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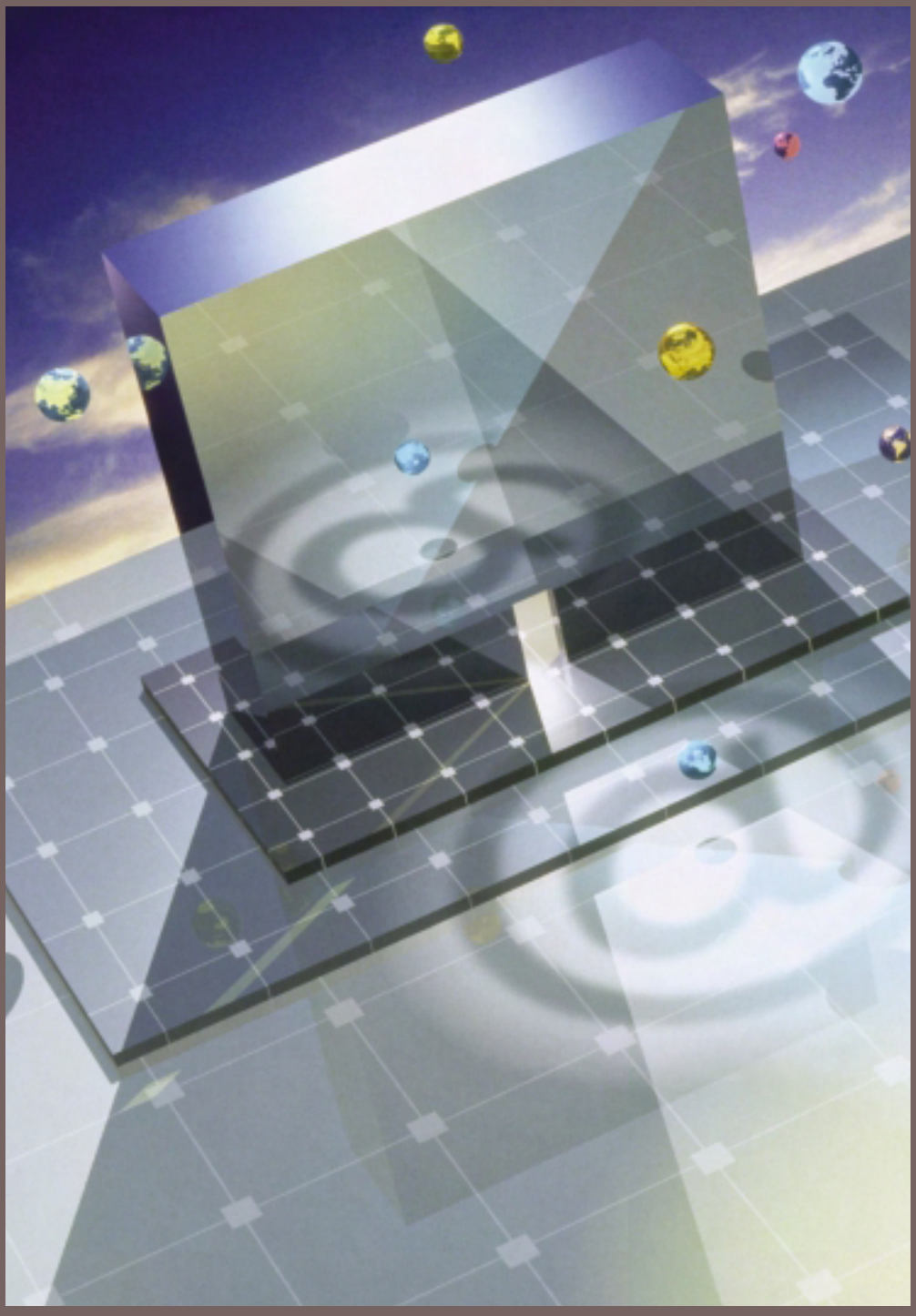
PROMOTING COMPETITION, INNOVATION, AND OPPORTUNITY



A STATEMENT BY THE RESEARCH AND POLICY COMMITTEE OF THE COMMITTEE FOR ECONOMIC DEVELOPMENT

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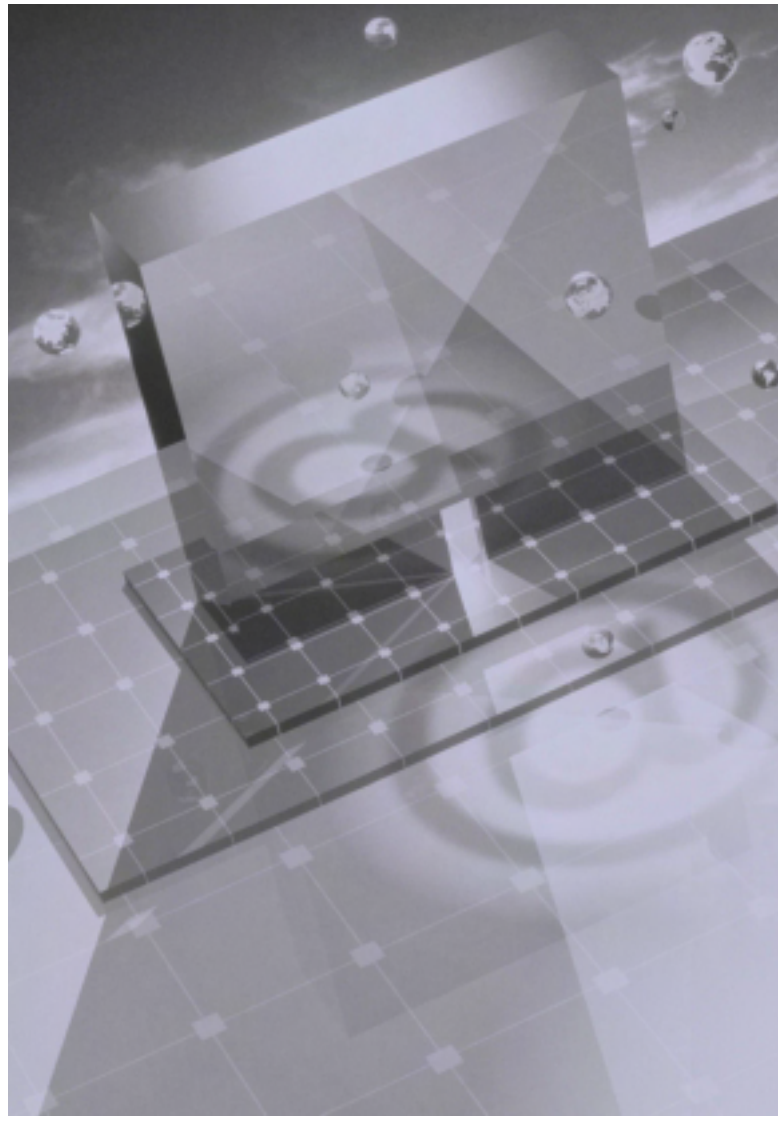

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RESPONSIBILITY FOR CED STATEMENTS ON NATIONAL POLICY

The Committee for Economic Development is an independent research and policy organization of some 250 business leaders and educators. CED is nonprofit, nonpartisan, and nonpolitical. Its purpose is to propose policies that bring about steady economic growth at high employment and reasonably stable prices, increased productivity and living standards, greater and more equal opportunity for every citizen, and an improved quality of life for all.

All CED policy recommendations must have the approval of trustees on the Research and Policy Committee. This committee is directed under the bylaws, which emphasize that "all research is to be thoroughly objective in character, and the approach in each instance is to be from the standpoint of the general welfare and not from that of any special political or economic group." The committee is aided by a Research Advisory Board of leading social scientists and by a small permanent professional staff.

The Research and Policy Committee does not attempt to pass judgment on any pending specific legislative proposals; its purpose is to urge careful consideration of the objectives set forth in this statement and of the best means of accomplishing those objectives.

Each statement is preceded by extensive discussions, meetings, and exchange of memoranda. The research is undertaken by a subcommittee, assisted by advisors chosen for their competence in the field under study.

The full Research and Policy Committee participates in the drafting of recommendations. Likewise, the trustees on the drafting subcommittee vote to approve or disapprove a policy statement, and they share with the Research and Policy Committee the privilege of submitting individual comments for publication.

The recommendations presented herein are those of the trustee members of the Research and Policy Committee and the responsible subcommittee. They are not necessarily endorsed by other trustees or by non-trustee subcommittee members, advisors, contributors, staff members, or others associated with CED.

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PURPOSE OF THIS STATEMENT

When this project began in June 2000, the prospective impact of the Internet and e-commerce on the national and global economies was less clear than it is today. Some view it as ironic that convincing evidence of a new, more productive economy has emerged just as the U.S. economy has begun to slow from its nearly ten-year expansion and the "dot-com bubble" has burst. Nevertheless, it has become clear that the spread of digital network technologies, in particular the Internet, is rapidly transforming the way we work and live. Developments in information technology are making the exchange of global information faster, easier, and more pervasive, thus redefining the productive capacities of the global economy. From our perspective, the deflating of the dot-coms suggests that the new economy operates under the same principles and standards as the old. Profitability and competition still matter. Similarly, we can now see more clearly that e-commerce is not an oddity detached from normal business practices, but a tool to be integrated into nearly all forms of commercial activity.

CED's study of the digital economy focuses on the two-way interaction between public policies and e-commerce. In one direction, Internet-based commercial activity is challenging government policies and the principles that underlie them, for example in the protection of intellectual property, where new technology undercuts the physical basis of copyright protection. In the other direction, government policies are shaping the development of these technologies and the business models that employ them, as illustrated by the effects communications policies are having on the development of broadband services and the competition between cable and telephone-based systems.

Although e-commerce is already making substantial contributions to economic growth, it has enormous potential to contribute even more. The digital economy is still in its infancy. Its growth is limited by numerous factors, including public concerns regarding consumer privacy and computer security, and government policies that are sorely in need of modernization. At this early stage in the evolution of Internet-based commerce, the decisions of business and government leaders can have an extraordinary influence on the future course of events. As business and education leaders, we recognize the growing importance of e-commerce to our economy and society. We hope that our recommendations on some of the central policy issues facing the digital economy will help guide its development in ways that promote sustained economic growth with opportunity for all, CED's long-held goal.

CED'S DIGITAL CONNECTIONS COUNCIL

This policy statement is only a first step. We plan to maintain an ongoing interest and presence in this area. In particular, we welcome reader comments on the policies discussed in this policy statement or on other issues of related interest. Comments should be directed to the project director, Elliot Schwartz, who can be reached through CED's website (www.ced.org).

To sustain discussion of these issues, CED has assembled leaders from businesses and other institutions that are guiding society into the digital age who have direct expertise in the field of information technology. Together, these leaders will form CED's Digital Connections Council. The Digital Connections Council will build on the recommenda-

tions of this report, provide a forum for open discussion of current and emerging e-commerce issues, and exchange information on successful programs and methods they have employed. The Council will pick up where *The Digital Economy* leaves off in helping to amplify the benefits and reduce the frictions of the new economy.

ACKNOWLEDGMENTS

This policy statement was developed by the committed and knowledgeable group of business, academic, and policy leaders listed on pages viii and ix. We are grateful for the time, effort, and care that each put into the development of this report.

Special thanks go to the subcommittee co-chairs, Irwin Dorros, President of Dorros Associates, Robert Lessin, Chairman and CEO of Wit Soundview Group, Inc., and Ellen Marram, Partner at North Castle Partners, for their guidance and leadership. Others who took leadership roles by chairing working groups on the substantive issues include Carolyn Chin, Donald Peterson, John Siciliano, and Martin Zimmerman. We are also indebted to Elliot Schwartz, Vice President and Director of Economic Studies at CED, and Van Doorn Ooms, CED's Senior Vice President and Director of Research, for their contributions, and to Tarek Anandan and Michael Berg for research assistance. Thanks are also due to the project's expert advisors, Everett Ehrlich and Robert Litan, for their substantial contributions to this work, and to Fred Cate, Professor of Law and Director of the Information Law and Commerce Institute at Indiana University, who contributed at an early stage to our understanding of many of these issues.

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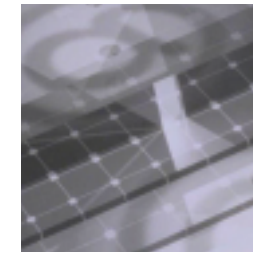
Chapter 1

FINDINGS AND RECOMMENDATIONS



The spread of digital network technologies, in particular the Internet, is rapidly transforming commercial relationships, economic opportunities, and social life. Overall, these technologies are creating beneficial economic and social change. Faster, easier, and more pervasive exchange of global information is intensifying competition, fostering market economies, expanding choice and opportunity, improving productivity, and raising global education and living standards. At the same time, these technologies are disrupting established practices and forcing private enterprise, government, and other social institutions to adapt. Individuals, whether acting as consumers, workers, students, or in other roles, are also adapting to these new technologies.

The United States and other nations that face such changes must facilitate the productive deployment and acceptance of digital network technologies to reap the substantial gains they offer. The actions that need to be taken are reasonably clear. In general terms, the government must preserve and protect the underlying institutions and incentives that have propelled us to economic success. It must continue to foster innovation through the legal and practical protection of intellectual property—patents, copyrights, and trademarks—and a competitive environment that allows each producer a chance to compete in open markets. Firms operating over the Internet and using other digital technologies need to ensure that proprietary and personal information of customers is protected for those who wish it, that unwanted material can be blocked by consumers who wish to block it, that legitimate government surveillance can be carried out subject to court-ordered approval and limited only to those included in the court order, and that consumer scams over the Internet are monitored and removed. Consumers need to make greater efforts to educate themselves about their rights, obligations, and means of self-protection when engaged in online commerce. In addition, government and business must work together to improve access to these path-breaking technologies for those who typically lack such access and to close the gaps in economic opportunity by using the new technologies to improve education, computer and Internet literacy, and the delivery of social services.

We are at an important stage in the evolution of digital network technologies, government policies, and business strategies, where the decisions of business and government leaders can have an extraordinary influence on the future course of events. This report focuses on key public policy issues that will shape the environment not only for e-commerce, but for other commerce as well, which increasingly relies on network technologies. The report does not try to tackle all problems, nor does it always provide detailed solutions. For example, we do not address such important economic issues as taxation of online sales, cross-boundary dispute resolution, and product life-cycle concerns (including environmental impacts). Nor do we address the profound implications for society of such social concerns as the legiti-

macy of cyber-identities, the rules of civil behavior (netiquette) in virtual realities, and the decisions of firms and individuals on where to locate and reside.

We have selected a limited number of difficult problems that, in our judgment, are best addressed by the practical application of the sound principles that already underpin our economic system. This report is focused specifically on four key areas of public policy that have been roiled by technological and commercial developments: *competition, intellectual property, privacy and security, and the gap in skills and income.* In the broadest terms, our recommendations follow four key findings:

- The success of the U.S. economy in achieving high productivity growth is due to a combination of factors, including the existence of a skilled and flexible labor force, advances in technology, innovations in business practices, pursuit of economic policies that favor investment, and promotion of economic opportunity in all segments of society.
- The principles that underlie current policies are generally sound. In some areas, however, the problem is finding practical solutions that apply those principles in an economy that extensively employs digital network technologies.
- In some cases, enforcement of existing laws needs to adapt to changes that have occurred in the technological and economic landscape. The Internet has changed, undercut, or reduced the relevance of some of the means by which laws, rights, and responsibilities have been enforced.
- Market competition will in time resolve many of the issues that seem difficult today. In part, we need the patience to allow sufficient time for markets to respond.

We recognize that our recommendations will not completely resolve all problems. We also recognize that policy solutions generally cannot be contained within existing local, regional, and even national jurisdictions. Many policies will require international consistency, although not necessarily uniformity, to be effective. But we believe that our perspective, based on experience and business leadership, will point the way toward a continuing and fuller examination of these issues and their resolution in the directions we indicate.*

COMPETITION POLICY

In many instances, the Internet increases competition by lowering barriers that inhibit market entry. In a networked economy, however, competition policy must cope with the potential for some markets to result in less short-run competition due to network externalities, which generate substantial benefits while tending to favor a single market leader at any one time. In addition, the speed of technological change puts pressure on government officials to respond more quickly to antitrust and merger issues.

Competition: Findings and Recommendations. CED finds that in policing anti-competitive practices—predatory and collusive actions—antitrust policy remains as relevant in the new economy as in the old. However, other policies on competition and economic regulation are losing relevance in an economy characterized by rapid technological change, lower barriers to market entry, and the prominence of networked products and services. These policies must be reconsidered and reoriented.

Antitrust (pages 15-16)

- **Predatory and collusive practices should be prosecuted in the new economy as they have been in the old.**

*See memorandum by JOHN DIEBOLD (page 60).

- **In an economy characterized by rapid technological change, antitrust authorities should not take preemptive actions to resolve prospective market dominance issues that are likely to be resolved by market competition.**
- **The antitrust process should be reformed to include a greater emphasis on prompt resolution of issues and cases. Antitrust remedies should lean toward conduct-oriented penalties, rather than structural ones; substantial monetary fines should also be an option. Federal antitrust lawsuits should pre-empt state actions.**

Mergers (pages 17-19)

- **U.S. merger guidelines should raise the dollar threshold from $15 million to $100 million for reporting and adhere to a four to six month limit on the time for review.**
- **U.S. authorities should work with other jurisdictions, in particular the European Union, to coordinate merger reviews and harmonize standards.**

Economic Regulation (pages 19-22)

- **Regulators should adopt a wait-and-see approach, rather than act preemptively to regulate an industry based on the view that a particular technology will confer an insurmountable competitive advantage.**
- **When the goal of regulation is to achieve a social objective, such as the subsidization of service to high-cost areas, that objective should be addressed through direct spending programs rather than by mandated rate structures.**
- **The goal in broadband markets should be to allow separately regulated markets to converge toward common rules of competition and taxation. The transition from the current system of regulation, however, must be made carefully to avoid creating disincentives to investment.**

INNOVATION AND INTELLECTUAL PROPERTY

Intellectual property protection ensures that innovators and other creators have sufficient incentive to bring their works to market. As we move towards a digital economy powered by the Internet and low-cost information processing and communication, each component of the intellectual property system is being challenged, in particular, the traditional standards of invention and patent protection. In addition, the ability to duplicate and transmit at near zero marginal cost all types of information–data, images, voices, or other digital signals–is changing the nature of the intellectual property protection problem by leaving the legal rights to creative property intact while making full enforcement of those rights nearly impossible.

Intellectual Property: Findings and Recommendations. CED finds that the foundation that underlies intellectual property policy is strong. The application of that policy, however, has created problems in some specific cases. In some instances, such as automated business method patents, current policy undermines the key objective it seeks to promote—the long-term flow of innovation and creative works. The issuance of patents for such common activities as business referrals and rapid retail checkout has the potential to divert economic resources to "innovations" that are neither productive nor sufficiently creative. In addition, for parties that gather and generate data, current law is unclear as to the copyright protections that they retain and unhelpful in terms of providing the appropriate incentives to the development of electronic information. Blatant copyright violations, especially for text and media, are a significant concern. A balance needs to be found between compensation for the value-added contributions of authors and personal and fair uses (for example, recording a television program for later viewing, or using

published works in an educational setting or political commentary). Better enforcement of rights is part of the answer. The combination of technological solutions and competitive market-based outcomes offers the most likely resolution of current problems.

Patents (pages 23-28)

- **Automated business methods should not be subject to patenting when they merely replicate existing physical practice or are obvious. Copyright should be used as the more suitable protection for specific implementation of a business process by a computer program.**
- **The patent application process should be more open to public review and comment.**
- **The patent system should not create new types of patents, differentiated by type of invention or number of years of protection.**

Copyright (pages 28-31)

- **Existing principles for establishing copyrights should apply regardless of whether the content is in digital or analog form.**
- **Education and enforcement should be used in both public and private efforts to cope with the new realities of copyright law. Private efforts should also emphasize technological solutions and better business models. Enforcement, however, should not be designed to protect a specific technology or business model.**
- **The United States must engage the international community in standard-setting processes, while maintaining the highest possible standards of intellectual property protection.**

PRIVACY AND SECURITY

Issues of privacy, consumer protection, and business security have taken on greater urgency because of fear that the power of digital networks could be easily abused. Concerns on the part of consumers about these issues hinder the growth and development of e-commerce. At the same time, businesses also have concerns related to the costs of guaranteeing the privacy of consumer data, theft of proprietary business information, infection by computer viruses, computer hacking, and "denial of service" attacks.

Privacy and Security: Findings and Recommendations. Privacy concerns stem from several sources, but in general they start with information gathering methods on the Internet that are unique or at least qualitatively different from anything that preceded them. Many consumers, businesses, and legislators lack an accurate understanding of the risks and the protections applicable to online commerce. Even if minimum standards are legislated, these issues will require action by consumers and businesses to increase understanding of potential online dangers and the means of safely navigating commercial websites. Online security threats can be diminished but are unlikely to go away.* The more dependent we are on networks, the more vulnerable we become to disruptions. The economic benefits of computer networks vastly outweigh the costs due to network interruptions, hacking, viruses, and other online dangers; nonetheless, those costs can all be reduced through greater security measures.

Privacy (pages 33-37)

- **A federal privacy law should establish online privacy standards. Specifically, businesses, governments, and other parties that provide content through digital interfaces should be required to disclose fully their practices and policies concerning privacy. The federal law should allow and encourage the use of voluntary trust marks such as BBBOnline and TRUSTe. The Federal Trade Commission should be responsible for enforcement of privacy claims.**

*See memorandum by EDMUND B. FITZGERALD (page 61).

- **A federal privacy law should be written in a manner that allows the use and appropriate disclosure of information needed for the delivery of services in areas such as health and finance, which depend heavily on the use of such data.**
- **In general, markets should be allowed sufficient leeway to mediate privacy concerns between consumers and businesses.**
- **Businesses and consumers share responsibility for educating consumers about the benefits and costs of privacy restrictions, options for protection, and ways to express their preferences.**

Security (pages 37-44)

- **Businesses should make greater use of encryption, electronic firewalls, and similar techniques to ensure privacy and security. Likewise, consumers should take responsibility for their online activities and educate themselves about the steps they can take to improve their security.**
- **We support strong encryption and wish to avoid a return to policies that restrict encryption technology or limit it to the United States.**
- **We encourage further development of security reporting systems that allow businesses to report hacking, breaking in, viruses, and other security breaches anonymously, without fear of possible legal or financial repercussions.**

THE DIGITAL DIVIDE

The spread of digital network technologies may exacerbate exisiting income and skill gaps, which are already the object of numerous public and private programs, both domestic and international. Leaders of businesses, civic organizations, educational institutions, and governments have expressed concern that significant portions of the United States and world populations have thus far not enjoyed the economic and social benefits of the Internet because they do not possess the physical access or basic computer and Internet skills needed to participate in the digital world.

Digital Divide: Findings and Recommendations. The gap between the haves and have-nots of the digital age reflects a lack of technological literacy and access to the Internet, especially among low-income populations. We expect, however, that the current gap in Internet use will narrow in time as a result of less costly equipment and services, simpler user operations, more attractive content (including the provision of government services), and the success of numerous public, private, and nonprofit programs to provide access to the Internet and training in basic computer literacy.

Bridging the digital divide is in both the narrow and broad interests of the business community.* Businesses will gain directly as the proportion of the population online grows and indirectly as rising prosperity and stronger communities strengthen society. Therefore, business leaders have a particularly strong interest in supporting steps to close the divide. To the business community, the digital divide presents a barrier to greater economic prosperity, a larger potential customer base, and a high-skilled and more productive workforce. In that respect, the digital divide does not present business or society with significantly new issues beyond those already encompassed in efforts to raise the education, skills, and economic potential of low-income individuals. CED therefore views it as critically important that efforts and new programs to overcome the digital divide not become a short-term fad that siphons resources and energy from core programs aimed at economic advancement. Instead, such efforts should be integrated with current programs aimed at raising skills and income; those programs should use the new technologies to achieve better results; and

*See memorandum by EDMUND B. FITZGERALD (page 61).

high-quality efforts should be sustained over a long period.

General (pages 46-47)

- **Programs to close the digital divide should not substitute for sustained efforts to lift people from poverty. Computer- and Internet-oriented goals should be integrated into programs that concentrate on development of basic skills, education, and social and physical infrastructure. New digital technologies should be applied to enhance the performance of those programs.**

Access and Literacy (pages 47-53)

- **Public and private programs should promote widespread access to the Internet as rapidly as possible. The development of community access points should be a priority. Computer and Internet literacy should be fundamental components of basic public education and workforce training programs. Short-term public and private initiatives should focus on providing access to basic digital applications (for example, email and the Web). We encourage state and local communities to experiment with Internet-based programs and integrate digital technologies into programs that meet traditional economic and social objectives.**
- **CED supports the objective of equipping schools and libraries for the digital age, but equipment must be accompanied by training. Sufficient funds should be made available to support a wider array of technology-related needs, including professional development and classroom software. In addition, such programs should be funded in ways that allow integration of decision-making for these and other educational purposes.**
- **CED recommends that both new and continuing teachers receive comprehensive professional training in the use of computers and the Internet for education.**
- **Because numerous digital divide programs already exist, while others are being proposed and developed, it is important that appropriate resources be devoted to their synthesis and evaluation.**

Content to Attract Users (pages 53-56)

- **CED encourages private and government providers of Internet content to address the interests of the low-income populations that thus far have been excluded from the Web.**
- **Federal, state, and local governments should provide their internal and external services electronically and promote their use.**

Global Issues (pages 56-59)

- **Global efforts should proceed with a three-pronged strategy. First, developing countries should help themselves by establishing the basic institutional groundwork for sustained economic growth. Second, with international aid organizations, they should address the same access and literacy issues that are being pursued in the United States. Third, they should improve the technological capabilities of medium and smaller businesses to engage in international electronic commerce.**
- **CED urges larger businesses to consider the implementation of volunteer-based "Digital Corps" programs to support small business development in developing nations.**

CONCLUSIONS

The Internet is generating substantial benefits for businesses, workers, and consumers. Those benefits will not be fully realized without some changes in government policies and similar adaptations by businesses and consumers. This report embraces the economic advances that are occurring, seeks new solutions to some old problems, and recommends specific actions that businesses, governments, and individuals can take to maximize the benefits and minimize the costs of the economic transformation we are experiencing.

Chapter 2

WHAT IS NEW ABOUT THE "NEW ECONOMY?"[1]

Few observers of American business at the beginning of the 21st century need to be convinced that commerce conducted over the Internet—e-commerce—is of growing importance to the world economy. Yet, such commerce is not well understood. Even its scope and size are poorly defined and measured. In such an environment, both business and government decision makers are having difficultly understanding this phenomenon and sorting through options for its development and use.

We are now in a transition stage where many of the benefits of e-commerce remain to be realized through continued innovation and diffusion of new technologies and practices. Users are gaining familiarity with this new medium of commerce and experimenting with new products, services, businesses processes, and consumer preferences. The results of these experiments will establish the potential for future economic growth and opportunity.

Based on the accumulated evidence that information technology in general and e-commerce in particular are fueling growth in labor productivity and consumer welfare, we feel confident that these technologies will provide a strong basis for future economic growth, even if temporary setbacks occur. That judgment is tempered only by the awareness that no gains can be guaranteed to continue just because they have occurred in the past. Continued growth depends in part on the resolution of many difficult policy issues that have accompanied the development of Internet-based commerce. The recommendations of this report aim to facilitate such growth through specific policy reforms.

THE NEW ECONOMY

Advancements in information technologies have led in particular to two watershed developments. The first is the conversion of information and its storage in digital form—the zeros and ones of computer language. The second is the creation of a ubiquitous communications network, based on open rather than proprietary access, for rapid retrieval and transmission of such information—that is, the Internet.[2] These two developments have combined to create the capacity for nearly instantaneous storage, retrieval, reproduction, and transmission of all types of information at very low incremental cost and thereby to fuel the so-called "new economy".

A significant element of the new economy is the commercial use of the Internet. The Internet has created a virtual world of commerce that is transforming the conduct of business. An important feature that makes the Internet different from previous commercial electronic media is its accessibility to consumers and smaller businesses that had been left out of some forms of private electronic

1. Informed readers may skip this background chapter and go directly to the issues in chapters 3-6.

2. See Kahn, Robert E. and Vinton G. Cerf. "What Is The Internet (And What Makes It Work)." Internet Policy Institute. December 1999. *http://www.internetpolicy.org/briefing/12_99_story.html.*

commerce. The Internet enables the formation of new products and services, new business providers, and new and more efficient ways of providing existing goods and services. Long-established companies are using the tools of the new economy to become more efficient and more responsive to their customers.

From an economic perspective, one of the key differences between the "old economy" and the "new economy" is the increased importance of network effects.[3] Networks create positive feedbacks, which amplify benefits; in a network, the whole can be greater than the sum of its parts.[4] In individual markets, however, network effects can lead to "winner take all" outcomes, where both positive and negative feedbacks lead the strong to get stronger and the weak to get weaker. As indicated throughout this report, although network effects are not new—they are present in most forms of transportation and communication—they will play an increasingly important role in the economics and policy issues of the new economy. Nevertheless, network effects are not the only means by which the Internet affects competition. Even where networks are less important, competition can flourish and intensify because the Internet lowers transaction costs, makes price comparisons among suppliers easier, and reduces advantages based on location.

Of course, the Internet is not the only factor creating the new economy, and the new economy is far from a revolutionary break from the old economy. No clear delineation exists between new and old, or between e-commerce and traditional commerce. Firms engaged in e-commerce, both old and new, are using the Internet and other forms of information technology to create new products and services and to deliver old products and services in new ways.[5] They are innovating business practices through such methods as just-in-time inventory control, greater use of Intranets for internal communications, and other changes in the organization of business. As when faced with other aspects of a competitive marketplace, firms that fail to take advantage of opportunities provided by information technologies and networks to cut costs and improve quality struggle to compete. At the same time, newer Internet-based businesses are finding that it takes more than a new technology and an interesting concept to compete successfully.

The New Economy Generates Economic and Social Benefits

The commercial use of the Internet and associated technologies is a major factor in raising productivity growth—output per hour of work—which is the key to raising incomes.[6] Higher productivity growth produces large economic and social benefits

3. Shapiro, Carl and Hal R. Varian. *Information Rules: A Strategic Guide to the Network Economy*. Boston, MA: Harvard Business School Press, 1999. pp. 173-225.

4. Mann, Catherine, Sue Eckert, and Sarah Cleeland Knight. *Global Economic Commerce*. Washington, D.C.: Institute for International Economics, 2000. p. 27.

5. By e-commerce, we mean financial and commercial transactions that take place electronically over open networks, including on-line sales, off-line support, other internal business applications (such as infrastructure used to support electronic business processes and conduct electronic commerce transactions), and on-line services for which no charges are assessed (typically, informational websites). See Organization for Economic Cooperation and Development (OECD). *The Economic and Social Impact of Electronic Commerce: Preliminary Findings and Research Agenda*. 1999. pp. 28-29.

6. See for example, Blinder, Alan. "The Internet and the New Economy." *Brookings Policy Briefs*. Number 60. June 2000. *http://www.brook.edu/comm/policybriefs/pb060/pb60.pdf*. and Jorgenson, Dale and Kevin Stiroh. "Raising the Speed Limit: U.S. Economic Growth in the Information Age." *Brookings Papers on Economic Activity*. Volume 1. March 2000. pp. 125-211. In recent years, the measured rate of growth of labor productivity in the United States has accelerated. From about 1973 to 1995, labor productivity growth averaged about 1.4 percent per year, less than half the rate experienced from the end of World War II until 1973. But from 1995 through 2000, that growth rate suddenly rose again to about 3.0 percent. Litan and Rivlin estimate that economy-wide cost savings could easily exceed $200 billion annually. See Litan, Robert E. and Alice M. Rivlin. "The Economy and the Internet: What Lies Ahead?," Conference Report #4. The Brookings Institution. December 2000. *http://www.brookings.edu/comm/conferencereport/cr4/cr4.htm.*

when sustained over a long period. The basis for much of these productivity gains is the disruption of traditional, less efficient market relationships.[7] In many markets the Internet cuts out the middleman and allows upstream firms and their downstream customers to deal directly. Examples abound of airlines, hotels, stock brokers, computer makers, and automobile manufacturers cutting away at traditional retail channels to deliver products and services more efficiently and effectively through the Internet. Other gains come about by using better and faster information to reduce inventories, lower transaction costs, and deliver products and services—such as music, computer software, and airline tickets—directly over computer networks rather than in physical form.

Rising productivity frees resources that can be put to high-value uses elsewhere. In addition, new markets create new opportunities and have led to the creation of new firms to help consumers navigate the potentially treacherous and confusing avenues of cyberspace. These include firms like AOL and Yahoo!, which seek to be the trusted portals through which Internet users enter the World Wide Web; Amazon, which delivers directly to one's door products ranging from books to home furnishings; and e-Bay, which creates new markets everyday for the sale of products directly to consumers by other individuals or small businesses. Numerous examples of product and service improvements exist, as companies that employ the Internet innovate to meet consumers' needs through online shopping, easy comparison of prices, provision of product information, and other product enhancements that could not previously be accomplished at reasonable cost.

The economic benefits conferred by digital network technologies are accompanied by social benefits that may be equally significant.[8] The Internet has made the world seem smaller by reducing the cost and difficulty of communication. It has also promoted a sense of community both within specific geographic locations and among physically separated users who can meet in cyberspace to share common interests. Overall, the Internet is an empowering tool that opens a world of information to the user. People in remote areas can more easily gain access to information and services, such as health, education, and training that previously were limited by physical barriers. The ease of communication and the difficulty of censoring it promote open societies and make central state control much more difficult. Some institutions, including publicly held corporations, are allowing individuals to cast votes over the Internet, thus opening a new means of access to those otherwise unable to participate.

Governments at all levels are finding that they can deliver services more effectively and efficiently by using the Internet. Through the Web, services can be customized to an individual's needs, for example by providing a one-stop portal for government programs. Citizens can more easily access and correct personal information, such as their record of Social Security earnings. The Internet also allows governments to be more efficient in their own internal processes and procurement.

The New Economy Has Created Insecurities for Those Who Lack Skills

Leaders of businesses, civic organizations, educational institutions, and governments have expressed concern that significant portions of the United States and world populations have thus far not enjoyed the economic and social benefits of the Internet because they do not have access or possess basic skills. The inability to participate in new forms of

7. See Schumpeter, Joseph. *The Theory of Economic Development.* Cambridge, MA: Harvard University Press, 1934.

8. See OECD, *The Economic and Social Impact of Electronic Commerce: Preliminary Findings and Research Agenda*, pp. 146-153.

online interaction may have both immediate and long-lasting economic and social impacts. The primary concern is that this "digital divide" could lead to a situation where those with inadequate training and access to information technology would be relegated to a lifetime of low-skill jobs and low wages. Specifically, the concern is that the same network effects that make the Internet so valuable to those who use it will work as strongly in the opposite direction to disadvantage those who do not. The wage premium now being paid to skilled information technology workers has intensified long-standing concerns about the education and acquisition of job skills and training of disadvantaged persons.

EMBRACING THE DIGITAL ECONOMY AND FACILITATING ITS GROWTH AND DEVELOPMENT

Government and business decision makers will greatly influence the future course of the digital economy. Business decision makers will face difficult choices on a daily basis. However, the fundamental calculus of competitive, market-driven business decision making is unlikely to be changed, even if both the risks and rewards are increased. Similarly, public officials should be guided by the fundamentally sound principles that have helped the U.S. economy achieve success:

- Private ownership of property and competitive markets form the foundation for the allocation of resources and the distribution of income. The government ensures that private contracts are enforced, establishes policies that set the permissible rules of competition, and enters markets only when they fail.
- To support innovation the government grants incentives through temporary exclusive property rights (patents and copyrights).
- The government upholds equality of opportunity through support of universal education and other programs to improve work skills.

For the most part these principles, and the policies that carry them out, should continue to provide a solid foundation upon which economic growth and social advancement can be built. In some instances, however, while the principles remain strong, existing policies are being challenged because newer digital network technologies operate differently than older systems. In those cases, public decision makers will confront the difficult task of forging new policies and programs that conform to the digital age.

Government policies and programs that have supported the growth of the digital economy, such as overall macroeconomic policy, market deregulation, support for R&D and education, and encouragement of the development of private capital markets (especially the market for venture capital), need to be maintained and improved.[9]

Macroeconomic policy has made an important if under-appreciated contribution to the development of e-commerce and the "new economy." Sustained economic growth based on investment oriented fiscal and monetary policies has generated the markets and income needed to fuel investment and the environment to encourage risk taking. New investment tends to embody new technology. Thus, a higher investment rate speeds the introduction and diffusion of new economy technologies. Between 1995 and 1999, real business investment in information

9. These policies have been supported by CED in previous policy statements. See footnotes 11 and 12 for specific references.

technology equipment and software more than doubled, from $243 billion to $510 billion.[10] *The maintenance of a pro-investment macroeconomic policy that fosters rapid economic growth with low inflation is a prerequisite to promotion of innovation and closure of the so-called digital divide.*[11]

An important factor in sustaining economic growth and in boosting the adoption of digital network technologies has been economic deregulation. There is little doubt that the deregulation of the U.S. telephone industry that began in 1984 and culminated in the Telecommunications Act of 1996 has spurred competition through innovation in communications. As important, where the government has continued to be involved it has generally promoted competition and expanded network connections, for example through support of interconnect agreements between new entrants and existing local exchange carriers. The deregulation of capital markets has been one of the key factors fueling new economy entrepreneurship and investment. The robustness of U.S. capital markets and the role of venture capitalists is the envy of the world. *These sources of economic growth need to be preserved.*[12]

Government and private-sector support for research and development has been a key factor in the development and deployment of digital network technologies. The Internet was a direct product of federal spending through the Defense Advanced Research Projects Agency (DARPA) and the National Science Foundation (NSF) to support communication among research scientists. After a long decline, real R&D spending by the federal government, which supports basic and applied research, increased between 1998 and 2000 by about 3.8 percent. Spending by industry and universities, mostly for applied research and development, also increased over the same period.[13] *Maintaining support for research is critical to the further growth of the digital economy.*[14]

SPECIFIC POLICY CHALLENGES

The potential for the Internet to benefit the economy and society through higher productivity growth and increased consumer welfare will not be realized unless government and business leaders respond appropriately to numerous policy challenges. It seems clear that the benefits can be substantial. As analyzed in the following chapters, the policy issues are complex and significant but not insurmountable. In many cases, the Internet is a new dimension that forces a rethinking of how current policies are carried out. In other cases, it is fair to say that the Internet has merely focused new attention on a policy area that was long overdue for reexamination, regardless of recent technological advances. The following chapters analyze policies on competition, innovation and intellectual property, privacy and security, and the digital divide.

10. U.S. Department of Commerce. *Digital Economy 2000.* Washington, D.C.: GPO, June 2000. p. v.

11. See CED, *Growth With Opportunity*, 1997, and *Restoring Prosperity: Budget Choices for Economic Growth*, 1992.

12. See CED, *Modernizing Government Regulation: The Need for Action*, 1998, and *Growth With Opportunity*, 1997.

13. National Science Foundation, Division of Science Research Studies. "National Patterns of R&D Resources: 2000 Data Update." NSF (01-309). December 2000. Table 1B. *http://www.nsf.gov/sbe/srs/nsf01309/start.htm.*

14. See CED, *America's Basic Research: Prosperity Through Discovery*, 1998.

Chapter 3

COMPETITION POLICY

The Internet has heightened competition in many markets. As described in Chapter 2, e-commerce has been a disruptive but creative force. It upsets the equilibrium of markets by offering more efficient and less costly services and by removing advantages that often protect the market power of incumbent firms. But the vigorous competition created by the introduction of e-commerce technologies and new business models based on those technologies is raising productivity and incomes.

In some markets, however, Internet-based e-commerce has the potential to result in dominance by a single market leader. That would come about because network externalities and economies of scale, hallmarks of e-commerce technologies, tend to reinforce the competitive advantages of the market leader.[15] Thus, competition policy, which focuses on antitrust violations and merger activity, has become a significant concern in the new economy.

A second factor prompting concern about competition policy is the speed at which technology is changing. Some believe that technology is changing so rapidly in the high-tech world that antitrust laws are irrelevant or, at the very least, that regulators and the courts simply cannot keep up with markets that are constantly changing and making once dominant technologies obsolete.

A separate but related concern involves the treatment of industries where the potential for market dominance by a single firm has led to economic regulation. In some areas of the new economy, notably telecommunications, the legacy of economic regulation is a hindrance to effective market competition and technological change because competition now crosses the traditional market boundaries assumed by regulators.

ANTITRUST ENFORCEMENT AND MERGER POLICY

The central challenge to competition policy is what, if anything, to do about the tendency in some e-commerce markets towards short-run dominance by a single firm. If the nature of the underlying technology is to produce a single economically viable market leader, antitrust action other than policing predatory behavior would be either self-defeating or economically harmful. At the very least, officials would be faced with a difficult trade-off between the competing goals of supporting economic progress and avoiding the dangers of concentrated economic power. The value of antitrust action is diminished if network effects confer only a temporary advantage to the provider of some particular hardware or software. If continued innovation displaces that advantage, markets may become competitions in *serial market leadership*. However, antitrust maintains an important role in policing actions that have long been held to be violations of fair competition. Anti-competitive practices such as predatory pricing, exclusive dealing, and collusive agreements that were illegal in the old

15. Network externalities are discussed in Chapter 2.

economy will continue to be illegal in the new economy.

Policy Issues

The adoption of digital network technologies by both existing firms and new start-ups is changing the nature of competition. Even the nature of the firm is changing. In some industries, lower information costs tighten relationships between separate firms in the supply chain nearly as much as if they were in a single vertically integrated firm. In other instances, firms have shed specialized activities that can now be purchased more efficiently through competitive markets. In still other cases, "virtual firms" have arisen to connect consumers to suppliers without themselves providing any of the physical activities normally associated with order taking, production, or distribution.

These changes provide new context for traditional antitrust concerns about what constitutes fair competition and how to treat market dominance by a very large firm. With regard to fair competition, the Justice Department and the Federal Trade Commission (FTC) have made it clear through the prosecution of individual cases that anti-competitive practices in the new economy will not be tolerated any more than in the old. The Securities and Exchange Commission (SEC) has also aggressively and appropriately prosecuted securities fraud over the Internet.

The greater challenge for regulators is how to view the economic power of a market leader when the future is uncertain. For example, the current advantage of a market leader may arise from strong network externalities, reinforced by the leader's role in setting the industry standard. The market leader may have certain advantages such as intimate knowledge of trade secrets and easier access to capital that allow it to stay entrenched in its position—certainly it can be expected to try to do so. In general, however, as long as the firm is competing legally and fending off challenges to its dominant position through innovation and greater efficiency, it is unlikely to harm the economy. In that situation, the role of antitrust authorities is to ensure that technologies that can potentially compete with the incumbent have a chance to do so. As in the past, market dominance by itself should not be the criterion by which a company is judged. Rather, antitrust officials should be concerned only with the firm's behavior.

Industries with strong network effects—where the value of a product or service to the user increases with the number of users—can tip toward a dominant firm, as its success is reinforced by positive feedback. Commerce conducted over the Internet—the "network of networks"—is very likely to be subject to this effect. Economies of scale also play an important role in shaping Internet-based commerce, especially in information-based products and services, including information in the form of music or video entertainment. Information services, especially in digital form, exhibit the classic characteristic of being costly to produce but cheap to reproduce.[16]

Development costs make the first copy very expensive, while additional copies cost almost nothing to produce and, if delivered over the Internet, almost nothing to distribute. This cost structure—high fixed and very low variable costs—tends to result in markets that are led by just one or a very few dominant producers. At the same time, however, the Internet also reduces entry barriers for new business, and scaling effects can sometimes make size a liability. Thus, many markets may become more competitive. The ability of small firms to gain access to world markets by making a relatively small investment creates a new competitive dynamic. Thus, on the one hand, the cost structure of Internet-

16. Shapiro and Varian, *Information Rules: A Strategic Guide to the Network Economy,* pp. 20-22.

based competition may give an individual firm a competitive advantage, while on the other hand, start-up firms are likely to have a greater ability to challenge market leaders than in the past.

What should antitrust authorities do about the potential for market dominance? Very little. As long as such dominance results from the economic forces described earlier, attempts to break up or hobble industry leaders would produce undesirable economic effects. For example, an industry leader may play an important role by establishing a product standard. The establishment of such a standard can be beneficial both to consumers and to other firms, which can build on that standard to offer additional products and services. By reducing uncertainty and search costs, the existence of a set standard often advances technological and innovative activity. Where economies of scale are involved, products are made more cheaply and consumers pay lower prices than they would otherwise.

As important, competition does not end solely because a market leader emerges. For example, although network externalities may reinforce the position of the market leader by making it more costly for consumers to switch to an incompatible network, such switches do occur, although perhaps more slowly than some might like. Technology leadership in the computer industry has changed hands several times. Early domination of the industry by the mainframe computer gave way first to the mini computer and then to the personal computer, which is now being challenged by wireless devices and so-called net appliances. Competition may also occur across industry boundaries. In telecommunications, for example, the market for basic telephone service, which continues to be regulated as a monopoly, is being challenged by competitive local exchange carriers (CLECs), cable television providers, satellite systems, wireless telephones, energy companies, and even the Internet. Technological change and, as discussed later, economic deregulation have opened the field of competition.

Recommendations

Overall, antitrust policy works reasonably well to maintain competitive markets under fair rules of competition and continues to have a place within the digital economy. All firms must be well-behaved within the legal parameters of accepted competitive practices. **Predatory and collusive practices should be prosecuted in the new economy as they have been in the old.**

Antitrust policy would be improved, however, by a greater recognition that market competition takes place over a broad range of products and services, rather than in narrow niches. In addition, the processes of making antitrust and merger decisions need to be speedier and more flexible to minimize the drag that time-consuming reviews can have on bringing new technologies to market. The following recommendations are designed to carry out these improvements.

Antitrust

In an economy characterized by rapid technological change, antitrust authorities should not take preemptive actions to resolve prospective market dominance issues that are likely to be resolved by market competition. CED believes that because of rapid change within the digital economy, antitrust authorities risk creating economic harm by taking preemptive action. The economics of Internet-based competition will sometimes produce market leaders that have a competitive advantage over rivals. However, that advantage is likely to be relatively short lived. A firm with a technology at the leading edge of competition may be able to dominate the field only until leapfrogged by another with next-generation technology. The potential for serial leadership is much more likely to benefit consumers through improved tech-

nologies and falling prices than to harm them. In addition, authorities should take a wider view of the relevant market. Cross-market competition is greater today than at any previous time.

The antitrust process should be reformed to include a greater emphasis on prompt resolution of issues and cases. The process of enforcement and regulation needs to be modified to meet new realities. Most important is the increasing speed of change. Slow resolution of antitrust cases can create problems because the uncertainty of the outcome generates real economic costs in the form of delayed business decisions and deferred benefits to consumers. In addition, remedies may be outdated by the time of implementation, which could distort markets and create inefficiencies. Whenever possible, reforms that accelerate the process should be institutionalized.

Federal antitrust lawsuits should pre-empt state actions.[17] The existence of several state lawsuits, separate from federal action, makes it both more difficult and more expensive to bring antitrust actions to a conclusion. Suits from multiple jurisdictions can lead to inconsistent policy approaches, cast doubt on the timing and outcome of cases, and make both defense and prosecution more expensive. As described by a leading judicial authority, "States do not have the resources to do more than free ride on federal antitrust litigation, complicating its resolution. In addition, they are too subject to influence by interest groups that may represent a potential antitrust defendant's competitors."[18] We see no overriding interest on the part of states that would justify their separate antitrust actions when there is a federal suit.[19]

Antitrust remedies should lean toward conduct-oriented penalties, rather than structural ones; substantial monetary fines should also be an option. Experience has shown that structural remedies—breaking up a company—can produce more harm than good, especially with respect to innovation. Neither government regulators nor the courts can predict well how technologies and markets will develop. The use of structural remedies presupposes that one can. In our view, such remedies should be used only in rare and extreme cases, such as the 1984 breakup of AT&T, which was already operating under government regulation. In that case, government regulation had created a structure that inhibited some forms of innovation within the company, while simultaneously technological change outside of the regulated monopoly made it difficult and counterproductive to maintain the regulated structure. In some respects, market developments since the breakup of AT&T have shown the limits of the government's ability to contain competition within a set structure. Market-driven changes, including technological innovations, have moved the current structure of competition among telecommunication service providers a great distance from the one imposed in 1984.

In competitive markets, conduct remedies, whereby antitrust authorities outline and monitor acceptable conduct, are a more appropriate policy. Very large monetary penalties, used in part to compensate the injured, would also be appropriate either as a supplement to conduct restrictions or in lieu of such restraints as a way to penalize and deter bad conduct.

17. In general, differences in antitrust law and the proliferation of antitrust suits at the state level create an inconsistent national antitrust policy. Such policies as state carve-outs from the Illinois Brick doctrine, which limits liability from price-fixing to direct purchasers, allow indirect purchasers to sue and create greater expense for firms that operate nationally than would a uniform policy.

18. U.S. Circuit Court Judge Richard Posner, as quoted in Wilke, John. "Microsoft Suit Mediator Rues State Antitrust Role." *The Wall Street Journal.* 19 September 2000.

19. As described by Posner, one clear exception would be that a state should be allowed to bring suit when it has been directly harmed in its role as consumer of a product or service, such as price fixing of a good purchased by the state.

Mergers

U.S. merger guidelines should raise the dollar threshold from $15 million to $100 million for reporting and adhere to a four to six month limit on the time for review. Currently, the U.S. merger review system is based on the principles of pre-merger notification and a two-stage review process established by the 1976 Hart-Scott-Rodino Act (HSR). In general, transactions valued at over $15 million must be submitted to federal officials for

AN EXAMPLE OF ANTITRUST POLICY IN THE NEW ECONOMY: DIGITALLY-ENABLED EXCHANGES

The comments of antitrust regulators on proposed business-to-business electronic exchanges are instructive with regard to how they view their role in the new economy. In general, their comments appear consistent with two findings of this report: *current antitrust policy is appropriate and adequate for handling anti-competitive practices, should they occur; electronic business exchanges have the potential to produce substantial economic gains through lowered transaction costs and increased competition, and therefore should not be discouraged.*

One of the promises of the Internet is that it will enable consumers and businesses to more easily compare prices of products and services, and in the case of business in particular, to lower costs by improvement of their supply-chain and inventory management. A principal vehicle by which these promises may be realized is the "B2B exchange" — joint ventures to afford easier communication between businesses and their suppliers (the auto exchange is an example).

Although business exchanges, such as commodities and metals exchanges, have existed in the physical world for a long time, these Internet-based joint ventures have aroused criticisms by those who believe that they could be used to further anti-competitive objectives. Specifically, concerns have arisen that: (1) exchanges sponsored by competitors may promote collusion in setting prices to the buyers; or (2) exchanges sponsored by buyers may become so important as a way of doing business that they could require all suppliers to trade exclusively through the exchange and inhibit competition by excluding some buyers from participating in the exchange. In addition, the "winner-take-all" tendency of Internet-based competition could lead to single monopoly exchanges in individual markets, although at present competition among the nearly 1000 exchanges belies that concern.

A recent FTC staff report concluded that "the antitrust concerns B2Bs may raise are not new and…B2Bs are amenable to traditional antitrust analysis."[a] In the view of CED, to ensure the competitive nature of exchanges two principles should be adhered to: (1) quotes offered via exchanges must be genuine and firm, meaning that suppliers must be willing and able to deliver quoted goods or services at quoted prices, and (2) buyers and sellers must have adequate access to each other, either through the electronic exchange or offline alternative, since consumer benefits are directly related to the number of suppliers in an exchange.

Overall, we believe that non-competitive outcomes are no more likely to occur in electronic exchanges than in other settings. Where such tactics as exclusion or price fixing are used, they are likely to be transparent and therefore manageable under antitrust law. However, as noted by the FTC report, the bottom line is that "B2B marketplaces have the potential to generate significant efficiencies, winning lower prices, improved quality and greater innovation for consumers."[b]

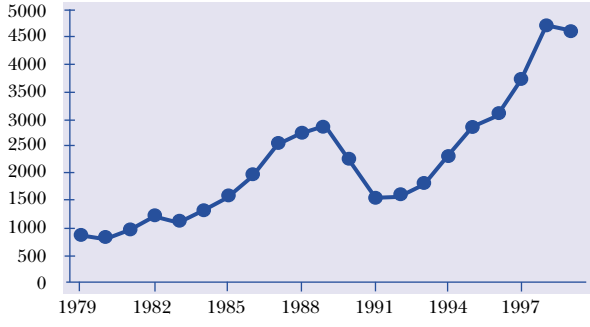
a. Quoted from Robert Pitofsky, Chairman of the Federal Trade Commission, in press release, "FTC Staff Issues Report on Competition Policy in the World of B2B Electronic Marketplaces." 26 October 2000. *http://www.ftc.gov./opa/2000/10/b2breport.ht.* The FTC report is, *Entering the 21st Century: Competition Policy in the World of B2B Electronic Marketplaces.*

b. Federal Trade Commission. *Entering the 21st Century: Competition Policy in the World of B2B Electronic Marketplaces.* October 2000. Executive Summary, p. 1. *http://www.ftc.gov./os/2000/10/b2breport.pdf.*

initial review. That figure captured only 868 cases in 1979, the first full calendar year for filing notifications under HSR.[20] In 1999, it applied to nearly 5000 cases, of which only 113 were subject to second-stage review after initial screening. (Figure 1, "Hart-Scott-Rodino Pre-Merger Notifications," shows the growth in pre-merger notifications.)[21] Regulatory costs, in the form of paperwork and fees that are now set at $45,000 per filing, can be burdensome for smaller mergers that are unlikely to result in monopolies, especially when the merger is essentially a new business formation.[22] Raising the threshold for pre-merger notification would most likely help smaller innovative firms and speed technological change. To capture the largest 200 deals would require raising the filing requirement to $1 billion.[23] Since federal regulators give only cursory review to 98 percent of the filings, lifting the filing level to at least $100 million would seem a reasonable step.

Figure 1

Hart-Scott-Rodino Pre-Merger Notifications (FY 1979–1999)



SOURCE: FTC/DOJ Annual Reports to Congress

20. Federal Trade Commission and US Department of Justice. *Fourth Annual Report to Congress.* 1981. Appendix A.

21. Data are on a fiscal year basis. Federal Trade Commission and U.S. Department of Justice. *Twenty-Second Annual Report to Congress: Fiscal Year 1999.* 1999. Appendix A.

22. In cases where a venture capitalist buys into a small innovative group that has already incorporated as a company, the fees and filings act as a tax on new capital formation.

23. "Antitrust: The New Enforcers." *The Economist.* 7 October 2000. p. 82.

U.S. authorities should work with other jurisdictions, in particular the European Union, to coordinate merger reviews and harmonize standards. Although the objectives of merger policies may differ from country to country, many of the procedures require similar efforts, including the production of vast quantities of information. Harmonization would lower costs and could raise the level of certainty in merger decisions. At present nearly 90 countries have antitrust laws of some type and more than 60 have pre-merger notification requirements.[24] Thus, large mergers and other transactions are subject to costly review by many jurisdictions. Although some progress has been made, at least informally in coordinating US and EU merger reviews, much more can be done in cooperation with both the EU and other countries. A recent report on international competition policy, which has been echoed by former Assistant Attorney General Joel Klein, contains a number of valuable suggestions to promote greater harmonization.[25] Among the report's proposals are:

- *Improve the transparency of the review processes by clearly enunciating the principles employed.* By publishing annual reports and guidelines explaining their merger evaluation policy, each jurisdiction will have greater access to the other's policies and develop a better understanding of their commonalities and differences.

24. Melamed, A. Douglas. "Promoting Sound Antitrust Enforcement in the Global Economy." Address before the Fordham Corporate Law Institute, 27th Annual Conference on International Antitrust Law and Policy, New York, NY, October 19, 2000. U.S. Department of Justice. *http://www.usdoj.gov/atr/public/speeches/6785.htm.*

25. U.S. Department of Justice. Antitrust Division. *Final Report of the International Competition Policy Advisory Committee to the Attorney General and Assistant Attorney General for Antitrust.* Washington, D.C.:GPO, February 2000; and Klein, Joel. "Time for A Global Competition Initiative?" Address at the EC Merger Control 10th Anniversary Conference, Brussels, Belgium, September 14, 2000. U.S. Department of Justice. *http://www.usdoj.gov/atr/public/speeches/6486.htm.*

- *Develop agreed upon approaches (best practices) to guide reviews with significant international spillover.* The establishment of an accepted set of "best practices" will facilitate consistent and unbiased merger reviews and enforcement actions.
- *Deepen work-sharing and information-sharing arrangements among jurisdictions.* Cooperation in these areas will limit the potential for duplication in review or inconsistency in evaluations and enforcement actions.
- *Support a "Global Competition Initiative" to promote the solution of practical enforcement-related problems.* A small international group would promote a common language and view of antitrust enforcement. It could also provide technical assistance to competition authorities in emerging nations. If successful, this institution could play an important role in harmonizing antitrust actions and reducing costs both for firms and governments.

ECONOMIC REGULATION OF MARKET LEADERS

Economic regulation can slow technological change, deny consumers benefits, and create economic inefficiencies. Many of these problems are generated by regulating according to the boundaries of an industry, typically defined on the basis of a particular technology. In an economy where technological change is occurring rapidly, such static regulation makes little sense. As discussed above, the new dynamic of competition is likely to afford most market leaders only temporary dominance based on technological leadership. In such an environment, economic regulation should give way to greater reliance on open market competition. The goal should be competition based on prices that reflect market conditions rather than the distortions created by regulation.

Policy Issues

Regulation of an industry establishes its boundaries and biases decisions about investment and technological change, both inside and outside of the regulated industry. For example, innovative business ideas may be more easily pursued outside of the regulated industry. Lenders and investors may be more willing to provide financing for projects that entail greater risk if pursued outside of a regulated environment in which rewards from risk-taking may be limited. Thus, investment and technological advancement are encouraged to grow in the unregulated environment. Inside regulated firms, growth is channeled along circumscribed paths.

In part, these distortions occur because regulation is typically built on static economic and technological assumptions that may be short-lived. The assumption of a static market is especially questionable when network effects are present. The most common argument offered in support of regulation is the natural monopoly. Telephone, electricity, and other utilities were all sheltered from competition under variants of this doctrine. Under that justification, the regulator sanctions a single supplier so that a scale of operation can be achieved that permits output to be produced at the lowest cost possible. At the same time, the regulator also imposes controls on prices charged to consumers, so that the monopolist does not abuse its power. The requirement to meet other social goals, such as the subsidy of low-income or remotely located consumers, may also be imposed by regulation.

However, the assumption that a new technology produces a natural monopoly may prove false, as substitutes begin to emerge either in the unregulated sector or between one regulated industry and another that is

regulated differently.[26] Moreover, competition today appears to pit several high fixed-cost, low marginal-cost technologies against each other. In the past, viewed separately we might have seen each of these technologies as a potential natural monopoly. However, when viewed as competitors across technological boundaries, the concern that one firm will dominate the competition dissipates, and the rationale for regulation recedes. As we survey the economy, it is hard to name a product or service that is not threatened either by actual or potential competition.

Regulation in the telecommunications industry and the growth of broadband services provide good examples of the problems associated with such regulation. Although less than in the past, telecommunications regulation sets prices and services that can be offered, establishes rules to promote public goals such as universal service, and includes excise taxes that take advantage of the potential of a "must-have" service to raise revenue for government programs. In this environment, unregulated firms have been able to appear innovative by offering lower-priced services in specific market segments, usually the most lucrative ones. In most cases, such firms—typically telecommunications resellers—can provide service at lower prices, not because they are using an advanced technology, but because they are able to maneuver strategically around the regulatory and tax systems.

Regulation currently plays a key role in economic decision-making in the competition among providers of broadband Internet service. The next phase of Internet development is tied to the spread of higher-speed, "broadband" Internet services—at speeds exceeding 1 megabit per second, in contrast to most current modems, which operate at 56K. Broadband technologies deliver data through coaxial cable lines, conventional copper wires upgraded through Digital Subscriber Line (DSL) technology, wireless systems (especially once advanced third-generation, 3G, standards are rolled out), or satellites. By one count, as many as seven different delivery services are currently capable of providing broadband connection to the Internet.

The two services that dominate the competitive field, however, are cable and DSL. Competition between these two services is strongly affected by differences in how they are regulated and taxed. Despite differences in technologies and regulatory treatment, these two technologies now deliver nearly the same capability. Most important to the current competitive landscape is the issue of "open access." (Open access refers to the question of whether the owner of the communication connection—cable or telephone wire—must allow other providers to offer services over the connection.) Under current regulations, local telephone companies must allow other Internet service providers to lease facilities, but cable companies are generally under no such restriction. Developments in this area, however, are highly fluid. Changes in technology, rulings by local courts, policy developments in the Federal Communications Commission, and negotiations between the federal government and AOL/Time Warner over the details of their merger and its effect on cable facilities owned by the company have left the question of access unsettled. The question of regulatory treatment is affecting both the willingness of capital markets to finance new investment in each of these services and consumer choices about which service will best meet their needs.

26. Economists have come to believe that the market is really the appropriate test for determining what industries can be truly characterized as natural monopolies. Economists' support for deregulation and privatization suggests there are very few industries that are thought to be natural monopolies. See for example, Winston, Clifford. "U.S. Industry Adjustment to Economic Deregulation." *The Journal of Economic Perspectives.* Volume 12. Number 3 (Summer 1998). pp. 89-110.

Recommendations

Technologies should be able to compete fairly, without regulatory distortions. Keeping competition open is particularly important in an era of rapid technological change. Government authorities cannot know how technologies will develop. **Regulators should adopt a wait-and-see approach, rather than act preemptively to regulate an industry based on the view that a particular technology will confer an insurmountable competitive advantage.** An open competitive environment allows firms the opportunity to experiment with different approaches to meet the consumer's needs, including the introduction of newer technologies, variations in the mix of products and services offered, and, of course, different pricing options to attract customers. Such an environment will produce much better results for consumers than one circumscribed by regulation. Should competitive problems develop, regulation can be imposed as a last, rather than first, resort.

Within the context of a regulated monopoly, regulators have used the rate structure to achieve social goals through "cross-subsidies." **When the goal of regulation is to achieve a social objective, such as the subsidization of service to high-cost areas, that objective should be addressed through direct spending programs rather than by mandated rate structures.** Thus, for example, a revolving fund program such as the Universal Service Fund for telephone, which subsidizes through direct payments Internet access and basic services to high-cost rural areas and low-income consumers, is an improvement over the imposition of a rate structure that forces cross-subsidization of service to achieve these social ends, but is still inferior to a conventional appropriated spending program.[27] One of the consequences of such a structure is that firms that are not subject to the same high-cost requirements can out-compete regulated firms in the most lucrative markets. In those markets new entrants can charge prices near the actual (low) cost of production, while incumbent firms must charge the higher prices needed to support the subsidy of operations in other market segments.

With respect to the question of open access requirements for broadband providers, views on the appropriate policy answer tend to turn on two questions: first, whether government should preemptively involve itself in the prevention of a potential abuse of market power; and second, whether different services that perform nearly identical functions should be forced to compete under different regulatory regimes. At present, broadband technologies such as cable, DSL, and satellite compete on unequal terrain. In some cases, these technologies compete directly against each other in local markets. In others, one or the other may have a local monopoly with no competition.

These circumstances create tension and often a conflict between policy goals. For example, our view of pre-emptive action is that policy makers should in general adopt a wait-and-see approach. That position would lead to the conclusion that regulators should not pre-empt markets by forcing open access in cable. However, our view of regulation and competition leads to the conclusion that competition between cable and DSL should not be biased by the regulatory regime. That view could support a demand for open access in cable to "level the playing field."

In the specific case of broadband cable, CED believes that further regulation to force open access is unnecessary because cable providers will probably need to open competitive access to their lines to satisfy the demands of their customers. If they do not, the solution is more likely to be found in removing restrictions from the regional Bell

27. Our support for the USF is limited to the concept of accounting for direct outlays to pay for a social program. As discussed in Chapter 6, CED does not support the revenue side of the USF, which draws on an excise tax rather than general funds. In general, a revolving fund is inferior to a direct expenditure program.

operating companies (RBOCs) than in imposing new restrictions on cable services.[28] Either way, as telephone and cable emerge from separate regulatory regimes to compete with one another, and with other technologies, the task of regulatory authorities must be to move toward a common set of rules. **The goal in broadband markets should be to allow separately regulated markets to converge toward common rules of competition and taxation. The transition from the current system of regulation, however, must be made carefully to avoid creating disincentives to investment.** Regulated firms' investments in activities that are no longer required by regulators may quickly become obsolete. An appropriate exit strategy to minimize uncertainty about the value of such investments would require a clear timetable for deregulation.*

28. See, for example, Crandall, Robert W. "Competition is the Key to 'Open Access'." *The Wall Street Journal.* 13 December 2000.

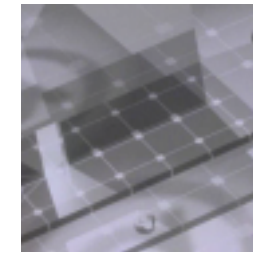
*See memorandum by CHARLES R. LEE (page 61).

CONCLUSIONS

Competition policy is an important feature of today's economic landscape. In policing anti-competitive practices, such as predatory and collusive actions, it remains as relevant in the new economy as it was in the old. In other respects, however, competition policy and economic regulatory policy, which are similarly motivated, are losing their relevance in an economy characterized by rapid technological change and the prominence of networked products and services. These policies must be reconsidered and reoriented to account for the lack of clear competitive boundaries between many products and services. The goal must be to allow all providers, including those with lowest costs, a chance to compete fairly in open markets.

Chapter 4

INNOVATION AND INTELLECTUAL PROPERTY



The economy's rapid growth following the commercialization of the Internet demonstrates the importance of innovation and technological progress. A principal component of the system that supports innovation, and that receives special attention in this report, is protection of intellectual property, including copyrights, patents, and trademarks. The purpose of intellectual property protection is to ensure that inventors and authors have enough incentive to bring their innovations and creations to market. In the "Industrial Age," this objective led to certain processes for identifying, certifying, and protecting intellectual property. For the most part, these processes struck a workable balance between the protection of intellectual property and competing goals such as the maintenance of open competition and open access to scientific discoveries and cultural works of art. However, as we move towards a digital economy powered by the Internet and low-cost information processing, storage, and communications, each of the components of the intellectual property system is being challenged and must be refreshed if not redefined in order to support and promote innovation.

Two aspects of the digital economy in particular are creating problems that need to be resolved as soon as possible.[29] One is that the movement of commerce from physical space to cyberspace is challenging the traditional standards of invention and patent protection. Specifically, what type of intellectual property protection should be extended to business concepts implemented through the Internet, and how should inventions be evaluated in an era of rapid technological change? The other is that the ability to duplicate and transmit at near zero marginal cost all types of information—data, images, voices, or other digital signals—changes the nature of the intellectual property protection problem by leaving the legal rights to creative property intact while making full enforcement of those rights nearly impossible. How will intellectual property be protected in an environment of easy data transmission and duplication? How these issues are resolved will have important consequences for the economy's growth.

PATENTS

The modern patent system can be traced back as far as the Renaissance, when Italian city-states sought to induce innovation in the building of better ships for commerce and

29. This chapter focuses on patents and copyrights. A third area of intellectual property concerns trademarks. The broader dissemination of information allowed by e-commerce makes trademarks easier to pirate and raises questions as to what constitutes legitimate use. Even more important is whether the rights conveyed through recognized trademarks extend to the selection of Internet keywords or domain names. Again, the issue turns on whether rights and processes generally respected in the physical business world convey into the "virtual" one.

warfare. Patents were extended to inventors in this area in the hope of directing their attention to this problem. This early recognition of the need to reward inventors reflects a tension well understood within economics–the asymmetry of risks and rewards between innovators and imitators. Innovators take substantial risks with their time and money, often with little result. When their efforts are successful, the gains they create can be substantial. But, absent patent protection that grants an exclusive property right, imitators can usurp those gains without compensating the original inventors for their effort. By avoiding research and development costs, the imitator can sell at a price far below that of the inventor.

Thus, the patent system is in place to address this imbalance and maintain incentives for inventors to perform their vital function. The award of a monopoly right acts as an incentive to invent and invest, and knowledge of the invention diffuses more quickly because it must be made public. The system amounts to a contract based on a calculation that the cost to society of granting an exclusive right for a temporary period is small compared to the economic benefits provided by the innovation and its more rapid diffusion due to its registry and publication.

Absolute protection for all commercially valuable discoveries, however, would create an economic chokehold that would undermine a key part of the original purpose of that protection. Thus, for example, it has been long-standing policy that basic concepts, such as mathematical algorithms and abstract ideas, cannot be patented. The distinction between patentable and non-patentable ideas is important because a patent owner has the right to exclude others from use of the invention, or to charge a price for its use. The desire to restrict the ability of imitators to capture innovators' economic returns does not mean that the *user* of innovations should be restricted: indeed, the overarching goal of protecting innovators is to keep the stream of innovations flowing to their ultimate users. Nor does it mean that *imitators* could not develop alternative, better or cheaper, ways of producing the same, or similar, benefits.

Policy Issues

The practice of granting patents for computer-assisted business methods has generated considerable controversy. Although the courts have upheld the principle that such "innovations" can be patented, we see no overriding justification for the grant of an exclusive property right when the social return is negligible or nonexistent.[30] Until recently, the patent system did not recognize either software or business concepts as patentable inventions. Software is now the fastest growing patent category and, as shown in Figure 2, the category of patents that includes automated business methods has grown almost four-fold in the last three years.

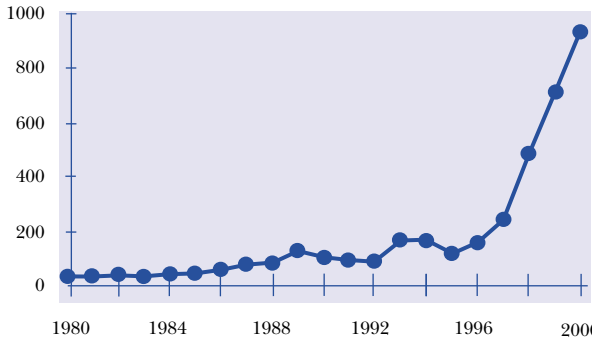
While we do not doubt that from a commercial perspective the translation to the Internet of techniques or practices common in the physical world is "innovative," such commercial innovations do not merit patent protection. Allowing patents for such well understood processes as reverse auctions, payment for referrals, or expedited order entry is inconsistent with the principles that underlie the patent system. If such business processes were not patentable in the physical world, why should they be patentable in the virtual one, particularly insofar as the software code that implements these methods can be copyrighted?

The logic of the patent system does not apply to the development of business method innovations. The incentives to innovate and invest in the fast growing field of e-commerce appear more than sufficient to induce innova-

30. The case that sets precedent is *State Street Bank & Trust Co., Inc. v. Signature Financial Corp., Inc.,* 149 F.3d 1368, 47 U.S.P.Q. 2d 1596 (Fed Cir. 1998).

Figure 2

Annual Number of Patents Issued in Class 705* (1980–2000)



* Class 705 is Automated Business Data Processing Technologies, which includes business method patents.

NOTE: CY 2000 is an estimated annual value based on mid-year data.

SOURCE: USPTO Patent Counts By Class By Year: January 1977–June 2000, August 2000

tion. This is particularly so since first-mover advantages are magnified by economies of scale and network externalities associated with the Internet. The nature of Internet-based innovation in business methods is that it tends to be open to view, not hidden or secretive as some industrial process innovations may have been in the past.

In addition, patents for new activities tend to channel commercial activity towards obtaining similar patents, either to protect against future claims of infringement or to establish a claim against others. The incentive to establish a claim is particularly strong in the absence of a long-standing record of previous patents in the area. Many analysts claim that precisely this degenerative spiral is now underway and that such "strategic patenting" is distracting inventors, entrepreneurs, and patent specialists from other, more socially valuable, pursuits. Granting a patent to an undeserving application can be a costly error, and a system that routinely makes such errors is harming the economy rather than helping it.[31]

At a practical level, many observers have expressed doubts about the ability of the Patent and Trademark Office (PTO) to judge the novelty and "nonobviousness" of a patent application when it lacks specific knowledge of prior art in the relevant field.[32] How can the patent system identify "prior art" in a field such as software, where most innovations are not patented and therefore are not recorded in patent registries? Absent that record and given the existence of physical counterparts to many virtual "innovations," what constitutes a legitimate innovative advance?

Critics have pointed out that patents for business methods tend to be of poor quality, in part because they tend to overlook prior art.[33] The number of references to prior art in business method patents is reported to be much lower than for other inventions. This may be due partly to the nature of a field that has been growing rapidly through the application of technology in business and in which the literature on these applications has lagged significantly. In addition, the rapid increase in the number of patent applications in this field, combined with the open bias of the patent system to approve applications, probably contributes to the grant of poorly justified patents.

31. Merges, Robert. "As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform." *Berkeley Technology Law Journal*. Vol. 14. Issue 2 1999. pp. 577-615.

32. To be patentable, an invention must satisfy the criteria of being useful, nonobvious, and a novelty. An idea is considered useful if it satisfies "the condition that the subject matter has a useful purpose"; nonobvious if not obvious to a "person having ordinary skill in the area of technology related to the industry"; and a novelty if the idea was not previously "known or used by others." US Patent and Trademark Office. *General Information Concerning Patents*. 18 August 1999. *http://www.uspto.gov/web/offices/pac/doc/general/index.htm.*

33. Merges, "As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform," p. 589.

Recommendations

Automated business methods should not be subject to patenting when they merely replicate existing physical practice or are obvious. Copyright should be used as the more suitable protection for specific implementation of a business process by a computer program. Patents for automated business methods provide too much protection for too little innovation; they may actually impede, rather than promote, the development and application of digital technologies. Patents on broad and well-known business methods may deter market entrance, compromising capital formation and other factors that drive innovation. In addition, they encourage wasteful strategic behavior to establish patent claims and initiate legal procedures to determine a patent's validity. Little would be lost, and much could be gained, by refusing to grant such patents. Software, however, can be copyrighted to protect the specific implementation of a computer process. In our view, copyright is the appropriate means of protection for the unique execution of an automated business method.

The patent application process should be more open to public review and comment. The Patent and Trademark Office does not currently have sufficient knowledge of "prior art" to perform patent review for many of the newest technologies and their applications. Recent changes in patent law through the American Inventors Protection Act of 1999 (AIPA) will help open some patent applications to public review and challenge. It will move the U.S. towards an open system, similar to that used in Europe, and improve the evaluation of patent applications by bringing more information to bear on prior art and obviousness.

Among the significant reforms made by the AIPA, are:

- The requirement that patent applications be published 18 months after filing if an application for patent is also filed in another country.
- A re-examination procedure that expands the participation of third parties.

The AIPA, however, has too many loopholes that allow for continued secrecy, and it will continue to impose too long a waiting period before a patent becomes public. Our preference is for a faster and more transparent system. Given the current pace of technological change, especially in Internet-related activities, a six to nine-month period for publication of a patent application and a process that allows greater opportunity for third parties to comment is more likely to produce the intended result than an 18-month period. In general, a faster process for review and final determination of a patent application will be better for all parties concerned.

The patent system should not create new types of patents, differentiated by type of invention or number of years of protection. Some critics of recent trends in software patents have called for the creation of a new, shorter-duration patent for such software.[34] Our view is that setting up a differential patent system would be a mistake. The even-handed treatment of all innovative ideas is an important hallmark of the patent system. Once the precedent has been established, the demand will arise for other special categories of patents with either longer or shorter lives. Adjudication of patent categories would create a new and unnecessary burden on the patent office. Such a system would bias research incentives and ultimately prove unworkable. The creation of different patents for different types of inventions would put government officials in the impossible position of deciding the relative worth

34. Bezos, Jeff. "An Open Letter from Jeff Bezos on the Subject of Patents." About Amazon.com. *http://www.amazon.com/exec/obidos/subst/misc/patents.html/105-5861237-1256720.*

AMERICAN INVENTORS PROTECTION ACT OF 1999 (AIPA)[a]

The AIPA establishes an 18-month period for the publication of patent applications and moves the U.S. system closer to processes followed in Europe and Japan. The norm in the U.S. has been for applications to be published after the Patent and Trademark Office (PTO) grants a patent and the patentee pays the required fee. The new system also improves the reexamination procedure, which allows third parties to challenge the claims of a patent by bringing forward information about prior art. Before AIPA, third parties were excluded from the review process after filing a request for reexamination. The new procedure reduces the need for lengthy and expensive litigation after a patent has been approved.

Significant Changes in Publication and Harmonization

The primary motivation for publishing patent applications 18 months after submission is to make patents filed in foreign countries available in an English language form in the United States. The AIPA does not require the publication of patents that are filed only in the United States or subject to a secrecy order.

The 18-month early publication provision allows for faster dissemination of information on patents filed in other countries and eliminates some duplication in the application process. U.S. companies are aided by having up-to-date information on the estimated 40 percent of U.S. patent applications that are of foreign origin. When firms are more rapidly informed of the patent office's docket, they will waste less time and effort researching, developing, and applying for previously established ideas and processes. Reduced duplication in patent applications also reduces the workload for the PTO, which will not have to devote resources to evaluating applications that lack innovative ideas, and hence, patentability.

The 18-month early publication would align the U.S. process with that under the recent Patent Cooperation Treaty (PCT). Under the PCT, applicants can submit a claim for a patent in an individual country, as well as to the International Bureau of the World Intellectual Property Organization (WIPO). Although application to the WIPO bureau does not provide an International patent, it protects the priority date of the applicant if later contested by allegedly prior art.

In addition, the PCT creates an international examination committee that can assess the chances of receiving a patent in particular PCT contracting states. The number of PCT contracting states currently exceeds 100, including all of the world's developed nations. The cost of an international examination is much lower than the costs of applying for patents in several nations, and the process provides applicants more time and a better estimate of the chances of a patent being granted before funds and efforts are spent.

Changes to the Reexamination Procedure

AIPA creates a procedure that triggers review of a patent application based on information provided on prior art. The primary motivation of the Inter Partes Reexamination procedure is to reduce the incidence of court cases following patent approval. By expanding the grounds for reexamination, increasing the opportunities for third party involvement throughout the process, and providing the right to appeal PTO decisions, third parties should be less inclined than at present to opt for litigation. Once the decision is made for the reexamination process, third parties are limited in post-examination litigation, since they may not assert the "invalidity of any claim finally determined to be patentable on any ground that the third-party requester raised or could have raised during the inter partes reexamination." Beyond being a less expensive and faster alternative to litigation, the PTO reexamination allows for the assessment of patentability to be made by patent experts rather than federal judges, who generally are less knowledgeable in the field.

a. The American Inventors Protection Act of 1999 became effective November 29, 2000.

of various categories of invention. Our preference is to define clearly the scope of allowable patents—excluding automated business method innovations, as discussed above—and to treat all allowed patents equally.

COPYRIGHT

The same motivations that underlie the patent system underlie copyright. When the invention of the printing press left authors unable to protect their works against duplication, they pressed sovereigns to establish exclusive rights of publication.[35] Absent copyright, many literary, artistic, commercial, or other types of works would not be produced. The purpose of providing protection to authors and artists is to ensure that a healthy stream of their creative works finds its way to consumers. Thus, the exclusive rights granted to authors and artists are properly viewed as a social cost of a policy to promote creative works.

Policy Issues

Internet technology has radically changed the economics of publishing. A recent study by the National Research Council points out the nature of these changes.[36] The costs of reproducing digital information are close to zero for both copyright holders and infringers, and digital copies are perfect copies of the original. Thus physical barriers to reproduction, which once deterred infringement, no longer exist. Similarly, high-speed computer networks have significantly lowered the cost of distribution of information products, and the World Wide Web has changed the nature of a "published document;" anyone with a computer and an Internet connection can now be a publisher.[37] The result is that while individuals now have greatly expanded access to information, including factual reporting, fiction, opinion articles, music, and video entertainment, they also have the capacity (whether knowingly or unwittingly) to violate the intellectual property laws.

No one seriously challenges the principal values that underlie the copyright system. Thus, the overarching issue is enforcement. The new ways in which copyrighted information can be shared represent an unprecedented challenge to the traditional system of enforcement, and perhaps the very business model of "for sale" musical and video entertainment itself. Of what value is it to hold legal title to a song, television program, book, article, or movie, if your work can be freely copied and transmitted to anyone who wants it? The practical resolution of this question will have important effects on both how copyrighted property is protected and how e-commerce and Internet-related services develop. This is also an international issue, given the Web's borderless purview and the prospect of piracy "safe havens" if international agreement is not reached on what constitutes intellectual property rights and how they are to be enforced.

The forces that undermine the copyright protection of creative works also raise the issue of extending copyright protection to digital databases that are not now protected in their physical form. A conventional example is the telephone directory. In its original, small-print form, the courts decades ago ruled that it was not protected by copyright because the fact-based nature of the work lacks creativity. But this decision reflected the

35. Patterson, Alan and Stanley Lindberg. *The Nature of Copyright: A Law of Users' Rights*. Athens, GA: University of Georgia Press, 1991. pp. 19-46. Although copyright was initially used by the sovereign to control content, author's rights were eventually recognized in the Statute of Anne (1710).

36. National Research Council, Committee on Intellectual Property Rights and the Emerging Information Infrastructure, Computer Science and Telecommunications Board, Commission on Physical Sciences, Mathematics, and Applications. *The Digital Dilemma: Intellectual Property in the Information Age*. Washington, D.C.: National Academy Press, 2000.

37. Publication on a large scale, however, would require additional computing resources.

circumstances of the moment. Telephony was a regulated monopoly, so only one company had ready access to all phone numbers. Reproducing the phone book took substantial effort and cost because it had to be set in type and produced little reward because all users already had one. But in the digital context, reproducing the phone book, or any other information, is a simple matter of copying a data set or scanning an image. The ease of copying or extracting information from a database and recompiling it into other formats can significantly impair the incentives of producers to compile such data in the first place. Examples of non-copyrightable databases in the private sector include internal business records, records about customers and suppliers, research results, and compilations of facts from diverse sources. The Internet has heightened concerns over the lack of protection for so-called non-creative databases in part because of competition with Europeans who are protected by a database extraction right and because such databases comprise a significant portion of digital electronic commerce.[38]

Recommendations

Existing principles for establishing copyrights should apply regardless of whether the content is in digital or analog form. For most forms of copyrighted material, the key question is how to enforce rights. The question for databases is how to separate non-copyrightable content (facts) from formatting, presentation, and other creative activities that normally would qualify for copyright protection for the creator.*

Education and enforcement should be used in of both public and private efforts to cope with the new realities of copyright law. Private efforts should also emphasize technological solutions and better business models. Education and enforcement are key elements of a strategy to reaffirm the value of copyright material. The logical consequence of a failure of that strategy is that either creative works will diminish in commercial value, and consequently be produced in less quantity, or they will become subject to contract and licensing provisions that are potentially more secure but less beneficial to society as a whole than copyright.

Certainly, society would be better served if users of copyright material were better informed about acceptable practices with respect to copying such material. In fact, programs already exist to teach the ethical use of technology to children who are using Internet technology in the classroom.[39] The more informed users become, the less likely that problems will persist. While some may prefer to surrender to the seemingly intractable problems caused by the ease and costless nature of copy and transmission, we believe that the principle of copyright protection is worth defending. An aggressive enforcement strategy, which might produce some high-profile cases, could reverse the trend that has made copyright infringement so common. In the current environment, a considerable number of private enforcement actions have been initiated against some of the prominent Internet-based technologies that have enabled users to copy music and other digital information. In our view, such actions should be accompanied by government efforts to halt copyright infringement. A few high-profile enforcements against egregious piracy would help defend the legal

38. A related issue, which we do not examine here, is market-generated or event-generated information. Institutions such as the New York Stock Exchange or, eBay, generate information as a consequence of their trades, just as sporting events do scores as they are played. Do they have the right to require payment for the use of that data? The answer becomes all the more important as trading venues such as the stock exchange become more competitive and are less able to use listing and trading fees as sources of revenue.

39. The Department of Justice and the Information Technology Association of America have created the Cybercitizen Partnership to develop curricula and promote cyber-ethics to schoolchildren. See Shuchman, Lisa. "Teach Your Children Well." *The Industry Standard.* 20 November 2000. p. 105.

*See memorandum by CHARLES R. LEE (page 62).

rights of copyright holders. This will become especially important as copying moves from relatively centralized sources (such as Napster) to more decentralized systems (such as Gnutella). **Such enforcement, however, should not be designed to protect a specific technology or business model.** The point is to protect the principles of copyright. The technologies and business models that have developed to commercialize copyright works have contributed substantially to the common good. However, they are not sacrosanct. Indeed, to the extent that they may hinder the development of new, more efficient technologies, change would be beneficial.

The primary alternatives to more effective education and stronger enforcement are greater use of licensing and technical protection measures, which use electronic technologies to lock or open the content based on conditions set by the seller. (See box, "Technical Protection of Information.") Both alternatives are likely to diminish the tradition built into copyright law of providing for

TECHNICAL PROTECTION OF INFORMATION

Digital rights management (DRM) and "technical protection services" (TPSs) are recently developed technologies that aim to secure content and let companies choose the terms and conditions of product use. DRM technology works in a variety of ways depending on the company that provides it, but in general relies on encryption.

An open question is whether DRM will protect digital content effectively and enable companies to distribute content on the Web securely. Many experts, including developers of software that provides free access to music files, believe DRM-secured files will be decrypted as soon as they reach the Internet. Microsoft, for one, admits that when the licensed user is accessing a file, a hacker could divert the unencrypted file to another file on that machine. They argue, however, that the main point is not that hackers can find ways around the encryption, but that with encrypted systems only piracy involving malicious intent will occur and the widespread distribution of copyrighted files will stop.

One high-profile effort is being undertaken by the recording industry, which has teamed with the consumer electronic and information technology industries to form the Secure Digital Music Initiative (SDMI) to protect future music releases. The first two phases of this project involve developing and marketing SDMI-compliant players that play both already existing files and new files with "digital watermarks" encrypted into the music. If the new music lacks or has a damaged watermark, the compliant player will not play it. The aim is to provide new music in the encrypted watermarked format available to download for a nominal price so that consumers can access music and artists and companies can receive compensation for their work.[a] However, hackers responding to an industry challenge to break the code may have already done so.[b]

Aside from questions about the ability of DRM and TPS to protect fully electronic information, critics have argued that such systems have important implications for public access.[c] Encrypted products are typically offered to the user through a license, which operates under different legal rules from copyright. Concerns focus in particular on the ability of libraries to continue to serve their function as permanent repositories of material that constitutes a cultural heritage and, more generally, on the notion that material distributed by license may not become part of the long-term public record. Individual users have also expressed concerns about the erosion of their long-held ability to copy material they own, such as audio or videocassette recording, for personal use.

a. "Justin Frankel." *Time Digital. http://www.time.com/time/digital/reports/mp3/frankel4.html* and "Frequently Asked Questions." Secure Digital Music Initiative (SDMI). *http://www.sdmi.org/FAQ.htm.*

b. "Hackers Insist They Beat Audio Technology." *The New York Time*s. 24 October 2000.

c. Samuelson, Pamela. "The Digital Dilemma: A Perspective on Intellectual Property in the Information Age." Paper for the 28th Annual Telecommunications Policy Research Conference, Alexandria, VA, September 23-25, 2000.

a limited degree of public access and "fair use." Although not our preferred approach, the use of technical protection measures seems a reasonable second best solution. It could at least preserve the value of creative works and provide sufficient incentive for their development. The loss of some public access through restrictive contracts and licenses could be offset in other ways, such as through legislation that would establish an explicit right for public libraries of access to such works.[40]

Finally, the United States must engage the international community in standard-setting processes, while maintaining the highest possible standards of intellectual property protection. It has long been recognized that protection of intellectual property must be an international effort since ideas know no geographical boundaries. Together, the *Paris Convention for the Protection of Industrial Property* and the *Berne Convention for the Protection of Literary and Artistic Works*, ratified in 1883 and 1886 respectively, established the basic system of international cooperation. Those treaties have been frequently updated and extended, most recently through the *Copyright Treaty* and *Treaty on Performances and Phonograms* of the World Intellectual Property Organization (WIPO).[41] In addition, intellectual property now receives special attention in international trade under the agreement on Trade Related Intellectual Property (TRIPS) of the World Trade Organization (WTO).

WIPO, in particular, is now considering many of the same questions raised for domestic policy regarding the assignment and protection of intellectual property rights. It is in the process of trying to bring the recently negotiated treaties regarding copyright and the rights to recordings into force by the end of 2001. The goals include establishing procedures for promoting consistency between "domain" and "real" names, for protecting data bases, and for extending existing protections for recordings to audiovisual products; developing principles for determining the liability of online service providers; and many other fundamental activities. Business leaders should be aware of this process and provide input to make it consistent with the primary objective of reconciling the assignment of intellectual property rights and economic growth.

CONCLUSIONS

The foundation that underlies intellectual property policy is strong. The application of that policy, however, has created problems in some specific cases.

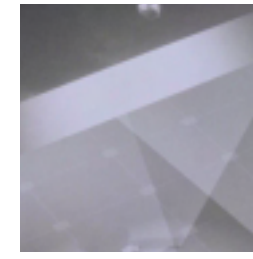
In some instances, such as automated business method patents, current intellectual property policy undermines the very thing it means to protect—the long-term flow of innovation and creative works. The issuance of patents for automated business methods has the potential to overstimulate unproductive "innovations." In addition, for parties that gather and generate data, current law is unclear as to the copyright protections that they retain and unhelpful in terms of providing the appropriate incentives to the development of electronic information. Blatant copyright violations, especially for text and media, are a significant concern. A balance needs to be found between compensation for the contributions of producers and "fair uses," such as in educational and library settings. A combination of technological solutions and competitive market-based outcomes offers the most likely path out of current problems.

40. The National Research Council has suggested rethinking whether "copying" should remain a benchmark concept. In the context of libraries, it suggests that a new legal framework may be needed. See National Research Council, *The Digital Dilemma: Intellectual Property in the Information Age*, pp. 140-145.

41. Ratified in 1996.

Chapter 5

PRIVACY AND SECURITY



Concerns about privacy, security, anonymity, fraud, and the difficulty of obtaining redress, especially across jurisdictional boundaries, when using the Internet hinder the growth and development of e-commerce because they discourage consumers from engaging in commercial transactions via the Web. Businesses also have concerns related to the costs of guaranteeing the privacy of consumer data, theft of proprietary business information, infection by computer viruses, computer hacking, and "denial of service" attacks. Many companies find it difficult to provide the privacy and security that consumers want while making their websites convenient to use, protecting their own commercial interests, and obtaining an adequate return on their investment in Internet resources.

Many of these consumer concerns are not unique to the Internet. For example, the Internet has for the most part not changed the nature of fraud; it has simply provided a new arena for old crimes. With regard to privacy, however, the Internet brings several new dimensions to existing concerns. Among these are a new ability to monitor, undetected, the specific mouse clicks and habits of a shopper and the enhanced ability to store, process, and exchange vast quantities of data. For businesses, making consumer information held in computers secure is a daunting and expensive task. The open architecture of the Internet makes it very difficult to ensure privacy and security and leaves businesses vulnerable to new forms of risk. In addition, some forms of privacy protection can interfere with the delivery of services that consumers demand, especially in the areas of health and finance. In many ways, these are new, complicated, and evolving issues, and any analysis of them must necessarily be limited and evolving as well.

While a consensus appears to be emerging on the need for greater online privacy protection, no agreement exists on the proper approach. Disagreement tends to focus on where the balance lies between consumer and commercial interests and whether self-regulation or a mandatory legal requirement is the better means to the goal. Our view is that business-to-consumer (B2C) e-commerce will not achieve its true potential until privacy concerns are put to rest.[42] Thus, businesses need to actively reassure customers that their privacy will be respected and that information held by a business will only be used in an appropriate manner.

Business attitudes towards security issues are also beginning to take shape. On these issues, government mandates to force businesses to enhance security are probably not needed. Competition and self-preservation are providing sufficient motivation for businesses to improve online security practices. That point was made forcefully at a recent conference on privacy and security hosted by Microsoft, where chairman Bill Gates reminded privacy and security leaders that the continued growth of online shopping depends

42. Similarly, the adoption of the Fair Credit Billing Act (15 U.S.C. § 1666) paved the way for widespread use of credit cards by limiting consumer liability and placing other requirements on lenders.

largely on the confidence of consumers and other users that their personal information is secure.[43]

PRIVACY

Privacy concerns stem from several sources, but in general they start with information gathering methods that are unique to the Internet or at least qualitatively different from anything that preceded it. "Cookies" and "Web bugs" are examples of some of these controversial new techniques. Cookies are small text files stored on the user's computer when he or she visits a website that can be accessed only by that website or someone affiliated with that site. Cookies are widely used to personalize a user's experience on a website and to enhance user convenience, for example, by recording his or her password, address, or credit card information. Users can set their browsers so that they will not accept cookies or will do so only after asking user permission. However, the default setting on most browsers is to permit cookies to be stored without informing the user. A newer method for collecting information about Web users is the "Web bug," which can report to its home server (belonging to the host site, a network advertiser, or some other third party) detailed information on the Internet-viewing habits of the computer user.[44]

Three conclusions emerge from a review of the major policy issues concerning the interaction of consumers and commercial websites. First, many consumers (as well as legislators and others) lack an accurate understanding of the risks posed by, and the protections applicable to, online commerce. Second, whether or not this lack of understanding contributes to a hesitancy to engage in commerce online, it is clearly creating pressure for governmental action. Third, this heightens the urgency for businesses both to improve their efforts to educate consumers and to provide consumers with policy-based, contractual, and technological protections. Consumer education would focus on the risks, opportunities, and protections applicable to B2C e-commerce. Consumer protections would reduce the need for regulation of e-commerce and provide an opportunity for businesses to distinguish themselves in the marketplace by the clarity and quality of their responses to consumer concerns.

Policy Issues

Survey after survey about online privacy indicate that consumers would use the Web more if privacy were better protected and that many want the government to pass laws now to regulate how personal data are collected and used on the Internet.[45] The following list, although incomplete, makes it clear that a wide variety of issues are included under the "privacy" rubric (see also Figure 3, Internet Users' Fears): surreptitious collection of personal information, such as undisclosed monitoring of browsing habits; reuse of personal information for purposes other than those for which it was collected, such as using e-mail addresses collected for one purpose to market other products or services; combining or matching personal information collected from disparate sources (profiling); transfer of personal information to third parties through sale, rental, or exchange, includ-

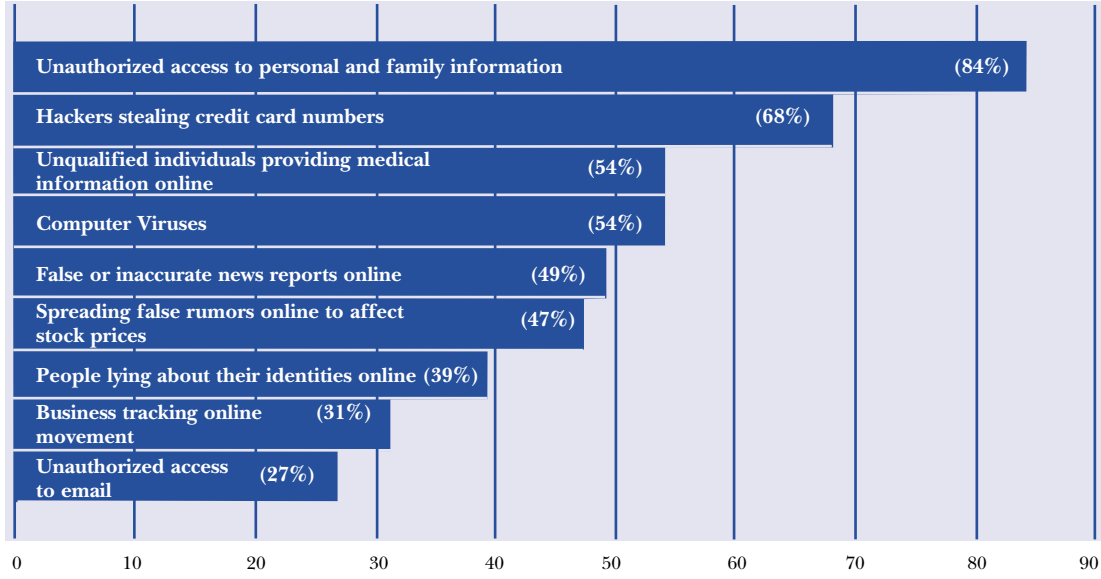
43. "SafeNet 2000: Security and Privacy Leaders Gather at Microsoft Campus to Seek Solutions to Challenges Facing Internet Users." Microsoft PressPass. 7 December 2000. *http://www.microsoft.com/presspass/features/2000/Dec00/12-07safenet.asp.*

44. A Web bug is also known as a "clear GIF" or "1-by-1 GIF." Web bugs are graphic image files embedded in a Web page or an e-mail; they are invisible to the user because they are the same color as the background on which they are displayed; they can be detected only by looking at the source code of a Web page.

45. In October 2000, two-thirds of respondents in a survey of online privacy said that their biggest worry is that websites will provide their personal information to others without their knowledge. "Online Americans More Concerned about Privacy than Health Care, Crime and Taxes, New Survey Reveals." National Consumers League Press Release. 4 October 2000.

Figure 3

Internet Users' Fears*



SOURCE: Pew Internet & American Life Project May-June 2000 Poll
*Internet users equaled nearly 50 percent of survey sample of 2117 adults

ing the use of personal information by one company to market the products or services of another company; interception or misappropriation of personal information, whether through third-party "hacking" or the misappropriation by employees or contractors; use of personal information to commit fraud or physical or emotional harm, such as fraudulent charges on credit cards, identity theft, and stalking; maintenance and use of inaccurate personal information, thereby denying the consumer benefits to which he or she is otherwise entitled or marketing products or services to a consumer in which he or she is unlikely to be interested; and indefinite retention of personal information, so that an individual is hard-pressed to move beyond past mistakes.

Several states are considering privacy laws, and the FTC recently recommended to Congress that it enact online privacy legislation—thereby reversing the Commission's position of the past four years.[46] The Commission recommends that such legislation build on four key principles: clear and conspicuous notice of how a consumer's information will be used; choice as to whether and how personal information is used; access to personal information collected online and the ability to contest its accuracy; and assurance that the information is secure from unauthorized use.[47]

In response to consumer concerns, the private sector has developed a variety of privacy solutions, although none completely solves all problems. Some companies, such as

46. The National Association of Attorneys General is developing legislative recommendations for state privacy laws. See Perine, Keith. "The Persuader." *The Industry Standard.* 13 November 2000. pp. 155-170.

47. Federal Trade Commission. *Privacy Online: Fair Information Practices in the Electronic Marketplace.* May 2000. *http://www.ftc.gov/reports/privacy2000/privacy2000text.pdf.*

IBM, have appointed a "chief privacy officer," who will be responsible for the establishment and maintenance of privacy policies.[48] Several business associations, notably the Online Privacy Alliance (OPA) and the Global Business Dialogue on E-Commerce (GBDe), have called for standards to safeguard personal information online. The OPA website also highlights privacy initiatives taken by its member companies, which others may want to follow.[49] In January 2001, the AeA (formerly the American Electronics Association) proposed principles to guide policy makers in the creation of a federal privacy law.[50]

Several private groups, including TRUSTe and the Better Business Bureau (BBBOnLine), offer a privacy seal of approval that businesses can use to show that their policy complies with the established requirements.[51] However, the lack of both consumer awareness and voluntary business participation, as well as a failure to require notification of policy changes, diminish slightly the effectiveness of these seals. The seals also do not identify the policies of ad agencies when they act as third-party profilers on other companies' Web pages. To remedy that problem, the FTC has worked with online ad agencies to develop the Network Advertising Initiative Principles, which address the key issues of consumer notice, choice, access, and security.

In the international arena, the OECD has taken steps to help firms develop adequate privacy practices. The OECD Privacy Guidelines represent an international consensus on how best to balance effective privacy protection with the free flow of personal data.[52] The guidelines allow for various means of compliance. To help implement them, the OECD has developed an online computer program called the OECD Policy Statement Generator.[53] The program offers free assistance on compliance with the guidelines. The hope is that the program will raise awareness of privacy issues and private organizations will use the generator to develop privacy policies and statements for display on their websites.

Technology holds several potential solutions to privacy issues. Anonymizers are one potential privacy solution. They hide a personal computer's unique IP address so an individual can browse the Web anonymously. Consumers can purchase any one of a variety of anonymizers for about $50 per year. Another recently developed solution is the automated privacy provided by World Wide Web Consortium's Platform for Privacy Preferences Project (P3P). The P3P requires websites to use a standardized privacy policy format and allows the consumer to set personal privacy preferences. If the consumer visits a site that meets his or her preset minimum privacy preference level, the computer automatically gives information to the site; if the site does not meet the minimum level, no information transfer occurs. The White House, AOL, and Microsoft have backed the project. Internet Explorer 6.0 will incorporate P3P technology and allow users to download default settings created by privacy groups or other organizations. In the work place, Microsoft is also backing the use of smartcards to ensure authentication of the user and to limit access to secure files.[54]

48. Wilcox, Joe. "IBM Appoints Chief Privacy Officer." *The New York Times*. 29 November 2000.

49. *http://www.privacyalliance.org/*.

50. "AeA Unveils Federal Privacy Principles." AeA News Release. 18 January 2001. *http://www.aeanet.org/public/press/index.html.*

51. *http://www.bbbonline.com/* and *http://www.truste.com/*.

52. The OECD Privacy Guidelines are available at *http://www.oecd.org/dsti/sti/it/secur/prod/priv-en.htm.*

53. *http://cs3-hq.oecd.org/scripts/pwv3/pwhome.htm.*

54. "SafeNet 2000: Security and Privacy Leaders Gather at Microsoft Campus to Seek Solutions to Challenges Facing Internet Users."

Recommendations

A federal privacy law should establish online privacy standards. Specifically, businesses, governments, and other parties that provide content through digital interfaces should be required to disclose fully their practices and policies concerning privacy. The federal law should allow and encourage the use of voluntary trust marks such as BBBOnline and TRUSTe. The Federal Trade Commission should be responsible for enforcement of privacy claims.* Two factors justify a federal law that sets minimum standards of online privacy protection. First, a federal privacy law would preempt multiple state laws and supersede private lawsuits based on federal wiretapping statutes; the costs and inefficiencies created by having to comply with inconsistent requirements would hinder the development of e-commerce. Second, federal law would go some distance toward reassuring reluctant consumers, who may be unable to make their concerns known to business effectively. One way of doing that would be to affirm the authority of the FTC to enforce privacy policies posted by businesses. While we would like to see businesses retain sufficient flexibility to establish their own policies within minimum guidelines from the law, we believe that for consumers to view those policies as credible the standards must be reasonably stringent and subject to enforcement.

However, a federal privacy law should be written in a manner that allows the use and appropriate disclosure of information needed for the delivery of services in areas such as health and finance, which depend heavily on the use of such data. In considering federal legislation, lawmakers should take care to recognize the legitimate use of private information under various circumstances. While safeguarding consumer privacy is important, some data are routinely needed by business not only to deliver important services directly, but also to improve the delivery of those services through indirect means. In health care, for example, patient medical data are routinely needed for outcomes analysis, medical research, and health education purposes, including care management itself.[55]

In general, markets should be allowed sufficient leeway to mediate privacy concerns between consumers and businesses. While a role exists for government policy to set minimum standards and enforce private contracts (as discussed above), the primary focus should be on actions that consumers and businesses can take to protect consumer privacy. In both cases, technological solutions hold substantial promise. With respect to business, privacy options should be one of the dimensions in which firms compete. If privacy concerns are an important factor in consumer preferences, online suppliers will begin to offer more privacy options. That, of course, will only occur if markets can adequately convey such information between consumers and businesses.

Businesses and consumers share responsibility for educating consumers about the benefits and costs of privacy restrictions, options for protection, and ways to express their preferences. Education is essential for consumers to make sound choices about their policy preferences. Education should include information about why a certain level of privacy is necessary, why too much privacy may inhibit markets, and how

*See memorandum by CHARLES R. LEE (page 62).

55. In December 2000, the outgoing Clinton Administration announced new privacy standards for patient medical records. Those rules, which cover both paper and electronic records, would be effective in 2003, if allowed to stand by President Bush. In general, health care providers would be restricted from using patients' data without their permission, and patients would be granted further rights for copies, corrections, and notifications. See, "HHS Announces Final Regulation Establishing First-Ever National Standards to Protect Patients' Personal Medical Records." U.S. Department of Health and Human Services Press Release. 20 December 2000. *http://www.hhs.gov/news/press/2000pres/20001220.htm.*

technology can be used to exercise their preferences. For example, a consumer can set the Internet browser to encrypt information and disallow cookies that track browsing habits. Consumers can also use one of several credit card services that generate a unique authorization number for each online transaction.

To make consumers more aware of the implications of shopping or gathering information online, providers of digital interfaces must make their policies available and understandable. While consumers bear primary responsibility for their own actions, including use of the Internet, we expect businesses that have commercial interests in consumer privacy issues, which includes almost all retail businesses, to actively take steps to help inform consumers of their choices. Businesses need to build the confidence of consumers by providing safe and secure websites, which help overcome fears of doing business online. Once trust is built between consumers and suppliers, applications of digital technologies will proceed more smoothly.

SECURITY

Consumer concerns about commercial websites, even when identified as relating to privacy, often relate to security. Security issues include concerns about both data interception and unauthorized access to stored data. Businesses offer a variety of valuable information in one place, making them easy targets and forcing them to spend time and money protecting against the theft of trade secrets, proprietary business information, and customer information. Surveys indicate that 80 percent of companies identify security as the leading barrier to expanding e-commerce with their customers and partners.[56]

To protect the confidentiality and reliability of data and maintain continuous service, Internet-based operations must limit their exposure to such factors as environmental disruption, human operational errors, design and implementation errors, and malicious attacks. Environmental disruptions vary from natural disasters such as earthquakes and floods to construction crews digging in improper places and accidentally cutting connection lines. Operational errors include mistakes made by human workers because of poor training, poor judgment, and inadequate staffing, or just the ordinary, unpredictable mistakes people often make. Design and implementation errors result from the convergence of many different software programs and computer systems over the Internet. With so many different systems and programs being used together, it is nearly impossible for a programmer to eliminate all potential conflicts. Malicious attacks are intentional, man-made assaults directed at particular computer systems.

Policy Issues

As the Internet has connected computers, it has become easier and less dangerous for attackers to gain unauthorized access to a computer and its programs; physical access is not needed. In addition, as both the quantity and quality of data stored on networked computers has increased, the incentives of attackers have also increased. According to the recent "Computer Crime and Security Survey," 85 percent of responding corporations and government agencies reported some type of security breach in the last year.[57] Losses can be difficult to quantify. Estimates that aggregate total losses are especially poor because many crimes and security breaches are not reported. Nevertheless, quantified losses, for firms that reported crimes, rose

56. Mann, Catherine, et. al. *Global Economic Commerce*. p. 106; and Ho, David. "U.S. Public Worried about Hackers, Poll Indicates." *The Seattle Times*. 20 June 2000.

57. Hatcher, Thurston. "Survey: Costs of computer security breaches soar." CNN.com. 12 March 2001. *http://www.cnn.com.*

SOURCES OF ATTACK ON COMPUTER SYSTEMS

Attacks on computer systems have become more sophisticated and more frequent. Reported breaches include attacks both by insiders and outsiders, employees and former employees who access information without permission and hackers who gain unauthorized access to the network through the Internet. These attacks can further be broken down according to the intention of the attack, whether to prevent the availability of services or to attack the integrity or confidentiality of stored data.

Insiders vs. Outsiders

Unauthorized access to stored data typically takes place in one of two ways. The first is third-party access ("hacking") that exploits some defect in the security measures surrounding the data. Anecdotal reports suggest that this occurs relatively infrequently, but a number of well-publicized reports of hackers obtaining access to stored lists of credit card numbers and Social Security numbers have heightened consumer concerns about such risks. Tools to access vulnerable systems externally are becoming more sophisticated, widespread, and user friendly. Hackers can now attack a large number of sites simultaneously, denying service or stealing information.

The other and reportedly more common form of unauthorized access to stored data is through an employee or contractor who acts outside the scope of his or her employment or contract. This type of access is more difficult to prevent. It is also more difficult to assuage customer concerns about such access. Employees constitute one of the greatest threats to company information systems, and attacks by employees cause the most damage. The average insider attack costs a company $2.7 million in damages, the average outsider attack only $57,000. Employees have intimate knowledge of a company's computer system and can more easily exploit its vulnerabilities.[a]

Availability

The loss of access to computer services can be extremely costly for any business. When their computer systems are down, businesses lose both access to their files and their ability to conduct e-business. A loss of either one eliminates a company's ability to do business.

While businesses are constantly subject to the possibility of loss of service as a result of an environmental problem or human or software error, man-made denial-of-service attacks are the major threat to computer systems' availability. Denial-of-service attacks aim to deny access to a particular resource by "flooding" the network, disrupting connections between two machines, preventing a user from accessing a service, or disrupting service to a specific system or person.[b]

Denial-of-service attacks waste memory and generate traffic at particular sites, and because attackers can coordinate computers in the process, such attacks can interrupt services from the most sophisticated sites. Although many attacks do not inflict any permanent harm on sites, they can create costly interruptions of service for extended periods of time. The denial-of-service attacks that temporarily halted traffic to major websites in February 2000 are estimated to have cost as much as $1.2 billion.[c]

Integrity

A second major security concern is to ensure that attackers cannot alter or erase stored information. The major threat to maintaining the integrity of stored data is the computer virus. Viruses are based on programming code that infects a computer, reproduces itself, and spreads to others via email. In addition to self-replication, viruses can erase data, infect hard drives, and overwhelm networks. Between 1996 and 1999, virus infection increased 800 percent.[d]

Currently, anti-virus software is available to prevent infection. Because they are generally small files that try to remain hidden, most viruses can be easily eliminated once exposed. Unfortunately, viruses can inflict much damage before their existence is well known. The May 2000 "I Love You" bug, for example, caused an estimated $6.7 billion in damage and downtime.[e] In addition, the potential for new polymorphic viruses "designed to rewrite their code every time they infect a new computer"[f] poses new challenges to anti-virus software producers.

Confidentiality

Threats to Internet confidentially are among the greatest concerns to the digital economy. Currently, two-thirds of Americans are concerned about crime on the Internet.[g] If confidentiality cannot be assured, consumers will fear the spread of the confidential information including social security numbers, addresses, and credit card numbers over the Web and avoid e-commerce.

Attacks that jeopardize the confidentiality of protected information are the most lucrative for hackers. While attacks limiting service availability or altering data integrity can hinder business on the Web, information retrieved from websites has value. The most common online thefts involve credit card databases, trade secrets, and other confidential files.

In addition to the traditional attacks in which unauthorized personnel or hackers illegally retrieve confidential and valuable personal data, Internet confidentiality is threatened by "sniffer" devices, which allow outsiders to receive copies of email or other files that may include private information or passwords.

a. Shaw, Eric, Jerrold Post and Kevin Ruby. "Managing the Threat from Within." *Information Security.* July 2000. *http://www.infosecuritymag.com/articles/july00/features2.shtml.*

b. "Denial of Service Attacks." CERT Coordination Center. 12 February 1999. *http://www.cert.org/tech_tips/denial_of_service.html*

c. Abreu, Elinor. "Insurers Rush in When Security Fails." *The Industry Standard.* 17 July 2000

d. Grossman, Lev. "The New Hot Zone." *Time Digital.* July 2000. *http://www.time.com/time/digital/feature/0,2955,49120,00.html*

e. Grossman, "The New Hot Zone."

f. Grossman, "The New Hot Zone."

g. Burton, Tinabeth. "New Nationwide Poll Shows Two-Thirds of Americans Worry About Cybercrime." Information Technology Association of America Press Release. 19 June 2000. *http://www.itaa.org/news/pr/PressRelease.cfm?ReleaseID=96144345.*

from $265 million in 1999 to $378 million in 2000 (see Figure 4).[58]

Technological means of improving security. Firewalls are computer programs that regulate access to computer systems according to whether an outsider is authorized by possession of the password, or key. Firewalls are based on the military concept of perimeter security, where access to an entire base is limited by allowing very few entrances. Essentially, firewalls serve as the locks on entrances.

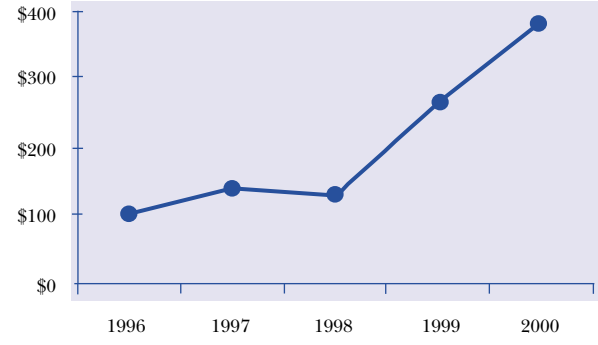
In general, firewalls are effective at defending against outside "hackers." However, they tend to be ineffective at eliminating insider attacks, which constitute the bulk of current attacks. Newer programs called "distributed firewalls" may improve security against both types of threat.[59] Without a single chokepoint, "there is no longer a single point of failure" that can expose the entire network to outside hackers.[60] They may also be used to limit insider attacks by restricting employees from gaining access to files that they are not authorized to view.

Encryption is the transformation of data by means of a mathematical algorithm that allows it to be understood only by individuals who have the key necessary for decryption. Unlike firewalls, encryption does not focus on controlling who gains access to particular files. Instead, security is maintained by limiting the ability of unauthorized individuals to decrypt the file. Encryption of confidential messages makes intercepted transmissions indecipherable without the appropriate key. For this reason, encryption serves to protect both stored data within a database and transmissions, such as electronic mail, that are transferred from network to network.[61]

Figure 4

Annual Reported Losses from Computer Crime and Security Breaches

(In Millions of Dollars)



NOTE: Totals are based on surveys of Computer Security Practitioners in U.S. Corporations, Government Agencies, Financial Institutions, Medical Institutions, and Universities.

SOURCE: CSI/FBI 2001 Computer Crime and Security Survey

Government programs to improve security. The federal government has taken several steps to improve the security of computer systems and the Internet. Among the most prominent is the Computer Emergency Response Team (CERT) Coordinated Center at Carnegie Mellon University, which is devoted to insuring the survivability of computer networks. (See box on the CERT Coordinated Center.) CERT both responds to specific security problems and works to prevent such problems by increasing awareness of security issues.

In 1997, following the report by the President's Commission on Critical Infrastructure Protection, the Administration issued Presidential Decision Directive No. 63 (PDD-63), which outlined a strategy to assess and minimize the potential vulnerabilities of

58. This figure undoubtedly understates the true level of losses, but by how much is unknown. The figure cited, although the most authoritative available, includes only reported and quantified losses from surveyed firms.

59. Messmer, Ellen. "New firewalls defend the interior." *Federal Computer Week.* 20 June 2000. *http://www.fcw.com/fcw/articles/2000/0619/web-fire-06-20-00.asp.*

60. Bellovin, Steven. "Distributed Firewalls." November 1999. *http://www.research.att.com/~smb/papers/distfw.html.*

61. Nunno, Richard M. "Encryption Technology: Congressional Issues." CRS Issue Brief: IB96039. 14 July 2000.

the U.S. critical infrastructure by the year 2003.[62] (See box on the President's Commission and PDD-63.) Through increased cooperation and communication between federal agencies and private businesses, PDD-63 has facilitated the creation of a national plan to improve security information sharing and reduce the vulnerabilities of the critical infrastructure. The plan was released in January 2000, and is known as the National Plan for Information Systems Protection, Version 1.0.

Most recently, the FTC has recommended the enactment of a legal requirement concerning online security, based on the finding of the Advisory Committee on Online Access and Security.[63] Although the advisory committee did not specify an exact recommendation, it clearly leans towards the imposition of government standards of security. To supplement any security standards the committee also supported the development of programs to educate consumers on security issues. The committee's recommendations included the following principles:

- "Each commercial Web site should maintain a security program that applies to personal data it holds.
- The elements of the security program should be specified (e.g., risk assessment, planning and implementation, internal reviews, training, reassessment).
- The security program should be appropriate to the circumstances. This standard, which must be defined case by case, is sufficiently flexible to take into account changing security needs over time as well as the particular circumstances of the Web site—including the risks it faces, the costs of protection, and the data it must protect."[64]

62. The President's Commission on Critical Infrastructure Protection. *Critical Foundations: Protecting America's Infrastructures.* Critical Infrastructure Assurance Office. October 1997. *http://www.ciao.gov/CIAO_Document_Library/PCCIP_Report.pdf.*

63. Federal Trade Commission, *Privacy Online: Fair Information Practices in the Electronic Marketplace.*

64. Federal Trade Commission. *Final Report of the FTC Advisory Committee on Online Access and Security.* May 2000. Executive Summary. p. 25. *http://www.ftc.gov/acoas/papers/acoasfinal1.pdf.*

THE COMPUTER EMERGENCY RESPONSE TEAM (CERT) COORDINATED CENTER

The CERT program was created by the Defense Advanced Research Projects Agency in response to the 1988 "Morris Worm" computer virus that crippled nearly 10 percent of all computers connected to the Internet.[a]

In the past decade, CERT's growth has paralleled that of the Internet. While the CERT only handled six computer security incidents in its first year, the center responded to nearly 10,000 incidents in 1999.[b] The scope of CERT's functions has also expanded. The center now provides alerts on its Web page of current viruses and offers a program, the Operationally Critical Threat, Asset, and Vulnerability Evaluation (OCTAVE), which allows individuals to assess the value of their network and decide on necessary security measures. The center also provides courses and training to increase public knowledge of computer security issues and serves as a model for additional security centers.

a. "About CERT/CC." CERT Coordination Center. 27 November 2000. *http://www.cert.org/nav/aboutcert.html.*

b. "CERT/CC Statistics 1988-2000." CERT Coordination Center. 11 January 2001. *http://www.cert.org/stats/cert_stats.html.*

THE PRESIDENT'S COMMISSION ON CRITICAL INFRASTRUCTURE PROTECTION AND PRESIDENTIAL DECISION DIRECTIVE NO. 63

President's Commission on Critical Infrastructure Protection

The President's Commission on Critical Infrastructure Protection was established in 1996 to determine the vulnerabilities of the nation's critical infrastructure and develop a plan for protecting it. The Commission was established because of the recognition that many parts of the nation's crucial infrastructure had become both more automated and more intertwined. With concerns being raised about the potential effects of the upcoming Y2K computer problem, the Commission provided an evaluation of the government's ability to ensure that the distribution of essential goods and services would not be disrupted by the potential effects of that problem or any cyber threat.

The Commission recommended the implementation of a program based on industry cooperation and information sharing, including proposals to create information centers for an attack warning system, as well as an organization to determine a national plan for assessing and eliminating critical infrastructure vulnerabilities. The recommended plan and organization structure was adopted in PDD-63.

PDD-63 Proposed Structure

PDD-63 was designed with goals of significantly increasing the security of government systems by 2000 and creating a secure and reliable infrastructure by 2003. PDD-63 also created two major bodies. First, the National Infrastructure Protection Center (NIPC) was designed to link federal and state agencies with private businesses for threat assessment and response. Second, it assigned the Critical Infrastructure Coordination Group (CICG) of government and business leaders the task of continuing the assessment of the critical infrastructure's vulnerabilities and providing plans to remedy them.

NIPC is designed to assess and respond to network threats. It began operation in December 1998 and is located within the FBI's headquarters. It joins the efforts of leading computer security experts from the FBI, Department of Defense, and other government agencies, as well as those from private businesses. NIPC is linked to the computer systems throughout the federal government, and is intended to provide "timely warnings of inten-

Recommendations

Businesses should make greater use of encryption, electronic firewalls, and similar techniques to ensure privacy and security. Likewise, consumers should take responsibility for their online activities and educate themselves about the steps they can take to improve their security. Technical means exist to reduce significantly the exposure of individual consumers and businesses to external threats. Yet, businesspeople, consumers, and even some network managers rarely understand or give high priority to security issues, and security practices are typically not state of the art.[65] All users and providers of Internet service must educate themselves about the ways in which they can improve security. Consumers in particular should be aware that no public policy can substitute for the need to take responsible actions for self protection. In general, those actions include the use of home firewalls and the privacy measures noted above.

Security also means secure communications and protection against disruption. **We support strong encryption and wish to avoid**

65. Schneider, Fred B., Ed. *Trust in Cyberspace*. Washington, D.C.: National Academy Press, 1999. p. 240.

tional threats, comprehensive analyses, and law enforcement investigation and response."[a] Private Sector Information Sharing Analysis Centers (PSISAC's) are the private sector NIPC counterparts in specific sectors. Currently, PSISAC's exist in banking, telecommunications, and electric power.[b]

PDD-63 deemed several critical sectors necessary to maintain minimum operation of the government and economy and created a Sector Liaison Official (SLO) to analyze and reduce the network vulnerabilities of each sector in coordination with private business leaders. After completing sectional reviews and evaluations, the SLOs convened as the CICG, which combined the sector reports and released the National Plan for Information Systems Protection, Version 1.0, January 10, 2000.

National Plan for Information Systems Protection, Version 1.0

The national plan focuses on three major objectives. First, the plan emphasizes the continued efforts of critical infrastructure asset and vulnerability analysis to prevent successful cyber attacks. Second, the plan proposes increased efforts towards detection of and response to, attacks and unauthorized network entries. This included efforts to improve information sharing abilities to spread attack warnings and enhance response capabilities. Third, the plan suggests building a strong foundation against cyber attacks by training more security specialists, heightening public awareness of the issue, and encouraging new legislation and funding to support other programs.[c]

a. "Presidential Decision Directive 63." Critical Infrastructure Assurance Office. 22 May 1998. *http://www.ciao.gov/CIAO_Document_ Library/paper598.pdf.*

b. Moteff, John D. "Critical Infrastructures: Background and Early Implementation of PDD-63." CRS Report: RL30153. 12 September 2000.

c. "National Plan for Information Systems Protection." Critical Infrastructure Assurance Office. January 2000. Executive Summary. *http://www.ciao.gov/National_Plan/executive_summary_01-11-00.pdf.*

a return to policies that restrict encryption technology or limit it to the United States. Over the past ten years, the government's position on the regulation of encrypted data has been caught between concerns over the protection of national security and the protection of privacy rights and encouragement of the growth of business through electronic commerce. While we recognize the legitimate interests of the government in national security and law enforcement, past government regulations have had an unnecessarily negative effect on business activity. Our hope is that past mistakes such as promotion of the "clipper chip" that allowed for easy decryption of encrypted messages and export controls on strong encryption programs, will be supplanted by policies that recognize both the limits of the government's reach and the realities of the borderless Internet and a globally integrated market. One of those realities, as spelled out by the National Research Council, is the positive role that encryption can play in protecting connected businesses and individuals.[66]

We encourage further development of security reporting systems that allow

66. Dam, Kenneth W. and Herbert S. Lin, Eds. *Cryptography's Role in Securing the Information Society.* Washington, D.C.: National Academy Press, 1996.

businesses to report hacking, breaking in, viruses, and other security breaches anonymously, without fear of possible legal or financial repercussions. Although some steps have been taken to encourage private organizations to report electronic intrusions, government and industry experts must be able to work more closely together to combat security problems. Their interests overlap on issues of incident reporting, investigation, law enforcement, legal reform, and critical infrastructure. However, a recent survey showed that businesses only report about 32 percent of serious hacker attacks to law enforcement agencies because they want to avoid embarrassment and doubt the government's ability to track down criminals.[67] In response, the Administration and industry leaders have formed the Partnership for Critical Infrastructure Security to share security information, and the FBI has announced a new program, InfraGard, to allow companies to share sensitive information about cyberattacks.[68] Nevertheless, more needs to be done. The FBI has acknowledged that it has had difficulty persuading businesses that involvement with FBI programs is more beneficial than harmful. Legislation introduced in the 106th Congress would encourage the disclosure and exchange of information on networked information systems by protecting the party providing such information against public disclosure, civil action, and antitrust prosecution.[69] Legislation to remove barriers to sharing information about computer security violations, threats, and vulnerabilities would be a useful step towards making the system more secure.

CONCLUSIONS

While there is some room to improve government policies in the areas of privacy and security, the most important need for additional action lies with the private sector. Consumers and businesses should become better educated and more active participants in efforts to protect the privacy of data gathered online and the security of the network and its components. All should recognize that while threats can be diminished, the system can never be made totally secure. As consumers and businesses gain greater experience with network technologies, including technologies to protect personal data and guard against other security threats, they will find that the benefits of the system greatly outweigh the risks.

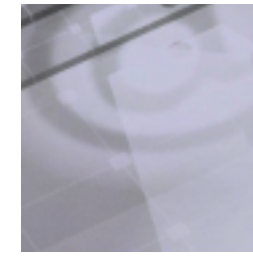
67. Piller, Charles. "Internet Industry Wary of U.S. Cyber Crime Unit." *The Seattle Times.* 6 March 2000.

68. "FBI Takes Aim at Cyber-Crime." *The Washington Post.* 6 January 2001. p. A2 and "Strengthening Cybersecurity through Public-Private Partnership." The White House Press Releases. 15 February 2000. *http://www.whitehouse.gov.*

69. See, for example, H.R. 4246, "The Cyber Security Information Act."

Chapter 6

OVERCOMING THE DIGITAL DIVIDE



The gap between the haves and have-nots of the digital age, termed the digital divide, reflects a lack of Internet access and literacy among low-income populations. Business leaders have a particularly strong interest in supporting steps to close this divide. To the business community, the digital divide presents a barrier to greater economic prosperity, a larger potential customer base, and a higher-skilled and more productive workforce. In those respects, the digital divide does not present business or society with significantly new issues than those already encompassed in efforts to raise the education, skills, and economic potential of low-income individuals. CED therefore views it as critically important that new digital divide programs not become a short-term fad that siphons resources and energy from core programs aimed at economic advancement. Instead, such efforts should be integrated with current programs and sustained over a long period to raise skills and incomes, and those programs can achieve better results by using the new technologies.

Whether the gap is domestic or international, three factors are likely to interact strongly with efforts to bridge the digital divide. First, the divide is primarily a function of more deeply rooted factors associated with poverty such as inadequate education, disrupted families, decaying communities, and, in developing countries, a lack of necessary infrastructure. Efforts to bridge the divide should be viewed within this broader context. Second, to some degree, the divide between the haves and have-nots should narrow in time if those who lack access are motivated to provide themselves with the necessary basic equipment, services, and training, and businesses are motivated to reach lower-income market segments. The potential for higher earnings and the attractiveness of the products and services available through the Web will undoubtedly be a powerful incentive for individuals to get online. Similarly, businesses may find more profit opportunity in broader markets. Third, markets are not stagnant, and the technologies deemed essential for productive access will keep changing. Even if the current gap closes, another will surely open as those with higher incomes move up the technology ladder to more powerful and sophisticated devices. Thus, efforts to bridge the divide will need to be ongoing.

POLICY ISSUES

The inability to participate in new forms of networked interaction may have both immediate and long-lasting economic and social impacts. The primary concern is that the digital divide "could lead to a two-tier economy in which those with inadequate access to information technology would be relegated to a lifetime of low-skill jobs and low wages."[70] Specifically, the same network effects that make the Internet so valuable to those who use it could work as strongly in the opposite direction to disadvantage those who do not. These elements of the digital econo-

70. Peterson, Molly M. "Net Dreams." *National Journal.* 11 March 2000. p. 767.

my could increase inequalities. As important, however, the Internet also provides new means to address some of the sources of those inequalities.

In response to such potential negative consequences, leaders of business, educational institutions, civic organizations, and government have all expressed concern. It serves both narrow and broad self-interest for businesses to bridge the divide. As expressed at the World Economic Forum by Carleton Fiorina, chairman of Hewlett-Packard, companies should seek to tackle the divide in their own self-interest rather than as philanthropy, because today's poor countries are the potential growth markets of tomorrow.[71]

Businesses may profit in a narrow sense by lowering their unit costs, expanding their customer base, and reaching new markets, even as competition intensifies and limits their pricing power. More broadly, the wider social benefits associated with new information technologies should also benefit business. Widespread Internet access and use helps improve the quality of the labor force, customer relationships, and communities in general. From the education and preparedness of its workforce to public opinion on the value of its services, business has a significant stake in the general improvement of the social environment. The more extensive the reach of the digital economy, the greater will be the opportunity for individual firms to grow and profit within a healthy, prosperous, and well-functioning society.

Internationally, the greatest danger is that the gulf between developed and developing countries will widen. Differences in the economic and business capabilities between the United States and developing countries appear magnified by the increased economic integration commonly referred to as "globalization." On the positive side, the Internet provides businesses in poor countries an easier route to tap into global markets, and they may also be able to leapfrog costly and outdated technologies. On the other side, however, unless developing countries can quickly upgrade basic infrastructures, such as telephone service, energy, and transportation, and the national institutions necessary for the growth of all commerce, they risk falling further behind.

Finally, the realization of network benefits is limited by the size, accessibility, and pervasiveness of the network. The more important the Internet becomes as a primary channel to goods at reduced cost and access to information of all kinds, as well as a conduit for political and cultural expression, the greater will be the opportunity for low-income populations and their businesses to gain by obtaining access to the Internet. For business in general, this network effect provides a motivation beyond mere charity to invest in its own future prosperity by providing resources to help others gain the access and skills they need to cross the digital divide. Such investments may pay dividends in unexpected ways, for example, through increasing the future supply of engineering and scientific talent.

RECOMMENDATIONS

CED believes that closing the digital divide is an important national and international goal. We applaud the many existing public and private initiatives to address this issue. However, there is danger that digital divide programs will become a faddish detour on the road to economic opportunity unless integrated with more traditional education, training, and other skills-development programs. Below, we provide a series of recommendations (including illustrative examples) that policymakers should consider in the construction and implementation of programs in three areas: access and literacy, content, and global issues. In general, our rec-

71. As reported in Buerkle, Tom. "Rich Ask Themselves How to Help the Poor." *International Herald Tribune.* 31 January 2001.

ommendations attempt to insert Internet concerns into traditional domestic anti-poverty and international economic development programs. **Programs to close the digital divide should not substitute for sustained efforts to lift people from poverty. Computer- and Internet-oriented goals should be integrated into programs that concentrate on development of basic skills, education, and social and physical infrastructure. New digital technologies should be applied to enhance the performance of those programs.***

Access and Literacy

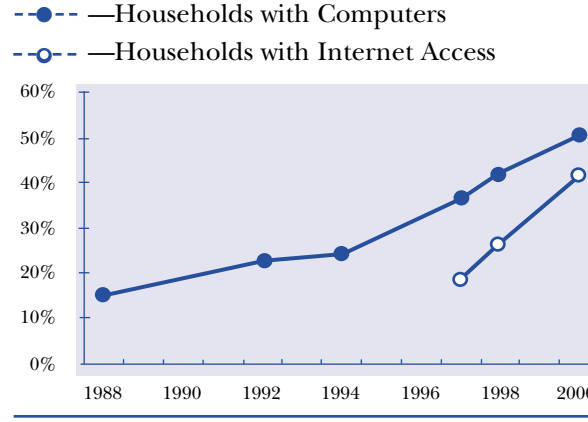
Before people can fully benefit from the digital economy, they must have physical access to computers and the Internet, and they must be literate in both the traditional sense of knowing how to read and write and the sense of knowing how to use a computer and navigate the World Wide Web. As a starting point, individuals and communities need computers or other Internet-enabled devices to access the digital network. Access, which is primarily an issue of infrastructure and physical capital, appears to be the most immediate barrier to participation in the online world. Thus, accessibility has become a key criterion for evaluating the digital divide.

Recent data show that computers are steadily becoming more common within American homes. In 2000, computer penetration reached 51 percent, a sharp rise from 42 percent in 1998.[72] In addition to an increased number of computers in our homes, computers are also more common in workplaces, public libraries, schools, and community centers. The number of households with Internet access has also been increasing. Further, the margin is shrinking between those with computers but not Internet, and those with access to both (see Figure 5). As time passes, fewer people are off the network for reasons other than choice.

Although the overall number of households with computers and Internet access is rising, penetration across demographic groups is uneven. For instance, households with lower incomes and less education are, on average, less likely to be online. In August of 2000, nearly 78 percent of the 17 million households with annual incomes of $75,000 or higher had Internet access, compared to only 13 percent of the 16 million households with incomes below $15,000.[73] Location is also an important variable, as households within central cities or rural areas are less likely to have Internet access.[74]

Figure 5

U.S. Households with Computers and Internet Access, Selected Years



SOURCE: U.S. Department of Commerce, Economics and Statistics Administration, National Telecommunications and Information Administration. *Falling Through the Net: Towards Digital Inclusion.* Washington, D.C., October 2000.

72. U.S. Department of Commerce, Economics and Statistics Administration, National Telecommunications and Information Administration. *Falling Through the Net: Towards Digital Inclusion.* October 2000. p. xv. *http://www.esa.doc.gov/.*

73. U.S. Department of Labor, Bureau of Labor Statistics. "Current Population Survey, Internet and Computer Use Supplement." August 2000. *http://ferret.bls.census.gov/.* Each of these household groups, those with annual incomes above $75,000 and those with annual incomes below $15,000, represent about 15 percent of all households.

74. U.S. Department of Commerce, Economics and Statistics Administration, National Telecommunications and Information Administration. *Falling Through the Net: Towards Digital Inclusion.* p. 4.

*See memorandum by JAMES Q. RIORDAN (page 62).

Based upon the demographic trends above, it is not surprising that penetration differs among racial and ethnic groups. Asian Americans and Pacific Islanders (59 percent) surpass other groups in terms of Internet access and Whites (47 percent) have a penetration rate slightly above the national average of 42 percent. Well below the national average, however, are African-American households and those of Hispanic origin, both with penetration rates of about 23 percent. Estimates by the National Telecommunications and Information Administration suggest that differences in income and education account for approximately one-half of the difference between the races. After adjustment, the gap between the national average (all races) and African-Americans is about 10 percent, and for Hispanics it is nearly 7 percent.[75] The remaining margin shows that income and education levels do not account for all the differences in Internet access.

Despite the differences outlined above, Internet use is increasing across all demographic groups. Further, any snapshot of current use in a nascent market like the Internet is likely to misjudge longer-term outcomes. As with many technologies of the past, adoption and use gradually increase over time. The factors affecting adoption include awareness of a technology and attraction to use it, in addition to affordability.[76] For purposes of illustration, it may be helpful to compare the Internet and cable television. During cable television's earliest years of expansion, from 1970 to 1980, use among TV owners grew from 6.7 to 19.9 percent. In contrast, in the six years since the Internet was introduced to the public in 1994, the number of households with access has already reached 42 percent. A longer-term look at cable television also shows that between 1970 and 1997, household subscribers grew almost tenfold to 66.5 percent. Based on its remarkable penetration thus far, we expect the number of Internet users to continue to grow to levels similar to basic television (98 percent) and telephone service (94 percent).[77]

Nevertheless, even if Internet use eventually reaches near 100 percent, sufficient justification exists to speed up that process. Most important, because of continuing technological advances, delay puts excluded populations further behind and makes it more difficult for them to catch up. An example can already be found in the gap in access to high-speed broadband service, which is more likely to be available in high-income and densely populated communities than in low-income and low-density areas.[78] In addition, an individual's investment in computer equipment and appliances, even at lower costs, can still be expensive, especially considering the very rapid rate of obsolescence. **Thus, we believe public and private programs should promote widespread access to the Internet as rapidly as possible.**

Short-term public and private initiatives should focus on providing access to basic digital applications (for example, e-mail and the Web). Some of the most important basic services and tools of the digital economy can be provided at relatively low cost through alternative Internet appliances. Businesses should not overlook the profit opportunity in supplying a potentially high-volume market for simple Internet devices. For example,

75. U.S. Department of Commerce, Economics and Statistics Administration, National Telecommunications and Information Administration. *Falling Through the Net: Towards Digital Inclusion.* p. 15.

76. U.S. Department of Commerce, Economics and Statistics Administration, National Telecommunications and Information Administration. *Falling Through the Net: Towards Digital Inclusion.* pp. 3-4.

77. U.S. Department of Commerce, Economics and Statistics Administration, Census Bureau. *Statistical Abstract of the United States.* 119th Edition. Washington, D.C., 1999. p. 581, Table No. 921.

78. U.S. General Accounting Office. *Telecommunications: Characteristics and Choices of Internet Users.* GAO-01-345. Washington, D.C., February 2001.

WebTV, a relatively inexpensive device that provides Web access and e-mail may be easier to promote among low-income consumers than full-function personal computers. Also, basic public pay-per-use systems, such as simple e-mail or Web-browsing devices, may prove as valuable and profitable as public telephones were in an earlier period.

The development of community access points should be a priority. The development of pubic access points, such as community centers and public libraries, is important, and a variety of public and private efforts are already underway to remedy gaps in physical access. Community access centers (CACs) have become especially useful in the provision of access to groups with lower incomes and education levels, minorities, and the unemployed (see box, "Federal Action and Neighborhood Networks").[79] In addition, CACs are commonly bundled with education resources and therefore simultaneously address literacy issues.

Probably the most widely known and best-funded effort by the federal government to promote widespread access to the Internet is the so-called e-rate program, which directly subsidizes Internet access for schools, libraries, and rural hospitals. (See box, "The E-Rate Program.") While the program has been judged by many to be successful in helping to bring schools and libraries online, it has also been subject to significant criti-

79. U.S. Department of Commerce, Economics and Statistics Administration, National Telecommunications and Information Administration. *Falling Through the Net: Defining the Digital Divide*. Washington, D.C. November 1999. Executive Summary. *http://www.ntia.doc.gov/ntiahome/fttn99/contents.html.*

FEDERAL ACTION AND NEIGHBORHOOD NETWORKS

The Clinton administration's stated goals were to make every child technologically literate and connect every classroom and library to the Internet. To accomplish these goals, the federal government has initiated programs that range across an array of agencies, including the Department of Agriculture, the Department of Commerce, the Department of Education, and the Department of Housing and Urban Development (HUD). Within these agencies, efforts are concentrated in the areas of education, housing, and community development.

HUD's Neighborhood Networks initiative is an example of how the federal government is promoting access to the Internet through community centers. Launched in 1995, Neighborhood Networks supports the provision of technology-based resources for residents of HUD-assisted and –insured housing. As of December 2000, 644 centers were in operation and an additional 727 HUD properties were in the planning process.[a] The initiative focuses on providing computer, job and microenterprise training as well as job search assistance through public-private partnership.

HUD's primary role is to act as an information provider, but it provides only limited direct financial assistance for the centers. HUD teaches communities how to develop their centers and cultivate partners, and it shares the experiences of existing centers with developing ones. While exact Neighborhood Networks programming and operations vary across centers, the general model is reasonably consistent. The centers rely on donations for equipment and staff support and typically provide GED classes, literacy programs, and other educational programs. Importantly, the centers are being used to supplement ongoing community activities and social services. For example, some centers enhance their community health efforts by helping senior citizens explore Internet-based health-care resources.

a. "About Neighborhood Networks: A Neighborhood's Economic Engine". U.S. Department of Housing and Urban Development, Office of Housing—Multifamily. December 2000. *http://www.hud.gov/nnw/*.

THE E-RATE PROGRAM: CONNECTING SCHOOLS AND LIBRARIES

The Federal government subsidizes public and private schools, libraries, and consortia in their purchase of telecommunications services, Internet access, and internal networking equipment through the e-rate program. Depending upon the income level of a community, program discounts range from 20 to 90 percent.[a] E-Rate has been noted as an important element in encouraging communities to invest in technology and address digital literacy. In addition, the program, by essentially enlarging the potential market for services, provides an incentive for companies to build out broadband infrastructure to traditionally underserved regions.[b]

As more schools and libraries have begun to take advantage of the e-rate program, some are worried that communities will be excluded due to insufficient program funding. The program is limited to outlays of $2.25 billion annually, yet was expected to receive requests for funding of $4.7 billion in 2000.[c] The program has also been criticized for the confusing and burdensome nature of the application process.[d] Despite these concerns, a large number of beneficiaries have successfully used e-rate funds to address the digital divide.

Use of e-rate funds has differed across districts and generally reflects the unique situation of a community. For instance, the large, primarily poor, urban school district of San Bernardino, California has used $33,000,000 of e-rate funds to help connect 97 percent of its classrooms to the Internet. In contrast, the small, agriculturally based town of Rembrandt, Iowa used just $684 worth of funds to make its public library the town's first public point of Internet access.[e]

a. U.S. Department of Education, Planning and Evaluation Service. *E-Rate and the Digital Divide: A Preliminary Analysis From the Integrated Studies of Educational Technology.* DOC #00-17. September 2000. p. vii. *http://www.ed.gov/offices/OUS/PES/elem.html#technology.*

b. The Education and Libraries Networks Coalition (EdLiNC). *E-rate: Keeping the Promise to Connect Kids and Communities to the Future.* 10 July 2000. *http://www.edlinc.org/pubs/eratereport2.html.*

c. Peterson, "Net Dreams," p. 770.

d. EdLiNC. *E-rate: Keeping the Promise to Connect Kids and Communities to the Future* and Trotter, Andrew. "Rating the E-Rate." *Education Week.* 20 September 2000. p. 9

e. EdLiNC. *E-rate: Keeping the Promise to Connect Kids and Communities to the Future.*

cisms. As currently configured, e-rate subsidies can only be used for telecommunications hardware and services. This has led to underfunding of software applications and teacher training in the use of digital technologies.

In addition, funding for the program was built on an existing subsidy of universal access to telephone service and channeled through the Universal Service Fund, an accounting device that resembles a trust fund. This funding mechanism has guaranteed sufficient resources for its purpose. But, because it lacks integration with other funding for educational purposes, it can distort decision-making in local school districts and put an added burden on school administrators. It also distorts communications markets, because it taxes some services but not others.[80]

Elimination of the universal service fund tax and placement of the schools and libraries program in the discretionary portion of the budget for the Department of Education would eliminate distortions in both public and private decision-making. In addition, it would create more appropriate links between payment and financing of public goods and services and among competing educational priorities, including computer equipment and training. **CED supports the objective of equipping schools and libraries for the digital**

80. The Universal Service Fund has had the unrelated benefit of making telecommunications subsidies explicit rather than implicit, as they were previously.

age, but equipment must be accompanied by training. Sufficient funds should be made available to support a wider array of technology-related needs, including professional development and classroom software. In addition, such programs should be funded in ways that allow integration of decision-making for these and other educational purposes.

Access cannot be the only goal; it is useless without knowledge of how to use the equipment. To reap the advantages that the new digital technologies promise, people must be sufficiently computer and Internet literate. The rapid computerization of society suggests that computer and Internet literacy may be as important to individual success in the future as fundamental reading and writing skills have been in the past. One study suggests that up to 40 percent of the U.S. adult population is "illiterate" in terms of the skills necessary for a "knowledge economy."[81] As CED has shown in previous reports, the new economy is based on skills.[82] The wage premium paid to highly skilled information technology workers is evidence of their productivity, and it is likely to be a long-lasting feature of the economy. It is crucial, therefore, that computer-oriented education and workforce programs be extended, even for career paths that do not focus on mathematics, science, or engineering.

Computer and Internet literacy should be fundamental components of basic public education and workforce training programs. Individuals who enter the workforce without a basic familiarity with computers and at least rudimentary skill in navigation of the Internet will find themselves at a disadvantage similar to not being able to read or write.* Because an education should, among other goals, prepare students for work, K-12 curricula should emphasize not only the basic skills of reading, writing, and mathematics, but also computer competence.

The idea that our youth should be skilled computer users brings to the forefront issues about our current education system. The Internet seems certain to play a significant role in improving the delivery and assessment of education. A considerable amount of evidence suggests that today's teachers have insufficient training with computers and therefore are unsuited to supply such education. **CED recommends that both new and continuing teachers receive comprehensive professional training in the use of computers and the Internet for education.** While a majority of teachers have some facility using computers, nearly two-thirds feel unprepared to use technology in their teaching. Unfortunately, simple competence with technologies does not translate into effective classroom use. A recent report of the Web-based Education Commission noted several deficiencies in the training of today's teachers. Both initial teacher training with computers and the Internet and continuing education (to parallel continuing innovation) are lacking. In addition, schools are neglecting professional development needs when assigning resources from their technology budgets. The result is training that is far from comprehensive, too basic, and too generic. The Commission also highlighted differences in training practices favored by private businesses and educational institutions. Unlike employees of many private firms, teachers are given little paid training, are not rewarded or reimbursed for training, and are given insufficient on-site technical support.[83]

State and local communities are also addressing issues posed by the movement

81. Pont, Beatriz, and Patrick Werquin. "Literacy in a Thousand Words." *OECD Observer.* 2 November 2000.

82. CED, *New Opportunities for Older Workers,* 1999 and *Reforming Immigration: Helping Meet America's Need for a Skilled Workforce,* 2001.

83. Web-based Education Commission. *The Power of the Internet for Learning: Moving from Promise to Practice.* December 2000. pp. 41-43. *http://www.webcommission.org.*

*See memorandum by THOMAS J. BUCKHOLTZ (page 63).

towards a digital economy, independent of federal initiatives. Across the country, numerous communities have developed programs to increase digital literacy, provide access, and promote use of new technologies. LaGrange, Georgia and Blacksburg, Virginia are two of the many communities carrying out interesting experiments (see box, "Bridging the Divide Community by Community"). These and other towns have found ways to make the Internet more accessible, user-friendly, and often part of everyday life. **We encourage state and local communities to experiment with Internet-based programs and integrate digital technologies into programs that meet traditional economic and social objectives.**

Non-government entities are also heavily involved in digital divide initiatives. Private foundations and nonprofit organizations are acting as information clearinghouses, philanthropic groups are making substantial financial contributions, and grass-roots groups are bringing plans into action. Many private corporations are involved in initiatives to extend Internet access and computer training to

BRIDGING THE DIVIDE COMMUNITY BY COMMUNITY

Many communities have taken on large-scale efforts to bridge the digital divide. The following are illustrative examples of how two communities have approached the issues.

LaGrange, Georgia. The city was among the first in the United States to bridge the digital divide by offering free Internet access to all of its cable subscribers. With a population of 27,000, the city has approximately 11,000 household cable subscribers that are eligible for LaGrange Internet TV (LITV). LaGrange even provides financial support for citizens who cannot afford the $8.95 monthly cable fee.[a] LITV includes five e-mail accounts per household and "Surf Watch," a parental control feature that filters violence, sex, or other objectionable material. The city plans to use the widespread access to help citizens learn keyboarding, e-mail and surfing skills, complement the local school curriculum, establish a community network, enhance dialogue between citizens and government, and support local e-commerce.[b]

Blacksburg, Virginia. Through a unique public-private partnership and several years of concerted effort, the town of Blacksburg has achieved the highest per capita use of the Internet in the world—about 87% of its 38,000 residents use the Internet on a regular basis. The integration of a digital network into the community began with an experiment in 1993 when the Blacksburg Electronic Village (BEV)—a partnership consisting of Virginia Polytechnic Institute and State University, the Town of Blacksburg, and Bell Atlantic-Virginia—made the Internet widely accessible via no-charge dial-up connections and provided free email accounts. After developing the town's market, BEV turned over many of its technical operations to the private sector. These efforts provided momentum for expansion of the town's network, resulting in high-speed connections for all 21 Blacksburg schools and use of the Internet for commercial purposes by nearly 75 percent of local businesses.[c]

a. Lukken, Jeff, Mayor of LaGrange, GA. Speech at CED luncheon, New York City, NY, October 6, 2000.

b. Lukken, Jeff. "LaGrange Internet TV Initiative Announcement." City of Lagrange. 22 March 2000. *http://www.lagrange.net/*.

c. Kongshem, Lars. "Wired Village." Electronic School. September 1997. *http://www.electronic-school.com/* ; "Smart Communities Profiles: Blacksburg, Virginia." Government of Cananda. 1999. *http://collectivitesingenieuses.ic.gc.ca/*; and "Blacksburg Electronic Village – About the BEV." Virginia Polytechnic Institute and State University. 1999. *www.bev.net/project/brochures/about.html.*

communities.[84] In April 2000, President Clinton announced that over 400 companies and nonprofit organizations had signed a "National Call to Action" to bring digital opportunities to youth, families and communities. In addition to highlighting efforts of the Corporation for National Services (AmeriCorps) to provide technical support and other services through volunteers, the administration noted efforts by:

- Yahoo!, which invested $1 million to help enlist volunteers with high-tech skills to work on technology-related projects;
- 3Com, which partnered with the YWCA to launch TechGYRLS, a program that will offer training to girls aged 14-16; and
- The American Library Association, which is working to expand "information literacy" in communities across the country.

Among the numerous private-sector programs that fund digital divide initiatives, some of the most interesting are using the model introduced to the United States by Ford Motor Co. and Delta Airlines. These and other companies have instituted intra-company programs that offer PCs and Internet service to all employees at zero or significantly reduced cost. (See box, "Empowering Employees with PCs and Internet Access.") The roots of these policies and programs appear in the Swedish Home PC Initiative, which involves both public and private subsidies of personal computer ownership. In Sweden, payments towards PCs are publicly subsidized by allowing workers to lease computers from their employers with pre-tax earnings. An employer can further subsidize a worker's computer payments by contributing additional funds on the worker's behalf. Overall, participating firms offer PCs to employees at 30-50 percent below market rates. In 1998, the program contributed to the supply of 550,000 company-provided computers and raised Sweden's computer penetration rate to 48.5 percent.[85]

Because numerous digital divide programs already exist, while others are being proposed and developed, it is important that appropriate resources be devoted to their synthesis and evaluation. The proliferation of public and private programs to increase access and Internet literacy can provide many benefits. In this early phase of the development of networked technologies, such diversity brings results more rapidly and supplies valuable experimentation. However, as the Internet, access and literacy programs, and even the target population mature, it becomes important to find out what works and to make adjustments in program goals. For example, as individual ownership of Internet-enabled devices grows, fewer resources may be needed for publicly financed community centers. Most important, programs should be evaluated to establish their effectiveness so that others can copy effective programs and drop ineffective ones. In some instances, programs may need to be modified to meet the unique needs of individual communities or eliminated when they no longer serve a useful purpose. Over time, priorities may shift from initial installation of equipment or establishment of basic training programs to equipment maintenance and upgrade and the development of more complex training programs.

Content to Attract Users

Closing the digital divide depends in part on the existence of valuable content on the Internet, such as job notices, government services, low-priced goods, other important

84. The number of initiatives is too large to recount here. Some prominent examples can be found at *www.digitaldividend.org*, *www.digitaldividenetwork.org*, and *www.powerup.org*.

85. "Government Case Studies: Swedish Government, Sweden opens the home PC market, and closes the skill gap". Microsoft Industry Solutions, 13 April 1999. *http://www.microsoft.com/europe/industry/government/casestudies/1390.htm* and "Gates Praises Swedish Home PC Initiative." Microsoft PressPass. 5 February 1999. *http://www.microsoft.com/PressPass*.

EMPOWERING EMPLOYEES WITH PCS AND INTERNET ACCESS

Throughout 2000, several companies announced that they would begin offering PCs and Internet access to their employees at subsidized rates. Ford Motor Co., Delta and American Airlines, and Compaq have all introduced such programs. Ford, the first in a unionized industry to announce such a large-scale program, is making fully equipped PCs as well as Internet access (ISP subscription) available to all of its 350,000+ employees for only $5 per month. Using a somewhat different model, Compaq's Employee Purchase Program allows its employees to buy significantly discounted computers and promotes ISP subscriptions through a $15 monthly paycheck subsidy.

As it becomes increasingly difficult for employers to retain workers, a personal computer program can be helpful, just as gym memberships and free lunches have been in the past. However, employee retention is only a portion of why companies are instituting these programs. Providing workers with continual access to new technologies in their homes is also, if not more importantly, a tactic in workforce development. Research shows that employees are likely to train themselves on personal computer applications, consequently making them more productive workers.[a] CEO of Ford, Jac Nasser, noted that, "Having a computer and Internet access in the home will accelerate the development of these [technology] skills, provide information across our business and offer opportunities to streamline processes."[b]

When viewed as an investment in the workforce, a company's program costs are substantially reduced. Ford, for instance, is making the program possible through a partnership with PeoplePC. PeoplePC offers similar packages to private consumers at $25 per month, and has likely reduced its price to some corporations to as little as $10 per employee per month.[c] After deducting the small fee paid by employees from program costs, and then adding gains from a more productive worker, the company's cost approaches zero, if not yielding a positive return.

a. "Employees Increasingly Being Offered Free Home PCs." The Associated Press. 8 March 2000.

b. "Ford Unleashes Power of the Internet for Employees Around the World." Ford Motor Company Press Room. 3 February 2000. *http://www.ford.com.*

c. Dix, John. "Ford and Delta see the Light." Network World Fusion. 14 February 2000. *www.nwfusion.com.*

information, and even entertainment. Such content motivates private efforts among all income classes to gain access, either by purchasing a personal computer or using public facilities.

Developments in the personal computer, communications, and Internet service provider markets all lead to lower prices and to the conclusion that in the near future cost may not be the primary cause of limited access. The availability of entry-level equipment and low-priced Internet connection services indicate that in many cases the lack of access may in part be a conscious choice by the consumer. Certainly, low-income consumers, no less than high-income ones, make choices in what they purchase based on the perceived utility of products and services. At present, other electronic appliances, such as VCRs have vastly higher penetration rates (84.2 percent) among all households than do personal computers. And, while the rate of television viewing is fairly uniform among all households regardless of income, Internet access is highly skewed towards upper income households.[86]

Useful applications, whether professional, personal, educational, governmental, or commercial, are key to generating demand that will motivate people to gain Internet access and training. Market forces will ultimately

86. U.S. Department of Commerce, Economics and Statistics Administration, Census Bureau. *Statistical Abstract of the United States.* P. 581, Table No. 921-922.

provide much of the impetus to generate content. But as noted above, delays can be costly. **CED encourages private and government providers of Internet content to address the interests of the low-income population that thus far have been excluded from the Web.**

Low-income individuals do not use the Internet in part because they do not think that its content is worth investigating. Several businesses have responded and are already pursuing the markets of ethnic groups that have significant low-income populations. For example, BET Holdings Inc., StarMedia, and Community Connect have all had reasonable success in the African-American, Latino, and Asian-American markets, respectively. Their sites, and those of similar firms, provide minority-oriented content that is often "underplayed" by mainstream media.[87] However, some sites have also alienated potential users because the content and technologies of their sites have surpassed the equipment capabilities of their users.[88] While some of the newest and most exciting content can only be delivered via broadband, only a very small proportion of disadvantaged populations actually have access to this level of equipment and service.[89] Continued experimentation and a wider array of offerings may be necessary to engage and serve these populations.

Federal, state, and local governments should provide their internal and external services electronically and promote their use. While we expect the private sector to invest heavily to provide content, it will also be necessary for government to do more to promote Internet access to public services. Greater use of Internet technology by governments can play the dual role of improving existing anti-poverty strategies and providing motivation to get online. The existence of government services online can be a powerful draw. At the very least, government services, both those that address poverty and those that do not, can be made more accessible through digital networks. Recently issued regulations also require federal government sites to be more accessible to disabled users.[90]

Some efforts along these lines are already under way within the United States. The Federal government and most state governments already have a great deal of content online; there are 27 million Federal agency Web pages alone. [91] (See box, "FirstGov Makes Sense of Government.") Informational content, such as the address of a government office or description of an after-school program, is common. Also, materials that in the past could be obtained only in print, from statistical reports to various application forms, are now often available through government websites. While such electronic services are important advances, they only begin to take advantage of the Internet's full capacity.

In select areas of government, the Internet allows almost complete electronic service delivery. For instance, the Postal Service allows customers to purchase stamps via its website and the Internal Revenue Service encourages taxpayers to file their returns electronically. Providing these electronic services reduces government costs and can increase convenience for users. In Arizona for example, a driver's registration renewal takes only two minutes to complete online and saves about $4 per electronic transaction. Although only 15 percent of

87. Cha, Ariana Eunjung. "Ethnic Sites Grow in Popularity." *The Washington Post.* 28 December 2000, p. E6.

88. Li, Kenneth. "Harsh Urban Realities." *The Industry Standard.* 11 August 2000.

89. Only about 4 percent of all residential Internet connections are through broadband. See Crandall, Robert W. "Bridging the Divide Naturally." *Brookings Review.* Winter 2001. p. 41.

90. Delio, Michelle. "Fed Opens Web to Disabled." *Wired.* 21 December 2000. http://*www.wired.com.*

91. "President Clinton Launches FirstGov: A Single, Easy-to-Use Website for Government Services and Information." The White House Press Releases. 22 September 2000. http://*www.whitehouse.gov.*

FIRSTGOV MAKES SENSE OF GOVERNMENT

The U.S. Government has millions of Web pages and thousands of websites. For the average citizen, who may not be familiar with government's institutional framework, navigation through seemingly endless numbers of independent websites can be extremely arduous. In response to these concerns, the U.S. Government launched FirstGov (www.firstgov.gov), a "one-stop" online portal to all government sites. FirstGov effectively removes boundaries between agencies and the need for users to understand institutional frameworks; it allows users to search all of government's online resources from a single site and navigate by topic rather than agency.

FirstGov is a remarkable improvement to a system that once held great potential for frustrating citizens and alienating users. It has even been suggested that improvements in the application of government information technology like FirstGov may eventually reveal possibilities for improving government in the offline world. For instance, by providing a unified portal to government services and content, the opportunity for identifying governmental inefficiencies (redundancy or overlap) should be more apparent. Further, objectives that cut across jurisdictional agency boundaries could be rendered more effective and manageable.[a]

a. It should be noted that while FirstGov does remove surface boundaries, it does not actually consolidate any functions of government. The term portal, as it is used, means that it acts as an initial starting point for locating government resources and helps users identify appropriate agencies or offices.

its renewals are currently processed online, the state's motor vehicle department is saving about $1.7 million per year.[92] Of all government services, however, only a fraction is available by electronic means. Undoubtedly, additional services could be offered electronically and existing services can be promoted. Governments should also continue to improve their internal operations by applying new information technologies. In some areas, governments may be justifiably hesitant to bring a service online because of privacy or security concerns. In other areas, though, such expansion simply needs to be given priority and agencies need reasonable room for experimentation.

Global Issues

A global divide, perhaps more significant than the domestic digital divide, is forming between developed and developing nations. This divide is primarily a byproduct of poverty. For poor nations, the digital divide stands alongside an array of other economic and social concerns. For many developing countries, the obstacles to closing the digital divide begin with a lack of basic infrastructure to support digital electronic networks and of sufficiently strong institutions to foster the development of Internet-based communication and commerce. The Internet's potential rewards are greater inclusion in global commerce and higher incomes; the penalty for failure is continued poverty and further isolation.[93]

In recognition of these obstacles, the July 2000 G-8 Summit in Okinawa focused on the global digital divide. On the basis of an analysis of the problem and action recommendations developed by a task force of the World Economic Forum, the Summit adopted a program entitled, the "Okinawa Charter on

92. "Government and The Internet: The Next Revolution." *The Economist.* 24 June 2000.

93. One analysis estimates the potential gains from effective new policies to yield GDP increases of $100 billion for developing countries in Asia, $45 billion in Latin America and a similar amount for Africa. See, Mann, Catherine, Sue Eckert, and Sarah Cleeland Knight, *Global Economic Commerce*, p. x.

Global Information Society." This program includes:

- A coordinated G-8 effort to assist developing nations;
- Fostering policies that will facilitate the expansion of the Internet in developing countries;
- Improving connectivity and access to digital networks;
- Building human capacity; and
- Participation in global e-commerce.[94]

In our view, the priorities of the Okinawa Summit are correct; developing countries should proceed along several fronts simultaneously to expand their access and use of the Internet. **Global efforts should proceed with a three-pronged strategy. First, developing countries should help themselves by establishing the basic institutional groundwork for sustained economic growth. Second, along with international aid organizations, they should address the same access and literacy issues that are being pursued in the United States. Third, they should improve the technological capabilities of medium and smaller businesses to engage in international electronic commerce.**

Basic institutions. The Digital Opportunity Taskforce (DOT Force), created at the G-8 Summit in July 2000, provides a comprehensive view of the many actions that developing countries need to take to become active participants in the new digital economy. As emphasized in the DOT Force program, developing countries face the task of improving the basic institutions of society to promote both a strong economy and good government. In essence, this task is no different than the steps they would need to take even if there were no Internet. We emphasized in a past policy statement that those steps start with good governance and pro-competitive economic policies.[95]

Access and literacy. The attainment of access to the Internet and technological literacy is as important for developing country populations as for disadvantaged populations in the United States. Many initiatives are currently underway to spread up-to-date computer and Internet knowledge and hardware around the world. (See box, "Private Efforts to Support Access and Training in Developing Countries.") As recommended for domestic efforts, global programs should focus on basic digital applications, public access points, and literacy.

International e-commerce. Just as important as the promotion of basic technological literacy is the need for programs to help smaller businesses get online and participate in the global economy. E-commerce allows vendors of isolated communities to develop new customer bases and business contacts. For example, the website of the Robib village in Cambodia allows one not only to order handmade scarves, but also to view scenes of the village, receive news of the village school and telemedicine projects, and get other information on village activities.[96] Such village vendors, however, are still rare. Most lack the ability, either because of insufficient equipment, training, or other support, to connect to potential global customers.

Although the Peace Corps and AmeriCorps are both exploring ways to integrate technology into their agendas, little emphasis has thus far been placed on facilitating efforts by smaller businesses to get online. CED believes there is an opportunity for many communities and skilled individuals to

94. *Okinawa Communique.* The Government of Japan. 23 July 2000. *http://www.g8kyushu-okinawa.go.jp/e/documents/index.html.*

95. See CED, *Improving Global Financial Stability,* 2000.

96. The Robib village (*www.villageleap.com*) was featured in the article Markoff, John. "Fast-Changing Genie Alters the World." *The New York Times.* 11 December 2000.

PRIVATE EFFORTS TO SUPPORT ACCESS AND TRAINING IN DEVELOPING COUNTRIES

The following descriptions highlight just a few of the many efforts currently underway to bridge the global digital divide. The initiatives, like domestic ones, often address multiple issues such as access, literacy and even Internet commerce.

Cisco Systems Networking Academies are designed to teach high school and college students how to design, build, and maintain computers. The venture, which initially started as a U.S. domestic program, is based upon a cooperative between Cisco Systems and educational institutions throughout the world. Cisco provides lab equipment to regional academies, which in turn support local academies with program delivery and recruitment. Local academies purchase equipment from Cisco resellers for approximately $10,000.

Academy programs provide students with 280 hours of hands-on Internet and technology literacy in education in over 6000 locations worldwide. As of February 2001, there were academies in 110 countries including El Salvador, Rwanda, Bosnia, and Vietnam.[a]

Hewlett-Packard's World e-Inclusion is a new business strategy that extends HP's business focus to low-income markets by establishing partnerships with nonprofit, health, finance and other community organizations. For 2001, HP has a goal to sell, lease, or donate $1 billion worth of products and services to as many as 1000 villages throughout Africa, Asia, Central and Eastern Europe, and Latin America. It hopes that the effort will broaden developing countries' access to social and economic opportunities, including sustainable business ventures, through the application of digital technologies and global collaboration.

StarMedia Foundation's IT Training Program teaches youth in Latin American countries basic Internet and computer maintenance skills in a 3-month course. Star Media also operates one of the leading websites geared towards the interests of Hispanics.

a. "Cisco Education Ecosystem: Networking Academy – Statistics." Cisco Systems. 14 February 2001. *http://www.cisco.com.*

benefit from a program that would help to provide technical assistance to e-commerce enterprises in developing nations. Such a "Digital Corps" could rely on volunteers from high-technology companies to serve brief tours in developing country sites. Because the Internet allows continued distanced communication and support, such tours can be of relatively short duration. Support for a "Digital Corps" program could help U.S. corporations recruit U.S.-based staff who have an interest in such volunteer efforts. The Volunteer Service Organization (VSO), an international development charity of British origin, is currently pursuing opportunities to partner with global companies such as McKinsey and Accenture (formerly Andersen Consulting).[97] Another volunteer-based organization, Geekcorps, is committed to building businesses on the W eb for communities around the world. **CED urges larger businesses to consider the implementation of volunteer-based "Digital Corps" programs to support small business development in developing nations.**

97. Heuer, Steffan. "A New Lease on Work." *The Industry Standard.* 4 December 2000.

CONCLUSIONS

A gap in Internet use between higher and lower income populations will always exist. We expect, however, that over time the current gap will narrow due to the combination of less costly equipment and services, simpler user operation, more attractive content (including the provision of government services), and the success of numerous public, private, and nonprofit programs to provide access to the Internet and training in basic computer and Internet navigational skills. To be successful, these programs must not become a faddish diversion from core efforts to raise education, skills, and incomes of the target populations. Digital divide programs should be integrated with traditional anti-poverty efforts and digital technologies should be employed to improve the performance of those programs. The same holds true for international efforts. Developing country governments should redouble efforts to improve local institutions, physical infrastructure, and market incentives; they can use digital tools to help them do so.

MEMORANDA OF COMMENT, RESERVATION, OR DISSENT

Page 2, JOHN DIEBOLD, with which JAMES Q. RIORDAN has asked to be associated

In proposing policy structures relevant to a digital age, it is important that the changes beginning to take place all about us not be viewed in isolation from either of the two other technologies already driving change—biotechnology and materials technology—nor from the role of the user in applying digital and other technology, and in so doing recasting older business models and even the definition of industries.

The Internet is a good example of the economic importance of technologies often being determined by the older industries changing themselves in the application and use of new technologies. In many ways, these applications are even more important to our future than the technologies themselves. But the Internet is neither the beginning nor the end form of information technology (IT). It is one important step ahead.

Thus, public policies for a digital age should be developed in a wider perspective than purely IT and not on the assumption that the United States is going to remain the driving force in digital or any other technology.

We must understand that while the United States today leads in all three of these fields that our leadership is not God given and will depend upon our ability to pursue imaginative policies that develop our human resources and produce and maintain an environment supportive of risk and rewarding of change.

We can already see a new international pattern developing, in the case of India for example—both in the estimated 200,000 Indians at work in Silicon Valley, many in key executive positions contributing to U.S. GNP, and in the extensive development of new companies in the subcontinent itself, contributing to India's GNP. This is only a foretaste of what we can expect as China begins seriously to address its potential in a knowledge-based age. The United States must look hard at an increasingly competitive situation for leadership in these new fields.

We must do all we can to determine what conditions have led to today's U.S. leadership and to do all possible to strengthen these conditions and to correct negative conditions. Better understanding of future conditions necessary to continue leadership is attainable but not receiving as important attention as it should. Imagination and drive in the application of invention is often of equal importance to the technology itself.

The meaning of all of this to U.S. policy must surely be to focus on the development of public policy to be aggressive in understanding and in maintaining the conditions necessary to stay ahead. Direct targeting of technologies is rarely rewarding. Technology moves faster than policy. What we can do is to create a supportive environment for entrepreneurs and to focus on education, not only of high-level scientists but for workers with appropriate mathematical and computational skills, so that immigration will not always be a limitation on science-based growth. Development of our own human talent must be more extensive than to date.

Page 4, EDMUND B. FITZGERALD

With respect to privacy and security matters, I believe the statement could go further. While we should support the ability of business, conditional on appropriate disclosures to the public, to develop and own valuable marketing data which undoubtedly contributes to economic efficiency, I suggest that it is time to review the dramatic growth in the commercial use of social security numbers as individual identifiers. The details of any remedies or policy changes, such as prohibiting the denial of a commercial relationship based on a refusal to reveal the number, a prohibition on further disclosure of such numbers, or a minimum security standard for numbers thus obtained, are not for this statement. However, this issue should be kept in sight as the issue of individual privacy and security is addressed.

Page 5, EDMUND B. FITZGERALD

I strongly support this policy statement and commend the CED for its recommendations regarding competition, innovation, the protection of intellectual property, and privacy and security in the digital age. However, I am concerned by the discussion of the digital divide which seems intent in carving out unique solutions for a single facet of the global income gap resulting from factors rooted in poverty such as inadequate education, poor skill training, disrupted families, decaying communities, and in the case of poor counties, inadequate economic infrastructure. The CED has a long history of recommending solutions to these broader issues, and I am concerned that high-lighting just this one economic outcome could siphon resources and energy away from core programs aimed at the underlying economic issues. As Ms. Carly Fiorina, chairman of Hewlett-Packard, so aptly expressed at the World Economic Forum meeting in Davos recently, "companies should seek to tackle the divide in their own self-interests… because today's poor countries are the potential growth markets of tomorrow."

Page 22, CHARLES R. LEE, with which IRWIN DORROS has asked to be associated

The Statement correctly notes that regulation of broadband is deterring investment and adversely affecting consumer choices. The Statement urges that cable and telephone technologies should be allowed to compete "without regulatory distortions". The Statement concludes, however, that "[r]egulators should adopt a wait-and-see approach, rather than act preemptively" to equalize the regulations applicable to cable and telephone technologies. The Statement recommends "removing restrictions" that apply most strictly to telephone companies as a goal to "move toward" but with no particular urgency.

With capital fleeing our markets, we cannot "wait and see" how things develop under distorted regulation. We must act now to eliminate regulatory barriers to broadband deployment. George Gilder argued recently that broadband deployment requires immediate deregulation:

> "The problem is that DSL is risky and hard. Some studies have reported that 50% of DSL hook-ups fail on the first try. Even amicable relationships between CLECs and Bells are a software nightmare, with a different billing and provisioning system for each service provider. Such difficulties render DSL not a matter of will and politics but of technical and entrepreneurial risks. Companies are forced to invest heavily in research and engineering personnel, but have few opportunities for outsized rewards.
>
> That's because Congress and the FCC set up an awkward scheme in which everyone got a piece of the action but no one could

make any money. Often barred from carrying signals across long-distance boundaries, the Bell hand off traffic to other long-distance carriers. CLECs rent lines from Bells. And Internet service providers end up doing costly customer service and marketing to get people signed up in the first place. In short, as many as four parties routinely battle for low- or negative-margin chunks of $40-monthy bills.

By summoning new competition and then mandating the rivals cooperate in open access, the government effectively privatized the risks and socialized the profits. By December, the Bells had signed up 1.8 million users and the CLECs 600,000, combining for just 2.4 million DSL subscribers among the 120 million or so copper-connected U.S. homes and businesses.

Cable modems, with 4.9 million subscribers at year-end, have done better, but AOL Time Warner and AT&T, America's two cable behemoths, are bogged down by the same open-access nonsense that plagues DSL. Over the past two years, AT&T CEO Michael Armstrong acquired $140 billion in cable assets while watching his company's $184 billion market capitalization plummet to $81 billion.

…This regulatory morass treats the most dynamic, technically creative, and transformative industry in the world economy as if it were some static commodity market for corn or pork bellies.

…No Internet advantage can last more than a couple of years. In 1999 and 2000, over 150 million kilometers of optical fiber were laid worldwide, enough to stretch to the sun. …But none of these deployments, including fiber to the home, can flourish under a regime of forced sharing of entrepreneurial assets and profits.[1]

Page 29, CHARLES R. LEE, with which IRWIN DORROS has asked to be associated

In the discussion of intellectual property, the Statement calls for promotion of copyright law but omits any reference to the Digital Millennium Copyright Act, which balances the interests of copyright owners, service providers, and users. There is no reason for deviating from this industry-agreed compromise.

Page 36, CHARLES R. LEE, with which IRWIN DORROS has asked to be associated

In the discussion of privacy, the Statement should make explicit that creation of a federal privacy law should preempt conflicting state laws.

Page 47, JAMES Q. RIORDAN

I agree that we should address the poverty education gap. In addition, we face a generational gap that needs to be addressed. We will likely continue to face that gap as technological change continues at a rapid pace and life expectancy increases. We should call for initiatives to provide suitable lifetime education that will maintain the productivity of our citizens for the decades that they will live and work beyond the traditional formal education of their youth.

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1. Gilder, George and Bret Swanson. "The Broadway Economy Needs a Hero." Wall Street Journal. 23 February 2001. p. A14.

Page 51, THOMAS J. BUCKHOLTZ, with which JAMES Q. RIORDAN has asked to be associated

The digital divide recommendations address the desirability for people to acquire computer literacy and other, generally unspecified skills. The report also discusses needs to improve technology. The first of the following two lists more completely identifies skills required for success in business-like activities.[2] The second list provides a road-map for technology suppliers to improve their products and services. The two lists should be viewed in parallel. The first represents the demand side of the information-proficiency marketplace; the second represents the supply side. For both lists, success at any step depends on strength at lower steps.

Demand-side skills

- Making, communicating, and implementing decisions.
- Collaborating and coaching.
- Creating, evaluating, and using insight.
- Finding, filtering, and assessing the trustworthiness of information.
- Creating and working with routine data and transactions.
- Working with technology ("computer literacy").

Supply-side technologies

- Provide products and services that make decisions for people.
- Provide tools that help people collaborate and coach each other.
- Provide tools that help people create and understand the applicability of new concepts.
- Make available information that people need and can use easily and successfully.
- Make available data that people need, can use easily and successfully, and can integrate across dissimilar sources.
- Produce platform technology that serves people's needs, is easy to learn and use, and is widely affordable.

2. These lists are drawn from Thomas J. Buckholtz, *Information Proficiency: Your Key to the Information Age*, John Wiley and Sons, and Thomas J. Buckholtz, "Current and Future Value," *Today's Engineer*, Volume 3, Number 3, 3rd Quarter 2000, IEEE-USA.

OBJECTIVES OF THE COMMITTEE FOR ECONOMIC DEVELOPMENT

For nearly 60 years, the Committee for Economic Development has been a respected influence on the formation of business and public policy. CED is devoted to these two objectives:

To develop, through objective research and informed discussion, findings and recommendations for private and public policy that will contribute to preserving and strengthening our free society, achieving steady economic growth at high employment and reasonably stable prices, increasing productivity and living standards, providing greater and more equal opportunity for every citizen, and improving the quality of life for all.

To bring about increasing understanding by present and future leaders in business, government, and education, and among concerned citizens, of the importance of these objectives and the ways in which they can be achieved.

CED's work is supported by private voluntary contributions from business and industry, foundations, and individuals. It is independent, nonprofit, nonpartisan, and nonpolitical.

Through this business-academic partnership, CED endeavors to develop policy statements and other research materials that commend themselves as guides to public and business policy; that can be used as texts in college economics and political science courses and in management training courses; that will be considered and discussed by newspaper and magazine editors, columnists, and commentators; and that are distributed abroad to promote better understanding of the American economic system.

CED believes that by enabling business leaders to demonstrate constructively their concern for the general welfare, it is helping business to earn and maintain the national and community respect essential to the successful functioning of the free enterprise capitalist system.

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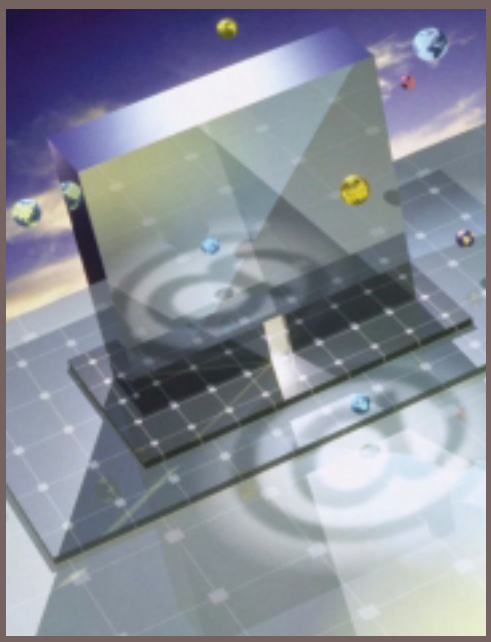

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