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SOCIAL ANALYSIS IN MIS: THE IRVINE SCHOOL, 1970-1990

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ABSTRACT

The Irvine School of research and instruction in information systems is distinct in its focus on the social and organizational implications of information technology. Over an eighteen year period, the Irvine School has developed and employed empirical research methods to study automation in a wide array of organizational sectors. In the process, the school has produced a number of seminal findings on the nature of innovation, the politics of technological change, and the effects of computerization on productivity, performance, and work life. The major approaches of the school are discussed, the essential findings of the research are reviewed, and emerging directions are presented.

INTRODUCTION

The Irvine School of research and instruction in information systems was born in the early 1970's with a series of studies on policies for managing computing and assessing the impacts of computing in American municipal corporations. The principle elements of this school, then and now, have been empirical investigation into the organizational and social aspects of information systems, using an intellectual base from research on technical innovation and organizational change.

The Irvine School is organized through an interdisciplinary arrangement called Computing, Organizations, Policy and Society (CORPS), involving faculty from Management, Information and Computer Science, Sociology, Political Science, and Economics. Instructional activities are targeted primarily toward the Ph.D. level, although part of the B.S. curriculum in Information and Computer Science and the MBA and MPA programs in Management are influenced by the CORPS focus.

The balance of this paper discusses salient features of the Irvine School's research tradition, describing both the approaches to research and some major contributions of that tradition. Where useful, references are made to key books and articles that illustrate the points made in the text. A complete listing of the publications from the Irvine School consists of several hundred items, and is not practical in this context. The paper concludes with a brief overview of emerging directions of the program.

NATURE OF THE IRVINE RESEARCH PROGRAM

From the beginning of its work in the early seventies, six features have characterized the Irvine School. These include: (1) concentration on social analyses of automation; (2) use of multiple intellectual perspectives in forming research questions; (3) maintenance of a critical intellectual stance toward the subject; (4) a focus on technical innovation and organizational change; (5) dependence on empirical research strategies using a mix of methods; (6) interest in history and change over time; and (7) a concern with policy implications at multiple levels and over time.

Social Analysis of Automation

Two major research perspectives dominate MIS: the engineering perspective, concerned with moving from concepts to prototypes to production and operation of systems; and the social analytic perspective, developing explanations for consequences of use of information technology. The Irvine School's research has been mainly social analytic, focusing on the human and behavioral aspects surrounding the introduction, adaptation, use and continuing innovation with the technology. It incorporates analytical perspectives from all of the social sciences, and examines the effects of information technology at the level of role types, groups, organizations, institutions, social networks, and other social entities. Such research typically concentrates on the effect of information technology on particular social, economic or management questions such as the nature of work and work organization, the behavior of individuals and groups as economic entities, the character of decision making, and the distribution of power throughout organizations.[2, 7, 9, 10, 12, 13, 20]

Multiple Perspectives in Research

Social analytic research requires multiple perspectives for viewing the interaction of technology and organizations. All meaningful explanations of the social aspects of the use of information technology proceed from an ideological base that influences the theories and explanations constructed by the investigators. Embracing and accounting for ideology enables us to "triangulate" on issues of concern from several explanatory positions, producing more comprehensive and precise insights. It also provides greater selfconsciousness during observation and explanation, and increased precision from having explicit perspectives that can be examined in light of the facts.[8, 12, 20]

Supply-push views of technical development, coupled with a rational economic interpretation of managerial behavior, have dominated MIS research. These explanatory perspectives have considerable power, and have

yielded useful results. However, they do not explain the variance observed in the patterns and processes of adoption and routinization of information technology in various tasks, or the differences in successful use of the technology across organizations. The Irvine School incorporates the additional element of volition in explanations of adoption and use behavior. In this model, change is seen as a result of interactions among competing and cooperating groups, each of which seeks to pursue some mix of its own and common interests, within the framework of broader organizational and social constructions of what is appropriate and expected. Faith, social pressure, perceived political advantage, and other factors play roles at least as strong as do "cost-benefit" calculi and other rational constructs of behavior, and are incorporated in the research of the Irvine School.[3, 11]

A Critical Stance Toward the Subject

The Irvine School's research proceeds from a critical stance, challenging existing ideas, examining expectations about technology and organizations, and counteracting unsubstantiated biases in claims about both. Ideology and expectations play important roles in the use of information technology, and the ongoing relation between expectations and outcomes is a crucial part of understanding the dynamics of information technology in organizations. There is often a gulf between expectations and subsequent experience with the technology, so it is important to start from common expectations and accepted explanations and attempt to corroborate them with empirical evidence. Incomplete corroboration requires modification, expansion, or displacement of explanations in order to develop a more accurate fit of theory with the facts. A critical stance, together with the multiple perspectives approach, reveals biases inherent in popular claims, and provides leverage to think critically about alternative explanations.[8, 9]

A Focus on Technical Innovation and Organizational Change

The Irvine School's focus on the organizational and social impacts of information technology is well known. Less well known is the more basic effort to understand the relationship between technical innovation and organizational change. The conception of change followed in the Irvine research goes beyond the one-way causality implied by the impacts research label. Technology and organizations are interactive. Organizations are affected by their use of technology in the process of adaptation, and continually deal with consequences that are anticipated and unanticipated, desirable and undesirable. In turn, they act to shape future effects of technological reform through decisions about adoption, use and management of the technology. The iterating processes of action and consequence govern the broader course of change over time, and require techniques such as longitudinal research and the application of robust models of change.[20]

Robust models of change must be applicable to various levels of analysis, and to various kinds of organizations. Ideally, the research would cover all levels of social activity and all kinds of organizations, but such a strategy is practically impossible. The Irvine School has used the organization as its primary level of analysis, although specific projects adopt different units. The organization level is a useful "entry point" for the study of information technology. Most uses of information technology take place in organizations, which makes them fertile ground for

investigation. Organizations also provide an effective means of addressing the broader social impact of the technology. They provide a means for studying a broad range of social levels, from role type at the "individual" end of the spectrum, up through work group, department, division, organization, sector, and institution levels at the "society" end.[10]

The Irvine School is noted for its work in governmental organizations. This focus has been beneficial for some of the group's larger studies, in that government agencies provide a productive venue for long-term study, and have traditionally been a setting for important research in organizational structure and behavior. However, major projects at Irvine have focused on organizations in other sectors, including service firms, educational institutions, international agencies, and households. The venue of the group's research is less important than the overall objective, which is to develop sound explanations of change.

An Empirical Research Strategy

The Irvine School's research involves mainly *in vivo*, empirical study of living organizations. This generally means field research as opposed to *in vitro* laboratory studies. This mode of study requires sustained work by teams of researchers, including graduate students, professional research staff, and faculty investigators. All are involved directly in the fieldwork and interpretation of results. The research involves a mix of quantitative and qualitative research methods. Research over the past fifteen years has included largescale survey research augmented by detailed qualitative studies. The mixing of qualitative and quantitative methods is consistent with the use of multiple perspectives in the formation of research questions and explanations. Qualitative research permits concentration on micro issues, which prove to be important to understanding how things work and why they work the way they do. Quantitative research enhances validity of findings by investigating a larger population, which provides an overview of conditions, a check on the generalizability of findings from qualitative work, and suggestions of where further qualitative work would be fruitful. This mix of approaches is a particularly strong feature of the Irvine School's research.[3, 11, 14, 20]

Analytical research also plays an important role. Conventional tools of empirical social science research are not useful for studying some questions. For example, the longterm implications of the use of information technology for democratic government must be approached through an assessment of the historical context of democratic government, past experiences with major technological and social innovations, and construction of analogies to information technology. A lack of specific information on the institutions of democratic government are lacking, requires extrapolation from what is known about other organizational and institutional settings. The interplay of technology and social circumstances at these levels provides the most reliable insights about the probable consequences of technology and democratic government.[4, 11, 17]

An Emphasis on History and Change Over Time

The Irvine School's major research projects are concerned with change over time. They incorporate longitudinal research methods of varying time scope, from the Project NOAH two year study of computing in households, to the URBIS project's twenty year longitudinal examination

of computerization in municipal corporations. The research also depends increasingly on historical analyses. An important element of historical and longitudinal approaches is the development of a coherent explanatory framework.

In recent years, substantial elements of the Irvine research program have been built around the emerging paradigm of evolutionary explanations in the social sciences. In particular, "reinforcement evolution" models provide a means of accounting for change that incorporate both environmental and volitional explainers in systematic ways. These models posit that social entities (e.g., work groups, organizations) generally seek improvement of their overall welfare through actions toward "local optimality." Environmental conditions shape what is possible, and generally define what will be locally optimal, but movement in particular directions is essentially a matter of choice by the entity involved. Actual choices are governed by numerous factors, including availability of information, beliefs about circumstances and processes, and social relations among actors involved in the process of choosing. Change is a product of both contextual change, which is outside the entity's control, and deliberate action by the entity in an effort to reach a state that is more locally optimal. Imperfect information, social convention, and many other factors conspire with environmental circumstances to affect the actual outcomes of these efforts, and result in the achievement of some new state or condition.[8, 20]

This broad model of change underlies many of the current projects of the Irvine School, although the connections of the specific research efforts to the underlying model are not always made explicit.

A Concern with Policy Implications

A central concern of the Irvine School's research is to improve management and policy in shaping use and effects of information technology. This concern takes two forms: the management of information systems within organizations; and the creation of effective public policy to deal with the development, promotion, diffusion and impact of the technology.

Concern with the management of information systems is aimed at managers in public and private organizations. The general strategy of this research is to determine the importance of management policy relative to broader environmental and organizational factors, which sets boundaries on the efficacy of policy, and then to determine empirically the actual effectiveness of specific policies under particular circumstances. An ongoing stream of research represents this concern, from the policy-related research reviews of the early 1970's to the current research on management action in computing development.[5, 6, 16, 18, 19, 20]

The concern with public policy issues is more diverse. One aspect of this concern is with federal and state policies that affect the use of information technology. The aim is to assess the relative effectiveness of these policies on the formation of organizational strategies for use of the technology, the distribution of technology resources across and within organizations, the nature of applications produced as a result of such intervention, and the distortion of local priorities that results. This has been the primary theme of several major studies by the group. Another aspect is to evaluate the public policy implications of the in-

creasing pervasiveness of information technology in organizations and society. This concern embraces such broad issues as vulnerability, privacy, and democracy, and has been a focus of a number of smaller research projects.[9, 15, 17, 23]

RESEARCH CONTRIBUTIONS

The Irvine School's research projects over the past eighteen years are summarized in Figure 1. Among these projects, the basic topics of research have included:

1. Computing in government (URBIS and its various spinoff projects).
2. Computing in the office and work (COMPUS and DESK-TOP).
3. Computing in the home (NOAH).
4. Computing in policy making (FIBS and IMPMOD)
5. Computing in other countries (MISUJI, MISPAC, OECD, and PACRIM).

The venues and questions of each research project have varied, but all of these studies have focussed on issues related to the use and impact of computers and other information technologies. Five major contributions to the field of information systems research can be identified from these projects.

Automation is a Complex Social Phenomenon

The process of automation involves more than the acquisition and implementation of discrete components of technology. Automation is a social phenomenon involving a "package" of technology (hardware, networks, software), people (technical experts, users, managers), and technique (organizational protocols, policies and procedures). All of these components interact with one another, and with the broader external environment. Research of the Irvine School views computing activity as a "web" of activities incorporating this package, and the development of computerization as establishment of a "trajectory" of change.[13, 20]

Automation is also well characterized as the interplay of the stimulus of technology supply and the inherent or fabricated demand for technology. While the adoption and diffusion of information technology is influenced by both demand pull and supply push factors their effects vary. Demand forces dominate the evolution of large, complex applications, while supply forces appear to exert a major influence on the evolution of small, simple applications. Nevertheless, research of the Irvine School shows demand forces to be decisive determiners of success in adoption, implementation and use of the technology.[7, 21]

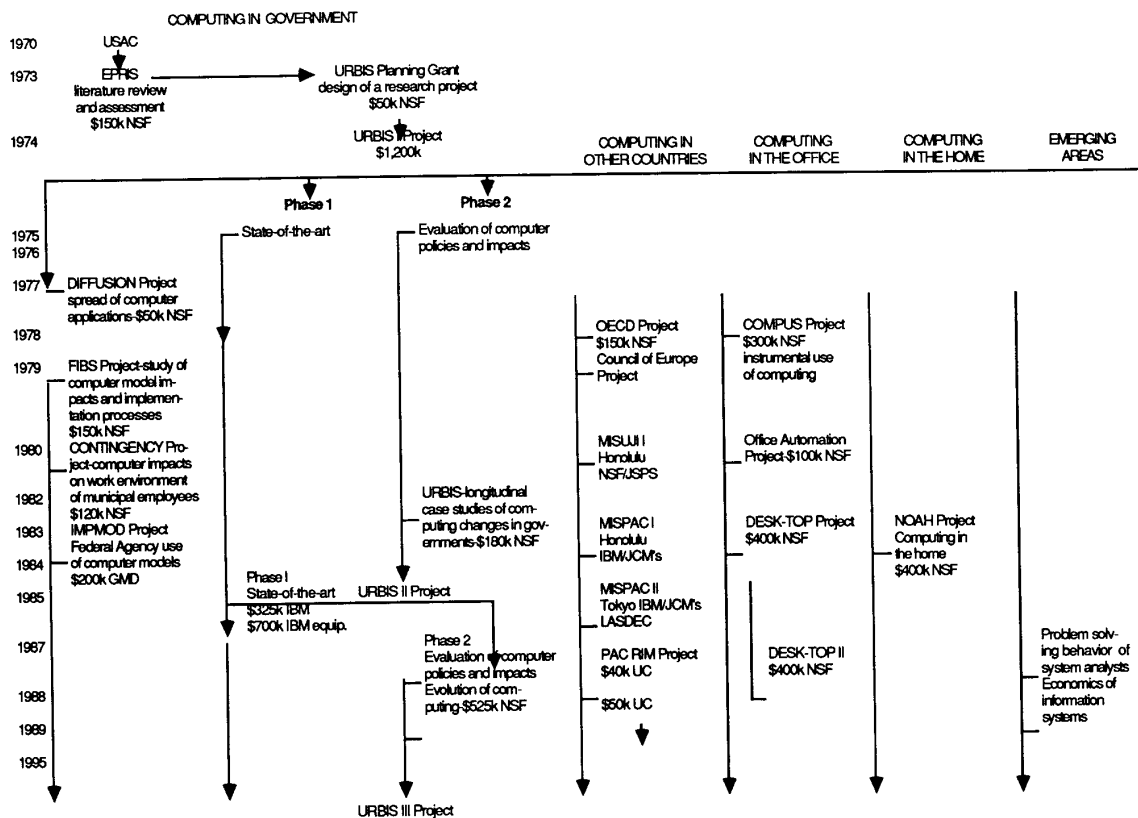


FIGURE 1. LINES OF WORK IN THE IRVINE SCHOOL

The Impacts of Automation are Seldom as Predicted

Common predictions about the effects of using information technology frequently fail to materialize as expected. For example, the use of information technology has brought an increase in the tasks of middle managers and the stress they face, rather than a reduction or splintering of their ranks as originally predicted. Indeed, many predictions about the effect of computerization on work life have proven offbase. Similarly, many unpredicted impacts have appeared. For example, instead of the idealized, "service bureaucracy" model of MIS departments predicted in the literature, many such departments emerge as "skill bureaucracies" of politically motivated staff who use their technical expertise to maintain freedom from control by management and users alike.[2, 3, 4, 11, 20]

The failure of a prediction is not a signal that the outcome is negative. It is good that computerization has not resulted in widespread job displacement of middle managers, and MIS skill bureaucracies frequently produce leading edge applications of the technology. The important lesson from the research is that failures of expectation and prediction are commonplace in the world of automation. The technology and its applications are best characterized as evolutionary in impact rather than producing radical change. Most organizational managers desire stability and work against surprises. New information technology is generally introduced slowly so it can be adapted to, and so staff can adapt to the technology's introduction.

Technology is Political

Rational perspectives of change seldom acknowledge the explicitly political character of technology. They emphasize organizational efficiency, concentrate the positive potential of technology, and assume organization-wide agreement on the purposes of computing use. In contrast, political perspectives see efficiency as a relative concept, embrace the notion that technology can have differential effects on various groups, and believe that organizational life is rife with social conflict rather than consensus. In a political perspective, organizations are seen to adopt computing for a variety of reasons, including to enhance their status or credibility, or simply in reaction to the actions of some other organization. Moreover, applications of the technology can cause intra-organizational conflicts. Decisions about technology are inherently political, and the politics behind them may be technocratic, pluralistic, or reinforcing, with different consequences for different groups in each case.[2, 9, 15]

Political perspectives are essential for understanding technology's role in organizations. Technocratic politics helps explain the relations between the technologists and end users; pluralistic politics helps explain the relations among various user interests vying for access to computing resources; and reinforcement politics helps understand the effects of computing on power and authority in organizations. Reinforcement politics has proven to be an important explanator of overall computerization decisions in organizations, wherein the technology is used primarily to serve the interests of the dominant organizational elites. Reinforcement occurs sometimes through the direct influence of the elites, but more often it occurs through the actions of lower level managerial and technical staff in anticipation of the interests and preferences of the elites. The political mechanisms used to determine the course of organizational automation will vary, depending on the broader political structure of the organizations themselves, and these mechanisms tend to remain stable over time.

Management Matters, but in Complex Ways

Prescriptive literature is full of admonitions about the importance of management in effective use of information technology. However, empirical research into the role of management and the efficacy of management policies is lacking. Research of the Irvine School has demonstrated the crucial role of management action in determining the course of automation, even in cases where major environmental changes were present. Moreover, there are distinct patterns of management action that yield different outcomes. The effect of management action is a function of the structure of control over use of the technology, coupled with the basic orientations of those controlling agents regarding the appropriate applications of the technology. Rather than evolving through "stages" of growth, these Irvine studies show that computing evolves through "states" that are less deterministic and more dependent on the judgements of management.[7, 20]

Effective management of automation efforts is much more difficult than often suggested, however. Specific policies for automation are contingent in their effects on the state of computing management as well as the characteristics of the organization. Policies recommended in the practitioner literature have proven to be associated with serious problems in the computing environment, and it unclear whether the policies are not working, whether they have not yet had time to work, or whether they work only under certain conditions. The Irvine School has made several contributions to the policy literature. Among them are: that keeping up with the technology ("mainstreaming") is strongly associated with productive use of the technology; that the mobilization of political support for computerization efforts is essential to continued success; that certain policy problems such as centralization vs. decentralization have no inherent resolution; and that conventional approaches to training do not bring positive results in user performance.[6, 7, 16]

Social Analysis Requires Innovation in Research Design

The Irvine School has produced methodological as well as substantive contributions. Most are innovations in research design which are especially suited to social analysis. The basic research strategy of the group is that the scale of research has to match the scope of the problem one seeks to address. Large, complex and multifaceted problems require similar approaches. Given customary con-

straints (shortage of knowledge, resources and talented people), one is challenged to focus both energy and effort.

Four basic components of our research have emerged in response. First is a focus on leading adaptors of the technology when studying the effectiveness of policies for managing computing. This focus enables determination of what works and what does not in the process of innovating, and to provide advice that will bring others up to the level of the leading performers. Second, when studying policies we have sampled sites at the extremes of policy application (e.g., high and low centralization, insignificant and extensive user training). This maximizes the variance on the policies, and provides better indication of the basic direction in the relationships. Third, we have census surveys to investigate the extent of the technology's diffusion, the extent of its use, and the nature of its organizational impact. In addition to eliminating all sampling bias, a census provides a much better indication of the distribution of patterns of diffusion throughout a population of organizations. Fourth, we have concentrated on longterm study of organizational and social impacts. Such impacts cannot be studied over the short term because changes occur slowly, the effects of the technology are indirect more often than direct, and the organization and the technology are interactive.[2, 8, 14, 20]

EMERGING RESEARCH DIRECTIONS

Five emerging directions characterize the Irvine School. The first is expansion of existing research into new sectors. A project is currently in process to develop a longitudinal study of information technology and organizational performance, similar to the URBIS study but extending into other major sectors of the economy and society. This project will measure the contributions of information technology to productivity, effectiveness, and competitive advantage in different industry sectors, and in several areas for each sector. Approximately 200 organizations will be selected to provide adequate representation of sectors, creating a study that is larger and more complex than anything done before.[20, 23]

The second is an increased emphasis on the economic aspects of information technology. Planning is underway on two projects applying the tools of economic theory and research to questions of the effect of information technology on management decision making, inter-organizational interaction, and industry structure. These proceed from a base of work already completed in the study of corporate investment behavior with respect to information technology, and the application of agency theory to studying the effects of organizational and political factors on decisions about adoption of the technology. These tools also have applicability to broader welfare-related questions of shifts in relative power distribution following the creation of new electronic intermediaries in markets, and to the analysis and design of governance mechanisms for markets.[1, 5]

Third is the identification of the role of government policy in shaping the international diffusion of information technology. A tenyear study was recently begun of the role of government policy in the diffusion of information technology in different countries in the Pacific Rim. Data are being collected on the rates of technology diffusion in different industry sectors in developed, newly industrialized, and developing countries. The goal is to characterize dif-

ferential rates of diffusion, and identify the influence, over time, of government policies on the rate of diffusion.

Fourth is the study of the role of social structure and context in the creative process of designing new technologies. A study of the sociology of technical design was recently started, which in time will grow in to a program of research. This work focuses on the ways in which social constructs in the lives of designers eventually manifest themselves in the kinds of technologies that are created. Of particular interest is the creation of technologies that are intended to facilitate the collective work of individuals from varying cultural and substantive backgrounds.[22]

Fifth is the development and use of data archives for longterm study of automation in organizations and society. Several largescale databases of crosssectional and longitudinal data have been created from projects of the Irvine School, and the construction of such data bases will continue as part of the research program. Presently, the archives contain data on information technology in government, the office, the home, and MIS organizations. Plans are underway to expand the archive through data from the projects noted above, but the overall objective is to create a national center for data and analysis on information technology in organizations and society.

CONCLUSION

The Irvine School is nearly twenty years old. During this time it has developed a distinct identity and made numerous contributions to the information systems research field. The school's identity has been developed through focus on a common research objective -- understanding the organizational and social impacts of information technology, and more broadly, the role of technical innovation in organizational change. This common objective and the methods developed to attain it grew from a large, multidisciplinary project that has been underway for more than a decade, and that at one time or another, involved most of the current actors in the Irvine school. That single project had a substantial influence on the creation of the Irvine school, and the definition of its character. The emerging research directions of the school build upon this foundation, but expand into new areas and new challenges.

REFERENCES

- [1] Bakos, Y.J., "Dependent Variables for the Study of Firm and Industry Level Impact of Information Technology", Proceedings of the 8th International Conference on Information Systems, Pittsburgh, Pennsylvania, November 1987.
- [2] Danziger, J.N., Dutton, W.H., Kling, R. and Kraemer, K.L. (1982). Computers and Politics. New York: Columbia University Press.
- [3] Danziger, J.N. and Kraemer, K.L. (1986). People and Computers. New York: Columbia University Press.
- [4] Dutton, W.H. and Kraemer, K.L. (1984). Modeling as Negotiating. Norwood, N.J.: Ablex Publishing Company.
- [5] Gurbaxani, V., and Mendleson, H. "Software and Hardware in Data Processing Budgets", IEEE Transactions on Software Engineering, 13(9) 1010-1017.
- [6] King, J.L. (1983). Centralized vs. Decentralized Computing: Organizational Considerations and Management Options. ACM Computing Surveys, 15(4):319-349.
- [7] King, J.L. and Kraemer, K.L. (1985). The Dynamics of Computing. New York: Columbia University Press.
- [8] King, J.L. and Kraemer, K.L. (1984). Evolution and Organizational Information Systems: An Assessment of Nolan's Stage Model. Communications of the ACM, 27(5):466-475.
- [9] Kling, R. (1978). Automated Welfare Client Tracking and Service Integration: The Political Economy of Computing. Communications of the ACM, 21(6):484-493.
- [10] Kling, R. (1987). Defining the Boundaries of Computing Across Complex Organizations. In Boland, R. and Hirscheim, R. (eds.), Critical Issues in Information Systems. New York: John Wiley.
- [11] Kling, R. (1988). The Mobilization of Support for Computerization: The Role of Computerization Movements. Social Problems, 35(3):226-243.
- [12] Kling, R. (1978). Social Analyses of Computing, Computing Surveys, 12(1): 61-110.
- [13] Kling, R. and Scacchi, W.S. (1982). The Web of Computing: Computer Technology as Social Organization, Advances in Computers, Volume 21. New York: Academic Press.
- [14] Kraemer, K.L., Danziger, J.N., Dutton, W.H., Kling, R., and Mood, A.M. (1976). A Future Cities Survey Research Design for Policy Analysis. Socioeconomic Planning Sciences, 10(5).
- [15] Kraemer, K.L., Dickhoven, S., Fallows-Tierney, S. and King, J.L. (1985). Datawars. New York: Columbia University Press.
- [16] Kraemer, K.L., Dutton, W.H., and Northrop, A. (1981). The Management of Information Systems. New York: Columbia University Press.
- [17] Kraemer, K.L. and King, J.L. (1987). Computers and the Constitution: A Helpful, Harmful, or Harmless Relationship? Public Administration Review, 47(1):93-105.
- [18] Kraemer, K.L. and King, J.L. (1988). Computer-based Systems for Cooperative Work and Group Decision making. ACM Computing Surveys, 20(3):115-146.
- [19] Kraemer, K.L. and King, J.L. (1976). Computers in Local Government. New York: Praeger.
- [20] Kraemer, K.L., King, J.L., Dunkle, D.E. and Lane, J.P. (1989). Change and Control in Organizational Computing. San Francisco: Jossey-Bass.
- [21] Perry, J. and Kraemer, K.L. (1978). Technological Innovation in American Local Governments. New York: Pergamon.
- [22] Star, S.L. and Gerson, E.M., The Sociology of Science and Technology, Social Problems, 35(3):197-205
- [23] Venkatesh, A. and Vitalari, N.P., The Social Impact of Computers in the Home. Final Report, Irvine, California: Public Policy Research Organization, University of California, May 1988