e., delivery date) to create value for their customers.

In general information morphing is the process by which organizational information elements are transformed into information that is more meaningful and easily usable by the receiving partner while still maintaining the secrecy of proprietary information. The undisclosed morphing function prevents the “leakage effect” faced by firms sharing proprietary information (Li, 2002). It is easy to guess the morphing function in a rudimentary morphing process such as the conversion of a decimal-based metric system to a foot-and-inch-based British system (a conversion that is common in the implementation of semantic web technologies across countries). In more complex morphisms, the morphing function is undisclosed and acts as a deterrent for the trading partners’ inappropriate use of the proprietary information being shared by the firm. To the extent that the two firms use the underlying information for different purposes, the process of morphing can be securely used to differentiate the proprietary information elements from the information being shared.

The difference in purpose of use also creates the need for different information and elucidates the process of information morphing in organizations. The difference in objective function creates the opportunity to morph the information elements of the focal firm as different information is desired by the partners for their operations and/or strategy. The organizational actors often sense this opportunity as they analyze three critical factors—the business environment they operate in, their organizational objectives, and the nature of relationship with partners. However as all these factors change with time, the actors have to rethink their strategy for sharing information. This process of continuous rethinking and reflecting by interpreting changes due to ongoing events was highlighted by Weick (1979) as the sensemaking process followed by the organizational ac-

tors and forms the underlying mechanism for information morphing.

### Future Research

There is a tremendous scope for future research to more comprehensively elaborate on the process of information morphing and connect it to other key constructs in the nomological network in the domain of supply chain and information systems research. Research is needed to conceptually and empirically test the advantages of information morphing for partners engaged in information sharing. A key research question is: What is the value and/or relevance of information morphing to supply chain organizations and how can it be more effectively harnessed by organizational actors?

While firms might morph their information elements into a different form to be shared with their partners, they are vulnerable to the guessing of the functional form of the morphing function and other information elements used in the transformation. The information provider firms in this case might calculate the probability of the morphing function being revealed and hence create a confidence interval around the point estimate of risk involved in sharing information. The future research thus needs to study the sensitivity of information morphing to guessing and to develop a model to predict the net return of information sharing.

Further research is also needed to study the organizational factors that act as antecedents to the process of information morphing. Auto manufacturers such as Honda capitalize on their supplier relationships to effectively implement information morphing in their exchange of information with their partners. However, there are various other factors that may facilitate the transformation of information in organizations such as top management support, organizational culture etc. and a thorough review of these factors is essential for an understanding of how to effectively facilitate information morphing within organizations.

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