IT and Organizational Change in Digital Economies:

A Socio-Technical Approach

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1. Introduction to the Digital Economy and Organizational Change

Many people are enthusiastic about the prospects of a digital economy (sector) energizing the larger US economy. Much of the speculation and reporting emphasizes new business models – a fun topic. However, it is easy to assume that business firms and public agencies can readily change to take advantage of new business models when they decide which ones are most appropriate. Regardless of the specific business models that are devised and selected, they have to be enacted by organizations in order to realize their expected economic and social value.

We know that organizations are imperfect implementers of business strategies, even those that appeal to many experienced managers. For example, between 1993 and 1995, Business Process Re-engineering (BPR) was enthusiastically advanced by the popular business press and was tried by a substantial number of our major business firms, despite high costs and a high failure rate (75%) (Bashein, Markus, and Riley, 1994). Many professional managers have now become wary of BPR, and have turned to Knowledge Management as "the next big thing," despite considerable confusion about what it means in practice and how to change organizations to take advantage of its insights.

More seriously, thirty years of systematic empirically grounded research about IT and organizational change suggests that many organizations have trouble in readily changing their practices and structures to take effective advantage of IT. Research has found how it requires complex organizational work takes to get information systems "up and running." In addition, researchers have found that there are sometimes major differences between the ways that systems have been envisioned and how they are used in practice. The body of research that examines topics like these is called Organizational Informatics (OI). OI research has lead us to a deeper understanding of IT and organizational change and some highlights of this "deeper understanding" are the substance of this article.

Before we discuss some key ideas from this body of research, it helps to characterize a Digital Economy, so that we may better understand how IT is to play an enabling role.

The term "digital economy" was popularized by pundit and consultant Don Tapscott in his 1996 book, *The Digital Economy*. Tapscott provides many engaging examples of the ways that IT plays a role in business operations, and he is especially enthusiastic about the role of the Internet in fostering electronic commerce. But he doesn't provide a significant analytical conception of a digital economy. In fact, he often uses the term "digital economy" interchangeably with "new economy" (which is a different construct – one that emphasizes high growth, low inflation, and low unemployment).

A recent Commerce Department report, *The Emerging Digital Economy*, is much more analytical. It characterizes a "digital economy" based on industries and forms of IT-enabled business activity that are likely to be significant sources of economic growth in the next decade. These include the IT industry itself, electronic commerce among businesses, the digital delivery of goods and services, and the IT-supported Retail sale of tangible goods.

Our approach builds on both of these, by focussing upon important forms of IT-enabled business activity. The 'digital economy" is conceptualized differently than the better understood and more carefully studied "information economy" (Porat, 1977; Cooper, 1981; Katz, 1984; Robinson, 1986; Jussawalla and Lamberton, 1988; Kling, 1990; Schement, 1990; Engelbrecht, 1997). In brief, the digital economy focuses on goods or services whose development, production, sale, or provision is critically dependent upon digital technologies. In contrast, the information economy includes all informational goods and services, including publishing, en-

Editor's note: The authors were generous in trusting me to reduce the size of their manuscript to fit this publication. I have tried to preserve both the flow of their arguments and the essentials of their examples as closely as possible. However, any errors of omission *will be solely mine. – T.J.*

tertainment, research, legal and insurance services, and teaching in all of it forms. These are overlapping but different conceptions.

We identify four subsectors of a Digital Economy:

1. **Highly Digital goods and services:** These include those goods that are delivered digitally and services where a substantial portion of the service is delivered digitally. These include interbank fund transfers, online information services (e.g. Lexis/Nexis, DIALOG), electronic journals, some software sales, and so on. It may soon include a significant portion of music sales. It can also include distance education what is enacted primarily on-line. By acknowledging that many of these services are "Highly Digital" rather than purely digital, we can have a better understanding of the organizational activities that are required to support them.
2. **Mixed digital goods and services**: These include the retail sale of tangible goods, such as music, books and flowers via the Internet, as well as services such as travel reservations. While a significant fraction of some of these products, such as pop music, may be sold in purely digital form within the next decade, there is a durable market for tangible goods. For example, around valentine's day, many people want "real flowers," not digital simulacra. In addition, people who make airline reservations to fly to a resort hotel usually want "a real flight" and a "real hotel room." The production and distribution system for tangible goods can be the same that is used for mail catalog or telephone sales; the Internet serves as another sales channel.
3. **IT-intensive services or goods production**: These include services that depend critically upon IT to be provided. They include a majority of accounting in the U.S., data-intensive market research, and complex engineering design. They also include the manufacture of tangible goods where IT is critical in their production (such as the use of computerized numerical control for precision machining or the computerized control of chemical process plants). This set of activities has been the major focus of computerization between the 1950s and the early 1990s.
4. **The segments of the IT industry that support of these three segments of the Digital Economy**: The goods and services of the IT industry that most directly support these three segments of the Digital Economy include a large fraction of the computer networking subindustry, PC manufacturing, and some of the IT consulting firms.

Taken together, these four segments represent a significant scale of economic activity, and one that will grow in the next decades. Most of the systematic analytical empirically-grounded research about IT and organizational studies has been focussed on the third sector: IT-intensive services or goods production. However, we believe that many key concepts and theories that have come from this research provide a useful basis for understanding some key aspects of the first and second sub-sectors, and also help inform a research agenda.

2. Information Systems as Socio-technical Systems

It is easy for business analysts and IT specialists to become enthusiastic and even evangelical about the prospects of a Digital Economy to be a source of business innovation and economic growth (Tapscott, 1996). This professional enthusiasm has lead, unfortunately, to a rather promotional literature which emphasizes streamlined 'success stories" and legitimate kinds of "old technology" examples are dressed up in new language to signify new practices.

A close reading of *The Emerging Digital Economy* (Margherio et al., 1998.), is instructive. Most of the projects are described in terms of a series of tasks, and give us little clue about how organizations changed to accommodate new practices. Improvements in organizational sub-systems are treated as organizational-wide gains. For example, a description of the way that General Electric's Lighting Division developed an on-line procurement system focuses upon the efficiencies in the procurement department (faster orders, 30% cost reduction, and 60% staff reduction). However, there is no account of the costs of developing the on-line procurement system, deploying and maintaining numerous new workstations in the Lighting Division, training those who request materials ("the internal customers") to correctly specify orders on-line to effectively use the on-line forms with digital drawing attachments, and so on. There may still be important net savings after these costs are factored in; but the cost reductions would not be so dramatic. The magnitude and characteristics of the co-requisite organizational changes would also be clearer.

Most seriously, an expanded systems view of this kind suggests that IT is should not be conceptualized simply as a "tool" which can be readily applied for specific purposes. GE Lighting's on-line procurement system has important features as complex technological system in which the orchestration of digitized product drawings and purchase orders has to be synchronized. It has important social properties regarding the authorizations to initiate an electronic purchase order, the control over product drawing versions that have been subject to engineering changes or manufacturing changes, and so on. In short, organizational researchers have found that systems like this are better conceptualized as "socio-technical systems" than as tools. In practice, the boundaries between what is social and what is technological blurs because some of the system design encodes assumptions about the social organization of the firm, in this case GE Lighting.

A different kind of example comes from the experience of Charles Schwab and Co. to develop an on-line trading

operation (e-Schwab) in 1995-1996 (Schonfield, 1998). Like many firms, Schwab initially set up a new small division to develop the software, systems, and policies for e-Schwab. To compete with other Internet brokerages, Schwab dropped Its commissions to a flat fee that was about one-third of its average commission. Schwab's regular phone representative and branch officers could not help e.Schwab customers. E-Schwab customers were allowed one free phone call a month; all other questions had to be e-mailed to e.Schwab. While over a million people rapidly flocked to e-Schwab, many of these customers found the different policies and practices to be frustrating. In 1997, Schwab's upper managers began integrating e-Schwab and 'regular Schwab." This integration required new, more coherent policies and training all of Schwab's representatives to understand e-trades. It also required the physical integration of e-Schwab's staff with their "jeans and sneakers" culture into the offices of regular Schwab staff with a button-down "jacket and tie" culture. One result was the development of a more flexible dress code in Schwab's headquarters.

E-Schwab has been discussed in some business articles as a tool or a technological system. But the policies and procedures for any trading system — including pricing, trade confirmations and reversals, and advice – are integral to its operation. These are social practices without which there is no e-Schwab. Consequently, the standard "tool view" is insufficient for adequately understanding the design of e-Schwab, its operations, and consequently the character of the organizational change required to develop this line of business.

These brief examples illustrate an approach to understanding IT as a socio-technical system. The table below characterizes some of the key differences between the Standard (tool) models of IT and organizational change and the Socio-technical models. The socio-technical approach has been developed by analytical empirically-anchored researchers who have studied IT and social change in a diverse array of public and private sector organizations during the last 25 years (see Kling & Scacchi, 1982; Kling, 1992; Kling & Star, 1998; Kling, 1999; Kling, Crawford, Rosenbaum, Sawyer, and Weisband, 1999). The research is robust insofar as it rests of studies of diverse kinds of IT (from accounting systems through engineering design to knowledge bases) and varied organizations.

Unfortunately, the Standard Model still undergirds many of the stories about electronic commerce that appear in the professional and popular business and technological magazines. The major predictive errors that result from relying upon the Standard Model are to overestimate the ease of "going digital" by substantially underestimating the complexity and time of the required organizational changes.

3. Illustrations from Organizational Informatics Research

A socially rich view of Highly Digital and Mixed Digital products and services can help policy makers and practitioners anticipate some of the key organizational shifts that

Standard (Tool) Models	SocioTechnical Models
IT is a tool	IT is a sociotechnical system
Business model is sufficient	Ecological view is needed
One shot implementation	Implementation is an ongoing social process
Technological effects are direct and immediate	Technological effects are indirect and involve different time scales
Incentives to change are unproblematic	Incentives may require restructuring (and may be in conflict with other organizational actions) (Section 3.1)
Politics are bad or irrelevant	Politics are central and even enabling (Section 3.2)
IT Infrastructure is fully supportive. Systems have become user-friendly, people have become 'computer-literate," and these changes are accelerating with the "net-generation"	Articulation work is often needed to make IT work. Socio-technical support is critical for effective IT use. (Section 3.3)
Social relationships are easily reformed to take advantage of new conveniences, efficiences and business value.	Relationships are complex, negotiated, and multi-valent. (Section 3.4)
Social effects of IT are big but isolated and benign	Potentially enormous social repercussions from IT (Section 3.5)
Contexts are simple (described by a few key terms or demographics)	Contexts are complex (matrices of businesses, services, people, technology history, location, etc.)
Knowledge and expertise are easily made explicit	Knowledge and expertise are inherently tacit/implicit
IT infrastructure are fully supportive	Articulation needed to make IT work

accompany introductions of new technologies. That view is supported by a large and growing body of carefully designed empirical studies, known as organizational informatics (OI) research (Kling, 1995; Kling and Star, 1998). We have selected a few OI studies that exemplify the contrasts between the socially rich and socially thin views outlined above: incentives, politics, support, interorganizational networks and social repercussions. These studies illustrate the ways in which a socio-technical perspective may guide researchers toward important insights about technology and organizational change.

3.1 Organizational and Social Incentives Shapes IT Configurations and Use

OI researchers have found repeatedly that *incentives matter* when it comes to introducing new technologies, and more importantly, getting people to use them. People need good reasons to change their organizational practices, and they need the time and the training to make those changes. In many cases, work incentives require restructuring in ways that conflict with other organizational actions. Too often, however, the sponsors of new technologies view incentives as unproblematic. They believe that information workers will "naturally" see the advantages of using a new technology, like Lotus Notes, and adopt it immediately.

Lotus Notes at Price Waterhouse

Price Waterhouse is an international consulting firm with tens of thousands of employees worldwide, and about 10,000 of them in the U.S. In 1989, the vice-president of information systems bought 10,000 copies of the Lotus Notes. He believed that Lotus Notes was such a powerful technology that it would sell itself, and that the main thing to do was to rapidly roll it out to the consulting staff, and let them use it to find creative ways to share information.

The information technology staff tended to use Lotus Notes fairly aggressively for sharing information about their own projects. The line consultants, who were supposed to become Lotus Notes' primary users, often seemed uninterested in learning how to use Notes, readily gave up if they faced early frustrations with Notes, and, as a group did not spend much time with it. The senior line consultants, who were partners in the firm, tended to be modest users. The more numerous junior line consultants, called associates, were low users.

Reimbursement incentives go a long way toward explaining this mixture of results. The partners, who had substantial job security, could afford to experiment with Notes. Many of the information technology staff were technophiles who were also willing to work with an interesting new application. It was not clear to the line consultants, however, what their incentives were for using Notes. Price Waterhouse's associates were valued for their billable hours, and were effectively required to bill almost all of their time. Consultants who wanted to use Notes had to have an account to charge their time against, and the initial learning time was in the order of 20 to 30 hours. In 1991, the consultants were billed at about $150 an hour, so they had to find a client who would be willing to pay $3,000 to $4,500 for them to learn a system whose value wasn't yet clear to them — there were no exemplary demonstrations showing them how other successful line consultants used Notes. Consequently, relatively few associates saw value in Notes.

Lotus Notes at Ernst & Young

An organization with different incentive systems, might use Notes very differently. Ernst and Young (E&Y), another major consulting firm, created an organization whose charter was to organize E&Y's consultants' know-how in specific high profile areas. By 1997, E&Y had developed 22 cross-office networks of consultants with expertise about certain industries, organizational reforms, and technologies that were a focus of E&Y's business (Davenport, 1997; Gierkink and Ruggles, n.d.). Each network was assigned one line consultant, on a short term half-time basis, to codify in Notes databases the group's insights from specific consulting projects, to prompt line consultants to add their own insights, and to edit and prune a project's discussion and document databases. Davenport (1997) observed that these "knowledge networkers" became network domain experts whose consulting services were in demand throughout the firm, and that Lotus Notes served as their information support system.

The case of E&Y illustrates an important idea—that of conceptualizing the design of computer and networked systems as a set of interrelated decisions about technology and the organization of work. Unfortunately, thinking and talking about computerization as the development of socio-technical configurations rather than as simply installing and using a new technology is not commonplace.

Different incentive systems for different groups is one way to view a key concept that helps to integrate some of these seemingly disparate cases—one that may helpfully guide implementations of Highly Digital and Mixed Digital products and services. Varied and conflicting consequences in different settings are a common finding in organizational informatics research. Our job as researchers is not simply to document the various consequences of computerization, but also to theorize them (see Lamb, 1996; Robey, 1997).

3.2 IT Implementations Have Important Political Dimensions

OI researchers have also found that organizational politics can have very different effects on the outcomes of new technology implementations. The backroom manipulations of key players can be enabling and even central to the success or failure of complex system implementations, such as financial accounting systems and material resource planning

(MRP) systems. Interestingly, many discussions, particularly those that report on successful implementations, simply ignore behind-the-scene activities, implying that they are irrelevant. (See for example the account of an inventory control system by IBM's Personal Systems Group in Margherio et al., URL.) Other accounts, particularly those that report on failed IT implementations, dismiss the political wrangling as unusual or aberrant. The following OI research examples show that organizational change, technology implementation and political activities are commonly associated in complex ways. Key organizational actors can both promote and thwart the changes needed for widespread use of a new technology. They can also vie for power by backing competing technologies. The PRINTCO and Golden Triangle cases show that it can be folly to ignore organizational "histories" when trying to evaluate what has made a new technology implementation successful—more so if one seeks to emulate that success.

PRINTCO

PRINTCO is the pseudonym for a medium-sized manufacturing firm (about 800 employees) which designed, manufactured and marketed several lines of medium-speed dot matrix line printers for the mini-computer and small business computer marketplace in the 1970s and 1980s. A case study from the 1980s may seem anachronistic when we are discussing 21st century IT developments. But it helps to illustrate some organizational dynamics of upgrading IT that as pertinent today as then.

In 1977 key actors adopted and began operating a simple Material Requirements Planning (MRP) inventory control system that they purchased from a nearby manufacturing firm. They wanted better control over their investments in purchased parts. As PRINTCO grew by diversifying the variety of printers produced, the new products complicated the logistics of managing inventory. The material control managers began looking for more sophisticated MRP software to help resolve manufacturing logistics problems, like capacity planning, tracking multiple simultaneous revisions of products, and accounting for planned orders. An informal committee found an MRP package that satisfied their preferences.

The conversion began in 1980, but 18 months later the staff still had not completed the conversion. Unexpected problems plagued the project, such as lack of onsite vendor support and difficulties in hiring programmers with the necessary skills, in addition to the complexities of making large-scale modifications to poorly documented system code. The senior vice president of manufacturing saw an impending crisis, and he formed a data processing steering committee to help guide the DP manager. But months later, the steering committee hired a new DP manager with stronger managerial skills but weaker technical skills. They ended the conversion project, deciding instead to upgrade the existing IBM System 34 and enhance the MRP system. Unfortunately, the new DP Manager spent his effort mobilizing support for the purchase of a more sophisticated computer (an IBM System 38). When after 10 months, the steering committee saw little progress on the enhancements of their MRP system, they fired the new DP manager and promoted the manager of engineering services to the role of Operations Director, a new title for the DP manager.

PRINTCO's management was not simply replacing one MRP system with another, they were also attempting to replace the existing social organization of computing in their firm with an altered configuration. PRINTCO's managers were acting in ways they knew (standard operating orientations), such as minor reorganizations and changing managers. These kinds of changes did not shake up their organization, but they were not effective either.

Golden Triangle

Pfeffer's (1981) account of the design of a financial information system at Golden Triangle serves to further illustrate the ways in which IT implementations are often entwined with power struggles within many organizations. Golden Triangle Corporation, is a major chemical manufacturing concern which operates internationally, with sales in excess of $3 billion. It is organized into a staff group that includes accounting and four fairly autonomous operating groups. Within each operating group, divisions are headed by general managers. Divisional accountants report directly to these general managers, with only an indirect relationship to corporate accounting, which is supposed to provide "broad policy guidelines" (Markus, 1980: 7-8).

In 1971, Golden Triangle had seven different computerized systems and numerous manual systems in use in the divisions. The introduction of the financial information system would serve to standardize these systems by collecting and summarizing financial data from input covering transactions involving expenses, revenues, assets, and liabilities; and storing all transactions in a single, centralized data base. The system would output monthly profit and loss statements by division and for the whole company, as well as balance sheets. Prior to the development of the new system "divisional accountants had collected and stored transaction data however they saw fit, but had reported summary data to corporate accountants in a standardized format" (Markus, 1980:7). Clearly, the introduction of the standardized system would profoundly change the relationship between corporate and divisional controllers, as well as between the division and headquarters operating managers.

In many respects, the financial information system design was a political choice. Corporate accounting used an outside vendor to implement it, and to avoid having to rely on internal operating support. The divisions fought cooperation with the new system, attacking its design, technical adequacy, and feasibility. This process dragged on over years, costing numerous hours of effort and meetings. Attempts

were even made by the divisions to sabotage the system. During the conflict, the head of accounting for the chemical division was reorganized out of his job, which alleviated tensions and drastically altered the political rationale that had originally driven system design.

As we consider the potentially radical organizational restructurings that Highly Digital and Mixed Digital products and services will require, the lessons learned from these cases could provide critical guidance. In some ways, the technology can be held hostage by the political milieu, as at PRINTCO. In other organizations, like Golden Triangle, key actors may seek to enlist the technology as a political tool. Even successful IT implementations cannot be easily understood or emulated without an adequate description of the attendant political arrangements.

3.3 Socio-technical Support Is Critical for Effective IT Use

Discussions about supporting IT infrastructures are often constrained to the physical architectures of systems and networks. In practice, a "supporting infrastructure" involves a much wider range of "systems" and "networks" that include organizational practices, key support staff, and access to technical and social skill sets. These extensions are often referred to as 'the hidden costs of computing,' because most IT systems are built around a set of assumptions and defaults that makes deviation difficult and expensive. However, most accounts portray IT infrastructures as fully supportive—they rarely refer to the articulation work needed to make IT implementations usable and dependable. The brief description of a Collaborative Planning Forecasting Replenishment system in Margherio et al.'s report (1998) on the Emerging Digital Economy gives few clues that would help us understand the challenges member firms faced as they each implemented the system within their own organizations. But another account of a collaborative effort among geneticists at 50 organizations shows clearly that supporting infrastructure and articulation work are key components of networked collaboration.

Worm Community System

The Worm Community System (WCS) was a large-scale, custom software, collaborative system that was designed to serve a geographically dispersed community of geneticists. Ultimately, WCS was used by 250 geneticists at 50 commercial and University laboratories. Although the system had a well-designed interface, that users found easy to manipulate, many still found the system difficult to access and use routinely. This failure was not due to any inadequacies from an end-user point of view—the system met the demands of the geneticists. However, the demands on University computer support staff were often greater than their system skills and availability.

The social infrastructure of networked computer systems like WCS—which includes not only hardware and software, but also knowledgeable, skilled support staff to maintain system availability and to respond to user problems or questions—is not usually homogeneous, and therefore equally robust, across all collaborating sites. In short, lack of attention to local infrastructure can undermine the workability of larger scale projects. WCS is no longer used. Much of its functionality has been added to newer, more popularized web-based systems developed for the genome projects. These preserve some of the best features of WCS, like the link-following capability, nice graphical displays and easy to use interface; and are better integrated to the desktop tools, operating systems, and networking skill sets that are commonly supported for web browsing.

3.4 Interorganizational Computer Networks are also Social Networks

Many network characterizations seem to suggest that the most important relationships can all be wired directly, and that they can be easily established and reformed. The Automotive Network Exchange (ANX), for example, a high-maintenance, tightly managed, virtual private network for automotive design, was recently characterized as a network of routinized interactions among a stable set of participants (Margherio et al, 1998.) In sharp contrast, OI studies show that interorganizational relationships are complex, dynamic, negotiated and interdependent. As the following study shows, a socio-technical approach can expose the complexities of using online technologies in support of interorganizational relationships, and can help to explain why some firms find online technologies essential, while others use them very little, or not at all.

Interorganizational Relationships and Information Services (IRIS)

In a recent study of online information resources, we examined the differences in online information use among 26 California firms in three industries: biotechnology, law and real estate (Lamb, 1997.) We found that there are as many differences among firms within an industry as there are between firms in different industries. Five factors seem to affect the greater use of online information by some firms over others:

1. Interaction with regulatory agencies, as illustrated by biotechnology firms who submit documentation about product and product effects to regulatory agencies for review and approval, and by law firms whose clients are governed by such agencies.
2. Demonstration of competence and superior service to clients, as illustrated by the packaging of information from online and other information sources in the real estate industry, and by the profiling of competitors and markets in all three industries.

3. Opportunities to obtain information from other organizations through load-shifting, whether through outsourcing, partnering or purchasing information services.
4. Existence of industry-wide information infrastructures to provide critical information, such as law libraries and real estate multiple listings services.
5. Client expectations for timely, cost-effective information exchanges, such as corporate clients' demands for immediate, specialized legal advice outside "normal" business hours.

These factors describe a set of influences that come from the interorganizational relationships of the firm. Some, like profiling, have a technical orientation, and some, like documentation, have an institutional orientation. The first two factors lead to increased use of online information resources. Firms that interact directly with regulators and those that see a need to demonstrate competence, use more online information than firms that don't. The third factor, leads to decreased use. When firms have an opportunity to shift data gathering responsibilities to another firm, they will do less of it themselves. The fourth factor may also lead to decreased use if the infrastructure provides an alternative to going online, such as publicly supported law libraries. But it will lead to increased use if the infrastructure is online, such as the multiple listing services of the real estate industry. The fifth factor may, similarly, lead to either decreased or increased online use, depending on the types of resources (including support staff) that are available to busy firm members in the evenings or on weekends; but time pressures generally lead to increased use of online information resources.

The IRIS study confirms that careful and effective designs for interorganizational networks must take into account the nature of interorganizational relationships. It also suggests that it is not 'just a matter of time' before all organizations adopt online technologies. Some firms have less need and fewer incentives to use online technologies, by the very nature of their industry, their clientele and their interorganizational relationships.

3.5 Profitable Electronic Retailing may Weaken Community Life

The power of online technologies to strengthen or reshape relationships is not restricted to organizations. Internetworking has the potential to reshape relationships within our local communities, and to affect the way we live, work and shop. The authors of

The Emerging Digital Economy (Margherio et al., 1998) report that companies are beginning to use the Internet for customer service and to better manage customer relations by operating around the clock and around the world. They also discuss the skills that workers and consumers will need to acquire, as well as expected consumer behaviors in the Cybermall to come. Socio-technical analyses, however, go further toward examining the social repercussions of sweeping reforms like Internet shopping.

Irvine

Some technology developers and enthusiasts believe that Cyberspace will radically reshape our physical space. They could be right. The visions of utopian planners have, in fact, frequently shaped our landscapes and lifestyles (Kling and Lamb, 1998.) The city of Irvine, California serves as a case in point. rvine is a post-suburban version of the 'city of efficient consumption' (Goodman and Goodman, 1960.) It is characterized by a fundamentally decentralized spatial arrangement "in which a variety of commercial, recreational, shopping, arts, residential, and religious activities are conducted in different places and are linked primarily by private automobile transportation—[making it] complex, seemingly incoherent and disorienting, and yet dynamic and lively" (Kling, Olin, and Poster, 1995:p.viii). road boulevards allow shoppers speedy access to local shopping centers, and Irvine residents can conveniently reach 12-lane freeways for their workday commutes.

When Irvine residents verbally interact with non-residents who work in Irvine retail outlets, there is little chance that the interaction will blossom into an ongoing relationship. The types of efficient, high-volume transactions favored by the national and regional chain stores that dominate Irvine shopping malls allow only for a brief encounter between a customer and a service provider. And since these types of service provider jobs are not well-paid, there is usually a high personnel turnover, further lessening the probability of an ongoing relationship. As Gutek (1995) has observed, the prevalence of encounter-based services is not unique to new cities. It is a growing phenomenon in many service industries, including retail sales, social services, education and medical care. Social scientists worry that this phenomenon contributes to the deterioration of a sense of community. The human interaction seems so disconnected. What's the difference between this type of an encounter and a fully automated electronic encounter, complete with computer-controlled voice synthesis? For the most part, Irvine residents seem comfortable with the encounter-based service format. It is often convenient, but it is not their only option. If they want more personalized service, they can afford to go elsewhere and pay more for it.

Wal-Mart vs. the Web

Some California commercial realtors speculate that the Cybermall is about to do to Wal-Mart and The Irvine Company, what Wal-Mart is accused of doing to small downtown retailers in the 1980's and '90's. According to Gary London (1995), as the expansion of Internet retailing brings more choice, lower prices and better service to consumers, it will result in a downsizing of all physical-space retailers. He is not suggesting that traditional retail shopping centers will be

eliminated, but that in order to remain profitable, shopping center owners will have to rethink how retailers pay rent. If local stores become mere showcases for products and services, with the eventual purchase being made online, the shopping center owner cannot depend on retail receipts for revenue.

But the threat of Internet retailing isn't just to small shopping centers and retailers. The 'big box' discounters, like Wal-Mart, Circuit City, Costco, CompUSA and others, will also be challenged. Their centers usually have a warehouse-type interior, and their selling approach has changed the nature of retail consumer relationships—inadvertently making it more comfortable for consumers to shop online. "The emphasis is on large selection, discounting and convenience. They have de-emphasized customer service and presentation. The concept has taken the nation by storm and appears to represent a permanent change in the nature of shopping" (London, 1995.)

Faced with declining market share for the past two decades, traditional "downtown" retailers and those in regional community centers have been forced to establish alternative marketing or rehabilitation plans. London has participated in at least one physical rehabilitation of a small shopping center. The project, which may indicate the shape of 'malls to come' involved the evolution of an inspired thematic concept. The center's pedestrian-only streets became an extension of those of the community. The developers simulated a dynamic downtown retail center—a pseudo-community that they hope will redefine why people go shopping, where they go, and how they spend their time. As our shopping habits become more rationalized, and more often online, we may also be inadvertently encouraging the developers who have planned our post-suburban landscapes to begin planning more and more of our 'quality' life experiences.

4.0 Conclusions

A research agenda on the organizational issues in developing Highly Digital and Mixed Digital goods & services can be usefully guided by a socio-technical approach. Our analysis of prior research amply demonstrates the ways in which socio-technical IT studies can foster a deeper understanding of organizational change in increasingly digitally-enabled environments. We identify a few key areas where socio-technical perspectives diverge from mainstream conceptualizations of IT in organizations, and where further research may amplify our abilities to benefit economically and socially from new information technologies. From these areas, a few key empirically researchable questions emerge:

1. What are the organizational and social processes and technological opportunities/constraints that influence the ways that organizations "go digital" and how do these infleucne the development of new services, business viability, etc.? (For example, how do these processes work out in bookstores such as amazon.co, Barnes & Nobles, Borders, and major independent bookstores?)
2. What are the organizational and social processes that influence the ways that whole industries "go digital"? How can we understand differences between industries, such as travel versus steel manufacturing?
3. What kinds of customers and services seem to be advantaged by digitally supported goods and services, and which kinds of customers and services are cut back or cut out?

Questions such as those listed above should be studied with some significant historical perspective and ecological perspective. For example, firms like amzon.com could not have functioned on the web alone: they rely upon a financial infrastructure (ie., credit cards) and distribution infrastructure (ie., rapid national shipments of small parcels). Some of this infrastructure has been developing over a 100 year period since the advent of mail order!

This research agenda is preliminary and is far from exhaustive. But we believe it provides a starting point for discussions that will lead to a robust research program that examines the social, technical and organizational aspects of the emerging Digital Economy. ◆

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