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Enhancing the Internet for Health and Biomedical Applications

Technical Requirements and Implementation Strategies

This project will define technical capabilities that the Internet must provide in order to support a variety of medical applications. It will identify likely health care applications of the Internet; examine their demands for such characteristics as bandwidth, quality of service, security, and access; and recommend an appropriate strategy for implementing these capabilities in future instantiations of the Internet. An attempt will be made to distinguish those capabilities that are unique to health care applications from those more generally demanded of the Internet.

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Organization of the Report

Executive Summary

1. Overview and Introduction

2. Motivating Applications

3. Technical Issues

4. Organizational Issues

5. Policy Issues

6. Findings and Recommendations

Accessible via www.cstb.org

Today's Internet & Health Care

- **Internet today fails to meet needs of many health-care applications:**
  - **Quality of Service (QOS)**
  - **Security**
  - **Reliability/availability**
  - **Ubiquity of high-speed access**
- **Private networks heavily used**
  - **some mature networked healthcare applications (e.g. mammography, telemedicine)**
- **Will the current research agenda address these issues?**

Unique Requirements?

- **Hard to argue that health care is unique**
  - **QOS: if ubiquitous, medium quality video conferencing worked on the Internet, it would be enormously valuable to health care**
  - **Lots of other industries would like this sort of QOS too**
  - **Moving a mammography study (c 160 GB) in 2 seconds would require high bandwidth and low latency, but not clear that this is ever needed**

Unique Requirements? (cont.)

- **Security - are requirements different than e-commerce?**
  - **leaking results of an HIV test worse than disclosing a credit card number**
- **Need to create security associations on the fly, e.g., ER physician accessing patient record**
- **Existing models are flawed:**
  - **E-commerce uses server certificates and user passwords**
  - **weak authentication of user**
  - **time-consuming, hard to manage**

Security Requirements

- **Public Key Infrastructure (PKI) would be enormously valuable**
  - **Public keys issued to all health-care participants**
  - **Some form of "certification hierarchy' (or a global authority) needed**
- **Role-based access to patient records**
- **Digital rights management**

The Internet Research Agenda

- Most of the issues raised in the report are known to the networking community
- The issue is one of priorities and fine-tuning
- Design decisions get made with an application in mind
  - e.g., QOS mechanisms for multiparty videoconferences may not be ideal for remote instrument control
  - Health-care applications are rarely in the picture today

Policy Implications and Needs

- **Social, cultural and political factors also affect health-related use of the Internet**
- **Policy areas reflect core values: individual rights, public good, free enterprise, appropriate role of government, equal access**
- **“The resolution of technical issues will not, by itself, assure greater use of the Internet in the health sector”**

Conclusion 1

The Internet can support a wide range of applications in consumer health, clinical care, health care financial and administrative transactions, public health, professional education, and biomedical research. The networking capabilities needed to support these applications are not unique to health, but they do reflect distinctive characteristics of the health environment.

Conclusion 2

Security and availability are critical technical needs for health applications of the Internet and are not adequately met by today's Internet.

Conclusion 3

The quality of service needed by a number of high-end health applications will not necessarily be deployed soon across the Internet in a form that meets the needs of the health industry.

Conclusion 4

Ensuring widespread access to the Internet is essential to achieving its promise in health applications.

Conclusion 5

Technical advances are needed across many areas of information technology (not just networking) if the potential of the Internet is to be achieved in support of health applications.

Conclusion 6

Health care organizations are ill-prepared to adopt Internet-based technologies and applications effectively.

Conclusion 7

A number of difficult public policy and regulatory issues constrain the adoption of Internet-based health applications by health organizations and consumers. Some of these issues are specific to health care; many others extend beyond the health sector but require the health community's active participation in their resolution.

Technical Capabilities: Research, Development, & Deployment

- **Recommendation 1.1 The health community should ensure that technical capabilities suitable for health and biomedical applications are incorporated into the testbed networks being deployed under the Next Generation Internet (NGI) initiative and eventually into the Internet.**
- **Recommendation 1.2 To ensure that the Internet evolves in ways supportive of health needs over the long term, the health community should work with the networking community to develop improved network technologies that are of particular importance to health applications of the Internet.**

Technical Capabilities: Research, Development, & Deployment

- **Recommendation 1.3 The National Library of Medicine should forge stronger links between the health and networking research communities to ensure that the needs of the health community are better understood and addressed in network research, development, and deployment.**
- **Recommendation 1.4 The National Institutes of Health and its component agencies should fund information technology research that will develop the complementary technologies that are needed if the health community is to take advantage of the improved networking technologies that can be expected in the future.**

Demonstrations and Evaluations

- **Recommendation 2.1 The Department of Health and Human Services should fund pilot projects and larger demonstration programs to develop and demonstrate interoperable, scalable Internet applications for linking many health organizations.**

- **Recommendation 2.2 Federal agencies such as the Department of Veterans Affairs, the Department of Defense, the Health Care Financing Administration, and the Bureau of Indian Affairs should serve as role models and testbeds for the health industry by deploying Internet-based applications for their own purposes.**

Demonstrations and Evaluations

- **Recommendation 2.3** **The Department of Health and Human Services, as well as industry and academic organizations, should continue to fund efforts to evaluate various health applications of the Internet in order to improve understanding of their effects, the business models that might support them, and impediments to their expansion.**

- **Recommendation 2.4** **Public and private health organizations should experiment with networks based on Internet protocols and should incorporate the Internet into their future plans for new networked applications and into their overall strategic planning.**

Educational Needs

- **Recommendation 3.1 Professional associations with expertise in health issues and information technology should work with health care organizations to develop and promulgate guidelines for safe, effective use of the Internet in clinical settings.**

- **Recommendation 3.2 Government, industry, and professional associations with experience in health and information technology should work together to educate the broader health and health care communities about the ways the Internet can benefit them.**

Educational Needs

- **<u>Recommendation 3.3</u> The Department of Health and Human Services should commission a study of the health information technology workforce to determine whether the supply of such workers balances the demand for them, to identify the kinds of training and education that workers at different levels will need, and to develop recommendations for ensuring an adequate supply of people with training at the intersection of information technology and health.**

Policy Issues

- **<u>Recommendation 4</u> The Department of Health and Human Services should more aggressively address the broad set of policy issues that influence the development, deployment, and adoption of Internet-based applications in the health sector.**

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Overall Goal

- **Develop an IT research strategy and rationale to enable the "Transforming the Practice of Healthcare" vision of the PITAC February 1999 report**
- ***Vision: Telemedicine applications are commonplace. Specialists use videoconferencing and telesensing methods to interview and even to examine patients who may be hundreds of miles away. Computer-aided surgery with Internet-based video is used to demonstrate surgical procedures to others. Powerful high-end systems provide expert advice based on sophisticated analysis of huge amounts of medical information. Patients are empowered in making decisions about their own care through new models of interaction with their physicians and ever-increasing access to biomedical information via digital medical libraries and the Internet. New communications and monitoring technologies support treatment of patients comfortably from their own homes.***

Objectives

- **Define the scope of healthcare activities to be considered.**
- **Seek out and consider in-scope government and industry R&D status and plans.**
- **Gather and assess recent studies. Consider incorporating or supporting their recommendations in whole or part.**
- **Detail the vision of transformed healthcare, perhaps with milestones (10, 15 years?).**
- **Determine and explain the rationale for the technological capabilities required to implement the detailed vision.**

Building on the NRC Report

- **Focus on implementation strategies for recommendations that the committee endorses**
- **Add consideration of other IT issues beyond Internet-related topics (e.g., high-end computing)**
- **Give greater consideration to industrial partnerships and the role of industry**
- **Consider management issues that build on more general recommendations of initial PITAC report**

Schedule

- First subcommittee meeting February 24
- Outline/sparse draft -- March 15, 2000
- Teleconferences
- Second subcommittee meeting and progress report -- May 2000, PITAC meeting
- Teleconferences
- Probable third subcommittee meeting during summer of 2000
- Draft report distributed to PITAC members for review -- August 31, 2000
- Final review -- September 2000, PITAC meeting