White Paper: Summary of Discussions at a Planning Meeting on the Effects of Information Technology on the Role and Authority of Government

National Research Council

March 26-27, 1997

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The Effects of Information Technology on the Role and Authority of Government

Abstract

Information technology evolves today at a very rapid rate. Such rapid evolution means that the range and the sophistication of what people can do with information technology increases, and further that small organizations and even individuals have access to quite powerful computing and communications capabilities. In this environment, it is commonplace to observe that national governance today is affected by increasingly ubiquitous international deployments of information technology in areas relating to public safety, national security, economics, foreign policy, and maintenance of national cultures and identity.

A planning meeting held in Washington, DC under the auspices of the Computer Science and Telecommunications Board (CSTB) of the National Research Council concluded that the CSTB should undertake a project that would examine the impact of modern information technologies on governance. This project would have two goals. The first would be to develop an analytical taxonomy for discussing the relevant issues - what are the issues, why are they important, how are they affected by information technology, and how policy may affect technology development, deployment, and use. Illustratively, such a taxonomy might be arranged around the impact of information technology on areas in which governments generally exercise authority, including national security and law enforcement, control over national community and territory, promotion of economic welfare, and the maintenance of national identity, community, and culture. A second goal is to address anticipated concerns of U.S. policy makers, perhaps by examining how the traditional levers through which governments affect national life and civic activities are affected by the widespread diffusion of information technology. Of course, in examining the impact on traditional levers of influence, the study would address possible new levers enabled or necessitated by information technology.

Introduction

With the intention of examining the feasibility and utility of a study on the impact of new developments in information technology on the effectiveness of traditional approaches to the exercise of national sovereignty, the Computer Science and Telecommunication Board (CSTB), with input from the Office of International Affairs (OIA) hosted a meeting on March 26-27, 1997 to seek advice on the issues that such a study might address. Appendix A contains a description of both CSTB and OIA.

The meeting was chaired by Kenneth H. Keller of the University of Minnesota and the Council on Foreign Relations. Meeting participants (Appendix B) were drawn from a broad range of professional backgrounds, including international relations, economics, law, communications, education, and information technology. The meeting agenda is reproduced in Appendix C.

Participants endorsed the concept of a CSTB study that would identify the areas in which developments in information technology are likely to affect the role and authority of government. The thrust of the study would be to link specific technological developments to specific aspects of U.S. government activity that will require or would benefit from changes in policy or practice. The participants believed that, by linking technical and policy issues, such the study would contribute in a useful way to our understanding of the connection between information technology and governance. Furthermore, there was a broad consensus that the National Research Council was especially well-positioned to undertake a task of this sort.

This paper documents the key points made at the meeting. Where appropriate, it draws on presentations by Hal Varian on the impact of global telecommunications and information processing on micro- and macro-economic policy, Bruce Berkowitz on security issues and information technology, Lawrence Grossman on the transfer of power to non-government actors, and James Duderstadt on a number of institutional and educational structures and processes affected by information technology.

The Technical Context

The technologies underlying the information revolution are evolving at a very rapid rate, with two consequences. One is that both the range and the sophistication of what people can do with information technology are increasing dramatically. The second is that the cost per unit of capability is dropping rapidly. Consequently, deployments of highly capable (even if not state-of-the-art) information technology are occurring on a large scale in nations that have previously been unable to afford them. In addition, dropping costs mean that small organizations and even individuals have access to quite powerful computing and communications capabilities.

The technologies of importance range from those that focus on the gathering of information (local and remote sensors, signal receivers and interceptors, image recorders, chemical and biological detectors and analytical tools) to those that allow the storage, filtering, reorganization, analysis and use of massive volumes of data in short time frames (microprocessors and computers), to those that communicate data in increasingly large quantities at increasingly fast rates. As many observers have noted, each of these subsets of technologies is empowering, but the most significant changes arise from synergistic interactions between them. For example, the enormous amount of raw data on land vegetation gathered by satellites gain enormous value when they can be manipulated by computers to yield information on land use changes over time and/or communicated to environmental scientists around the world for testing theoretical models or signaling large-scale ecological changes.

Computational power at low cost gives a much wider range of actors the same capacity to analyze information in real time as governments have. Databases become more accessible and useful when powerful computer-based search tools can be employed with them; indeed, computationally-transformed databases add sufficient value to the original data that such databases are often assigned intellectual property rights.

Communications technologies are of special concern because they enable trans-border as well as domestic information exchange. The wider proliferation of highly capable communications technology means that large volumes of information cross national borders much more easily and at much faster rates than in the past. Clearly, the Internet is a major element in this new communication environment, but it is only one of many. Other networks ("private intranets" and single purpose networks) are proliferating and are likely to continue to do so because of the added reliability, availability and security they provide. Furthermore, a number of other technologies-wired and cellular telephony, facsimile, direct broadcast satellites, to name a few-supplement Internet-like communications, with various kinds of bi-directional and uni-directional information flows.

The major changes in the patterns of development of information technologies over the past several decades are also significant. In the more than forty years following World War II, the United States government played an activist role in their development, driven by military competition with the Soviet Union. In this, as in other areas of technology, government-supported projects led the way, with diffusion of the

resulting technologies to commercial applications taking place through "spin-off." See, for example, Alic, John A. et al. Beyond Spin-off (Boston: Harvard Business School Press, 1992). Similarly, the early development and expansion of the Internet was undertaken to support activities of the Departments of Defense and Energy, NASA, and the National Science Foundation. Its expansion to wide commercial use was a later development.

Today, the government is a less important player. With the end of the Cold War, it has reduced its role generally in technological development and that has certainly been reflected in reduced government funding for information technology products. Moreover, the rapidly growing commercial market gives the private sector major advantages as well as a major stimulus. The private sector can make investments, try a wider variety of new approaches, and respond to market signals more easily than the government. It can enter into alliances and otherwise draw on non-American capabilities more easily than the government. Thus, in many ways, commercial technological advances precede and lead to government adoption and the government is considerably less able to influence the direction of information technology development.

Although information infrastructures are global in many respects, and information technologies are spreading throughout the world, there are wide variations in the extent of deployment. Certain newly industrialized countries, such as Singapore, pride themselves on the sophistication of their infrastructures and claim (justifiably) to be more advanced than the United States in that respect. However, a large fraction of the world lacks access to even basic telephone service. On the other hand, many less developed nations, unburdened by an existing communication infrastructure with which new installations must be integrated, can "leap-frog" the current twisted pair network configuration of developed nations and are doing so, rapidly moving to rather sophisticated installations.

These variations in the extent of deployment obviously affect the intermediate impact of information and communications technologies in different regions of the world. It is also useful to keep in mind that the Internet-based network is not as globally dispersed in a physical sense as the term might imply. Because the growth of the Internet has been largely driven by the interests and actions of U.S. government agencies and U.S. corporations, its architecture is such that the physical connections are concentrated in the United States. That is, most traffic between, and even within nations passes through nodes in the U.S. on the way to its destination. That situation is likely to change over time, but at least for the present, the United States can, in principle, play an influential role on transmission protocols and traffic control.

National Sovereignty, Autonomy, and Governance

While the original title of the meeting referred to "Information Technology and National Sovereignty", meeting participants readily acknowledged that the term "sovereignty" is subject to many interpretations. Discourse and debate over its definition and meaning have occupied a prominent place in the legal and political science literature for centuries and the group gathered for this meeting had little to add to that intellectual history.

On the other hand, one need not venture into those deep waters to recognize, as commentators such as former Secretary of State George Shultz have done, Shultz, George. "On Sovereignty." Speech to the National Academy of Engineering, October 4, 1989. that sovereignty has practical manifestations that are readily recognizable. Those practical dimensions can be described in terms of the role and authority of governments, and the capacity of nations to act autonomously on the world stage-and few would quarrel with the general assertion that information technology is having and will continue to have a significant impact in those terms. Indeed, the impact is as far-reaching as information itself is in empowering or constraining governments in their relations with the governed and with other nations.

A number of writers have referred to the current era as the beginning of the Information Age. See, for example, Wriston, Walter B. "Bits, Bytes, and Diplomacy." Foreign Affairs 76(5):172-182, September/October 1997. Their comments repeat and combine a number of themes: the importance of information as a key factor in determining security, economic prosperity, and quality of life; the role of information technology in turning us into an increasingly global society; the transfer of functions historically performed by governments to non-government entities; and the informal collaborations among individuals and institutions made possible by advances in information technology.

Certainly, these changes are affecting how governments govern, how societies and institutions function, how individuals relate to communities. But moving from generalities to specifics is more difficult. It is doubtful that we are approaching the end of the nation-state, as some writers have suggested. Guehenno, Jean-Marie,

The End of the Nation-State (Minneapolis: University of Minnesota Press, 1995). It is even difficult to establish clear cause and effect in circumstances where we have stronger reason to suspect a relationship.

For example, many observers believe that the Warsaw Pact nations were undermined at least in part by the increased availability of information to the populaces within those countries. The argument, reasonable on its surface, is that authoritarian governments are seriously undermined when they lose their monopoly over information, as they surely do in an age of Internet and inexpensive faxes. However, the mimeograph machine was more important that the fax in Eastern Europe and old-fashioned western television and radio more important than the Internet. Thus, although information flows are clearly important, the significance of new information technologies per se is harder to ascertain.

The meeting participants, therefore, were primarily concerned with the question of whether or not it would be feasible at present to move beyond the general observation that information technology is affecting the power of governments, the tools of governance, and the nature of nations, to a more specific identification of which aspects of information technology are affecting or are likely to affect which aspects of the nation state. The presentations and discussions at the meeting were aimed either at providing examples to illustrate how one might progress from generalities to specifics or suggesting the kinds of questions a more comprehensive study of the issue might profitably address. Those examples and questions are presented in abbreviated form in the following sections.

Political and Economic Diplomacy

Governments no longer have a monopoly on information or its interpretation:

> Broadcast media -- television and radio -- are so widely available that governments are limited in their ability to conceal the facts about events.
>
> Commercial satellites can now provide pictures and data that were once available only within the intelligence communities of the most advanced nations, leveling the playing field in international negotiation.
>
> The diffusion of information technology has amplified the voices of those who previously were not able to make their views known to large numbers of people. As a consequence, a much wider range of opinions and interpretations of events is available to publics throughout the world.

For these and other reasons, it appears that governments may be required to alter the strategies and tactics of setting foreign policy and conducting international negotiations:

> Strategies for preserving or enhancing economic or technological advantage based upon control or restriction in the flow of information are impractical.
>
> In principle, the availability of great quantities of information in a very short time can facilitate better decision-making in international negotiations. On the other hand, the time frame for reaction to events has been markedly shortened and, in fact, the media is arguably more important than governments in determining the relative importance of events. Such pressures may well force policy-makers to place a greater emphasis on "crisis dynamics" than on problem outcome.
>
> The widespread availability to non-government actors of information and the means to analyze and interpret it quickly, puts non-government actors are in a stronger position to debate and even "negotiate" with governments-and, as made evident in a number of recent international conferences, they do.

As with other areas in which information technology affects policy, it would be a mistake to view the effects in the arena of diplomacy as diminishing government power in every respect. For example, the increasing capacity of governments and others to gather information on compliance with treaty obligations through satellite observations and rapid data analysis has enabled nations to enter into treaties on disarmament and environmental protection. Such opportunities demonstrate that the impact of information technology on government autonomy may well be mixed.

Social Organization

Information technology facilitates group organization by lowering the cost and effort for people to gather together without requiring a physical presence. Because it is easier for groups to form, the number of groups that can exercise political influence or mount a significant physical threat increases. As a consequence:

> Groups of smaller size proliferate. When communications pathways are difficult, small and geographically dispersed organizations are very inefficient compared to larger ones and require a much larger investment relative to their overall budget to establish these pathways. By lowering the costs and ease of communication, smaller dispersed groups find it easier to organize themselves.
>
> Negotiating room is narrowed. When a group is widely dispersed, institutional, geographical, or national affinities tend to diminish in importance compared with the issue that draws them together. Single issue politics becomes a dominant theme. Combined with the capacity for real-time communication throughout the interest group, single issue politics appear likely to change the dynamics of international negotiation.

These trends are occurring at a time when ethnicity in world politics is on the rise, environmental concerns are increasing, the gap between the haves and the have-nots is growing in some regions, and a host of other issues are no longer submerged or constrained by the bi-polar politics of the Cold War. There is some evidence to support the thesis that information technology is an important catalyst for these political developments. For example, diasporas are being united through the Internet, garnering support for ethnic struggles. Groups such as the Zapatistas in Mexico are learning to use e-mail and other electronic communication to broadcast their plight.

Although the great proliferation of information made possible by new information technologies is often stressed, a number of trends suggest that it may be more difficult in the future to reach certain individuals or groups with information countering or moderating their views. The shift of control to the receiver of information to filter his or her sources is likely to lead to highly focused inputs. Some examples:

> The economics of direct broadcast satellites introduces the possibility of a wide selection of very narrowly circumscribed programming tailored to particular groups.
>
> The so-called electronic newspaper of the future would allow individuals to pre-select what topics and points of view would be transmitted to his or her receiver.

Within the United States, the proliferation of information and the ease of expressing and communicating views, is leading many to the conclusion that representative government, expert opinion, and delegated authority are less necessary and that a return to the direct democracy of an earlier era may be possible. It is worth exploring whether, on balance, these technical trends and others now anticipated are more likely to lead to more informed judgments on the part of the public or, as one meeting participant suggested, to "...the illusion of knowing."

In general, the phenomena discussed above are indicative of the diffusion throughout society of information capabilities at the grass roots level. It is enabled by communication networks, personal computers, and other low cost information and digital resources. However, not all of the trends are to decentralization and to the proliferation of information sources.

The electronic mass media industries, for example, are becoming more concentrated in their ownership, a trend exacerbated by the deregulation trends that allow mergers between the generators and the transmitters of programming. This concentration of control gives extraordinary power to a few providers of news (the so-called "CNN phenomenon" is the most well-known example, in which policy-makers are forced to react to stories broadcast worldwide regardless of their actual policy significance), giving them major roles in determining the agenda of public debate and discussion. Thus, the theoretical diversity of points of view made possible by the new technologies may, in practice, be more than offset by the power of the few organizations who provide most individuals with their information.

An important related issue is how the economics of the new technology-intensive mega-media companies will work in practice. That is, will the new integrated media systems involve significantly higher capital

investment leading to greater dependence on mass audiences and advertising income and will this, in turn, affect programming?

Regulation and National Security

Three characteristics of the development of information technology have given rise to a set of difficult regulatory and security challenges:

> The relatively minor role of government in the development of the technology diminishes its innate influence on (and control of) the direction of technological development, increasing the tendency to seek alternative regulatory mechanisms to achieve the same ends. The policy debate on encryption is an example. See for example, Dam, Kenneth W. and Herbert S. Lin, eds. *Cryptography's Role in Securing the Information Society* (Washington, DC, National Academy Press, 1996). At an earlier time, the U.S. government had a near monopoly over encryption technology. But commercial pressures for information security have led vendors to respond by providing the private sector with powerful tools over which the government is trying to assert greater control through trade and licensing mechanisms-and, some have even suggested, through legal constraints on hardware manufacturing.
>
> The accelerated development and deployment of new technologies whose power derives from synergies between and among the gathering, storage, structuring, and communication of information-areas that have been separately regulated in the past-has given rise to a new set of policy questions and regulatory challenges. For example: the extent to which information and programming providers should be allowed to own communication media; equitability in the use of the electromagnetic spectrum; protection of privacy; intellectual property protection; and the regulation of international business activities, particularly in services, that can now range from multi-national corporations to cottage industries.
>
> A number of services previously provided only by governments or regulated utilities are now being shifted to the private sector in the interest of efficiency and cost-effectiveness. However, this has effectively moved large segments of the "national infrastructure" to private hands, raising new kinds of challenges to national security. A major question for the future will be how to develop structures and mechanisms to deal with this situation.

The security challenge goes beyond the issue of the ownership and operation of information networks, extending to the role of information itself. Most nations recognize that building an infrastructure for communicating and facilitating the movement of information throughout the society, is a useful tool for governance as well as a vital part of economic and social development. At the same time, most governments are also interested in controlling or restricting the dissemination of certain types of information either into, within, or out of their boundaries. Obviously, national security information is in this category (although nations differ greatly in what should be included under that rubric). So, too, to varying extents, are socially-offensive materials or programming viewed as threatening to national identity or culture.

This problem is not a new one, but it is certainly exacerbated by the new information technologies, making the balance of control and exploitation more difficult to achieve. The new technologies facilitate information transfer across national boundaries and promote a kind of trans-national culture, at least for the technology-literate elite and their children.

Monitoring of information flows has become more difficult as the routes for information transfer multiply. Packet switching (a key characteristic of TCP/IP technologies Transmission Control Protocol/Internet Protocol, the suite of electronic protocols that provides technical compatibility and transparency throughout the global computer network.), designed to provide higher reliability of successful message transmission, makes interception of information in transit more difficult. And the new potential for economic growth through the development of service industries that easily reach across national borders increases the desire of all nations to take advantage of these technologies precisely at the same time as the cause for government concern grows. Indeed, what was difficult in the past, may be impossible in the future; governments are likely to have to accept the wider availability of information to the public if they are to obtain the advantages of the new technologies.

Aside from the issue of content management, there is the issue of content accuracy. Because the new

technologies make it possible to access a much wider range of information than before, misinformation is less likely to be distinguishable from reliable information. This has already been apparent in the field of health care, where individuals seeking guidance on disease prognoses or treatment approaches on the Internet can be deluged with information of highly varying quality, from the results of medical studies at one extreme to folklore at the other.

Does this suggest a new role or responsibility for government? That is, if, in the future, the limitation on being "well-informed" will not be a dearth of information, but a surfeit of "facts" of varying reliability, will the public good require an increasing emphasis on holding providers of information accountable for its accuracy, or the creation of mechanisms for certifying the reliability of information?

Economic Issues

In market economies, the role of the nation-state and the institutions of governance are somewhat ambiguous. The dependence on and belief in the operation of the market as the key to economic development and health suggests a minimal role for the state. Nevertheless, the state creates and enforces the legal environment for the market domestically, negotiates the principles of trade, creates a healthy environment for private sector enterprise, sets macro- and micro-economic policy, taxes, and is responsible for advancing the public good of the nation. Information technologies have an impact on all of these functions:

Fiscal policy. Nations determine public finance variables such as taxes and government spending, or import/export tariffs and quotas. However, the ease with which multi-national corporations can coordinate activities anywhere in the world provides them with the flexibility to shift operations to avoid what they consider to be onerous regulation or taxation. Thus, the effectiveness of fiscal policy tools is somewhat reduced and governments are cast more in the position of negotiators than regulators in their dealings with such corporations.

Exchange rates. For participants in international financial transactions, information technology extends the market notion to currency itself, challenging the power of governments to set macro-economic policy. The sheer volume of international currency movement (now in excess of $1 trillion/day) made possible by communication and computation technologies enables individual speculators to "attack" currencies, overwhelming the ability of central banks to control exchange rates by adjusting the amount of money in circulation.

Determination of short-term interest rates. Information technology facilitates international transfers of capital, and it is these flows that are a major determinant of short term interest rates. In the absence of national restrictions on the movement of capital (which tend to be counter-productive), such rates are hard to control.

International linking of financial institutions. The linking of banking systems and stock exchanges throughout the world through electronic networks is one of the key elements in the globalization (and vigor) of the economy. However, the speed, magnitude, and tight linkage of these systems, create systemic control problems and the potential for rapidly propagating instabilities. An important question is how to compensate for inherently weakened national regulatory mechanisms and whether (and how) new technology can be used to achieve this goal.

Taxation. Information technology may reduce the visibility of individual transactions and thus the enforceability of taxation based on the occurrence of individual transactions. Information technology may thus drive a shift in the basis of taxation away from individual transactions to more monitorable measures, such as the labor that is needed to produce objects or information of value.

Monitoring economic transactions. Will information technology, on balance, increase or decrease the ease of monitoring financial transactions? For example, in the United States, where cash transactions exceeding $10,000 must be reported to the government, "digital cash" would enable the completion of 10,000 one-dollar transactions with relative ease, thus evading the requirements of existing law. On the other hand, information technology might ease the problem of tracing smaller transactions so that the $10,000 minimum could, as a practical matter, be markedly reduced.

Extraterritorial application of national laws. To a much larger degree than in the past, technology enables a nation such as the United States to enforce some of its laws even on entities located outside its national boundaries. As the world's financial center, it is possible for the United States to freeze or attach foreign assets held by U.S. controlled banks and institutions. An important question for the United States, as an increasingly wide range of economic and political activities extend beyond geographical boundaries, is what transactions ought to be subject to the laws of the United States.

A CSTB Study on Information Technology and Governance

In short, information technology is changing the power relationships among governments and also between governments and the citizens, groups, and institutions under its jurisdiction. Depending on the situation (and one's perspective), the changes can be good or bad. Certainly, in some respects the government's power is curtailed. However, as pointed out in the preceding sections, in other respects the ability to achieve national goals may well be enhanced even if there is some shift in power or some requirement for an alteration in strategy.

The issue here is less the fact of change, which governments have always faced, than the anticipation of change, at which governments have been much less successful. Technology is not deterministic; its ultimate effect on society depends upon how we respond with policies and adjustments. The participants in this meeting believe that the first step in planning necessary policy changes is improving our understanding of the specific ways in which information technology impinges on governance.

Therefore, meeting participants believe that the Computer Science and Telecommunications Board of the NRC should undertake a project that would examine the impact of modern information technologies on governance. This project would be particularly appropriate as a CSTB undertaking because it requires that policy issues be linked with technical issues in order to carry debate and discussion beyond rhetoric and generalizations. Indeed, the strength of the study and its potential contribution depend upon this linkage, which will require the participation of experts with both technical and policy backgrounds.

Popular philosophers such as George Gilder and Alvin Toffler have asserted that the spread of information technology means that all hierarchies must break down, that governments will necessarily lose control and will be unable to be effective in certain areas, that all power relationships will have to be redefined, and that governments will find it impossible to control their money supply or to regulate their domestic industries. These assertions-offered with little hard evidence-have certainly influenced the public discourse about information technology that has taken place thus far.

The meeting participants believe that information technology will clearly change the effectiveness of many of the tools of governance, as illustrated in the preceding sections. However, cataclysmic scenarios are often inaccurate; more importantly, they give little guidance on actions that nation-states-and the United States in particular-should be taking to anticipate the real changes that will occur and make appropriate adjustments in goals and policies to account for the changes.

A CSTB study would be a useful first step in preparing for such changes. As envisioned by the participants, the project would have three goals: first, to develop a taxonomy of the relevant issues more thorough than that which came out of the brief discussion at this planning meeting; second, to identify areas in which adjustments in U.S. foreign and domestic policy have the potential to ameliorate the perceived negative effects of these technological developments or to accommodate to them; and, third, to signal new opportunities that information technology developments might provide for achieving the purposes of government more effectively.

The development of a taxonomy would provide a comprehensive set of categories to prod thinking about the issues that connect information technology with the functions and activities that underlie the practical exercise of sovereign status: what these areas are; why they are important; what reasonable observers believe to be the range of possible effects on these functions that might be brought about by developments in information technology. The study would provide a vehicle for alerting the foreign policy community to the reality of these issues by moving beyond the general rhetoric of futurists to a more specific set of recognizable and important connections.

The brief discussion at this planning meeting gave rise to some themes that are likely to emerge in this taxonomy. They include:

Changes in the effectiveness of the tools of government, including regulatory approaches, fiscal and monetary policy, trade and labor policy, and the scope as well as the reach of law in a world in which information exists primarily in electronic form and communication networks do not respect national boundaries.

Threats to national security as national infrastructure becomes more dependent on information technology, as the control of the information infrastructure shifts to the private sector, and as national defense becomes less a matter of territorial control than protection of that infrastructure.

Changes in the dynamics of diplomatic negotiation as the wide availability of information and the means for analyzing and communicating it rapidly and inexpensively shift power to non-government actors, change the time-frame for decision-making, and increase the influence of the media in agenda-setting.

Changes in the strength or coherence of national identity, cultural values, and religious or ethnic solidarity that can be induced or catalyzed by the power of broadcast media and the growth of trans-national information and communication networks.

These illustrate the range of issues that ought to be considered, but participants emphasized that the list is neither prescriptive nor exhaustive. The thorough study proposed may well find more useful and effective organizational categories.

With respect to policy matters, it is less important at this stage that the proposed study yield specific recommendations than that it identify the policy areas that will need (and are amenable to) modification to cope with changes brought about by information technology-and the new policy tools that are likely to be made available by the new technologies.

Meeting participants emphasized the importance of being clear about the time horizon to be considered in such a study. As a practical matter, the time horizon chosen should conform to the period within which the broad outlines of likely information technology developments are fairly well known. Speculation on changes farther into the future is not likely to be particularly useful to policy makers because the technology scenario is more likely than not to be wrong and, in any event, policy concerns tend to have a shorter time horizon.

Participants also recommended that the study be a synthetic effort with a pragmatic focus. That is, rather than undertaking original research in this area, the project should synthesize the best of what is known now. Case studies could be used to illustrate principles, but comprehensive case work should probably be left to academic research.

A formal NRC proposal that takes into account the insights developed at this planning meeting will be formulated.

Appendix A

On the National Research Council

The National Research Council (NRC) is the operating arm of the Academy complex, which includes the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine (IOM). The NRC is generally regarded as a source of impartial advice to the federal government and other policy makers that is able to bring to bear the best scientific and technical talent in the nation to answer questions of national significance. In addition, it is able to act as a neutral party in convening meetings among multiple stakeholders on any given issue, thereby facilitating the generation of consensus on controversial issues. The NRC generally does not undertake original scientific research on its own, relying instead on the expert judgment of its committees and the existing literature and research. Projects are funded by the federal government, foundations, and industry, though NRC policy states that no funding in excess of 49% will be obtained from sources that may have a financial interest in the outcome of a project.

The Computer Science and Telecommunications Board (CSTB) of the NRC considers technical and policy issues pertaining to computer science, telecommunications, and associated technologies. The CSTB

monitors the health of the computer science, computing technology, and telecommunications fields, pays attention as appropriate to the issues of human resources and information infrastructure, and initiates studies involving computer science, computing technology, and telecommunications as critical resources and sources of national economic strength. In its history, it has produced reports relating to information infrastructure, information technology and the economy, and certain aspects of international relations (e.g., export controls on computer technology).

The Office of International Affairs of the NRC is concerned with the development of international and national policies and programs to promote more effective application of science and technology to pressing economic and social problems facing both industrialized and developing countries, and to promote U.S. economic and international security interests. OIA participates in international cooperative activities, conducts studies of international issues, engages in joint studies and projects with counterpart organizations, manages scientific exchange programs, and represents the Academy complex on matters aimed at facilitating international cooperation in science and engineering.

Appendix B

Planning Meeting on Information Technology and National Sovereignty

LIST OF PARTICIPANTS

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Appendix C

MEETING AGENDA
INFORMATION TECHNOLOGY AND NATIONAL SOVEREIGNTY
March 26-27, 1997

Computer Science and Telecommunications Board
National Academy of Sciences
2001 Wisconsin Avenue, NW
Washington, D.C. 20007
Room GR-126, Green Building

Wednesday, March 26, 1997

9:00 - 10:00 a.m. Continental Breakfast

10:00 - 10:15 Welcome, Overview, and Logistics
Herb Lin, CSTB staff

10:15 - 10:30 Focus and Context Setting
Kenneth Keller, Council on Foreign Relations
(Meeting Chairman)

10:30 - 12:00 p.m. Self-introductions (Each participant: 5 minutes)

12:00 - 12:45 Working Lunch

12:45 - 1:30 The Economics of Global Telecommunications
Hal Varian, University of California at Berkeley

1:30 - 2:15 Security Issues and Information Technology
Bruce Berkowitz, consultant

2:15 - 2:30 Break

2:30 - 3:15 Transfer of Power to Non-Government Actors
Lawrence Grossman, Horizons Cable Network

3:15 - 4:00 Other Issues not covered previously
James Duderstadt, University of Michigan

4:00 - 4:15 Break

5:00 - 6:30 General Discussion

- What other important issues have not been discussed?
- What are the policy issues? What are the technical issues? How closely are technical and policy issues joined?
- To what extent is the rubric "Information Technology and National Sovereignty" useful in framing these issues?
- Given how fast information technology evolves, what issues are enduring? Transient?
- How are other nations dealing with these issues?
- Who are the important players (government, non-government)?
- Where is important intellectual work on these issues being done?

6:30 - 7:00 Reception, South Prefunction Room

7:00 p.m. Dinner, Green 110

Thursday, March 27, 1997

8:00 - 9:00 a.m. Continental Breakfast

9:00 - 10:15 Recap of Previous Day (Upon reflection, what are the important issues?)

10:15 - 10:30 Break

10:30 - 12:30 p.m. Opportunities for the Computer Science and Telecommunications Board

Does the CSTB have a unique role to play in this area?
If so, what issues should be addressed, and how?
What approach would be best for addressing these issues?
What would be the product of a CSTB effort in this area? Who is the audience for such a product?
How should foreign nations be involved in such an effort, if at all?
Who would support such an effort in this area?

12:30 p.m. Adjourn