Minutes of the
President's Information Technology Advisory Committee
September 25, 2001

The fourteenth meeting of the President's Information Technology Advisory Committee (PITAC) was called to order by Co-Chairs Raj Reddy and Irving Wladawsky-Berger at 8:05 A.M., September 25, 2001, in Room II-555 of the National Science Foundation (NSF) building, 4121 Wilson Boulevard, Arlington, Virginia. 19 Committee members, 54 Federal employees, and 46 private citizens were in attendance at the one-day PITAC meeting.

Welcome and Announcements

I. Wladawsky-Berger announced that the PITAC meetings for the coming year were scheduled for February 14-15, June 10-11, and October 1-2, 2002. He announced that the President had extended the tenure of the PITAC by two years, to June, 2003. He said that a draft mission statement for the PITAC had been prepared and was included in the members' binders, for discussion at the next PITAC meeting. He noted that Ruzena Bajcsy was leaving the NSF to take a position at the University of California at Berkeley and, on behalf of the PITAC, thanked her for her excellent work. Finally, he noted the need for the PITAC to address and revise the recommendations made in the PITAC's 1999 report, *Information Technology Research: Investing in our Future*.

White House Report

Paul Domich, Office of Science and Technology Policy (OSTP), Executive Office of the President, said that the White House and OSTP expressed their thanks to the PITAC for their excellent and productive work. Dr. John Marburger has been nominated as the Science Advisor and Director of OSTP. Confirmation hearings are expected to occur in mid-October; once Marburger is confirmed, the appointment of other individuals within OSTP will proceed, beginning with the Associate Directors. There are currently eight openings on the PITAC and the nominating process for these vacancies is proceeding. Finally, Domich said that this would likely be his last PITAC meeting, as he is returning to his position at NIST in Boulder, CO.

David Trinkle, Office of Management and Budget, Executive Office of the President, said that almost all agency budgets had passed both House and Senate at funding levels at or above their requests for IT-related items but were not yet through conference. Budgets for the Departments of Defense and Health and Human Services were still unresolved.

Report of the Panel on Individual Security

J. Thompson, Chair of the Individual Security Panel (ISP), announced that the panel would have a draft report to present at the February 2002, PITAC meeting. Although the ISP could not yet give recommendations, Thompson enumerated several of the panel's findings. First, individual identity (and the ability to adequately authenticate identity) is now part of our national infrastructure, without which our economy can not operate. Second, a new definition of identity and authentication is needed and the possession of a correct Social Security Number (SSN) can no longer be accepted as sufficient proof of identity. Third, although transaction initiation and execution have become very fast using modern technology, correction of mistakes (including recognition of fraud) is still dependent on older, slower technology. Fourth, although IT is not itself a cause of the problems associated with individual security, it serves to amplify these problems because corrective measures are too slow to contain the damage done by crimes using Information Technology, such as identity theft.

Thompson said there are very real conflicts between ensuring privacy and protecting against identity theft that must be resolved, especially between consumers' desire for instant gratification and ease-of-use versus the government's need to regulate commerce. Areas of conflict include: the use of the SSN as an authenticator, despite the fact that these numbers are easily compromised and that the American public has traditionally resisted a national identity system; the need to cross-check government databases to establish identity versus fears that this will lead to unacceptable loss of privacy; controversy in the responsibilities of the credit reporting industry as to the accuracy of the information they report; and controversy in establishing what constitutes due diligence in establishing identity and in accepting changes of address (a major component in identity theft.)

Address by Rita Colwell, Director, National Science Foundation

Wladawsky-Berger introduced *Rita Colwell, Director of the National Science Foundation*. Colwell said that the 1999 PITAC Report had been very influential in Congress, and credited it with helping to obtain significant increases in the federal IT portfolio. She attributed PITAC's success to their partnership, leadership, and vision. On the very day of this PITAC meeting – September 25, 2001 – NSF announced 309 research awards from more than 2000 proposals in their ITR program, totaling more than $156 million. Proposals were submitted in areas to include system design and implementation; social, economic and workforce implications of Information Technology; information management, data analysis and informatics; applications focusing on simulations and advanced computation; and scalable information infrastructure. Some specific examples of research awards include:

- a $7 million, 5 year award to U.C. Berkeley to create an unprecedented societal-level information system;
- Computer scientists and associated researchers at Carnegie Mellon University, Rice University, and Old Dominion University will develop software for distributed on-line simulation;
- Researchers at the University of Kansas will deploy radar sensors in polar regions to collect real-time data on ice-sheet interactions;
- Clarkson University of New York will apply IT to the study of solid-state physics; and
- Survivors of the Shoah Visual History Foundation will develop speech recognition software to deal with the multi-lingual aspects of cataloging 116,000 hours of multi-media content from Holocaust survivors.

Colwell emphasized the unprecedented size, complexity, and distributed character of these awards. More than two-thirds of ITR awards are now multi-disciplinary and multi-investigator. The Laser Interferometry Gravity-Wave Observatory (LIGO), at $300 million is the largest research project ever undertaken by NSF. It includes seven research organizations, three frontier physics experiments, thousands of scientists, and the need to collect, store, and process 100 petabytes of data (far outpacing current capabilities). The NSF-sponsored Grid Physics Network (GRIPHYN) will provide the IT advances needed for LIGO. The Distributed Terascale Facility (DTF) is the first component of the "cyber infrastructure," an integration of high-end instrumentation, computing, networking, and human-computer interaction.

Colwell stated IT is the common thread running through every single one of NSF research areas, citing examples in biocomplexity, ecology, and nanotechnology. She showed a video presentation that highlighted aspects of recent nanotechnology research. She closed by citing some areas of future ITR emphasis, including security and revolutionary computing technologies, and thanked the PITAC for their continuing help.

In response to a question about issues she had faced at the NSF, Colwell cited the successful migration of NSF from stove-piped Directorates to an interacting team. Noting also the emphasis that PITAC placed on software research, she said that $90 million is being devoted to it thus far, and that more would follow. Finally, there is a need to increase enrollments, degrees, and stipends in graduate studies in math, science, and engineering.

Brainstorming the Future: Issues and Opportunities in IT

R. Reddy introduced, and I. Wladawsky-Berger led, a discussion on issues and opportunities in IT, and what lessons might be drawn from recent events, beginning with the industry members' assessments. Wladawsky-Berger noted that it is an entirely new era from 1999 to the present especially following the economic downturn in the IT

industry. The pace of innovation is nonetheless super-exponential in many technologies, especially storage. Moreover, grid computing is turning the Internet from a simple transport and content medium into a computing platform in its own right. But he questioned whether the IT recession might inhibit the development of these new technologies. J. Gray said that the super-exponential growth of technology was not being matched by increases in human intelligence or productivity, and that for these technological advances to have any real effect, many difficult and long-term problems remain to be solved. He predicted that graduate school enrollments will increase, with students' expectations becoming more realistic and their research once again oriented to longer-term advances.

V. Cerf noted that hardware improvements were not being matched in software, especially in light of the huge and continuing increase in software complexity. He also cited the "last mile" problem of end-to-end Internet bandwidth. Several members agreed that, despite continuing strong growth in demand, these are key blockages to IT industry recovery. They predicted that, following a period of consolidation, significant bandwidth improvements would lead the IT recovery. E. Benhamou noted that the entire IT industry was very seriously sick even before the events of September 11, and that even with healthy demand, innovation, and consolidation, IT industry recovery might not occur until well into 2002. B. Ewald and L. Smarr emphasized that the pace and breadth of innovation are still strong, and that both ideas and opportunities are available in the marketplace. Venture capital firms continue to invest money, although at a reduced pace and more narrowly focused on existing companies and technologies. Wladawsky-Berger summarized the discussion as having a mood of concern but not of pessimism, and that continued long-term research and development is still the key to recovery.

Report of the Subcommittee on Social, Economic and Workforce (SEW) Implications of IT and IT Workforce Development

J. Miller revisited two of the findings of the 1999 PITAC Report as well as the over-arching recommendation. First, the use of information technology, in particular the growing popularity of the Internet and the growing use of global commerce has introduced a series of important and complex policy issues. The central point is IT policy decisions and investments are based upon incomplete research and data concerning the effects of IT on society. Since that Report, the amount of SEW research has grown significantly and the results of that research are being used in policy-making. Second, the supply of information technology workers does not meet the current demand. Changes in the economy since then suggest that this situation has improved. Academic experience shows that it is not nearly as hard to get really good, smart kids to stay in Master or PhD programs to work in collaborative projects that require IT research. However no systematic research has been put forward to answer the question with certainty. The over-arching recommendation to expand Federal research initiatives and government/university/industry partnerships to increase IT literacy, education, and access

still holds. Good research is being conducted but more research in all these areas still needs to be conducted and it needs to be effectively plugged into the policy decision-making stream.

The Subcommittee received a presentation by *Lawrence Grossman, former President of NBC News and PBS*, on how he and *Newton Minnow, former Chairman of the FCC*, had proposed to establish a "Digital Opportunities Trust Fund." The Fund would sponsor IT education-related R&D at a level commensurate with the national importance of this issue, and would be paid for by auctions of the radio frequency spectrum. (The details of the proposal can be found on the Internet at www.digitalpromise.org, and in the book, *A Digital Gift to the Nation*, by Grossman and Minnow.) The Subcommittee supports the proposal and is considering drafting a letter to the President requesting his support, possibly to include mention of it in his State of the Union speech in January 2002.

Miller also cited the new emphasis on SEW issues at NSF, noting the large number of excellent proposals, only about one third of which could be funded. Funding levels still remain too low to support the good research and really innovative ideas being offered. PITAC members can help by recommending more SEW funding and by other efforts to increase SEW visibility, such as mentioning SEW issues when talking to Congress and giving talks at workshops and conferences. Finally, he noted the need to get more members with SEW expertise on the PITAC.

Report of the Subcommittee on High End Computing (HEC)

S. Wallach began by citing the High End Computing recommendations in the 1999 PITAC Report, especially those calling for increased funding for NSF Centers and increased support for the U.S. research community. Progress is satisfying with respect to high performance computing and the recommendations made in the 1999 PITAC Report. Total HEC funding has increased approximately three-fold since that report. However, these advances, particularly those in innovative architectures, had been evolutionary rather than revolutionary, and the recommended funding increases for revolutionary architectures has not happened.

Wallach cited the NSF's new Distributed Terascale Facility (DTF) as an example of current HEC activity. The DTF is especially novel because it uses heterogeneous and distributed platforms. Additionally, DTF is a prime example of the convergence of communications and computing. He cited also the breadth of new supercomputing applications, such as genome splicing, adding that more such applications were now appearing and that more and more applications of high end computing will be seen in the life sciences. Another major event in high end computing is the on-line petabyte databases on disks that provide milliseconds of latency as opposed to seconds and allows for a true distributed processing nationwide. Finally, he noted that virtually all massively parallel processor systems were moving toward RISC-based processors.

Looking to the future, Wallach noted the convergence of high-end communications and computing research. Moore's law will continue to operate for hardware, but much more research is required in high-end software at all levels. Open-source software will become ever more important, and functionalities such as security will become mandatory. New materials and paradigms, including nanotechnologies and optical computing, will soon become realistic bases for supercomputing.

Address by Mark Forman, Office of Management and Budget

I. Wladawsky-Berger introduced *Mark Forman, Associate Director of Information Technology and E-Government, Office of Management and Budget*, who gave a presentation on "Achieving the Vision of E-Government." Forman began by noting that e-government is one of the five points of the President's Management Agenda, the other four being performance-based budgeting, competitive sourcing, human capital, and financial management reform. The function of e-government is to transform the way government operates by improving its effectiveness, efficiency, and quality of service. Forman's goal is one order-of-magnitude improvement in the value of government to citizens, particularly in responsiveness and accountability.

The current Federal budget for IT is roughly $45 billion. The challenge is to optimize that figure, focusing on results and aligning them with agency performance plans. This will require integrating "islands of automation" while still providing a secure IT environment and protecting individual privacy. Forman said that users (citizens, businesses, and other governmental entities) must have a unified view of data and simplified government processes in order to reap the benefits of improved access to government. This will involve adopting knowledge management tools and distributing their processes among the "knowledge communities" that actually do the work. Success will require clear definition of governance, roles, and responsibilities.

In the discussion period, several speakers noted that this is very similar to what larger businesses have been trying to do, although the scale of e-government is much larger. Forman cited the PITAC publications on *Digital Libraries: Universal Access to Human Knowledge* and *Transforming Access to Government Through Information Technology*, and said that they had been quite helpful to him, but much more remained to be done. Wladawsky-Berger offered that the PITAC would help in whatever way it could.

Report of the Subcommittee on Scalable Information Infrastructure (SII)

L. Vadasz said that the SII Subcommittee had reviewed the results of the recent discovery process. The responses were excellent and very thorough, and that interpreting them fully would be very complex. In the SII area, there are a large number of projects across seven

different agencies, which in total address all of the SII recommendations in the 1999 PITAC Report. There is strong evidence of interagency cooperation, with different projects being managed together and different groups being brought together to leverage each other's work. Some examples include test beds, end-to-end system analyses, and issues, network measurement and network modeling. There is also a definite change toward larger, multi-investigator, multi-year projects, representing a broader range of research than previously conducted. Finally, limited funding is still a major problem, although some areas (e.g., security) may receive more funding following the events of September 11. The discovery process also highlighted the need for better coordination between and understanding of PITAC's topics and goals and the more limited scope of acceptable activities within the mission-oriented agencies.

D. Cooper noted that the Next Generation Internet (NGI) project was now four years old, and asked whether there had been successes. *George Strawn, Co-Chair of the Large Scale Networking Coordinating Group*, said that the NGI project had finished and had achieved notable success in improving overall throughput, but that difficult problems had surfaced in translating this into end-to-end improvement. These problems are now being addressed.

Report of the Subcommittee on Software

S. Graham reported that the software subcommittee had begun examining the results of the discovery process and was preparing possible updates to its recommendations in the 1999 Report. She began the summary by identifying systemic issues. The PITAC and the software subcommittee must do a better job of explaining the nature of software research to non-IT people, explaining why software research needs are not being satisfied by commercial activity, and presenting software research done by mission agencies clearly within the context of the agency mission.

The subcommittee was pleased with the government response to the 1999 software recommendations. There was excellent interagency collaboration and planning, with the ITR program in particular filling a vital role. The number of proposals is high and the proposals are diverse both in duration and breadth of investigation. But the range of risk is too narrow. This was due, in part, to the 1999 funding recommendations not having been met for higher-risk proposals, and to the conservatism inherent in the funding enterprise. Graham cited specifically that larger grand-challenge proposals had faced many difficulties in obtaining funding. But the subcommittee itself had also been too conservative in estimating the research community's ability to propose high-quality, higher-risk projects.

Graham revisited the recommendations made at the May 2001 PITAC meeting: better monitoring and assessment of modes of funding and more encouragement for multi-disciplinary research. Areas such as scalability, digital libraries, and human interaction

technologies need continued support, and areas such as security, software design and development, and managing intellectual property need increased attention.

In the comment period, H. Garcia-Molina and E. Benhamou noted the high cost of the proposal process itself, and suggested studying the methods of venture capital companies. D. Nagel said that students are not being sufficiently trained to think in terms of higher-risk research, and that this is influencing their proposals when they themselves become researchers.

Public comments

There were no public comments.

Adjournment

Raj Reddy and Irving Wladawsky-Berger adjourned the meeting at 2:47 P.M.

The full transcript of the PITAC meeting is available from the National Coordination Office for Information Technology Research and Development, 4121 Wilson Boulevard, Suite II-405, Arlington, Virginia 22230, Tel, (703) 292-4873, E-mail: nco@itrd.gov

Attendees

September 25, 2001

PITAC Members Attending

Raj Reddy, Co-Chair	Carnegie-Mellon University
Irving Wladawsky-Berger, Co-Chair	International Business Machines Corporation
Eric A. Benhamou	3Com Corporation
Vinton Cerf	WorldCom
Ching-Chih Chen	Simmons College
David Cooper	Lawrence Livermore National Laboratories
Steven D. Dorfman	Hughes Electronics Corporation
Bo Ewald	EStamp
Sherrilynne S. Fuller (by Telephone)	University of Washington Health Science Center
Hector Garcia-Molina	Stanford University
Susan L. Graham	University of California at Berkeley
James N. Gray	Microsoft Research
Robert E. Khan	Corporation for National Research Initiatives
John P. Miller	Montana State University
David C. Nagel	Palm, Incorporated
Larry Smarr (by Telephone)	California Institute for Telecommunications and Information Technology
Joe F. Thompson	Mississippi State University
Leslie Vadasz	Intel Corporation
Steven J. Wallach	Chiaro Networks

Government Attendees

Rick Adrion	NSF
Frank Anger	NSF
David Bernholz	NCO/ITRD
Brett Bobley	NEH
Jill Bothe	NASA
Ann Bush	NSF
Nesa Call	NSF
Yuon Chang	FCC

George Cotter	NSA
Lawrence Daly	DOC
Frederika Darema	NSF
Mita Desai	NSF
Richard desJardins	NASA/NREN
Lester Diamond	GAO
Paul Domich	OSTP
Lela Ellis	USDA
Tom Fioramonti	EPA
Mark Forman	OMB
Cita Furlani	NCO/ITRD
Greg Garcia	U.S. House of Representatives Science Committee
Tom Garritano	NSF
Helen Gigley	NCO/ITRD
Helen Gill	NSF
Martin Herman	NIST
Lee Holcomb	NASA
Sally Howe	NCO/ITRD
Susan Iacono	NSF
Gary Johnson	DOE
Marjory Johnson	NASA
Nina Kieull	NAS
Eva Kingsbury	NSF
Gary Koob	DARPA
Norm Kreisman	DOE
Tsengdar Lee	NASA
Mari Maeda	DARPA
Stephan Mahaney	NSF
Mike Marron	NIH
Jennifer McAndrew	NIST
Gary Minarich	NASA
Greg Monaco	NSF
José Muñoz	DOE/NNSA
Charles E. Oliver	DOE
Jane Prey	NSF
Rita Rodriguez	NSF
Jean Scholtz	DARPA
Robert Sloan	NSF
George Strawn	NSF
Gary Strong	NSF
David Trinkle	OMB
Susan Turnbull	GSA

William Turnbull	NOAA
Carmen Whitson	NSF
Xiaodong Zhang	NSF
Lee Zia	NSF

NCO Contractors

Ed Garcia
Larry Janicki
Martha Matzke
Virginia Moore
Betty McDonough
Grant Miller
Ann Rutherford
Lori Shapiro
Frank Sledge
Alan Tellington
Diane Theiss
Carolyn Van Damme
Bob Winner

Private Citizens

Fred Adler	FLA
Robert Albano	George Washington University
R. Bazz	University of Pennsylvania
Melvyn Ciment	
Clifford Collins	OARNET
Laurant de Mercey	Embassy of France
Stephen Dennis	BEEDNET
Ed Derrick	AAAS
Michael Dunaway	Noesis, Inc.
David M. Everard	Intel
Diane Frank	Federal Computer Week
Susan Fratkin	Coalition for Academic Scientific Computation
Cynthia Gayton	
David Hoffman	Ace Federal
Rick Jones	Intel
Taffy Kingscott	IBM
Christopher Koehaki	Embassy of Japan
Kei Koizumi	AAAS
Rich Kostro	Interpretech

Scott Nance	New Technology Week
Todd Nash	Tech TV
Michael Nelson	IBM
Phillip Nelson	
Lori Perine	Interpretech
Mari Peterson	SRI
Patrick Reys	Washington Internet Daily
Karen Rohb	Federal Times
Jean Smith	CRA
Patrick Smith	Government Computer News
David Staudt	EduCause
RaeAnn Steinberg	APHSA
Dan Van Belloghem	Alliance-EPSCoR
Hugh Wolfe	Cisco

Minutes prepared by Frank Sledge

November 30, 2001

Cita Furlani

Director, National Coordination Office for Information Technology Research and Development

Approved:

November 30, 2001

Raj Reddy

Co-Chair, President's Information Technology Advisory Committee

November 30, 2001

Irving Wladawsky-Berger

Co-Chair, President's Information Technology Advisory Committee