



STRUCTURING FOR E-COMMERCE SUCCESS:

**CENTER FOR RESEARCH
ON INFORMATION
TECHNOLOGY AND
ORGANIZATIONS**

University of California, Irvine
3200 Berkeley Place
Irvine, California 92697-4650

and
Graduate School of
Management

JANUARY 2000

INTEGRATING PRELIMINARY CASES WITH THEORY

First Progress Report

AUTHORS:

Rebecca Grant

Research Fellow, CRITO
Assoc. Prof., Faculty of Business
University of Victoria
Email: rgrant@uvic.ca

And

Terry Huston

Asst. Prof., Faculty of Business
University of Victoria
Email: thuston@uvic.ca

Acknowledgement:

This research has been supported by grants from the CISE/IIS/CSS Division of the U.S. National Science Foundation and the NSF Industry/University Cooperative Research Center (CISE/EEC) to the Center for Research on Information Technology and Organizations (CRITO) at the University of California, Irvine. Industry sponsors include: ATL Products, the Boeing Company, Bristol-Myers Squibb, Canon Information Systems, IBM, Nortel Networks, Rockwell International, Microsoft, Seagate Technology, Sun Microsystems, and Systems Management Specialists (SMS).

STRUCTURING FOR E-COMMERCE SUCCESS: INTEGRATING PRELIMINARY CASES WITH THEORY

Introduction

There has been considerable attention paid to the dramatic emergence of “dot-com” businesses. These companies are born in cyberspace and evolve in a Greenfield environment. As challenging as such virtual start-ups might seem, they emerge free of the necessity to adapt existing physical organizations to the new demands of e-commerce. “Clicks and mortar” companies, on the other hand, face the daunting task of changing policies, structures, practices and often products in an unfamiliar and rapidly changing environment.

The role of the Information Technology¹ (IT) unit in established businesses is particularly interesting. Is e-commerce unique or volatile enough that it should be outsourced entirely? Or should the company develop e-commerce internally, with new or retrained employees? If the development is kept in-house, should it be in a separate e-commerce unit, or integrated into the established IT unit? Each of these approaches has its supporters in trade journals and executive briefing reports (see, for example, Cohen 1999, Kalin 1999, Null 1999, Paul 1999, Smith 1998). But e-commerce is still a relatively recent phenomenon and many of the recommendations are anecdotal, based on experiences with a few firms, or relevant primarily to the Greenfield dot-coms. In addition, while e-commerce strategy permeates research journals and the trade press, research focused on e-commerce system implementation is still rare.

Our project studies the organizational design and system development/delivery issues facing established businesses moving into e-commerce. In the end, its objective is to answer two questions:

1. Are there common patterns in how successful clicks and mortar businesses structure IT to develop and deliver e-commerce?, and
2. Are particular approaches more effective than others and, if so, what are the contingencies that determine when a specific approach will be most effective?

This is the first progress report on this project. It begins by reviewing the overall project design. It then describes the four organizations involved in the first phase of the research – their characteristics, their e-commerce activities, the structure used to implement e-commerce, and the role played by each firm’s internal IT group. Next, the paper describes the conceptual model derived from the interviews of that first phase and positions the four companies on the model. We then discuss the findings of the pre-

¹ Some companies and authors distinguish between the terms “Information Technology (or IT)” and “Information Systems (or IS)”, but there is inconsistency in their use. We have chosen to use the term Information Technology (IT) whenever possible to refer to any activities and organizational units related to information systems develop-

liminary review of literature and theory related to our research questions. We conclude by describing the next steps in the research project.

Research Design

Because the issues addressed by this research are so recent, the project has been structured in three phases. The first step was to understand in some detail current practice among clicks and mortar businesses. This understanding could then be combined with available literature to produce a preliminary model of how firms organize to deliver e-commerce. Thus, Phase I focused on four successful “clicks and mortar” operations as a series of background cases. Phase II, currently in progress, integrates the findings of Phase I with literature from related fields – such as project management, IT outsourcing, and IT management in general – to strengthen underlying theory and flesh out the preliminary model. Phase III (beginning in mid-2000) will involve a more extensive set of case studies of relevant firms. It will be aimed at testing the model and the limits of its generality. This paper reports on the findings of Phase I and the preliminary work done to integrate those findings with related literature.

The project uses four criteria to narrow its focus. First, the project as a whole concentrates on business-to-business e-commerce. The business-to-business arena represents approximately 90% of electronic trade (Thompson, 1999) and thus the area where decisions about structure and implementation can have the biggest impact. Second, the project only considers firms with well-established internal IT groups. The research is concerned with how companies choose from among the complete range of structuring options; firms without internal IT groups aren’t likely to consider creating such a group for e-commerce if they haven’t done so for any of their other IT applications. Third, the research looks at firms that have been actively engaged in e-commerce for more than one year. That criterion is used to ensure that the firms chosen have had time to see the effects of their organizational structure and implementation decisions. Finally, the project considers only those firms using the Internet or World Wide Web as the core infrastructure of their e-commerce (whether or not they also have more traditional network systems such as EDI). While e-commerce does include EDI and proprietary networks, this project is concerned with how firms have responded to the demands of the rapidly-changing and highly competitive environment of web-based business.

ment, implementation, operation and/or maintenance. However, where “information systems” (or IS) appears, it is interchangeable with IT.

Phase I – The Background Cases

Phase I began with a series of interviews to gather detailed background information about e-commerce structures in use by major firms. In preparing for a broader study, we used a judgement sample of four North American businesses. Two of the firms were identified in a *CIO* white paper on successful players in business-to-business e-commerce (CIO.com, 1999). The third is a wholly owned subsidiary of one of these first two and was included in the interviews at the suggestion of the parent company's e-commerce executive. The fourth had been the subject of an earlier case study on website implementation and was of particular interest as an early Canadian entrant into the field of web-based e-commerce (Lovatt, 1997).

In each company, our key informant was the executive most directly in charge of implementing e-commerce and deciding how to structure the e-commerce organization. In two cases we interviewed the executive who had made and implemented the decisions. In the other two cases, the senior executive in question had left the company. In those cases, the individual interviewed was closely involved in the original implementation and was, at the time of the interview, directly responsible for the ongoing e-commerce initiative.

Data gathering involved unstructured, 30 to 90 minute interviews with the key informants. We did not use a detailed question guide at this early stage of the work. We felt it was more important to give the interview subjects the opportunity to direct the discussion into the areas they felt were relevant to the general topics of interest. We also wanted the flexibility to add or redirect questions on the basis of the answers given in early interviews. Thus, we concentrated on exploring two general areas:

- How has the company structured (or restructured) its IT function to support e-commerce and why? Who is in charge of the groups that deliver/support e-commerce and e-commerce technology, and why?
- Where does the e-commerce unit reside in the overall structure and why?

A third topic had been suggested in preliminary discussions with CRITO² partners. In the course of the mini-case interviews, it became clear it was a fruitful area of discussion and so we also explored this third area with each informant:

- How does the company view electronic commerce – as an alternative technology to support well-established activities or as a new business opportunity?

² Center for Research on Information and Technology

Participating Firms

Kenonic Controls

Company Description: Kenonic Controls is based in Calgary, Alberta. It identifies itself as being four companies in one. First, it is an automation engineering consulting company. In that role, professional engineers and technologists design integrated control systems using components from a wide variety of manufacturers for Kenonic's clients. Second, as a field service company, the firm builds, commissions and maintains control systems at client sites. The field service operation involves instrumentation technologists, electricians, and control system engineers. Thirds, as an information technology company, Kenonic provides information systems development services. Their IT specialists provide the database and programming expertise to integrate process data into corporate information systems and decision making. Finally, as a Y2K consulting company, Kenonic works with clients to assess and certify the Y2K compliance of various manufacturers' equipment.

Kenonic employs approximately 400 individuals and is entirely owned by its employees. It has 30-40 employees in the IT group, but also has technical and system development skill outside that functional group. The company manages more than \$200 million in automation capital annually.

E-Commerce Applications: Kenonic got its feet wet on the web by producing a straightforward electronic brochure. This brochure comprises numerous pages describing the company, and its products, services, employees, history, clients and areas of expertise. It is the online equivalent of an annual report. The sole difference is that, as a private company, Kenonic does not publish extensive financial performance data in its reports or on its website.

Kenonic's next application on the web, known as JumpStart, is the e-commerce project relevant to this research. At the request of a client, Kenonic developed a database application to permit the client to assess the Y2K compliance of its field devices. The system was treated as a consulting project and developed in-house following the Kenonic's standard consulting project procedures and team structures. The project was carried out between January and April, 1998, by a team that included approximately 5 people in product support and 2-3 developers. While specific individuals moved in and out of the team over the project's life, it was always executed by the IT group.

Kenonic has considerable expertise and experience in developing information systems to support the resource industries and automation engineers. As JumpStart evolved, the company realized its potential as a product with broader market appeal. If the systems developers were to expand the scope and sources of data in the database, JumpStart would be well-suited to the needs of large clients who wanted to share compliance information across multiple sites. This was done, and the system evolved into a web-based, extranet application that let clients tap into a vast database of equipment from a wide variety of

manufacturers. The resulting database includes information from manufacturers, information from projects where Kenonic was hired to do compliance testing, and validation data provided by Kenonic's engineers independent of specific client projects. JumpStart currently serves over 900 users in 110 client organizations. The database, meanwhile, has grown to include more than 52,000 product items from 6,000 vendors.

E-Commerce Organization Structure and Internal IT Role: Because JumpStart began as a client project, the company used existing IT staff and structures for its development. The IT group had, as a result of the brochure website, begun to build web programming skills and technology expertise. The development of skills was accomplished partly through self-training on the part of staff and partly via deliberate internal training programs to acquire specific expertise. There was no consideration of creating a new unit or management structure for this effort because it was, after all, seen as a single project.

Eventually, however, the VP IT recognized the broader potential of the system. At that point, it was "thrown over the wall" for ongoing development and management as a product, under the supervision of a Product Manager, Ms. Marlee Lovatt. The membership of the team changed little; the employees are still internally considered to be employees of the IT group, rather than of a separate and autonomous e-commerce group.

In considering the effectiveness of the structure used to develop and manage JumpStart, Ms. Lovatt suggested that it was probably ineffective to have ever managed it as a project. At Kenonic, products are supported differently from projects. Issues arose over customer training, internal infrastructure, central customer and developer support, and the use of an external ITP once JumpStart moved from being a project to a product. In hindsight, Ms. Lovatt recommended that firms begin any e-commerce application as if it were a potential product, rather than a single-client project and manage its development as if it would ultimately have a wider market. She also urged keeping the development team intact to avoid slowing down development and complicating communication. Furthermore, she pointed out, standards should emerge as a new e-commerce application develops. Keeping the team in place ensures that standards do emerge and are consistently applied.

Chubb Insurance

Company Description: Chubb Insurance is a Chicago-based commercial and personal insurance firm, which began in 1882 when Thomas Caldecot Chubb and his son Percy opened a marine underwriting business in the seaport district of New York City. The Chubb Corporation was formed in 1967 and was listed on the New York Stock Exchange in 1984. Today, it is one of the largest insurers in the world, with 9500 property and casualty operating in more than 120 offices internationally. Chubb has built a

solid base of commercial and personal niche products. In its business-to-business operations, it offers such lines as insurance for directors & officers, financial institutions, law firms, personal collections and high-end homeowners, as well as standard commercial lines.³

E-Commerce Applications: When considering the potential role of e-commerce, Chubb looked at the strategic options of using e-commerce in the context of a completely new business model or using it as a new channel within the existing model of selling commercial insurance through a system of intermediaries (brokers/agents). Management quickly concluded that a new business model was inappropriate and the best use of e-commerce would be as a new channel mechanism to support the existing model. For its non-EDI e-commerce⁴, Chubb defined a 4-tier approach:

1. *Informational uses:* the use of websites as online brochures, CD-ROMs and kiosks to disseminate information. The objective of the chubb.com website is to drive traffic to agents and brokers. The company uses the site to build credibility and provide useful information to readers.
2. *Basic commerce:* using e-commerce tools such as the web to generate leads generally and by product, and to pull clients through Chubb's traditional agent distribution channels rather than directly to Chubb. In this area, Chubb performs generic activities like "find nearest agent". It also collects information from associations and affinity groups and conveys it to specially designated agents. Chubb creates special content for associations and businesses. It carries out targeted activities to promote client retention and gain trust.
3. *Transactional commerce:* using EDI, traditional network mechanisms and web-based systems to process transactions. This is the focus of most of Chubb's e-commerce. Chubb's commercial activity is different from personal insurance, in that its business-to-business insurance tends to involve complex, specialized underwriting. The web is not a good tool for activities that require a lot of individualized input and output and complex interaction. Thus, rather than try to create a standard online application or risk assessment tool, Chubb has used e-commerce to create interface capabilities that allow agents and brokers to upload and download from their own agency management system to Chubb's mainframe risk assessment and underwriting applications.
4. *Specialized solutions:* using web-based systems to support special products such as affinity group policies and direct sale of products that don't compete with agents (such as travel insurance).

E-Commerce Organization Structure and Internal IT Role: Chubb has approximately 900-1100 employees in its IT organization throughout the world. The annual IT budget is in the range of \$95-100 million (US). The organization has been building systems for internal users for more than 30 years. These

³ The company engages primarily in business to business underwriting via independent agents, but also sells some specialty personal insurance, such as travel accident, directly to consumers. The consumer side of the business is organized in areas that do not compete with the lines sold through agents.

were largely transaction-focused (for example, claims systems, risk assessment systems,) and thus tailored to the needs of specific functional areas. The result was a host of different systems with their own characteristics and interfaces. All IT employees are in groups, each of which is aligned to a business unit whose systems the group develops and supports.

In 1991, a new CIO joined Chubb. He quickly moved the company from a mainframe shop to a client-server environment, deploying 10,000 desktop PCs in the process. This was a massive undertaking, and by the mid-90s when the Internet, thin clients and other emerging technologies were outpacing client-server networks, the thought of another major change was daunting. A group of 5 individuals in the IT group, however, began acquiring free web tools and developed a Chubb intranet. They recognized that the idea of web-based applications wouldn't grow without a business champion. Seeing communication as a logical first use of these new technologies, they convinced the Chief Communications Officer to play the role of champion. Chubb's CCO reports directly to the CEO, so the project had a very high level champion early on.

Mr. B.C. Verniero, Assistant VP Marketing, was involved from the beginning in his role reporting to both CCO and the VP Marketing. The group got permission to experiment with web technologies and carry out pilot projects and seeded e-commerce efforts by developing pilots for carefully selected key users. Thus, momentum for broader use of the tools and technologies developed from the bottom up.

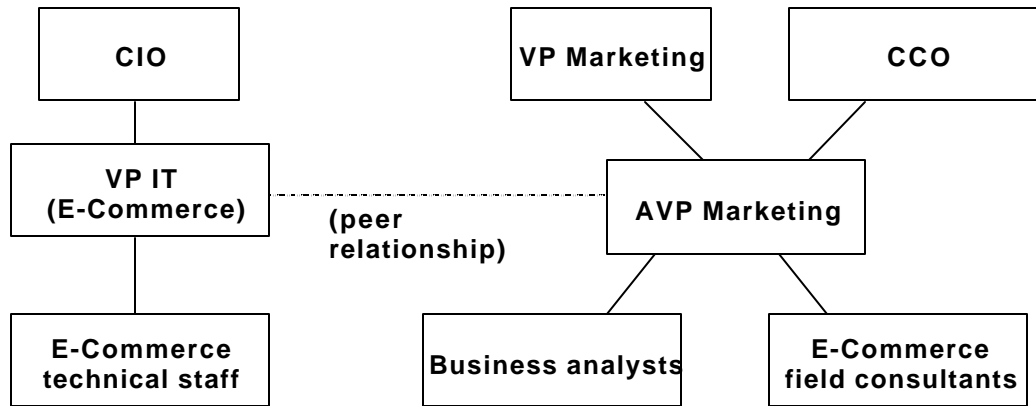
Eventually, it became clear that the time was coming to expand browser-based applications to all desktops. The CCO and CIO focused on the need to upgrade Chubb's proprietary internal email system so that employees could communicate with external partners, agents, etc. The skunkworks e-commerce organization and a growing number of professionals within other IT areas had developed a host of applications throughout the company. These early applications were proving the value of the technology throughout the company and facilitating expansion of web-based systems.

Chubb went to some of the major IT firms who were its clients for advice on e-commerce trends and emerging strategies. The result was the structure shown in Figure 1 below. The dispersed business people with e-commerce expertise were pulled together into a single unit under Mr. Verniero. The technology people with such expertise were grouped into an e-commerce group under the VP IT (E-Commerce), Ms. Deb Bronson. The result was the structure shown in Figure 1 below.

Ms. Bronson's group "owned" the infrastructure and security systems, as well as the e-commerce tool set. It housed the company's e-commerce technical experts. The group was responsible for developing and maintaining infrastructure, and establishing standards. Its members also led development of a business unit's first e-commerce applications. Their objective, however, was to develop the business unit's own IT group into one that capable of building and maintaining its own e-commerce applications.

⁴ EDI is treated separately, as a long-standing and well-developed set of applications within the company.

Figure 1: Chubb E-Commerce Structure



Mr. Verniero’s group was responsible for defining business applications strategy. He was granted two ‘home office’ e-commerce business analysts and a team of e-commerce field consultants who deployed the applications in the field and brought ideas back in from agents and brokers. His group also gathered input from the staff of the various business units across the company.

Boise Cascade Office Products Corporation

Company Description: Boise Cascade Office Products is a major office products supplier, based in the US. The company employs 12,000 people and had 1998 sales in excess of \$3 billion (U.S). It competes in three industry sectors. The “contract stationery” sector involves sales force and catalog sales to large businesses with delivery direct to the customer. The “direct mail” sector serves small businesses and home offices. The “storefront/retail” sector generates sales in a retail outlet. From BCOP’s perspective, e-commerce overlaps all three sectors.

E-Commerce Applications: Boise Cascade has been an industry leader in electronic commerce since the mid-1980’s. E-Commerce began at that time with traditional electronic data interchange systems connecting corporate customers directly to Boise Cascade. Over time, e-commerce started moving toward PC-based systems operating on LANs, and BCOP began offering LAN-based ordering systems to its customers. Eventually, technology developed to a point where the web became a feasible business-to-

business technology. BCOP customers began asking for web-based ordering capability. Again, BCOP led the industry in providing web-based functionality to its clients via a system known as I-97, which was launched in 1997.

Today, the company operates a two-step web-based ordering system. Approved customers can access the Boise catalogue on-line via id and password. They then place orders directly over the Internet (fax and phone ordering is also supported). The orders accumulate on the web server. Every ½ hour, new orders are stripped off the web server, formatted according to ANSI EDI standards and entered into BCOP's AS400-based EDI translation job stream.

BCOP is moving into support for international partners. Boise Australia, for example, runs an I-97 system based on the Australian version of the Boise catalogue. In reality, Australian web customers interact with the web server in Chicago. As with US orders, the online orders accumulate on the Illinois web server and are stripped off every ½ hour. Once formatted, they are transmitted via FTP over a private line to Boise Australia's operations systems.

E-Commerce Organization Structure and Internal IT Role: BCOP has a large IT group (270 employees) with responsibility for numerous legacy and emerging operational systems. The applications they control are primarily large mainframe and AS400 systems – systems with efficiency as the primary objective and maintenance/fine tuning as the major ongoing tasks. The IT group is working on new initiatives in the areas of data warehousing and other systems, but still focusing primarily on AS400 or mainframe technologies.

The IT group has an image of one whose core competence is traditional data processing and computer operations, as opposed to moving rapidly into leading edge and volatile technologies and skills. BCOP spends on training and upgrading of its IT staff, but generally in the areas related to existing or near future job requirements rather than training individuals on emerging technologies. The group is skilled, conscientious and hard-working, but not necessarily innovative or risk-taking.

With the first moves into EDI, responsibility fell to the sales force to “sell” customers on the benefits of adopting that technology to do business with BCOP. The company recognized that they needed representatives who could relate well to customer concerns, take a marketing view of EDI, and still answer technical questions about the systems and process. As a result, the EDI initiative was moved into Marketing. Staffing, training, system design and all related activities fell under the aegis of Marketing where it has continued to this day.

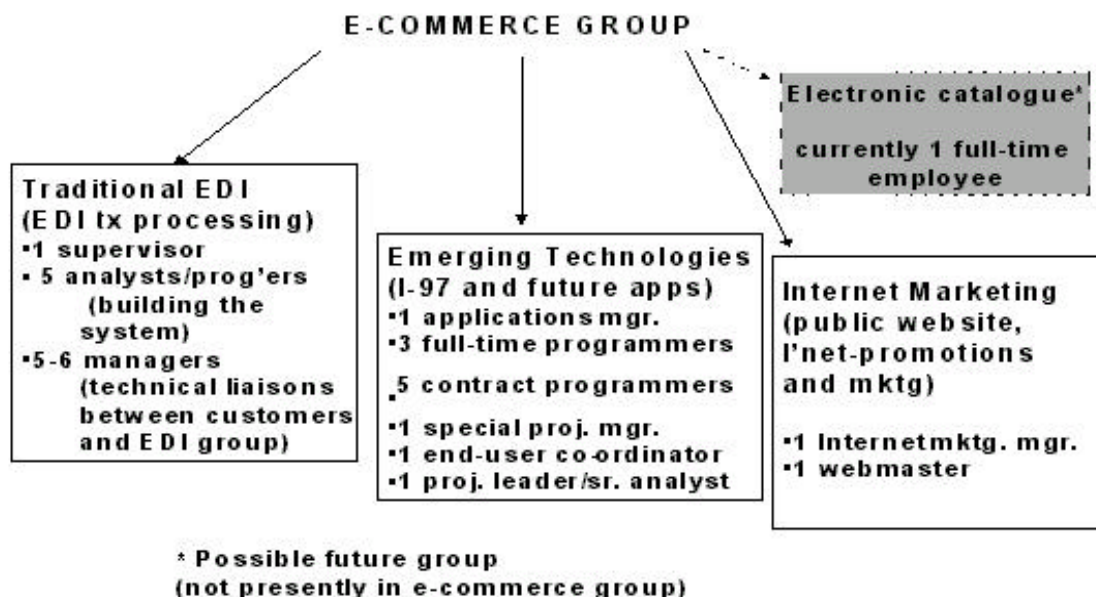
BCOP believes that, with each evolution of e-commerce, its strategic significance has grown, as has the need for a marketing perspective on the introduction and implementation of the systems. Hence, responsibility for such systems still seem to be a better fit in Marketing than in IT area, where the emphasis is on maintenance and efficiency. In addition, because the e-commerce group has evolved outside the

IT group and the functional discipline, it is more flexible and less tied to traditional procedures, methodologies and standards.

The e-commerce group consists of three sub-groups, as shown in **Figure 2** below. The “Emerging Technologies” group is responsible for the development of the business-to-business e-commerce applications. It was originally structured to include a small core of programmers (full-time BCOP employees). These programmers were augmented by contract programmers on an as-needed basis. This structure would allow for easy reduction of personnel when the “major” development work was done on I-97. In reality, the contract programming complement ran at 13 during the 1-97 initial development then dropped off to 5. Since that reduction, it has remained relatively stable. The need for development work and upgrades to adapt to new technologies means that there really hasn’t been a another decline in workload. It costs BCOP more to use contract programmers for this work than it would to have permanent employees and less flexibility in staffing. However, salary and internal personnel policies make the use of contract programmers more effective in a volatile market of high demand and low labor supply.

BCOP has recently modified its structure, and there has been discussion around other possible re-organization. Specifically, the hardware/network/OS support functions have been shifted to IT from the e-commerce group. These are seen as primarily “operational” functions with efficiency objectives, and thus better performed by the IT group. Increasing emphasis on electronic, rather than print, catalogues has prompted consideration of the future placement of the e-catalogue function for three reasons. First, the online side of the business and use of the electronic catalogue by strategic e-commerce applications is growing. Second, there is increasing demand for “custom” catalogues tailored to major clients who then want to access the custom catalogue (rather than the broader catalogue) via I-97. Finally, print catalogues are expected to decline in significance and importance as the online business grows.

Figure 2: BCOP E-Commerce Structure



A final area of discussion related to e-commerce structure is the possibility of moving the EDI function back under the IT group. The sense is that the traditional EDI applications and practices are well-established. Future success with traditional EDI will come from operational efficiency and effectiveness (the strengths of the IT group), rather than new strategic developments in that arena.

Grand & Toy

Company Description: Grand & Toy is Canada's leading commercial and retail office products company, with offices and retail outlets across the country. Headquartered in Don Mills, Ontario, Grand & Toy is a wholly owned subsidiary of Boise Cascade Office Products. It employs 2,100 individuals in 90 locations (corporate, sales, and retail). Like BCOP, Grand & Toy competes primarily in the contract stationery segment of the office products market. BCOP has divisions and subsidiary structures competing in the catalogue, direct mail and retail segments. Grand & Toy, on the other hand, competes in catalogue and retail under the Grand & Toy name. It recently relaunched its direct mail operation under the name "The Stockroom", to make direct mail look more like a separate company. Retail is a small part of the Grand & Toy mission – its retail outlets exist primarily to provide a convenient source of supplies for major clients who need to buy a few one-time items or occasional immediate replenishment. Essentially, the retail arm provides added value to the Grand & Toy service for major clients, but also ends up selling to walk-ins.

E-Commerce Applications: Grand & Toy provides e-commerce support through four applications. The first is "Order Point." This online ordering system evolved from PC-LAN roots to the current web-based application. It has been running in full production mode over the Internet since 1996. Customers must be directed to the OrderPoint website, as there are no hyperlinks to it from the company's brochure site at www.grandtoy.com. Grand & Toy account representatives provide customers with ids and passwords, as well as the URL to gain access to OrderPoint. Like the BCOP system, the application does live calls to the product database that resides on the AS/400 as needed and accumulates orders on the web server. It then periodically strips out the web orders and sends them to the AS/400 order processing application.

Second, Grand & Toy operates a traditional EDI system for communication with its vendors. Third, it offers an application called "G&T Link." The Link application gives large corporate customers direct, dial-in access to the Grand & Toy mainframe databases. Once connected, the client can check order status, inventory levels, account data, and other information about their dealings with Grand & Toy. Finally, Grand & Toy is soon to launch an application called "G&T Connect". Also web-based, Connect will allow small businesses to order directly over the web by setting up an account at grandtoy.com based on credit card billing. That system will eliminate the need for an account rep to visit the client, set up one

of the more flexible OrderPoint accounts, establish billing information, and provide the id/password/URL needed for the OrderPoint site.

E-Commerce Organization Structure and Internal IT Role: Grand & Toy has a legacy IT group consisting of approximately 50 employees. The company runs a single database and application base for its entire national operation. The IT group is, first and foremost, responsible for those mainframe databases and applications. As in BCOP, the group's principle strength is in mainframe operations and database management. The staff are responsible for running e-commerce hardware – maintaining the web server, managing the networks, and hardware/programming support for the mainframe-based and traditional EDI applications (such as billing, inventory control, order processing). The group also works with the e-commerce systems developers when new e-commerce developments trigger programming on the mainframe (such as interfaces between the web content and the product database).

E-commerce is managed by a 3-person team: a Business Development manager from the IT group, an E-Commerce Coordinator from the national sales organization (who also contributes ideas and suggestions that come directly from customers), and the Electronic Marketing Manager (from Marketing). This team makes the critical decisions about e-commerce function and design. Each sales branch has a representative whose responsibility is to provide e-commerce support to that branch's customers, relay requests, and carry out application demos.

The graphic design work for both the brochure website and the OrderPoint site was outsourced to the company that did Grand & Toy's print catalogues. Grand & Toy saw this as an obvious move. The designers already had all the necessary graphics, logos, etc., in digital form. It also had considerable layout and design experience. The graphic design company also did the straightforward html coding needed for the brochure site.

The OrderPoint site implementation was outsourced to a small Toronto web development company. OrderPoint was first programmed in 1995. At that time, html and web programming skills were in short supply generally, and Grand & Toy's IT group didn't have anyone with those skills. The web company was ready and able to deliver the site. Since then, Grand & Toy has continued the relationship, outsourcing all programming for its web-based ordering to the same firm. The relationship has worked well, and the e-commerce management team sees no need to change a satisfactory arrangement.

Where BCOP stresses the strategic opportunities presented by the web, Grand & Toy applications are more focused on improving the efficiency and effectiveness of existing channels. At the same time, Grand & Toy is constantly upgrading its services. For example, enhancements in progress include multi-drop shipment capabilities to allow different ship-to locations for individual line items on a single purchase order, increased functionality in standing order options, and expanded customer account enquiry options. These moves respond to customer requests for enhancements to the existing distribution channels

and systems, rather than new business initiatives. Grand & Toy is very strongly customer-focused in its approach, and that focus carries through in its e-commerce.

Summary of Structures and Proposed Conceptual Model

Each of the companies studied here adopted a different approach to implementing its e-commerce. Kenonic Controls, for example, began with a project-based design, using a small team drawn from the IT group. Because Kenonic's application began as a client project and the IT group had strong systems skills, the company used existing staff and structures for its development. Eventually, however, the project team became a product team. The membership of the team changed little, and the employees are identified with the IT group. But they are clearly charged with the development and enhancement of e-commerce products and subject to product (rather than project) management procedures and standards.

Chubb Insurance's IT organization had been building systems for internal users for more than 30 years. They were transaction-focused and tailored to the needs of specific functional areas. In developing its e-commerce model, Chubb went with a dual structure. The technology group handles the technical aspects of web implementation. It is responsible for developing and maintaining infrastructure and for establishing standards. At the same time, the business opportunity identification and development are handled by an internal, but non-IT, group.

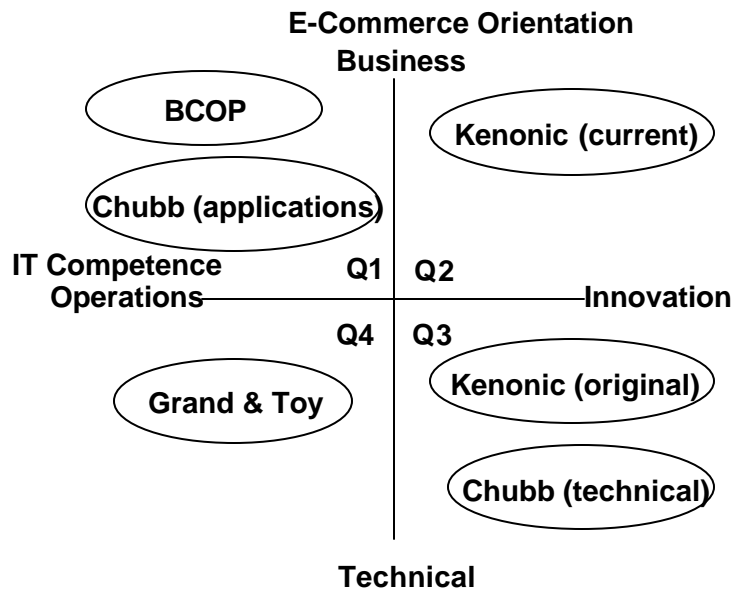
Boise Cascade Office Products' internal IT group was strong in efficiency and maintenance. Staffing, training, system design and all related activities fell under the aegis of Marketing where it has continued to this day. BCOP believed that the strategic significance of e-commerce had grown with each enhancement. So did the need for a marketing perspective on the introduction and implementation of the systems. Hence, the company created a new unit outside IT and hired web technical expertise from outside the company into the new unit.

Grand & Toy's IT group was strikingly similar to that of its parent, Boise Cascade. While smaller, the group represented about the same proportion of total employees. It demonstrated the same strength in building and maintaining efficient transaction-processing systems. Yet G&T saw web-based e-commerce as primarily a new delivery mechanism for existing services, while BCOP saw it as opening up significant new business opportunities. Thus, G&T chose to outsource, rather than build, its web systems.

There was no a priori public information to suggest that the companies in the Phase I interviews would each represent distinct e-commerce structures. They were selected because they had been successful in implementing "clicks and mortar" e-commerce in the business-to-business arena. However, the data gathered in the Phase I interviews suggests the two dimensions shown in the model of **Figure 3**.

First, did the company see e-commerce as an opportunity to create new businesses or business models? Or did the firm see e-commerce as a technical application using new technologies to deliver existing products and services? Kenonic and BCOP, for example, saw the Web as a platform for developing entirely new products or services. G&T, on the other hand, saw it primarily as a means to deliver existing products and services. Chubb viewed it both ways.

Figure 3: Firm Positioning

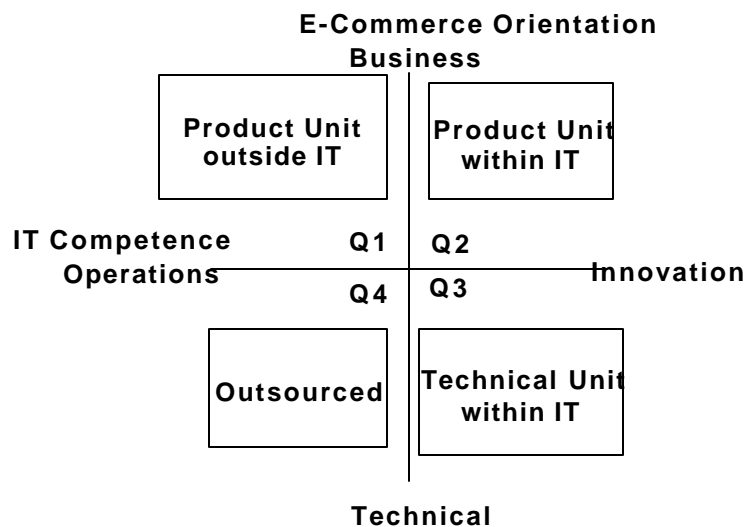


Second, what was the company's existing IT competence? Was IT noted for its leading edge skills, business orientation and ability to innovate – the innovation perspective? Or was it primarily involved in providing technical support to well-established systems with well-understood technologies – the operations perspective? Kenonic specialized in leading edge systems development based on complex and evolving technologies. E-Commerce executives at BCOP and G&T described their IT groups as excellent at maintaining legacy and mainframe systems. Those groups were not proficient in web-based technologies and were uninterested in improving skills in that area. Chubb had a large organization skilled in traditional technologies and systems, but had also spawned a subset of technical staff who developed sophisticated technical skills in e-commerce.

Figure 3 positions the four companies described here on the model. Kenonic had strong skills in state of the art IT, but began e-commerce with an application requested by a customer. The application

was a technical project, and Kenonic used an IT project team to implement it. When it became clear that e-commerce applications represented significant new business opportunities, Kenonic created an e-commerce product unit within the IT group. BCOP also saw e-commerce as a business opportunity, but had an IT group whose major competence was operational. BCOP implemented e-commerce by developing an in-house group under the marketing area, with IT personnel hired from outside the company for their e-commerce skills. G&T, with the same IT competence but a technical perspective on e-commerce, outsourced its applications. Chubb, with its dual orientation and IT competence, built two structures. The product/application development work fell to an e-commerce group under Marketing. Technical e-commerce activities (network development, website design training, database programming) went to a subgroup of IT comprising employees who had independently upgraded their e-commerce skills. The technical group reported to the VP IT, who shared e-commerce management responsibility on a peer basis with the VP Marketing.

Figure 4: Conceptual Model



Generalizing from these cases leads to the model shown in **Figure 4**. This conceptual model suggests that appropriate firms can be placed into one of the four quadrants of the model and appropriate e-commerce structures chosen accordingly. Firms that fall into Quadrant 1 (business/operations) will rely on an in-house e-commerce group, separate from the traditional IT organization. Although the orientation and skill set of the IT group is not consistent with the needs of e-commerce, the firm will resist outsourcing a significant new business opportunity. Firms in Quadrant 2 (business/innovation), on the other hand,

other hand, are well-positioned to create an e-commerce group under the umbrella of the company's IT group. Firms in Quadrant 3 (technical/ innovation) will be most effective if e-commerce initiatives are treated as projects within the existing IT organization. The applications do not represent dramatically new strategic initiatives that would call for a separate organization within IT. Instead, they can be handled by the company's IT group within the framework of support for current applications. Finally, those in Quadrant 4 (technical/operations) are best served by contracting out the e-commerce development. Without the leading edge skills in-house, the firm will be unable to implement e-commerce projects quickly. At the same time, the applications are unlikely to have such strategic impact that the company would be concerned about bringing them to the attention of a third party. The firm is also unlikely to build a new in-house group to handle implementation of a new channel. Hence the suitability of outsourcing.

Phase II – Reviewing the Literature

The next step in developing and testing a robust model is integrating it with other theoretical and empirical research. E-commerce is a relatively recent phenomenon, and we do not have a large body of work directly focused on e-commerce structure/implementation issues. Best known, perhaps, is the work of Kalakota and his various co-authors. Though largely concerned with e-commerce strategy and marketing or customer service tactics, they have put forward some propositions and advice regarding organizational design issues. For example, Kalakota and Whinston (1997) proposed that new organizational structures would be required so firms would be flexible enough to respond to market requirements. They asserted that firms would need to decide whether the management of web-based business activities was “a business operations issue where efficiency is key, or a software development issue where creativity is crucial” (p. 28). More recently, Kalakota and Robinson (1999) wrote extensively on e-business strategy and provided what they called a “roadmap” for implementing that strategy. Their book gave detailed advice on how to derive and justify an e-business plan. Yet, with the exception of exhorting companies to outsource to maintain flexibility (p. 40) but not rely too heavily on consultants (p. 90), it provided almost no specific advice on how companies with legacy systems and established IT departments should actually build e-commerce applications.

Research has been going on in related areas for many years, however, and that work may prove fruitful in our efforts to develop and test a general model of e-commerce structure. As part of this second phase of the CRITO project, we are examining literature from areas that include project management, IT management in general, and IT outsourcing. The literature in these fields tends to overlap and interact. In addition, they frequently consider potential effects of various contingencies on effective organizational structure. Such studies are especially relevant because we believe that the nature of the IT department in-

fluences e-commerce implementation. Thus far, we have begun reviewing work in five areas, which follow.

New technology adoption: The first topic we have begun exploring is literature on the adoption of other new technologies, notably the closely related areas of client-server computing, telecommunications, and local area networks. Adler and Shenhar (1990) indicated that managers need a framework for assessing the much broader question of how well their organizations are positioned to derive competitive advantage from technology. They presented a step-by-step guide to lead managers through the four components of the technological base. In doing so, they counseled managers to assess technological assets, organizational assets, external assets, and project management. Of the four dimensions, they concluded that organizational assets usually proved to be the limiting element. Among those organizational assets, five specific elements were important -- skills, procedures, structure, strategy, and culture. This may apply to e-commerce prescriptive characteristics, particularly as it relates to the IT competence dimension of the model.

Project and general IT management: Long before e-commerce, companies faced mounting pressure from many sources to abandon bureaucratic forms of organization in favor of flexible project-based structures (Partington, 1996). Kalakota and Robinson (1999) and Kalakota and Whinston (1997) are among others who pointed out the need for flexibility in e-commerce in particular. Our work will tap into this literature in its efforts to predict what forms may, in fact, be more effective than traditional designs.

In the IT management literature, many authors have studied how project management and other systems implementations efforts affect organizational structure. We expect this literature to suggest factors relevant to the implementation of e-commerce. For example, Bishop (1999) identified the characteristics of successful cross-functional project teams and characteristics of typical functionally aligned organizations, and showed the relationship between them. In some cases, e-commerce implementation may be done by cross-functional project teams, making Bishop's work a potential source of insight.

Organizations often try to achieve a more flexible and responsive nature by integrating project management work into a conventional or line organizational culture. Firth and Krut (1991) found that integration of a project management culture offered a powerful means to strengthen many large organizations. The success or failure of outsourcing e-commerce may be tied to the effectiveness of project management culture. Jolivet and Navarre (1996) described classical project management and then, for comparison, outlined an alternative approach, all of which was designed to help managers find the right form of management approach for their large-scale projects. Such evaluation of alternatives will, we believe, fuel our analysis and prediction of effective e-commerce implementation.

Outsourcing: Many consultants have exhorted companies to jump on the outsourcing bandwagon when implementing e-commerce. The advantages of outsourcing have been widely debated in IT for

some time now, and whether a given company should outsource its e-commerce is an important aspect of our work. Lacity and Willcocks (1999) showed that organizations that invited both internal and external bids experienced a higher success rate than did those that chose total outsourcing or total insourcing. This would suggest that certain quadrants of our proposed model would be inherently less effective. However, such predictions will also depend on knowing the strength of the insourcing and outsourcing options.

It may prove useful to understand each company's business and its typical approach to IT outsourcing. Pinnington and Woolcock (1995) presented drivers for IT outsourcing (the organizational structure of the IT function, human resource management, and the changing organizational ownership of IT competencies) for twelve companies in the 'Times 150'. Their work will undoubtedly provide guidance in our expanded model development.

McLeod (1995) noted that firms were beginning to pursue strategies that disbursed more and more of their information resources throughout the organizational units. These strategies also gave information processing responsibilities to outsourcers. The conclusions from that work may also help us identify effective e-commerce implementation strategy on the basis of the IRM characteristics of the companies in question.

Organizations are primarily driven toward outsourcing by a desire for cost rationalization, particularly by achieving economies of scale and operational efficiencies. Takac (1994), in an analysis of outsourcing information technology services, concluded that outsourcing made it easier to restructure an organization in several ways. Those included:

- Outsourcing made it easier to achieve growth through mergers and acquisitions;
- It sometimes made it easier to downsize;
- It improved the prospect of selling a business unit; and
- It led to tighter linking of strategy and information technology.

But according to McLellan and Marcolin (1994), outsourcing was not a solution to poor management and was fraught with risk. Those risks included technology skill stripping, loss of strategic control, risk of technological obsolescence, and limiting of long-term flexibility.

A significant area for our work will be the conditions that promote outsourcing or predict when firms will outsource an activity. Loh and Venkatraman (1992) developed a research model on the determinants of IT outsourcing by firms. However, this work was directly contradicted by the later work of Hu, Saunders, and Gebelt (1997) who thought that examining IT outsourcing using the theories of innovation diffusion would be fruitful. They explored the sources of influence in the adoption of IT outsourcing. Their work then tested three hypotheses of influences, using four different diffusion models.

CIOs continue to consider the option of outsourcing their organizations' IT needs instead of blindly assigning projects to their IT department. For years, outsourcing has been a feasible and attractive alternative for IT departments confronted with one or more of the following situations:

- a dire and immediate need to reduce or stabilize costs,
- a critical shortage of IT talent within the organization,
- a lack of strategic advantage in the given IT function,
- an organization that is not equipped to respond to and stay abreast of the technology needed to remain competitive in its market,
- an organization in which the time and talent of the IT experts are spent in maintaining old products rather than creating new ones, or
- hiring freezes.

We have seen the influence of the talent shortage, internal shortcomings in technology readiness, and competing demands for the time of the IT experts already in our preliminary cases. We thus expect these factors to appear again in the broader study.

Gupta and Gupta (1992) asserted that integrating external data with internal information would be essential for managers to make solid decisions, and this in turn would spur a renewed interest in outsourcing. This may be as true today in e-commerce solutions as it was in the early part of the decade of the 90s.

Today's e-commerce articles debate who should manage e-commerce strategy, just as those in the 1980s debated who should manage IT generally. Dearden (1987) hypothesized that the economics of information technologies were changing, and as a result, the centralized IT department was becoming obsolete. He said that users would completely control individual systems, and systems development would be done almost entirely by outside software specialists. However, he went on to say that companies with large IT departments would not dismantle them. Those corporations would establish independent IT profit centers or independent subsidiaries that would compete both inside and outside the company. This may be an appropriate approach for companies in a position to obtain both internal and external bids on e-commerce development projects.

Organizational and IT Design: Organizational design is a critical factor in strategic information systems. Traditional IT structures cannot cope with continual change and the rapid horizontal introduction and utilization of information technologies (Boar, 1998). In information systems and organization theory research, the alignment or fit between information technology (IT) and organizational structure has long been hypothesized to be essential for success. Researchers have found that IT sophistication is positively related to structural sophistication, IT usage is positively related to organizational performance, and the

relationship between IT management and structural sophistication is stronger among the better-performing firms than among the worst-performing firms (Raymond, Pare, and Bergeron, 1995). We hope our work will offer prescriptive advice for successful structures to support e-commerce.

The increasing globalization of business has led firms to seek new, and more appropriate, organizational structures, processes, and cultures. King and Sethi (1999) offered an understanding of the organization of information systems in organizations whose activities cross national boundaries. Their results supported the proposition that IT configurations in multinational corporations reflect the organizational characteristics of centralization, dispersal, and coordination differentially.

IT structure may very well influence the way an organization should pursue its e-commerce implementation. Fiedler, Grover, and Teng (1996), identified four IT structures: centralized, decentralized, centralized cooperative, and distributed cooperative. They then derived a taxonomy of IT structure with implications for matching information technology and organizational structures. The taxonomy is based on the degree of centralization of computer processing, capability to support communications, and the ability to share resources, and may help to predict the most effective e-commerce implementation structure for an organization.

Sloan and Green (1995) showed that manufacturing organizations must create the optimum IT architecture and computing infrastructure and adopt an organizational structure that reflects its new primary product: information delivery. They also described the steps required to move an IT organization toward information delivery. Those steps depended on current IT business practice and how quickly the IT and business cultures could accept change. Although the individual paths might differ, the overall goal would be to establish sustainable change in both the technology and the human processes.

Identifying the best way to organize the information systems (IT) functions within an enterprise has been a critical IT management issue since the mid-1980s. Brown and Magill (1994) conducted a study to explain a firm's IT organization design decision for a decentralized, centralized, or hybrid locus of responsibility. They looked at an expanded set of environmental, overall organizational, and IT-specific antecedents as well as a larger concept of organizational alignment. They selected potential antecedents (drivers or enablers) from prior contingency research and the IT literature; other variables emerged from the data collected. They confirmed that centralized, decentralized, and hybrid IT structures existed, but often not in pure form. Furthermore, they found industry type was not a strong predictor of IT structure. We are thus encouraged to look for complex structures in the companies we study, and we would expect to see the structures emerge independent of industry.

The proper alignment between organization and information systems (IT) structure is critical to achieve flexibility and efficiency in competitive and turbulent environments, as seen in e-commerce. Lee and Leifer (1992) developed a framework to explain this alignment, based on the concept of information

sharing. They classified IT management into four modes: centralized; decentralized; hybrid; and inter-organizational. IT can be effective as coordinating mechanisms, along with rules, hierarchy, planning, and teams. Dispersed IT groups may be located below the business unit level, where IT professionals can work closely with each functional unit, controlling applications and data generated by each project team. We may also gain insight from the work of Clark (1992) who looked at the evolution of the IT organizational structure stemming from the dispersion of IT management and resources. Similar principles may be applied to the evolution of IT organizational structure in concert with e-commerce implementations.

Business Process Re-engineering: One objective of our work is to aid in the organizational restructuring that many organizations will face when they implement e-commerce. Previous authors (Malone, et al., 1999) have tried to put together a handbook to help people redesign existing organizational processes, invent new organizational processes, and share ideas about organizational practices. This work in the area of business process re-engineering (BPR) may yield useful ideas for our own project.

Sifting through vendor promotional hype and identifying the best set of techniques and tools for a particular e-commerce project can be a daunting task. Kettinger, Teng, and Guha (1997) investigated BPR methods, techniques, and tools (MTT) and placed them in a reference framework. The comprehensive picture of BPR emerged included MTTs that help in reengineering strategy, people, management, structure, and technology dimensions and may be relevant to our ongoing work.

Some organizations developing e-commerce may restructure their business processes in order to succeed. The majority of business process reengineering projects fail because they are implemented tactically, rather than being closely linked to corporate strategy. To produce meaningful results, reengineering must be driven by corporate strategy and supported at the highest levels of the organization. Manganelli and Raspa (1995) described a successful implementation team. That team began reengineering by focusing on the needs and wants of its existing customer base, which is what drives many of the e-commerce initiatives. The approach drew upon pre-existing improvement programs and touched on four major areas in the company: redesigning the process; restructuring the organization; reorienting individuals; and recreating the corporate culture. The new design met, and in some cases exceeded, the breakthrough goals established at the start of the project. Lessons can be employed from that study in future e-commerce initiatives that include BPR as part of the development.

The role of IT is different when a business reengineering approach is taken. In most successful reengineering projects, the technology is viewed not as a solution, but as an enabler, and the information systems staff plays the role of a catalyst. Huff (1992) wrote that the central challenge of the process was to reconceive how the business should be conducted in light of the capabilities of current and near-term future information technology. This challenge remains particularly important today in light of the impact that e-commerce has on the way business is conducted.

Next Steps

To date, Dr. Grant has presented parts of this research to members of CRITO and to the Information Systems group's Research Colloquium at the Anderson School of Management at UCLA. She will be presenting it to the Anderson School's Executive Education program, "Managing the Information Resource", in March, 2000. She has also had a paper entitled, "E-Commerce Organizational Structure: An Integration of Four Cases", accepted for the upcoming conference of the Special Interest Group on Computer Personnel Research (Association for Computing Machinery) and will be presenting that in Chicago in April, 2000. Papers are also under development for submission to a major IT research journal and to the November, 2000, conference of the Decision Sciences Institute.

In the current stage of the project, the model describes the approaches of the four cases considered. It is purely grounded in data. One objective of ongoing work is to determine whether this is a robust descriptive (and ultimately normative) model. As such, it would indicate how effective firms in each of the quadrants structure their e-commerce implementation. A second prospect for the model is prediction. A predictive model would say that a firm using the structure proposed by the normative model would be more successful at implementing e-commerce than one using another structure. For example, is a firm in Quadrant 2 that uses an IT-based product unit (as depicted in Figure 1) more successful at implementing e-commerce than a firm in the same quadrant that outsources?

The next step in this project is to enhance the generality of the model by first integrating it with lessons from the studies described above and others yet to be collected. Using that model, we can then develop an expanded and more precise interview guide. Such a guide will permit us to collect data from numerous companies in a variety of industries, which we can then use to test the model's descriptive, normative, and prescriptive value. As we gather literature and develop the interview guide, we are also identifying industries and specific companies that will participate as research sites. These next steps will thus improve our understanding of the phenomena observed in Phase I and flag additional issues for research into the staffing, development, and delivery of e-commerce.

References

Adler, P. S. and Shenhar, A. "Adapting Your Technological Base: The Organizational Challenge," *Sloan Management Review* (32:1), Fall 1990, pp. 25-37.

Bishop, S. K. "Cross-functional project teams in functionally aligned organizations," *Project Management Journal* (30:3), September 1999, pp. 6-12.

Boar, B. H. "Redesigning the IT organization for the information age," *Information Systems Management* (15:3), Summer 1998, pp. 23-30.

- Brown, C. V. and Magill, S. L. "Alignment of the IS functions with the enterprise," *MIS Quarterly* (18:4), December 1994, pp. 371-403.
- CIO.com, "Creating a Business Model for E-Commerce", *CIO.com*, May 1, 1999, http://www.cio.com/sponsors/050199_1.html
- Clark, T. D. "Corporate Systems Management: An Overview and Research Perspective," *Communications of the ACM* (35:2), February 1992, pp. 60-75.
- Cohen, J. "E-constructionists", *The Industry Standard*, Sept. 20, 1999. http://www.cio.com/sponsors/050199_1.html
- Dearden, J. "The Withering Away of the IS Organization," *Sloan Management Review* (28:4), Summer 1987, pp. 87-91.
- Fabris, P. "The Perfect Host", *CIO Web Business Magazine*, Mar 1, 1999 http://www.cio.com/archive/webbusiness/030199_host.html
- Fiedler, K. D., Grover, V., and Teng, J. T. C. "An empirically derived taxonomy of information technology structure and its relationship to organizational structure," *Journal of Management Information Systems* (13:1), Summer 1996, pp. 9-34.
- Firth, G. and Krut, R. "Introducing a Project Management Culture," *European Management Journal* (9:4), December 1991, pp. 437-443.
- Gupta, U. G. and Gupta, A. "Outsourcing the IS Function: Is It Necessary for Your Organization?" *Information Systems Management* (9:3), Summer 1992, pp. 44-50.
- Hu, Q., Saunders, C., and Gebelt, M. "Research report: Diffusion of information systems outsourcing: A reevaluation of influence sources," *Information Systems Research* (8:3), September 1997, pp. 288-301.
- Huff, S. L. "Reengineering the Business," *Ivey Business Quarterly* (56:3), Winter 1992, pp. 38-42.
- Jolivet, F. and Navarre, C. "Large-scale projects, self-organizing and meta-rules: Towards new forms of management," *International Journal of Project Management* (14:5), October 1996, pp. 265-271.
- Kalakota, R. and Whinston, A. *Electronic Commerce: A Manager's Guide*, (Reading, MA: Addison-Wesley, 1997).
- Kalakota, R. and Robinson, M. *e-Business: Roadmap for Success*, (Reading, MA: Addison-Wesley, 1999)
- Kalin, S. "It's Not Easy Being B2B", *CIO Web Business Magazine*, Oct. 1, 1999 http://www.cio.com/archive/webbusiness/100199_infra.html
- Kettinger, W. J., Teng, J. T. C., and Guha, S. "Business process change: A study of methodologies, techniques, and tools," *MIS Quarterly* (21:1), March 1997, pp. 55-80.
- King, W. R., and Sethi, V. "An empirical assessment of the organization of transnational information systems," *Journal of Management Information Systems* (15:4), Spring 1999, pp. 7-28.
- Lacity, M. C. and Willcocks, L. P. "An empirical investigation of information technology sourcing practices: Lessons from experience," *MIS Quarterly* (22:3), September 1998, pp.363-408.
- Lee, S. and Leifer, R. P. "A framework for linking the structure of information systems with organizational requirements for information sharing," *Journal of Management Information Systems* (8:4), Spring 1992, pp. 27-44.

- Loh, L. and Venkatraman, N. "Determinants of information technology outsourcing: A cross-sectional analysis," *Journal of Management Information Systems* (9:1), Summer 1992, pp. 7-24.
- Lovatt, M. "Herding Cats: A case study on the development of Internet and Intranet strategies within an engineering organization" *Proceedings of SIGCPR 1997* (San Francisco: 1997), pp. 104-109.
- Lucas, H. C. and Baroudi, J. "The role of information technology in organization design," *Journal of Management Information Systems* (10:4), Spring 1994, pp. 9-23.
- Malone, T. W., Crowston, K., Lee, J., Pentland, B., et al. "Tools for inventing organizations: Toward a handbook of organizational processes," *Management Science* (45:3), March 1999, pp. 425-443.
- Manganelli, R. L. and Raspa, S. P. "Why reengineering has failed," *Management Review* (84:7), July 1995, pp. 39-43.
- McLellan, K. and Marcolin, B. "Information technology outsourcing," *Ivey Business Quarterly* (59:1), Autumn 1994, pp. 95-104.
- McLeod, R. "Systems theory and information resources management," *Information Resources Management Journal* (8:2), Spring 1995, pp. 5-14.
- Null, C., "How to Select an E-Commerce Strategy for your Business", *MicroTimes*, 1999, <http://www.microtimes.com/189/ecom.html#howto>
- Paul, L.G., "E for Two", *CIO Magazine*, Feb 15, 1999, http://www.cio.com/archive/021599_ecom.html
- Partington, D. "The project management of organizational change," *International Journal of Project Management* (14:1), February 1996, pp. 13-21.
- Pinnington, A. and Woolcock, P. "How far is IS/IT outsourcing enabling new organizational structure and competencies?" *International Journal of Information Management* (15:5), October 1995, pp. 353-365.
- Raymond, L., Pare, G., and Bergeron, F. "Matching information technology and organizational structure: An empirical study with implications for performance," *European Journal of Information Systems*, (4:1), February 1995, pp. 3-16.
- Sloan, R. L. and Green, H. H. "Manufacturing decision support architecture," *Information Systems Management* (12:1), Winter 1995, pp. 7-16.
- Smith, P., "Let Someone Else Do It", *The Industry Standard*, Nov. 9, 1998. <http://www.thestandard.net/articles/display/0,1449,2378,00.html>
- Takac, P. F. "Outsourcing: A key to controlling escalating IT costs?" *International Journal of Technology Management* (9:2), 1994, pp. 139-155.
- Thompson, M.J., "Tracking the Internet Economy: 100 Numbers You Need to Know" *The Industry Standard*, Sept. 13, 1999. <http://www.thestandard.com/metrics/display/0,1283,978,00.html>