Executive Summary

The President's Information Technology Advisory Committee (PITAC) held its 15th meeting (and the first meeting with the current members and Co-Chairs) on November 12, 2003.

Dr. John Marburger III, Director of the Office of Science and Technology Policy, Executive Office of the President welcomed the new PITAC members and reviewed the history of the Networking and Information Technology Research and Development (NITRD) Program, which is one of the Administration's highest priority cross-agency R&D initiatives. He will welcome the PITAC's advice, as its first study topic, about how the health care sector can take advantage of NITRD advances.

PITAC Co-Chairs Marc Benioff and Ed Lazowska reviewed their charge, which is to provide independent advice about Federal investments in the NITRD Program. The PITAC is specifically to assess:

- The appropriateness of the Nation's R&D investments to maintain America's leadership in information technologies and the applications of those technologies
- Progress in implementing the Program
- Balance among the Program's components
- Any need to revise the Program

Through focused briefings the PITAC plans to develop implementable budget-neutral policy recommendations that can yield demonstrable results. The focus areas are:

- Health care and biomedical research
- Homeland security
- Advancing the sciences
- The American education system
- Efficient operation of government
- The compassion organizations
- The global environment

The remainder of the meeting was organized by the PITAC Health and Information Technology Subcommittee. The speakers were:

- Elias Zerhouni, Director, National Institutes of Health (NIH)
- Mark B. McClellan, Commissioner, Food and Drug Administration (FDA)
- Anthony Principi, Secretary, and Jonathan Perlin, Deputy Undersecretary for Health, Department of Veterans Affairs (VA)
- Kevin Kiley, Director, Walter Reed Army Medical Center
- Carolyn Clancy, Director, Agency for Healthcare Research and Quality (AHRQ)
- David Kibbe, Director, Center for Health Information Technology, American Academy of Family Physicians (AAFP)

- David B. Nelson, Director, National Coordination Office for Information Technology Research and Development (NCO/IT R&D)

The following summarizes the input by the speakers from the health care and biomedical research communities:

- Health care and biomedical research make less use of information technology than other sectors of the U.S. economy.
- Health care and biomedical research would mutually benefit from shared data collection and feedback, since clinical research and clinical practice mutually inform one another. Use of information technology could speed the transition of research results to clinical practice.
- In a future health care and biomedical research information infrastructure, clinical errors and the cost of health care delivery can be reduced, and the quality of life can be improved by employing the following health information technology capabilities:
    - Standards for data collection and standard vocabularies, both of which enable data sharing
    - Electronic health records (EHRs)
    - Computerized physician order entry (CPOE) and e-prescribing
    - Bar coding of health care products and devices
    - Interoperability of health information systems
    - Technologies and tools for (a) analyzing health care information, (b) identifying, best practices, safety issues, adverse events, public health risks, and new research topics, (c) incorporating that knowledge in decision support systems, and (d) updating those systems as new knowledge becomes available
- Any emergent health care and biomedical research information infrastructure should:
    - Preserve the security and privacy of patients' records
    - Accommodate both large and small health care systems
    - Increase patient participation in and feedback about their own health care and quality of life
    - Address concerns that information systems might become incompatible or obsolete
- The Department of Veterans Affairs and the Department of Defense have developed and deployed health information technology systems that include many of the above features.
- To address their missions, the National Institutes of Health (NIH), the Food and Drug Administration (FDA), the Agency for Healthcare Research and Quality (AHRQ), the Center for Medicare and Medicaid Services (CMS), and the Center for Disease Control and Prevention (CDC) have initiatives in (a) developing and deploying information technologies that are aligned with the above features and (b) in evaluating their effectiveness.

- Professional organizations such as the American Academy of Family Physicians are helping better understand and address the needs and concerns of their members as a national health information infrastructure is deployed.
- Professional organizations are developing and promoting health care information standards and advancing the interoperability of health care information.
- Private-sector organizations are developing and deploying health care information systems with many of the above features.
- Understanding the costs and benefits of a health care and biomedical research information infrastructure, and addressing those costs, will be crucial to speeding its deployment. The costs are not only monetary but also include the time and resources needed to learn about and deploy new technologies.
- Explaining the benefits of and promoting increased use of information technology by health care practitioners, and by the general public in its role as health care consumers, will speed its deployment.

The last briefing of the meeting was an overview of the NITRD Program, with a focus on activities relevant to health care and medicine.

A series of information gathering meetings, including town hall meetings and briefings by invited experts, will result in a draft report on health and information technology for PITAC review in April, with a final report containing findings and recommendations expected in June 2004.

Minutes of the President's Information Technology Advisory Committee
November 12, 2003

The President's Information Technology Advisory Committee (PITAC) held its 15th meeting (and the first meeting with a new slate of members and Co-Chairs) from 11:30 am to 3:10 pm on November 12, 2003.The meeting was held on-line via the Internet using WebEx and at a public site at Noesis, Inc., 4100 N. Fairfax Drive, Arlington, VA. This meeting was recorded in its entirety and can be found at http://www.itrd.gov/pitac/meetings/2003/index.html. Briefing slides that often expand upon or augment these minutes can be found athttp://www.itrd.gov/pitac/meetings/2003/20031112/agenda.html.

The High-Performance Computing Act of 1991 (P.L. 102-194) authorized the PITAC. With this law Congress also established the High-Performance Computing and Communications (HPCC) Program, predecessor to today's Networking and Information Technology Research and Development (NITRD) Program and authorized the functions performed by the National Coordination Office (NCO) for HPCC, now the NCO for Information Technology Research and Development (ITRD).

President William Jefferson Clinton established the PITAC on February 11, 1997, with Executive Order 13035. He subsequently extended the Committee's tenure and revised its charter in 1998 and 1999. In February 2001,shortly after taking office, President George W. Bush directed that the PITAC continue its work. On May 28, 2003, he signed Executive Order 13305, which extended the PITAC through June 1, 2005. H e also announced his intention to nominate new members and new Co-Chairs.
Twenty Committee members, seven speakers, 46 U. S. Government agency personnel, 11 NCO staff members, and 58 members of the public attended this open meeting. Non-PITAC attendees are listed at the end of this report.

President's Advisory Committee Members Attending:

Edward Lazowska, Co-Chair	University of Washington
Marc Benioff, Co-Chair	Salesforce.com
Ruzena Bajcsy	University of California – Berkeley
J. Carter Beese	Riggs Capitol Partners
Pedro Celis	Microsoft
Patricia Thomas Evans	Global Systems Consulting Corporation
Manuel Fernandez	SI Ventures/Gartner
Luis Fiallo	Teleglobe
Jose-Marie Griffiths	University of Pittsburgh
Jonathan Javitt	Potomac Institute for Policy Studies
Judith Klavans	Columbia University
Harold Mortazavian	Advanced Research, Inc.
Randall Mott	Dell Computer Corporation
Eli Noam	Columbia University

David Patterson	University of California – Berkeley
Alice G. Quintanilla	Information Assets Management, Inc.
Daniel Reed	University of Illinois – Urbana-Champaign
David Staelin	MIT
Peter Tippett	TruSecure Corporation
Geoffrey Yang	Redpoint Ventures

E. Lazowska, PITAC Co-Chair, called the meeting to order.

Welcoming and Opening Remarks – Remarks by John Marburger III, Director, Office of Science and Technology Policy (OSTP)

Dr. Marburger began by thanking the members for their willingness to serve on the Committee. He explained that, as its name implies, OSTP advises the President on national science and technology policy. OSTP also lends its technical expertise to other White House policy offices, providing not only policy advice, but also specific information and proposals relevant to their projects. It staffs a number of interagency working groups and works closely with the Office of Management and Budget to develop the science and technology portion of the President's annual budget proposal to Congress. OSTP also staffs the President's Council of Advisers on Science and Technology (PCAST). And finally OSTP is PITAC's link to the President and his Administration. The OSTP website, http://www.ostp.gov, describes OSTP's mission and activities, and Dr. Marburger encouraged people to access it.

PITAC's members, Marburger noted, come half from industry and half from academia. Within these broad categories they bring considerable diversity. On the industrial side, PITAC represents small, medium, and large companies. The Committee's academics represent a number of different disciplines. Harnessed effectively, their varied expertise adds value and credibility to the Committee's recommendations and products. Dr. Marburger expressed his conviction that the Committee's recommendations would have a positive impact on national policy.

PITAC's purpose is to help the Federal government guide and effectively manage its sizable investment in information technology research and development. This now totals more than $2 billion per year—a significant investment with highly visible returns. Today's electronic PITAC meeting is an example of that technology at work. Not all the participants in this meeting had to travel to Washington and spend a day or more in the same conference room, yet they participate nonetheless. This powerful technology would not exist had the Federal Government not invested in the Internet. Dr. Marburger pointed out that this investment had its earliest roots in the Defense Advanced Research Projects Agency, and that other agencies—notably the National Science Foundation—helped nurture the Internet to its present maturity.

It was in that early Internet era that Congress passed the High-Performance Computing Act. Marburger reminded the Committee that this Act not only authorized PITAC but also established the framework for the Networking and Information Technology R&D

(NITRD) Program [successor to the High Performance Computing and Communications (HPCC) Program]. The various agencies represented in the NITRD Program have different missions and therefore different interests; the agencies coordinate their efforts and the significant funds they dispose. The PITAC helps OSTP provide this interagency coordination.

Dr. Marburger described the NITRD Program as one of this Administration's highest priority cross-agency R&D initiatives. President Bush's FY 2004 budget request to Congress gives it particular prominence because of information technology's critical role in enabling advances across nearly every economic sector and every scientific discipline. Information technology plays essential roles in securing the Nation and stimulating the economy and pervades the substance of modern science.

This promise has not yet been realized at the interface that most Americans have with the health care system, and so the Committee now undertakes a review of this sector. Information technology has unfilled potential in this field in ways other commercial sectors have already exploited. Dr. Marburger expressed his delight that PITAC is undertaking this challenge: determining what must be done to get the health care industry to catch up in its use of information technology.

He closed by thanking the PITAC again and by wishing it all success.

M. Benioff and E. Lazowska, PITAC Co-Chairs, thanked Dr. Marburger for setting the context of the Committee's work.

PITAC Overview - Remarks by Edward Lazowska, PITAC Co-Chair

PITAC's responsibilities are set by the High-Performance Computing Act of 1991, by a set of Executive Orders about the Committee, and by Dr. Mar burger's guidance, given both today and in his memorandum of June 5,2003. The critical questions for PITAC are:

- Are the Nation's R&D investments appropriate to maintain America's leadership in information technologies and the application of those technologies?
- Is progress being made in implementing the Program?
- Is there a balance among program components?
- Is there a need to revise the Program?

This PITAC intends to conduct its studies with the broad approach "leadership through innovation." America has been the land of innovation for more than 200 years. Our world leadership derives from this, and information technology now lies at the heart of our capacity to innovate: advances in information technology are critical to progress elsewhere. PITAC's seeks to achieve a broader recognition of these principles and of the value of an explicit innovation agenda for America. Today's Federal policies and investment in information technology research and development will sustain American leadership. PITAC plans to:

- Use focused briefings rather than comprehensive studies
- Develop policy recommendations that are implementable and budget neutral (although budget reprioritization and redirection are also possible), and that will yield demonstrable results
- Generate excitement about innovation

In selecting its focus of activity, the PITAC co-chairs have identified areas that:

- Are widely recognized as critically important to the U.S., and that require information technology innovations
- Have recently received authoritative study that suggests policy changes
- Offer both short- and long-term payoff
- Have funding available that could be reprioritized or redirected, rather than requiring significant additional funding

The previous PITAC benefited from an environment in which it was possible to allocate significant additional funding to information technology research and development. That is not today's environment. But many government agencies and private organizations may be willing to reprioritize their information technology investments to make them more effective. These are the circumstances in which the present Committee must work and of which it must take advantage.

Finally, the President appointed the members of PITAC for their interests and expertise. The topics the Committee addresses must fall within the scope of its talents.

The following areas meet those criteria:

- Health care and biomedical research
- Homeland security
- Advancing the sciences
- The American education system
- Efficient operation of government
- The compassion organizations
- The global environment

The PITAC has initiated three subcommittees and selected PITAC members who will co-chair them: Health Care, to be co-chaired by Jonathan Javitt, David Staelin, and Peter Neupert; Homeland Security, to be chaired by Tom Leighton; and Advancing the Sciences to be co-chaired by Harold Mortazavian and Dan Reed. Additional co-chairs may be added in each of these areas as they move forward.

PITAC will (as it has for today's session) assemble a broad range of experts who can describe what innovation has already contributed and what it could contribute both to solve near-term and long-term problems and take advantage of opportunities in each area.

This Committee will have succeeded if, at the end of its tenure, it has increased appreciation of the value of innovation in information technology. To do so we must help the Nation:

- Realize the practical potential of yesterday's innovations
- Invest in innovations that will be reduced to practice over the next 15years

We hope that Federal agencies continue to make appropriate investment in information technology research and development. As Dr. Marburger noted, the Internet, the High-Performance Computing Program, and the Next Generation Internet Program, have all benefited from investments made by abroad range of Federal agencies. And indeed the precise role of the National Coordinating Office for Information Technology of Research and Development (NCO/ITRD) is to help ensure that NITRD agencies work together to cover the waterfront in information technology for the benefit of the Nation.

Lazowska concluded by outlining the day's agenda (see Appendix A). Co-chair M. Benioff asked each of the day's presenters to give examples of the sorts of recommendations they believe the PITAC might develop.

Transforming Health through Information Technology – Remarks by Jonathan Javitt, PITAC Health and IT Subcommittee Co-Chair

Dispersed health care practitioners and medical information can lead to risky and expensive medical errors. One 70-year old woman's life was put at risk because the dentist who cleaned her teeth did not know she had leukemia, with its attendant risk of infection. After her routine teeth cleaning she developed a heart infection that ultimately required a heart valve replacement. The cost to Medicare amounted to more than $100,000. A dog, on the other hand—also vulnerable to infection because of his recent knee surgery—got the right antibiotics after his teeth were cleaned because the veterinarian who did the dental work had also done the knee surgery.

The dentist's innocent failure to prescribe antibiotics after a routine cleaning is but one example of hundreds of thousands of medical errors that occur annually in a country with the highest standard of healthcare in the world. As noted in the March 2001 Institute of Medicine report, "Crossing the Quality Chasm," the U.S. health care system needs fundamental change in this regard. Health care harms too often; it fails to help as routinely as it should. The performance of the health care system also varies considerably. Sometimes exemplary, it often falls short of its promise, and millions of Americans miss effective care. A fragmented delivery system with at best rudimentary clinical information capabilities yields poorly designed care characterized by unnecessary duplication of services, long delays, and—sometimes—errors of oversight and ignorance.

Statistics reflect the inefficiency of the health care system and the rapid rise in its cost, but only four solutions have been identified:

- Raise payroll taxes on employees and employers
- Raise the retirement age so that people enter Medicare later in life
- Allow costs to rise and increase the Federal deficit by a corresponding amount
- Employ health information technology to reduce cost and improve quality of care

The first three solutions are obviously undesirable. The fourth solution—the promising one—has been adopted by the six-sevenths of the U.S. economy, but not, of course, by the remaining seventh, the health care sector.

The first three choices are not only politically unacceptable, but also temporary at best. In 2003, the Institute of Medicine was asked to define the key elements of health information technology needed to address the quality issues identified its earlier reports raised. It concluded that a sound health care information technology system would offer:

- A secure, portable, personal electronic health record delivered via a national health information infrastructure
- A computerized physician's order entry system in hospitals
- e-prescribing from physicians' offices
- Clinical decision support
- Connectivity for ready exchange of information among caregivers

Seventy-five percent of the adverse drug events common today could be avoided through electronic entry of medication orders with error checking systems for proper dosing, allergies, and other contraindications.

The Department of Veterans Affairs has shown that without computerization, 12 percent of physicians' orders are incorrectly followed. With electronic health records, with bar coding to prevent such errors, and with other electronic systems, the error rate drops well below one percent. The Army has shown that basic computer systems to track care of patients with chronic illnesses can lead to improvements in health outcomes far exceeding those we see in the civilian world.

Nationwide deployment of health information technology systems could save up to 25 percent of health care costs—more than $240 billion a year—while at the same time saving more than 100,000 lives each year. This is enough to pay for prescription drugs under Medicare, to extend care to the uninsured, and to reduce the cost of employer-sponsored health insurance to the point where increases in worker's compensation results in higher salaries rather than simply paying for higher health insurance costs.

Computerizing our health care system would empower Americans to participate more completely in their health care and to make more informed choices of caregivers and hospitals.

What has this to do with PITAC and with the mission Congress gave us? Our primary mission is to advise on the NITRD Program. In 2004, NITRD will make its first major investment in research and development related to health care delivery. This will take the

form of a new $50 million research program within the Agency for Healthcare Research and Quality. The National Institutes of Health will continue to support medical knowledge databases through the National Library of Medicine—also using NITRD funds. But this Committee should ask what needs to be done next. Consider these questions:

- Are there existing health information technology investments that can readily be expanded to serve the Nation?
- Where should we be investing today, so that we have the health information technology solutions for tomorrow?
- What can we achieve as a Nation by making those investments?
- What barriers must we overcome?
- How can we empower disparate departments of government to work more closely around health information technology?
- How can we use NITRD funds to stimulate public-private partnerships in this critical area?

We might approach these issues by asking, first:

- What do you imagine could be achieved in the next few years by aggressive deployment of today's technology?
- What are the barriers to this?
- What steps should be taken to surmount those barriers and to realize the potential?
- What do you imagine could be achieved in ten years with appropriate research and development investments in the area of health information technology?

Transforming Health through Information Technology: The NIH Roadmap – Elias Zerhouni, Director, National Institutes of Health (NIH)

The National Institutes of Health are working to transform the way health care research is done. A NIH Roadmap is under development to pinpoint areas of research most likely to produce the biggest payoffs across all disciplines and diseases. The Roadmap is particularly concerned to develop and use information technology to transform how scientists collaborate and conduct biomedical research. We need the Roadmap because:

- Health care expenditure and its burden on society are growing rapidly.
- Discoveries are arriving at an accelerated pace, and we need to transform those discoveries into tangible, preventive strategies that will eventually reduce costs. If we keep practicing medicine as we practice it today, we will make only marginal improvements. We need novel approaches orders of magnitude more effective.

From deliberation and consultation with several hundred recognized leaders in academia, industry, government, and the public, three Roadmap themes have emerged. Information technology is critical to their success:

- **New Pathways to Discovery.** This seeks comprehensive understanding of the building blocks of the body's cells and tissues, and how complex biological systems operate. Using computational biology, NIH is trying to model the cells' information superhighway. There are a million molecules per cell, each interacting in ways that are only partially known. A very high performance computing environment requiring a strong national biomedical computing infrastructure would be critical to progress in this research. We have only partial information about the human genome and its function, and about the three-dimensional structure of proteins. We need to develop those three-dimensional structures and understand the variations between structures and the temporal resolution of molecular-to-molecular interaction. Advances in structural biology require better understanding of proteins, and in particular, those proteins that reside within cell membranes. To draw an analogy from information technology, proteins might be considered transistors, and cell membranes an integrated circuit substrate. Understanding the integration of the circuits is more important than knowing each element in the circuit. Molecular engineering will prove the key to further progress. Underlying efforts in molecular libraries, over the next five to six years NIH plans to develop a database for chemical genomics containing the cumulative knowledge of experiments being conducted in hundreds of laboratories around the world, and that will require making grid computing available to that community. This will enable the researchers to test complex molecular pathways and networks with tools unavailable to them today.

- **Research Teams of the Future.** We seek to recombine the biological, physical, informational, social, and behavioral sciences. We delay development of interoperable information systems in medicine, health care, and research if we do not promote interdisciplinary work, and so NIH will create interdisciplinary research centers to build interdisciplinary research teams.

- **Re-engineering the Clinical Research Enterprise.** The health care system is fragmented. It lacks a single strategy for data and information management, for the exploitation of that information, and for long-term follow-up of identified populations. An example of this is hormone replacement therapy (HRT) in women. For 30 years HRT was dogmatically held to constitute good health care management, but there was no scientific basis to prove that this was beneficial to the 60 million women using it. NIH's multi-year Women's Health Initiative found that HRT was not only neutral, but positively harmful. If we had possessed a system that captured data elements from clinical practice, that question would have been resolved within three years without the need to create a new infrastructure for a specific, one-use clinical trial.

The way clinical research is done in the country has changed dramatically. Two noteworthy trends in health care are:

- A movement away from studying acute problems to studying chronic problems
- A movement away from the treatment of disease to its prevention

Seventy-five percent of health care expenditures are related to chronic at-home diseases that move much treatment away from academic health research centers and into the community. These trends mark the importance of:

- Conducting clinical research with data collected from the population
- Translating fundamental research into clinical reality faster
- Earlier intervention into the disease cycle

Data integration also helps formulate new research questions that tie together major fields of inquiry.

To advance our understanding of pathobiology, we need high-quality genotype-phenotype correlations. We need to be able to understand at the level of the patient population what characteristics correlate with what genetic, genomic, and proteomic characteristics at the basic kinase, or enzyme transfer, level.

So we should first tackle the problem of bench-to-bedside and its reverse—bedside-to-bench—translation. Interoperable research networks will ultimately lead to a national network of networks: a revolutionary new clinical research infrastructure. Fully networked clinical research centers will have a multitude of information technologies and shared public databases. The central nervous system of this endeavor is the National Electronic Clinical Trials and Research (NECTAR) Network. It will have common data standards and vocabularies and software for analyzing and reporting data on a prospective basis and on a long-term basis.

Realizing the new research information infrastructure will require more efficient and effective clinical research business practices and processes, enhanced data sharing and analysis, interdisciplinary research collaboration, improvement in patient safety, human subject protection, and rapid translation of research into clinical findings and products. The Roadmap will deliver an acceptable return on the public's very substantial NIH investment only if it transforms the NIH research enterprise with a new generation of tools and an enhanced information infrastructure.

In response to questions by Benioff and Javitt, Zerhouni recommended that PITAC take a strong position on data standards and evaluate the possible pathways to success.

Zerhouni suggested both a top-down approach to linking NIH more tightly with the point of care—including campaigns that to get the message out—and a bottom-up approach that connects research to the community. NIH proposes recruiting Clinical Research Associates who would conduct research faster and transfer the results back to the community. Fastest adoption of good practices is usually related to the trust of intermediaries directly connected to the patients. It is very hard to translate that information unless you have systems that are hard-wired, perennial, and organic to the process.

Responding to a question by PITAC member J. Klavans on whereto apply effort to interagency collaborations, Zerhouni advocated harmonization strategies across agencies and departments. Harmonization rules and regulations allow sharing of data generated locally as well as coordination and data sharing across the research community as a whole.

Electronic Medical Records: Evidence Shows Impact –Remarks by Mark B. McClellan, Commissioner, Food and Drug Administration (FDA)

Information technology has great potential benefits to the FDA's mission of promoting the public's health by delivering safe and effective medical products and advancing public health through better information and better products. New treatment technologies cost more to develop, and these development costs in turn drive up the cost of health care. Health information technology is a key part of FDA's new strategic action plan—we have an excellent opportunity to improve it.

Health information technology can have an immediate impact on FDA's mission in three ways:

- More efficient collection and analysis of information in clinical trial helps FDA determine the safety and effectiveness of medical products quicker and less expensively. A judgment about safety and effectiveness determines when to approve a product. Large paper reports on side effects can be replaced by electronic systems that improve the pathways from good research ideas, through clinical studies, to action on the information gathered. Much FDA data on what works and doesn't in the development of new treatments reside in paper records stored in ways that do not permit further analysis, so learning about treatment effects in particular subgroups or identifying patterns is difficult. FDA is working with NIH to develop broader data standards and tools to implement electronic information sharing. FDA and the National Cancer Institute (part of NIH) also announced today that they are starting to take electronic Investigational New Drug (IND) applications on cancer therapy. FDA is also working with NCI on sharing interactive information systems for collecting clinical trial information and on integrating clinical trial information collected from product developers.

- FDA is taking steps to transform medical product labeling to be consistent with modern health information systems. Drug developers usually provide information about possible adverse side effects in thin microprint form that is not easily accessible to either health practitioners or patients. FDA is working with the National Library of Medicine to make information on the safety and effectiveness of medical products available in electronic form that can be integrated with other clinical information. FDA's goal is to make this information accessible to doctors using hand-held devices to make e-prescribing decisions. FDA is developing *Med Guides for Patients*—the patient's electronic versions of information about the drug's use, the latest scientific evidence about it, risks to look for, and potential danger signs.

- FDA is working to improve its ability to monitor treatments after their approval and entry into the market. This adds to information gathered in controlled, randomized clinical trials about subgroups of patients and particular clinical settings. Medical product developers are required to report adverse events, and FDA is making those reports electronic and easier to analyze. FDA has also laid out a vision of linking real-time or near-real-time surveillance to electronic medical records, thereby improving our understanding of adverse events. The risks of new drugs to particular populations and understanding how treatments are being used in actual practice will guide FDA toward providing better labeling and instruction to health practitioners. Pilot programs at Columbia Presbyterian Hospital and elsewhere are developing a widespread standard way of collecting more complete, timely, and useful information on potential safety problems.

But the FDA faces significant barriers to carrying out its mission:

- **Standards**. Electronic systems have not been widely adopted in health care because, unlike grocery stores or financial institutions, the health care system lacks even codes for all of its products, let alone everything relevant to that product in terms of response values, complications, and the like. While the FDA is close to having a complete coding system for drug products, literally thousands of medical devices on the market have no standardized electronic nomenclature. Fortunately, all medical producers must register with the FDA to get products licensed in the U.S., so making the licensing process electronic is helping us ensure that new codes for new products can be built into the system as they come on the market.

- **Security and confidentiality.** Patients worry that their records might not be used appropriately. The Health Insurance Portability and Accountability Act (HIPAA) helps assuage those concerns, but we must do more to ensure that sensitive data can be shared securely in surveillance systems so that patient information is not placed at risk.

- **Costs and benefits.** FDA is considering provision of small financial incentives for submitting information into FDA surveillance systems. We also need to ensure that health care information technology improves quality of care. For example, we proposed a new regulation to require bar codes on all medicines and blood products. This regulation is widely regarded as accelerating the adoption of bar code readers and other electronic systems at hospitals. More can be done along these lines. For example, electronic labeling information could be provided in a way that is easily integrated with electronic medical records in e-prescribing, so that doctors have access to up-to-date and useful information relevant to their particular prescribing decisions.

We see this approach as creating a “virtuous circle.” Our ability to collect and provide information electronically and automatically enables still better guidance to health practitioners, thereby increasing the payoff from adopting electronic record systems or

e-prescribing. As more people come on line, the payoffs increase. The virtuous circle reinforces and is reinforced. PITAC has an opportunity to help clear the roadblocks and see that the investments are made to complete this kind of system.

In answer to a question from E. Lazowska concerning multiple standardization efforts and the need to coordinate them, McClellan stated that as long as Federal agencies participate, the relevant stakeholders are engaged, and a consensual process is used, then standards development will progress well. Health insurers can play a major role. Legislation in Congress for a drug benefit in Medicare [subsequently signed into law] can be implemented in such a way to push use of an electronic standard. Health insurers and payers can support these standards. More can be learned in real-world practice about whether one drug is comparably more effective than another in a particular clinical setting, or whether certain kinds of patient groups may have particular risks or benefits. Health information technology systems, properly implemented and coupled with signals of key safety problems, would make such studies less costly.

Health Achievement through Information Technology–Remarks by Secretary Anthony Principi and Deputy Undersecretary for Health Jonathan Perlin, Department of Veterans Affairs (VA)

J. Perlin communicated Secretary Principi's regrets for his not attending this PITAC meeting due to his commitments during the week of Veteran's Day. Secretary Principi strongly believes that the electronic health record and associated technologies are among the best ways to improve the quality and efficiency of care for our Nation's veterans. Perlin then introduced Principi's recorded remarks.

The Department of Veterans Affairs (VA) redeems part of America's debt to its veterans by providing them with world-class health care. The key to this mission is a paperless, safe, secure, and cost-effective medical records system. To accomplish this goal, the VA is pushing the boundaries of medical and information technologies to transform the VA from a collection of limited in-patient hospitals (often located far from a veteran's home) to a 21st century health care system based on a technology-supported outpatient model with more than 1300 sites across the Nation. The current VistA and next generation Health*e*Vet/VistA are indispensable tools supporting the largest integrated health system in the U.S., which serves almost five million veterans a year. The system includes:

- Computerized provider order entry, a leading strategy to achieve VA standards for patient safety. Ninety-three percent of VA's order entries are now computerized, compared to eight percent in non-VA hospitals.
- Bar code matching of medication to patient records at the point of delivery, so that veterans receive the right medications in the right dose at the right time from the right provider.
- The Health*e*Vet/Vistasystem's health data repository will store a veteran's whole health record and make it available anywhere in the VA system in real time. The

patient's portal, My Health*e*Vet, will allow veterans to see their health records, access health information, and communicate with their health care providers.

The VA has been collaborating with DHHS and others to improve health care delivery across the widest possible range.

Perlin showed what a care provider would see on an electronic health record that resembles a doctor's chart. The VA's information-based system spans all care providers: emergency rooms, operating rooms, intensive care units, the doctor's desk, ambulatory clinics, and long-term care settings. The Undersecretary then walked the audience through the system using two case studies to point out its salient features:

- A cover sheet that provides the patient's basic information including name, medications, and vital signs.
- Doctors' notes in the form of templates. Different specialists can use different data entry templates that can be repopulated to bring in key elements like vital signs.
- A reminder area that keys doctors into times for the patient to get vaccinations, medications, etc.
- An action area. With one click an immunization can be ordered and that order will have natural language documentation. Such documentation conveys medical evidence that is now seldom used, such as why vaccination is important. Evidence shows that people would experience better health outcomes by receiving appropriate vaccinations. The simple intervention of a pneumonia vaccine can significantly reduce hospitalization and death rates. Administering a pneumonia vaccine and a flu shot can yield even greater improvements. The VA has reached the Surgeon General's U.S. benchmark by having vaccinated seventy-eight percent of its vets.
- An automatic indicator alerting the physician to changes in the status of a patient's condition (such as cholesterol level) and suggesting evidence-based treatments that can be ordered with a direct provider order entry. This electronic entry removes the opportunity for transcription errors. It also supports drug/drug, drug/lab, drug/allergy and drug/history checking systems. The inpatient and outpatient environments are now safer because there are fewer errors. One of the VA's consolidated computerized mail-out patient pharmacies delivers medications accurately with a failure rate of less than eight per million. Contrast this with studies showing that one in 20 ambulatory care prescriptions is complicated by an error. The work of Latham and Bates shows that inpatient prescription errors occur at a rate of one in six-and-a-half hospitalizations. This is the quality chasm we are bridging.
- Through the My Health*e*Vetsystem, the patient moves from a transactional to a proactive transformational mode by having access to information.
- Remote Data View permits access to laboratory tests, scans, and imaging in diverse clinical settings.
- In sum, the patient's total health history, current conditions, and treatments, are all more accurate, more complete, and more accessible.

Perlin concluded with the hope that the audience would share the VA's excitement about what is possible. Seventy percent of all physicians in the U.S. and 60 percent of all health

professionals receive training in the VA, and so belong to the computer age. They are ready to use IT in their work. Today's 24-year-olds grew up with information technologies as transparent as pencil and paper are to us. Would you trust your banking to paper systems like those used in health care? The question is not what is possible, but when can we get there.

Responding to questions by Marc Benioff, Perlin identified three areas that would make these new technologies as widely used as the Internet:

- **Standards**. Perlin would welcome endorsement of standards that allow the undercapitalized providers to be able to develop systems that communicate with each other. PITAC can help to develop this infrastructure, the equivalent of the Interstate Highway System for healthcare. Health care commerce can take place on that infrastructure.
- **Incentives**. There are no obvious rewards for investing in some of the information infrastructure; there may be some disincentives. Capital investment could be jumpstarted.
- **Culture.** PITAC's involvement and excitement, the Administration's interest, and our new generation of young health care providers and administrators all converge to change the culture of information technology for health care. PITAC can help move it from a novelty to the expected baseline for safe, high quality, and more patient-centered, humane health care.

HEALTH*e*FORCES: a new standard in military medicine – Remarks by Kevin Kiley, Director, Walter Reed Army Medical Center

The HEALTH*e*FORCES initiative, begun at Walter Reed Army Medical Center (WRAMC) a few years ago, is now being promulgated across the North Atlantic. It will merge with the next generation of Military Health Care Systems—the Composite Health Care System II (CH-CSII). Brigadier General Mike Dunn and Colonel Jill Phillips recognized a need for outcomes-based studies to close the quality chasm, and so set the goals of the HEALTH*e*FORCES, which are to:

- Improve the quality of care for patients in the Walter Reed Health Care System
- Enhance patient-provider partnerships
- Use information technology to capture the patient's perspective on the status and treatment of their conditions
- Measure compliance with evidence-based medicine

Comprehensive care would seamlessly connect patient and providers, closing the gap between the care patients should receive and what they do receive. HEALTH*e*FORCES combines traditional hands-on medicine with the latest innovations in information technology. Scientifically based, recognized guidelines will eventually establish new standards for military health care. The Joint Commission on Accreditation of Healthcare

Organizations (JCAHO) awarded WRAMC and HEALTHeFORCES effort six disease-specific certifications; HEALTHeFORCES has also won several national awards.

HEALTHeFORCESworks as follows:

- The patient provides biographic and geographic information on a hand-held device.
- This information is entered into an integrated clinical database.
- The patient's vital signs are taken by health practitioners.
- The patient uses a remote survey tool to enter information about their perceptions about their quality of life and other issues.
- That information is downloaded in the HEALTH*e*RECORD, and the provider fills in the remaining information.
- Finally, the patient receives an exit interview (to make sure the diagnosis and treatment are understood and to coordinate referrals) and educational information about the problem. The patient can also evaluate the care he or she received.

The Point-of-View Patient Survey allows patients to share their concerns and receive education and feedback on their specific case. It also asks them how their illnesses are affecting their lives. In the case of diabetes, for example, the patient receives multiple cues for self-care, such as foot care, and the need for foot and eye examinations. This forges a partnership between the patient and the provider. A scorecard then allows physicians to maintain a checklist of each patient's treatment. It shows what the health care team needs to do for the patient, and what the patient needs to do. The system also provides instructions on the proper use of such medical devices as metered-dose inhalers or peak flow meters for asthma, and for such self-care practices as watching for signs and symptoms.

The HEALTH*e*LIFESTYLES enable WRAMC to exceed national standards for care of eight chronic conditions. Patients from the National Capitol Area have been enrolled in a program that gives them access to HEALTH*e*CARE technologies. The Diabetes Management Program is illustrative. We have begun to monitor things like hemoglobin A1c and give eye exams. We estimate that for every one percent reduction in blood sugar levels (hemoglobin A1c blood tests), the risk of blindness, kidney failure, or leg amputation drops by about 40 percent. If the diabetic maintains normal blood sugars, his or her average life expectancy increases significantly. So we understand the benefits of compliance. The HEALTH*e*RECORD is bridging from a paperless inpatient-centered record to a more robust in-patient and outpatient-centered system that captures the efforts of both provider and patients.

Kiley concluded by thanking the PITAC for the opportunity to show the great work of WRAMC staff, their vision, and their ability to pull this system into the 21stCentury. They would like this technology to enter the public domain.

Responding to questions by PITAC member D. Patterson and Benioff, Kiley reported that HEALTHeFORCES has been statistically linked to reductions in emergency room visits and unnecessary hospitalization, as well as to other improvements in health care. These

reduce health care costs—a direct benefit of the program. Quality of life is harder to measure, but when patients feel themselves more active participants in their own care, they do tend to feel some increased sense of wellness regardless of their age. The younger generation is more proactive and aggressive in its own care than their grandparents, who have tended to be satisfied with going to the doctor and doing what the doctor recommends. It's not just about dollars and cents; it's about reducing hospital admissions, making more efficient use of pharmaceuticals, and so forth.

Perlin added that with a 32 percent increase in its budget, the VA is taking care of 98percent more veterans than in 1995, and doing so with measurably better outcomes in quality, access, and satisfaction.

PITAC member G.Yang requested more information about the WRAMC systems architecture and a better understanding of the systems used.

Health Information Technology: Current and Future Initiatives – Remarks by Carolyn Clancy, Director, Agency for Healthcare Research and Quality (AHRQ)

AHRQ focuses on investments to help the rest of the world achieve what the VA and Army have accomplished. Department of Health and Human Services (DHHS) Secretary Thompson is committed to exploiting information technology for improving health care. We have been hearing a lot about the quality chasm, and the Institute of Medicine and others strongly believe that information technology is critical to the bridging that chasm. Beth McGwen and her Rand colleagues published a study in the *New England Journal of Medicine* (June 2003) that showed Americans received recommended care only 54.9 percent of the time. Where have we gone wrong?

We think information technology of the kind you have heard discussed today is a means to the end of improving the quality, safety, efficiency, and effectiveness of health care. But according to a recent Government Accounting Office (GAO) report, 75 percent of what it will take to make information technology work within the health care delivery system to improve the health care system will be "social engineering."

Outside of places like the DoD, the VA, and a few tightly managed systems such as Kaiser Permanente, health care delivery remains relatively decentralized. So in talking about information technology, the first challenge is to clarify what we mean. Very broadly, we are talking about electronic health records, electronic prescribing, decision support, and computerized physician ordering. All of these can be tightly linked, but they need not be—for example, doctors are now pursuing e-prescribing with hand-held computers that are not linked to any of the other functions. We are also talking about connectivity and interoperability across various sectors of the community. If I see a patient who has been to an emergency room across town, I need the information from that visit, and the fact that they are not part of my system is not helpful.

Over the years, AHRQ has had a modest but compelling opportunity to support evaluation of the use of health information technology in clinical settings, most recently as part of the agency's overall portfolio in improving patient safety. We have funded both grants and contracts to evaluate the use of different application of health IT and patient safety. For example, a project at Brigham and Women's Hospital is looking at how shared on-line health records improve patient safety and clinical care. A number of projects focus on the use of hand-held devices, and one project on consumer use of the Internet focuses on parent-initiated prevention.

Within DHHS, AHRQ works with the Centers for Medicare and Medicaid Services (CMS), the Centers for Disease Control and Prevention, and the Food and Drug Administration to reduce the burden of reporting medical errors through centralized electronic reporting. AHRQ also works with CMS and private-sector purchasers to make ambulatory care safer. We have also worked on health IT mechanisms for getting information from clinical care delivery systems to the public health infrastructure to identify effective strategies for detecting early warning signs of a potentially catastrophic event. AHRQ is also working with the Assistant Secretary for Planning and Evaluation at CMS to support anew evidence report on the cost and benefits of health information technology functionalities.

The Brigham and Women's Hospital study and others like it have demonstrated that error reduction reduces costs, but the question of how to implement such systems in Peoria, for example, remains. On the cost side, the implementation and transition are far from trivial. Cedar Sinai Hospital, for example, has put its system in hiatus after an investment of tens of millions of dollars. We do not yet fully appreciate what the costs and length of transitional periods will be, and we are still looking for ways to accelerate progress through the implementation phase. We also do not yet understand what improvements mean in terms of economic productivity and other quality metrics. A systematic review of published and unpublished evidence is a first step in clarifying costs and benefits, and is not a one-time task.

We have also been working with the Institute of Medicine and the HL-7[1] standards organization to develop the functionalities for an electronic health record. AHRQ is working to bring updated information technology to the population served by the Indian Health Service.

In the President's FY 2004 budget, AHRQ has the opportunity to invest $62 million in health information technology:

- $50 million of that will demonstrate hospital-based information technology solutions with a specific emphasis on small community and rural hospitals. $26 million of this total is earmarked for implementing proven technologies in small and rural communities where information technology penetration has been low. The remaining $24 million is targeted for developing, implementing, and evaluating new and innovative technologies to improve patients' safety and quality of care in diverse

health care settings, including a specific focus on interoperability within communities.
- Another $10 million will accelerate diffusion of clinical data standards.

During an experts' meeting AHRQ held during the summer, a variety of stakeholders—including colleagues from Federal agencies and leaders in health care, information technology, patient safety, and rural health—identified several clear themes for our initiatives:

- Financial and non-financial incentives to adopt information technologies and a better understanding of the economics of investing in health information technology needed to develop the business case
- A framework to assess the value of specific features in diverse clinical settings, including the critical link to workflow
- Evaluation of systems currently in use to understand successes and shortcomings
- Development of clinical knowledge—decision support rules and knowledge libraries—for the public domain
- Evaluation of emerging technologies that integrate administrative and clinical systems

While stakeholders told the Department that they have these systems in place, their evidence base (guidelines, protocols, reminders, etc.) must be systematically and frequently updated to be credible. Clancy noted that the issues are similar for rural health care. AHRQ is trying to publicize these initiatives quickly so that the right kinds of partnerships apply to participate in them, including some collaborations between the private and public sectors.

In response to a question by Lazowska, Clancy stated that some private sector systems such as Kaiser and the Mayo Clinic are catching up to the VA and DoD systems, but they are very few. AHRQ works to clarify and identify best practices that others can use in more dispersed settings.

In response to a question by Benioff, Clancy recommended that PITAC strongly support investment in health information technology and examine the tough policy questions being debated across the public and private sectors, especially those dealing with the return on investments. What is it that we are buying? If 75percent of the challenge actually relates to implementation, what role should the government play in supporting technical assistance to accelerate implementation?

Health Information Technology and the Family Physician: Making the Transition from Paper to Electronic Health Records – Remarks by David Kibbe, Director, Center for Health Information Technology, American Academy of Family Physicians (AAFP)

D. Kibbe thanked PITAC for being able to report on the activities of the AAFP in advancing health information technology for medium and small medical practices. His presentation to PITAC covered:

- Surveys and information exchange the AAFP has done over the last year that indicate doctors are ready to make the transition to electronic healthcare systems
- Barriers to acquisition and use of electronic health records by this population of medical practices
- Current AAFP activities

AAFP has 94,000 members, 65,000 of whom are in active practice. While they represent only about eight percent of the physician workforce, on a yearly basis as primary care physicians the active members receive almost a quarter of all outpatient visits. The average practice size of AAFP members is two to five people. This size is not expected to change much, in part because larger practices of primary care physicians are splitting into smaller groups. Since most care is provided outside the hospital setting, a national health information infrastructure must take these small practices into account.

In 2000 the AAFP Board had two goals for family physicians: use the Internet by 2003, and use electronic health records (EHRs) by 2005. While according to a survey about90 percent are connected to the Internet, only about five to ten percent use EHRs even though they would like to. Barriers to using EHRs are:

- Cost—$20,000 to $50,000 the first year
- Workflow interruptions
- Lack of standards
- Fear that systems will become incompatible or obsolete, and not interoperate with other data sources

In the morning at the National Press Club, AAFP announced a coalition of information technology companies including GE Medical, Siemens Medical Solutions, Hewlett-Packard, Quest Diagnostics, Med Plexis, NexGen, TNSI, and A4 to participate in standard-setting activities and to foster use of electronic health records in small and medium practices. They seek a breakthrough in the acquisition and use of electronic health records for small and medium-sized practices. The principles guiding the Principled Group Purchasing Agreements will be affordability, compatibility, interoperability, and data stewardship. Of these, the last is the most controversial.

Information technology products must be in the price range that primary care practices can afford. The systems must be plug-and-play compatible, and physicians must be

assured that they will not have to scrap a system completely when they buy new products. What they have now are devices that do not interact with each other.

The issue of data stewardship is still unresolved. Who is the guardian of the data—drug companies, the Federal government, or vendors? Many companies base their business model and supply of information technology on some form of sale of information from doctors' offices, and we want to make sure that those uses are increasingly ethical.

AAFP does not endorse either products or companies. Rather, it is assembling companies that feel strongly that these principles should be the basis of health information technology for doctor's offices. The agreements include significant reductions in fees to AAFP members for products and services, including hardware, software, and devices. These companies are developing specific standards, particularly around open interface activities for connectivity with laboratories, e-prescribing, the patient's home, etc.

In addition to the Principled Group Purchasing Agreements with the companies mentioned above, AAFP is working with the Healthcare Information and Management Systems Society (HIMSS)[2]and the Massachusetts Medical Society to develop a new XML document standard called the "Continuity of Care Record" (CCR). The CCR includes some 60 to 70data elements that patients and physicians would find helpful in transferring or discharging a patient. At least nine vendors are already working toward interchanging the CCR. The CCR is both machine- and human-readable and can be displayed in many forms—paper, MS Word, Adobe Acrobat Reader, or on a Web browser. Patients who have access to it can transport some of that basic information such as an accurate medication list with doses and times of administration, which will result in fewer medical errors and consistently safer and higher quality care.

In conclusion, Kibbe stated the need for innovative technology firms to align with the physician down in the trenches to create a vision of products and services that will improve office-based quality, care, safety, and efficiency. We need to end the "build it and they will come" mentality of the last 20 years. Standards, promotions, and implementation projects are crucial. Quality, performance, and safety data collection can become routine by-products of EHRs and other office-based information technology, saving time and money over collecting such date by hand or by patient registries. We are very enthusiastic about the support we have gotten from the industry in this regard.

Benioff began the discussion by asking if the VA and Army (Walter Reed) systems were interoperable. The Army representatives said that they are not, since the Army's system is currently programmed to ASP and migrating to DOTNET by January2004 with an Oracle backend for the database, whereas the VA system is client-server based. An XML type of CCR (DD2766) is available as a three-page document, and that is what the soldier takes into the field.

Benioff also asked about Web services standards, a medical Web services description language (WSDL), and interoperability across WSDLs, and received general concurrence that work was being done to bring standards forward. Kibbe pointed out that the

crosswalk between the CCR and HL-7 is going well, and that military and civilian CCRs could be similar.

Benioff asked if the PITAC should prioritize the development of standards for some kind of CCR in XML or WSDL and the development of interoperability, and promote their adoption by industry. Unlike the VA and Army, which are self-contained systems, private practices and hospitals find that interoperability problems get amplified across many systems. Kibbe concurred, adding that interoperability was an important priority that they are close to achieving using existing standards, existing systems, and existing technology. Kibbe also noted a demand for similar standards in e-prescribing; data exchanges between EHRs and laboratories and between EHRs and hospitals; and data exchanges between EHRs and medical devices. Lazowska agreed that this was a good approach to applying existing technologies now, but noted that at some point PITAC should examine how future investments in information technology research and development can lay the foundation for what would be deployed in five or ten years. Benioff stated that letting private industry and innovators build software or software services to deliver these standards, as working applications would be a step forward.

NITRD Programs Related to Health Care and Biomedical Research – Remarks by David B. Nelson, Director, National Coordination Office for Information Technology Research and Development

D. Nelson explained that the Networking and Information Technology Research and Development (NITRD) Program's role is to help focus interagency research and development by identifying common needs, planning common programs, coordinating such programs, and then reviewing them. Twelve government agencies are involved in the NITRD Program, including parts of the Departments of Defense, Energy, Health and Human Services, and Commerce, and the National Science Foundation, National Aeronautics and Space Administration, Environmental Protection Agency, and, as an observer, the Federal Aviation Administration.

NITRD evolved from the High-Performance Computing and Communications (HPCC) initiative, was succeeded by the Computing Information and Communications (CIC) Program, and included the Next Generation Internet (NGI) Initiative. The PITAC, authorized by the High-Performance Computing Act of 1991, is tasked with reviewing the NITRD Program, which is why we are here today. PITAC is to provide an independent assessment of:

- Progress made in implementing the Program
- The need for revisions
- The balance among the Program's components
- Whether the research and development undertaken helps maintain U.S. leadership in computing technology
- Other issues identified by the Director of the Office of Science and Technology Policy

Nelson cited the 1999 PITAC report, *Information Technology Research: Investing in Our Future*, and the PITAC report on *Transforming Health Care through Information* Technology. This last report, released in February 2001, is a preliminary report to PITAC's current study. In fact, several of its recommendations have already been implemented. He commended it to the PITAC.

The NITRD Program's components and the elements that are applicable to medicine include:

- High-End Computing (HEC), especially:
  - Computing architectures and technologies
  - Algorithms and tools
  - Applications
  - Computing resources
- Large System Networking (LSN), especially:
  - Network technologies, scaling, reliability, security
  - Wireless, *ad hoc*, and sensornet capabilities
  - Future Internet architectures to overcome current limitations (for example, real-time applications)
  - Middleware to enable network-aware applications
  - Collaboration technologies
  - Network resources
- High Confidence Software Systems (HCSS), especially:
  - Software theories and methods for reliability, security, safety, usability, and confidentiality
  - Certification of software for medical and other devices
- Software Design and Productivity (SDP), especially:
  - Methods and tools for software requirements, specifications, design, and implementation that will produce software on time, within cost, and meet functional requirements
  - Reliable medical software
- Human-Computer Interaction and Information Management (HCI&IM), especially:
  - How humans use data and information
  - Synergies between humans and computers
  - Health care and medical issues such as:
    - Data quantity—there are 800 million doctor visits each year
    - Data management—health care come in both large and small chunks (CAT Scans vs. doctors' notes)
    - Human interface with data—it must be intuitive, easy, and fast
    - Finding data and relationships among data elements
    - Data quality metrics
- Social, Economic, and Workforce Issues and IT Workforce Development (SEW)

He gave specific examples of Federal health related NITRD programs in the areas of:

- Modeling and simulation (for example, water transport through cell membranes)
- Mobile telemedicine—to optimize treatment in the "Golden Hour"
- Patient monitoring and management
- Information management and analysis
- Medical technologies
- Standards development
- A networked collaborative surgical system that illustrates what multi-disciplinary teams can accomplish when they take advantage of existing technology

PITAC can help support current research that might have high payoff for the health care community:

- Prioritize near-term, high-leverage areas that would have immediate economic or patient-survival impact. Emergency care's "golden" hour is one such area.
- Take advantage of "low hanging fruit"— products that already exist in prototype within the medical community, or products outside that community easily applicable to health care.
- Partner across communities and disciplines to avoid wasting money.
- Develop standards with all the relevant actors at the table. Have reference implementations and feedback to enable improvements in the prototype phase. The development of the Internet, with its "rough consensus and running code," is an historical model. Similar practices are being used today in grid computing and middleware.

Proposed Work Areas for PITAC Health and Information Technology Subcommittee – Remarks by David Staelin, Co-Chair, PITAC Health and IT Subcommittee

The PITAC Health and Information Technology Subcommittee will cover three areas during Phase I of this study (each area led by one Subcommittee Co-Chair):

- Implementing health information technology (Javitt)
- Building a durable national health information infrastructure (Neupert)
- Privacy and security for health information (Staelin)

The Subcommittee will meet every other week via teleconferencing. A series of information gathering meetings, including town hall meetings and briefings by invited experts, will result in a draft report for PITAC review in April, with a final report containing findings and recommendations expected in June 2004.

The next meetings are on November 25 and December 11, 2003, and a face-to-face meeting in Washington on January 8, 2004.

Discussion among PITAC members and presenters

Staelin asked the VA representatives if the technology they use were publicly available. Javitt replied that the system is in the public domain, but since no large private-sector vender like Oracle or Microsoft supports its underlying database system, it would be difficult for others to employ. The Indian Health Service at DHHS currently uses it, and it could be more widely used.

Mortazavian raised the questions of how to minimize the probability of errors in diagnosis and treatment by comparing an individual case with a database drawn from a larger population. The data are there, but access currently is not. Javitt said this could be addressed by looking at three kinds of errors:

- Mistakes due to failure to carry out the doctor's intentions—bar coding approaches can help here
- Mistakes due to the doctor's failure to think of the right thing to do at the right time—informing the doctor about current guidelines can help
- Mistakes due to inability to evaluate the patient's care against some standard or within certain populations—mathematical models built into systems could compare patients' care to a large population

Discussion from the public

L. Kun from the National Defense University raised several new issues for consideration:

- Consumers ordering self-prescribing drugs through the Internet with few quality checks
- International standards in disease surveillance and reporting
- Anonymously accessible genomic and other information for disease prevention

Adjournment: The co-chairs thanked the NCO, Noesis staff, and others for their assistance in supporting the PITAC meeting. The meeting was adjourned at 3:10 pm.

Invited Speakers (7):

John Marburger, III	OSTP
Elias Zerhouni	NIH
MarkMcClellan	FDA
JonathanPerlin	VA
Kevin C.Kiley	WRAMC
CarolynClancy	AHRQ
David Kibbe	AAFP

U. S. Government Attendees (46):

KamalAbdali	NSF
FrankAnger	NSF
DougBabcock	VA
DavidBernholz	CIA
David Brantley	DOC
Jay Carlson	U.S. Army
Gary Christopherson	VA
Rex Cowdry	National Economic Council
Alexander Daniels	Department of State
Richard Desjardins	NASA
Joseph Evans	NSF
J. M. Flynn	AHRQ
Nelson Ford	OSD
Michael Gill	NIH/NLM
John Grosh	OSD
Jane Bortnick Griffith	NIH/NLM
James Halstead	WRAMC
Guy Hammer	OSD
Sharon Hays	OSTP
Cray Henry	DoD
Peter Highnam	NIH
Daniel Hitchock	DOE/SC
Sean Jackson	NSF
GaryJohnson	DOE/SC
MikeKane	NOAA
RobertKolodner	VA
GaryKoob	DARPA
NormanKreisman	DOE/SC
Luis Kun	National Defense University
Carl Landwehr	NSF
M. Marron	NIH
Steve Meacham	NSF
Maureen O'Brian	OSTP
C. Edward Oliver	DOE/SC
Haesun Park	NSF
Jill Phillips	U.S. Army
Kevin Piekarski	DHS
Marshall Potter	FAA
Lt. Col. Jaime Rosado	U.S Air Force
Richard Russell	OSTP
Karen Skinner	NIH
Shiela Strand	NIH
Michael Strayer	DOE
Erwin Ta	VA

Scott Young	AHRQ
Susan Zevin	NIST

NCO Government Personnel (2):
David Nelson
Sally Howe

NCO Contractors (10):
LaShante Jenkins
William Harrison
Frankie King
ElizabethKirk
MarthaMatzke
GrantMiller
Virginia Moore
Paula Offord
Alan Tellington
Diane Theiss

Private Citizens (58):

Don Asmonga	AHIMA
Bill Bartalone	SGI
Jane Beach	Ace Federal Reporting (Court Reporter)
Rick Bennett	
Richard Betel	Dell
Dennis Carroll	IBM
John Cary	Business Week
John Chisholm	Customer Sat, Inc.
David Clark	SAIC
Elisabeth J. Cohen	Wills Eye Hospital
R. Copeland	Platform
William Delaney	PKC Corporation
Laurent demarche	Embassy of France
DeChane Dorsey	American Academy of Ophthalmology
Michael Dunaway	Noesis, Inc.
Phil Duncan	eHealth Initiative
P. Dunphy	Active Health Management
John Eisenberg	National Academy of Sciences
Laurie Evans	eHealth Initiative
Jim Foley	Georgia Tech
John Forrester	SAIC
Wanda Gamble	SAIC
Jerry Grossman	Harvard
Bianca Gwinn	Healthwise, Center for Information Therapy
Shane Harris	Government Executive

Peter Harsha	Computing Research Association
Paul Hebert	Patient Safety Institute
Charles Hoyes	Verizon
Joab Jackson	Government Computer News
Joy Jordan	
Dave Kiefer	Unify Corporation
David A. Kobus	Pacific-Science?
Mary Kratz	Internet2
Thomas Leary	HIMSS
Dan Looper	SAIC
Edward Lowry	MIT
Robert Marotta	WebMD Corporation
Lisa Kolker Max	
David Mongillo	College for American Pathologists
John Nyland	IBM
Nancy Olsen	WebEx
Laura Pavlovich	Salesforce.com
Suzanne Rexing	Battelle
Deborah Rudolph	IEEE
Greg Simon	CAMS
Vi Shaffer	Cerner Corp.
D. Stevens	SGI
Sheila Strand	National Association for Home Care and Hospice
Karl Sydulko	
Ofer Tennenbaum	EFI
Laura Vartain	Wexler and Walker Public Policy Associates
Rebekah Weiss	Kegler, Brown, Hill, and Ritter
Stephen Weaty	Data Pharm
James Wilson	Johns Hopkins University
Dan Winship	Patient Safety Institute
Patti Yamakido	SGI

Minutes prepared by Sally E. Howe, Elizabeth Kirk, and John Petrick

David B. Nelson
Director, National Coordination Office for Information Technology Research and Development

Marc Benioff
Co-Chair, President's Information Technology Advisory Committee

Edward Lazowska
Co-Chair, President's Information Technology Advisory Committee

[1] Health Level 7 is one of several ANSI-accredited Standards Developing Organizations (SDOs) operating in the healthcare arena. www.hl7.org

[2] www.himss.org