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## Connections

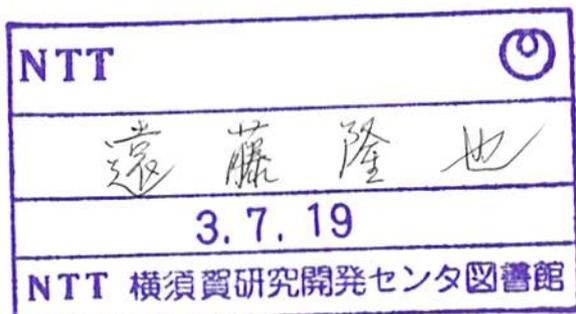
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## Connections

# New Ways of Working in the Networked Organization

Lee Sproull

Sara Kiesler



The MIT Press  
Cambridge, Massachusetts  
London England

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This book was set in Sabon and Courier by the MIT Press and was printed and bound in the United States of America.

Library of Congress Cataloging-in-Publication Data

Sproull, Lee.

Connections : new ways of working in the networked organization

Lee Sproull, Sara Kiesler.

p. cm.

Includes bibliographical references and index.

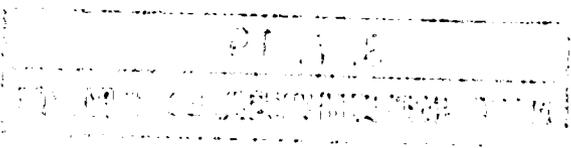
ISBN 0-262-19306-X

1. Electronic mail systems. 2. Communication in organizations.

3. Decision-making. I. Kiesler, Sara B., 1940- . II. Title.

HE6239.E54S68 1991

384.3'4—dc20



90-476  
CIP

**This book is dedicated to Allen Newell**

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## Introduction

In 1986, seven teams of software developers raced against a deadline to design and implement computer-based information systems for their clients. All the teams used a computer network to access databases and programming tools; some also used the network for team communication. Teams that used the network to communicate had fewer meetings but induced greater contributions from their members even though team members were physically dispersed and had divided responsibilities. When the teams completed their projects, those that used network-based communication had created better products but with a work process that was substantially different, with more bottom-up contributions, new coordination procedures, and new subgroup structures.

For the past eight years, we have been conducting social science research on pioneering changes in communication in organizations. In the organizations we have studied, like the software teams, new computer-based communication technology—electronic mail, distribution lists, bulletin boards, conferences—is changing how people work. It can overcome temporal and geographical barriers to the exchange of information. Even more significant, these technologies can connect anyone with anyone or everyone on the same computer communication network. They do not simply cross space and time; they also can cross hierarchical and departmental barriers, change standard operating procedures, and reshape organizational norms. They can create entirely new options in organizational behavior and structure. How will these technologies influence and change organizations? Does a computer network make work groups more effective? How do people treat one another when their only connection is a computer message? What kinds of procedures best suit long-distance management using a computer network? What problems do these technologies alleviate—and what problems do they create?

We think computer-based communication may prove more significant than was the mainframe computer revolution of thirty years ago and the personal computer revolution of ten years ago. Because the technology is used for communication, it has an impact on the most critical process in an organization: whether and how people communicate. Communication determines the connections people have with one another and with their different activities. We have published our research on these topics in academic journals, but we have long felt that the behaviors we have been studying will be so important for organizations that we should write a more accessible book about them. This is that book.

We demonstrate how computer-based communication can alleviate barriers and distortions in organizational communication and can create opportunities for new connections among people. And we also show how it can create new problems that need to be addressed. Ours is a social and organizational view of computer-based communication. We write in the same spirit as social analyses of other technologies—the railroad, telegraph, telephone, steel axes, guns, stirrups, snowmobiles, and CAT scanners.<sup>1</sup> We do not consider technical details of how bits travel over networks or optimum command sequences for creating or reading messages.<sup>2</sup> Others have already reported on how new technology streamlines office and factory work.<sup>3</sup> Our contribution is to document how the technology opens up and stimulates new ways of working and thinking. Our purpose is to discuss how these changes can be exploited by people and to illuminate both the benefits and complications of doing so.

We have conducted our field research in well-established electronic mail communities—those in which large numbers of people already have easy access to good networking technology and information resources. This is our operational definition of a networked organization. In such settings, people typically send and receive between twenty-five and one hundred electronic messages every day. They can't imagine living without these connections. We studied these groups and organizations because we wanted to understand behavioral changes under optimum conditions of use. Good strategies for introducing new technology and building support for it are important policy issues, but they are not the focus of this book. We emphasize what can be anticipated once large numbers of people use the technology routinely. Currently, well-established electronic communities are easy to find in high-technology organizations, universities, and the financial industry. Thus the preponderance of our data comes from those

domains. Yet successful networks are also to be found in elementary schools (Levin and Cohen 1985; Newman 1990), scientific disciplines (Hesse, Sproull, Kiesler, and Walsh 1990), and even restaurants (Rule and Attewell 1989).

Our goal is to present an argument that is widely relevant to everyone interested in organizations and new technology. We also have subgoals for four more specialized audiences. Managers and executives should be able to use the ideas in this book to help shape their vision of a new communication environment and policy decisions that carry out this vision. Technology designers and developers should be able to use the ideas in this book to expand their picture of the real-life uses of their inventions, and of the different kinds of people who could use them. People who use information technology in their work should find the ideas helpful in gaining a new perspective on their work environment. Social scientists should find this book a source of research ideas. We have included many citations to and discussions of the relevant research of our academic colleagues. They often appear in the notes rather than in the body of the text to preserve the flow of the main argument.

Although each chapter can be read as an independent essay, the book follows a historical ordering of organizational communication technology over time. Chapter 1 draws on the social history of nineteenth century technologies, such as the railroad, typewriter, and telephone, to introduce a two-level framework for thinking about technology changes in organizations. We then use that framework to explain the surprising early history of networked computer communication. Chapters 2 through 8 use the same two-level perspective to focus on contemporary organizations and contemporary computer-based communication technology. The topics of chapters 2 through 8 proceed from smaller-scale to larger-scale processes and from more prevalent to less prevalent change in today's organizations. Chapters 2 and 3 discuss the first social effects people are likely to notice with these new technologies. Chapter 2 shows how computer-based communication can improve coordination among people. We offer evidence that the most interesting coordination effects will emerge not from letting small numbers of people communicate more efficiently but from letting large groups coordinate their activities in ways that have not been possible previously. Chapter 3 analyzes what happens as technology lets communication cross social barriers as well as physical ones. We describe "electronic etiquette" and why it differs from that of other communication

situations. Chapters 4, 5, and 6 focus on specific kinds of changes that are likely to occur in three areas: meetings, connections among peripheral workers, and patterns of control. Chapter 4 demonstrates how group dynamics change when people hold meetings electronically rather than face to face. Chapter 5 shows how computer-based communication can reduce the isolation of physically and socially peripheral workers through increasing organizational participation and personal ties. Chapter 6 examines the other side of participation: how increased information exchange can pose problems of authority, control, and influence. Chapters 7 and 8 discuss longer-range changes that we can expect to see in organizational procedures and structures, respectively, as networked communication becomes more ubiquitous.

Some organizations are already doing or thinking about everything we describe in Chapters 2 through 8. For those organizations, these chapters describe the current state of affairs and offer new interpretations of current behavior. For other organizations, the topics in these chapters represent the future. That is, many organizations are likely to be doing at least some of these things within the next five years. These chapters represent a way to imagine what the future could look like. The final chapter identifies technology developments that are infeasible today but are likely to be practical within the next ten years. It also suggests how to think about moving in a principled way from today's organization and technology into a future with more connections among people and organizations.

We owe a large intellectual debt to Carnegie Mellon University, which provided the initial inspiration for our research. CMU is probably the most computer-intensive university in the world. It not only owns thousands of computers, but also people from all over campus have used the network to create a genuine electronic community. We are grateful as well to specific people for their support and good advice. Allen Newell, who exemplifies our ideal of scientific scholarship, intellectual curiosity, and enthusiastic collegueship, has supported our work from its beginning. Professor Newell, Professor Herbert Simon, and Braden Walter, CMU's dean of students, worked with us on the CMU Committee on Social Science Research in Computing. The committee's job was to help coordinate people and resources to study the impact of computing on campus. Michael Cohen, John P. Crecine, James G. March, and James Morris advised the committee and encouraged us. Many other colleagues worked with us on the research projects described in this book, especially Mike Blackwell,

Diane Burton, Kathleen Carley, David Constant, Vitaly Dubrovsky, Tom Finholt, Brad Hesse, Chuck Huff, Tim McGuire, Anne Marie Moses, Jane Siegel, John Walsh, Suzanne Penn Weisband, and David Zubrow. Arlene Simon has been our administrative and secretarial mainstay since this research began. Several people read and commented on earlier drafts: Robyn Dawes, Rob Kling, Pat Larkey, Richard Mason, Bob Sproull, and Ivan Sutherland. Lorrie LeJeune, Sandra Minkkinen, and Bob Prior of The MIT Press provided valuable production and editorial guidance. We have received financial support from CMU, the Markle Foundation, the National Institute of Mental Health, the National Science Foundation, the System Development Foundation, and the Xerox Palo Alto Research Center. Finally, we thank the managers and employees who gave us interviews, offered to participate in experiments, and allowed us to analyze internal communications and outcomes in their organizations. (We name some of them at various points in the book; others requested anonymity.) Of the people trying to develop and understand new communication systems, these individuals have the daily experience of new technology. We hope this book shows how it is they who really decide the effects of technology.

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