

COMPUTER STUDIES

# COMPUTERS IN SOCIETY

## SIXTH EDITION



An ANNUAL EDITIONS™ Publication

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### Cataloging in Publication Data

Main entry under title: Computer Studies: Computers in Society. 6/E.  
"An Annual Edition Publication."

1. Computers and civilization—Periodicals. 2. Computers—Periodicals. I. Schellenberg, Kathryn, comp. II. Title: Computers in society.  
ISBN 1-56134-449-4 303.4'834

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Printed in the United States of America

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**Kathryn Schellenberg**  
University of Guelph

Members of the Advisory Board are instrumental in the final selection of articles for each edition of Annual Editions. Their review of articles for content, level, currentness, and appropriateness provides critical direction to the editor and staff. We think you'll find their careful consideration well reflected in this volume.

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# To the Reader

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In publishing ANNUAL EDITIONS we recognize the enormous role played by the magazines, newspapers, and journals of the *public press* in providing current, first-rate educational information in a broad spectrum of interest areas. Within the articles, the best scientists, practitioners, researchers, and commentators draw issues into new perspective as accepted theories and viewpoints are called into account by new events, recent discoveries change old facts, and fresh debate breaks out over important controversies.

Many of the articles resulting from this enormous editorial effort are appropriate for students, researchers, and professionals seeking accurate, current material to help bridge the gap between principles and theories and the real world. These articles, however, become more useful for study when those of lasting value are carefully collected, organized, indexed, and reproduced in a low-cost format, which provides easy and permanent access when the material is needed. That is the role played by *Annual Editions*. Under the direction of each volume's Editor, who is an expert in the subject area, and with the guidance of an Advisory Board, we seek each year to provide in each ANNUAL EDITION a current, well-balanced, carefully selected collection of the best of the public press for your study and enjoyment. We think you'll find this volume useful, and we hope you'll take a moment to let us know what you think.

We can only guess at how the ever increasing power, diversity, and pervasiveness of computers and other information technologies might affect the patterns of our individual and social lives. However, it is hoped that *Computer Studies: Computers in Society* will complement your technical understanding of these emerging technologies by acquainting you with the philosophical, economic, political, and social dimensions of the information society.

Contributors to the sixth edition of *Computer Studies: Computers in Society* represent a diverse range of backgrounds, and their collective writings highlight a wide spectrum of issues and views about how the information age will or ought to unfold. For the most part, their writing styles are very understandable and devoid of the kind of unintelligible technical jargon that can be a barrier to becoming informed about technological issues.

Because of its social focus, *Computer Studies: Computers in Society* is organized to reflect the major dimensions of society rather than various aspects of computing. The major themes of the book are the economy, community, and conflict. Many of these themes are also examined in an international context. The final section looks at some of the philosophical challenges posed by emerging technologies.

Each article has been selected for its informational value, but "informative" does not necessarily imply correctness or validity. In fact, some of you may find that you strongly disagree with, or are even offended by, a position expressed in one or more articles—I may well agree with you. On the other hand, some may feel simply inspired by arguments that make others irate. *Computer Studies: Computers in Society* is meant to generate rather than answer questions on how computers will affect society. Hopefully, such queries will serve to clarify issues, broaden perspectives, provoke curiosity, and stimulate informed discussion of and participation in the computer age.

Readers can have input into the next edition of *Computer Studies: Computers in Society* by completing and returning the article rating form in the back of the book.



Kathryn Schellenberg  
Editor



## Introduction

Three articles offer various visions of the present and future computer-networked society.



## Unit 1

## The Economy

Six articles examine the impacts of various computing applications in manufacturing, communications, publishing, medicine, money and finances, and business.

### To the Reader Topic Guide

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### Overview

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1. **Welcome to Cyberspace: What Is It? Where Is It? And How Do We Get There?** Philip Elmer-DeWitt, *Time*, Special Issue, Spring 1995.

6

Philip Elmer-DeWitt contrasts novelist William Gibson's science-fictional cyberspace with current reality. Focusing on the **Internet**, he observes that the near-term impact of cyberspace is being oversold. The long-term impact, however, "is likely to be more profound and widespread and unanticipated than anyone imagined—even the guys who write science fiction."

2. **Alone Together: Will Being Wired Set Us Free?** Andrew Kupfer, *Fortune*, March 20, 1995.

11

Andrew Kupfer explores some positive and negative scenarios for life, work, and **human interaction** in a globally networked future. Networks may "obliterate the industrial model of society," but they could also destroy solitude and human intimacy.

3. **From Global Village to Global Mind**, Derrick de Kerckhove, *The UNESCO Courier*, February 1995.

15

Drawing on Marshall McLuhan's concept of the global village, Derrick de Kerckhove contrasts the **collective mind produced by computers** with the **public mind of television**. He argues that computing's "binary code" does not threaten local cultures and identities and may allow diverse cultures to flourish.

### Overview

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4. **The Flexible Factory Revisited**, Robert U. Ayres and Duane C. Butcher, *American Scientist*, September/October 1993.

20

Despite important advances in factory automation, computer-integrated **manufacturing** has been "slow to take hold." In this essay, the authors discuss a number of technological, economic, and cultural/social reasons why this has been the case.

5. **Global Telecommunications and Export of Services: The Promise and the Risk**, Vary T. Coates, Todd M. LaPorte, and Mark G. Young, *Business Horizons*, November/December 1993.

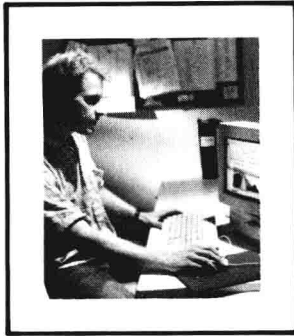
32

In this article, the authors offer specific examples of services that depend on **international telecommunications**. Some of the legal/political barriers, as well as export opportunities for U.S. firms, are discussed.

6. **The End of the Book?** D. T. Max, *The Atlantic Monthly*, September 1994.

39

According to some visions of **multimedia**, "the book, the newspaper, and the video will be hard-pressed to maintain their place in our culture." D. T. Max agrees that publishers are not in for an "easy ride." However, he suggests that the important question is not whether CD-ROMS and the Internet can replace books, but whether they should.



## Unit 2

### Computerized Work and Workplaces

Seven articles look at the latest in office automation, "clerical" workers, computer-related injuries, electronic monitoring, computers as a career threat, and the specialists who help workers use their computers.

7. **Where's the Money?** David C. Churbuck, *Forbes*, January 30, 1995. 45

David Churbuck looks at the "hype" versus the current reality of doing **business** in cyberspace (that is, **via computer networks**). He speculates that while on-line business ventures may be profitable in the future, the short-term outlook is that many of today's eager investors will be disappointed.

8. **The Future of Money**, *Business Week*, June 12, 1995. 48

Several companies around the world are experimenting with **E-cash**. According to this report, the experiments could change the way consumers think about and handle money. Ultimately, they could even "shake the foundations of **global financial systems** and even **governments**."

9. **The Productivity Pit**, James Krohe Jr., *Across the Board*, October 1993. 55

During the 1980s, "service businesses on average doubled their investment in technology per worker," yet productivity was stagnant. In this article, James Krohe explains the reasons underlying this **productivity paradox** of information technology.

- Overview 60

10. **Age of the Road Warrior**, Leon Jaroff, *Time*, Special Issue, Spring 1995. 62

In the "virtual office"—the ultimate in **office automation**—workers no longer have space they can call their own. Rather, they telecommute and call to reserve a desk when they need to go to the office. As Leon Jaroff relates, this has resulted in benefits and drawbacks for firms and employees.

11. **The Ripple Effect of Computer Networking**, Bob Filipczak, *Training*, March 1994. 64

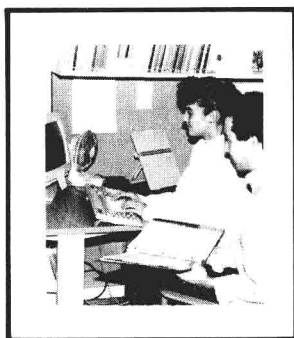
Working with network computers changes the way employees **communicate**. According to Bob Filipczak, networking can also lead to increased employee loyalty and **democratic participation** in organizational affairs. It may even affect the way employees think.

12. **A Match Made in Heaven**, James Daly, *Forbes* ASAP, June 5, 1995. 69

Some firms are turning to **monasteries** for electronic **data entry services**. Monks (the original "clerical" workers) and nuns make excellent data entry clerks because they are "conscientious, highly educated, and underemployed most of the year," and they can be trusted with confidential information.

13. **When the Work You Do Ends Up Costing You an Arm and a Leg**, Richard Wolkomir, *Smithsonian*, June 1994. 71

"Repetitive strain injury" is a **medical affliction** shared by musicians and computer workers. In this report, Richard Wolkomir relates how a computer became his "instrument of torture" and describes a unique therapy center devoted to treating these types of injuries.

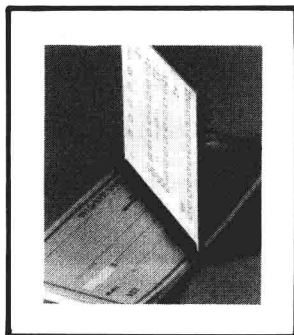


## Unit 3

# Computers, People, and Social Interaction

Six articles discuss computer applications for the disabled and students, the contributions of women pioneers in computing, social etiquette, and computer networking as a tool for social activism.

14. **Working under an Electronic Thumb**, Michele Picard, *Training*, February 1994. 76  
 "When the computer is both a tool and an unblinking watchdog, managers can tell exactly how their employees are doing." Michele Picard addresses whether "companies are paying a higher price than they think for **electronic monitoring**."
15. **Software as Career Threat**, Philip E. Ross, *Forbes*, May 22, 1995. 81  
 Paraprofessionals armed with software can now perform some tasks that used to be the exclusive domain of highly trained professionals. Philip Ross warns people to think long and hard about how computers could destroy an investment in specialized **education and training** in law, medicine, accounting, and other fields.
16. **Help! My Hard Disk Has Fallen and It Can't Get Up**, Bob Filipczak, *Training*, February 1995. 84  
 Bob Filipczak gives a brief job description of **computer support specialists**. While the members of this new occupation created by the computer revolution are called upon to solve a wide array of hardware and software problems, their main function is to "improve the performance of everyone in the company."
- Overview** 88
17. **Closing the Windows on Opportunity**, Norman Coombs, *EDUCOM Review*, March/April 1995. 90  
 Norman Coombs, a blind history professor, explains how numerous computer innovations have opened up "exciting and empowering new worlds" for **people with disabilities**. However, some new innovations that make computers easier for most people to use could make them harder for disabled persons to use, especially the blind.
18. **Pioneering Women in Computer Science**, Denise W. Gürer, *Communications of the ACM*, January 1995. 92  
**Women** have made significant contributions to the field of computing from its earliest days. Denise Gürer presents a brief survey of women computing pioneers. In an accompanying piece, Anita Borg and Telle Whitney discuss the recent Grace Hopper Murray conference for women computing professionals.
19. **The Learning Revolution**, *Business Week*, February 28, 1994. 99  
 An expanding offering of **multimedia** products promises to reshape **education** in the home and at school. In this article (and accompanying sidebars), several authors give their views on the potential benefits and limitations of computerized education.
20. **Reach Out and Snub Someone**, Robert Fulford, *Saturday Night*, May 1995. 106  
**Call display** is changing the nature of social interaction. Whereas anonymity enhances the power of the caller, call display enhances the power of the person being called. As Robert Fulford explains, this and other effects of call display mean "a new code of **telephone manners** is slowly being written."

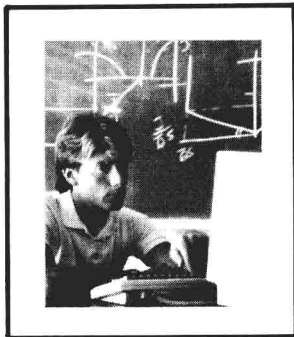


# Unit 4

## Ethical and Legal Issues

Eight articles examine issues related to software piracy, appropriate computer conduct on college and university campuses, and computer crime (including electronic counterfeiting and malicious hacking).

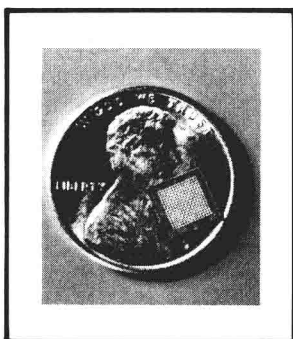
21. **Core Rules of Netiquette**, Virginia Shea, *EDUCOM Review*, September/October 1994. 109  
Humans exchanging e-mail often act like ill-mannered car drivers; they "curse at other drivers, make obscene gestures, and generally behave like savages." In this article, Virginia Shea offers guidelines for those who should be **well-mannered and considerate** in their electronic dealings with others.
22. **Spreading the Net**, John E. Young, *World Watch*, January/February 1994. 114  
Computer networks are being used to share information on social and political issues. John Young focuses on how activists are using a global "network of networks" to accelerate worldwide communications about **environmental issues**.
- Overview** 120
23. **Warning: Here Come the Software Police**, Janet Mason, *Across the Board*, October 1990. 122  
A good deal of "illegal" **copying of software** occurs in the corporate world. As Janet Mason points out, even firms that have policies against piracy can and are being sued if their employees are caught with unauthorized copies of software.
24. **Computers, Pornography, and Conflicting Rights**, Virginia Rezmierski, *EDUCOM Review*, March/April 1995. 126  
Virginia Rezmierski questions a computer user's right to access potentially **offensive or threatening information** "in a way that crosses beyond his/her own personal space and boundaries." Her essay addresses the issues of **censorship versus freedom of speech** in the use of college/university computing systems.
25. **Should I Copy My Neighbor's Software?** Helen Nissenbaum, from *Computers, Ethics, & Social Values*, Prentice Hall, 1994. 129  
**Copying software is not legal.** The ease by which this can be done and the wider moral implications are topics of this article.
26. **Crime in Cybercity**, Warren Caragata, *Maclean's*, May 22, 1995. 136  
Unethical or illegal uses of the Internet pose problems for several countries. Warren Caragata discusses the "**dark side of the Internet**" from a **Canadian** view.
27. **Desktop Counterfeiting**, Doug McClellan, *Technology Review*, February/March 1995. 139  
"Virtually anything that can be printed on paper—whether a birth certificate or a banknote—can be **forged** by anyone with a . . . desktop publishing system." Doug McClellan offers counterfeiting examples and discusses measures for safeguarding against "America's fastest growing means of **fraud**."
28. **Hackers: Taking a Byte Out of Computer Crime**, Wade Roush, *Technology Review*, April 1995. 145  
Hackers are widely known for unauthorized intrusions into computer systems. In this article, Wade Roush relates **contributions of former hackers** in helping organizations fend off growing numbers of truly malicious attacks from the newest breed of intruders.



## Unit 5

### Privacy

Three articles in this section deal with new technologies and legislation that have implications for privacy.



## Unit 6

### Technological Risks

Five articles discuss the risk of technological obsolescence, anticipated computer glitches in the year 2000, the threats posed by computer malfunction, legal implications of flawed electronic information, and the phenomenon of technological stigma.

29. **Legally Speaking: Can Hackers Be Sued for Damages Caused by Computer Viruses?** Pamela Samuelson, and Viruses and Criminal Law, Michael Gemignani, *Communications of the ACM*, June 1989. 150

Two legal scholars discuss potential benefits and problems in bringing civil and criminal action against those who plant **viruses in computer systems**. In both cases the law is highly ambiguous and has not kept pace with technological developments.

30. **Simulations on Trial**, Arielle Emmett, *Technology Review*, May/June 1994. 156

"Computer-generated animations are helping judges and juries visualize the final moments of an air crash, the ballistics of an unsolved murder, even botched medical care." Arielle Emmett discusses the benefits of such **simulations** and their potential for distortion.

#### Overview 162

31. **Open Secrets**, James Fallows, *The Atlantic Monthly*, June 1994. 164

Proposed legislation regarding the **Clipper chip encryption** device and its **Digital Telephony** bill has generated controversy. While critics claim these initiatives pose a threat to the **privacy of electronic communication**, James Fallows counters the criticisms.

32. **Spies in Cyberspace**, Douglas Waller, *Time*, March 20, 1995. 168

The **Pentagon**, **CIA**, **NSA**, and other U.S. intelligence agencies now have a shared computer network. As Douglas Waller relates, the level of security measures to prevent unauthorized access is but one of the notable features of **Intelink**.

33. **In the Eyes of the Law**, Mark Eckenwiler, *Internet World*, August 1995. 170

The privacy of any **communication sent via e-mail** is not necessarily protected under current federal law statutes. Mark Eckenwiler examines the extent and effectiveness of federal laws governing electronic privacy.

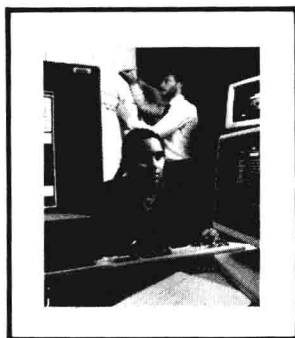
#### Overview 172

34. **It's 10 O'Clock: Do You Know Where Your Data Are?** Terry Cook, *Technology Review*, January 1995. 174

Computers make it possible to store and lose vast amounts of critical information. In this report, Terry Cook outlines the problems in **preserving** both the content and context of **electronic documents**.

35. **Waiting for 01-01-00**, Brian Hayes, *American Scientist*, January/February 1995. 178

Soon after midnight on **January 1, 2000**, computer systems, which have recorded dates based on two-digit codes, may begin to malfunction. Brian Hayes relates some of the problems that might arise and some "quick fixes" that could let programs survive or at least postpone a **millennial crisis**.



# Unit 7

## International Perspectives and Issues

Three articles examine progress in linking nations to a global system of computer networks, how some smaller countries are successfully competing in the global computer market, and the state of computing and future prospects for South Africa and some of its neighbors.

36. **Software's Chronic Crisis**, W. Wayt Gibbs, *Scientific American*, September 1994. 182

It is virtually impossible to write error-free complex software. W. Wayt Gibbs offers several examples of large-scale software projects gone awry. Gibbs explains why it is so difficult to design and write reliable software and reports on efforts to improve the standard of software production.

37. **Fatal Dose**, Barbara Wade Rose, *Saturday Night*, June 1994. 191

In 1985 one model of a **radiation therapy machine** began drastically **overdosing cancer patients**. Barbara Wade Rose explains how simple computer errors compromised the machine. She also recounts the difficulties and frustrations encountered in diagnosing and fixing the machine's problems.

38. **Liability for Defective Electronic Information**, Pamela Samuelson, *Communications of the ACM*, January 1993. 196

Legal scholar Pamela Samuelson draws on the legal protections and **liabilities** of authors, publishers, and booksellers to outline some of the legal issues surrounding the production, publication, and distribution of **defective software** that causes economic or physical harm.

- Overview 202

39. **It's a Wired, Wired World**, James O. Jackson, *Time*, Spring 1995. 204

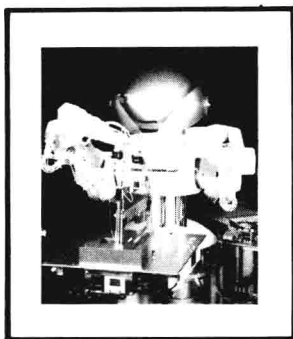
Little by little, the world is getting wired. This does not mean that the cyberworld will be a global village where everyone speaks the same language and thinks the same thoughts. In this article, James Jackson highlights technical, social, economic, and political factors shaping the pace at which different **nations are coming on-line**.

40. **Computing in South Africa: An End to "Apartheid"?** Seymour E. Goodman, *Communications of the ACM*, February 1994. 207

Only about 25 percent of **South Africa's** population is served by its "world class" computing capability. In this article, Seymour Goodman outlines some of the technical, social, and political dimensions underlying current conditions and future prospects for South African computing.

41. **Little Engines That Could: Computing in Small Energetic Countries**, Jason L. Dedrick, Seymour E. Goodman, and Kenneth L. Kraemer, *Communications of the ACM*, May 1995. 211

Several "small" nations have become major players in the global information technology arena. The authors of this report recount the success stories of **Denmark, Finland, Hong Kong, Ireland, Israel, New Zealand, Norway, and Singapore**.



# Unit 8

## Philosophical Frontiers

Five articles in this section discuss a range of issues, which pose or may pose philosophical challenges for the computer age.

Overview	216
42. <b>Coming of Age in a Weapons Lab</b> , Hugh Gusterson, <i>The Sciences</i> , May/June 1992.	218
An anthropologist discusses the <b>ethical and moral challenges</b> faced by scientists and engineers whose lifework is designing <b>nuclear weapons</b> at the Lawrence Livermore National Laboratory in California.	
43. <b>We're Going to Have Computers Coming Out of the Woodwork</b> , Richard Wolkomir, <i>Smithsonian</i> , September 1994.	223
Richard Wolkomir describes futuristic technologies being developed at the <b>Xerox Palo Alto Research Center</b> . Today's PCs will be deconstructed and replaced with <b>Ubiquitous Computing</b> systems spread throughout society. One benefit and drawback of these systems is that in order for them to do their job, they must always "know who you are and where you are."	
44. <b>Computers Go Bio: DNA Beats a Pentium Any Day</b> , Steven Levy, <i>Newsweek</i> , May 1, 1995.	228
Steven Levy reports about an "unexpected new merger of <b>biology and engineering</b> ," wherein scientists take pieces of DNA and use them as "molecular computers." Levy claims that this is mind-boggling, but it makes sense and offers such dramatic potentials that the "future may never be the same."	
45. <b>Compelling Signs of Artificial Life</b> , Mark Nichols, <i>Maclean's</i> , June 7, 1993.	229
Researchers are creating "digital creatures" that clone themselves and evolve into new forms. Some scientists are claiming that these or future creatures may constitute <b>artificial life forms</b> and "intelligence is the next frontier."	
46. <b>Will Robots Inherit the Earth?</b> Marvin Minsky, <i>Scientific American</i> , October 1994.	231
In this highly futuristic article, a pioneer in <b>artificial intelligence</b> predicts that "as we engineer replacement bodies and brains . . . we will then live longer, possess greater wisdom and enjoy capabilities as yet unimagined."	
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# COMPUTERS IN SOCIETY

Sixth Edition

**Editor**

**Kathryn Schellenberg**  
University of Guelph

Kathryn Schellenberg earned a Ph.D. in sociology from the University of Utah and is presently assistant professor of sociology at the University of Guelph in Ontario, Canada. One of her areas of scholarly interest is the social impact of technology, especially computing, and she has taught several sociology courses dealing with this subject. Dr. Schellenberg has also conducted several studies of computer-related topics.

Her current research centers on the implications of computer-linked technologies on policing and on how workers in high-tech "information" firms deal with change and uncertainty.

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# Topic Guide

This topic guide suggests how the selections in this book relate to topics of traditional concern to students and professionals involved with computers in society. It can be very useful in locating articles that relate to each other for reading and research. The guide is arranged alphabetically according to topic. Articles may, of course, treat topics that do not appear in the topic guide. In turn, entries in the topic guide do not necessarily constitute a comprehensive listing of all the contents of each selection.

TOPIC AREA	TREATED IN:	TOPIC AREA	TREATED IN:
<b>Artificial Intelligence</b>	46. Will Robots Inherit the Earth?	<b>Ergonomics</b>	(See Health and Medicine)
<b>Artificial Life</b>	45. Compelling Signs of Artificial Life	<b>Ethics</b>	8. Future of Money 12. Match Made in Heaven 23. Warning: Here Come the Software Police 24. Computers, Pornography, and Conflicting Rights 25. Should I Copy My Neighbor's Software? 28. Hackers 29. Legally Speaking 30. Simulations on Trial 37. Fatal Dose
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<b>Cutting Edge Technology</b>	43. We're Going to Have Computers Coming Out of the Woodwork 44. Computers Go Bio 45. Compelling Signs of Artificial Life 46. Will Robots Inherit the Earth?	<b>Hackers and Hacking</b>	26. Crime in Cyberspace 28. Hackers
<b>Cyberspace</b>	(See Networks and Networking)	<b>Health and Medicine</b>	13. When the Work You Do Ends Up Costing You an Arm and a Leg 15. Software as Career Threat 37. Fatal Dose
<b>Disabled Persons</b>	17. Closing the Windows on Opportunity	<b>History of Computing</b>	18. Pioneering Women in Computer Science
<b>Economic Issues</b>	1. Welcome to Cyberspace 4. Flexible Factory Revisited 5. Global Telecommunications and Export of Services 6. End of the Book? 7. Where's the Money? 8. Future of Money 9. Productivity Pit 27. Desktop Counterfeiting 41. Little Engines That Could	<b>Human Interaction</b>	1. Welcome to Cyberspace 2. Alone Together 10. Age of the Road Warrior 11. Ripple Effect of Computer Networking 16. Help! My Hard Disk Has Fallen 20. Reach Out and Snub Someone 21. Core Rules of Netiquette 24. Computers, Pornography, and Conflicting Rights
<b>Education and Training</b>	6. End of the Book? 9. Productivity Pit 15. Software as Career Threat 16. Help! My Hard Disk Has Fallen 19. Learning Revolution 24. Computers, Pornography, and Conflicting Rights	<b>Intellectual Property</b>	23. Warning: Here Come the Software Police 28. Hackers 29. Legally Speaking
<b>Electronic Monitoring</b>	(See Privacy)		
<b>Encryption</b>	(See Privacy)		
<b>Environment</b>	22. Spreading the Net		

TOPIC AREA	TREATED IN:	TOPIC AREA	TREATED IN:
<b>International Issues</b>	2. Alone Together 3. From Global Village to Global Mind 4. Flexible Factory Revisited 5. Global Telecommunications and Export of Services 8. Future of Money 22. Spreading the Net 36. Software's Chronic Crisis 39. It's a Wired, Wired World 40. Computing in South Africa 41. Little Engines That Could	<b>Philosophical Issues (cont'd)</b>	43. We're Going to Have Computers Coming Out of the Woodwork 45. Compelling Signs of Artificial Life 46. Will Robots Inherit the Earth?
<b>Legal Issues</b>	23. Warning: Here Come the Software Police 24. Computers, Pornography, and Conflicting Rights 25. Should I Copy My Neighbor's Software? 26. Crime in Cybercity 27. Desktop Counterfeiting 28. Hackers 29. Legally Speaking 30. Simulations on Trial 31. Open Secrets 37. Fatal Dose 38. Liability for Defective Electronic Information	<b>Political Participation</b>	1. Welcome to Cyberspace 11. Ripple Effect of Computer Networking 22. Spreading the Net
<b>Manufacturing</b>	4. Flexible Factory Revisited	<b>Privacy (and Security)</b>	2. Alone Together 8. Future of Money 11. Ripple Effect of Computer Networking 14. Working under an Electronic Thumb 20. Reach Out and Snub Someone 24. Computers, Pornography, and Conflicting Rights 28. Hackers 31. Open Secrets 43. We're Going to Have Computers Coming Out of the Woodwork
<b>Multimedia</b>	6. End of the Book? 19. Learning Revolution 43. We're Going to Have Computers Coming Out of the Woodwork	<b>Productivity</b>	4. Flexible Factory Revisited 9. Productivity Pit
<b>Networks and Networking</b>	1. Welcome to Cyberspace 2. Alone Together 3. From Global Village to Global Mind 5. Global Telecommunications and Export of Services 7. Where's the Money? 8. Future of Money 10. Age of the Road Warrior 11. Ripple Effect of Computer Networking 21. Core Rules of Netiquette 22. Spreading the Net 24. Computers, Pornography, and Conflicting Rights 26. Crime in Cybercity 28. Hackers 29. Legally Speaking 32. Spies in Cyberspace 39. It's a Wired, Wired World 43. We're Going to Have Computers Coming Out of the Woodwork	<b>Publishing</b>	6. End of the Book?
<b>Nuclear Weapons</b>	42. Coming of Age in a Weapons Lab	<b>Risks (Frustrations) and Computer Reliability</b>	16. Help! My Hard Disk Has Fallen 34. It's 10 O'Clock 35. Waiting for 01-01-00 36. Software's Chronic Crisis 37. Fatal Dose 38. Liability for Defective Electronic Information
<b>Office Automation</b>	10. Age of the Road Warrior 11. Ripple Effect of Computer Networking 12. Match Made in Heaven 34. It's 10 O'Clock 43. We're Going to Have Computers Coming Out of the Woodwork	<b>Robotics</b>	4. Flexible Factory Revisited 46. Will Robots Inherit the Earth?
<b>Philosophical Issues</b>	2. Alone Together 3. From Global Village to Global Mind 42. Coming of Age in a Weapons Lab	<b>Rural/Urban (Residential) Shifts</b>	2. Alone Together
		<b>Simulations</b>	15. Software as Career Threat 30. Simulations on Trial
		<b>Spying (Intelligence)</b>	31. Open Secrets 32. Spies in Cyberspace
		<b>Ubiquitous Computing</b>	43. We're Going to Have Computers Coming Out of the Woodwork
		<b>Viruses</b>	(See Hackers and Hacking)
		<b>Women in Computing</b>	18. Pioneering Women in Computer Science
		<b>Work and Employment</b>	2. Alone Together 4. Flexible Factory Revisited 10. Age of the Road Warrior 11. Ripple Effect of Computer Networking 12. Match Made in Heaven 13. When the Work You Do Ends Up Costing You an Arm and a Leg 14. Working under an Electronic Thumb 15. Software as Career Threat 16. Help! My Hard Disk Has Fallen 17. Closing the Windows on Opportunity

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# Introduction

“Computer revolution” and “information revolution” are widely used terms these days, and these terms imply that society is undergoing a radical transformation. This was the view of the late British computer expert, Christopher Evans. In his thought-provoking book, *The Micro Millennium*, Evans argued that the societal impacts of computers in general, and personal computers in particular, would rival the effects of the Industrial Revolution that:

brought about immense shifts in all aspects of society, affecting the individual, his family, his neighbors, his domestic and working environment, his clothes, his food, his leisure time, his political and religious ideals, his education, his social attitudes, his life-span, even the manner of his birth and death. (1979:ix)

Moreover, Evans insisted that we cannot choose the future. He stated that as we began to apply these powerful new tools to the tasks of bettering our lives, we set in motion a process that took on an independent, unstoppable momentum.

There are those who scoff at the idea that we are being swept up in a revolution or at least dispute the claim that we have no control over the future. For instance, in his book *Personal Computer Book*, Peter A. McWilliams argued that while computers will have a dramatic impact on our lives, we are in command of our own fate:

For the most part, personal computers will prove their worth to the extent that they fit into your daily life, not to the degree that you adapt your life to be more in step with The Computer Age. (1984:15)

Contradictory predictions about the implications of computing are not surprising since people operate from many different premises about society and human nature. We need to keep this in mind when we try to make sense of competing claims about the future. This is not easy because we are often unaware of our own assumptions about social life. Mostly, we just tend to take certain things for granted and believe them so strongly we simply assume other reasonable and intelligent people see things the same way.

However, if you believe people are fundamentally honest, generous, and altruistic, it is just as clear to someone else that people are basically greedy, self-interested, and manipulative. If you take it for granted that an orderly, stable society is the result of people cooperating and

working toward the common good, there are others who would argue that power and coercion bind society together. If you are convinced people have free will to create the kind of society they desire, others are more inclined to think that the nature of society is determined by forces beyond human will. And, if you believe “idealism” governs society, others are persuaded that we live in a “material” world.

The disagreement between Evans and McWilliams basically reflects the difference between how idealists and materialists look at the world. Those who feel that idealism and free will govern society are uncomfortable with claims that cultural, political, and religious ideals can be influenced by technical innovation. They would argue that the ideals come first and are the foundation of society. Technical innovations are accepted or rejected depending on whether they harmonize with basic values. This assumption is implied in McWilliams’ argument that computers are mere tools that people are free to use or avoid. Materialists, on the other hand, insist that new technologies need not support any basic belief system. They maintain that if a technology can provide real material benefits, such as greater wealth or longer life expectancy to society or to a powerful minority, it will be adopted. If some aspect of the technology clashes with society’s values and ideals, then the values, not the technology, will be modified or abandoned. Clearly, Christopher Evans is in the materialist camp.

Social theorists and philosophers have debated for centuries over which of the competing social assumptions are valid. Like the rest of us, they continue to disagree about where the truth lies. The articles in this edition of *Computers in Society* do not put these issues to rest, but they do show us that technology and cultural ideals influence each other in complex, and sometimes strange, ways.

The articles introducing this edition center on the revolutionary power of computer networking and telecommunications. Philip Elmer-DeWitt sets the stage by welcoming us to “cyberspace.” He introduces us to the information infrastructure that makes up cyberspace as it exists now and how it might look in the future. Elmer-DeWitt refrains from drawing conclusions, but he concedes that the model of cyberspace may—“just may”—be a vehicle for revolutionary change.”

Idealist- McWilliams  
Materialist- Evans



Andrew Kupfer examines how computing networking may change how we work, where we live, and, most importantly, how we interact. In "Alone Together: Will Being Wired Set Us Free?" he argues that while networking may enhance interaction in many ways, it may also destroy solitude and human intimacy.

Finally, Derrick de Kerckhove contrasts the effects of television and computer networking on cultural diversity. In "From Global Village to Global Mind," de Kerckhove claims that television was a threat to local cultures and identities. But he argues that computer networks may allow diverse cultures to flourish.

#### **Looking Ahead: Challenge Questions**

If society has a choice about which technologies are developed and how they are used, who should participate in making those choices? Should those with political power, wealth, or technical expertise assume the responsibilities of shaping our society? If everyone should have a say, how might we provide the opportunity for all to have their views and concerns taken into account?

If we discover that we really dislike some of the social changes that result from new technologies, will we be able to discard our inventions and return to the ideals of an earlier age?

# Welcome to Cyberspace

What is it? Where is it? And how do we get there?

PHILIP ELMER-DEWITT

IT STARTED, AS THE BIG IDEAS IN TECHNOLOGY often do, with a science-fiction writer. William Gibson, a young expatriate American living in Canada, was wandering past the video arcades on Vancouver's Granville Street in the early 1980s when something about the way the players were hunched over their glowing screens struck him as odd. "I could see in the physical intensity of their postures how *rapt* the kids were," he says. "It was like a feedback loop, with photons coming off the screens into the kids' eyes, neurons moving through their bodies and electrons moving through the video game. These kids clearly *believed* in the space the games projected."

That image haunted Gibson. He didn't know much about video games or computers—he wrote his breakthrough novel *Neuromancer* (1984) on an ancient manual typewriter—but he knew people who did. And as near as he could tell, everybody who worked much with the machines eventually came to accept, almost as an article of faith, the reality of that imaginary realm. "They develop a belief that there's some kind of *actual space* behind the screen," he says. "Some place that you can't see but you know is there."

Gibson called that place "cyberspace," and used it as the setting for his early novels and short stories. In his fiction, cyberspace is a computer-generated landscape that characters enter by "jacking in"—sometimes by plugging electrodes directly into sockets implanted in the brain. What they see when they get there is a three-dimensional representation of all the information stored in "every computer in the human system"—great warehouses and skyscrapers of data. He describes it in a key passage in *Neuromancer* as a place of "unthinkable complexity," with "lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding . . ."

In the years since, there have been other names given to that shadowy space where our computer data reside: the Net, the Web, the Cloud, the Matrix, the Metaverse, the Datasphere, the Electronic Frontier, the information superhighway. But Gibson's coinage may prove the most enduring. By 1989 it had been borrowed by the online community to describe not some science-fiction fantasy but today's increasingly inter-connected computer systems—especially the millions of computers jacked into the Internet.