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Information technology and the transformation of industries: three research perspectives

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Abstract

It is often claimed that information technology has the potential to transform entire industries. However, we find that very little IS research has been conducted at the industry level. Moreover, the small amount of research that has been conducted on IT and industries has been based largely on just one perspective of industries. Given the scale and potential impact of the changes that are happening at an industry level, we believe a concerted effort is needed to study this phenomenon.

We propose a research agenda for studying IT and industries. We suggest three research perspectives for studying IT and industries: an economic perspective, an institutional perspective, and a socio-cultural perspective. Just as IS research that addresses these aspects at the organizational level has grown in recent years and contributed to our understanding of IS, so in this paper we argue that a similar broadening, as well as more studies, are needed at the industry level of analysis. We provide an example from the real estate industry to illustrate the usefulness of the three research perspectives.

Keywords: Information technology; Industry transformation; Economic perspective; Institutional perspective; Social/cultural perspective; Real estate industry

1. Introduction

It is often claimed that information technology has the potential to transform organizations and entire industries. By this is usually meant the idea that IT can be used

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not simply to support the status quo, but to fundamentally and radically re-shape organizations and industries. The idea of 'industry transformation' appears most frequently in the practitioner literature and in the research literature on strategic information systems. Industry transformation in these articles usually refers to a change in industry boundaries, a change in industry structure, and/or a change in the basis of competition (Hammer, 1996; Hammer and Champy, 1993; McFarlan, 1984; Porter, 2001; Porter and Millar, 1985; Scott Morton, 1991).

For example, Evans and Wurster (1997) say that 'Over the next decade, the new economics of information will precipitate changes in the structure of entire industries and in the way companies compete' (p. 71). Mendelson and Kraemer (1998) say that 'Changes in IT have transformed not only organizations at all levels, but also entire industries. The dramatic decline in the costs of information processing and communications has resulted in the restructuring of business organizations, the nature of interactions among them, their boundaries—and the industries they operate in' (Mendelson and Kraemer, 1998). Mowery (1999) says that many industries, especially non-manufacturing industries such as trucking, food retailing, and financial services have undergone 'fundamental change' as a result of adopting advanced information technologies.

While we tend to agree with the above authors that entire industries have been—or are in the process of being—transformed by IT, our review of the IS research literature reveals that very little empirical IS research has actually been conducted at the industry level of analysis (see Section 2). Most IS research has focused at the individual or organizational level of analysis, overlooking the industry level. Furthermore, the limited amount of research that has been done on the relationship between IT and industries has addressed this subject primarily from one perspective, i.e. an economic or strategic IS perspective (e.g. Ciborra and Jelasi, 1994; Hopper, 1990; Kettinger et al., 1994; McFarlan, 1984; Porter and Millar, 1985; Segars and Grover, 1995; Vitale, 1986). While we agree that the economic perspective on industries is important, it is just *one* perspective. Additional perspectives are needed if we are to gain a broader understanding of the relationship between IT and industry transformation.

The purpose of this paper, therefore, is to propose a research agenda for the study of IT and industry transformation. We believe it is important for IS researchers to study the development, use and impact of IT at an industry level and conversely, how industry-level concerns shape the design and use of IT. We are not advocates of technological determinism—that technology is the primary driver for industry changes (Orlikowski, 1992)—but rather suggest that studying the *relationship* between IT and industries is an important subject, for several reasons.

First, just as organizational phenomena (such as organizational structure and culture) are not reducible to individual phenomena, so industry-level phenomena are not reducible to organizational phenomena. The well-known truism that 'the whole is greater than the sum of the parts' applies here, meaning that there are industry-level phenomena, such as laws, institutions and culture, that are best studied at an industry level. These industry-level laws, institutions and culture have a major influence on how IT is used in a particular industry. Scholars have suggested that it is important not to underestimate the scale and potential impact of the changes at an industry level (Carlson, 1993;

Gallivan and Benbunan-Fich, 2002; Hillis, 2000; Monteiro and Macdonald, 1996; Rao et al., 1999; Roberts, 1999).

Second, advances in a particular technology may affect every single organization within an industry, and may have industry-wide effects (Orlikowski and Barley, 2001). For example, computerized reservation systems (CRS) have impacted the entire airline and travel industry. The primary impact has been to greatly increase the number of price points, and to promote price discrimination by the airlines. CRS have also enabled code sharing and various regional and global alliances amongst airlines and may be leading to a degree of consolidation in the industry. The combination of the MP3 music format and peer-to-peer use of the Internet seems poised to fundamentally transform the structure of the music recording and distribution industry (Easley and Michel, 2001; Rao et al., 1999; Tsiavos et al., 2002). While the music industry may be particularly susceptible to transformation because the product itself has become digital, changes of a similar scope seem likely in many other industries. We suggest that organizational-level studies could miss these industry-wide effects of IT.

Finally, industry-level concerns may shape how the technology develops. This effect can be seen directly in the way that software companies develop software packages for vertical markets or specific industries. For example, all the major ERP vendors have developed modules and versions of their software for various industries (e.g. PeopleSoft has developed a module for university administration). This suggests that IS researchers should study the development, use and impact of information systems at an industry level of analysis, since ERP software is specially developed for industries, not individual organizations.

For all these reasons, therefore, we propose a research agenda for the study of IT and industry transformation. Another important part of our agenda is to suggest that IT and industry transformation should be studied from multiple perspectives (we suggest three in particular). Indeed, the definition of industry and industry transformation varies depending on the research perspective adopted. We wish to emphasize that these three perspectives are complementary to one another, not competing. We believe that all three perspectives together offer a broader view of the impact of IT on industries.

This paper is organized as follows. In Section 2 we present a survey of the IS research literature. In Section 3 we present three alternative perspectives on industries. In Section 4, we discuss the real estate industry as an empirical example to illustrate the usefulness of the three research perspectives. Section 5 is the discussion and conclusions.

2. IS research literature on industries

To assess the amount of research carried out on industries by IS researchers, we categorized a random sample of articles that appeared from 1990 to 1999 in leading IS publication outlets by the level of analysis employed. Specifically, we selected the journals *Information Systems Research*, *Journal of MIS*, and *MIS Quarterly*. We also selected articles published in the *Proceedings of the International Conference on Information Systems* (including research-in-progress articles, but not panels). Because we thought industry-level research might appear more commonly in some specialized journals, we also included articles from the *Journal of Organizational Computing and Electronic*

Commerce, the *International Journal of Electronic Commerce*, and the *Journal of Strategic Information Systems*. These six journals and one international conference yielded a total of 1734 articles. While obviously not a complete inventory of the IS literature, these articles provide a snapshot of its current state.

To estimate the proportion of IS articles taking an industry-level of analysis, we drew a random sample of 196 articles and classified each by level of analysis. The results of this analysis is given in Table 1. Table 1 indicates that most IS research was conducted at the organizational level of analysis (51%). This is followed by the individual (21%) and group (11%) levels of analysis. Only 4% of IS studies in our sample were conducted at the industry level of analysis, suggesting that the total proportion in the population is very low.

We further analyzed all of the industry-level studies we found to determine the theoretical approach employed. The majority of industry-level studies adopted an economic perspective on industries (e.g. see Choudhury et al., 1998; Crowston, 1997; Ein-Dor et al., 1997; Pereira and Tavares, 1998; Wang et al., 1996), including all of the articles in a Special Issue of *Information Systems Research* on the information industries (Mendelson and Kraemer, 1998). Most strategic IS studies usually used one or more economic theories (e.g. see Kettinger et al., 1994). As Segars and Grover (1995) point out, transaction cost economics (Williamson, 1975), agency theory (Gurbaxani and Whang, 1991), and Porter's five forces model (Porter, 1985; Porter and Millar, 1985) 'have become cornerstones' for research in strategic information systems.

Within our selected list of seven publication outlets, we found only a few articles that used an alternative, or non-economic, perspective to study the relationship between IT and industries. Morgado et al. (1995) examined Brazilian bankers' perceptions of key IS issues for their industry. Jin and Robey (1999) used institutional theory to explain the emergence of new intermediaries in electronic retailing. Kumar et al. (1998) analyzed the failure of SPRINTEL, an inter-organizational information system intended to connect firms in the textile district of Prato, Italy. All three articles above are examples of a social or cultural perspective on industries (see Section 3).

We can summarize our analysis of leading IS research publication outlets by saying that little empirical research has been conducted at the industry level of analysis. Most IS research has focused at the individual or organizational level of analysis. While it is impossible to say what the 'right' amount of industry-level research would be, clearly 4%

Table 1
Breakdown of the sample of IS articles by level of analysis

Level of analysis	Total	95% confidence interval
Individual	41	21 (18.7, 23.4)
Group	21	11 (9.4, 12.1)
Organization	100	51 (47.5, 54.5)
Industry	7	4 (3.1, 4.1)
Community	2	1 (0.9, 1.2)
National	5	3 (2.2, 2.9)
Transnational	4	2 (1.8, 2.3)
Other	16	8 (7.1, 9.2)
Grand total	196	

is small given the importance of the subject. Furthermore, the limited amount of research that has been done on the relationship between IT and industries has addressed this subject primarily from one perspective, i.e. an economic or strategic IS perspective. Thus, though there are some exceptions, by-and-large most IS research has adopted a single view of the relationship between IT and industries.

While it is possible to argue with our selection of journals, we believe that the journals we chose provide a reasonable snapshot of the IS research literature. And, given that our selection of journals includes those which we thought would have a greater chance of publishing industry-level studies, we believe that our overall contention regarding the lack of industry studies in information systems is reasonably sound. We conclude, therefore, that there has been relatively little IS research on entire industries, and that the research that has been done is primarily from a single perspective.

3. Theory: three research perspectives on industries

In this section we present three research perspectives on industries. While most IS research has studied the relationship between IT and industry transformation from just from one perspective, we suggest that a broader view of this relationship is warranted. We would like to re-emphasize our view that we do not see these three perspectives as competing with one another. Rather, they are complementary—each explains some observations that the others do not—and overlapping at the margins (e.g. economists have provided analyses of institutions and regulations from an economic perspective).

Table 2 provides a summary of the three perspectives. The three perspectives we discuss are the economic, the institutional, and the social and cultural perspectives. Although we acknowledge that there is much interplay between these perspectives

Table 2
Summary of three research perspectives

Perspective	Key focus	Phenomenon of interest	Types of data	Characteristics of industry transformation
Economic	The relation between inputs and outputs of an industry	The structure of the market: the product, the firms supplying the product, the buyers, and the transactions	Economic data such as costs, profits, number of transactions	A change in the structure of the market
Institutional	The contextual issues that surround an industry	Legal and institutional arrangements: the regulatory framework governing an industry; organizations that regulate and constrain interactions	Legal documents, laws, court decisions, interviews with key informants	A change in the regulatory framework and/or legal and institutional arrangements
Social and cultural	The processes and structures within an industry	Social relationships and networks, beliefs, norms, and values	Notes from fieldwork and observations, interview data, documents	A change in social relations, social structure, social networks and culture

and they are not mutually exclusive, from this table it can be seen that each perspective makes different assumptions and focuses on a different aspect of an industry.

- The economic perspective views an industry as a collection of firms that produce substitutable products. The key focus is on the structure of markets and the relation between inputs and outputs of an industry.
- The institutional perspective views an industry as a set of institutional and regulatory arrangements. The key focus is on the contextual issues that surround an industry.
- The social and cultural perspective views an industry as a set of social and cultural relationships with shared norms, values, and beliefs. The key focus is on the processes and structures within an industry.

In the remainder of this section we introduce each perspective and discuss how research in each perspective might address the question of IT and industry transformation.

3.1. Economic perspective

The most common perspective used to analyze industries is an economic one. Researchers adopting an economic perspective treat actors as rational profit-maximizing entities and focus on the relative costs and benefits of different actions or arrangements. The resulting research tends to be quantitative and positivist in orientation (although in the micro-economic/strategic literature there is some variety).

In this perspective, an industry is generally defined as the set of firms that compete with each other. A narrow definition would restrict the industry to firms that supply the same product (e.g. the movie industry, which is the collection of firms that produce movies); a broad definition would include firms that produce substitutable goods (e.g. the entertainment industry, which includes firms that produce movies, television shows, computer games, and run theme parks, etc.). In either case the economic perspective considers an entire industry as a value-chain (or as a set of competing value systems), transforming inputs into outputs.

The use of information technology may have various economic impacts on an industry. First, the use of IT can reduce the cost of searching for a product and thus change the set of suppliers considered by a buyer. One phenomenon that has attracted particular attention is *disintermediation*: this is the idea that buyers and sellers will deal with each other directly, rather than through intermediaries, as the use of IT makes interactions cheaper, allowing buyers and sellers to handle a wider range of interactions. Some predict that the widespread adoption of electronic commerce will lead to the disappearance of all human agents who 'merely' act as match-makers—helping buyers find sellers and vice versa (Bakos, 1998; Doherty, 2000; Hess and Kemerer, 1994; Schmitz, 2000). Others, however, disagree with this prediction. Wimmer et al. (2000), for example, note that middlemen do more than simply match buyers and sellers: they also provide immediacy, access to wider markets, and expert analysis that alleviates problems of asymmetric information. While they agree that some middlemen may be replaced by IT, those that provide more than just matchmaking services seem likely to survive (Wimmer et al., 2000). Yet another possibility is re-intermediation, where a new intermediary arises to connect buyers

and sellers. Retailers like Amazon.com and Virtual Vineyards are examples of new 'cybermediaries' (Jin and Robey, 1999).

Predictions of disintermediation seem to be borne out in certain industries (Hess and Kemerer, 1994). For example, conventional travel agencies are struggling to survive the double blow of airline commission cuts and on-line competition (Lewis et al., 1998; Lewis and Talalayevsky, 1997). Insurance firms are also struggling with the role of agents as intermediaries in the insurance sales process (Fisher, 2000). However, new 'cybermediaries' are also emerging, often in these same industries. Travelocity and Expedia compete with conventional travel agencies, allowing customers to make their own travel reservations online. It thus appears that both disintermediation and re-intermediation are occurring simultaneously in some industries.

Second, IT use can change the competitive position of buyers and suppliers (McFarlan, 1984; Porter and Millar, 1985). For example, a company that successfully employs IT to cut costs or to increase service levels may be able to out-compete traditional competitors. These changes can be considered changes to the industry when they lead to changes to the set of suppliers for the product.

Third, IT can reduce transaction costs and may have some impact on the boundaries of the firm (Williamson, 1975, 1981). Transaction cost theory (which extends the neoclassical economic perspective of the firm by recognizing the significance of transaction costs in any market exchange) has been used to help explain IT outsourcing decisions in various industries (Ang and Straub, 1998).

Finally, IT can change the nature of the product itself (Venkatraman, 1991). In some cases, information becomes an important part of the good or service. In other cases, the product itself becomes digital (e.g. music CDs, digital videos, online journals). Such changes to the nature of the product can lead to changes in the basis of competition among firms and changes in industry structure.

The economic perspective on industries offers several advantages for researchers. First, economics is a well-established discipline, meaning that there is a high degree of agreement on the definition of terms and on the goals, techniques and approaches for analysis. This agreement is reflected in the availability of economic data, e.g. from the census or other government agencies. Furthermore, data can be obtained on a population of firms over time, making it possible to draw strong conclusions about an entire industry, which is important given the long timescale of industry-level changes.

However, the economic perspective has several weaknesses. First, the high degree of agreement and seeming objectivity of the numbers disguises the subjective aspects of the measures. For example, studies of IT productivity impacts have been hampered by difficulties in defining outputs (e.g. Ein-Dor et al., 1997). More generally, what is counted is often a subjective decision. The definition of an industry rests on the question of which products are substitutes, a question that ultimately depends on consumer opinion, since few products are exact substitutes (e.g. does purchasing a DVD replace going to a movie?). In practice, data collection typically uses conventional definitions of industries, but these definitions are also problematic. For example, a firm may produce products that compete in numerous industries, making it difficult to assign the firm to any one. On the other hand, the definition of an industry may be too broad, including many firms that do not directly compete (e.g. until recently there was just one standard ISIC code for the entire computer

industry). Second, because of the economic focus on costs and benefits (or inputs and outputs), IT use is often treated as a black box, meaning that the details of how IT impacts an industry are often not examined.

3.2. Institutional perspective

A second perspective that may be used to analyze industries is an institutional one. An institution can be defined as any standing legal entity that exerts influence and regulation over other social entities. Institutions constrain and regularize behavior, and 'have the capacity to establish rules, inspect or review others' conformity to them, and as necessary, manipulate sanctions—rewards or punishments—in an attempt to influence future behavior' (Scott, 1995, p. 35). Examples of institutions are government agencies, international agencies, professional and trade and industry associations, educational institutions, financial institutions, and labor organizations (King et al., 1994).

Researchers adopting an institutional perspective, e.g. in public policy, political science, sociology or institutional economics, see an industry as a set of institutional arrangements that govern the production and exchange of certain goods. They tend to focus on institutions, on the regulatory framework governing an industry, and on the rights and responsibilities of participants within it. The institutional perspective can also include factors that pressure organizations to conform in order to maintain legitimacy (Robey and Boudreau, 1999). Researchers adopting an institutional perspective on industries tend to take a qualitative and historical approach.

In this perspective, an industry is defined more broadly than in the economic perspective. It includes those firms that compete to supply a given set of products, but it also includes the regulatory framework that specifies the allowable competition. Many industries are heavily regulated, especially those that may impact on public safety or the environment (e.g. transportation, utilities, and food). Various government or para-government institutions may administer the laws or legal agreements relating to a particular industry.

For example, the Federal Communications Commission (FCC) is an independent United States government agency, directly responsible to Congress. The FCC is charged with regulating interstate and international communications by radio, television, wire, satellite and cable (Federal Communications Commission, 2002; see also Garcia-Murillo and MacInnes, 2001).

Changes to the regulatory framework of an industry can have far-reaching implications for every single organization within an industry. Changes to the law may also significantly affect IT use. Many organizations and researchers in economics, public policy and law study the impact of regulatory changes on industries (e.g. Center for Business and Government, 2002; Center for Regulatory Policy, 2002; National Regulatory Research Institute, 2002).

As well as the regulatory framework, most industries have national trade and professional associations. These associations usually collect industry data, publish consumer information and trade and industry magazines, hold trade fairs, represent the members of that association to the public, the government, the media and other interested parties, and promulgate and enforce codes of conduct. In the real estate industry, for

example, the National Academy of Building Inspection Engineers (NABIE) in the United States works 'to establish the highest standards for the building and home inspection industry and to verify the qualifications of individuals offering these services. As an organization, NABIE strives to protect the integrity of the home and building inspection industry, and thus, the general public' (National Academy of Building Inspection Engineers, 2002).

We suggest it is important to understand the relationships between IT use and the set of institutional arrangements within an industry, and the way in which these relationships and arrangements may change over time. The regulatory framework often determines how IT should be used, and conversely, developments in IT may necessitate or enable changes in the laws or other legal agreements relating to an industry. The application of these laws and agreements may affect the economic performance of an industry.

For example, a software company called Napster developed a program that allowed users to share or swap songs via the Internet. However, many large music-publishing companies saw this company as engaging in unfair and illegal competition. The Recording Industry Association of America (RIAA), representing the big five major recording labels and itself an institutional player, took Napster to court in 2001. The RIAA won a court injunction ordering Napster to prevent the users of its software sharing music subject to copyright on its network servers. The RIAA saw Napster as a threat to the entire US music recording industry (Recording Industry Association of America, 2002). In February 2002, however, district court judge Marilyn Hall Patel ruled that the five major record labels must prove they own thousands of music copyrights, and prove those copyrights were not used to monopolize and stifle the distribution of digital music (Boycott RIAA, 2002). Subsequent court cases have tipped the balance in favor of the RIAA and Napster recently ceased operations in its original form.

Irrespective of the ethical and copyright issues in the Napster vs. RIAA case, it is clear that innovations in IT are having a dramatic impact on the music recording and distribution industry (Leyshon, 2001). But how these innovations in IT are to be used depends upon the applicable laws and contractual agreements in various countries and how these laws and agreements are interpreted by judges. Although innovations in IT enabled the sharing of songs by millions of people around the world, this particular use of IT was resisted by the RIAA. Various institutions (the RIAA and the courts) forced Napster to change its software such that it would operate within the existing regulatory framework governing the sale and distribution of music.

The institutional perspective offers several advantages for IS researchers. First, institutional economics, economic history, economic sociology and legal research provide a good basis for understanding the role of IT in industries. The institutional perspective offers IS researchers 'a more structural and systemic understanding for how technologies are embedded in complex interdependent social, economic, and political networks, and how they are consequently shaped by such broader institutional influences' (Orlikowski and Barley, 2001, p. 154). Government agencies 'are clearly among the most powerful institutional forces affecting (IT) innovation' (King et al., 1994). The institutional perspective offers one way of understanding these forces and the regulatory framework within which an industry operates.

Second, this perspective recognizes that industries and nations have unique characteristics. It takes account of the fact that the history of an industry has an important bearing on its present and future use of IT. Third, as technology changes, the effects on institutional arrangements within an industry may be dramatic. Although the music publishing industry has been relatively slow to adapt to the innovative use of IT, other industries have welcomed IT with open arms and effected changes in the way the industry operates. Global airline alliances (e.g. Star Alliance and One World) have been enabled by advances in IT and provide a good example of what we mean, although the scope of these alliances is still limited and controlled by various government agencies (e.g. competitive watchdogs).

The institutional perspective has several weaknesses, however. First, a strict focus on the regulatory framework may miss how IT is being used in practice. For example, although the RIAA succeeded in winning its latest court case against Napster, numerous 'Napster clones' using more advanced technologies have emerged to take its place. The legal victory of the RIAA may end up being a hollow one if it is overtaken by new technologies. Second, by concentrating on those aspects that make each industry unique, it is easy to focus on just one industry and lose sight of how IT might be used in other industries. An institutional perspective may miss these large-order effects of IT use. Finally, institutional indicators of industry-level change may take a long time to become apparent.

3.3. The social and cultural perspective

A third perspective that can be used to analyze industries is a social and cultural one. Researchers adopting a social and cultural perspective see an industry as a set of social, organizational, and cultural relationships. They tend to focus on the patterns of interaction among people and organizations within an industry, on shared language and jargon, meanings, norms, beliefs, and cognitive frames (Scott, 1995). They might study classification schemes about products, processes, and customers, as well as the processes of enculturation, education or training that shape these characteristics. Researchers adopting a social perspective on industries tend to take a qualitative and interpretive or critical approach, drawing on the disciplines of sociology, social and cultural anthropology, history, and socio-linguistics.

In this perspective, an industry is defined more broadly than in the institutional perspective. It includes the various institutional relationships within an industry, but it also includes the social relationships and networks between the various people and organizations within it. An industry is the set of firms and organizations whose stakeholders share cultural characteristics and consider themselves to be in the same industry. An industry is thus a socially defined community of discourse with accepted norms, beliefs, and values.

Within an industry there are accepted norms for manufacturing or product design, accepted ideas of what a product is and what is should look like, and who should do the work (Keller, 1983). Phillips documents differences between industries in "conceptualizations of membership, competition, the origins of 'truth', the purpose of work, and the nature of work relationships" (Phillips, 1994, p. 384). The existence of such a culture

can be seen in the ease with which people move from one firm to another within an industry.

There are many examples of social and cultural research conducted by anthropologists, sociologists, and historians on entire industries. For example, Bailey studied the slave trade and the part it played in the development of the textile industry in New England (Bailey, 1992), MacLennan conducted studies on the automotive industry in the US (MacLennan, 1985, 1988), Barley studied the funeral home industry (Barley, 1983), and Nash studied the high tech defense industry in the US (Nash, 1989).

A small number of researchers have also studied the social and cultural aspects of IT in industries (e.g. Anand and Peterson, 2000). Boyns and Wale (1996) studied the development of management information systems in the British coal industry, from 1880 to 1947; Buhalis looked at the strategic use of information technologies in the tourism industry (Buhalis, 1998); and Codington and Wilson (1994) looked at the use of IT in the UK insurance industry.

We suggest that, as technology changes, the patterns of social interaction and culture within an industry may also change in systematic ways. IT use may lead to industry transformation by changing its social and cultural characteristics. For example, an information system may have a classification system embedded within it and therefore users may be forced to adopt the language of the system. Such was the case with the Norwegian drug prescription exchange described by Monteiro and Hanseth (1995). A system may similarly reflect and impose particular sets of values, norms and behavior, all of which affect the constitution of the industry (Hanseth and Monteiro, 1997). More generally, the kind of systems that can be implemented is constrained by the vocabulary we have for talking about them (Wynn et al., 2002).

The social and cultural perspective offers several advantages for researchers. First, sociology and social and cultural anthropology are well-established disciplines, meaning that there are well-developed research methods for analyzing social relationships and networks (Avison and Myers, 1997; Lewis, 1985; Wright, 1994). Second, this perspective provides explanations about how and why technologies are used. For example, Kumar et al. (1998) showed how a system that might seem economically desirable was incompatible with cultural beliefs about how business should be done in Prato, Italy.

A weakness of the social and cultural perspective is that, like the institutional perspective, it can sometimes miss the larger-order economic aspects of an industry. Another weakness is that it is hard to generalize from one industry to another using this perspective. The strength of the social and cultural perspective (its in-depth treatment of a particular industry) is, at one and the same time, its main weakness.

4. An example: the transformation of the real estate industry by IT

In Section 3 we presented three alternative perspectives on industries. In this section we discuss the real estate industry to illustrate the usefulness of the three research perspectives and to demonstrate how each perspective offers particular insights. Table 3 summarizes the phenomena of interest in this industry from each perspective. We acknowledge that

Table 3
Analysis of real estate industry from three perspectives

Perspective	Phenomena of interest
Economic	IT-induced reduction in cost of locating properties; disintermediation of real estate agents and increase in FSBOs; development of cyber-intermediaries
Institutional	The use of IT as allowed or mandated by the regulatory environment; the role of MLS and MLS agreements between agents in transactions; rules for being listed on real estate Websites; institutional support (or lack thereof) for FSBO real estate sites
Social and cultural	Role of agents in contextualizing information from databases; use of IT to support social networks of agents, customers and other professionals; IT support for representation schemes

the real estate industry is 'unique', but argue that all industries are unique in some way; we do not believe there is such a thing as a 'typical' industry.

Our discussion will draw on data from previously published studies (Crowston et al., 2001; Crowston and Wigand, 1999; Sawyer et al., 2003; Wigand et al., 2001) and from unpublished follow-up work (a description of the project can be found on the Web at http://crowston.syr.edu/real-estate/). Since detailed descriptions of the methods employed in those studies can be found in the cited publications, we will not repeat that information here. Suffice to say that multiple methods of data collection were used, including surveys of real estate agents (two pilot studies with a total of 205 respondents), interviews with 13 agents in the United States and 5 in New Zealand (some agents were interviewed on multiple occasions), discussions with officials at the national realtor associations in both countries and analysis of industry documents and websites.

4.1. Economic perspective

The economic perspective focuses on the economic performance of an industry (outputs) and on the structure of the market—the product, the firms supplying the product, the buyers, and the transactions—and how these might change with the introduction or increased use of IT. In this section, we focus on predictions of IT-induced disintermediation of agents, a transformation in the industry structure.

The real estate industry is interesting from an economic perspective because houses are expensive and have high transaction costs. Much of the research on electronic commerce has focused at the other end of the spectrum, on low-cost, easily describable commodity or branded goods, such as music CDs. There are several reasons for the high transaction costs. First, houses differ widely along numerous dimensions (e.g. size, location, features), which makes them hard to describe succinctly and increases their asset specificity.

Second, real estate transactions are complex, with somewhat high uncertainty and difficulty in measuring outcomes. Finally, transactions are characterized by high information asymmetry, since sellers typically know much more about their houses than buyers. All of these factors increase the perceived risk and cost of the transaction. An interesting feature of the real estate industry is that a large proportion of sales are of 'used' products rather than new. These sales of existing homes take place between individuals (consumer-to-consumer), unlike new goods, which are sold by companies (business-to-consumer). However, individuals who buy or sell real estate infrequently have little incentive or opportunity to develop much expertise in the process.

The high transaction cost and consumer-to-consumer characteristics of the real estate industry increase the importance of real estate agents as intermediaries. Intermediaries, traders, or matchmakers are essential players in the economy in that they create desirable efficiencies and provide expertise to reduce the problems of asymmetric information (Wimmer et al., 2000). Economists have long argued for the importance and theoretical justification for intermediaries (e.g. Wigand, 1997; Wigand et al., 2001).

One view of the role of real estate agents is that they help reduce the transaction cost for an individual buyer. For example, an agent can reduce contact cost by use of a listing service (discussed below), reduce contracting cost by providing standardized contracts, monitor performance, etc. Agents might also address some of the transaction attributes, e.g. by providing specialized knowledge to help buyers more quickly determine if a house is appropriate (thus managing asset specificity), and by providing transaction support (thus managing transaction complexity and information asymmetry). Clearly, transaction costs cannot be entirely avoided, since agents must be paid, but the cost of the agent could be less than the transaction costs borne by a buyer who does not use an agent (Schmitz, 2000; Wimmer et al., 2000). Finally, for most buyers and sellers, agents are seen as necessary insurance against the risk of a transaction gone bad.

Despite the potential advantages of human intermediaries, many professions, trades and industries today are facing the potential of disintermediation, since IT can often provide similar services at a reduced cost. For example, the use of IT might reduce search costs to the point where a human intermediary is unable to compete. IT might also be used to provide information about the process of a sale, thus reducing the perceived risk. Since real estate agents and real estate firms are pure market-intermediaries—they match buyers and sellers but rarely buy or sell themselves—they are potentially vulnerable if buyers can find sellers directly. For example, buyers and sellers can now use the Internet to list and search for houses themselves, bypassing traditional real estate agents, who used to have a monopoly on providing information about listings. eBay, which revolutionized consumer-to-consumer sales by enabling individual buyers and seller to easily find each other, now allows real estate listings. If the value added by agents is merely as a source of information about listings or reassurance about the process, their position is vulnerable and they may become victims of disintermediation.

There is indirect and circumstantial evidence that these developments have indeed had an impact on this profession. Several studies, including research by the National Association of Realtors, found that 60% of all housing purchases in the USA start on the Internet. While brokers still control four out of five real estate transactions, the number of homes sold directly by their owners ('for-sale-by owner' or FSBO sales) has increased in

recent years (Fletcher and Wright, 1997). Over 3600 individual Websites have been created in the US to sell homes, most newspaper advertisements now appear on-line, and FSBO listing registries have emerged (National Association of Realtors, 1998).

Real estate agents have begun to realize the disruptive potential of the Internet (Bottenberg, 1998; Harper, 1997; Self, 1997). For agents, the major challenge in these developments is to figure out a way to add sufficient value in the real estate transaction such that they are able stay 'in the middle'. Some agents are adopting these new communications channels for their own use. For example, Lloyd Anderson, a Harcourts rural sales consultant based in Gore, New Zealand, listed more than 70 of his properties on the Internet (Real Estate Institute of New Zealand, 1999). Anderson is cited in August 1999 as having received more than 670 inquiries from around the world on one property in 2 months, with the Internet leading directly to a sale in excess of NZ $3 million (about US $1.6 million). Other agents are stressing individual service and creating other value-adding mechanisms, such as buyer–broker relationships, connections to other house-buying services, buy/sell deals, and guarantees.

In summary, an economic perspective focuses on changes in the costs of various transactions due to factors such as changes in access to information. Analysis from this perspective leads to the prediction of disintermediation as buyers and sellers seek to save the costs of the agent. This shift would be reflected in a growing proportion of homes sold by owners.

4.2. Institutional perspective

An institutional perspective on the real estate industry focuses on legal and institutional arrangements—the regulatory and contractual framework governing the industry and the organizations that regulate and control interactions—and how these institutions shape and are shaped by the use of IT. To understand the industry from this perspective, it is necessary to understand the current arrangements between buyers, sellers, and agents, so we will first briefly describe a typical sale. To highlight the importance of the institutional perspective, we will compare the practices in the United States and New Zealand.

Typically, a seller agrees to list a property with a real estate agent, called the listing or selling agent (as noted above, only a minority of sellers sell their properties without an agent). The agent advises the seller on the various decisions about selling the house (e.g. pricing) and markets the house to potential buyers (e.g. by placing advertisements, holding open houses, or putting a picture in the agency's shop window). In return for these services, the agent collects a commission when the house is sold (on the order of 5–7% of the selling price in the United States, with wide variation by locale, price of the house, etc.). The relationship between the agent and the seller and buyer is governed by the contract they sign, law, professional licensing standards, and professional codes of ethics.

An essential institutional difference between New Zealand and United States is the use of a multiple listing service (an MLS, also called a multiple listing bureau, or MLB) in the United States. An MLS is a database of the houses listed by member real estate agencies. Originally the MLS was a printed book, but today it is a computer database of listings that can be searched by member agents. In the US, nearly every area has an MLS to which essentially all agencies belong and agencies typically include all of their listings in

the MLS (a significant exception is New York City, and even here, one may soon be developed). But the MLS is much more than just technology. An MLS, strongly influenced by the legal frameworks and professional codes of conduct in each country, contains encoded rules of conduct and role definitions for the industry, and thus influences practice. In particular, the MLS agreement in the US provides a framework for limited cooperation among agents. For example, the MLS agreement generally allows member agents to show houses listed by other agents (using a lockbox to access the house when the sellers are away) and requires selling agents to share their commission with any agent who brings in a buyer (and not with any non-agent). As a result, it is common in the US for a house listed by one agent to be sold by a different agent, working for a different agency, and for an agent to show houses listed by other agencies. Even though agents represent opposite sides of the transaction, the MLS agreement ensures that both are paid by the seller.

The use of the MLS in the US gives agents a considerable information advantage. On the buyers' side, the availability of information in the MLS makes it much easier for an agent to identify desirable properties, thus encouraging buyers to work with agents. (Since the seller pays the agent's commission, there is no direct cost to the buyer for working with an agent.) Historically, this control over listing information was jealously guarded. On the seller's side, houses that are not listed with an agent are kept out of the MLS, which dramatically reduces the number and quality of prospective buyers (since most buyers work with an agent). Indeed, in some locales, agents have been able to have ordinances passed banning 'For Sale' signs, thus increasing the value of the MLS. Because of the importance of the MLS, agents market primarily to each other, and secondarily to the general public (in fact some of the US agents interviewed felt that open houses for the public were ineffective and a waste of time).

In New Zealand, MLBs existed in Auckland and Christchurch, but these recently closed (as discussed below). Even when they were in operation, only a fraction of the agents in these two cities belonged, and even those who did belong did not list all their properties. The lack of success of both these MLBs can be explained by the institutional arrangements in New Zealand. There are about half a dozen large real estate firms throughout New Zealand, and these firms compete fiercely with one another. Agents who work for a particular firm generally do not cooperate with agents in other firms because there is no institutional structure comparable to the US MLS agreement that encourages them to do so. The lack of such an agreement is due in part to public policy, as competition is required in every industry by the New Zealand Commerce Commission (a statutory body charged with preventing monopolistic practices).

Working within an institutional framework that encourages competition and discourages cooperation, it is not standard for agents to cooperate or share their commission with agents in other firms. Agents show only their own firm's properties, so buyers must check with each agency in an area to be sure of seeing all offered properties. Agents try to convince sellers to list with their own firm only (called an 'exclusive listing') and actively discourage sellers from listing with multiple agencies (e.g. by offering less support to such listings). Once they have captured an exclusive listing, agencies then focus their efforts on advertising directly to potential buyers, perhaps to compensate for the potential reduction in the number of buyers caused by the absence of shared listings. Agencies have large shop windows with displays of houses for sale. Most buy large

amounts of advertising and the largest firms produce their own glossy advertising magazines. For sale signs are large (2 m × 2 m is not uncommon) and provide a large amount of information about the property offered. New Zealand real estate agents hold many more open houses than is typical in the US (several a week for several weeks, rather than one or two). This approach may be more work (i.e. economically less efficient) for buyers, but persists because of the institutional support.

The difference in institutional context has also affected the impact of the agents' use of the Web. In the US, a real estate agent's Web site is often a presentation of their MLS listings, as is the national site, www.realtor.com, run by the National Association of Realtors (NAR). In New Zealand, the national Web site developed by the Real Estate Institute of New Zealand (REINZ) www.realenz.co.nz allows a buyer to compare listings across multiple real estate agents. But the only way to get a listing on the Web site is to list with an agent, and the only way to buy a listed property is to deal with the agent. Thus, as might be expected, the REINZ Web site does not affect the basic relationship between agents, sellers, and buyers. The respective Websites thus seem to reinforce the existing institutional arrangements rather than change them.

The position of agents could be threatened by the emergence of competitive FSBO listing sites. As with eBay, such sites could allow buyers and sellers to find each other directly rather than having to employ an agent (of course, they would have to also take on the other functions performed by agents). Although there are numerous such sites, none seem to have the critical mass needed to be successful, and indeed, many have folded. From an institutional perspective, a critical difference is that the real estate agent sites can piggyback on the existing infrastructure for listings and advertising. In contrast, there is no central player in the FSBO world. Most sellers are selling only a single house and have little chance to develop expertise or economies of scale in the process. Furthermore, the NAR and REINZ encourage agents to avoid real estate sites that mix listed and FSBO properties, thus limiting competitive sites to only FSBO advertisements, further decreasing their appeal.

A question raised by this analysis is why some other established organization does not take a leading role in organizing the FSBO market. For example, newspapers run ads from both real estate agents and individuals in their local markets, and many have made their advertisements available on their Web sites. One hypothesis for this behavior is that newspapers derive more revenue from real estate agents, who are regular customers, than they do from individuals, and so are reluctant to become active competitors.

In summary, the institutional perspective emphasizes the importance of the regulatory environment and institutional arrangements in shaping the use of technology. This perspective helps to explain the differences in how IT is being used in New Zealand and the US. In the US, it is in the agents' interest to use the MLS; in New Zealand it is not. What is rational in one country is not so in another. We can see, therefore, that the institutional perspective helps us to understand more fully how IT can transform an industry and how that industry uses IT.

4.3. Social and cultural perspective

A social and cultural perspective looks at the social structure and culture of the real estate industry in a region, state, or country. This social structure and culture influences

what agents, buyers, sellers, and other parties believe about their industry (their norms and values) and how it should operate (their practice). This perspective leads to an examination of agents' social networks along with a study of shared industry language and jargon, meanings, norms, beliefs, cognitive frames and classification schemes about products, processes, and customers, as well as the processes of enculturation, education, or training that shape these characteristics.

From a social and cultural perspective, the use of IT leads to the increased availability of information about properties to all the parties, but much of this information is 'de-contextualized', meaning that it may not be clear how it applies to a particular situation or circumstance. Real estate agents often have stories to tell about the local neighborhood, about the relative merits of schools in the area, the local shopping centers and so forth. While the basic data is usually available from various sources, buyers may need help interpreting and putting the data into context. In this way the social network, and especially the strong local ties, represents the added value that the agent provides during the sale process. Additional sources of de-contextualized information, such as listings, FAQs, etc. may not reduce the perception of risk for customers who have little experience with the complexities of real estate. Rather, these individuals need access to embodied expertise and other resources.

From this perspective, the primary value that an agent provides to a customer continues to be access to the agent's established social network of value-adding players. Expertise is much more important than simple listings data, and much harder to replace with technology. For example, since most buyers need legal advice on the transaction, real estate agents often seek out and form strong relationships with lawyers who will help their clients (and vice versa: lawyers seek to develop relationships with agents who will bring them business). These relationships certainly have an economic aspect, but the economic transactions are built on social relationships of trust and reciprocity. A listing of lawyers in the phone book or an on-line equivalent is not a replacement for a recommendation from an agent or a friend. The agent provides a certain comfort level that the transaction will be completed satisfactorily.

A social perspective suggests that the increased use of IT by real estate agents may enable them to extend their social networks and thus increase their social capital (Kraut et al., 1998a,b). Increased connectivity (via cellular phones, pagers and email) allows a real estate agent to more easily maintain contact with the members of his or her social network. The increasing use of certain technologies also makes it easier for potential customers to contact the agent. And, as we mentioned earlier, an Internet presence can extend the agent's reach. Contemporary 'Web-savvy' agents often have their listings on personal Web sites, organizational Web sites (such as local franchise sites), cooperative sites (such as www.homehunter.com), and the National Association of Realtors' Web site.

Another focus of this perspective is on the use of language and cognitive schemes by individuals in the industry. The real estate industry uses a specific representation scheme to describe properties. These schemes capture and represent the characteristics of houses important to buyers, such as the number of rooms, construction materials, special features, etc. These schemes are embodied in and therefore affected by the introduction of a system such as an MLS. The technology can lead to changes in several ways.

First, when an MLS is introduced, it is necessary to standardize the descriptions of properties. Technological limitations may require pruning of descriptions. In order to provide search facilities, systems impose a standard format and selection of fields. Standards can differ among regions, reflecting the diverse needs of these areas. As MLS systems move on to the Web, though, two additional changes become necessary. First, because the Web versions of the systems are open to the general public, the presentation of the information has to change. Professionals who use a system everyday can be expected to learn abbreviations, labeling conventions, etc. but an occasional user requires a more explicit presentation. More importantly though, to integrate separate MLS systems into a seamless Web presence, it is also necessary to integrate the representation schemes they embody. As far as we know, no research has yet looked at how the changes in these representation schemes affect the work practices of agents or the behaviors of buyers and sellers.

4.4. Summary

Each of the three perspectives offers a different view of the relationship between the real estate industry and IT. The economic perspective suggests that the increasing use of IT will lead to the disintermediation of real estate agents. The institutional perspective suggests that the use of IT on the real estate industry will vary considerably by country and or region. The social and cultural perspective suggests that IT may lead to an increase in the social capital of agents. Each perspective highlights particular kinds of changes in the roles of players in the industry, but no perspective alone provides a complete view.

Hence, we suggest that much more research is needed in the real estate industry and many other industries to understand better the relationship between IT and industry transformation. We also suggest that this relationship should be studied from three perspectives—all three perspectives together offer a broader view of the relationship between IT and industries. New information technologies may make new business arrangements and processes economically possible, but how IT is used depends upon the regulatory and institutional environment (and this varies by country). Also, people's social networks, assumptions, beliefs, cognitive structures and norms affect the way in which technology is developed and applied.

5. Discussion and conclusions

In this paper we have suggested a broadening of the research agenda within IS. Although it is often claimed that IT has the potential to transform entire industries, our research has shown that very little IS research has actually been conducted at the industry level. Most IS research has focused at the individual, group, or organizational levels of analysis.

We believe that there is a simple reason for the scarcity of studies at the industry level: they are hard to do. Studying an entire industry is simply more difficult than studying one or more organizations, just as studying an organization is more difficult than studying one or more individuals. Indeed, some of the studies that draw industry-level conclusions have

in fact relied on data collected at the organizational level. As well, it is difficult to draw boundaries around and fully comprehend an entire industry, particularly as industry boundaries may change.

Nevertheless, we believe that industry studies are important. Industrial phenomena are not reducible to organizational phenomena, just as organizational phenomena are not reducible to individual phenomena. Just as industry-level laws and institutions influence the use of IT in an industry, so information technology may have industry-wide effects (Orlikowski and Barley, 2001) (and especially where the products themselves have an information component and are becoming digital). Indeed, an interesting question is why industries differ in their rates of adoption of information technologies. Given the scale and potential impact of the changes that are happening at an industry level, we believe that a concerted effort is needed by the IS research community to study this phenomenon.

There are a variety of approaches to studying an industry. One approach is to use economic or census data. Another is to use surveys of firms, which can address a wider set of questions. Yet another approach is to examine a single firm (or a few firms) in depth as an exemplar of changes going on in an industry. An institutional approach suggests the importance of studying a smaller number of key institutions that influence and regulate the industry. The social and cultural perspective suggests a study of the processes and structures through which culture and social ties are reproduced (e.g. educational institutions, standards bodies, or trade associations). Many of these bodies sponsor industry portals on the Internet. Finally, one can study a network of firms and their interactions, in order to understand the pattern of social relations that under girds an industry (e.g. Kumar et al., 1998).

Until now the dominant approach in IS research has been economic or strategic, largely drawing upon micro-economic theory and the theoretical frameworks of Michael Porter. We agree this is a valuable perspective, but suggest that industry studies in IS should draw on a wider range of perspectives. We suggest that the study of IT and industry transformation could be revitalized by an appreciation of two other perspectives—in particular, the institutional, and the social and cultural perspectives.

In this paper we have suggested three research perspectives for the study of IT and industry transformation. As demonstrated by our analysis of the real estate industry, each perspective offers unique and potentially valuable insights and is capable of explaining a different set of observations. Whereas the economic perspective suggests that the increasing use of IT will lead to the disintermediation of real estate agents, the institutional perspective suggests that the impact of IT on the real estate industry will vary considerably by country and or region. The social and cultural perspective suggests that IT may lead to an increase in the social capital of agents. Comparison of these perspectives suggests that the actual transforming effect of IT in the real estate industry is not immediately obvious. Further research is needed in the real estate industry and many other industries to better understand the relationship between IT and industry transformation. In Table 4, we provide a list of research questions that might be addressed at an industry level from each of the three perspectives. As can be seen, there are many questions raised by each perspective, from the impact of IT on industry structure (economic perspective), to the impact of IT on patterns of communication and cooperation within an industry (social and cultural perspective).

Table 4
Sample research questions for each perspective

Perspective	Sample research questions
Economic perspective	Impact of IT on de-skilling and unemployment (macro)
	Impact of IT on productivity (macro)
	Impact of IT on competition (micro)
	Impact of IT on industry structure, e.g. suppliers, intermediaries
Institutional perspective	How advances in IT may lead to changes in the regulatory framework of an industry
	How changes in the regulatory framework of an industry affects the use of IT
	Differences in the use of IT in different legal jurisdictions, each having its own institutional structures, statutory bodies, licensing and certification standards
	Process of standards setting within an industry
	Political lobbying within an industry
Social/cultural perspective	Influence of social networks and social interactions on IT use, e.g. diffusion of innovation studies
	Impact of IT on patterns of communication and cooperation within an industry
	Changes in vocabulary of industry and discourse related to IT use
	Role of IT in professions, e.g. education and training, enculturation, values, beliefs, professional lifecycle, rites of passage
	Cultural values related to IT, e.g. norms and legitimacy of IT use
	Perceptions of substitutability of product and relation to competition

We note, however, that each perspective offers only one view of the world. Each perspective has its strengths and weaknesses. Therefore, we also see a need for studies that attempt to integrate multiple perspectives on a single industry. We agree that it might be difficult for a single study to address multiple perspectives simultaneously. We also think it is unrealistic to expect economists to become cultural anthropologists and vice versa. Rather, a realistic way of approaching these studies might be for IS researchers to form multi-disciplinary teams where these teams work on multiple projects. That is, a number of researchers from each perspective could collaborate on a study of a particular industry, or they might just coordinate their studies of a particular industry. While it may be difficult for researchers with such different perspectives to work together, we believe that deep insights might be gained from such projects. One approach to bring the research from different perspectives together would be to identify a few key concepts that act as a boundary object to link these studies together. For example, classification systems could be of interest to researchers from all three perspectives. Similarly, there may be particularly interesting phenomena in an industry, such as disintermediation, that can be examined from multiple perspectives. Finally, we recommend studies that compare and contrast industries.

We acknowledge that this paper has many limitations. First, the real estate industry is unique and in many respects unlike any other. Our response to this limitation is to suggest that all industries are unique is some way. We do not believe that there is such

a thing as a 'typical' industry. Another limitation is our rhetorical strategy of presenting the three perspectives as distinct, when it is clear that there is much overlap between them. For example, at the interface between economics and social and cultural anthropology there is economic anthropology, at the interface between institutional and legal and economics there is political economy and institutional economics, at the interface between social and cultural and cognitive and linguistic there is linguistic anthropology and social psychology. Our response to this limitation is to acknowledge much overlap, but to argue that the three perspectives are sufficiently different from one another that they each deserve to be highlighted. We believe that all three perspectives together offer a broader view of the impact of IT on industries.

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References

Anand, N., Peterson, R.A., 2000. When market information constitutes fields: Sense making of markets in the commercial music industry. Organization Science 11(3), 270–284.

Ang, S., Straub, D.W., 1998. Production and transaction economies and IS outsourcing: a study of the US banking industry. MIS Quarterly 22(4), 535–552.

Avison, D.E., Myers, M.D., 1997. Information systems and anthropology: an anthropological perspective on IT and organizational culture. Information Technology and People 10(3), 43–56.

Bailey, R., 1992. Slave(ry) trade and the development of capitalism in the United States: the textile industry in New England. In: Inikori, J.E., Engerman, S.L. (Eds.), Atlantic Slave Trade: Effects on Economies, Societies, and Peoples in Africa, the Americas, and Europe, Duke University Press, Durham, pp. 205–246.

Bakos, Y., 1998. The emerging role of electronic marketplaces on the Internet. Communications of the ACM 41(8), 35–42.

Barley, S.R., 1983. Semiotics and the study of occupational and organizational cultures. Administrative Science Quarterly 28(3), 393–413.

Bottenberg, T.A., 1998. Making the Internet work for REALTORS® or, getting serious about the Web!

Boycott RIAA, 2002. Napster judge hammers the RIAA.

Boyns, T., Wale, J., 1996. The development of management information systems in the British coal industry, c 1880–1947. Business History 38(2), 55–80.

Buhalis, D., 1998. Strategic use of information technologies in the tourism industry. Tourism Management 19(5), 409–421.

Carlson, W.M., 1993. Transforming an Industry through Information Technology. IEEE Annals of the History of Computing 15(1), 39–43.

Center for Business and Government, 2002. Harvard University.

Center for Regulatory Policy, 2002. University of California at Berkeley.
Choudhury, V., Hartzel, K.S., Konsynski, B.R., 1998. Uses and consequences of electronic markets: an empirical investigation in the aircraft parts industry. MIS Quarterly 22(4), 471–507.
Ciborra, C., Jelasi, T., 1994. Strategic Information Systems, a European Perspective, Wiley, Chichester.
Codington, S., Wilson, T.D., 1994. Information-system strategies in the UK insurance industry. International Journal of Information Management 14(3), 188–203.
Crowston, K., 1997. Price Behavior in a Market with Internet Buyer's Agents International Conference on Information Systems, Atlanta, GA, USA.
Crowston, K., Wigand, R., 1999. Real estate war in cyberspace: an emerging electronic market? International Journal of Electronic Markets 9(1–2), 1–8.
Crowston, K., Sawyer, S., Wigand, R., 2001. Investigating the interplay between structure and information and communications technology in the real estate industry. Information Technology and People 14(2), 163–183.
Doherty, J., 2000. Bye-Bye, middleman. Barron's 80(4), 17.
Easley, R.F., Michel, J.G., 2001. Open Standards, Information Systems Strategy, and Adoption of Innovative Technology: The Case of the Recording Industry and the MP3 Standard International Conference on Information Systems, New Orleans.
Ein-Dor, P., Myers, M.D., Raman, K.S., 1997. Information technology in three small developed countries. Journal of Management Information Systems 13(4), 61–89.
Evans, P.B., Wurster, T.S., 1997. Strategy and the new economics of information. Harvard Business Review 75(5), 71–82.
Federal Communications Commission, 2002. About the FCC.
Fisher, S.E., 2000. Internet shakeup for insurance InfoWorld.
Fletcher, K., Wright, G., 1997. Strategic and organizational determinants of information system sophistication: an analysis of the uptake of database marketing in the financial services industry. European Journal of Information Systems 6(3), 141–154.
Gallivan, M.J., Benbunan-Fich, R., 2002. Creative destruction: examining the influence of Ecommerce on information products. Unpublished working paper, CIS Department, Robinson College of Business, Georgia State University, Atlanta, GA.
Garcia-Murillo, M.A., MacInnes, I., 2001. FCC organizational structure and regulatory convergence. Telecommunications Policy 25(6), 431–452.
Gurbaxani, V., Whang, S., 1991. The impact of information systems on organizations and markets. Communications of the ACM 34(1), 59–73.
Hammer, M., 1996. Beyond Reengineering, Harper Business, New York.
Hammer, M., Champy, J., 1993. Reeingeering the Corporation: A Manifesto for Business Revolution, Nicholas Brealey, London.
Hanseth, O., Monteiro, E., 1997. Inscribing behaviour in information infrastructure standards. Accounting, Management and Information Technologies 7(4), 183–211.
Harper, J., 1997. How to fix the Real Estate Web.
Hess, K., Kemerer, C., 1994. Computerized loan origination systems: an industry case study of the electronic markets hypothesis. MIS Quarterly 18(3), 251–275.
Hillis, D., 2000. The bandwidth bomb. Harvard Business Review 78(5), 179–183.
Hopper, M.D., 1990. Rattling SABRE—new ways to compete on information. Harvard Business Review 68(3), 118–125.
Jin, L., Robey, D., 1999. Explaining cybermediation: an organizational analysis of electronic retailing. International Journal of Electronic Commerce 3(4), 47–65.
Keller, J.F., 1983. Division of labor in electronics. In: Nash, J., Kelly, M.P.F. (Eds.), Women, Men, and the International Division of Labor, State University of New York Press, Albany, pp. 346–373.
Kettinger, W.J., Grover, V., Guha, S., Segars, A.H., 1994. Strategic information systems revisited: a study of sustainability and performance. MIS Quarterly 18(1), 31–58.
King, J.L., Gurbaxani, V., Kraemer, K.L., McFarlan, F.W., Raman, K.S., Yap, C.S., 1994. Institutional factors in information technology innovation. Information Systems Research 5(2), 139–169.
Kraut, R., Rice, R.E., Cool, C., Fish, R.S., 1998a. Varieties of social influence: the role of utility and norms in the success of a new communication medium. Organization Science 9(4), 437–453.

Kraut, R.E., Patterson, M., Lundmark, V., Kiesler, S., Mukophadhyay, T., Scherlis, W., 1998b. Internet paradox: a social technology that reduces social involvement and psychological well-being? American Psychologist 53(9), 1017–1031.

Kumar, K., van Dissel, H.G., Bielli, P., 1998. The Merchant of Prato-*Revisited*: toward a third rationality of information systems. MIS Quarterly 22(2), 199–226.

Lewis, I.M., 1985. Social Anthropology in Perspective, Cambridge University Press, Cambridge.

Lewis, I., Talalayevsky, A., 1997. Travel agents: threatened intermediaries? Transportation Journal 36(3), 26–30.

Lewis, I., Semeijn, J., Talalayevsky, A., 1998. The impact of information technology on travel agents. Transportation Journal 37(4), 20–25.

Leyshon, A., 2001. Time–space (and digital) compression: software formats, musical networks, and the reorganisation of the music industry. Environment and Planning 33, 49–77.

MacLennan, C.A., 1985. Political response to economic loss: the automotive crisis of 1979–1982. Urban Anthropology 14(1–3), 21–57.

MacLennan, C.A., 1988. From accident to crash: the auto industry and the politics of injury. Medical Anthropology Quarterly 2(3), 233–250.

McFarlan, F.W., 1984. Information technology changes the way you compete. Harvard Business Review 62(3), 98–103.

Mendelson, H., Kraemer, K.L., 1998. The Information industries: introduction to the special issue. Information Systems Research 9(4), 298–301.

Monteiro, E., Hanseth, O., 1995. Social shaping of information infrastructure: on being specific about the technology. In: Orlikowski, W.J., Walsham, G., Jones, M., DeGross, J.D. (Eds.), Information Technology and Changes in Organizational Work, Chapman & Hall, London, pp. 325–343.

Monteiro, L., Macdonald, S., 1996. From efficiency to flexibility: the strategic use of information in the airline industry. Journal of Strategic Information Systems 5(3), 169–188.

Morgado, E.M., Reinhard, N., Watson, R.T., 1995. Extending the Analysis of Key Issues in Information Technology Management International Conference on Information Systems, Amsterdam, The Netherlands.

Mowery, D.C., 1999. America's industrial resurgence: how strong, how durable? Issues in Science and Technology 15(3), 41–48.

Nash, J.C., 1989. From tank town to high tech: The Clash of Community and Industrial Cycles, State University of New York Press, Albany.

National Academy of Building Inspection Engineers, 2002.

National Association of Realtors, 1998. You own it…protect it!, Washington, DC.

National Regulatory Research Institute, 2002. About the NRRI, Ohio State University.

Orlikowski, W.J., 1992. The duality of technology: rethinking the concept of technology in organizations. Organization Science 3(3), 398–427.

Orlikowski, W.J., Barley, S.R., 2001. Technology and institutions: what can research on information technology and research on organizations learn from each other? MIS Quarterly 25(2), 145–165.

Pereira, M.J., Tavares, L.V., 1998. Linking the European Monetary Union and the Information Systems Strategy of Financial Institutions: A Research Approach to Understand the Changeover International Conference on Information Systems, Helsinki, Finland.

Phillips, M.E., 1994. Industry mindsets: exploring the cultures of two macro-organizational settings. Organization Science 5(3), 384–402.

Porter, M.E., 1985. Competitive Advantage, The Free Press, New York.

Porter, M.E., 2001. Strategy and the Internet. Harvard Business Review 79(3), 63–78.

Porter, M.E., Millar, V.E., 1985. How information gives you competitive advantage. Harvard Business Review 63(4), 149–160.

Rao, B., Parikh, M., Navoth, Z., 1999. Re-inventing Music Distribution Americas Conference on Information Systems, Milwaukee.

Real Estate Institute of New Zealand, 1999. Internet Success in the Deep South REINZ Journal.

Recording Industry Association of America, 2002.

Roberts, M., 1999. Transforming the role of marketing in the chemical industry—new information, new opportunities. Chemical Week S, S18–S20.

Robey, D., Boudreau, M.-C., 1999. Accounting for the contradictory consequences of information technology: theoretical directions and methodological implications. Information Systems Research 10(2), 167–185.

Sawyer, S., Crowston, K., Wigand, R., Allbritton, M., 2003. The social embeddedness of transactions: evidence from the residential real estate industry. The Information Society 19(2), 135–154.

Schmitz, S., 2000. The effects of electronic commerce on the structure of intermediation. The Journal of Computer-Mediated Communication 5(3) Available online at http://www.ascusc.org/jcmc/vol5/issue3/schmitz.html.

Scott, W.R., 1995. Institutions and Organizations, Sage Publications, Thousands Oaks, CA.

Scott Morton, M. (Ed.), 1991. The Corporation of the 1990s, Oxford University Press, Oxford.

Segars, A.H., Grover, V., 1995. The industry-level impact of information technology: an empirical analysis of three industries. Decision Sciences 26(3), 337–368.

Self, T., 1997. The Agent and the Web, December 2, 1997.

Tsiavos, P., Whitley, E.A., Hosein, I., 2002. An Exploration of the Emergence, Development, and Evolution of Regulatory Characteristics of Information Systems International Conference on Information Systems, Barcelona.

Venkatraman, N., 1991. IT-induced business reconfiguration. In: Scott Morton, M.S., (Ed.), The Corporation of the 1990s, Oxford University Press, New York, pp. 122–158.

Vitale, M.R., 1986. The growing risks of information systems success. MIS Quarterly 10(4), 327–334.

Wang, Y.-M., Gallaugher, J., Vasudevan, S., 1996. The Determinants of Network Growth: The Case of Commercial Online Information Networks International Conference on Information Systems, Cleveland, OH, USA.

Wigand, R., 1997. Electronic commerce: definition, theory and context. The Information Society 13(3), 1–16.

Wigand, R., Crowston, K., Sawyer, S., Allbritton, M., 2001. Information and communication technologies in the real estate industry: Results of a pilot survey. In: Smithson, S., Gricar, J., Podlogar, M., Avgerinou, S. (Eds.). European Conference on Information Systems (ECIS), Bled, Slovenia, pp. 339–343.

Williamson, O., 1975. Markets and Hierarchies: Analysis and Antitrust Implications, The Free Press, New York.

Williamson, O., 1981. The economics of organization: the transaction cost approach. American Journal of Sociology 87, 548–577.

Wimmer, B.S., Townsend, A.M., Chezum, B.E., 2000. Information technologies and the middleman: the changing role of information intermediaries in an information-rich economy. Journal of Labor Research 21(3), 407–418.

Wright, S. (Ed.), 1994. Anthropology of Organizations, Routledge, London.

Wynn, E.H., Whitley, E.A., Myers, M.D., De Gross, J.I. (Eds.), 2002. Global and Organizational Discourse about Information Technology, Kluwer Academic Publishers, Norwell, MA.