2000

How do Information and Communication Technologies Reshape Work? Evidence Form the Residential Real Estate Industry

Kevin Crowston
Syracuse University

Steve Sawyer
Pennsylvania State University

Rolf Wigand
Syracuse University

Marcel Allbritton
Syracuse University

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Kevin Crowston

Syracuse University
School of Information Studies

4–206 Centre for Science and Technology
Syracuse, NY 13244–4100
Telephone: +1 (315) 443–1676
Fax: +1 (315) 443–5806
Email: crowston@syr.edu

Steve Sawyer

The Pennsylvania State University
School of Information Sciences and Technology

513 Rider I Building, 120 S. Burrowes St.
University Park, PA 16801
Telephone: +1 (814) 865–4450
Fax: +1 (814) 865–5604
Email: sawyer@ist.psu.edu

Rolf Wigand and Marcel Allbritton

Syracuse University
School of Information Studies

wigand@syr.edu, mmallbri@syr.edu

Research-in-progress paper to be presented at the International Conference on Information Systems, Brisbane, Australia, December 2000.

Keywords: electronic commerce, disintermediation, transaction cost, coordination theory, social capital, fieldwork, survey

[1] This study was supported in part by NSF Grant IIS 97-32799 and by a grant from the Office of the Dean at the School of Information Studies, Syracuse University. The authors thank the unnamed real estate agents and other real estate professionals for their time and insight, and the anonymous reviewers for their comments.

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Abstract

We are exploring how ICT use affects the work lives of real estate agents, the process of selling/buying houses and the overall structure of the residential real estate industry. Earlier stages of our work involved intensive field research on how real estate agents use ICT. In this paper, we report on the design and analysis of a pilot survey of 868 agents intended to investigate their ICT use more generally. Analysis of the 153 responses to this survey sheds light on how ICT use supports information control, enables process support, and helps agents to extend and maintain their social capital.

(100 words)

How do information and communication technologies reshape work? Evidence from the residential real estate industry

For the past three years, we have been studying the use of information and communications technologies (ICT) in the residential real estate industry. Through this project we seek to understand how the pervasive use of ICT in the real estate industry changes the way people and organizations in that industry work. Our overall research project has three specific objectives:

1. *Describe how the use of ICT changes the ways individual knowledge workers conduct their work.*
2. *Describe organizational and industrial changes related to the use of ICT.*
3. *Describe how changes in individual work change organizational and industrial structures and processes.*

In this research-in-progress paper, we first discuss the research setting, then present the conceptual framework and theoretical bases of our study. The main section of the paper is devoted to a review of our initial findings and a discussion of the specific research questions of the survey phase of our study. We then describe our research methods, specifically, the administration of a pilot questionnaire to real estate agents and brokers in one medium-sized metropolitan area in the Northeastern United States. We conclude by discussing the anticipated results of this phase of our study and plans for a follow-on national survey.

Research setting

The residential real estate industry has been a revelatory setting (Yin 1984) for several reasons. First, real estate professionals are rapidly adopting new ICT. For instance, the penetration of computer usage reported grew from 5% of licensed agents in 1995, to nearly 95% in 1999 (National Association of Realtors 2000). Second, since agents act as transactional intermediaries, they are greatly affected by the potential disintermediation implied by a shift to electronic transactions. Finally, real estate is a contemporary example of what other industries may become as they shift toward information-intensive organizational forms supported by ICT (Nohria and Berkley 1994). In particular, the predominant form of organization in this industry is the "corporation of one", described as the future of many other kinds of work (e.g., Malone and Laubacher 1998). Understanding how ICT use is changing one industry—the residential real estate industry in this case—provides empirical evidence about potential changes that might be expected in other industries with the increased use of ICT.

Theoretical Foundations

Since the object of our study—ICT use and its effects—is multi-faceted and spans multiple levels of analysis, our overall project adopts multiple research perspectives and theories. In the remainder of this section, we will first describe the framework in which we placed these theories, and then briefly discuss each theory in turn. In subsequent sections, we discuss the various research methods we have employed.

The overall framework that guides our study is shown in Figure 1. In this framework, uses of ICT are enacted by individuals who, through their actions, change the conduct of their work in response to the availability of these technologies. Individual-level uses of ICT lead in

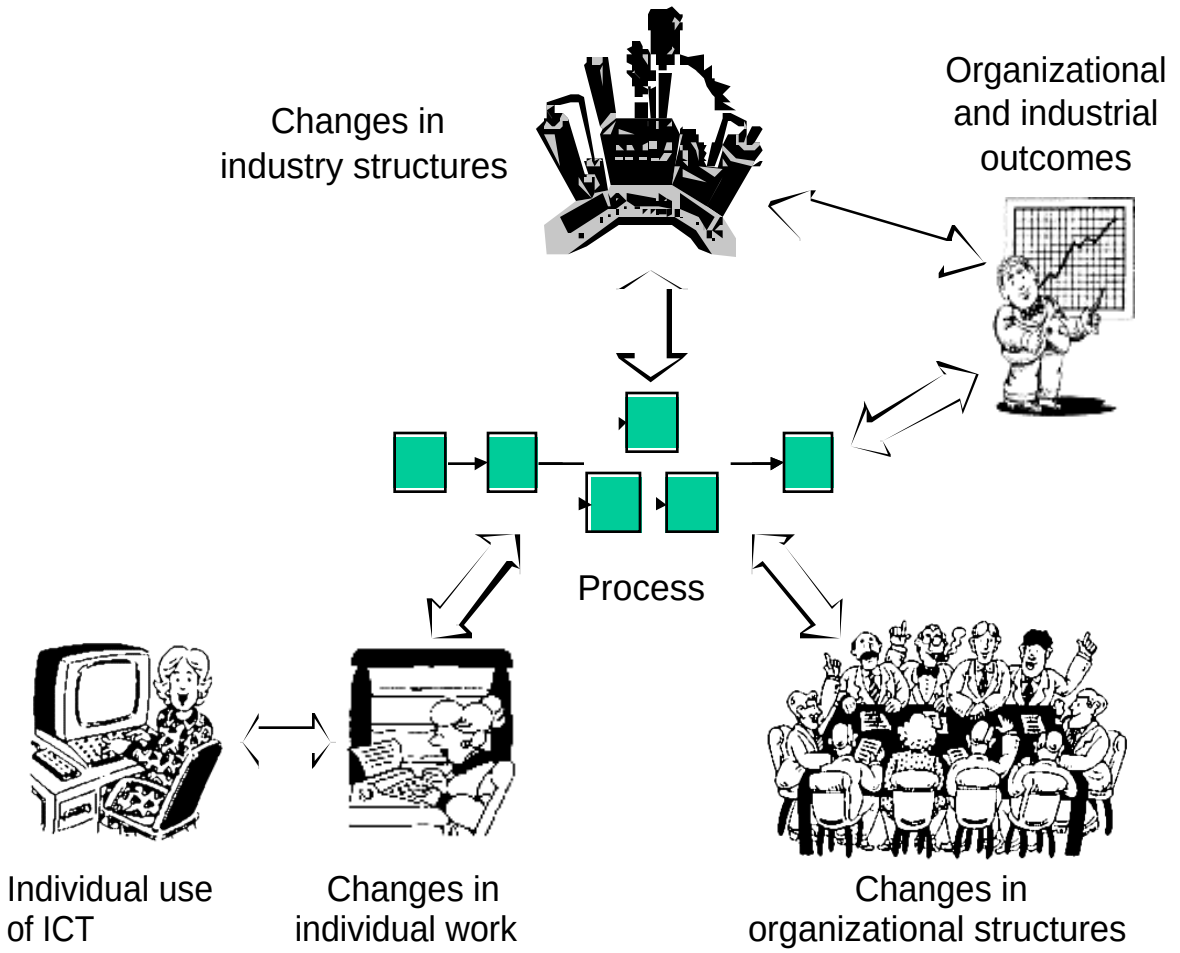

Figure 1. The relationship between ICT-induced changes in individual work and changes in organizational and industrial structures and outcomes.

turn to changes in the organizations in which the work is done. These effects manifest themselves as changes to organizational processes and eventually to changes in organizational structures. Organizational structures include how people are organized for reporting and dissemination of information. Organizational processes reflect the choice and sequencing of tasks to accomplish intended outcomes. Changes in process also have implications for industrial structures and value-chains (Baker 1990). Industrial structure includes the division of work among companies (i.e., the position of firm boundaries). The industrial value-chain can be seen as a process extended across multiple firms.

In other words, as individual workers use various forms of ICT in their work, they alter both how they conduct their work and how they participate in the organization's processes and structure, and thus indirectly how their organizations participate in the industry-wide value-chain. Conversely, there are organizational and industry-wide forces shaping how work is done—that is, the arrows in Figure 1 run in both directions (Crowston, Sawyer, and Wigand in press). For example, the real-estate-sales process imposes certain requirements for information sharing, dissemination and use, with implications for individual work and use of ICT. The interaction of these forces shapes the uses of ICT, new forms of work and new ways of organizing (Kling and Scacchi 1982; Orlikowski and Robey 1991; Wigand, Picot, and Reichwald 1997). Finally, changes to organizational processes and industrial structures, arising in part from how individual workers use ICT in their work, lead to changes in organizational and industrial outcomes such as productivity or performance. One implication of this set of relations is that the uses of ICT are not directly related to changes in outcomes, nor mediated in a simple way. Consequently, the eventual outcomes are impossible to predict in general. Instead, to understand the ways ICT can change work, our research framework suggests the need to understand the individual, organizational and industrial levels, and the underlying processes, simultaneously.

To understand **individual work**, we drew on the concepts of work design (Hackman 1977; Hackman and Oldham 1980): the degree of task autonomy, task variety, task feedback, task interdependence and task identity and changes in these due to increased use of ICT.

To understand **process changes enabled by the extensive use of ICT**, we applied two theoretical perspectives, transaction cost economics (Williamson 1981) and coordination theory (Malone and Crowston 1994). Transaction cost economics focuses on changes in the costs of various transactions due to factors such as changes in access to information. Coordination theory

extends this perspective by describing alternative coordination mechanisms and the trade-offs between them more explicitly. In these views, ICT has an impact by changing the relative desirability of different ways of working by making different activities and processes more or less attractive (Crowston 2000). These theories also describe implications for **industry structure**. For example, these perspectives lead to a common prediction of disintermediation, since the reduced cost of communication allows buyers and sellers to find each other without requiring the services of an intermediary.

In the case of residential real estate, most agents are independent contractors. As a result, agents' work is affected by informal social structures as well as formal organizational arrangements. The social structure encompasses the set of patterns, relations and artifacts that both shape and evolve through the interaction among people. To explore how the use of **social structures might affect (and be affected by) use of ICT**, we examined the agents' development and use of social capital, defined as the set of social resources embedded in relationships (Tsai and Ghoshal 1998, p. 464). We viewed social capital as having three components: structural, relational, and cognitive (Tsai and Ghoshal 1998; Wellman 1988, pp. 31-40). The structural dimension involves social interaction that the agent uses to gain access, information, or resources. This dimension is mostly clearly affected by the use of ICT. The relational dimension encompasses qualities that arise from interactions (such as trust and loyalty). The cognitive dimension includes attributes such as shared norms, codes of action, and convergence or similarity of views.

Initial Findings

We have gathered data in multiple ways over the past three years. During the first year of our study, we conducted multiple interviews and extended periods of observation concerning the work of individual real estate agents and their adaptations to the introduction of ICT. Drawing from our fieldwork and archival records analysis, we offer some initial findings about the nature of real estate agents' work and their use of ICT (see also Crowston, Sawyer, and Wigand in press; Crowston and Wigand 1999; Sawyer, Crowston, and Wigand 1999).

First, we observed that the agent's traditional role as an information intermediary was being contested. While agents once had complete control over access to the MLS listings, this control has been weakened by the development of alternative sources of listing information, such as Web sites or FSBO guides. Second, we observed that agents seemed to play an increasing role in "process support." Because the real estate process is complex, agents were valued for their ability to guide the buyer and seller through the transaction. Third, agents use social capital to establish their stake in the value chain. Transactions occur through networks of individuals engaged in reciprocal, preferential, mutually supportive actions. Finally, we found some examples of real estate agents active management of ties (both strong and weak) and their social capital.

Research Questions for Survey

Based on our overall model and the initial results of our fieldwork, we developed a series of research questions to be addressed in a survey. First, to establish the generality of our observations, we had some simple descriptive questions regarding agents, their work and their uses of ICT. For example:

- What ICT do agents use (and how often)?
- Where in the process of a real estate transaction do agents use which types of ICT?
- What kinds of relationships do agents have with other professionals that might constitute social capital?
- How do agents coordinate the process of a real estate transaction?

Second, we had questions about the relationships between these constructs. Because the survey collected only cross-sectional data, we could not directly assess causality. Instead, we asked about perceived effects or assessed the correlation between constructs. For example:

- What ICT do agents perceive as being effective and valuable in supporting their individual work?
- What is the relationship between an agent's ICT use and their access to social capital?
- What is the relationship between an agent's ICT use and coordination of the process of a real estate transaction?

We also requested performance indicators (e.g., number of houses sold, time to a sale, etc.) to address questions about agents' contributions to the process and the benefits (or costs) of the use of ICT. For example:

- What is the relationship between an agent's coordination of the process of a real estate transaction and their individual performance?
- What is the relationship between an agent's ICT use and their individual performance?

Finally, we collected basic demographic data about the agents such as age, years in the profession, training, etc.

Research Methods

The research questions listed above were addressed using data gathered from a self-administered mail questionnaire of agents. Items for the questionnaire were based in some cases on survey items in the literature or were developed based on the interviews with agents. Most questions were closed-ended (using seven-point Likert scales), although there were several opened-end questions asking for perceptions about the general research questions. Following the procedure suggested by Dillman (1978), the questionnaire was pre-tested by two groups of agents (a total of eight agents) before distribution.

As a pilot test, the survey was distributed to 868 agents in a single metropolitan area in the Northeast USA. The local realtor association and the four largest realtor agencies assisted us in data collection. Again following Dillman (1978), all agents received an alert (via either mail or meeting) one week before the survey was distributed. Follow-up surveys were distributed both two and four weeks following initial distribution. The survey data collection resulted in 153 useable responses, a response rate of 17.6%. This data has been coded and is currently being analyzed.

Data Analysis and Preliminary Results

Data analysis includes descriptive statistics, reduction of multiple items to scales for various constructs (e.g., by performing factor analyses to understand the dimensions of ICT use or agents' working relationships) and testing relationships between constructs (e.g., using correlations and/or regression).

While analysis is still in progress, we can report on some preliminary findings. First, use and perceived value of ICT seem to have a small number of underlying factors. Our data suggest factors for basic technologies (telephone and multiple listing service, and Fax and cell phone), communications technology (beeper and voice mail) and advanced technologies (e.g., email, Web, PC, PDA). Some of these technologies are used almost universally (e.g., telephone and MLS), while others are used and valued by only a few agents (e.g., PDAs and Web). We are now considering the relation between the use of these advanced technologies and other aspects of the process and performance of the agents.

Our analysis also suggests that the relationships that agents maintain are reciprocal (that is, patterns of giving and receiving resources appear to be similar). Again, factor analysis suggests a small number of underlying factors for these relationships. Primary relationships are maintained with those who have close connections to the closing (other agents, brokers, buyers and sellers). In essence, these are strong-tie links. Secondary relationships are maintained with those whose contributions to the closing are not as direct (inspectors, lawyers, mortgage consultants). These seem like weak-tie links. We are continuing to examine the relationship between these ties and process and performance measures.

After completing the analysis of the pilot data, the next step in our study will be to survey a stratified national sample of real estate professionals, after having revised the survey based on the analysis of the pilot data. The national survey will be followed by additional intensive fieldwork in a number of settings chosen to span a theoretically interesting range of conditions.

Conclusions

Our research provides insight into how value is provided in the real estate industry and into the potential for disintermediation, the possible outcomes of re-intermediation and the identification of emerging intermediaries in the market. In addition to contractual and formal mechanisms of coordination, the core networks that the agents maintain and the interconnections among them also function as coordination mechanisms. The homebuyer benefits from access to the agents' established social network as well as to MLS information. Lessons learned and knowledge gained may be applied to other information and information technology-intensive industries and to the increasingly prevalent "corporation of one". The proposed research will provide a deeper understanding how work and information technology are interrelated. In turn, these findings should provide useful insights and know-how shaping the design of ICT.

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