Theoretical Perspective in Social Analyses of Computerization An Addendum

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ABSTRACT

Since I wrote "Social Analysis of Computing" in 1979, more than 200 scholarly books and articles and several literature surveys have been published about the social dimensions of computerization. In addition, there have been interesting empirical and theoretical studies published in Danish, French, German, Italian, and Norwegian, among other languages. This addendum serves as a brief guide to some of this newer literature.

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THEORETICAL ADVANCES AND EMPIRICAL STUDIES: 1980-1987.

Since I published "Social Analysis of Computing" in 1980, more than 200 scholarly books and articles and several literature surveys have been published about the social dimensions of computerization (Attewell and Rule, 1984; King and Kraemer, 1986; Danziger, 1985; Hirschheim, 1986). In addition, there have been interesting empirical and theoretical studies published in Danish, French, German, Italian, and Norwegian, among other languages. It is impossible to concisely summarize the key findings of this massive body of new research and explain the newer theoretical ideas in detail[2]. This addendum takes the more pragmatic approach of serving as a brief guide to some of this newer literature.

During the 1980's, computerization took a wider variety of forms than in the 1950's through 1980's. In the 1950s through 1980s, most social studies of computerization focussed on data entry clerks or users of printed reports which were generated from batch systems run on shared minicomputers or mainframes. In the 1980s, the diffusions of millions of microcomputers and terminals ("desktop computing") substantially altered the character of computer use in many workplaces in North America (Kling and Iacono, 1989).

Home computer use is another example of the way that changing technologies have altered the social conditions and meaning of computing for millions of people in the United States. In the 1970's, home computer users were relatively a tiny minority; they were primarily scientists who had terminals connected to timesharing services or hobbyists who built primitive microcomputers. By the mid-1980's millions of people from diverse walks of life had acquired commercial quality microcomputers at home -- for entertainment, finance, education, word processing, etc. As a consequence, computerization at home had different meanings for many people in the 1980s and was more accessible as a subject of study than in the 1970s (Olson, 1983; Vitalari, Venkatesh, and Gronhaug, 1985; Turkle, 1984). Similarly, desktop computerization (Kling and Iacono, 1989), electronic mail (Sproull and Kiesler,

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[2] There have been some interesting studies which examine computerization from several analytical perspectives which were not included in this study: Frankfurt School critical theory (Hirschheim, 1986), feminism (Wright and Associates, 1987), and ethnomethodology. These are distinct perspectives. For example, while some studies of information technology examine sex-role differences and the sex-typing of jobs, as in Iacono and Kling (1987) and Kling and Turner (forthcoming), feminism adds a programmatic thrust which goes beyond these analyses. Because of space constraints, I have not amplified the original characterization of six theoretical perspectives to include these newer approaches.

1986), instructional computing (Kling, 1986; Beeman and Associates, 1988) were also much more widely adopted and began to become subjects of scholarly inquiry.

However the scale of scholarly research has not kept up with the vast increase in the kind of computer systems in use and the variety of conditions under which they are developed, deployed, and used. For analysts who see a uniform logic beyond all forms of computerization, such as "more choices in life" or "tightened managerial control" and "deeper penetrations of the organizations into private life," this research gap isn't a fundamental problem. But those scholars who have become intrigued by the empirical reality of computerization have found that the "social and economic forces" that shape computerization are somewhat varied, that systems do not always fit the preferences of managers and the visions of their designers, and that computer usage is shaped by social relations and physical conditions that can vary from one setting to another. To us, this research gap echoes loud silences. It is ironic that we are still puzzled by key possibilities, meanings and many actual consequences of computerization as we race into a social form that some analysts joyfully label "the information age." The possibilities and actual working out of computerization for people, organizations and the larger social order still continues to pose many significant questions. In the absence of a body of good scholarship which adequately covers computerization, the dominant discourse is a anchored in a professional and journalistic literature which simplistically heralds new technical possibilities (cf. Giuliano, 1982; Poppel, 1982) and occasionally reports discouragement when optimistic promises are not readily fulfilled (cf. Salerno, 1985).

COMPUTERIZATION IN WORKLIFE

Computerization in workplaces has been the topic most subject to systematic study in the 1980's, and several recent books examine the topic from different theoretical perspectives (Kraut, 1987; Shaiken, 1986; Noble, 1985; Danziger and Kraemer, 1986; Wright and Associates, 1987; Howard, 1985; Bjorn-Anderson, Eason, and Robey, 1986). Class Politics and Human Relations approaches have dominated the literature, but they are not the only viable approaches to understanding computerization and work.

The Class Politics analyses focus on one primary storyline: that managers shape computerization to control the workforce through a variety of strategies, including more tightly

monitoring workers, deskilling jobs, fragmenting jobs, etc (Howard, 1985; Shaiken, 1986; Noble, 1985). Mowshowitz (1986) summarizes some of this research literature and argues that the regimented "factory of the past" is the model of work organization which drives current office automation projects. He argues that clerical workers of all kinds have been substantially regimented by managerially imposed regimes, and that managers will employ emerging computer-based technologies to similarly regiment, fragment the work of professionals and socially isolate them as well.

While managers have computerized so as to fragment, speed up, and more tightly control some jobs, the overall body of empirical studies have found relatively little electronic monitoring and regimentation. Some studies report complex patterns of sharpened control, not simple top-down control (Kling and Iacono, 1984a). But overall, the literature indicates that there is a substantial variety in the changes in work that are attributable to computerization (Danziger and Kraemer, 1986): clerks can report upskilling and job integration (Carter 1987), as well as occasions of increased regimentation and stress (Turner, 1984). Professionals often benefit more from computerization than clerical workers (Danziger and Kraemer, 1986). These outcomes are not entirely happenstance. There is good reason to believe that occupational power plays a key mediating role. On the average, professionals and managers are more likely than clerks to adapt computing in ways that improves their working conditions. But there are substantial variations in work within occupations and with different modes of computerization as well as between them (Iacono and Kling, 1987).

The study of computing and work has also become more sophisticated in at least three ways. (1) Scholars are beginning to study the ways that work is organized rather than the character of individual jobs. This shift has profound repercussions for study designs, since one examines work groups or work groups and their clients rather than random samples of workers who have specific jobs, but who do not necessarily work together (Kling and Iacono, 1989). (2) Scholars have begun to appreciate that computerization is a long term process; as a consequence short "before-after" comparisons may not tell us much about the nature of working conditions 10 or 20 years after a work group first computerized (Kling, 1984). (3) Scholars have realized that occupations change substantially over time and that the

interplay between technology, work, work organization, skill levels, and labor markets unfolds over decades (Iacono and Kling, 1987)[3].

I do not believe that the big question about how computerization transformed work for any major occupational group has not yet been answered definitively. And I am skeptical of studies that rapidly generalize from a small sample of technologies and workplaces to "all work and computerization." One key difficulty in assessing studies of computerization and work -- and drawing sound general conclusions -- is in understanding which work worlds the studies readily generalize to. In 1984, there were approximately 105 million fulltime paid workers in the United States. Approximately 57 million participants in the fulltime paid workforce were white collar workers; of these approximately 48 million were office workers; and of these office workers, about 15 million were clerical workers of various kinds -- from data entry clerks through telephone operators to secretaries (Kling and Turner, 1991). These people worked in several dozen occupations and for a wide variety of organizations - large and small, rich and poor, public and private, etc. No single study can examine more than a tiny fraction of occupations, kinds of organizations, technologies, forms of work organization, and work worlds. This does not mean that we need 10,000 studies before we can draw meaningful conclusions. It does mean that we have to be careful how we generalize from studies which are necessarily limited in scope. One should pay attention to key dimensions of technology, work and social life, and not casually generalize from a study of clerks workers who work in a large regimented office to all clerks; from free-lance professionals to all professionals; or from rich organizations to poor ones. Nor can we generalize casually from work with mainframes to work with microcomputers, or from work with record keeping systems to communication via electronic mail. As a consequence, our understanding of how computerization alters the character of work will build slowly as careful studies accumulate across occupations, work arrangements, technologies, implementation strategies, labor market conditions, stage of computerization, etc. rather than through one definitive study. Theoretical perspectives play a key role in helping decide what small slice of computerization and worklife will stand as an adequate sample to generalize to a much larger set of worlds of

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[3] The first and third these themes can be found in the better Class Politics analysis of worklife (Zimbalist, 1979; Littler, 1982), and they are now influencing a broader sociologically informed series of inquiries. Class Politics analyses have often assumed a monolithic role for managers, a relatively passive role for workers, and an assumption that relations between workers and managers are basicly similar in all workplaces (Braverman, 1974; Mowshowitz, 1986).

work and computing and along what dimensions to develop new studies (Kling and Iacono, 1989).

THEORETICAL ADVANCES: Web Models

In earlier sections of this paper I contrasted two broad theoretical perspectives: Systems Rationalism and Segmented Institutionalism. Careful studies framed within Systems Rationalism can sometimes provide important insights about people's direct experience in using computing equipment under special social conditions (Sproull and Kiesler, 1986; Turkle, 1984). But the perspective has been of limited use in helping us understand how social and political relations shape computerization and the conditions under which people develop and work with computer-based systems. Nevertheless, Systems Rationalism dominates the professional literature about computerization (Giuliano, 1982; Poppel, 1982; Salerno, 1985). It is also characteristic of many social-psychological studies since they usually examine individuals or small groups in a sociological vacuum.

Some scholars have tried to use the multiple theoretical perspectives examined in this paper to generate alternative hypotheses within the same study (Scacchi, 1981; Rittenhouse, 1987). This has been an interesting strategy to build on the strengths of each perspective, but also to compensate for their weaknesses. But it proves unwieldy, since the researcher carries along six parallel sets of hypotheses (or storylines) simultaneously. Walt Scacchi and I have developed a simpler strategy which rests on a specific theoretical model for understanding computerization in social settings: web models (Kling and Scacchi, 1982; Kling, 1987). Several interesting empirical studies have explicitly adopted web models as an organizing frame (Kling and Iacono, 1984a; Goodman and McHenry, 1986) and several other recent studies use them implicitly (Laudon, 1986; Kraemer, Dickhoven, Tierney, and King, 1987; Beeman and Associates, 1988). The web models have been useful for giving new insights into the role of computerized systems in "decision-making" and negotiating (Section 4.3); and also for understanding the role of computer-based systems in altering power relations in social settings (Section 4.4). But their value goes beyond this limited, but useful, role.

Since there is scant room in this short section to explain web models conceptually and illustrate them with a detailed example, the interested reader should examine the original

expositions (Kling and Scacchi, 1982; Kling, 1987). In a web model, a computer system is a mixture of social and technological elements which are organized in a specific social setting; it is not simply a technology used in a social context. Here we can sketch their meaning and utility, and point the reader to relevant literature.

For example, consider a computerized system to monitor budgets. It may be viewed as a "tool" which can help accountants track the expenditures in their departments. However, a typical computer user does not have flexible control over all aspects of its use. Most computer-based systems are built or operated with critical resources shared with other users, other systems, or other organizational units. Shared arrangements which are commonplace for significant cost savings, also constrain operational schedules, the arrangements for altering the data collected or the reporting formats, or ways of getting access to basic computing resources. As a consequence, it may be difficult to rapidly reorganize a particular budget-monitoring system to track budgets differently, for example, by cost-center instead of by line item. Certainly "computers" can be programmed to execute the programs for budget-monitoring systems which are organized both by line items and by cost centers within departments. But the difficulty facing a cadre of accountants who wish to re-organize their particular budget monitoring system is not only the difficulty of reorganizing their kind of software, but also the difficulty of changing the particular complex sets of overlapping social obligations in which their systems are enmeshed:

** getting approval for their project through their own organizational hierarchies and through the agents who approve and schedule computing alterations;
** having programming staff understand their requirements;
** getting adequate commitments of skill, time, and money devoted to this project;
** insuring that systems analysts and programmers have an adequate understanding of the layers of software which comprise the current system so they can properly renovate it;
** altering data collection procedures so that data is properly coded by various clerks (e.g., by cost center in addition to the line item);
** having the new programs tested and integrated into the proper program libraries for routine operations and maintenance

n the course of getting their budget-monitoring system changed, most accountants would find that their organizations are not simply unified task systems. Some organizations, particularly those that are more "bureaucratic," can be rather cumbersome places to accumulate resources for altering standard procedures, communication channels, reporting arrangements, etc. In addition, if the accountants work in different organizational units, or have different lines of work, they may have different preferences for how the revised system should perform and who should control it. Rather than acting as efficient unified task systems, organizations also act as: (1) rule-oriented bureaucratic systems; (2) sets of political fiefdoms; and (3) arenas in which members negotiate social statuses and social meanings. Web models take these alternative aspects of organizational life into account (Kling and Scacchi, 1982; Kling, 1987).

Web models of computerization examine the adoption, development, use and impacts of systems like this budget-monitoring system, (a) in the context of key systems and social relations like those sketched above; (b) consider the infrastructure systems development and support as an integral element of its operational form; and (c) examine the history of systems and social relations as important constraints on the range of possible action. All analyses about the adoption, development and use of computer-based technologies draw boundaries to include significant participants. Many Systems Rationalist analyses draw formal, a-priori boundaries around direct computer-based systems and immediate users, their work groups, or at formal organizational boundaries. As Kling (1987) shows, these boundaries have often failed to capture important social relationships which influence the development and use of computer-based systems. Web models have helped analysts draw more meaningful, behaviorally justifiable boundaries (Goodman and McHenry, 1986; Kling, 1987; Beeman and Associates. 1988; Kraemer, Dickhoven, Tierney and King, 1987; Laudon, 1986; Dutton and Kraemer, 1985). Within these behaviorally drawn boundaries, web models help explain 1) the social leverage provided by computing arrangements; 2) the co-requisites for smoothly operating systems; and 3) the ways in which the social settings in which computing arrangements are developed and used shape their configurations and consequences. In addition to serving as an analytical approach to understanding computerization, web models help shape research strategies by providing explicit criteria for identifying the array of participants who influence computerization and the relevant time frames.

REFERENCES

Attewell, Paul and James Rule. 1984. "Computing and Organizations: What We Know and What We Don't Know." Communications of the ACM (December) 27(12):1184-1192

Beeman, William and Associates. 1988. Intermedia: A Case Study of Innovation in Higher Education. Institute for Research on Instructional Systems. Providence, RI: Brown University.

Bjorn-Anderson, Niels, Ken Eason, and Daniel Robey. 1986. Managing Computer Impact: An International Study of management and Organizations. Norwood, NJ.: Ablex Publishing Co.

Carter, Valerie. 1987. "Office Technology and Relations of Control in Clerical Work Organization." in Wright and Associates (1987).

Danziger, James N. 1985. "Social Science and the Social Impacts of Computer Technology." Social Science Quarterly March 66(1) 3-21.

Danziger James and Kenneth Kraemer. 1986. People and Computers: The Impacts of Computing on End-Users in Organizations. New York: Columbia University Press.

Dutton, William and Kenneth Kraemer. 1985. Modelling as Negotiating. Norwood, NJ.: Ablex Publishing Co.

Giuliano, Vincent. 1982. "The Mechanization of Office Work." Scientific American (September). vol. 247, pp. 148-164.

Goodman, Seymour E. & William K. McHenry. 1986. "MIS in Soviet Industrial Enterprises: The Limits of Reform From Above." Communications of the ACM (Nov.) 29(11) 1034-1043.

Hirschheim, Rudy. 1986. Office Automation: A Social and Organizational Perspective. New York: John Wiley.

Howard, Robert. 1985. Brave New Workplace. New York: Viking.

Iacono, Suzanne and Rob Kling. 1987. "Office Technologies and Changes in Clerical Work: A Historical Perspective" in Kraut (1987).

King, John and Kenneth Kraemer. 1986. "Computing in Public Organizations." Public Administration Review (November). pp. 488-496.

Kling, Rob. 1984. "Assimilating Social Values in Computing-based Technologies" Telecommunications Policy (June): 127-147.

Kling, Rob. 1986. "The New Wave of Academic Computing in Colleges and Universities." Outlook. 19(1\2) (Spring\Summer) pp.8-14

Kling, Rob. 1987. "Defining the Boundaries of Computing Across Complex Organizations." in Critical Issues in Information Systems, R. Boland and R. Hirschheim (eds.). New York: John-Wiley.

Kling, Rob and Suzanne Iacono. 1984a. "The Control of Information Systems after Implementation." Communications of the ACM. (December) 27(12), 1218-1226.

Kling, Rob and Suzanne Iacono. 1984b. "Computing as an Occasion for Social Control." Journal of Social Issues. 40(3) pp. 77-96.

Kling, Rob and Suzanne Iacono. "Desktop Computerization and the Organization of Work." in *Computers in the Human Context: Information Technology, Productivity, and People*, Tom Forester (ed.) Cambridge, Ma: The MIT Press, 1989.

Kling, Rob and Walt Scacchi. 1982. "The Web of Computing: Computer Technology as Social Organization," Advances in Computers, Vol. 21, New York: Academic Press Inc.

Kling, Rob and Clark Turner. (1991) "The Structure of the Information Labor Force: Good Jobs and Bad Jobs" in California's Informational Utopia: Orange County's Postwar Social Transformation" (with Clark Turner). in California's Informational Utopia: The Social Transformation of Postwar Orange County. Rob Kling, Spencer Olin, and Mark Poster (eds.). Berkeley: University of California Press.

Kraut, Robert. (ed.) 1987. Technology and the Transformation of White Collar Work. Hillsdale, New Jersey: Lawrence Erlbaum and Associates.

Kraemer, Kenneth, Sigfried Dickhoven, Susan Fallows Tierney, and John King. 1987. Datawars: The Politics of Modelling in Federal Policymaking. New York: Columbia University Press.

Laudon, Kenneth. 1986. Dossier Society: Value Choices in the Design of National Information Systems. New York, Columbia University Press.

Littler, Craig. 1982. The Development of the Labour Process in Capitalist Societies: A Comparative Study of the Transformation of Work Organization in Britain, Japan, and the USA. London: Heinemann Educational Books.

Mowshowitz, Abbe. 1986. "The Social Dimensions of Office Automation." Advances in Computers, Vol. 25, New York: Academic Press Inc.

Noble, David. 1985. The Forces of Production. New York: Alfred Knopf.

Olson, Margarethe. 1983. "Remote Office Work: Changing Patterns in Space and Time" Communications of the ACM 26, 182-xx.

Poppel, Harvey L. 1982. "Who Needs the Office of the Future?" Harvard Business Review, Nov.-Dec. 1982, Vol. 60, No. 6.

Rittenhouse, Robert G. 1987. "The Social Dynamics of Computer-Based Text Processing." dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy in Information & Computer Science. University of California, Irvine.

Salerno, Lynn M. 1985. "What Happened to the Computer Revolution?." Harvard Business Review (Nov.-Dec.) vol 63. No. 6, pp. 129-138.

Scacchi, Walt. 1981. "The Process of Innovation in Computing: A Study of the Social Dynamics of Computing." dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy in Information & Computer Science. University of California, Irvine.

Shaiken, Harley. 1986. Work Transformed: Automation and Labor in the Computer Age. Lexington, Ma: Lexington Books.

Sproull, Lee S. & Sara Kiesler. 1986. "Reducing Social Context Cues: Electronic Mail in Organizational Communication." Management Science (Nov.) 32(11) 1492-1512.

Turkle, Sherry. 1984. The Second Self: Computers and the Human Spirit. New York: Simon and Schuster.

Turner, Jon. 1984. "Computer Mediated Work: The Interplay Between Technology and Structured Jobs - Claims Representatives in the Social Security Administration." Communications of the ACM. (December) 27(12), 1210-1217.

Vitalari, Nicholas P. & Alladi Venkatesh & Kjell Gronhaug. 1985. Computing in the Home: Shifts in the Time Allocation Patterns Households. Communications of the ACM (May) 28(5) 512-522.

Wright, Barbara Drygulski and Associates (eds.). 1987. Women, Work and Technology: Transformations. Ann Arbor: The University of Michigan Press.

Zimbalist, Andrew (ed.) 1979. Case Studies in the Labor Process. New York: Monthly Review Press.