

STRUCTURING FOR E-COMMERCE SUCCESS:

PRELIMINARY MODELS

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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 eCommerce. “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 evolving environment.

The role of the Information Technology¹ (IT) unit in established businesses is particularly interesting. Is eCommerce so unique or volatile that it should be outsourced entirely? Or should the company develop eCommerce internally? If so, should it rely on new employees or retrain existing staff? If the development is kept in-house, should it be in a separate eCommerce 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 eCommerce is still a relatively recent phenomenon and many of the recommendations are anecdotal; they are often based on experiences with one or two firms, or are relevant primarily to the Greenfield dot-coms. In addition, while eCommerce strategy permeates research journals and the trade press, research focused on eCommerce system implementation is still rare.

Our project studies the organizational design and system development/delivery issues facing established businesses moving into eCommerce. 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 eCommerce?, 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?

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

This paper reports on the first phase of 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 eCommerce activities, the structures they used to implement eCommerce, 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 preliminary review of literature and related theory. 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 eCommerce. 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 eCommerce. The business-to-business arena represents approximately 90% of electronic trade (Thompson, 1999). Thus, it is 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. We are 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 eCommerce if they have not done so for any of their other IT applications. Third, the research looks at firms that have been actively engaged in eCommerce 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

eCommerce (whether or not they also have more traditional network systems such as EDI). While eCommerce 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.

Phase I – The Background Cases²

Phase I began with a series of interviews to gather detailed background information about eCommerce structures in use by major firms. In preparing for a broader study, we used a judgement sample of four North American businesses (two from the U.S. and two from Canada). Two of the firms were identified in a white paper on successful players in business-to-business eCommerce. The third was a wholly owned subsidiary of one of these first two and was included in the interviews at the suggestion of the parent company's eCommerce executive. The fourth was of particular interest as an early Canadian entrant into the field of web-based eCommerce.

In each company, our key informant was the executive most directly in charge of implementing eCommerce and deciding how to structure the eCommerce 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 eCommerce 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 eCommerce and why? Who is in charge of the groups that deliver/support eCommerce and eCommerce technology, and why?
- Where does the eCommerce unit reside in the overall structure and why?

² All names of companies, specific products and interview subjects have been disguised to maintain confidentiality.

A third topic had been suggested in preliminary discussions with industry partners of Center for Research on Information Technology and Organizations (CRITO). 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?

Participating Firms

Company 1: Technology and Software

Company Description: Technology and Software (T/S) was based in Calgary, Alberta. It identified itself as being four companies in one. First, it was an automation engineering consulting company. In that role, professional engineers and technologists designed integrated control systems using components from a wide variety of manufacturers for T/S's clients. Second, as a field service company, the firm built, commissioned and maintained control systems at client sites. The field service operation involved instrumentation technologists, electricians, and control system engineers. Thirds, as an information technology company, T/S provided information systems development services. Their IT specialists provided the database and programming expertise to integrate process data into corporate information systems and decision-making. Finally, as a Y2K consulting company, T/S worked with clients to assess and certify the Y2K compliance of various manufacturers' equipment.

T/S employed approximately 400 individuals and was entirely owned by its employees. It had 30-40 employees in the IT group, but also had technical and system development skill outside that functional group. The company managed more than \$200 million in automation capital annually.

eCommerce Applications: T/S 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, T/S does not publish extensive financial performance data in its reports or on its website.

T/S's next application on the web, which we've called Y2KFix, is the eCommerce project relevant to this research. At the request of a client, T/S developed a database application to permit the client to as-

sess the Y2K compliance of its field devices. The system was treated as a consulting project and developed in-house following the T/S's standard consulting project procedures and team structures. The project was carried out between January and April, 1998, by a team that included approximately five people in product support and two to three developers. While specific individuals moved in and out of the team over the project's life, it was always executed by employees in the IT group.

T/S had considerable expertise and experience in developing information systems to support the resource industries and automation engineers. As Y2KFix 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, Y2KFix 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 included information from manufacturers, information from projects where T/S was hired to do compliance testing, and validation data provided by T/S's engineers independent of specific client projects. By mid-1999, Y2KFix served over 900 users in 110 client organizations. The database grew to include more than 52,000 product items from 6,000 vendors.

eCommerce Organization Structure and Internal IT Role: Because Y2KFix 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 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. Karen Hanson. The membership of the team changed little; the employees were still internally considered to be employees of the IT group, rather than of a separate and autonomous eCom-merce group.

Company 2: Commercial Insurer

Company Description: Commercial Insurer was a Chicago-based commercial and personal insurance firm. By 1999, it was one of the largest insurers in the world, with 9500 property and casualty operating in more than 120 offices internationally. C/I had built a solid base of commercial and personal niche products. In its business-to-business operations, it offered such lines as insurance for directors & officers, financial institutions, law firms, personal collections and high-end homeowners, as well as standard commercial lines.³

eCommerce Applications: When considering the potential role of eCommerce, C/I looked at the strategic options of using eCommerce 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 eCommerce would be as a new channel mechanism to support the existing model. For its non-EDI eCommerce⁴, C/I defined a 4-tier approach:

1. *Informational uses:* using websites, CD-ROMs and kiosks to disseminate information, build credibility and provide useful information to readers.
2. *Basic commerce:* using eCommerce tools such as the web to generate leads, pull clients through C/I's traditional agent distribution channels, collect information from associations and affinity groups useful to specially designated agents, and execute targeted activities to promote client retention and gain trust.
3. *Transactional commerce:* using EDI, traditional network mechanisms and web-based systems to process transactions. In this category, C/I created interface capabilities that allowed agents and brokers to upload and download from their own agency management system to C/I'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 didn't compete with agents (such as travel insurance).

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

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

eCommerce Organization Structure and Internal IT Role: C/I had approximately 900-1100 employees in its IT organization throughout the world. The annual IT budget was in the range of \$95-100 million (US). The organization had been building systems for internal users for more than 30 years. These 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 were in groups, each of which was aligned to a business unit whose systems the group developed and supported.

In 1991, a new CIO joined C/I. 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-1990s 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 five individuals in the IT group, however, began acquiring free web tools and developed a C/I 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. C/I's CCO reported directly to the CEO, so the project had a very high level champion early on.

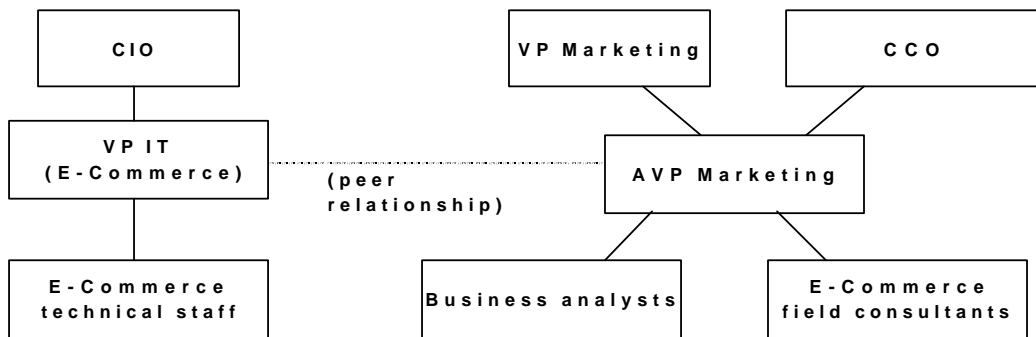
Mr. J.R. Constantine, Assistant VP Marketing, was involved from the beginning in his role reporting to both CCO and the VP Marketing. The group got permission to experiment with web technologies and seeded eCommerce efforts by developing pilots for carefully selected key users. Thus, momentum for broader 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 C/I's proprietary internal email system so that employees could communicate with external partners, agents, etc. In addition, the skunkworks eCommerce 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.

C/I went to some of the major IT firms who were its clients for advice on eCommerce trends and emerging strategies. The dispersed business people with eCommerce expertise were pulled together into a single unit under Mr. Constantine. The technology people with such expertise were grouped into an

eCommerce group under the VP IT (eCommerce), Ms. Laura Frenall. The result was the structure shown in Figure 1.

Figure 1: C/I eCommerce Structure



Ms. Frenall’s group “owned” the infrastructure and security systems, as well as the eCommerce tool set. It housed the company’s eCommerce 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 eCommerce applications. Their objective, however, was to develop the business unit’s own IT group into one capable of building and maintaining its own eCommerce applications.

Mr. Constantine’s group was responsible for defining business applications strategy. He was granted two ‘home office’ eCommerce business analysts and a team of eCommerce 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.

Company 3: US Office Supplier

Company Description: US Office Supplier (UOS) was a major office products supplier, based in the US. The company employed 12,000 people and had 1998 sales in excess of \$3 billion (U.S). It competed in three industry sectors. The “contract stationery” sector involved sales force and catalog sales to large businesses with delivery direct to the customer. The “direct mail” sector served small businesses and home of-

fices. The “storefront/retail” sector generated sales in a retail outlet. From UOS’s perspective, eCommerce overlapped all three sectors.

eCommerce Applications: UOS had been an industry leader in electronic commerce since the mid-1980’s. eCommerce began at that time with traditional electronic data interchange systems connecting corporate customers directly to UOS. Over time, eCommerce started moving toward PC-based systems operating on LANs, and UOS 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. UOS customers began asking for web-based ordering capability. Again, UOS led the industry in providing web-based functionality to its clients via a system we’ll refer to as OrderRoute, which was launched in 1997.

By Fall of 1999, the company operated a two-step web-based ordering system. Approved customers could access the UOS catalogue on-line via id and password. They then placed orders directly over the Internet (fax and phone ordering was also supported). The orders accumulated on the web server. Every ½ hour, new orders were stripped off the web server, formatted according to ANSI EDI standards and entered into UOS’s AS400-based EDI translation job stream.

UOS was moving into support for international partners. UOS Australia, for example, ran an OrderRoute system based on the Australian version of the UOS catalogue. In reality, Australian web customers interacted with the web server in Chicago. As with US orders, the online orders accumulated on the Illinois web server and were stripped off every ½ hour. Once formatted, they were transmitted via FTP over a private line to UOS Australia’s operational systems.

eCommerce Organization Structure and Internal IT Role: UOS had a large IT group (270 employees) with responsibility for numerous legacy and emerging operational systems. The applications they controlled were 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 was 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’s image was as a unit whose core competence was traditional data processing and computer operations, as opposed to moving rapidly into leading edge and volatile technologies and skills. UOS spent money training and upgrading 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 was 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 UOS. 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 remained.

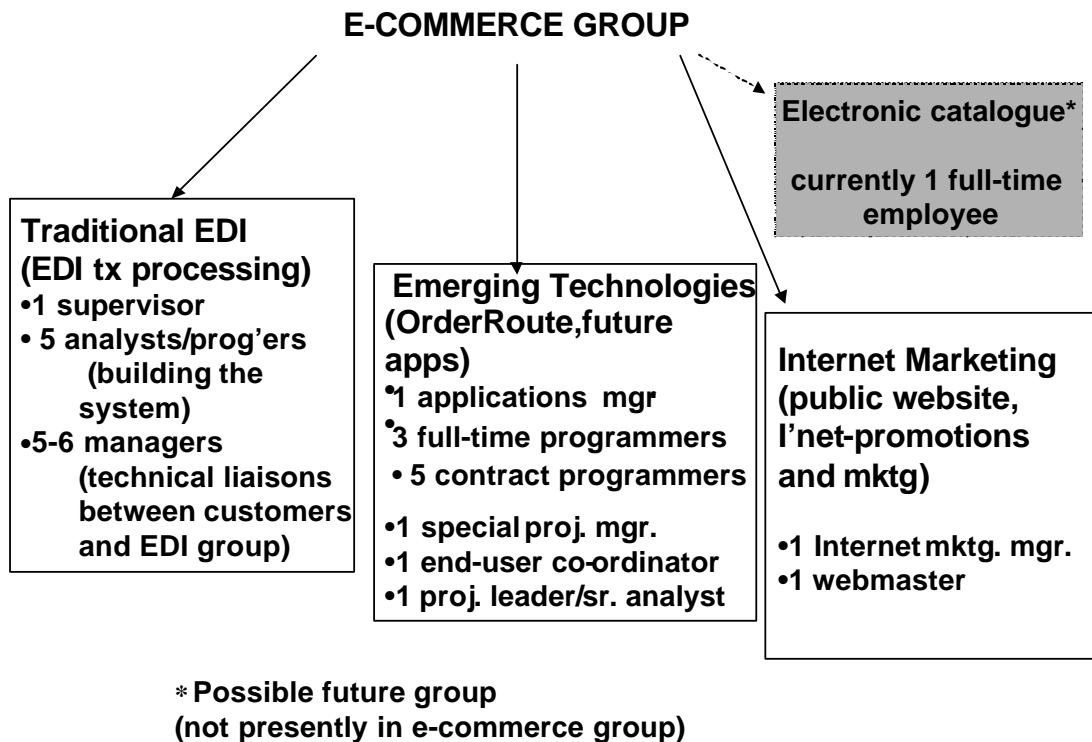
UOS believed that, with each evolution of eCommerce, its strategic significance grew, as did the need for a marketing perspective on the introduction and implementation of the systems. Hence, responsibility for such systems still seemed to be a better fit in Marketing than in IT, where the emphasis was on maintenance and efficiency. In addition, because the eCommerce group evolved outside the IT group and the functional discipline, it was more flexible and less tied to traditional procedures, methodologies and standards.

The eCommerce group consists of three sub-groups, as shown in Figure 2. The “Emerging Technologies” group was responsible for the development of the business-to-business eCommerce applications. It originally included a small core of programmers (full-time UOS employees). That core of programmers was augmented by contract programmers as needed. This structure would allow for easy reduction of personnel when the “major” development work was done on OrderRoute. In reality, the contract programming complement ran at 13 during the OrderRoute initial development then dropped off to five. Following that reduction, it remained relatively stable. The need for development work and upgrades to adapt to new technologies meant that there really wasn’t another decline in workload. It cost UOS 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 made the use of contract programmers more effective in a volatile market of high demand and low labor supply.

UOS had recently modified its structure, and there had been discussion around other possible reorganization. Specifically, the hardware/network/OS support functions were shifted to IT from the eCommerce group. These were seen as primarily “operational” functions with efficiency objectives, and thus better performed by the IT group. Increasing emphasis on electronic, rather than print, catalogues 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 eCommerce applications was growing. Second, there was increasing demand for “custom” catalogues tailored to major clients who then wanted to access the custom catalogue (rather than the broader catalogue) via OrderRoute. Finally, UOS expected print catalogues to decline in significance and importance as the online business grows.

Figure 2: UOS eCommerce Structure



A final area of discussion related to eCommerce structure was the possibility of moving the EDI function back under the IT group. Management sensed that the traditional EDI applications and practices were well established. Future success with traditional EDI would come from operational efficiency and effectiveness (the strengths of the IT group), rather than new strategic developments in that arena.

Company 4: Canadian Office Supplier

Company Description: Canadian Office Supplier (COS) was Canada’s leading commercial and retail office products company, with offices and retail outlets across the country. Headquartered in Ontario,

COS was a wholly owned subsidiary of UOS. It employed 2,100 individuals in 90 locations (corporate, sales, and retail). Like UOS, COS competes primarily in the contract stationery segment of the office products market. UOS had separate divisions and subsidiary structures competing in the catalogue, direct mail and retail segments. COS, on the other hand, competed in catalogue and retail under the COS name. It had recently relaunched its direct mail operation under a new name, to make direct mail look more like a separate company. Retail was a small part of the COS mission – its retail outlets existed primarily to provide a convenient source of supplies for major clients who needed to buy a few one-time items or occasional immediate replenishment. Essentially, the retail arm provided added value to the COS service for major clients, but also ended up selling to walk-ins.

eCommerce Applications: COS provided eCommerce support through four applications. The first was a system we call “QuickOrder.” This online ordering system evolved from PC-LAN roots to the web-based application. It had been running in full production mode over the Internet since 1996. Customers were given directions to the QuickOrder website, as there were no hyperlinks to it from the company’s brochure site. COS account representatives provided customers with ids and passwords, as well as the URL to gain access to QuickOrder. Like the UOS system, the application did live calls to the product database on the AS/400 as needed and accumulated orders on the web server. It periodically stripped out the web orders and sent them to the AS/400 order processing application.

Second, COS operated a traditional EDI system for communication with its vendors. Third, it offered an application we call “COS Link.” The Link application gave large corporate customers direct, dial-in access to the COS mainframe databases. Once connected, the client could check order status, inventory levels, account data, and other information about their dealings with COS. Finally, COS was building an application we’ll refer to as “COS Connect”. Also web-based, Connect would allow small businesses to order directly over the web by setting up an account at cos.com based on credit card billing. That system would eliminate the need for an account rep to visit the client, set up one of the more flexible QuickOrder accounts, establish billing information, and provide the id/password/URL needed for the QuickOrder site.

eCommerce Organization Structure and Internal IT Role: COS had a legacy IT group consisting of approximately 50 employees. The company ran a single database and application base for its entire national operation. The IT group was, first and foremost, responsible for those mainframe databases and applications. As in UOS, the group’s principle strength was in mainframe operations and database manage-

ment. The staff were responsible for running eCommerce 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 worked with the eCommerce systems developers when new eCommerce developments triggered programming on the mainframe (such as interfaces between the web content and the product database).

eCommerce was managed by a 3-person team: a Business Development manager from the IT group, an eCommerce Coordinator from the national sales organization (who also contributed ideas and suggestions that came directly from customers), and the Electronic Marketing Manager (from Marketing). This team made the critical decisions about eCommerce function and design. Each sales branch had a representative whose responsibility was to provide eCommerce support to that branch's customers, relay requests, and carry out application demos.

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

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

Where UOS stressed the strategic opportunities presented by the web, COS applications were more focused on improving the efficiency and effectiveness of existing channels. At the same time, COS was constantly upgrading its services. For example, enhancements in progress at the time of the research interviews included 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. The new functions were a response to customer requests for enhancements to the existing distribution channels and systems, rather than new business initiatives. COS was very strongly customer-focused in its approach, and that focus carried through in its eCommerce.

Summary of Structures and Proposed Conceptual Model

Each of the companies studied here adopted a different approach to implementing its eCommerce. T/S, for example, began with a project-based design, using a small team drawn from the IT group. Because T/S'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 were identified with the IT group. But they were clearly charged with the development and enhancement of eCommerce products and subject to product (rather than project) management procedures and standards.

Commercial Insurer'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 eCommerce model, C/I went with a dual structure. The technology group handled the technical aspects of web implementation. It was responsible for developing and maintaining infrastructure and for establishing standards. At the same time, the business opportunity identification and development were handled by an internal, but non-IT, group.

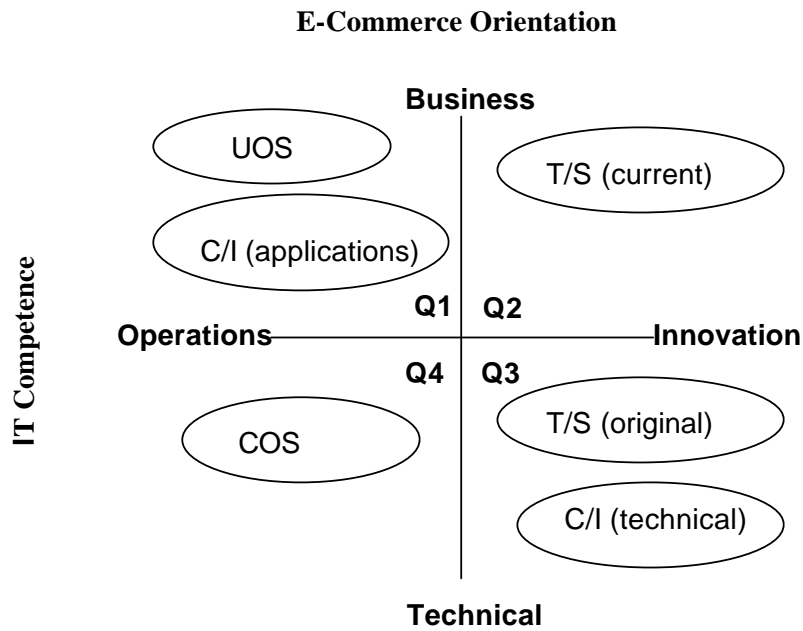
UOS's internal IT group was strong in efficiency and maintenance. Staffing, training, system design and all related activities fell under the aegis of Marketing where it remained. UOS believed that the strategic significance of eCommerce had grown with each enhancement, but so did the need for a marketing 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.

COS's IT group was strikingly similar to that of its parent, UOS. 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 COS saw web-based eCommerce as primarily a new delivery mechanism for existing services, while UOS saw it as opening up significant new business opportunities. Thus, COS 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 eCommerce structures. They were selected because they had been successful in implementing "clicks and mortar" eCommerce 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 eCommerce as an opportunity to create new businesses or business models? Or did the firm see eCommerce as a technical application using new technologies to deliver existing products and services? T/S and UOS, for example, ultimately saw the Web as a platform for developing entirely new products or services. COS, on the other hand, saw it primarily as a means to deliver existing products and services. C/I 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? T/S specialized in leading edge systems development based on complex and evolving technologies. eCommerce executives at UOS and COS 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. C/I had a large organization skilled in traditional

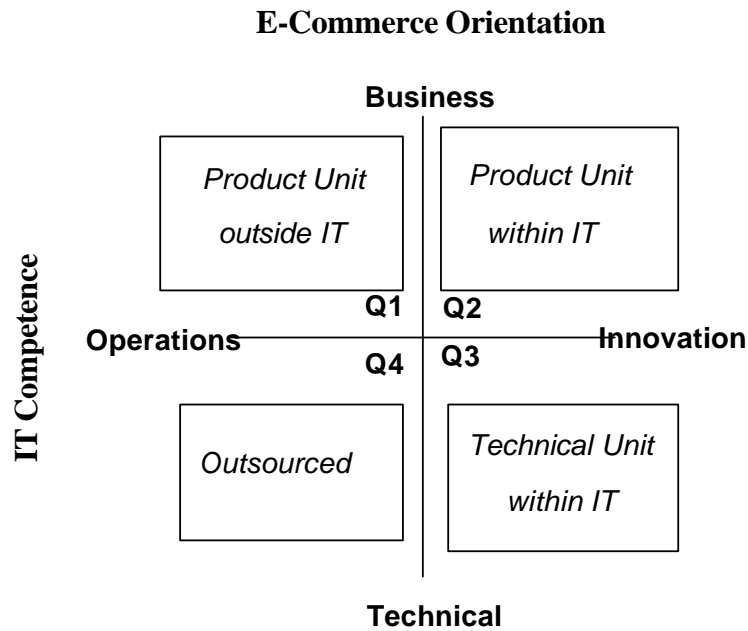
technologies and systems, but had also spawned a subset of technical staff who developed sophisticated technical skills in eCommerce.

Figure 3 positions the four companies described here on the model. T/S had strong skills in state of the art IT, but began eCommerce with an application requested by a customer. The application was a technical project, and T/S used an IT project team to implement it. When it became clear that eCommerce applications represented significant new business opportunities, T/S created an eCommerce product unit within the IT group. UOS also saw eCommerce as a business opportunity, but had an IT group whose major competence was operational. UOS implemented eCommerce by developing an in-house group under the marketing area, with IT personnel hired from outside the company for their eCommerce skills. COS, with the same IT competence but a technical perspective on eCommerce, outsourced its applications. C/I, with its dual orientation and IT competence, built two structures. The product/application development work fell to an eCommerce group under Marketing. Technical eCommerce activities (network development, website design training, database programming) went to a subgroup of IT comprising employees who had independently upgraded their eCommerce skills. The technical group reported to the VP IT, who shared eCommerce management responsibility on a peer basis with the VP Marketing.

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 eCommerce structures chosen accordingly. Firms that fall into Quadrant 1 (business/operations) will rely on an in-house eCommerce group, separate from the traditional IT organization. Although the orientation and skill set of the IT group isn't consistent with the needs of eCommerce, the firm will resist outsourcing a significant new business opportunity. Firms in Quadrant 2 (business/innovation), on the other hand, are in a good position to create an eCommerce group under the umbrella of the company's IT group. Firms in Quadrant 3 (technical/ innovation) will be most effective if eCommerce 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 eCommerce development. Without the leading edge skills in-house, the firm will be unable to implement eCommerce projects quickly. At the same time, the applications are unlikely to have such strategic impact that the company would be concerned about bring-

ing 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.

Figure 4: Conceptual Model



Phase II – Reviewing the Literature

The next step in developing and testing a robust model is integrating it with other theoretical and empirical research. eCommerce is a relatively recent phenomenon, and we don't have a large body of work directly focused on eCommerce structure/implementation issues. Best known, perhaps, is the work of Kalakota and his various co-authors. Though largely concerned with eCommerce 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). We have seen a similar division in our case sites. In our cases, however, the distinction between efficiency and innovation seems to apply to the IT department rather than the activity. At the same time, one might argue that the vertical axis, “eCommerce Orientation”, also differentiates between uses focused on efficiency (a “technical” perspective) and innovation (the “business” perspective).

More recently, Kalakota and Robinson (1999b) wrote extensively on e-business strategy and provided what they called a “roadmap” for implementing that strategy. They exhorted companies to outsource to maintain flexibility (p. 40) but not rely too heavily on consultants (p. 90). At the same time, their book provided almost no specific advice on how companies with legacy systems and established IT departments should actually build eCommerce applications. One might infer, however, that they saw only one productive approach to implementing eCommerce: namely, a model of outsourced application construction with internal IT management. This is akin to the approach described above at Canadian Office Supplier. Finally, Kalakota et al. (1999a) reinforced this view in debating Clayton Christensen’s assertion that firms can only succeed by creating a completely separate eCommerce organization. While arguing that firms could succeed without spin-off structures, they pointed to legacy systems, culture and organizational structures as potential barriers to success. Our model proposes that the appropriate response to the barriers will depend on the nature of those legacies.

While rigorous empirical research on this topic is sparse, work in related areas holds promise. We are now examining complementary studies as a way of grounding our model in empirical work. We have begun by identifying topics of interest: IT outsourcing, IT project and general management, organization design to support innovation, and business process re-engineering.

The most closely related area of research is IT outsourcing, since so much of the trade literature points to outsourcing as the most efficient means of implementing eCommerce. The advantages of this practice have been widely debated in the IT literature. While researchers like Takac (1994) identified advantages of outsourcing, others like McLellan and Marcolin (1994) argued that the practice was fraught with risk – specifically in the areas of technology skill stripping, loss of strategic control, risk of technological obsolescence, and limits on long-term flexibility. DiRomualdo and Gurbaxani (1998) supported the notion of outsourcing as a complex and risky move when the firm wants to improve its strategic position

rather than increase efficiency or reduce costs. We believe these factors would encourage firms to consider in-house alternatives when the strengths of the IT unit don't support flexibility and innovation.

One shortcoming in the literature reviewed to date is that much of it focused on cost reduction in areas where the firm has competence. For example, Lacity and Willcocks (1998) 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 any purely internal or external solution will be inherently less effective. However, such an outcome presumes that the internal IT group has the expertise to play at least some of the roles needed in the implementation process. This may be the case in companies like C/I and is captured in the dimension of "IT Competence". 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 too may be an appropriate approach for companies in a position to obtain both internal and external bids on eCommerce development projects.

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

Another relevant stream of research can be found in work on the adoption of client-server computing, telecommunications, and local area networks. For example, Adler and Shenhar (1990) counseled man-

agers to assess technological assets, organizational assets, external assets, and project management. They said that organizational assets usually proved to be the limiting element. Five specific elements were important -- skills, procedures, structure, strategy, and culture. Here again, we see elements found in our "IT Competence" dimension.

Long before eCommerce, companies faced mounting pressure from many sources to abandon bureaucratic forms of organization in favor of flexible project-based structures (Partington, 1996). In the IT management literature, many authors have studied how project management and other systems implementations efforts affect organizational structure. 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 our proposed quadrant Q1, eCommerce implementation can be executed by cross-functional project teams, making work on project structures helpful.

Organizations often try to become more flexible and responsive by integrating project management work into a conventional or line organizational culture. Firth and Krut (1991) found that integration of a project management culture could strengthen many large organizations, suggesting that the specifics of eCommerce project management may be a critical contingency.

Boar (1998) argued that traditional IT structures cannot cope with continual change and the rapid horizontal introduction and utilization of information technologies. IT structure may very well influence the way an organization should pursue its eCommerce 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 was based on the degree of centralization of computer processing, capability to support communications, and the ability to share resources, and may help us predict the most effective eCommerce implementation structure for an organization. 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 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 eCommerce. 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 eCommerce implementations.

Previous authors (such as 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.

As we have seen, some organizations developing eCommerce restructure their business processes in order to succeed. 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 eCommerce 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, project goals. The performance of individual firms in specific quadrants of the model may be linked to their ability to reengineer those four areas to successfully implement the chosen IT structure..

Next Steps

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 should structure their eCommerce implementation. A second prospect for the model is predic-

tion. A predictive model would say that a firm using the structure proposed by the normative model would be more successful at implementing eCommerce than one using another structure. For example, is a firm in Quadrant 2 that uses an IT-based product unit (as depicted in Figure 3) more successful at implementing eCommerce 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 eCommerce.

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