Developing the Learning Network Using Extranets

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Abstract

The commercialization of the Internet has led many to believe that companies are entering a new era of electronic commerce. New ways of using the Internet should result in new forms of electronic collaboration between trading partners. While recent attention has focused on the use of the World Wide Web to reach consumers and the development of internal intranets, it is the development of extranets, the business-to-business application of Internet technology, which is emerging as a critical component of the strategic use of electronic commerce.

In this paper, we discuss two types of extranets and show how they can be used to extend the existing notion of the virtual organization to create what we call the learning network. We draw on several industry examples to illustrate how gaining strategic value from extranets is based on three key factors: the uniqueness of the information, the extent to which users of the information alter their business processes, and the level of management the information is intended to support.

1. Introduction

Over the last several years organizations have invested heavily in a wide assortment of telecommunications applications such as e-mail, electronic data interchange (EDI), and most recently, the World Wide Web. The commercialization of the Internet has led many to believe that a new era of electronic commerce has dawned. Part of this new era is expected to be characterized by new types of electronic collaboration between trading partners. Moore [16] asserts that only a team of cooperative business partners is suited to assemble the creative ideas necessary to develop complex new products, achieve manufacturing agility, and attain a long term customer focus, in short, a “business ecosystem.” Much of this cooperation can only be achieved by using interorganizational systems enabled by Internet technology.

Originally, most commercial Internet applications focused on using the Web to direct a company’s marketing message to consumers. While possessing considerable potential and attracting much media attention, these so-called customer-to-business applications in many cases have not produced the revenues Web designers need to attract top management’s attention [7]. On the other hand, the intranet is by definition an internally focused application which is currently being used to disseminate information throughout the company or facilitate cross-departmental teams. Though intranets can yield significant cost savings [6], they too have not captured the attention of corporate executives, because they lack strategic significance in terms of altering trading partner relationships. The recent emergence of extended intranets, or extranets, the business-to-business application of Internet technology, bridges the gap between conventional intranets and Internet applications (see [3] for an overview of extranets). Current estimates predict that by the year 2000, business-to-business commerce on the Internet will be ten times the size of consumer-to-business electronic commerce [12].

This growth in the business-to-business application of electronic commerce provides strategists with an opportunity for unique forms of electronic integration between separate companies. Venkatraman [24] introduces “business network redesign” as the strategic use of electronic integration between separate business organizations to create a “virtual organization.” Much more than the use of EDI between companies, this IT-enabled virtual organization results from a tightly coupled strategic alliance between trading partners which functions as a “quasi-firm.” For firms seeking to collaborate together in this type of business ecosystem, the diversity of applications available through extranets allows the ecosystem to create competitive advantage by developing what we call the learning network. Just as an individual organization can be transformed into a learning organization [1, 17, 23], so too, the virtual organization...
can be transformed into a learning network. For the purposes of this paper, the learning network may be defined as

a group of trading partners who proactively seek to become more competitive as a unit by understanding how they can better cooperate as a team to meet the increasing demands of their customers.

This objective can be achieved as the network members interact with one another to learn more about each other, their competitors, and their markets. This paper examines how the use of extranets can promote such a learning network.

The paper is organized as follows. In §2, we discuss two different types of extranets that have been proposed. Section 3 includes specific examples of how companies are currently using these extranets in their respective industries. In §4, we highlight recent work in the area of organizational knowledge creation and discuss how this work can be extended to the interorganizational context through the application of extranets to create a learning network. In §5, we discuss how the strategic significance of an extranet is based on three key factors: the uniqueness of the information, the extent to which users of the information alter their business processes, and the level of management the information is intended to support. We point out how extranets can be used to help the extranet initiator improve its position within the ecosystem and make the entire ecosystem more competitive vis-à-vis other competing ecosystems. In §6, we summarize our conclusions and propose future research in this area.

2. Two Types of Extranets

Riggins and Rhee [19] classify electronic commerce applications along two different dimensions. First, users of the information may be either inside the system firewall, as is the case with typical intranet applications, or outside the firewall, for example customers who access a company’s home page to gather information about the firm’s products. This dimension determines the extent to which security issues are a concern and the degree to which the system may be used to alter external relationships. Second, Internet technology can be used to enhance existing relationships, such as EDI linkages between suppliers and customers, or facilitate the initiation of new relationships, such as Web sites targeting customers or groupware to support new decentralized work teams. The framework in Figure 1 shows four types of electronic commerce applications resulting from these two dimensions and identifies their potential impact on the initiating firm.

While most commercial applications of Internet technology have been located in the upper right corner (customer-to-business Web sites to reach new customers) or lower left corner (intra-organizational intranets to improve efficiency), the two off-diagonal cells represent two types of business-to-business extranets.

Extranets were originally touted as a hybrid application incorporating the benefits of both Internet and intranet applications [10]. Netscape popularized the term as an extension of an intranet which allows a firm to “reach out to people who may physically work outside the firewall but who are an important part of the business strategy” [4]. More formally, an extranet has been defined as

a collaborative network that uses Internet technology to link businesses with their suppliers, customers, or other businesses that share common goals. An extranet can be viewed as part of a company’s intranet that is made accessible to other companies or that is a collaboration with other companies [http://whatis.com].

In particular, the distinction that an extranet can be part of a proprietary system where trading partners receive controlled access to certain portions of the firm’s intranet or a collaborative network linking multiple trading partners together to engage in cross-application information messaging is an important one. Using this distinction, Riggins and Rhee [19] define extranets in Figure 1 as either intranets or supranets.

In some industries a group of trading partners, cooperating as a consortium or through an industry trade association, develop what can be called a supranet to be used by all members of the group. Supranets are consortium sponsored, multi-application networks created
to allow members of the consortium to seamlessly exchange various types of information, including design and product information, customer change requests, or traditional EDI. Within the context of Figure 1, the supranet firewall surrounds the entire group of trading partners and allows for new work relationships between parties within and across these separate firms.

In other industries, certain organizations within the business ecosystem may seek to use information technology to strengthen its position within the ecosystem relative to other ecosystem members by developing intronets. Intronets are constructed by these leaders to allow certain external trading partners controlled access to the firm’s internal intranet to gain access to certain proprietary information.

The combined use of intronets and supranets is illustrated in Figure 2. Here the extranet can be thought of as a gated community where the supranet is analogous to the streets open to members of the community, while the intronet is analogous to the individual homes where the owner may choose to allow members of the community (or someone from the outside world) entrance behind the corporate firewall. In a gated community two types of firewalls or barriers exist – one surrounding the entire community (the supranet firewall) and the other surrounding individual homes within the community (the intronet firewall).

3. Industry Examples of Extranets

The typical goals of developing a supranet are overall consortium efficiency and reduced time to market of deliverables, such as new product design or customer change requests. The firewall of the supranet essentially surrounds the members of the consortium, excluding, for the most part, outside entities from accessing information from inside the supranet. These networks function as interorganizational group support systems where information is electronically “pushed” to the next phase of the value chain. The overall objective of the supranet is to promote the competitiveness of the entire consortium against other ecosystems – competing foreign industries for example. The following examples illustrate the emergence of these types of supranets:

**InfoTEST International** is a consortium of major manufacturers, which seeks to illustrate the commercial opportunities of using Internet technology [http://www.infotest.com]. InfoTEST’s Enhanced Product Realization (EPR) project illustrates the viability of using the Internet to link consortium members via an extranet to engage in seamless interorganizational product design and development. InfoTEST members collaborate using a variety of applications including CAD/CAM, product data exchange systems, electronic whiteboarding, and videoconferencing. One of the primary goals of the EPR project is to show that the Internet, with its non-proprietary, open standards protocol can be used to create a virtual organization encompassing the entire value added supply chain, even if consortium members use different systems internally. The primary benefit from the network is a dramatic reduction in time to market with new products and response to customer change requests.

**Team InteGrated Electronic Response (TIGER)** is a DARPA-funded program designed to demonstrate how small and medium sized enterprises (SMEs) can utilize Internet technology. Specifically, the TIGER system allows SMEs to participate with prime contractors in the design process early in a product life cycle and to reduce the iterations necessary to produce a successful product design [http://www.ecrc.gatech.edu/tiger/]. Supported by leading corporations engaged in technical data interchange, the goal of the TIGER program is to accelerate the deployment of electronic commerce to these SMEs through the innovative use of integrated software tools, standards for data exchange and pilot demonstrations of this technology.

**AIAG’s Telecommunications Project Team** is an effort by the Automotive Industry Action Group (AIAG) to develop a common global data communications infrastructure to support automotive industry applications related to electronic commerce [http://www.aiag.org]. The project team is currently implementing ANX, a high performance and secure managed data communications network service based on the TCP/IP protocol. The primary goal of the project is to simplify communications between industry trading partners and reduce the corresponding electronic commerce costs for those companies using the network. Related work includes developing justification for the network, creating and managing the organizational structure that will implement and operate the network, and developing performance...
metrics and certification criteria for network service providers.

While a supranet can make an entire business ecosystem more competitive vis-à-vis other competing ecosystems, an intronet, can solidify the initiator’s position as a leader within the ecosystem. When a firm introduces an intronet to its trading partners the external party typically will access a database within the initiator’s intranet to gain access to a unique information product maintained by the initiator. Ideally, the external trading partner uses a typical Web browser to drill down and “pull” the desired information into the client browser application. In this way, the user controls the usage of the system, while the initiator controls the content and functionality of the system. The following examples illustrate the usage of intronets and demonstrate how the firm’s intranet can become a powerful tool when opened up to external trading partners:

**Lucent Technologies** is the primary engineering documents manager for a number of key customers, including several major regional telephone companies (TELCOs). Lucent is responsible for releasing, updating and maintaining engineering documentation as it relates to the particular customer’s equipment configurations, including that provided by other vendors – many of which are direct competitors to Lucent. Lucent’s AllViewô system provides internal engineering teams and external trading partners with online access to several types of engineering documentation such as drawings, floor plans, and equipment and network specifications, via the Internet using a standard web browser and a configured viewer plug-in. AllViewô creates an opportunity for Lucent to achieve significant internal operating efficiency improvements and improve customer service, while developing a new online market for a unique information product [19].

**Turner Broadcasting Sales, Inc. (TBSI),** which manages all of the advertising operations for the entire Turner Broadcasting System, has become one of the world’s largest advertising sales operations. Turner Mania is an intronet which allows advertising executives, using a Web browser and the Internet, to access a portion of TBSI’s intranet to gather information needed to develop targeted advertising campaigns and support managerial decision making [http://www.pcweek.com/builder/0902/02turner.html]. The system has resulted in significant efficiency improvements and creates competitive advantage by providing superior customer service in the form of an interorganizational decision support system. Because of the “pull” nature of the Web, the user controls the system to access, search for, and drill down to whatever information is required for the particular decision. This releases the TBSI customer service representatives from numerous telephone inquiries from advertising agency managers.

**Countrywide Home Loans, Inc.** has developed the Platinum Lender Access (PLA) system which links banks and mortgage brokers to Countrywide’s intranet to improve the mortgage application process [http://www.countrywide.com]. PLA allows trading partners to check the status of specific loan requests, inquire into the history of specific mortgage accounts, and check the latest interest rates, thus reducing information float time [10]. Questions concerning account history are answered immediately without the aid of a customer service representative. The system provides competitive advantage by providing superior customer service and locking-in banks and mortgage brokers. The result is a tighter linkage of these trading partners as the system provides value-added services to both parties.

The above examples of supranets and intronets illustrate the portentous change occurring in regards to the interaction and collaboration between separate trading partners. While the concept of “online communities” has generated much excitement in the customer-to-business sector of electronic commerce [2], these extranets are creating similar communities of interaction in the business-to-business sector. The extent to which this new level of interaction can transform a business ecosystem into a learning network depends on whether the information exchanged results in interorganizational knowledge creation.

### 4. Interorganizational Knowledge Creation

With the use of interorganizational systems (IOS), i.e. information systems that cross company boundaries, firms have experienced a dramatic reduction in the cost of coordinating with external trading partners [20]. Transaction cost economics predicts that this should result in an increase in the use of markets relative to hierarchies in the production of goods and services [9, 15, 25]. These attractive economic conditions also apply to the “production” or creation of knowledge in the modern business ecosystem. Recent advances in the cost and functionality of IOS, such as the extranets described above, result in attractive market condition for easier coordination of external collaboration. While researchers and practitioners have examined the concept of organizational knowledge creation [1, 17], there has been little work done concerning interorganizational knowledge creation.

Nonaka [17] develops a useful theory of dynamic organizational knowledge creation which can be applied...
to the interorganizational context. Indeed, Nonaka states that

It is also possible that there will be formal provisions to build knowledge at an interorganizational level. This might occur if informal communities of interaction, that span the link between customers, suppliers, distributors, and even competitors, are put on a more formal basis, for example, through the formation of alliances or outsourcing ([17], p. 17).

While the formation of alliances and information partnerships may signal some interorganizational learning, much of the discussion concerning IOS has been a debate over standards and protocols, such as EDI and CAD/CAM product data exchange, or factors leading to adoption and usage [14, 20]. This focus on the "syntactic" aspect of interorganizational information exchange is gradually giving way to the "semantic" aspect as the focus shifts to the meaning of the information and how it might be used more effectively by electronically linked organizations. For example, recent research has examined how the IOS may lead to interorganizational business process reengineering [8, 21], but has not examined how the IOS can be used for interorganizational knowledge creation.

Polanyi [18] distinguished between two types of knowledge: explicit knowledge (that which is easily transmitted in formal language) and tacit knowledge (that which may be inferred by actions, but is difficult to communicate using formal language). Using this distinction and the assumption that knowledge may be converted into new knowledge by a formal interaction between tacit and explicit knowledge, Nonaka [17] proposes the four modes of knowledge creation shown in Figure 3.

Socialization is the conversion of tacit knowledge into new tacit knowledge. This can be accomplished by interacting with others on a social, informal basis or by observing their actions in a mentoring type relationship. Second, combination is the process by which new explicit knowledge can be created by manipulating or combining existing explicit knowledge by putting it into new and more meaningful forms. The interaction between tacit and explicit knowledge results in internalization and externalization. Externalization is the conversion of tacit knowledge into explicit knowledge often by the use of metaphor and analogy, that is, understanding a concept by putting it in terms of another, previously understood concept. Finally, internalization is the creation of new tacit knowledge by observing existing explicit knowledge. This is most closely related to the typical use of the term "learning" [17].

Because explicit knowledge is concrete and easily articulated in formal language it is easily converted into electronic form, transmitted over low bandwidth telecommunications lines and interpreted by the recipient into further explicit knowledge. Because of this, most IOS information exchange results in only combination knowledge creation. Indeed, the concept of combination is based on the information-processing paradigm. What is important to note is that Nonaka states that meaningful knowledge creation occurs when all four modes of knowledge creation are managed in a continuous cycle or "spiral" process [17].

Until recently, most IOS exchange was rather low in terms of media richness [11]. In that regard, most IOS, such as EDI or computer reservation systems, were an ideal fit for operational support functions aimed at improving interorganizational efficiency. However, new forms of extranets provide higher levels of media richness. For example, InfoTest’s EPR project supports not only EDI and e-mail, but also electronic whiteboarding, videoconferencing, and other groupware capabilities. As bandwidth on the Internet expands, the opportunity to exploit richer media in an extranet will improve in the coming years. The more rich and varied the media provided by the extranet, the more opportunity to exchange both explicit and tacit knowledge.

The communication of tacit knowledge can be facilitated by the exchange of "mental models". Within the business ecosystem context, these mental models could be beliefs and viewpoints concerning the demand for certain products or features, the expectations concerning a competing ecosystem’s strategy, or ideas about how ecosystem members should work together. Until recently, exchanging these mental models between different companies often took place on the golf course or on the back of a napkin. Today, the Web provides an easy forum for executives to become online publishers of their mental models, which can be made available to select ecosystem members or a broader audience. In addition, Web-based systems promote two-way communication, as readers are encouraged to post responses or register feedback via e-mail.
For example, in his weekly online column, *The Main Thing*, Netscape’s President and CEO Jim Barksdale communicates with what might be called the “Netscape Ecosystem” and beyond. Using this forum, Barksdale is able to communicate his tacit knowledge to ecosystem members (and potential future members) by conveying his opinions and viewpoints on various subjects, such as trends in the marketplace, customer needs, or strategic moves by other major software firms. In this way, he is strongly influencing the direction of a particular ecosystem and helps establish Netscape as the leader and not just a player within that ecosystem. With an improved mutual understanding of “the Netscape Way”, cooperating software developers can plan specific strategies, actions, and product announcements. This conversion of tacit knowledge by one trading partner into explicit knowledge by another is an example of externalization. What’s more, when these software developers communicate to Barksdale their strategic intentions concerning product development and release, this influences his tacit knowledge of where the market is headed, resulting in internalization. This alternating process of internalization and externalization results in the spiral effect of knowledge creation. Within the business ecosystem model, this spiral of interorganizational knowledge creation is made possible by the flexibility and multimedia aspects of the Web.

The sharing of tacit knowledge is also facilitated via the social interaction that accompanies the development of online communities. Another important Web-based technology in this area is the emergence of newsgroups that facilitate message exchange on a variety of subjects. While these newsgroups often exist as public Internet forums, they can also be constructed as intronets where only certain individuals are allowed access. For example, a major soft drink company may provide a newsgroup for its bottlers to interact with both the manufacturer and other bottlers regarding innovative distillation procedures, distribution channel management, or coupon promotion strategies. By promoting the use of this intronet, the manufacturer can stimulate new interaction between users as they begin to communicate directly with one another via e-mail. By providing such a “field for interaction”, the initiator can generate learning throughout the network.

5. Competitive Advantage through Extranets

We have discussed how the media richness of the Web can be used to promote interorganizational knowledge creation. In this section, we discuss three key factors that differentiate a business ecosystem which functions as a virtual organization from one that develops into a learning network and achieves sustained competitive advantage. The first factor is based on the very notion of sustained competitive advantage, while the other two are based on the spiral interchange between externalization and internalization. The three factors are:

- **unique information** – competitive advantage is enhanced when the system provides unique information and knowledge which is available to those with access to the extranet and not to those outside the ecosystem;

- **process redesign** – externalization occurs when users of the extranet seek to alter their internal business processes due to the information provided via the extranet; and

- **higher level management decision support** – internalization occurs when information from the extranet is directed at higher level management decision making as opposed to operational management support.

5.1 Uniqueness of the Information

The very nature of an extranet is that while promoting information sharing, it is exclusive in that the distribution is limited to certain privileged parties. The residents of a gated community realize value due to the exclusiveness of their community by controlling who may simply drive down the neighborhood streets. In a similar way, users of both types of extranets realize value because the information made available through the system is unique and reserved for ecosystem members.

By utilizing supranets the ecosystem acts as a single organization bringing diverse, but proprietary, skills to work teams in order to satisfy the diverse customer needs in today’s markets. Developing this virtual organization often requires a cultural change by the consortium members resulting in more open information sharing between ecosystem members. As illustrated in the InfoTEST EPR project, a consortium can use a supranet to engage in interorganizational concurrent engineering, whereby the lead manufacturers and subcontractors can reduce rework requirements, design the product for manufacturability, and achieve dramatic reductions in time to market. This ability to use the supranet to create an agile, quick response virtual team that cuts across several independent organizations allows the entire ecosystem to achieve faster response times to changing customer requirements over the entire product life cycle. In particular, the skills and knowledge possessed by individuals within the ecosystem are made available to all members of ecosystem.

On the other hand, the very existence of an intronet is based on the provision of a unique information product controlled by the intronet initiator. If the initiator of the
intronet is able to provide unique, up-to-date valuable information, the initiator may be in a position to maintain long term competitive advantage from the network. Expert opinions and analysis made available on a controlled access Web site may result in for-fee subscription to the services or a shifting of the balance of power within a particular ecosystem in the favor of the intronet provider [9]. In this way, the initiator of the intronet may be in a position to become a dominant player within their particular ecosystem by leveraging their knowledge advantage within the consortium. For example, Turner Mania allows TBSI to have new influence over how customers formulate marketing advertising campaigns. Countrywide’s up-to-date analysis of housing market conditions creates additional leverage with banks and mortgage lenders. However, not all of the information provided by an intronet need be developed by the system initiator. In the example of the soft drink manufacturer that introduces an intronet to its bottlers, much of the new information is contributed by users of the intronet who share their expertise and ideas with other bottlers. Promoting this type of new information sharing is one of the major challenges for intronet initiators.

Lucent’s AllViewô system is another example of a company developing an intronet around a unique information product. By becoming the main information provider to the TELCO’s other non-Lucent suppliers, Lucent strengthens its position within a particular TELCO’s ecosystem. Originally Lucent implemented the system to enhance internal efficiencies in responding to the TELCOs’ requests for documentation. Having realized significant savings in both time and effort to manage these documents, the TELCOs realized that they need not act as a go-between for Lucent and their other non-Lucent vendors. With the cooperation of the TELCOs, Lucent opened up AllViewô to be accessible to the TELCOs’ other vendors. Rather than the TELCO functioning as the intermediary, Lucent has created a market where it controls the functionality of the system and provides various levels of support to the TELCO vendors. In this new market, Lucent can set prices for various levels of systems support, training, and consultation – thereby strengthening its position within the TELCO’s ecosystem.

The uniqueness of the information becomes particularly powerful when combined with the second factor of business process redesign.

5.2 Process Redesign

One example of tacit knowledge that is common in most organizations is when employees lament, “Surely things could be done in a better way around here.” The expression and operationalization of this knowledge is often difficult to do on an individual basis. The interaction with other peers in a team environment often aids the conversion of this tacit knowledge (“how things ought to be”) into explicit knowledge operationalized as radical process redesign. This form of externalization knowledge creation is at the heart of business process reengineering.

Recently there has been a move toward interorganizational business process redesign as it has been shown that this can enhance the benefits from EDI systems. Riggins and Mukhopadhyay [21] show that not only do changes at the firm’s facility result in improved benefits from EDI, but also that the initiator’s benefits are dependent upon how its trading partners implement the system. Specifically, the initiator could receive greater benefit from the system if its trading partners integrate the system with their internal systems or reengineer their internal business processes allowing the initiator to take greater advantage of the system. The authors call the use of IOS to encourage systems or process changes at the trading partner’s facility business partner reengineering. While minor process improvements may result in operational efficiency benefits, engaging in process innovation changes results in strategic gains for the consortium members.

Clark and Stoddard [8] develop and test a model that shows that technological and process changes are both required in order to reap significant benefits in productivity from EDI systems. Their analysis of companies in the U.S. grocery industry indicates that both manufacturers and retailers can reduce inventory when combining EDI with process redesign.

Conceptually, similar results should apply to the TIGER and AIAG projects discussed earlier which both emphasize EDI as a major portion of the supranet. In addition, these results should apply to a wide assortment of IOS technologies beyond EDI. In the case of the InfoTEST EPR project, members collaborate using a variety of applications. For example, the use of CAD/CAM and product data exchange systems will be enhanced when interorganizational engineering work teams alter their usual processes to take advantage of the online capabilities of downloading centrally stored engineering documentation to engage in interorganizational concurrent engineering. Additional team process changes will be required to make effective use of interorganizational electronic whiteboarding and videoconferencing.

While team process redesign is an operationalization of network learning utilizing supranets that can make the interorganizational team more effective, business process changes due to the unique information made available via the intronet can have quite different results. In particular, if changes are made at the information user’s organization, the intronet initiator may be in a position to
lock-in the trading partner and create dependence on the intronet. In some cases, an initial subsidy or other form of incentive may be required to induce usage and internal changes [20]. In other cases, an understanding of the information needs of trading partners and the ability to put that information in a useful format may result in usage and process changes. The interaction of unique information and user process changes is illustrated in Figure 4.

![Figure 4: Intronet Impact on Trading Partners](image)

We mentioned that if the information made available on the intronet is unique and up-to-date, the initiator may be in a position to charge for usage or shift the balance of power in the business relationship [9]. This effect is even more pronounced when the information user becomes dependent upon the intronet. Because the majority of these business-to-business applications are not accessible to most readers, a well-known customer-to-business Web service, CNN Interactive [http://cnn.com], may be illustrative.

CNN Interactive provides more than just current news articles which may be found on their television cable stations. CNN Interactive is in the process of developing an historical archive that is becoming increasingly valuable due to its comprehensive coverage and hyperlinks to related articles. While CNN Interactive is currently available free of charge on the Web, the news organization may eventually charge a fee for full access to its historical archive. As news journalists, educators, students, and others become accustomed to free access to the news service they will alter their process of gathering historical information to take advantage of the technology. Once the historical archive is so massive as to make it unlike any other historical database available on the Web and once users become locked-in to the service, CNN will be in a position to charge a fee for access and allow only certain external entities access to their intronet. At that point the company will likely implement a two-tier pricing scheme where some ubiquitous information is free, while other more scarce information is available only to those parties who have access to their well-organized historical archive intronet. The pay-for-access service may become a requirement for many information intensive organizations, making that portion of CNN Interactive a business-to-business intronet similar to the examples described above. In this case, the initial free access to the valuable information essentially acts as a subsidy to encourage process redesign resulting in dependency. What is important at this time is that CNN develop their comprehensive archive and extend their unique brand name in television news to the online environment.

As another example, an automotive company may allow select suppliers controlled access to constantly evolving models of customer preferences, thereby making these suppliers more competitive, not only with the original automotive company, but also within the automotive industry as a whole. By attempting to achieve a new level of competitiveness using this information, the supplier may become dependent upon this intronet, allowing the automotive manufacturer to charge for access to the customer preference database or shift the balance of power in the supplier-customer relationship toward the manufacturer. In that case, the intronet user becomes more competitive relative to other suppliers, but the provider of the intronet gains advantage relative to the suppliers as a whole. This is similar to the phenomena described by Clemons, Reddi, and Row as the “move to the middle” [9].

5.3 Level of Management Decision Support

Interorganizational business process redesign is a form of externalization utilizing information directed at operational management to improve the efficiency and coordination of ecosystem trading partners. However, Nonaka [17] emphasizes that the best type of knowledge creation occurs when externalization and internalization occur in an alternating fashion. Bateson [5] states that “information consists of differences that make a difference.” A corollary of this could be that differences that truly make a difference are those that occur at the top of an organization. Besides operational control issues, information systems have typically been categorized as supporting middle management decision making and top management strategic decisions [13]. While decisions made at the operational level of the organization are typically more structured and routine, those at the strategic level are more unstructured and not routine. Thus, while lower level decision making results in externalization (conversion of tacit knowledge into
explicit knowledge), higher level decision making results in internalization as shown in Figure 5. This occurs as explicit knowledge is converted into tacit knowledge, for example the refinement of a firm’s vision and mission.

![Figure 5: Three Level of Management Support](image)

TBSI’s Turner Mania system is essentially an interorganizational decision support system helping TBSI’s customers make better strategic decisions regarding resource allocation of advertising expenses and the development of advertising campaign themes. By offering suggestions and advice to advertisers concerning what types of advertisements work well on which stations, TBSI is able to influence their customer’s decision making process. In addition, the system enhances communications between the advertising executives and TBSI by encouraging feedback and two-way communications via e-mail. Turner Mania has resulted in changes to the structure of this portion of the advertising industry. Because all external advertising agencies have the same access to Turner Mania, smaller TBSI’s customers now have access to the same information as larger advertising agencies. This equalizing effect of allowing smaller advertising agencies to imitate larger agencies can be observed in various types of Web-based businesses. In addition, TBSI uses the system to gather information concerning the approximately 12,000 advertising agencies with which it interacts. Information gathered on Web site usage include hit rates by job title, agency name, and geographic location. Not only does this additional usage information allow TBSI to modify the system to offer better targeted value added services within Turner Mania, it also shifts the balance of power within this industry toward the supplier away from the customer.

Extranets targeted at influencing strategic management can help top managers form tacit knowledge about the overall direction and potential of the ecosystem to which they belong. Internalization occurs when explicit information regarding ecosystem performance (for example the impact of interorganizational process redesign), allows the manager to develop a stronger vision of what the ecosystem could accomplish as a whole. Also, socialization occurs when managers use e-mail to exchange tacit knowledge with each other, allowing them to refine and align their particular organization’s mission and vision with an emerging ecosystem culture. Here the interactive nature of the Web facilitates the formation of an overall ecosystem culture, vision, and set of values. For example, the creation of an online community using an intronet, with the intronet initiator at the hub, could result in the development of an overall ecosystem culture. This development of a “network mind” is analogous to Sandelands and Stabilein’s [22] view of the “organizational mind.”

The Countrywide PLA system is another example of strategic decision support using intronets. The long-range financial information provided to banks and mortgage brokers assists lenders in the use of financial assets. The more proprietary the information provided to select partners, the more valuable the system becomes for the banks and mortgage brokers. For example, using the system, Countrywide has the means to develop a large database of proprietary information that would be difficult to duplicate by competitors. In this way, Countrywide may be in a position to move beyond the lighter linkage with these trading partners and lock-in banks and mortgage brokers who become dependent on the system for account history, economic forecasts, and customer preference trends.

In the automotive example above, a supplier may use the market preference information, collected and made available by the automotive manufacturer, to make product mix decisions which increase the value of its contribution to the overall business ecosystem’s competitiveness. While the notion of being locked-in to the ecosystem leader’s intronet may seem onerous, forward-thinking managers within the ecosystem will realize that it is to their advantage to promote the overall business ecosystem allowing all members to thrive.

6. Conclusion

As the opportunity to use extranets to alter a company’s business-to-business relationships gains wider acceptance, recognizing the two types of extranets becomes increasingly important. While supranets promise various efficiency improvements across a business ecosystem, the opportunity for a single dominant organization to gain competitive advantage exists using intronets. Industry trade associations will continue to develop supranets, while individual organizations will seek to dominate an ecosystem by using intronets to leverage their unique information products. The extent to which
this will be possible will depend on the uniqueness of the information, finding ways to encourage users to alter their internal processes to create dependency, and targeting information to support top management decision making.

Research in this area is ripe for the formal development of a theory of interorganizational knowledge creation. In particular, Nonaka [17] points out three essential enablers of organizational knowledge creation: creative chaos, redundancy, and requisite variety. However, it is not clear to what extent these exist in the interorganizational context. Also, while most IOS have been targeted at operational management support, researchers and practitioners should examine the impact on top management support and the development of the so-called “network mind” or developing ecosystem culture. In addition, because ecosystem members are still autonomous business entities, it is not clear how ecosystem members should appropriately divide the gains reaped from developing the learning network.

Another area to explore is the development of a formal mechanism to identify specific extranet applications that can support the development of the learning network. Senge [23] identifies four basic disciplines that must characterize the learning organization: personal mastery, team learning, shared vision, and mental models. It is possible that similar disciplines exist for the learning network. We propose, and suggest further research into, the following four interorganizational disciplines: corporate mastery (the commitment of each organization to improve its contribution to the overall ecosystem), network teaming (the formation of entirely new interorganizational work teams), ecosystem vision (the development of the “network mind” discussed earlier), and environmental models (models about how ecosystem members work together and how the overall ecosystem performs within its external environment). Analogous to Senge’s [23] critical fifth discipline, systematic thinking, would be the concept of business partner reengineering (the alteration of ecosystem members’ systems and processes to improve overall ecosystem performance) [21].

References


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