A NITRD Dashboard

Spotfire

Build the Tweets from Open Government R&D Summit, March 21-22, 2011, in the Cloud
Build the NITRD Dashboard in the Cloud
Build the R&D Dashboard in the Cloud

Background


CONFERENCE AGENDA

Monday, March 21 (McGowan Theater)
1:00 PM WELCOME Introductions
1:10 – 1:30 PM OPEN GOVERNMENT RESEARCH AND DEVELOPMENT
1:30 – 3:00 PM REFLECTIONS ON 21ST CENTURY INSTITUTIONS AND ORGANIZATIONS FROM THE POLICY COMMUNITY
3:00 – 3:15 PM BREAK
3:15 – 4:45 PM DATA TRANSPARENCY in HEALTH
4:45 – 5:00 PM BREAK
5:00 – 6:30 PM COLLABORATION AND MULTI-SECTOR PARTNERSHIP — INT’L AFFAIRS
6:30 – 8:00 PM Reception (McGowan Theater Lobby)

Tuesday, March 22 (McGowan Theater)
8:00 – 8:30 AM Continental Breakfast
8:30 – 10:00 AM CITIZEN ENGAGEMENT AT THE DEPARTMENT OF VETERANS AFFAIRS
10:00 – 10:30 AM BREAK
10:30 – 11:30 AM Smart Disclosure for Consumer Panel Discussion Decision Making
11:30 – 12:30 PM Lunch
12:30 – 1:30 PM OPEN INNOVATION AT THE DEPARTMENT OF EDUCATION
1:30 – 2:30 PM OPEN GOVERNMENT – STATE AND LOCAL GOVERNMENT
2:30 – 3:00 PM BREAK
3:00 – 4:15 PM OPEN GOVERNMENT – REFLECTIONS FROM THE RESEARCH COMMUNITY
4:15 – 4:45 PM CLOSING REMARKS Prize Announcement

Panelist Information

H. Giovanni Carnaroli
CENDI Meeting, November 4, 2011
OSTP Databases at Data.gov
The R&D Dashboard
SUPPLEMENT TO THE PRESIDENT’S BUDGET FOR FISCAL YEAR 2011

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NITRD Agencies: NSF, OSD and DoD Service research organizations, DOE/SC, DARPA, NIST, NASA, NSA, NOAA, DOE/NNSA

President’s 2011 Request

Strategic Priorities Underlying This Request

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President’s 2011 Request

Strategic Priorities Underlying This Request

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NITRD Agencies: NIH, NSF, OSD and DoD Service research organizations, DARPA, NIST, NASA, AHRQ, NOAA, EPA, NARA
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President’s 2011 Request

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NITRD Agencies: NIH, NSF, OSD and DoD Service research organizations, DOE/SC, DARPA, NIST, NASA, NSA, AHRQ, NOAA
Other Participants: DHS, NTIA, USGS

President’s 2011 Request

Strategic Priorities Underlying This Request
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NITRD Agencies: NIH, NSF, AFOSR, ONR, NIST, NASA, NOAA
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NITRD Agencies: NIH, NSF, OSD and DoD Service research organizations, NIST, NASA, NSA
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- Subcommittee on Networking and Information Technology Research and Development

- NIH
- NSF
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High End Computing (HEC) Interagency Working Group
Cyber Security and Information Assurance (CSIA) Interagency Working Group
Human-Computer Interaction and Information Management (HCI&IM) Coordinating Group
Large Scale Networking (LSN) Coordinating Group

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- Middleware and Grid Infrastructure Coordination (MAGIC) Team
- Software Design and Productivity (SDP) Coordinating Group
- High Confidence Software and Systems (HCSS) Coordinating Group
- Social, Economic, and Workforce Implications of IT and IT Workforce Development (SEW) Coordinating Group

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- Technical/Scientific Merit
- Readiness
- Timeliness
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Acknowledgements
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For Internet Explorer Users and Those Wanting Full Screen Display Use: Web Player Get Spotfire for iPad App Tutorial Slides

Build the R&D Dashboard in the Cloud

For Internet Explorer Users and Those Wanting Full Screen Display Use: Web Player Get Spotfire for iPad App

Background

Home Page: http://nitrd.gov/

**Designing a Digital Future** (IN PROGRESS)

**Agenda:** [http://www.nitrd.gov/opengov/OPEN%20...T%20AGENDA.pdf](http://www.nitrd.gov/opengov/OPEN%20...T%20AGENDA.pdf)

**March 29, 2010:** [http://www.nitrd.gov/et/](http://www.nitrd.gov/et/)

**Report:** [http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-nitrd-report-2010.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-nitrd-report-2010.pdf) See Wiki Version

See [2010 NSF Science and Engineering Indicators](http://www.nsf.gov/sbe/)


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[http://fcw.com/articles/2011/03/15/g...cwdaily_160311](http://fcw.com/articles/2011/03/15/g...cwdaily_160311)  

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**Open Government Research & Development Summit, March 21-22, 2011**

**Connecting the Research and Development Community with Government**

Monday 1:00 - 6:30 plus reception  
Tuesday 8:30 – 4:45  
Please R.S.V.P. by March 16, 2011 to opengov@nitrd.gov

National Archives and Records Administration  
McGowan Theater, National Archives Building  
700 Pennsylvania Avenue, NW  
Washington, DC 20408-0001

The summit will set the foundation for a robust R&D agenda that ensures the benefits of open government are widely realized, with emphasis on how open government can spur economic growth and improve the lives of everyday Americans. The President's Council of Advisers on Science and Technology noted the importance of establishing an R&D agenda for open government in their recent report. This will be the first opportunity for researchers, scholars, and open government professionals to begin a discussion that will continue at academic centers throughout the country over the next few years.
Government innovators will talk about openness in the context of education, health, and economic policy, and international open government. Speakers include Aneesh Chopra, U.S. Chief Technology Officer, Todd Park, Chief Technology Officer of the U.S. Department of Health and Human Services (HHS), and David Ferriero, Archivist of the United States.

Panelists made up of scholars, activists, and present and former policymakers will then discuss the important research questions that researchers must grapple with in order to ensure lasting success in the open government space. Panels will discuss issues such as how to safely release data without creating mosaic effects. Panelists include Jim Hendler (Rensselaer Polytechnic Institute), Noshir Contractor (Northwestern University), Archon Fung (Harvard University), Chris Vein (U.S. Deputy Chief Technology Officer), Beth Noveck (New York Law School), and Susan Crawford (Yeshiva University).

The National Archives and Records Administration (NARA) and Networking and Information Technology Research and Development (NITRD) are hosting this summit, with support from the MacArthur Foundation. The conference is free to attend. We are preparing an agenda for distribution.

The Summit on Open Government Research is sponsored by the National Archives and Records Administration (NARA) and the Networking and Information Research Technology Research and Development (NITRD) Program, supported by the MacArthur Foundation.

CONFERENCE AGENDA

Tweets: http://twitter.com/#!/search?q=%23opengovrd


Monday, March 21 (McGowan Theater)

1:00 PM WELCOME Introductions
David Ferriero, Archivist of the United States
Chris Vein, Deputy U.S. Chief Technology officer
http://www.whitehouse.gov/blog/2011/03/17/three-trends-fostering-innovation-through-open-government

1:10 – 1:30 PM OPEN GOVERNMENT RESEARCH AND DEVELOPMENT
Keynote Aneesh Chopra, U.S. Chief Technology Officer SLIDES
http://blog.stodden.net/2011/03/21/open-gov-summit-aneesh-chopra/

1:30 – 3:00 PM REFLECTIONS ON 21ST CENTURY INSTITUTIONS AND ORGANIZATIONS FROM THE POLICY COMMUNITY
Aneesh Chopra, U.S. Chief Technology Officer
Panel Discussion
Shelley Metzzenbaum, OMB
Myron Gutmann, National Science Foundation
Susan Crawford, Yeshiva University (formerly NEC)
H. Giovanni Carnaroli, Department of Transportation
3:00 – 3:15 PM BREAK

3:15 – 4:45 PM DATA TRANSPARENCY in HEALTH
Todd Park, CTO, Health and Human Services Remarks
http://www.slideshare.net/amanbhandari/sxsw-2011-todd-park-health-innovation
Darrell West, Brookings Institute (Political Science) Panel Discussion
Victoria Stodden, Columbia University (Statistics)
Noshir Contractor, Northwestern University (Engineering)
Bradford Hesse, National Cancer Institute

4:45 – 5:00 PM BREAK

5:00 – 6:30 PM COLLABORATION AND MULTI-SECTOR PARTNERSHIP — INT’L AFFAIRS
Jeremy Weinstein, National Security Staff Moderator
Theresa Pardo, SUNY, University at Albany (Policy) Panel Discussion
David Stark, Columbia University (Sociology)
Miriam Nisbet, Office of Government Information Services, NARA

6:30 – 8:00 PM Reception (McGowan Theater Lobby)

Tuesday, March 22 (McGowan Theater)

8:00 – 8:30 AM Continental Breakfast

8:30 – 10:00 AM CITIZEN ENGAGEMENT AT THE DEPARTMENT OF VETERANS AFFAIRS
Peter Levin, CTO and Senior Advisor
Archon Fung, Harvard University (Policy) Panel Discussion
James Hamilton, Duke University (Communications)
George Strawn, National Coordination Office (NITRD)
Cary Coglianese, University of Pennsylvania

10:00 – 10:30 AM BREAK

10:30 – 11:30 AM Smart Disclosure for Consumer Panel Discussion Decision Making
Eugene Huang, Senior Advisor to the U.S. Chief Technology Officer
Joel Gurin, Federal Communications Commission
Christopher Meyer, Consumers Union

11:30 – 12:30 PM Lunch
12:30 – 1:30 PM OPEN INNOVATION AT THE DEPARTMENT OF EDUCATION

Jason Hoekstra, Senior Advisor Remarks
Vijay Kumar, MIT (Open Education) Panel Discussion
Marta Gonzalez, MIT (Computational Sciences)
Marti Hearst, UC Berkeley (on leave), U.S. Patent and Trademark Office
Robert Chadduck, National Archives and Records Administration (NARA)

1:30 – 2:30 PM OPEN GOVERNMENT – STATE AND LOCAL GOVERNMENT

Bryan Sivak, Former CTO, District of Columbia Remarks
Jon Walton, CIO, City and County of San Francisco Panel Discussion
Bill Oates, CIO, City of Boston
Carole Post, Commissioner, Dept. of Information Technology and Telecommunications, New York City

2:30 – 3:00 PM BREAK

3:00 – 4:15 PM OPEN GOVERNMENT – REFLECTIONS FROM THE RESEARCH COMMUNITY

Jim Hendler, RPI (Web Science) Panel Discussion
David Lazer, Northwestern University (Computational Social Science)
Beth Noveck, New York Law School (Networked Governance)
Ed Felten, Princeton University (on leave), Federal Trade Commission

4:15 – 4:45 PM CLOSING REMARKS Prize Announcement

Aneesh Chopra, U.S. Chief Technology Officer
Chris Vein, Deputy U.S. Chief Technology officer

Panelist Information

http://semanticommunity.info/A_NITRD_Dashboard
Updated: Sat, 19 Sep 2015 01:13:40 GMT
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H. Giovanni Carnaroli is the Associate Chief Information Officer (CIO) for Business-Technology Alignment and Governance and Senior Accountable Official for Open Government at the U.S. Department of Transportation. In this position, he is responsible for the policy, implementation, and oversight of the following IT areas: business planning and governance (which includes investment management, Enterprise Architecture, governance, and policy) and project management and performance (which includes service portfolio management, information/knowledge management, continuous service improvement), and more.

Carnaroli was previously the Program Director, IT Project and Portfolio Services in the Office of the CIO at the Federal Aviation Administration. In this position, he was responsible for all aspects of IT capital planning and investment management; overseeing the development of the agency's IT business cases and IT portfolio; and implementing Earned Value Management and other program management best practices and processes. Carnaroli also worked in the FAA's Office of Aviation Policy and Plans, where he was responsible for aircraft certification regulation, and prepared new policies and economic studies for funding facilities and equipment. In addition to his government career, he worked as an air transport management consultant, providing aviation management consulting to clients worldwide.

He is a licensed commercial airplane (single-engine and multi-engine land and sea, instrument) and helicopter pilot. He is fluent in Italian and has a working knowledge of French, Spanish, and Portuguese.

Carnaroli graduated summa cum laude in agricultural economics from North Carolina State University, obtained a Master of Business Administration from the University of Maryland at College Park, and a Master of Arts in security management from The George Washington University.
Robert Chadduck is the Principal Technologist and Director (Acting) of the National Archives Center for Advanced Systems and Technologies, also known as (“NCAST”). Prior NARA assignments include service as the Principal Technologist and Director of Research for NARA’s Electronic Records Archives (“ERA”) Program – where he directed NARA’s first “proof of technical concept” joint research (beginning in 1998) with DARPA and the National Science Foundation.

These significant efforts contributed to development of NARA’s ERA program, which subsequently influenced numerous Digital Preservation Programs across Federal, National and International communities. Chadduck represents the National Archives on a variety of significant Committees, Working Groups, and Councils.

In 2006, Chadduck led a team of federal and university based researchers in development of a transcontinental archives prototype that was recognized by the Internet-2 Consortium. The Prototype received one of the consortium’s inaugural “IDEA” awards for “innovators who have created and deployed advanced network applications that have utilized advanced networking to enable transformational progress in research, teaching and learning.” In 2010, Chadduck was recognized by Federal Computer Week as one of the 100 individuals in government and industry nationwide who have made major contributions to the Federal information technology community and furthered research in the IT world in the past year.

Prior to joining the National Archives, he served as a systems analyst contributing to numerical models and database applications supporting U.S. Navy military and civilian force planning. Chadduck holds two Masters of Science degrees from the George Mason University – the first in Environmental Biology, and the second in Information Systems from the Volgenau School of Information Technology and Engineering.
Aneesh Chopra

U.S. Chief Technology Officer
Executive Office of the President

Aneesh Chopra is the United States Chief Technology Officer and in this role serves as an Assistant to the President and Associate Director for Technology within the Office of Science & Technology Policy. He works to advance the President’s technology agenda by fostering new ideas and encouraging government-wide coordination to help the country meet its goals from job creation, to reducing health care costs, to protecting the homeland. He was sworn in on May 22, 2009. Prior to his appointment, he served as Secretary of Technology for the Commonwealth of Virginia from January 2006 until April 2009. He previously served as Managing Director with the Advisory Board Company, a publicly-traded healthcare think tank. Chopra was named to Government Technology magazine’s Top 25 in their Doers, Dreamers, and Drivers issue in 2008.

Aneesh Chopra received his B.A. from The Johns Hopkins University and his M.P.P. from Harvard’s Kennedy School.
Cary Coglianese is the Edward B. Shils Professor of Law and Professor of Political Science at the University of Pennsylvania, where he serves as the director of the Penn Program on Regulation. He specializes in the study of regulation and regulatory processes, with an emphasis on the empirical evaluation of alternative regulatory strategies and the role of public participation, negotiation, and business-government relations in policy making. He has published widely on a variety of regulatory issues, including the uses of information technology in the regulatory process. His most recent books include Import Safety: Regulatory Governance in the Global Economy and Regulation and Regulatory Processes.

Prior to joining Penn Law, Coglianese spent a dozen years on the faculty at Harvard University’s John F. Kennedy School of Government, and he also has taught at the Stanford and Vanderbilt law schools. He founded the Law & Society Association’s international collaborative research network on regulatory governance and served as a founding editor of the journal Regulation & Governance. A co-chair of the American Bar Association’s administrative law committee on rulemaking, he has led a National Science Foundation initiative on e-rulemaking, served on the ABA’s task force on improving Regulations.Gov, and chaired a task force on transparency and public participation in the regulatory process that offered a blueprint to the Obama Administration on open government. He currently is working on a report for the Administrative Conference of the United States on the use of information technology in agency rulemaking.
Noshir Contractor is the Jane S. & William J. White Professor of Behavioral Sciences and the Director of the Science of Networks in Communities (SONIC) Research Group at Northwestern University, USA. He is investigating factors that lead to the formation, maintenance, and dissolution of dynamically linked social and knowledge networks. His research program has been funded continuously for 15 years by major grants from the U.S. National Science Foundation with additional current funding from the U.S. National Institutes of Health (NIH), Air Force Research Lab, Army Research Institute, Army Research Lab and the MacArthur Foundation.

Contractor’s book titled Theories of Communication Networks (co-authored with Professor Peter Monge, published by Oxford University Press, and translated into Chinese in 2010) received the 2003 Book of the Year award from the Organizational Communication Division of the National Communication Association. He is the lead developer of C-IKNOW (Cyberinfrastructure for Inquiring Knowledge Networks On the Web), a socio-technical environment to understand and enable networks among communities, as well as Blanche, a software environment to simulate the dynamics of social networks. Contractor has a Bachelor’s degree in Electrical Engineering from the Indian Institute of Technology, Madras and a PhD from the Annenberg School of Communication at the University of Southern California.
Susan Crawford is a professor at Cardozo Law School in New York City and a Visiting Research Collaborator at Princeton’s Center for Information Technology Policy. Crawford was a professor at the University of Michigan Law School between July 1, 2008 and July 1, 2010. She was on leave from Michigan to co-lead the FCC Agency Review team for the Obama-Biden transition (11/08-1/09), and served as Special Assistant to the President for Science, Technology, and Innovation Policy (2009). As an academic, she teaches internet law and communications law. She was a member of the board of directors of ICANN from 2005-2008 and is the founder of OneWebDay, a global Earth Day for the internet that takes place each Sept. 22. One of Fast Company’s Most Influential Women in Technology (2009); IP3 Awardee (2010), World Technology Network Awardee (2010); one of Prospect Magazine’s Top Ten Brains of the Digital Future (2011); member of the boards of Public Knowledge and TPRC. B.A., J.D., Yale; partner, Wilmer, Cutler & Pickering (now WilmerHale) until 2003.
Ed Felten

Federal Trade Commission

Edward W. Felten is the first Chief Technologist at the Federal Trade Commission. He is on leave from Princeton University, where he is a Professor of Computer Science and Public Affairs, and founding Director of Princeton's Center for Information Technology Policy. His academic interests include computer security and privacy, especially relating to media and consumer products, and technology law and policy. He has published about eighty papers in the research literature, and two books. His research on topics such as web security, copyright and copy protection, and electronic voting has been covered extensively in the popular press.

He has testified before House and Senate hearings on privacy, electronic voting, and digital television. He received his Ph.D. in Computer Science from the University of Washington in 1993, and is a Fellow of the ACM. In 2004, Scientific American magazine named him to its list of fifty worldwide leaders in science and technology.
David S. Ferriero was sworn in as Archivist of the United States on November 13, 2009. Prior to his confirmation as Archivist, Mr. Ferriero was the Andrew W. Mellon Director of the New York Public Libraries. Mr. Ferriero was in charge of collection strategy; conservation; digital experience; reference and research services; and education, programming, and exhibitions. Before joining the NYPL in 2004, Mr. Ferriero served in top positions at two of the nation's major academic libraries, the Massachusetts Institute of Technology in Cambridge, MA, and Duke University in Durham, NC. In those positions, he led major initiatives including the expansion of facilities, the adoption of digital technologies, and a reengineering of printing and publications. Mr. Ferriero earned a Bachelor's and Master's degrees in English literature from Northeastern University in Boston and a Master's degree from the Simmons College of Library and Information Science, also in Boston.
Archon Fung

Harvard University

Marta González

Massachusetts Institute of Technology

Marta C. González is an assistant professor at MIT, from CEE with joint appointment at ESD. Her research interests and direction are mainly aimed at advancing the understanding of the laws and principles that characterize human behavior and result in collective social phenomena. More specifically, her work falls into the category of complex networks and statistical physics applied to social dynamic systems. She has applied statistical physics tools in a wide variety of areas such as Opinion Dynamics, Epidemics Spreading, Contact Networks of Mobile gents, Social Network Analysis, and Human Mobility. In these research efforts she has focused on the derivation of models from the analysis of very large data sets such as electoral data, school friendship networks, sexual-contact networks, and mobile phone track records.

Joel Gurin
Federal Communications Commission

Joel Gurin is Chief of the Consumer and Governmental Affairs Bureau of the Federal Communications Commission. The bureau develops policies related to consumer affairs; works with state, local, and tribal governments; communicates to the public about the FCC's work; facilitates public participation in the FCC's decision-making process; handles consumer inquiries and complaints; and ensures access to communications technology for people with disabilities.

Gurin, who joined the FCC in December 2009, comes to this position with a strong background in consumer issues and communication. He was Executive Vice President of Consumers Union (CU), nonprofit publisher of Consumer Reports, for almost a decade. He led the core operations of this large and complex advocacy and publishing organization, which then had a staff of 500 and budget of $200 million. Before becoming executive VP, he was Science Editor and then Editorial Director for Consumer Reports and related publications.

During his career at CU, Gurin directed strategic planning and budgeting, fundraising, editorial and communications, publishing, research, and product testing. Under his leadership, CU launched and grew Consumer Reports' Web site, a major driver of CU's success. ConsumerReports.org has become the world's largest information-based paid subscription site with more than 3 million active subscribers.

Before coming to CU, Gurin was an award-winning science and medical journalist. He was co-founder and Editor of American Health, the first health magazine to win the National Magazine Award for General Excellence. He has written and edited four books on health and medicine.

Mr. Gurin received his B.A. in Biochemical Sciences from Harvard University, Magna Cum Laude, Phi Beta Kappa. He commutes to Washington from Scarsdale, New York, where he has lived for 15 years with his wife Carol, who is a clinical psychologist, and their family.

Myron Gutmann

National Science Foundation

Myron P. Gutmann is Assistant Director of the National Science Foundation, where he leads NSF’s Social, Behavioral, and Economic Sciences Directorate. The SBE Directorate is responsible for NSF’s research about people and their lives, with broad interdisciplinary connections to research throughout the foundation. He is also Professor of History and
Information and Research Professor in the Institute for Social Research at the University of Michigan. Prior to joining NSF, he was Director of the Inter-university Consortium for Political and Social Research (ICPSR). Gutmann has broad interests in interdisciplinary historical research, especially health, population, economy, and the environment.

Since 1995 he has led a multi-site research program about population, agriculture and environmental change in the U.S. Great Plains, which has produced important research results that show how demographic and agricultural change both respond to environmental conditions and shape environmental outcomes such as greenhouse gas production. As Director of ICPSR, he was a leader in the archiving and dissemination of electronic research materials related to society, population, and health, with a special interest in the protection of respondent confidentiality. He has written or edited five books and more than eighty articles and chapters. Gutmann has served on a number of national and international advisory committees and editorial boards.

James Hamilton

James T. Hamilton is the Charles S. Sydnor Professor of Public Policy, and Professor of Political Science and Economics, at Duke University’s Sanford School of Public Policy. He is also the Director of the DeWitt Wallace Center for Media and Democracy. His books on information provision and media markets include All the News That’s Fit to Sell: How the Market Transforms Information into News, Regulation Through Revelation: The Origin, Politics, and Impacts of the Toxics Release Inventory Program, and Conserving Data in the Conservation Reserve: How a Regulatory Program Runs on Imperfect Information. For his accomplishments in teaching and research, he has won awards such as the Trinity College (Duke) Distinguished Teaching Award, the David N Kershaw Award of the Association for Public Policy Analysis and Management, the Goldsmith Book Prize from the Kennedy School’s Shorenstein Center, and a Center for Advanced Study in the Behavioral Sciences Fellowship. His current work focuses on sustaining the accountability function of journalism and lowering the costs of discovering public affairs stories.
Marti Hearst

Dr. Marti Hearst is a professor in the School of Information at UC Berkeley, with an affiliate appointment in the Computer Science Division. Her primary research interests are user interfaces for search engines, information visualization, natural language processing, and empirical analysis of social media. She has recently completed the first book on Search User Interfaces.

Prof. Hearst is currently on leave from the university and working as the Chief IT Strategist for the US Patent and Trademark Office. Among other duties, she is helping to revamp the IT for patent examination and implementing open government ideas. She is also a member of the Federal Web Managers Council.
Jim Hendler

Rensselaer Polytechnic Institute

James Hendler is the Tetherless World Professor of Computer and Cognitive Science, and the Assistant Dean for Information Technology and Web Science, at Rensselaer Polytechnic Institute. He is also a faculty affiliate of the Experimental Multimedia Performing Arts Center (EMPAC), serves as a Director of the U.K.’s charitable Web Science Trust and is a visiting professor at the Institute of Creative Technology at DeMontfort University in Leicester, U.K. Hendler has authored approximately 200 technical papers in the areas of Semantic Web, artificial intelligence, agent based computing and high performance processing.

One of the inventors of the Semantic Web, Hendler was the recipient of a 1995 Fulbright Foundation Fellowship, is a member of the U.S. Air Force Science Advisory Board, and is a Fellow of the American Association for Artificial Intelligence, the British Computer Society and the IEEE. He is also the former Chief Scientist of the Information Systems Office at the U.S. Defense Advanced Research Projects Agency (DARPA) and was awarded a U.S. Air Force Exceptional Civilian Service Medal in 2002. He is the Editor-in-Chief Emeritus of IEEE Intelligent Systems and is the first computer scientist to serve on the Board of Reviewing Editors for Science. In 2010, Hendler was named to the "honor roll" of the 20 most innovative professors in America by Playboy magazine. Hendler also serves as an "Internet Web Expert" for the U.S. government, providing guidance to the Data.gov project.
Bradford Hesse is Chief of the National Cancer Institute’s Health Communication and Informatics Research Branch. Hesse received his degree in social psychology from the University of Utah in 1988 with an accompanying internship in the nascent field of medical informatics. After completing his degree, he served as a postdoctoral fellow within the Department of Social and Decision Sciences at Carnegie Mellon University. For more than two decades since that time, he has been conducting research in the interdisciplinary fields of social cognition, health communication, health informatics, and user-centered design. Hesse was recruited to the National Cancer Institute in 2003 and has since been focusing his energies on bringing the power of evidence-based health communication to bear on the problem of eliminating death and suffering from cancer.

Hesse continues to direct the Health Information National Trends Survey, a biennial general population survey aimed at monitoring the public’s use of health information during a period of enhanced capacity at the crest of the information revolution; and he serves as program director for the Centers of Excellence in Cancer Communication Research, a cutting-edge research initiative aimed at expanding the knowledge base underlying effective cancer communication strategies. Hesse has authored or co-authored approximately 137 publications, including peer-reviewed journal articles, technical reports, books, and book chapters. In 2009, his book titled “Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press” was named Book of the Year by the American Journal of Nursing.
Jason Hoekstra

U.S. Department of Education

Jason Hoekstra is a Technology Solutions Advisor for the U.S. Department of Education. He plans and implements data visualization, social media and web-based solutions for citizen engagement and information dissemination. While at the Department, he has lead the construction and roll out for web sites such as TEACH.gov, Data.ED.gov, IdeaEngine.ED.gov and Innovation.ED.gov. Jason was an author of the Department's Open Government Plan and is a frequent contributor to open data, open source and open government efforts within the agency. Hoekstra is on Twitter: @jasonhoekstra

Contest and engagement efforts in the past:
* Race to the Top Commencement Challenge
* Open Innovation Portal - innovation.ed.gov
* I Am What I Learn YouTube video contest
* Open government dialog using IdeaScale
Eugene Huang

Senior Advisor to the U.S. Chief Technology Officer
Executive Office of the President

Eugene J. Huang currently serves in the White House Office of Science and Technology Policy as the Senior Advisor to the Chief Technology Officer, where he is responsible for open government and international technology and innovation policy with a specific emphasis on China. Concurrently, Huang also serves as the Chief Technology Officer for the implementation of the Consumer Financial Protection Bureau at the U.S. Department of the Treasury, where he is responsible for the overall technology strategy for the new Bureau.

From August 2009 to April 2010, Huang served as the Government Operations Director for the National Broadband Task Force at the Federal Communications Commission, and was part of the team responsible for authoring “Connecting America: The National Broadband Plan.” Huang served at the United States Department of the Treasury under two Secretaries of the Treasury from 2006 to 2009, as Policy Advisor to the Secretary and previously as a White House Fellow.

Previously, Huang was a Visiting Scholar at the Stanford Institute for Economic Policy Research (SIEPR) at Stanford University. From 2002 to 2006, Huang served the Commonwealth of Virginia under Governor Mark R. Warner as the Secretary of Technology. At the time of his appointment as Secretary of Technology in 2004, he was the youngest cabinet member in Virginia history at the age of 28.

Huang graduated magna cum laude from the University of Pennsylvania, with a B.S. in Economics from the Wharton School, a B.S. in Electrical Engineering, and a M.S. in Telecommunications Engineering, and studied at St. Peter’s College, Oxford University. Huang is a term member of the Council on Foreign Relations and a member of the International Institute for Strategic Studies.
Dr. Vijay Kumar provides leadership for planning and implementing technology-enabled educational innovations at MIT. In his prior roles at MIT as Assistant Provost and Director of Academic Computing, as well as at other institutions, Kumar’s work focused on the effective integration of information technology in education. Kumar was the Principal Investigator of O.K.I (Open Knowledge Initiative), the MIT-led collaborative project supported by the Andrew W. Mellon Foundation to develop an open architecture for enterprise educational applications. He has been a member of the Faculty Advisory Committee of MIT OpenCourseWare (OCW) since its inception. He serves as the Executive Officer of MIT’s Council on Educational Technology. Vijay’s research and his extensive engagement as advisor and consultant to academic and professional institutions are directed toward strategy, planning and implementing innovations for education.

Vijay has been actively involved in efforts, such as those supported by the Hewlett Foundation and Curriki to advance the use of Open Educational Resources for improving educational access and quality. He is a co-editor of a Carnegie Foundation book "Opening Up Education" (MIT Press, August 2008). Vijay has served as advisor to India’s National Knowledge Commission, and to UNESCO on their strategy for open educational resources. He is an advisor to the Open University of Catalonia, the Singapore University of Technology and Design, and to the Qatar Foundation International on educational technology and innovation. His experience includes programs for teacher education and planning for technology integration in k-12 education. He currently serves on the Operations Board of Massachusetts STEM Advisory Council.

Vijay received a bachelor’s in Chemical Engineering and a master’s in Industrial Management from the Indian Institute of Technology, Madras, which has recently recognized him as a Distinguished Alumnus (2011). He received his Doctorate in Education from the University of Massachusetts, Amherst.
David Lazer

Northwestern University

David Lazer is an Associate Professor in Northeastern University's Department of Political Science and the College of Computer and Information Science and Director of the Program on Networked Governance at Harvard University. His work focuses on the nexus of issues networks, governance, and computational social science. He is coeditor of Governance and Information Technology: From Electronic Government to Information Government (MIT Press: 2007). He is a reviewing editor for Science, and his research has been published in such journals as Science, Proceedings of the National Academy of Science, the American Political Science Review, and the Administrative Science Quarterly.

Peter Levin

U.S. Department of Veterans Affairs

Peter L. Levin was appointed Senior Advisor and CTO at the Department of Veterans Affairs in June 2009. His primary role is to identify opportunities and implement improvements of Veteran health and benefit services by promoting a deeply collaborative culture, renovating business processes, and leading the development of new technology platforms. He is the executive sponsor of the Blue Button personal health record, of the Fast Track electronic claims processing
system, and of the VA’s Open Government initiatives – especially its social media platform - all of which have been institutionalized by the agency as part of its ongoing transformation.

Levin was a National Science Foundation Presidential Young Investigator (G.H.W. Bush) a White House Fellow (Clinton), and an Alexander von Humboldt Fellow (TU Darmstadt). He is the co-author of more than fifty articles ranging from global positioning and cybersecurity to high performance computer simulations; he was also a co-author of the technology chapter of the 1997 Biennial Presidential Report to Congress on Science and Technology. Just before joining the Obama Administration, Levin cofounded and led an award-winning semiconductor design software firm, was a venture partner at Dusseldorf-based venture firm Ventizz Capital Partners, and was an executive director of Astaro A.G.

Levin studied in Electrical and Computer Engineering at Carnegie Mellon University, and he subsequently enjoyed post-doctoral training at the Technical University of Munich. His first academic appointment was at Worcester Polytechnic Institute, and he was later the associate dean for research in the College of Engineering at Boston University. Today he maintains his academic affiliation as Consulting Professor of Aeronautical and Astronautical Engineering at Stanford University.

Shelley H. Metzenbaum

Office of Management and Budget
Executive Office of the President

Dr. Shelley H. Metzenbaum was selected as the Associate Director for Performance and Personnel Management of the White House Office of Management and Budget in September 2009, reporting to the nation's first Chief Performance Officer. She previously served as founding director of the Collins Center for Public Management at the University of Massachusetts - Boston's McCormack School, associate administrator for Regional Operations and State/Local Relations at the U.S. EPA, undersecretary of the Massachusetts Executive Office of Environmental Affairs, Massachusetts capital budget director, executive director of Harvard's Kennedy School Executive Session on Public Sector Performance Management, and executive director of the Environmental Compliance Consortium. She is a fellow of the National Academy of Public Administration and holds a Ph.D. in public policy from Harvard’s Kennedy School of Government.
Metzenbaum has authored many publications, articles, and case studies dealing with various aspects of performance management, leadership, accountability, and using data to drive results on goals and outcomes.

Christopher Meyer

Consumers Union

Chris Meyer is responsible for management and oversight of multi-state campaigns, community building and grassroots initiatives and activism. In addition, he explores new initiatives in consumer education. Meyer supervises campaign staff in Consumers Union's Yonkers, New York headquarters and its regional offices in Austin, Texas and San Francisco, California.

Prior to his promotion to Vice President for External Affairs and Information Services in 2006, Meyer was Senior Director, Public Policy and Advocacy for Consumers Union.

Before joining Consumers Union in October 2004, Meyer worked for two decades as an organizer, lobbyist and, from 1997 to 2004, as executive director of the New York Public Interest Research Group (NYPIRG), New York State's largest consumer, environmental and government reform organization. Mr. Meyer developed an expertise on public health issues, including lead poisoning prevention, drinking water quality and tobacco control. He oversaw statewide campaigns on increased higher education funding and the successful 1996 environmental bond initiative, and was lead lobbyist on efforts to defeat construction of garbage-burning incinerators in New York City in the early 1990's.

Meyer was named "Best Lobbyist" by New York Magazine in 1993 and was quoted regularly in The New York Times and other New York City and State electronic and print media on good government issues. Meyer is a graduate of Haverford College and the New York University School of Law.
In September 2009, Miriam Nisbet became the first Director of the Office of Government Information Services (OGIS) at the National Archives and Records Administration. OGIS is the new FOIA Ombudsman office created by the 2007 FOIA Amendments; the office is charged with providing mediation services to resolve disputes between FOIA requesters and the Executive Branch agencies and with improving FOIA administration.

Miriam previously served for two years at the United Nations Educational, Scientific and Cultural Organization (UNESCO) in Paris as Director of the Information Society Division, in UNESCO’s Communication and Information Sector. From 1999 to 2007, Miriam was Legislative Counsel for the American Library Association in ALA’s Washington Office, working primarily on copyright and other intellectual property issues raised by the digital information environment. She was Special Counsel for Information Policy, National Archives and Records Administration from 1994 to 1999. Prior to joining the National Archives, Miriam had served since 1982 as the Deputy Director of the Office of Information and Privacy, U.S. Department of Justice.

Miriam received a BA degree from the University of North Carolina at Chapel Hill and a JD degree from the University’s School of Law. She is a member of the Bars of the District of Columbia and North Carolina. Miriam was elected in 2005 as a member of the American Law Institute. She represents the National Archives as a government member of the Administrative Conference of the United States (ACUS) and of the US National Commission for UNESCO.
Beth Simone Noveck is a professor of law at New York Law School. Dr. Noveck served in the White House as the nation's first Deputy Chief Technology Officer (2009-2011) and founder of the White House Open Government Initiative (http://www.whitehouse.gov/open). The John D. and Catherine T. MacArthur Foundation recently awarded Professor Noveck a grant to develop a multi-year interdisciplinary research agenda to gauge the impact of digital networks on institutions. In 2010, Professor Noveck was named “One of the Hundred Most Creative People in Business” by Fast Company magazine and “One of the Top 5 Game Changers” by Politico. She is the author of Wiki Government: How Technology Can Make Government Better, Democracy Stronger, and Citizens More Powerful (Brookings Institution Press, 2009), which will appear this year in Arabic and Chinese.
Bill Oates

Bill Oates is the Chief information Officer for the City of Boston, Massachusetts. Oates was named to the Cabinet level position by Boston’s Mayor Thomas M. Menino in June of 2006. As CIO, Oates is charged with spearheading the City’s technology initiatives and is responsible for the delivery of IT services in support of the various city functions.

Prior to joining the City, Oates served as the Senior Vice President & Chief Information Officer for Starwood Hotels & Resorts Worldwide, Inc. Based in White Plains, NY, Starwood is one of the leading hotel and leisure companies in the world. Named CIO in June, 2000, Bill was responsible for delivery of the Company’s global information technology services.

A graduate of Boston College, Oates is also an attorney and member of the Massachusetts Bar. He received his JD from Suffolk University Law School in Boston and was awarded his LL.M in Global Technology Law in 2005. In 1996, Oates was inducted into the hospitality industry’s “Technology Hall of Fame” for his vision in applying technology to the business.

Mr. Oates is based at Boston’s City Hall. A native of the Boston area, Bill is married with two children.
Theresa Pardo

University at Albany, State University of New York

Dr. Theresa A. Pardo is director of the Center for Technology in Government (CTG) and a member of the faculty of Rockefeller College of Public Administration and Policy and the College of Computing and Information at the University at Albany, State University of New York.

Under Pardo's direction, CTG is developing a public value assessment framework for open government initiatives. This work, funded by the U.S. National Science Foundation (NSF), is being carried out in partnership with numerous state and federal government agencies. Her most recent NSF-funded effort is to develop a data interoperability framework for the North American Free Trade Agreement (NAFTA) region. In addition to funding from the NSF, Pardo's work has been funded by the U.S. Department of Justice, the U.S. Library of Congress, the U.S. National Archives and Records Administration, the United Nations, SAP, Microsoft Corporation, the Organisation for Economic Co-operation and Development (OECD), and New York State, among others.

Pardo serves as a member of several national and international boards, including the Steering Committee of the National Gap Analysis on Homeland Security, the Digital Government Society of North America, Government Information Quarterly, the U. S. Government Accountability Office (GAO) Executive Council for Information and Technology Management, and the International Conference on Theory and Practice of Electronic Governance (ICEGOV). She is also a Senior Adviser to the State Information Center, P.R. China and has served as a member of the jury panel for the Sultan Qaboos Award for Excellence in eGovernment in Oman.
Todd Park

Todd Park has served as HHS’s Chief Technology Officer since August 2009. In this role, his mission is to be a change agent and “entrepreneur-in-residence,” helping HHS harness the power of data, technology, and innovation to improve the health of the nation. Prior to joining HHS, Mr. Park co-founded Athenahealth and co-led its development into one of the most innovative health IT companies in the industry. He also cofounded Castlight, a web-based health care shopping service for consumers. Mr. Park has also served in a volunteer capacity as a Senior Fellow at the Center for American Progress, where he focused on health IT and health reform policy, and as senior health care advisor to Ashoka, a leading global incubator of social entrepreneurs, where he helped start Healthpoint Services, a venture to bring affordable telehealth, drugs, diagnostics, and clean water to rural India. Mr. Park graduated magna cum laude and Phi Beta Kappa from Harvard College with an A.B. in economics.
Carole Post

Commissioner, Department of IT and Telecommunications, New York City

Carole Post was appointed Commissioner of the Department of Information Technology and Telecommunications (DoITT) by Mayor Michael R. Bloomberg on December 30, 2009, a capacity in which she began serving on January 19, 2010. Post has been involved in municipal and government operations since 1996. Before coming to DoITT, she served as Director of Agency Services at the New York City Mayor's Office of Operations. There, Post led a team of technical and policy advisors who oversaw City agency performance and coordinated strategic initiatives vital to the Mayor's vision for New York City. Chief among these was the development and implementation of the Mayor's Citywide Performance Reporting (CPR) system, modernizing the Mayor's Management Report and the award-winning NYC Stimulus Tracker tool, all of which have been instrumental in improving transparency and accountability throughout City operations.

Prior to joining the Mayor's Office, Post was Executive Director of Strategic Planning for the New York City Department of Buildings, where she was instrumental in re-engineering and modernizing agency operations.

Before her service with the City of New York, Post was legal counsel to several public entities in Florida, and was responsible for the operations of the City of Palm Beach Gardens while serving as Acting City Manager.

Post holds a Bachelor's Degree in Journalism and a Juris Doctor, and is licensed to practice law in New York and Florida.
Bryan Sivak

Former Chief Technology Officer, District of Columbia

Bryan Sivak was appointed by Mayor Adrian M. Fenty on October 13, 2009 to the Cabinet post of Chief Technology Officer (CTO) for the District of Columbia. As CTO, Sivak lead the Office of the Chief Technology Officer (OCTO), an organization of more than 500 staff that provides technology services and leadership for 86 agencies, 38,000 employees, residents, businesses and millions of visitors.

Sivak has more than 15 years of international experience in building software and internet technologies and organizations. In 2002, he founded and developed InQuira, Inc., a multi-national technology solutions company whose products are used at top private and public sector organizations including Bank of America, UK Ministry of Defence, Nokia, and T-Mobile. During his tenure, he oversaw every aspect of the business from design and development of the product to sales, marketing, and management activities relating to the overall execution of InQuira's business plan and growth of the company. In 2005, he moved to London and opened the European office of the company, which he grew from zero to 30 percent of the company's revenue in four years.

Prior to his work with InQuira, Sivak founded Electric Knowledge LLC, which provided the world's first Natural Language Search engine available on the web. The company's customers included Bank of America and Fidelity Investments among others. Electric Knowledge eventually merged with Answerfriend, which was the basis for the formation of InQuira. Sivak holds a bachelor's degree in computer science from the University of Chicago.
David Stark

David Stark is Arthur Lehman Professor of Sociology and International Affairs at Columbia University where he is Chair of the Department of Sociology. After completing his PhD at Harvard, Stark studied transitions from authoritarian rule in Eastern Europe. His book, Postsocialist Pathways (with Laszlo Bruszt, Cambridge University Press, 1998), and his frequently-cited article, “Recombinant Property in East European Capitalism” (American Journal of Sociology 1996), examine the twinned transformations of democratization and marketization. Stark’s most recent book, The Sense of Dissonance: Accounts of Worth in Economic Life (Princeton University Press, 2009), explores the perplexing situations in which organizations and their members search for what is valuable. The dissonance of competing frameworks of evaluation can lead to discovery.

To study the organizational basis for innovation, Stark has carried out ethnographic field research in new media start-ups in Manhattan before and after the dot.com crash and in a World Financial Center trading room before and after the attack on September 11th. Supported by a Guggenheim Fellowship and by major grants from the National Science Foundation, he has conducted large-scale, historical network analysis of ownership and personnel ties among the largest 2,000 Hungarian companies from 1987-2006 (“Social Times of Network Spaces,” AJS 2006; and “Structural Folds: Generative Disruption in Overlapping Groups,” AJS 2010). In New York City as well as in Eastern Europe he has studied the role of new technologies in facilitating new forms of public assembly. At Columbia, Stark directs the Center on Organizational Innovation whose mission is to examine non-bureaucratic, participatory organizational forms in the era of interactive technologies. His publications are available at http://thesenseofdissonance.com.
Victoria Stodden

Victoria Stodden (http://stodden.net) is Assistant Professor of Statistics at Columbia University. She completed her Ph.D. in statistics in 2006 and her law degree in 2007 at Stanford University.

Her current research focuses on how pervasive and large-scale computation is changing the practice of science and dissemination of knowledge: reproducibility and transparency of computational results; understanding factors underlying code and data sharing among researchers; and legal framing for scientific advancement. She has been a postdoctoral fellow at both Harvard and Yale Law Schools and MIT’s Sloan School of Business, won the Kaltura Writing Competition in 2008, and co-chaired a working group for the National Science Foundation’s Office of Cyberinfrastructure’s recently released Task Force on Grand Challenge Communities. She is also a Science Commons fellow, and a nominated member of the Sigma Xi scientific research society. Her webpage is http://stodden.net and she blogs at http://blog.stodden.net.
Dr. George O. Strawn is the Director of the National Coordination Office (NCO) for the Federal government’s multiagency Networking and Information Technology Research and Development (NITRD) Program. He also serves as the Co-Chair of the NITRD Subcommittee of the National Science and Technology Council. The NCO reports to the Office of Science and Technology Policy (OSTP) within the Executive Office of the President.

Strawn is on assignment to the NCO from the National Science Foundation (NSF), where he most recently served as Chief Information Officer (CIO). As the CIO for NSF, he guided the agency in the development and design of innovative information technology, working to enable the NSF staff and the international community of scientists, engineers, and educators to improve business practices and pursue new methods of scientific communication, collaboration, and decision-making.

Prior to his appointment as NSF CIO, Strawn served as the executive officer of the NSF Directorate for Computer and Information Science and Engineering (CISE) and as Acting Assistant Director for CISE. Previously, Strawn had served as the Director of the CISE Division of Advanced Networking Infrastructure and Research, where he led NSF’s efforts in the Presidential Next Generation Internet Initiative. During his years at NSF, Strawn was an active participant in activities of the interagency IT R&D program that is now called NITRD.

Prior to coming to NSF, Strawn was a Computer Science faculty member at Iowa State University (ISU) for a number of years. He also served there as Director of the ISU Computation Center and Chair of the ISU Computer Science Department. Under his leadership, ISU became a charter member of MIDNET, a regional NSFNET network; he led the creation of a thousand-workstation academic system based on an extension of the MIT Athena system; and the ISU Computer Science department was accredited by the then-new Computer Science Accreditation Board.

Strawn received his Ph.D. in Mathematics from Iowa State University and his BA Magna Cum Laude in Mathematics and Physics from Cornell College.
Chris Vein

Deputy U.S. Chief Technology Officer
Executive Office of the President

Chris Vein is the Deputy U.S. Chief Technology Officer for Government Innovation in the White House Office of Science and Technology Policy. In this role, Chris will help develop policies that enable government innovation, facilitate projects generated through a national discussion on research and development, and showcase projects that scale success to all levels of government.

Prior to joining the White House, Chris was the Chief Information Officer (CIO) for the City and County of San Francisco (City) where he led the City in becoming a national force in the application of new media platforms, use of open source applications, creation of new models for expanding digital inclusion, emphasizing "green" technology, and transforming government.

This year, Chris was again named to the top 50 public sector CIOs by InformationWeek Magazine. He has been named to Government Technology Magazine’s Top 25: Dreamers, Doers, and Drivers and honored as the Community Broadband Visionary of the Year by the National Association of Telecommunications Officers and Advisors (NATOA).

Chris is a sought-after commentator and speaker, quoted in a wide range of news sources from the Economist to Inc. Magazine.

In past work lives, Chris has worked in the public sector at Science Applications International Corporation (SAIC), for the American Psychological Association, and in a nonpolitical role, at the White House supporting three Presidents of the United States.
Jeremy Weinstein

National Security Council
Executive Office of the President

Jeremy M. Weinstein is Director for Development and Democracy at the National Security Council. He is on-leave as an associate professor of political science at Stanford University and a non-resident fellow at the Center for Global Development. His research focuses on civil wars and political violence; ethnic politics and the political economy of development; and democracy, accountability, and political change. He is the author of Inside Rebellion: The Politics of Insurgent Violence (Cambridge University Press) which received the William Riker Prize for the best book on political economy. He has also published articles in the American Political Science Review, American Journal of Political Science, Journal of Conflict Resolution, Foreign Affairs, Foreign Policy, Journal of Democracy, World Policy Journal, and the SAIS Review. Selected publications include: "Handling and Manhandling Civilians in Civil War" (APSR 2006), which received the Sage Prize and Gregory Luebbert Award, and "Why Does Ethnic Diversity Undermine Public Goods Provision" (APSR 2007), which received the Heinz Eulau Award and the Michael Wallerstein Award.

Weinstein also received the Dean’s Award for Distinguished Teaching at Stanford in 2007. Before joining the faculty at Stanford, Weinstein was the Project Director of the CGD-sponsored Commission on Weak States and U.S. National Security and the primary author of the Commission's final report, On the Brink: Weak States and U.S. National Security. Weinstein obtained a BA with high honors from Swarthmore College, and an MA and PhD in political economy and government from Harvard University.
Darrell M. West

Darrell M. West is the Vice President of Governance Studies and Director of the Center for Technology Innovation at the Brookings Institution. Previously, he was the John Hazen White Professor of Political Science and Public Policy and Director of the Taubman Center for Public Policy at Brown University. His current research focuses on technology policy, the Internet, digital media, and privacy and security.

The Center that he directs examines a wide range of topics related to technology innovation including technology policy, public sector innovation; legal and Constitutional aspects of technology; digital media and social networking; health information technology; virtual education, and green technology. Its mission is to identify key developments in technology innovation, undertake cutting-edge research, disseminate best practices broadly, inform policymakers at the local, state, and federal levels about actions needed to improve innovation, and enhance the public's and media's understanding of the importance of technology innovation.

West is the author of 17 books including Brain Gain: Rethinking U.S. Immigration Policy (Brookings, 2010), Digital Medicine: Health Care in the Internet Era (Brookings, 2009), Digital Government: Technology and Public Sector Performance, (Princeton University Press, 2005), Biotechnology Policy Across National Boundaries (Palgrave MacMillan, 2007), and Air Wars: Television Advertising in Election Campaigns (Congressional Quarterly Press, 2005), among others. He is the winner of the American Political Science Association's Don K. Price award for best book on technology (for Digital Government) and the American Political Science Association's Doris Graber award for best book on political communications (for Cross Talk). He has delivered nearly 150 lectures in a dozen different countries, including China, Japan, Russia, Taiwan, Mexico, Brazil, Germany, Netherlands, Portugal, Turkey, Bahrain, and the United States, and has been quoted in leading newspapers, radio stations, and national television networks around the world.

CENDI Meeting, November 4, 2011
Carl Hayden Room, 732 N. Capitol Street, Washington, DC 20401

Agenda
November 4, 2010

See Minutes and Presentations: http://www.cendi.gov/minutes/pa_1110.html

9:00 am Welcome and Introductions
Lisa Weber, Director, Information Technology Policy and Administration, NARA and CENDI Chair

9:15 – 11:00 AM

THE SEMANTIC WEB

Introduction to the Semantic Web: The Basics that an STI Manager Should Know
George Strawn, Director, NITRD

Semantic Medline: A Proof of Concept
Tom Rindflesch, NLM

11:00 am GPO Showcase

• GPO's Shelflist Conversion & Transcription Project
  Laurie B. Hall, Director, Library Technical Information Services

• MetaLib Federated Search Service
  Linda Resler, Manager, Library Technical Services Support

• GPO's Federal Digital System Update
  Selene Dalecky, Manager, FDsys Program, Project Management Office

12:00 – 1:00 Group Lunch
OSTP Databases at Data.gov

http://search.usa.gov/search?query=O...agov&x=36&y=11

http://www.data.gov/raw/1592/

http://www.data.gov/download/1592/csv

http://www.data.gov/raw/1557/

http://www.data.gov/download/1557/xls

http://www.data.gov/raw/1556/

http://www.data.gov/download/1556/xls

The R&D Dashboard


Source: http://rd-dashboard.nitrd.gov/

In response to the [eGov Act of 2002 Section 207](http://rd-dashboard.nitrd.gov/), the R&D Dashboard beta web site provides an initial look at U.S. Federal Investments in Science and Research from two agencies; the National Institutes of Health (NIH) and the National Science Foundation (NSF) from years 2000-2009. The R&D Dashboard will expand in a future iteration to include ALL federal research and development spending and expanded information on outputs.

What's available

The information presented reports data on the grants issued by the Federal government to research institutions ("investments"), and the publications and patent activity produced by researchers funded by those investments ("outputs"). The site reports "where" investments have been made at the state, congressional district and research...
institution. In addition, the site provides information on "what" investments have been made by providing the user the ability to select topic areas at the same geographic levels of detail.

This is a Beta Site

The R&D Dashboard is a beta site and feedback is welcome. Please direct comments or questions to our contact page.

- Office of Science and Technology Policy of the White House - Orszag/Holdren memos to science agencies (PDF) 
  Wiki
- Data Sources (and Assumptions) (SAME PAGE AS BELOW)
  Downloading Data and Tool Tips – making the most of this site (SAME PAGE AS ABOVE)

About the Prototype

The R&D Dashboard prototypes a grant and award reporting system which presents information derived from publicly reported federal agency data from the National Science Foundation and the National Institutes of Health. A next stage production system would be fully integrated with all available federal agency databases; this prototype reports data only from two agencies from 2001 to 2010. A full system would also include much broader outputs than simply publications, patents and patent applications; this prototype used currently available data.

Data Sources

All data available on the R&D Dashboard beta web site is publicly available data from the following U.S. government agencies.

- National Science Foundation award data at Research.gov
- National Institutes of Health award data at RePORT and ExPORTER
- National Institutes of Health publication data at Pubmed
- United States Patent and Trademark Office Patent -- Patents approved and Patents applied for
- Geographic detail
  ◦ Census Boundary Files
- Representation of scientific fields through topic modeling
  ◦ Topic Modeling Approach
  ◦ Topic Modeling Powerpoint
- Links to patent and firm data
  ◦ Patent Data Disambiguation Approach
- Links to agency funding data (2000 - 2009)
  ◦ National Institutes of Health
  ◦ National Science Foundation
- The data for NIH publications were derived from the following source:
  ◦ NIH ExPORTER
The data for NSF publications were derived from the following source:

- NSF Publications

**Data**

Investments: [http://rd-dashboard.nitrd.gov/investment.html](http://rd-dashboard.nitrd.gov/investment.html) Grants by States (52) and Congressional Districts for Two Agencies: Downloaded


Result: R&DDashboard.xlsx and R&DDashboardAllRecords.xlsx

Also used: NNI Investments by Agency and PCA 2001-2010-Spotfire.xls and SGCR-crosscut-1989-2010_updated3-Spotfire.xls

**Metadata**

NNI Investments by Agency and PCA 2001-2010-Spotfire.txt and SGCR 1989 2010-Spotfire.txt

Menu Popups:

Grants Awarded - Discover Grants by clicking on map or using the options below.
To view an activity, click on a state on the map or select a state from the drop-down menu.
Select a federal agency to see the grants they have funded.
Refine results by selecting institutions or topics.

Publications - Discover Publications by clicking on map or using the options below.
To view an activity, click on a state on the map or select a state from the drop-down menu.
Select a federal agency to see the publications attributed to a grant.
Refine results by selecting institutions or topics.

Patents Awarded - Discover awarded Patents by clicking on map or using the options below.
To view an activity, click on a state on the map or select a state from the drop-down menu.
Select all patents or those that have been influenced by funded grants.
Refine results by selecting institutions or topics.

Patent Applications - Discover applied for Patents by clicking on map or using the options below.
To view an activity, click on a state on the map or select a state from the drop-down menu.
Select all patent application or those that have been influenced by funded grants.
Refine results by selecting institutions or topics.

**SUPPLEMENT TO THE PRESIDENT'S BUDGET FOR FISCAL YEAR 2011**

THE NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT PROGRAM

A Report by the Subcommittee on Networking and Information Technology Research and Development
MEMBERS OF CONGRESS:

I am pleased to forward with this letter the annual report for FY 2011 on the Federal government's multi agency Networking and Information Technology Research and Development (NITRD) Program. The NITRD effort, comprising 13 member agencies and many more that participate in NITRD activities, plays a central role in developing new scientific foundations for long-term U.S. economic growth and prosperity.

Revolutionary networking and computing technologies developed through sustained Federal investments gave rise to the indispensable cyber infrastructure upon which our world now depends. The President believes that a renewed national commitment to such basic scientific research and development is more essential than ever for our prosperity, our security, our health, our environment, and our quality of life. In the face of unprecedented challenges, we must continue and even accelerate the flow of advances in these technologies, which drive U.S. economic competitiveness and innovation leading to job growth and provide cutting-edge capabilities for scientific discovery and education. Networking and computing capabilities are also critical for national and homeland security, health care reform, understanding and responding to environmental stresses, increasing energy efficiencies and developing renewable energy sources, and strengthening the security of U.S. critical infrastructures, including cyberspace itself.

The Federal NITRD investments we make in support of these important national policy priorities will also have a multiplier effect, as they have in the past, generating new industries and workforce opportunities through technological innovation. In addition, NITRD partnerships leverage Federal research dollars across agencies to produce broadly useful results that no single agency could attain.

I look forward to working with you to support this key Federal research activity.

Sincerely, John P. Holdren Director

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Introduction and Overview

This Supplement to the President’s Fiscal Year (FY) 2011 Budget provides a technical summary of the budget request for the Networking and Information Technology Research and Development (NITRD) Program, as required by the High-Performance Computing Act of 1991 (P.L. 102-194), the Next Generation Internet Research Act of 1998 (P.L. 105-305), and the America COMPETES Act of 2007 (P.L. 110-69). The NITRD Program, now in its 19th year, provides a framework and mechanisms for coordination among Federal agencies that support R&D in advanced networking and information technology.

The NITRD Supplement describes the FY 2011 networking and information technology R&D plans and current technical and coordination activities of the 13 Federal member agencies currently in the NITRD budget crosscut as well as other agencies that are not formal members of the Program but participate in NITRD activities. The Program expects to welcome the Department of Homeland Security (DHS), which has been a participant, as a NITRD member agency this year. In the NITRD Program, the term “agency” may refer to a department, a major departmental subdivision, or a research office or laboratory.

NITRD activities and plans are coordinated in eight Program Component Areas (PCAs): high-end computing infrastructure and applications (HEC I&A); high-end computing research and development (HEC R&D); cyber security and information assurance (CSIA); human computer interaction and information management (HCI&IM); large-scale networking (LSN); software design and productivity (SDP); high-confidence software and systems (HCSS); and social, economic, and workforce implications of IT and IT workforce development (SEW). Agency program managers in each PCA meet monthly in an Interagency Working Group (IWG) or a Coordinating Group (CG) to exchange information and coordinate research plans and activities such as workshops and solicitations. Overall NITRD Program coordination is carried out by the Subcommittee on Networking and Information Technology Research and Development, under the aegis of the Committee on Technology of the National Science and Technology Council (NSTC).

For each NITRD PCA, the Supplement presents, in brief, the interagency strategic priorities underlying the 2010 budget request, programmatic highlights of the request, ongoing and anticipated interagency planning and coordination activities, and additional technical activities by agency. NITRD agencies engaged in various R&D and coordination activities are listed in NITRD budget order followed by the other agencies participating in the activity; if there is a lead agency for the activity, that agency is listed first; agencies listed after the word “with” are in-kind contributors rather than funders or performers. Some large-scale activities may be cited in more than one PC because they involve R&D efforts in a variety of technologies. In such cases, agencies report the portion of program funding in each relevant PCA.

The President’s 2011 budget request for the NITRD Program is $4.261 billion; the 2010 NITRD budget estimate totaled $4.305 billion. Details of the NITRD budget, including 2010 estimates and 2011 requests by agency and by PCA, are presented in the budget table on page 21 and discussed in the budget analysis beginning on page 23. As part of the NITRD Program’s expanded responsibilities for coordination of Federal cyber R&D, the Senior Steering Group (SSG) for Cyber Security R&D is refining “game-changing” research objectives that emerged from the 2009 National Cyber Leap Year (NCLY). See page 9 for details.

Abbreviations and acronyms are used throughout the Supplement to maintain brevity. A glossary, beginning on page 28, is provided for reference.
NITRD Agencies: NIH, NSF, OSD and DoD Service research organizations, DOE/SC, NIST, NASA, NOAA, DOE/NNSA, EPA

HEC I&A agencies coordinate Federal activities to provide advanced computing systems, applications software, data management, and HEC R&D infrastructure to meet agency mission needs and to keep the United States at the forefront of 21st-century science, engineering, and technology. HEC capabilities enable researchers in academia, Federal laboratories, and industry to model and simulate complex processes in biology, biomedical science, chemistry, climate and weather, energy and environmental sciences, materials science, nanoscale science and technology, aerospace, physics, and other areas to address Federal agency mission needs.

President’s 2011 Request

Strategic Priorities Underlying This Request

Ongoing investment in Federal HEC facilities and advanced applications supports Federal agencies’ science, engineering, and national security missions and helps sustain U.S. scientific leadership. Priorities include:

Leadership-class systems: Continue acquisition and management of highest-capability systems for cutting-edge scientific research including energy, the environment, and national security applications

Production-quality HEC resources: Invest in capacity platforms to expand Federal computing resources for critical agency needs and for the science and engineering communities

Advanced applications: Develop scientific and engineering applications software for current and next-generation HEC platforms

Highlights of Request

Acquisition of prototype leadership-class and production R&D systems

NIH: Selected acquisition of cluster and midrange compute-intensive systems
NSF: Continue multiyear acquisitions of the Track 1 petascale system and other midrange systems exploring innovative solutions to HEC requirements; XD-Viz awards to TACC and UTK
OSD (HPCMP): Continue modernization of HEC platforms and storage subsystems at supercomputing centers
DOE/SC: Upgrade LCF system at ORNL to 2.3 PF (early FY 2010); begin preparation for expansion of ANL’s LCF resources by upgrading BlueGene/Q to 10 PF; NERSC 1 PF XT5 in full production and integrated into a common high-performance file system
NASA: Acquire test systems, exploit accelerator technologies, and upgrade production supercomputing and storage resources for next-generation HEC environments at Ames and Goddard
DOE/NNSA: Prepare for deployments of LANL Cielo system (1-2 PF) and LLNL Sequoia system (20 PF); continue operation of LANL RoadRunner system; initiate operation of LLNL Dawn system (500 TF BlueGene/P)

Applications

NIH: Scientific computing efforts such as biomolecular modeling, physiological modeling, and multiscale modeling that use HEC resources or are in pre-HEC state; biodata management and analysis; modeling and analysis of biological systems

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NSF: Multidisciplinary Cyber-enabled Discovery & Innovation (CDI) program, including applications that focus on understanding complexity, grid-computing infrastructure, and data-intensive applications; software that integrates computation, data acquisition in heterogeneous, dynamic environments; petascale applications to exploit leading-edge systems for breakthrough science across domains

OSD (HPCMP): CREATE program continues development of highly scalable application codes (aircraft, ships, antennas), CREATE-AV tools delivered; HPC software institutes continue support for mission applications

DOE/SC: Petascale multiphysics applications; recompetition of SciDAC; INCITE competition for access to LCF resources by outside researchers; mathematics for analysis of ultra-scale data sets; multiscale mathematics

NIST: Measurement science for HEC applications and visualization (predictive modeling, verification and validation of computational models, uncertainty quantification, computational experiment design, quantitative methods in visualization)

NASA: Increase model resolution, complexity, fidelity in aerospace, Earth science, and astrophysics modeling; support modeling to meet the goals of the National Plan for Aeronautics R&D

NOAA: Accelerate improvements in model-based computing of hurricane track and intensity forecast guidance

DOE/NNSA: Code validation and verification (V&V) and uncertainty quantification for predictive simulations

EPA: Applications and analytics required for a robust global-climate research program

HEC infrastructure

NIH: Grid computing infrastructure and tools for R&D (e.g., BIRN, CaBIG, BISTI, CVRG)

NSF: Develop numerical algorithms and innovative software implementations that push the boundaries of cyberinfrastructure, computational science and engineering, and computing on TeraGrid and XD; initiate Software Institutes to focus on producing the complex middleware and application codes for new HEC architectures

OSD (HPCMP): Operate and sustain supercomputing centers and support services for DoD RDT&E programs

DOE/SC: Continue emphasis on unified approach to software, languages, and tools support to reduce barriers to effective use of complex HEC resources by application developers and users

NIST: Continue development of a virtual laboratory facility and capability for HEC-based measurement science

NASA: Increase commonality and enhance or adopt operational best practices across computing centers

NOAA: Implement new tape archive architecture and high-speed network to link HEC centers

DOE/NNSA: Develop ASC common operating environment for deployment across its national lab platforms

EPA: Infrastructure to combine and model existing and future data at various temporal and spatial scales in a meaningful way; build data and information exchange components for R&D

Planning and Coordination Supporting Request

Access to leadership-class computing: Coordination to make highest-capability HEC resources available to the broad research community – NSF, DOE/SC, NIST, NOAA, DOE/NNSA

System reviews, benchmarking: Collaborations – NSF, DOE/SC, NASA, NOAA, DOE/NNSA

Acquisition procedures and analysis: Information sharing, streamlining of processes, and collaborative analysis of total cost of ownership; promote green computing practices – NSF, OSD, DOE/SC, NASA, NOAA, DOE/NNSA, EPA

Exascale computing: International Exascale Software Project (IESP) – NSF, DOE/SC, DOE/NNSA

Multiscale modeling in biomedical, biological, and behavioral systems: Interagency collaboration to advance modeling of complex living systems – NIH, NSF, OSD

Simulation-based engineering and science: Interagency activity under Administration innovation agenda – DOE/SC, NIST (co-chairs), NSF, NASA, other agencies


Computational toxicology: Integration of HEC technologies with molecular biology to improve methods for risk assessment of chemicals – NIH, OSD, DOE/SC, EPA, FDA

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Additional 2010 and 2011 Activities by Agency

NIH: NIH Common Fund National Centers for Biomedical Computing (NCBC); Center for Information Technology (CIT) high-performance, parallel systems with software solutions for NIH intramural research program investigators; Cancer Imaging and Computational Centers; P41 computational centers; bioinformatics centers; proteomics, protein structure initiatives; systems biology centers; international networks for biomedical data, software sharing
NSF: Support data-intensive computing program projects that increase ability to build and use systems and applications; eXtreme Digital (XD), successor to TeraGrid; cyberinfrastructure software; TeraGrid operations; virtual organization activities
OSD (HPCMP): HEC services for R&D and test communities (e.g., platforms, computational science software support); computational science institutes for DoD priorities (air armament, health force protection, weather prediction, ground sensors, space situational awareness, rotorcraft, networks, microwaves, munitions)
DOE/SC: Manage LCF facilities at ORNL and ANL; support computation-intensive and data-intensive applications; new generation of petascale tools; optimization and risk analysis in complex systems
NIST: Development, analysis of fundamental mathematical algorithms, software, tools; parallel and distributed algorithms in applications (nano-optics, nano-magnetic modeling, automated combinatorial software testing)
NASA: Integrate data analysis and visualization with Pleiades to implement concurrent visualization; deploy terascale data-analysis capability with online access; continue to broaden NASA’s HEC user base
NOAA: Detailed design for next-generation NOAA HPC architecture optimizing number, locations of HPC systems; award systems integration contract for planning and migration to the next-generation architecture

High End Computing (HEC) Research and Development (R&D)

NITRD Agencies: NSF, OSD and DoD Service research organizations, DOE/SC, DARPA, NIST, NASA, NSA, NOAA, DOE/NNSA

HEC R&D agencies conduct and coordinate hardware and software R&D to enable the use of high-end systems to meet Federal agency mission needs, to address many of society’s most challenging problems, and to strengthen the Nation’s leadership in science, engineering, and technology. Research areas of interest include hardware (e.g., microarchitecture, memory subsystems, interconnect, packaging, I/O, and storage), software (e.g., operating systems, languages and compilers, development environments, algorithms), and systems technology (e.g., system architecture, programming models).

President’s 2011 Request

Strategic Priorities Underlying This Request

Next-generation HEC systems and advanced architectures: Develop new scientific frameworks and system architectures; “beyond Moore’s Law”; innovative systems that combine increased speed, economic viability, high productivity, and robustness to meet agency needs for systems that manage ultra-large volumes of data and run multiscale, multidisciplinary science and engineering simulations; quantum information science
Extreme-scale computation: Integrate computer science and applied mathematics foundations to address computation at the petascale level and beyond, to exascale
New hardware and software directions: Explore novel concepts and approaches for solving technical challenges such as power use, thermal management, file system I/O latency, resiliency, highly parallel system architectures, and programming language and development environments that can increase the usability of large-scale multiprocessor (including hybrid) systems
Productivity: Continue collaborative development of new metrics of system performance, including benchmarking, lessons learned for acquisition, total ownership costs of HEC systems; integrate resources for improved productivity

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Prototypes: Develop, test, and evaluate prototype HEC systems and software to reduce industry and end-user risk and to increase competitiveness and productivity

Software for team environment support: Design and develop requirements for software to enable, support, and increase the productivity of multidisciplinary, geographically dispersed, collaborative teams that develop future HEC applications

Highlights of Request

High-Productivity Computing Systems (HPCS) Phase III: Complete the design, fabrication, integration, and demonstration of full-scale prototypes for a new generation of petascale, economically viable computing systems to provide leap-ahead advances in performance, robustness, and programmability; develop parallel programming languages and tools to increase user productivity and enable efficient implementation of performance-critical applications – DARPA, DOE/SC, DOE/NNSA

Next-generation architectures and programming: R&D in advanced architectures for science, highly parallel systems (silicon-based as well as radically new device-based technologies), parallel programming languages and programming environments, programming models, compilers, file systems and I/O, system software and tools; Forum to Address Scalable Technology for runtime and Operating Systems (FAST-OS) – NSF, DOE/SC, DARPA, DOE/NNSA

Petascale computing: R&D in petascale operating, runtime, and file systems; tools, programming models, performance modeling, low-power approaches, software for computation- and data-intensive applications; software effectiveness metrics; mathematics and computer science (scalable algorithms, optimization of complex systems, control theory, risk assessment) – NSF, DOE/SC, DARPA, DOE/NNSA

Pathways to exascale computing: Interconnect and memory technologies; participation in IESP – DOE/SC, DOE/NNSA

Advanced computing systems: R&D to improve power efficiency, chip-to-chip I/O, interconnects, productivity, resilience, and file system I/O – DARPA, NASA, NSF

Quantum computing: Quantum information theory; architectures and algorithms; modeling of quantum memory, quantum gates, components, and systems – NSF, DARPA, NIST, NSA

Resources for scientific research: Computational concepts, methods, and tools for discovery; centers, institutes, and partnerships for predictive science, applied math/computer science challenges of scientific computing at extreme scale, joint mathematics/computer science institutes – NSF, DOE/SC, DARPA, DOE/NNSA

Software environments: Develop modeling architecture based on ESMF – NOAA, with NSF (NCAR), DoD Service research organizations, DOE/SC, NASA

Planning and Coordination Supporting Request

Planning

Technical and planning workshops: Annual File System and I/O Workshop to coordinate HEC-URA effort; Federal Application Benchmark Workshop to plan multiagency benchmarking activity – NSF, OSD, DOE/SC, DARPA, NASA, NSA, DOE/NNSA

Open-source software: Enable HEC users to read, modify, and redistribute source code, fostering more efficient development and collaboration to improve software quality – NSF, DOE/SC, NASA, DOE/NNSA

Proposal reviews: Multiple HEC agencies

Systems architecture

HEC hardware and software: Facilitate access to and share knowledge gained and lessons learned from HEC hardware and software development efforts – NSF, OSD, DOE/SC, NIST, NASA, NOAA, DOE/NNSA

HPCS: Support architecture development – DARPA, DOE/SC Institute of Advanced Architectures and Algorithms: Direct and perform R&D in the focus areas that impact the performance and reliability of large-scale systems – DOE/NNSA, DOE/SC
Quantum information science: Study information, communication, and computation based on devices governed by the principles of quantum physics – NSF, DOE/SC, DARPA, NIST, NSA

Systems software development

HEC tools: Coordinate research in operating/runtime systems, languages, compilers, libraries – NSF, DOE/SC, DARPA, NSA, DOE/NNSA

HEC metrics: Coordinate research on effective metrics for application development and execution on high-end systems – NSF, DOE/SC, DARPA, with OSD, NSA, NASA, DOE/NNSA

Benchmarking and performance modeling: Collaborate on developing performance measurement test cases with applications commonly used by Federal HEC community for use in system procurements, evaluation of Federal HEC system productivity – OSD, with NSF, DOE/SC, DARPA, NASA, NSA, DOE/NNSA

File systems and I/O: Coordinate R&D funding based on a national research agenda and update agenda on a recurring basis – NSF, DOE/SC, DARPA, NASA, NSA, DOE/NNSA

Additional 2010 and 2011 Activities by Agency

NSF: Science and Engineering Beyond Moore’s Law (SEBML) program addressing hardware and software challenges associated with exploiting all the performance opportunities in new multi-core computing technologies; SEBML will support fundamental research to identify promising new technologies for computing, notably in quantum information science; multidisciplinary CDI emphasis on computational concepts, methods, models, algorithms, and tools to advance science and engineering; complex software and tools for HEC environments; software development and reuse technologies for cyberinfrastructure; modeling and simulation of complex systems; numerical algorithms and software implementations that push the boundaries of computing infrastructure; grid computing

OSD (HPCMP): HEC systems and software R&D in support of DoD mission priorities; modeling and simulation

DOE/SC: Joint mathematics/computer science institutes for petascale algorithms; data analysis and management, interoperability; software development environments; support for leading-edge application development to accelerate acceptance of new high-risk, high-payoff algorithms and software; R&E prototypes

NIST: Develop techniques and benchmarks to assess performance of quantum computing technologies; develop fault-tolerant architectures for quantum computers

NSA: Center for Exceptional Computing; continuation of IHEC; Adaptive Petascale Computing

DOE/NNSA: Technology R&D investments

Cyber Security and Information Assurance (CSIA)

NITRD Agencies: NSF, OSD and DoD Service research organizations, DARPA, NIST, NSA

Other Participants: DHS, DISA, DOT, FAA, FBI, IARPA, State, Treasury

CSIA focuses on research and development to prevent, resist, detect, respond to, and/or recover from actions that compromise or threaten to compromise the availability, integrity, or confidentiality of computer- and network-based systems. These systems provide both the basic infrastructure and advanced communications in every sector of the economy, including critical infrastructures such as power grids, emergency communications systems, financial systems, and air-traffic-control networks. These systems also support national defense, national and homeland security, and other vital Federal missions, and themselves constitute critical elements of the IT infrastructure. Broad areas of concern include Internet and network security; confidentiality, availability, and integrity of information and computer-based systems; new approaches to achieving hardware and software security; testing and assessment of computer-based systems security; and reconstitution and recovery of computer-based systems and data.

President’s 2011 Request
Strategic Priorities Underlying This Request

R&D priority areas for the CSIA agencies range from fundamental investigation of scientific bases for hardware, software, and system security to applied research in security technologies and methods, approaches to cyber defense and attack mitigation, and infrastructure for realistic experiments and testing. Emphases include:

• **Foundations**: Cyber security as a multidisciplinary science; models, logics, algorithms, and theories for analyzing and reasoning about trust, reliability, security, privacy, and usability; assured and trustworthy systems; cyber security metrics; social and technical dimensions of a trustworthy computing future; risk modeling; secure software engineering and development; cryptography and quantum information science for secure computing and communications

• **Applied and information infrastructure security**: Secure virtual platforms; assured information sharing; security for mobile, wireless, and pervasive computing; identity management principles, frameworks, standards, models, and technologies; security automation; secure protocols; vulnerability detection and mitigation; cloud computing; health IT; smart grid

• **Mission assurance**: Activities and processes that ensure an organization’s ability to accomplish its mission in an all-hazard cyber environment; cyber conflict defense

• **Infrastructure for R&D**: Testbeds, cyber test ranges, tools, platforms, repositories to support cyber security experimentation and analysis

Highlights of Request

**Foundations**

**Cyber Trust Centers**: Team for Research in Ubiquitous Secure Technology (TRUST); A Center for Correct, Usable, Reliable, Auditable, & Transparent Elections (ACCURATE); Collaborative Center for Internet Epidemiology & Defenses (CCIED); Security Assurance For Everyone (SAFE) – NSF; Trustworthy Cyber Infrastructure for the Power Grid (TCIP) – NSF, DARPA, DHS

**Secure software engineering**: Metrics for cost-benefit and risk-analysis tools; identification of operational security practices for early phases of systems development life cycle; construction of trustworthy systems from untrustworthy components; formal methods for validation and verification of composable systems; scalable secure systems; lightweight analysis – NSF, OSD, ONR, DARPA, NIST, DHS

**Software protection**: Function extraction technologies to automate the computation of software behavior; embedded software security technologies; software cross-domain security; malicious code detection, mitigation, and prevention; software anti-tamper – NSF, OSD, AFRL, ARO, CERDEC, ONR, DARPA, NSA

**Hardware and firmware security**: Virtualization technologies (e.g., NSA’s Secure Virtual Platform); secure OS; encryption of data in memory; security processors; high-performance intrusion-detection technologies and trusted platform modules – NSF, OSD, AFRL, ONR, NSA

**Cryptography**: Cryptographic algorithms and engineering for increasing network speeds; cryptographic key management; quantum information science and security; quantum computation-resistant cryptography – NSF, ONR, DARPA, NIST, NSA

**Models, standards, testing, and metrics**: Quantitative risk-analysis methods and tools; evidence-based security metrics; models and standards for protection, sharing of sensitive information; standards and tests to assess, validate system security; reliable information-assurance metrics; leadership in national and international standards bodies – NSF, OSD, ARL, ARO, NIST, DHS
Applied and information infrastructure security

Security management infrastructure: Policy-based access control systems and protocols; principles, frameworks, models, and methods for identity, authentication, privilege management in dynamic environments; management tools (threat analysis, attack- and risk-based decision models; survivability analysis framework; automated and real-time diagnostics for system security-policy flaws, configuration anomalies, vulnerabilities; Resiliency Engineering Framework for assessing security-management capabilities); next-generation biometric measurements, standards – NSF, OSD, AFRL, ARO, CERDEC, ONR, DARPA, NIST, NSA

Assured information sharing: DoD-wide priority to enhance technologies and tools to secure communications and data sharing across multiple, heterogeneous networks, platforms, and security levels; demonstrate secure collaboration through cyber sensing station – OSD and DoD Service research organizations, NSA

Information Security Automation Program (ISAP): Multiagency program to enable automation and standardization of technical security operations; applying Security Content Automation Protocol (SCAP), a method for using specific standards to enable automated vulnerability management, measurement, and policy compliance evaluation (e.g., FISMA compliance) – NSA, NIST, DHS, DISA

Mobile wireless and sensor networks: Security architectures for airborne/enclave networks, security of classified information on wireless networks; assured access anti-jam communications; geolocation; trustworthy information delivery in mobile tactical systems (including sensor networks); secure handover for roaming between heterogeneous networks – NSF, OSD, AFRL, ARO, CERDEC, ONR, DARPA, NIST, NSA

Mission assurance

Network protection and defense: Technologies and tools for situational awareness across organizations; threat anticipation and avoidance; attack sensing, warning, and response; cognitive policy-based intrusion protection and detection; rapid response (containment, adaptation, repair, self-regeneration); behavior-based network monitoring; defense against large-scale attacks (e.g., DDoS, worms, botnets, spyware); routing security; traceback, attribution, real-time forensics; prototype cyber operations center – NSF, OSD, AFRL, ARL, ARO, CERDEC, ONR, DARPA, NIST, NSA, DHS

Cyber Conflict Defense S&T: Harden key networks and systems; assure missions; defenses to disrupt adversaries’ cyber preparation and execution – DARPA, OSD, ONR

Software Protection Initiative: Models of the global threat; protection against nation-state class threats – OSD

Infrastructure for R&D

National Cyber Range (NCR): Enable a revolution in the Nation’s ability to conduct cyber operations and defend against cyber threats by providing capabilities for a persistent research cyber testing range – DARPA

Experimental research testbed (DETER): Experimental infrastructure to support next-generation cyber security technologies; allow repeatable medium-scale Internet emulation experiments – NSF, DHS

Information infrastructure security: Secure protocols; Domain Name System Security (DNSSEC); process control systems security; Internet route monitoring; modeling of Internet attacks – NIST, DHS, GSA

Protected Repository for the Defense of Infrastructure Against Cyber Threats (PREDICT): Research data repository to create and develop new models, technologies, and products to assess cyber threats to the country’s computing infrastructure and increase cyber security capabilities – DHS

Wisconsin Advanced Internet Laboratory (WAIL): Experimental infrastructure to enable arbitrary interconnections of routing, switching, and host components found along any path in the Internet – NSF

Planning and Coordination Supporting Request


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Collaborative deployment: Coordinate testing and deployment of DoD software-protection technologies within the DOE HPC environment – OSD, AFRL, DOE/NNSA

Interagency cooperation: Ongoing information exchanges in support of developing a national cyber security R&D agenda – All

Technical standards: Developing, maintaining, and coordinating validation programs for many cryptographic standards – NSA, NIST; participation in IETF security groups to develop standard representations and corresponding reference implementations of security-relevant data – OSD, NSA, NIST

Testbeds: Continued joint development of research testbeds, such as DETER, PREDICT, Web*DECIDE, WAIL, NCR, Mobile Networks Testbed Emulation – NSF, Army, ONR, DARPA, DHS, Treasury

DoD IA/CS S&T Steering Council: Expanded role to include oversight and coordination of all defensive cyber S&T programs – OSD and DoD Service research organizations

Technical Cooperation Program C3I Group: Information assurance and defensive information warfare – AFRL, Army, ONR, NSA

INFOSEC Research Council: Participation in technical forum for coordination of Federal CSIA R&D – All

Additional 2010 and 2011 Activities by Agency

NSF: Trustworthy Computing (TwC) program (includes support for the Comprehensive National Cybersecurity Initiative) seeking new models, logics, algorithms, and theories for analyzing and reasoning about all aspects of trustworthiness (reliability, security, privacy, and usability); fundamentals of cryptography; remediation of security weaknesses in current algorithms or protocols

OSD: Continue to lead DoD coordination through the expanded DoD IA/CS S&T Steering Council; new state-of-the-art-report in supply-chain risk management via the IATAC; cyber security metrics; leading the development of software-protection techniques; boot disk to provide instant, trusted, temporary client node for secure remote access; SBIR workshop to facilitate networking with small businesses

AFRL: Cyber science (fault tolerance, botnet and anomaly detection, applications of game theory); integrated cyber defense to ensure continued mission operations

ARO/ARL/CERDEC: Network Science Collaborative Technology Alliance – Trust Cross Cutting Research Initiative; Army Cryptographic Modernization Office; tactical security tools evaluations; biometric pilot programs; information assurance program support

ONR: Security architecture research for host, network, and application: securing the layers, the components, and interactions for information technologies/infrastructures; advanced technology demonstration: proactive computer network defense; secure distributed collaboration; security management infrastructure and assured information sharing; secure dynamic tactical communications networks

NIST: Federal Computer Security Program Managers' Forums; technical and managerial guidance, standards; global electronic ID verification; international hash competition; product assurance research; voting security; Software Analysis Tool Exposition (SATE); analysis and evaluation of software assessment tools and technologies to advance integrity, security, and reliability in software; advanced models, methods, technologies, and standards to enhance software experimentation, testing, and measurement

NSA: Developing low-cost, high-assurance, programmable, “easier” to certify guard (systems to assure separation between information environments with differing security classifications); privilege-management capability for information sharing in dynamic policy environments; leveraging commodity hardware, virtualization, measurement, and attestation to develop Secure Virtual Platform

DHS: DHS Secure Wireless Access Pilot (DSWAP); DNSSEC; Secure Protocols for the Routing Infrastructure (SPRI); network data visualization for information assurance; Internet tomography; data anonymization tools, techniques; Homeland Open Security Technology (HOST)
IARPA: Automatic Privacy Protection (APP); Securely Taking on New Executable Software of Uncertain Provenance (STONESOUP)

NITRD Program Identifies Initial Strategic Objectives for Cyber Security R&D

During 2009, the NITRD Program led a series of activities comprising the National Cyber Leap Year (NCLY), a Federally initiated public-private effort to shape research and development strategies that focus on game-changing technologies for securing the Nation’s cyber infrastructure and digital information. The NCLY was directed by the NITRD Senior Steering Group (SSG) for Cyber Security R&D, with guidance from the Office of Science and Technology Policy (OSTP) (see FY 2010 Supplement). The objective of the NCLY was to identify gamechanging ideas with the potential to reshape the cyber security landscape.

In three broadly distributed Requests for Input (RFI), the SSG invited interested stakeholders across all public and private sectors to submit concepts that would make it possible for the United States to leap ahead of current barriers to improved cyber security. Five game-change categories in cyber security emerged from this RFI process and other information-gathering efforts: (1) basing trust decisions on verified assertions (digital provenance); (2) attacks only work once if at all (moving-target defense); (3) knowing when we've been had (hardware-enabled trust); (4) moving from forensics to real-time diagnosis (nature-inspired cyber health); and (5) crime doesn’t pay (cyber economics). The NCLY efforts culminated in the National Cyber Leap Year Summit, supported by the NITRD Program and the Office of the Secretary of Defense. This event, held in August 2009, brought together 150 security experts from industry, academia, and government who identified a range of ideas for advancing leapahead R&D activities.

Inspired by ideas generated at the NCLY Summit and other community input, the SSG identified these initial strategic objectives for transforming cyber security:

• **Tailored trustworthy spaces**: Enable sub-spaces in cyberspace to support different security policies and different security services for different types of interactions
• **Moving target**: Deploy systems that are both diverse and changing, increasing complexity and costs for attackers, limiting the exposure to vulnerabilities, and increasing system resiliency
• **Cyber economic incentives**: Develop a scientific framework for cyber security incentives to create foundations for cyber security markets, to establish meaningful metrics, and to promote economically sound secure practices

The objectives lay out broad areas of research that can be conducted collaboratively by academic, government, and commercial researchers and contribute to fulfilling the goal of the President’s Cyberspace Policy Review for “a framework for research and development strategies that focus on game-changing technologies that will help meet infrastructure objectives, building on the existing Networking and Information Technology (NITRD) strategies and other related work.”

Human Computer Interaction and Information Management (HCI&IM)

**NITRD Agencies:** NIH, NSF, OSD and DoD Service research organizations, DARPA, NIST, NASA, AHRQ, NOAA, EPA, NARA

**Other Participants:** IARPA, HHS/ONC, USDA, USGS

HCI&IM focuses on R&D to expand human capabilities and knowledge through the use and management of information by computer systems and by humans, facilitated by hardware, software, and systems technologies. These technologies include robotics, multimodal interaction technologies, visualization, agents, cognitive systems, collaborative systems, and information systems that support the organization and refinement of data from discovery to decision and action. HCI&IM outcomes support U.S. national priorities such as scientific research, energy and the environment, climate
change and prediction, health care, education and training, protecting our information infrastructure, emergency planning and response, national defense, homeland security, weather forecasting, and space exploration.

**President’s 2011 Request**

**Strategic Priorities Underlying This Request**

**Information integration**: To support complex human, societal, and organizational ideas, analysis, and timely action and decision-making, large amounts of multisource forms of raw information (e.g., sensors) must be managed, assimilated, and accessible in formats responsive to the user’s needs and expertise. Information use, sharing, and re-purposing across domains for knowledge discovery require next-generation methods, technologies, and tools that integrate and efficiently manage massive stores of distributed, heterogeneous information while integrating the human in the discovery process (e.g., science and engineering data, Federal records, health information, scientific and other types of archival literature). Key research areas include:

- **Information standards**: Data interoperability, integration of distributed data; generalizable ontologies; data format description language (DFDL) for electronic records and data; data structure research for complex digital objects; interoperability standards for semantically understood ubiquitous health information exchanges; information services for cloud-based systems
- **Decision support**: Portals and frameworks for data, processes; user-oriented techniques, tools for thematic discovery, synthesis, analysis, visualization for decision making; mobile, distributed information for emergency personnel; management of human responses to data; collaborative information triage; portfolio analysis; development of data corpora for impact assessment and other metrics of scientific R&D
- **Information management**: Intelligent rule-based data management; increasing access to and cost-effective integration, maintenance of complex collections of heterogeneous data; innovative architectures for data-intensive and power-aware computing; scalable technologies; integration of policies (differential sensitivity, security, user authentication) with data; integrated data repositories, computing grids; testbeds; sustainability, validation of complex models; grid-enabled visualization for petascale collections

**Information infrastructure**: Technical challenges in management of the Federal government’s electronic records; technologies (data transfer, mass storage) and tools for long-term preservation, curation, federation, sustainability, accessibility, and survivability of vital electronic records, data collections, and health records; multidisciplinary R&D in ways to convert data into knowledge and discovery; social-computational systems

**Active systems**: Systems that learn, reason, and automatically adapt to new and unforeseen events; onboard autonomy; performance evaluation of intelligent sensing and control systems; robotic devices for emergency response, urban search and rescue, bomb disposal, manufacturing, and exploration

**Highlights of Request**

**Effective stewardship of science and engineering data**: Issues in access to and federation, preservation, curation, data life-cycle stewardship, and analysis of large, heterogeneous collections of scientific data, information, and records; fault-tolerant, scalable I/O – NIH, NSF, NIST, NASA, NOAA, EPA, NARA

**Cyberlearning Transforming Education (CTE)**: New multidisciplinary effort to fully capture the transformative potential of advanced learning technologies in education, enable new avenues of STEM learning for students and workforce members, advance the Nation’s ability to study the learning process itself, and bring advances in technology to learners at all educational levels – NSF

**Social-Computational Systems (SoCS)**: Develop understanding of the properties of systems of people and computers at all scales, and how to design systems to facilitate socially intelligent computing – NSF

**Data-Intensive Computing**: Cross-cutting focus on innovative approaches to processing, retrieving, exploring, analyzing, describing ultra-large data stores; new concepts, tools, systems for data-intensive science – NSF

**Cognitive and adaptive systems**: Cognitive, perceptual modeling for joint cognitive systems design; decision-support systems/tools; improve autonomy, trustworthiness, reliability of automated systems; intelligent robots; robotic manipulation; human-robot teaming; affective computing – NSF, DoD, DARPA, NIST, NASA
Multimodal language recognition and translation: Improve multilingual language technology performance in areas of speech-to-text transcription, spontaneous two-way communications translation, machine reading, text retrieval, document summarization/distillation, automatic content extraction, speaker and language recognition, multimodal interfaces, usability, language understanding – NSF, DoD, NIST, DARPA, NASA, NARA, IARPA

Information integration, accessibility, and management: Advanced technologies, system architectures, and tools for highly optimizable, scalable ingest and processing; high-capacity data integration, management, exploitation, modeling, analysis, and tools; video understanding; ontologies and metadata; efficient data access – NIH, NSF, DARPA, NIST, NASA, AHRQ, NOAA, EPA, NARA

Health Information Technologies: Clinical decision-support systems and standards; physician/personal electronic health records; preventable adverse drug effects, national health information interoperability standards; usability of health IT systems – AHRQ, NIH, NIST, FDA, HHS/CMS, HHS/ONC, other agencies

Human-in-the-loop: HCI and systems integration; personalization in design; decision-support systems and tools; distributed collaboration, knowledge management, virtual organizations and visual environments; cognitive and perceptual process modeling and measurement; virtual reality technologies for simulation and training, usercontrolled data abstraction, biometric and voting systems – NSF, DoD, DARPA, NIST, NASA, NOAA, EPA

Text Retrieval and Text Analysis Conferences: Evaluation of information-discovery technologies; relevance feedback; legal discovery; recognition of opinion in blogs; entity, web, chemical patent search; machine reading – NIST, NSF, NARA, IARPA

Planning and Coordination Supporting Request

White Paper on Data, Information and Visualization: Collaborative effort to document challenges, opportunities, gaps and the future of data, information, and visualization – NSF, NIST, NASA, AHRQ, NOAA, EPA, NARA

Environmental databases and data distribution: Multiagency collaboration to expand sharing, interoperability of large diverse datasets; GEOSS; Remote System Information Gateway – NASA, NOAA, EPA, NSF

Information access, management, and preservation: Collaborations in IWG on Digital Data; scalable repository architectures; data management and decision-support technologies; data grids; data intensive computing – NSF, NIST, NASA, NARA

Visualization: Coordination to consider feature extraction for anomaly detection; integration of multiple types of data and records at scale or format; use of visualization as an interface, biomedical imaging – NIH, NSF, NIST, NASA, NOAA, EPA, NARA, other agencies

Additional 2010 and 2011 Activities by Agency

NSF: Academic R&D in information privacy; integrative intelligence (agents, modalities, domains); ubiquitous networked data environments; human-computer partnerships; socially intelligent computing; universal access

DARPA: Autonomous Robotic Manipulation (ARM) and Machine Reading (MR)

NIST: Biometrics evaluation, usability, and standards (fingerprint, face, iris, voice/speaker); multimedia evaluation methods (video retrieval, audio and video analysis, smart-space technologies); measurement, evaluation tools for 3D shape searching; data preservation metrology, standards; usability of voting systems; ontologies for manufacturing information integration, supply chain; standards for manufacturing robots

NASA: Human-centered automation concepts for aviation safety (including automation design tools and metrics); decision-support technologies for Next Generation Air Transportation System (NextGen); operator state monitoring and classification; multimodal interface research; problem reporting systems; prototypes for new Crew Exploration Vehicle (Orion) flight deck; mission control technologies suite

AHRQ: Patient safety, quality improvement program in ambulatory care

NOAA: Technologies to provide real-time weather and climate data in multiple formats for scientists, forecasters, first responders, citizens; regional climate visualization; disaster planning, mitigation, response, and recovery

EPA: Databases for computational toxicology; technologies to improve visualization of distributed data and models; pilot projects for distribution and search of environmental data

NARA: Advanced decision-support technologies for ultra-high-confidence processing of very large Presidential electronic records collections (with ARL support)
Large Scale Networking (LSN)

NITRD Agencies: NIH, NSF, OSD and DoD Service research organizations, DOE/SC, DARPA, NIST, NASA, NSA, AHRQ, NOAA

Other Participants: DHS, NTIA, USGS

LSN members coordinate Federal agency networking R&D in leading-edge networking technologies, services, and enhanced performance, including programs in network security, future Internet design, heterogeneous multimedia community testbeds; middleware, end-to-end performance measurement, networks for disaster response, network science and engineering of complex networks; advanced networking components, grid and collaboration networking tools and services; and engineering, management, and enabling large-scale networks for scientific and applications R&D including large-scale data transfers and virtual organization functionality. The results of this coordinated R&D, once deployed, can help assure that the next generation of the Internet will be scalable, trustworthy, and flexible to support user applications.

President’s 2011 Request

Strategic Priorities Underlying This Request

Understanding large-scale network complexity, deriving fundamental insights, and measuring performance to enable trustworthy, economically viable networks that preserve our social values

Cyber-physical systems (CPS): Identify networking requirements and critical research (e.g., for “smart grids”); develop secure, reliable, dynamic, responsive services

Future of middleware: Identify new research directions in middleware (in light of recent computing and technology advances such as cloud computing and virtualization at scale) to improve basic science transparency, collaboration, efficiency across science domains, and network management

Performance measurement over federated, multidomain networks: Hold a continuing series of workshops to promote development and use of performance measurement capabilities based on the PerfSONAR infrastructure

Highlights of Request

Networking for health science research, clinical needs, and disaster management – NIH, NSF, NIST

Network architectures and protocols for future networks: Develop network architecture concepts to enable robust, secure, flexible, dynamic, heterogeneous networking capabilities and support sustainable environments, energy-efficient computing, and virtualization at scale – NSF, OSD, DOE/SC, DARPA, NIST, NASA

Experimental network facilities: Provide at differing scales, including DOE/SC’s 100 G network to support experimentation at scale in new architecture and protocols – NSF, DOE/SC, NIST, NASA, NOAA

Networking for CPS: Develop and demonstrate robust, secure, reliable networking for autonomous cars, intelligent (efficient) buildings, medical devices, and assistive technologies – NSF, NIST

Large-scale data flows: Develop, test terabit-plus transport protocols, capabilities (e.g., Coronet, ORCA, Military Networking Protocol, InfiniBand single-stream flows over WANs) – NSF, OSD, DOE/SC, DARPA, NASA, NOAA

Distributed computing and collaboration: Secure federated software tools and cloud services for data distribution and management, visualization, software stack for large-scale scientific collaborations, high-bandwidth implementation, interoperable smart grid standards and testbeds, Open Science Grid, Worldwide Large Hadron Collider Computational Grid, Earth System Grid – NSF, DOE/SC, NIST, NASA, NOAA

End-to-end performance measurement: Enable federated, end-to-end performance measurement for advanced networking; provide tools for, implement PerfSONAR – NSF, DOE/SC, NIST, NASA Security implementation (IPv6, DNSSEC, and Trusted Internet Connections [TICs]): Develop and implement near-term mandated capabilities – NIH, NSF, OSD, DOE/SC, NIST, NASA, NSA

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Network security research: Technologies for detection of anomalous behavior, quarantines; standards, modeling, and measurement to achieve end-to-end security over heterogeneous, multidomain networks and infrastructure; critical-infrastructure protection; trustworthy networking; privacy, confidentiality, authentication, policy, cryptography, and quantum communication – NIH, NSF, OSD, DOE/SC, DARPA, NIST, NASA

Cloud computing: Implement sharing of resources for open science communities; international science cooperation over networks – NIH, NSF, DOE/SC, NIST, NASA, NOAA

Network science and engineering: Develop concepts, methods, architectures, protocols, and measurement for modeling networks as complex, autonomous, and dynamic systems – NSF, DOE/SC, DARPA, NIST

Mobile and sensor networking: Standards, tools to allow for better interconnectivity, seamless interoperability, management (e.g., power, data fusion, heterogeneous interfaces, spectrum constraints) for robust, secure, dynamic, mobile networks (wireless, radio, sensor) and interoperability with heterogeneous networks; sensing, control systems – NSF, OSD, DARPA, NIST, NASA

Public-safety networking, disaster recovery, and crisis management: Disaster Information Management Research Center (DIMRC), public-safety communications, implant communication system – NIH (NLM), NIST

Planning and Coordination Supporting Request

Interagency research agenda: PerfSONAR implementation and future of middleware workshops – LSN agencies

Cooperative R&D efforts: Smart Grid, DETER, networking research projects – NSF, DOE/SC, DARPA; efficiency and security of CPS – NSF, DARPA; Internet Infrastructure Protection Program – DARPA, NIST; PerfSONAR deployment and cooperation – DOE/SC, NIST, NASA

Workshops: DOE/SC workshops on network requirements for biological/environmental research and basic energy sciences; LHC Tier 2 and Tier 3 developments workshop; NSF workshops on network security and trustworthy computing, FIND, software verification and validation for CPS, highly controllable, ultra-high-speed networks

Trans-Oceanic Networking for Science: NSF, DOE/SC Coordination by LSN Teams

– Joint Engineering Team (JET): NIH, NSF, OSD (HPCMP), DOE/SC, NIST, NASA, NSA, NOAA, USGS, with participation by academic organizations (CAIDA, CENIC, Internet2, ISI, MAX, NLARN, StarLight), ANL, supercomputing centers (ARSC, MCNC, PSC), universities (FIU, IU, UIC, UmD, UNC, UU, UW), and vendors - Advanced testbeds, coordination of end-user requirements, engineering of research networks and testbeds (JETnets); security best practices, applications testbeds (DNSSEC, IPv6, IPv6 multicast, performance measurement); TICs coordination; interdomain and end-to-end metrics, monitoring; tool sharing and exchange; international coordination; transit and services cooperation

– Middleware And Grid Infrastructure Coordination (MAGIC) team: NIH, NSF, DOE/SC, NIST, NASA, NOAA, with participation by academic organizations (EDUCAUSE, Internet2, ISI, UCAR), national labs (ANL, LANL, LBNL, PNNL), universities (UIUC, UmD, UNC, UWisc), vendors - Middleware and grid tools, services; cloud computing; grid standards and implementation status, (TeraGrid, OSG, ESG, CEDPS, caBIG, BIRN), grid security and privacy (e.g., coordinated certificate authorities); international coordination

Information exchange: Multiagency participation in review panels, informational meetings, principal investigator (PI) meetings; coordination among program managers; joint JET, DOE ESSC and Internet2 Joint Techs Meetings – NSF, AFRL, DARPA, NIST, NASA, NSA, DHS

Partnerships for research connectivity – NSF, DREN, DOE/SC, NASA, NOAA

Additional 2010 and 2011 Activities by Agency

NIH: Health care IT, infrastructure creation; applications (Web, wireless, grid-based, distributed databases and repositories, TeraGrid)

NSF: Core networking research; network experimental infrastructure; SEES efforts to optimize energy-computation performance; IRNC; NetSE focus on theory of network architecture, understanding complexity, robust socio-technological networking; collaboratories; data-intensive computing; “Expeditions”

OSD (HPCMP): Multidomain performance measurement; security (IPsec, VPN portals, security assessment script, Kerberos development, filters, encryption, data attribution); high-speed access to DOJ, Hawaii, and Alaska
DOE/SC: 100 G networking (technology, infrastructure, testbed, scaling middleware, coupled applications); cloud computing testbed; distributed systems software implementations; hybrid networking; scalable performance measurement; on-demand bandwidth services

DARPA: Radio networking in challenging environments (information theory for MANET, power and spectrum management, interface multiple access, brood of spectrum supremacy, Quint networking technology, LANdroids, wireless electronic protect/attack); data fusion and management (e.g., SAPIENT); dynamic quarantine of worms; collective technology for dynamic teams, software agents, and sensors (e.g., sensor topology, ASSIST, CLENS)

NIST: Smart grid standards; Internet infrastructure protection; seamless, secure mobility standards, tools; complex systems; quantum communications testbed, Quantum Key Distribution (QKD); cloud-computing security

NASA: 40-100 G testbed, high-performance encrypted Infiniband and file transfers, performance measurement, firewalls; innovative architectures; network security research and implementation; mobile and sensor networking; TIC development

NSA: Delay-tolerant and ad hoc networking; open-source cognitive radio

AHRQ: With ONC, health care IT (develop, evaluate IT tools to improve quality of care and patient safety; demo statewide, regional information networks; integrate with Nationwide Health Information Network data standards)

NOAA: Integration of and access to HPC centers; support to remote users, test, measurement and analysis tools, improved security

Software Design and Productivity (SDP)

NITRD Agencies: NIH, NSF, AFOSR, ONR, NIST, NASA, NOAA

Participating Agencies: DISA

The SDP R&D agenda spans both the science and the technology of software creation and sustainment (e.g., development methods and environments, V&V technologies, component technologies, languages, tools, and system software) and software project management in diverse domains. R&D will advance software engineering concepts, methods, techniques, and tools that result in more usable, dependable, cost-effective, and sustainable software-intensive systems. The domains cut across information technology, industrial production, evolving areas such as the Internet and the World Wide Web, and highly complex, interconnected software-intensive systems.

President’s 2011 Request

Strategic Priorities Underlying This Request

Critical U.S. defense, security, and economic capabilities depend on software-based systems that must remain operational, useful, and relevant for decades. Improving the quality and cost-effectiveness of this increasingly complex software constitutes a core technical challenge in information technology that requires breakthrough innovations, ranging from the fundamental science and engineering of software to the application level. SDP R&D priorities include:

Research to rethink software design: From the basic concepts of design, evolution, and adaptation to advanced systems that seamlessly integrate human and computational capabilities

- **Advance foundational/core research on science and engineering of software**: New computational models and logics, techniques, languages, tools, metrics, and processes for developing and analyzing software for complex software-intensive systems (e.g., a principled approach to software engineering that can provide assurances such as accountability, real-time, security, and affordability)

- **Develop next-generation software concepts, methods, and tools**: Reformulation of the development process, the tool chain, the partitioning of tasks and resources; open technology development (open-source and open-systems methods); technology from nontraditional sources; multidisciplinary and cross-
cutting concepts and approaches; emerging technologies such as multicore, software-as-a-service, cloud computing, end-user programming; modeling of human-machine systems

– **Advance capabilities for building evolvable, sustainable, long-lived software-intensive systems:**
Explore new means to create and maintain the currency of, and use design and engineering artifacts to support, long-lived software-intensive systems. These systems often outlive the original generation of developers and engineers, and call for new approaches to reliably and predictably meet changing requirements and infrastructure, as well as to assure security and safety.

**Predictable, timely, cost-effective development of software-intensive systems:**
Disciplined methods, technologies, and tools for systems and software engineering, rapidly evaluating alternative solutions to address evolving needs; measuring, predicting, and controlling software properties and tradeoffs; virtualized and model-based development environments; scalable analysis, test generation, optimization with traceability to requirements

– **Improve software application interoperability and usability:**
Interface and integration standards, representation methods to enable software interoperability, data exchanges, interoperable databases; supply-chain system integration; standardized software engineering practices for model development

– **Address cost and productivity issues in development of safety-critical and autonomous systems:**
Research composition, reuse, power tools, training, and education to address systems that can be inaccessible after deployment (e.g., spacecraft) and need to operate autonomously

**Highlights of Request**

**Software and hardware foundations:**
Scientific and engineering principles and new logics, languages, architectures, and tools for specifying, designing, programming, analyzing, and verifying software and software-intensive systems; V&V tools for sound development of reliable software, standards for certification; techniques that enable prediction of cost and schedule for large-scale software projects – NSF, AFOSR, ONR, NIST, NASA

**Software Development for Cyber Infrastructure:**
Software engineering solutions in support of science and engineering research – NSF

**Computer systems research:**
Rethink and transform the software stack for computer systems in different application domains; investigate systems that involve computational and human/social, and physical elements – NSF, AFOSR, ONR

**Robust intelligence:**
Design of software-intensive intelligent systems that operate in complex, realistic, and unpredictable environments – NSF

**Software-Intensive Systems Producibility Initiative (SISPI):**
Continue Software and Systems Test Track infrastructure for new technologies, methods, and theories for testing software-intensive systems; formal models for system, software development; software for systems of systems – AFOSR, ONR, NSF

**Intelligent software design:**
Investigate approaches to design of systems that operate in complex, realistic, and unpredictable environments; automation and scaling of testing, validation, and system-level verification; automated analysis of model-based software development; transformational approaches to drastically reduce software life-cycle costs, complexity and extend life span; languages and modeling tools that support interoperability, data exchange among engineering tools, and large-scale simulations – NASA, NSF, NIST

**Interoperability standards:**
Representation scheme for interoperability among computer-aided engineering systems; standards for instrument, mathematical, and measurement data; ontological approaches to facilitate integrating supply-chain systems; interoperability of databases; interoperability testing tools – NIST

**Planning and Coordination Supporting Request**

**Workshop on Future Research Directions for Science and Engineering of Software, ACM SIGSOFT/FSE 2010:** Planning for SDP-sponsored national workshop in FY 2010 – SDP agencies

**Software verification and validation:**
Effective approaches for next-generation air transportation – NASA, FAA

**Earth System Modeling Framework, weather research, and forecasting:**
Long-term multiagency effort to build, use common software toolset, data standards; visualization for weather and climate applications – NASA, NOAA, NSF (NCAR), DOE/SC, OSD and DoD Service research organizations

**Next-generation aircraft:**
Collaboration on concepts, modeling and simulation tools – NASA, DoD Service research organizations
Additional 2010 and 2011 Activities by Agency

**NSF**: SEES research on software advances to meet energy requirements in computation and communication; new software activity on topics such as software production, hardening, collaboration, and sustainability; SDP-related topics in cross-cutting programs (TwC, Data-Intensive Computing, NetSE); intellectual foundations of software design; software for real-world systems (micro- and nano-scale embedded devices, global-scale critical infrastructures, cyber-physical systems, networked and distributed systems); tools, documentation to support formal methods research; open-source development communities

**AFOSR**: Expand work in formal methods and new approaches for emerging software and systems challenges; devise new theories and behavioral models for development of complex, networked systems with human and machine components

**ONR**: Complex software; software producibility and security; legacy code re-engineering; analysis tools for modeling, testing software component interactions, error-handling policies; software for quantum processing

**NIST**: Standards development and testing tools supporting interoperability such as schema validation, automated test generation (conformance testing), naming and design rules; product data models and modeling tools; methods to facilitate 3D shape search; Units Markup Language

**NASA**: Defined interfaces for international partners; architecture for SensorWeb for Earth sciences; integrated vehicle health management tools and techniques to enable automated detection, diagnosis, prognosis, and mitigation of adverse events during flight; integrated aircraft control design tools and techniques; physics-based multidisciplinary analysis optimization framework (MDAO) for cost-effective advanced modeling in development of next-generation aircraft and spacecraft

**DISA**: Coordination with universities and others on development of research, development, and training aspects of the DISA-developed Open Source Corporate Management Information System (OSCMIS), a Web-based suite of applications including a learning management system, a balanced scorecard system, a telework management application, emergency notification and response products, and about 50 other office productivity tools; OSCMIS is now being licensed to government agencies, industry, and academia, with interest growing among other nations as well

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**High Confidence Software and Systems (HCSS)**

**NITRD Agencies**: NIH, NSF, OSD and DoD Service research organizations, NIST, NASA, NSA

**Other Participants**: DHS, DOE (OE), FAA, FDA, FHWA, NRC, NTSB

HCSS R&D supports development of scientific foundations and innovative and enabling software and hardware technologies for the engineering, V&V, assurance, and certification of complex, networked, distributed computing systems and cyber-physical (IT-enabled) systems (CPS). The goal is to enable seamless, fully synergistic integration of computational intelligence, communication, control, sensing, actuation, and adaptation with physical devices and information processes to routinely realize high-confidence, optimally performing systems that are essential for effectively operating life-, safety-, security-, and mission-critical applications. These systems must be capable of interacting correctly, safely, and securely with humans and the physical world in changing environments and unforeseen conditions. In many cases, they must be certifiably dependable. The vision is to realize dependable systems that are more precise and highly efficient; respond more quickly; work in dangerous or inaccessible environments; provide large-scale, distributed coordination; augment human capabilities; and enhance societal quality of life. New science and technology are needed to build these systems with computing, communication, information, and control pervasively embedded at all levels, thus enabling entirely new generations of engineering designs that can enhance US competitiveness across economic and industrial sectors.

**President’s FY 2011 Request**
Strategic Priorities Underlying This Request

The HCSS group is engaged in a sustained effort to identify and initiate multidisciplinary research that fills gaps in the science, technology, assurance, and education infrastructure required to make possible the engineering of these fundamentally new classes of systems, “systems you can bet your life on.” Key priority areas include:

Science and technology for building cyber-physical systems: Develop a new systems science to provide unified foundations, models and tools, system capabilities, and architectures that enable innovation in highly dependable cyber-enabled engineered and natural systems

CPS “leap" innovation challenges: Collaboration in research and transition platforms for mission system innovations. Such problem-driven CPS research will be a key enabler for innovation in almost every economic sector that deals with engineered systems – medicine and health care, energy, transportation, manufacturing, agriculture, and many others – as well as a broad range of agency missions including national security, environmental protection, and space exploration.

Assurance technology: Develop a sound scientific and technological basis, including formal methods and computational frameworks, for assured design, construction, analysis, evaluation, and implementation of reliable, robust, safe, secure, stable, and certifiably dependable systems regardless of size, scale, complexity, and heterogeneity; develop software and system engineering tool capabilities to achieve application and problem domain-based assurance, and broadly embed these capabilities within the system engineering process; reduce the effort, time, and cost of V&V/certification processes; provide a technology base of advanced-prototype implementations of high-confidence technologies to spur adoption

Next-generation high-confidence real-time software and systems: Pursue innovative design, development, and engineering approaches to ensure the dependability, safety, performance, and evolution of software-intensive, dynamic, networked control systems in aerospace, industrial-process, and other life- and safety-critical infrastructure domains; real-time embedded applications and systems software; component-based foundations for accelerated design and verifiable system integration; predictable, fault-tolerant, distributed software and systems

Advances to enhance understanding and management of complex systems: Cyber-enabled discovery and innovation to develop improved models of complex systems, software, human cognition, and human-system interactions; new integrated analytical and decision-support tools

Integration of research and education: Build a new research community that shares a commitment to integrate CPS theory and methodology in education and to promote increased understanding of and interest in CPS systems through the development of new curricula at all levels of education

Highlights of Request

Cyber-physical systems: Continuing support for research to enable physical, biological, and engineered systems whose operations are integrated, monitored, and/or controlled by a computational core and interact with the physical world, with components networked at every scale and computing deeply embedded in every physical component, possibly even in materials; real-time embedded, distributed systems and software – NSF, AFRL, ARO, ONR, NIST, NASA, NSA, FAA, FDA

Cyber-enabled Discovery and Innovation (CDI): Continuing focus to include software for tomorrow’s complex systems, including CPS; address challenges of large-scale interacting systems, investigate their non-linear interactions and aggregate or emergent phenomena to better predict system and decision-making capabilities about complex systems – NSF

High-confidence systems and foundations of assured computing: Methods and tools for modeling, measuring, analyzing, evaluating, and predicting performance, correctness, efficiency, dependability, scalability, and usability of complex, real-time, distributed, and mobile systems; high-confidence platforms for sensing and control; virtualization, architectures, components, composition, and configuration; systems-of-systems governance, engineering, analysis and testing of software and hardware; specification and synthesis, programming language semantics, and computational models; advanced tools design, development, V&V, and measurement capabilities to assure a safe computing platform; techniques for assuring applications are free from malware, vulnerabilities; quantum information processing – NSF, OSD, AFRL, AFOSR, ARO, ONR, NIST, NASA, NSA, FDA

Information assurance requirements: Methods, tools for constructing, analyzing security structures (management architectures and protocols, etc.); assurance technologies for cross-domain creation, editing, sharing of

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sensitive information in collaboration environments that span multiple security levels; assured compilation of cryptographic designs, specifications to platforms of interest – ONR, NSA; testing infrastructure for health IT standards, specifications, certification (with HHS); cross-enterprise document sharing in electronic health systems – NIST

**Standards and test methods for intelligent industrial control systems security (ICS) and networks:**
Approaches to balancing safety, security, reliability, and performance in SCADA and other ICS used in manufacturing and other critical infrastructure industries (e.g., water, electric power, oil and gas, chemicals, pharmaceuticals, food and beverage, materials processing) and building security into next-generation systems; ensuring performance, interoperability of factory floor network communication devices and systems; leading Smart Grid Industrial-to-Grid Domain Expert Working Group to achieve interoperability of Grid devices – NIST

**Planning and Coordination Supporting Request**

**National Research Workshop Series:** Academic, industry, and government stakeholder workshops to identify new R&D for building 21st century CPS for life-, safety-, and mission-critical applications; topics include:

- **High Confidence Medical Device CPS** – NSF, NIST, NSA, FDA
- **Future Energy CPS** – NSF, NIST, NSA, ARPA-E
- **High Confidence Transportation CPS:** Automotive, Aviation, and Rail – NSF, NIST, NASA, NSA, AFRL with DOT, FAA, FDA, NTSB
- **CPS Week** – NSF, AFRL, NIST, NASA, NSA
- **Verified Software, Theories, Tools, and Experiments (VSTTE) Workshop** – NSA, NSF
- **Static Analysis Tools Exposition (SATE):** Annual summit on software security for vendors, users, and academics – NIST, NSA, NSF with DHS
- **CPS Education:** NSF, ONR, NSA
- **CPS Extreme Manufacturing:** NIST, NSF, DARPA, ONR, FDA

**Software Assurance Metrics and Tool Evaluation:** Annual workshop for users and developers to compare efficacy of techniques and tools; develop vulnerability taxonomies – NIST, NSA, DHS Tenth Annual HCSS Conference: Showcasing of promising research to improve system confidence – NSA with NSF, ONR, NASA, FAA

**Software Assurance Forum** – OSD and DoD Service research organizations, NIST, NSA, DHS

**Safety of flight-critical systems:** HCSS agencies collaborating on workshops, technical discussions on this topic in which multiple agencies have ongoing activities – DoD, AFRL, NASA, NSA, NSF

**Future Directions in Cyber-Physical Systems Security:** Joint workshop – DHS, NIST, DOE (OE), OSD, USAF Standards, software assurance metrics for SCADA, ICS: Collaborative development – NIST, DOE (OE), others

**Biomedical imagery:** Technical standards for change measurements in patient applications – NIH, NIST, FDA, CMS

**Cooperative proposal evaluation** – NSF, AFRL, NIST, NASA, NSA, FAA, FDA, NRC

**Additional 2010 and 2011 Activities by Agency**

- **NIH:** Assurance in medical devices such as pulse oximeters, cardio-exploratory monitors for neonates; telemedicine; computer-aided detection and diagnosis; computer-aided surgery and treatment; neural interface technologies such as cochlear implants, brain-computer interfaces
- **NSF:** Joint research program of CISE and ENG directorates addressing CPS challenges in three areas (foundations; methods and tools; and components, run-time substrates, and systems); partnership to support advanced manufacturing through CPS research that helps better integrate IT into manufactured goods; core research in software and information foundations, communications, and computer systems; high-risk, high-return multi-year effort in large-scale fundamental research to define the future of computing, including next-generation approaches to software and system assurance and CPS (Expeditions in Computing)
- **AFOSR:** Theoretical foundations for specification, design, analysis, verification, use, and continued evolution of systems and software, including formal models for complex software-intensive systems and their environments, modeling of human-machine systems, and new development approaches
- **AFRL:** Flight Critical System Software Initiative (FCSSI), including design methods, tools for safety and security certification of onboard aircraft embedded systems operating in a system-of-systems environment (e.g.,

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UAVs); emphasis on mixed-criticality (air safety combined with security) interdependencies requiring deep interaction, integration of hardware and software components

**ARO:** Software/system prototyping, development, documentation, and evolution; virtual parts engineering research; reliable and secure networked embedded systems; reliable and effective mechanisms to monitor and verify software execution status

**ONR:** R&D in fundamental principles to understand, design, analyze, build software systems that are correct, assured, efficient, effective, predictable, verifiable, and extendible to emerging quantum information processing; includes work in real-time fault-tolerant software, software interoperability, systems for quantum processing

**NIST:** Computer forensics tool testing, National Software Reference Library (funded by DOJ/NIJ); National Vulnerability Database, Internet infrastructure protection (with DHS funding); seamless mobility; trustworthy information systems; information security automation, Security Content Automation Protocol (SCAP); combinatorial testing; next-generation access control

**NASA:** Aeronautics safety R&D with emphasis on technologies for software health management, integrated vehicle health management; enabling technologies for design, V&V of flight-critical systems (safety assurance, autonomy and authority, integrated distributed systems, software-intensive systems); enabling V&V technologies for NextGen airspace systems for separation assurance and super-density programs

**NSA:** High-assurance system construction (correct-by-construction methods, model-driven development, programming languages) and analysis (concolic execution, multi-tool analysis, separation/matching logic, static/dynamic analysis); assured implementation, execution of critical platform components and functionality; assured cryptographic implementations (software and hardware); domain-specific workbench developments (cryptography, guards, protocols, policies)

**DHS:** Security of cyber-physical systems in critical infrastructures; modeling, simulation, and analysis for decision making in the context of infrastructure protection

**DOE/OE:** Next Generation Control Systems (scaleable, cost-effective methods for secure communication between remote devices and control centers; cost-effective security solutions for new architecture designs and communication methods; risk analysis; National SCADA Test Bed; secure SCADA communications protocol; middleware for inter-utility communications and cyber security; virtual architecture modeling tools

**FAA:** Evaluate COTS technology and V&V techniques in complex and safety-critical systems for regulatory compliance and intended performance (e.g., software development techniques and tools; microprocessor evaluations; onboard network and hardware security, integrity, and reliability)

**FDA:** Formal methods-based design (assured verification, device software and system safety modeling and certification, component composition, forensics analysis, engineering tool foundations); architecture, platform, middleware, resource management for interoperable medical devices (plug-and-play, vigilance and trending systems); infrastructure for medical-device integration, interoperation; patient modeling, simulation; adaptive patient-specific algorithm; black box/flight-data recording

**FHWA:** Apply concept of cyber-enabled discovery and innovation to develop new transportation paradigm based on integrated information, prediction, prevention (optimization), and real-time response to improve highway transport and achieve energy-conservation, environmental, and economic innovation goals

**NRC:** Regulatory research to assure safety and security in cyber-physical systems (digital instrumentation and control systems) used in the nuclear energy sector

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**Social, Economic, and Workforce Implications of IT and IT Workforce Development (SEW)**

**NITRD Agencies:** NIH, NSF, DOE/SC

**Other Participants:** GSA, DoD

Research activities funded under the SEW PCA focus on the co-evolution of IT and social and economic systems, including interactions among people, organizations, and cyber infrastructure. Workforce development
concerns must also be addressed to meet the growing demand for workers who are highly skilled in information technology, requiring innovative IT applications in education and training. A related goal of SEW research and dissemination activities is to enable individuals and society to better understand and anticipate the uses and consequences of IT. To advance this aim, SEW actively seeks opportunities to help speed the transfer of R&D results to the policymaker, practitioner, and IT user communities in all sectors.

**President’s 2011 Request**

**Strategic Priorities Underlying This Request**

**Cyber-learning**: Cyber-learning will be essential to continued improvement, revitalizing education, training, and workforce development at all educational levels. Research is needed in ways to: distribute learning across time and space; personalize and customize the learning process to individual traits, such as “visual thinker,” and individual states, such as “excited” or “bored”; transform the teaching of science, technology, and mathematics, using scientific data to drive simulations; develop and evaluate effective K-12, undergraduate, and graduate-level recruitment and retention strategies to increase the number of students pursuing academic careers in computing.

**Broadening participation in computing**: R&D to develop effective undergraduate and graduate-level recruitment and retention strategies to increase the number of students pursuing academic careers in computing, with emphasis on underrepresented groups, and to improve computing research and education for all students

**Human-centered computing**: R&D to develop new knowledge about the complex and increasingly coupled relationship between people and computing, including socio-technical and social computational systems, computer-supported collaboration, virtual environments, social and affective computing, and the implications of novel computing technologies for individuals, communities, and society

**IT-enabled innovation ecology**: Research on the creation of an innovation ecology for increasingly collaborative, interdisciplinary, and distributed research endeavors. This includes new science-based knowledge about building and supporting shared infrastructure, including computing power, distributed and/or shared instrumentation; acquiring, processing and curating research databases; simulation, visualization, and analysis software, networking tools, and the human elements; administrators, scientists, and engineers who are skilled in designing, building, using, and managing a shared collaborative infrastructure.

**Computational thinking (CT) for everyone** – Explorations of the cognitive and educational implications of thinking algorithmically and understanding the consequences of scale and the process of abstraction, especially considering how such thinking might be incorporated into the K-12 curriculum

**Highlights of Request**

**Bioinformatics fellowships and training**: University-based graduate and post-doctoral programs to expand the ranks of professionals trained in both IT and applications of IT in biomedical research and health care systems – NIH (NLM)

**Cyber-enabled Discovery and Innovation (CDI)**: R&D addressing distributed knowledge environments that enhance discovery, learning, and innovation across boundaries – NSF

**Virtual Organizations as Socio-technical Systems (VOSS)**: Scientific research to advance understanding of the nature of effective virtual organizations and how they can enable and enhance scientific, engineering, and education production and innovation – NSF

**Creativity and IT**: Advance interdisciplinary understanding of the relationships among IT, creativity, and innovation; develop computational models of cognition and approaches that encourage creativity in scientific research and education – NSF

**Cyber Infrastructure Training, Education, Advancement, and Mentoring for our 21st Century Workforce (CI-TEAM)**: Prepare a workforce to exploit, enhance, and promote cyber-based tools and services and encourage equitable diffusion of cyber infrastructure throughout the science and engineering research communities – NSF

**CISE Education and Workforce Activities**: Continue to support and refine activities such as the Broadening Participation in Computing (BPC) and CISE Pathways to Revitalized Undergraduate Computing Education (CPATH) programs to help create and sustain a U.S. workforce with the computing competencies and computational thinking skills imperative for the Nation’s health, security, and prosperity in the 21st century – NSF
Computational Science Graduate Fellowship Program: Graduate program to build the community of computational scientists through advanced training that includes a three-month practicum at the national laboratories – DOE/SC

Planning and Coordination Supporting Request

Strategic leadership for IT education: Multi-agency workshop to be led by SEW to explore possible programs to support America’s strategic leadership across the digital landscape by identifying vital IT education, training, and workforce goals – SEW and other Federal agencies

Collaboration: Encourage and support collaboration among government implementers of IT and demonstrate promising IT capabilities emerging from Federal research (e.g., through Collaborative Expedition Workshop series co-sponsored by SEW and the FASTER Community of Practice); continue to work with IWGs/CGs to host joint workshops focusing on high-priority NITRD interests and interagency R&D topics – SEW, NITRD agencies, and others

Additional 2010 and 2011 Activities by Agency

NSF: Continue investments in core research and education programs in human-centered computing; expand opportunities for cyber-learning research; broaden participation in computing by underrepresented minorities

DoD: Develop world-class science, technology, engineering, and mathematics capabilities for DoD and the Nation; inventory of DoD educational programs; complete DoD-wide STEM Strategic Plan and begin implementation phase including communications, marketing of programs and opportunities

Agency NITRD Budgets by Program Component Area

FY 2010 Budget Estimates and FY 2011 Budget Requests (Dollars in Millions)

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1 Totals may not sum correctly due to rounding.
2 At the request of Congress, NIH embarked on a process to provide better consistency and transparency in the reporting of its funded research. This new process, implemented through the Research, Condition, and Disease Categorization (RCDC) system, uses sophisticated text data mining (categorizing and clustering using words and multiword phrases) in conjunction with NIH-wide definitions used to match projects to categories. The definitions are a list of terms and concepts selected by NIH scientific experts to define a research category. Due to significant methodology changes, it is likely that annual totals for categories (year over year) will exhibit a noticeable one-time adjustment. The research category levels represent NIH’s best estimates based on the category definitions.
3 The budget for OSD and the DoD service research organizations includes the High Performance Computing Modernization Program.
4 The DOE budget includes funding from DOE’s Office of Science and Office of Nuclear Energy.

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Agency NITRD American Recovery and Reinvestment Act (ARRA) Budgets by Program Component Area

**FY 2009 ARRA Budget** (Dollars in Millions)

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<th>Agency</th>
<th>High End Computing Infrastructure &amp; Applications</th>
<th>High End Computing Research &amp; Development</th>
<th>Cyber Security &amp; Information Assurance</th>
<th>Human-Computer Interaction &amp; Information Management</th>
<th>Large Scale Networking</th>
<th>Software Design &amp; Productivity</th>
<th>Social, Economic, &amp; Workforce Implications of IT</th>
<th>High Confidence Software &amp; Systems</th>
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<td>(CSIA)</td>
<td>(HCI &amp;IM)</td>
<td>(LSN)</td>
<td>(SDP)</td>
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<td>TOTAL (2009 ARRA)</td>
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Under the American Recovery and Reinvestment Act (ARRA) of 2009, signed into law by President Obama on February 17, 2009, six Federal agencies report allocations of $861 million to investments in NITRD research areas.

[Source](http://semanticommunity.info/A_NITRD_Dashboard)

Updated: Sat, 19 Sep 2015 01:13:40 GMT

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(note that these figures are final). The Act includes measures to modernize the Nation’s infrastructure, enhance energy independence, expand educational opportunities, preserve and improve affordable health care, provide tax relief, and protect those in greatest need. The NITRD agencies are using their ARRA funds to modernize, expand, and upgrade networking and high-end computing infrastructures and facilities for advanced scientific research; expand R&D in cyber security, human-computer interaction and information management, high-confidence software and systems, and software design; and increase investments in education and training for a diverse, highly skilled IT workforce.

5 Based on final allocations of Recovery and Reinvestment Act of 2009 (PL 111-5) appropriations.
6 Totals may not sum correctly due to rounding.

NITRD Program Budget Analysis

Fiscal Year Overview for 2010-2011

Differences between the President’s Budget request for a given year and estimated spending for that year reflect revisions to program budgets due to evolving priorities, as well as Congressional actions and appropriations. In addition, the NITRD agencies have continued to work collectively on improving the PCA definitions, as reflected by changes in the definitions outlined in OMB Circular A-11, and individually on improving the classification of investments within the PCAs, resulting in changes in NITRD Program budgets.

2010 Summary

The 2010 NITRD budget estimate of $4.305 billion is $0.379 billion, approximately 9.65 percent, more than the $3.926 billion 2010 President’s budget request. The overall change is due to both decreases and increases in individual agency NITRD budgets, which are described below.

2011 Summary

The President’s 2011 budget request for the NITRD Program is $4.261 billion, a decrease of $0.044 billion, approximately 1.02 percent, from the 2010 estimate. The overall change is due to both decreases and increases in individual agency NITRD budgets, which are described below.

NITRD Program Budget Analysis by Agency

This section describes changes greater than $10 million either between 2010 requested funding and 2010 estimated spending or between 2010 estimated spending and 2011 requests. Smaller changes are discussed only if they represent shifts in funding focus. Budget numbers in these descriptions are rounded from initial agency numbers with three decimals to the nearest whole number.

NIH

Comparison of 2010 request ($950 million) and 2010 estimate ($1,201 million): The $251 million increase is due to increases in HEC I&A ($44 million), HCI&IM ($282 million), SDP ($53 million), and SEW ($32 million), partially offset by decreases in HEC R&D ($44 million), LSN ($38 million), and HCSS ($78 million). These changes are part of an ongoing realignment at NIH under a new budget reporting process across the centers and institutes.

Comparison of 2010 estimate ($1,201 million) and 2011 request ($1,235 million): The $34 million increase is due to increases in HEC I&A ($11 million) and HCI&IM ($17 million) combined with small increases in other PCAs. Some of these changes are also part of the ongoing realignment at NIH.
NSF

Comparison of 2010 request ($1,111 million) and 2010 estimate ($1,091 million): The decrease of $20 million is primarily due to a reduction in appropriated NSF funding from the 2010 request level, which resulted in decreases in HEC I&A, HEC R&D, HCI&IM, LSN, SDP, SEW, and HCSS, partially offset by a $4 million increase in CSIA.

Comparison of 2010 estimate ($1,091 million) and 2011 request ($1,170 million): The increase of $79 million includes $14 million in CSIA for ongoing cyber research centers and the Comprehensive National Cybersecurity Initiative, which includes research in usability, theoretical foundations, and privacy; $30 million in HCI&IM to support the study of new modalities of learning enabled by current, nascent, and future computing technologies under the agency's new CTE program, and increased support for a national framework and new tools for preservation, access to, and use of digital data; $16 million in SDP to address the need for increasingly complex software systems as well as research on the software advances needed to meet the energy requirements inherent in computation and communication; $10 million in HCSS for increases including activities in the CPS program, particularly to fulfill the significant role computing will play in assuring U.S. leadership in advanced manufacturing; and smaller increases in HEC I&A, LSN, and SEW, partially offset by a small decrease in HEC R&D.

OSD and DoD Service Research Organizations

Comparison of 2010 request ($452 million) and 2010 estimate ($583 million): The $131 million increase is primarily due to increases in HEC I&A ($24 million), HEC R&D ($17 million), CSIA ($24 million), and HCI&IM ($59 million), resulting from planned program changes, and smaller increases in other PCAs.

Comparison of 2010 estimate ($583 million) and 2011 request ($516 million): The $67 million decrease is primarily due to decreases in HEC I&A ($21 million), CSIA ($28 million), and HCI&IM ($10 million), resulting from planned program changes, and smaller decreases in other PCAs.

DOE

Comparison of 2010 request ($468 million) and 2010 estimate ($482 million): The $14 million increase results primarily from an increase of $26 million in DOE/NE funding in HEC I&A and small increases in DOE/SC funding in HEC R&D and CSIA, partially offset by a $14 million decrease in DOE/SC funding in HEC I&A from a one-time reduction in the Oak Ridge Leadership Computing Facility to accommodate part of the reduction to the ASCR budget in the FY 2010 appropriation.

Comparison of 2010 estimate ($482 million) and 2011 request ($510 million): The $28 million increase results primarily from a $36 million increase in DOE/SC funding in HEC I&A for planned increases in lease payments at the Leadership Computing Facilities and preparation for the upgrade at the Argonne Leadership Computing Facility, partially offset by a decrease in HEC R&D.

DARPA

Comparison of 2010 request ($588 million) and 2010 estimate ($555 million): The $33 million decrease results from a decrease of $30 million in HEC R&D, reflecting the initial transition of the HPCS and producible software programs and removal of the semiconductor focus effort from the crosscut, and a small decrease in HCI&IM.

Comparison of 2010 estimate ($555 million) and 2011 request ($501 million): The $54 million decrease is largely due to decreases of $17 million in CSIA, reflecting completion of the initial research activity and transition of the NCR under the Comprehensive National Cybersecurity Initiative; $32 million in HCI&IM, reflecting completion and initial transition of language and machine learning programs (e.g., GALE, TRANSTAC, PAL); and $19 million in LSN, reflecting initial transition of cognitive systems and integrated systems technologies (e.g., cognitive networking, optical and RF, and wireless networking), partially offset by a $19 million increase in HEC R&D for extreme computing technologies.
NIST

Comparison of 2010 estimate ($77 million) and 2011 request ($92 million): The $15 million increase is due to increases in HEC R&D; CSIA, for work on the Comprehensive National Cybersecurity Initiative; LSN; SDP, for efforts on a Nationwide Healthcare Information Infrastructure Initiative and a proposed Interoperability Standards Initiative; and HCSS.

NSA

Comparison of 2010 request ($102 million) and 2010 estimate ($156 million): The $54 million increase largely results from a $58 million increase in HEC R&D due to Congressional add-ons, partially offset by decreases in other PCAs.

Comparison of 2010 estimate ($156 million) and 2011 request ($72 million): The $84 million decrease is largely due to non-sustainment of 2010 Congressional add-ons and the completion of the DARPA HPCS program.

AHRQ

Comparison of 2010 request ($45 million) and 2010 estimate ($28 million): The $17 million decrease results from a reduction of funding in the Health Information Technology program reported under HCI&lM.

NITRD Program Budget Summary by PCA

Using the information presented above, this section provides an analysis of the NITRD Program budget by PCA, summarizing the more substantial differences between 2010 requested funding and 2010 estimated spending and between 2010 estimated spending and 2011 requests. The changes are described below.

HEC I&A

Comparison of 2010 request ($1,396 million) and 2010 estimate ($1,469 million): The $73 million increase is largely due to increases of $44 million at NIH, $24 million at OSD and DoD Service research organizations, and $26 million at DOE/NE, partially offset by a decrease of $14 million at DOE/SC and smaller decreases at other agencies.

Comparison of 2010 estimate ($1,469 million) and 2011 request ($1,502 million): The $33 million increase is largely due to increases of $11 million at NIH and $36 million at DOE/SC, partially offset by a $21 million decrease at OSD and DoD Service research organizations, with smaller increases and decreases at other agencies.

HEC R&D

Comparison of 2010 estimate ($481 million) and 2011 request ($401 million): The $80 million decrease is largely due to a decrease of $87 million at NSA and smaller decreases at other agencies, partially offset by an increase of $19 million at DARPA.

CSIA

Comparison of 2010 request ($343 million) and 2010 estimate ($372 million): The $29 million increase is largely due to an increase of $24 million at OSD and DoD Service research organizations and smaller increases at other agencies.

Comparison of 2010 estimate ($372 million) and 2011 request ($349 million): The $23 million decrease is largely due to decreases of $28 million at OSD and DoD Service research organizations, $17 million at DARPA, and smaller decreases at other agencies, partially offset by a $14 million increase at NSF.
HCI&IM

Comparison of 2010 request ($823 million) and 2010 estimate ($1,149 million): The $326 million increase is largely due to increases of $282 million at NIH and $59 million at OSD and DoD Service research organizations, partially offset by a decrease of $17 million at AHRQ.

LSN

Comparison of 2010 request ($422 million) and 2010 estimate ($386 million): The $36 million decrease is largely due to a decrease of $38 million at NIH, with smaller decreases and increases at other agencies.  
Comparison of 2010 estimate ($386 million) and 2011 request ($369 million): The $17 million decrease is largely due to a decrease of $19 million at DARPA, with smaller decreases and increases at other agencies.

SDP

Comparison of 2010 request ($119 million) and 2010 estimate ($168 million): The $49 million increase is largely due to an increase of $53 million at NIH, with smaller increases and decreases at other agencies.  
Comparison of 2010 estimate ($168 million) and 2011 request ($191 million): The $23 million increase is largely due to an increase of $16 million at NSF and smaller increases at other agencies.

HCSS

Comparison of 2010 request ($212 million) and 2010 estimate ($138 million): The $74 million decrease is largely due to a decrease of $78 million at NIH, with smaller increases and decreases at other agencies.

SEW

Comparison of 2010 request ($125 million) and 2010 estimate ($142 million): The $17 million increase is largely due to an increase of $32 million at NIH, partially offset by smaller decreases at other agencies.

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Participation in the NITRD Program

The following goals and criteria developed by the NITRD Program are intended to enable agencies considering participation to assess whether their research and development activities fit the NITRD framework.

NITRD Goals

- Provide research and development foundations for assuring continued U.S. technological leadership in advanced networking, computing systems, software, and associated information technologies
- Provide research and development foundations for meeting the needs of the Federal government for advanced networking, computing systems, software, and associated information technologies
- Accelerate development and deployment of these technologies in order to maintain world leadership in science and engineering; enhance national defense and national and homeland security; improve U.S. productivity and competitiveness and promote long-term economic growth; improve the health of the U.S. citizenry; protect the environment; improve education, training, and lifelong learning; and improve the quality of life.

Evaluation Criteria for Participation

Relevance of Contribution

The research must significantly contribute to the overall goals of the NITRD Program and to the goals of one or more of the Program’s eight Program Component Areas (PCAs) – High End Computing Infrastructure and Applications (HEC I&A), High End Computing Research and Development (HEC R&D), Cyber Security and Information Assurance (CSIA), Human-Computer Interaction and Information Management (HCI&IM), Large Scale Networking (LSN), High Confidence Software and Systems (HCSS), Social, Economic, and Workforce Implications of Information Technology (IT) and IT Workforce Development (SEW), and Software Design and Productivity (SDP) – in order to enable the solution of applications and problems that address agency mission needs and that place significant demands on the technologies being developed by the Program.

Technical/Scientific Merit

The proposed agency program must be technically and/or scientifically sound, of high quality, and the product of a documented technical and/or scientific planning and review process.
Readiness
A clear agency planning process must be evident, and the organization must have demonstrated capability to carry out the program.

Timeliness
The proposed work must be technically and/or scientifically timely for one or more of the PCAs.

Linkages
The responsible organization must have established policies, programs, and activities promoting effective technical and scientific connections among government, industry, and academic sectors.

Costs
The identified resources must be adequate to conduct the proposed work, promote prospects for coordinated or joint funding, and address long-term resource implications.

Agency Approval
The proposed program or activity must have policy-level approval by the submitting agency.

Glossary
ACCURATE - NSF-funded A Center for Correct, Usable, Reliable, Auditable, and Transparent Elections
ACM SIGSOFT/FSE - Association of Computing Machinery’s Special Interest Group on Software Engineering/Foundations of Software Engineering conference
AFOSR - Air Force Office of Scientific Research
AFRL - Air Force Research Laboratory
AHRQ - HHS’s Agency for Healthcare Research and Quality
ANL - DOE’s Argonne National Laboratory
ANR - Agence Nationale de la Recherche
APP - IARPA’s Automatic Privacy Protection effort
ARPA-E - DOE’s Advanced Research Projects Agency-Energy
ARL - Army Research Laboratory
ARM - DARPA’s Autonomous Robot Manipulation program
ARO - Army Research Office
ARSC - Arctic Region Supercomputing Center
ASC - DOE/NNSA’s Advanced Simulation and Computing program
ASSIST - DARPA’s Advanced Soldier Sensor Information System and Technology activity
BIRN - NIH’s Biomedical Informatics Research Network
BISTI - NIH’s Biomedical Information Science and Technology Initiative
BlueGene - A vendor supercomputing project dedicated to building a new family of supercomputers
BlueGene/P - The next generation in the BlueGene line after BlueGene/L
BlueGene/Q - Latest-generation BlueGene architecture
BPC - NSF’s Broadening Participation in Computing program
C3I - Communications, Command, Control, and Intelligence
CaBIG - NIH’s cancer Biomedical Informatics Grid
CAIDA - Cooperative Association for Internet Data Analysis
CCIED - NSF-supported Collaborative Center for Internet Epidemiology and Defenses
CDI - NSF’s Cyber-enabled Discovery and Innovation program
CEA - Commissariat à l’Energie Atomique
CEDPS - DOE/SC’s Center for Enabling Distributed Petascale Science
CENIC - Corporation for Network Initiatives in California
CERDEC - U.S. Army’s Communications-Electronics Research, Development, and Engineering Center
CG - Coordinating Group
CISE - NSF’s Computer and Information Science and Engineering directorate
CIT - NIH’s Center for Information Technology
CI-TEAM - NSF’s Cyber Infrastructure Training, Education, Advancement, and Mentoring for our 21st Century Workforce activity
CLENS - DARPA’s Camouflaged Long Endurance Nano Sensor activity
CMIS - DISA’s Corporate Management Information System
CMS - HHS’s Centers for Medicare and Medicaid Services
CNRS - Centre National de la Recherche Scientifique
COMPETES - Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science
COTS - Commercial off the shelf
CPATH - NSF’s CISE Pathways to Revitalized Undergraduate Computing Education program
CPS - Cyber-physical system(s)
CREATE-AV - OSD's Computational Research and Engineering Acquisition Tools and Environments program for Air Vehicles
CT - Computational thinking
CTE - NSF’s Cyberlearning Transforming Education program
CSIA - Cyber Security and Information Assurance, one of NITRD’s eight Program Component Areas
CVRG - NIH’s CardioVascular Research Grid
DARPA - Defense Advanced Research Projects Agency
DDoS - Distributed denial of service
DETER - NSF- and DHS-initiated cyber DEfense Technology Experimental Research network
DFDL - Data Format Description Language
DHS - Department of Homeland Security
DIMRC - NIH’s Disaster Information Management Research Center
DISA - Defense Information Systems Agency
DNSSEC - Domain Name System Security protocol
DoD - Department of Defense
DOE - Department of Energy
DOE/NNSA - DOE/National Nuclear Security Administration
DOE/DE - DOE’s Office of Electricity Delivery and Energy Reliability
DOE/SC - DOE’s Office of Science
DOJ - Department of Justice
DREN - DoD’s Defense Research and Engineering Network
DSWP - DHS Secure Wireless Access Pilot
EDUCASUE - Nonprofit organization promoting advancement of IT in higher education
ENG - NSF’s Engineering directorate
EPA - Environmental Protection Agency
ESG - Earth System Grid
ESMF - Earth System Modeling Framework
ESSC - DOE/SC’s Energy Sciences network (ESnet) Steering Committee
FAA - Federal Aviation Administration
FASTER - NITRD's Faster Administration of Science and Technology Education and Research Community of Practice
FAST-OS - Forum to Address Scalable Technology for runtime and Operating Systems
FBI - Federal Bureau of Investigation
FCSSI - Flight Critical Systems Software Initiative
FDA - Food and Drug Administration
FHWA - Federal Highway Administration
FIND - NSF’s Future Internet Network Design program
FISMA - Federal Information Security Management Act
FIU - Florida International University
FY - Fiscal Year
G - Gigabit
GEOSS - Global Earth Observation System of Systems, a cooperative effort of 34 nations, including the U.S., and 25 international organizations to develop a comprehensive, coordinated, and sustained Earth observation system
GSA - General Services Administration
HCI&IM - Human-Computer Interaction and Information Management, one of NITRD’s eight Program Component Areas
HCSS - High Confidence Software and Systems, one of NITRD’s eight Program Component Areas
HEC - High-end computing
HEC I&A - HEC Infrastructure and Applications, one of NITRD’s eight Program Component Areas
HEC R&D - HEC Research and Development, one of NITRD’s eight Program Component Areas
HEC-URA - HEC University Research Activity, jointly funded by multiple NITRD agencies
HHS - Department of Health and Human Services
HOST - Homeland Open Security Technology
HPC - High-performance computing
HPCMP - OSD’s High Performance Computing Modernization Program
HPCS - DARPA’s High-Productivity Computing Systems program
I/O - Input/output
IA/CS - Information Assurance/Cyber Security
IARPA - Intelligence Advanced Research Projects Activity
IATAC - DoD’s Information Assurance Technology Analysis Center
ICS - Industrial control systems
IESP - International Exascale Software Program
IETF - Internet Engineering Task Force
IHEC - NSA’s Integrated High End Computing program
IM - Information management
INCITE - DOE/SC’s Innovative and Novel Computational Impact on Theory and Experiment program
INFOSEC - Information security
Internet2 - Higher-education consortium for advanced networking and applications deployment in academic institutions
IPsec - IP security protocol
IPv6 - Internet Protocol, version 6
ISAP - Multiagency Information Security Automation Program
ISI - Information Sciences Institute
IT - Information technology
IU - Indiana University
IWG - Interagency Working Group
JET - LSN’s Joint Engineering Team
JETnets - Federal research networks supporting networking researchers and advanced applications development
K-12 - Kindergarten through 12th grade
LANdroids - DARPA networking R&D program
LANL - DOE’s Los Alamos National Laboratory
LBNL - DOE’s Lawrence-Berkeley National Laboratory
LCF - DOE’s Leadership Computing Facility
LHC - Large Hadron Collider
LLNL - DOE’s Lawrence-Livermore National Laboratory
LSN - Large Scale Networking, one of NITRD’s eight Program Component Areas
MAGIC - LSN’s Middleware and Grid Infrastructure Coordination team
MANET - Mobile ad hoc network
MAX - Mid-Atlantic eXchange
MCNC - Microelectronics Center of North Carolina
MDAO - multidisciplinary analysis optimization
MIDAS - NIH's Modeling of Infectious Disease Agents Study
MR - DARPA's Machine Reading program
NARA - National Archives and Records Administration
NASA - National Aeronautics and Space Administration
NCAR - NSF-supported National Center for Atmospheric Research
NCBC - NIH's National Centers for Biomedical Computing
NCDI - National Cyber Defense Initiative
NCLY - National Cyber Leap Year
NCO - National Coordination Office for NITRD
NCR - DARPA's National Cyber Range program
NERSC - DOE/SC's National Energy Research Scientific Computing Center
NetSE – NSF’s Network Science and Engineering program
NextGen - Next Generation Air Transportation System
NIH - National Institutes of Health
NIJ - DOJ's National Institute for Justice
NIST - National Institute of Standards and Technology
NITRD - Networking and Information Technology Research and Development
NLANR - NSF-supported National Laboratory for Applied Network Research
NLM - NIH's National Library of Medicine
NOAA - National Oceanic and Atmospheric Administration
NRC - Nuclear Regulatory Commission
NRL - Naval Research Laboratory
NSA - National Security Agency
NSF - National Science Foundation
NSTC - National Science and Technology Council
NTIA - National Telecommunications and Information Administration
NTSB - National Transportation Safety Board
OMB - White House Office of Management and Budget
ONC - HHS’s Office of the National Coordinator for Health IT
ONR - Office of Naval Research
ORCA - Online Representations and Certifications Application
ORNL - DOE's Oak Ridge National Laboratory
OS - Operating system
OSD - Office of the Secretary of Defense
OSG - Open Science Grid
OSCMIS - DISA’s Open Source Corporate Management Information System
OSTP - White House Office of Science and Technology Policy
PCA - Program Component Area
PCAST - President’s Council of Advisors on Science and Technology
perfSONAR - performance Services-Oriented Network ARchitecture
PF - Petaflop(s), a thousand teraflops
PI - Principal investigator
PNNL - DOE’s Pacific Northwest National Laboratory
PREDICT - DHS’s Protected Repository for the Defense of Infrastructure Against Cyber Threats
PSC - NSF-supported Pittsburgh Supercomputing Center
QKD - Quantum key distribution
R&D - Research and development
R&E - Research and evaluation
RDT&E - DoD’s Research Development Test &Evaluation programs
RFI - Request for Input
S&T - Science and technology
SAFE - NSF-supported Situational Awareness for Everyone center
SAPIENT - DARPA’s Situation-Aware Protocols In Edge Network Technologies program
SATE - NIST's Software Analysis Tool Exposition
Acknowledgements

National Coordination Office (NCO) for Networking and Information Technology Research and Development (NITRD)
George O. Strawn, Ph.D.
Director

Ernest L. McDuffie, Ph.D.
Associate Director

Suite II-405
4201 Wilson Boulevard
Arlington, Virginia 22230
(703) 292-4873
FAX: (703) 292-9097
nco@nitrd.gov

Web Site
http://www.nitrd.gov

Martha K. Matzke
Editor, FY 2011
NITRD Budget Supplement

The information provided in the FY 2011 Supplement was contributed and reviewed by many Federal agency representatives involved in NITRD Program activities, with the support of NCO technical and administrative staff. Sincerest thanks and appreciation to all.

Contributors
Michael J. Ackerman, NIH
Nabil Adam, DHS
Bryan A. Biegel, NASA
Sushil Birla, NRC
Paul E. Black, NIST
Robert B. Bohn, NCO
Raymond A. Bortner, AFRL
Lawrence Brandt, NCO
Nekeia Butler, NCO
Robert Chadduck, NARA
Leslie Collica, NIST
Eric Cooper, NASA
Deborah L. Crawford, NSF
Candace S. Culhane, NSA
Vince Dattoria, DOE/SC
Warren Debany Jr., AFRL
Arlene de Strulle, NSF
Michael S. Feary, NASA
David Ferraioio, NIST
J. Michael Fitzmaurice, AHRQ
Dr. Valerie Florence, NIH
Simon Frechette, NIST
Kenneth Freeman, NASA
Cita M. Furlani, NIST
Helen Gill, NSF
Robert Gold, OSD
Nada Golmie, NIST
Sol Greenspan, NSF
Le Gruenwald, NSF
Cray J. Henry, HPCMP
Daniel A. Hitchcock, DOE/SC
David Homan, AFRL
Thuc T. Hoang, DOE/NNSA
Charles Holland, DARPA
C. Suzanne Iacono, NSF
Jerry Janssen, NOAA
Raoul Jetley, FDA
Kevin L. Jones, NASA
Paul Jones, FDA
Michael Kane, NOAA
Frankie D. King (formerly NCO)
Steven King, OSD
Rita Koch, NSF
Kunik Lee, FHWA
Sander Lee, DOE/NNSA
Michael Lowry, NASA
Ernest Lucier, NCO
David Luginbuhl, AFOSR
Peter Lyster, NIH
William Bradley Martin, NSA
Douglas Maughan, DHS
Ernest L. McDuffie, NCO
Robert Meisner, DOE/NNSA
Grant Miller, NCO
Nelson Miller, FAA
Paul Miner, NASA
Virginia Moore, NCO
José L. Muñoz, NSF
Thomas Ndousse, DOE/SC
Richard Nelson, DISA
William D. Newhouse, DoD
Joan Peckham, NSF
Rama Ramapriyan, NASA
Karín A. Remington, NIH
Kamie Roberts, NIST
Jennifer Schopf, NSF
William J. Semancik, NSA
Darren L. Smith, NOAA
Sylvia Spengler, NSF
Michael Strayer, DOE/SC
Robert Souder, NSA
Joan Stanley, NCO
David Su, NIST
Harriet Taylor, NSF
Judith D. Terrill, NIST
Diane R. Theiss, NCO
Susan B. Turnbull, DOE/SC
Tomas Vagoun, NCO
Ralph Wachter, ONR
National Coordination Office for Networking and Information Technology Research and Development

The annual NITRD Supplement to the President’s Budget is prepared and published by the National Coordination Office for Networking and Information Technology Research and Development (NCO/NITRD). The NCO/NITRD supports overall planning, budget, and assessment activities for the multiagency NITRD enterprise under the auspices of the NITRD Subcommittee of the National Science and Technology Council’s Committee on Technology.

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Cover design and printing: The cover was designed by NSF Scientific Designer/Illustrator James J. Caras and printing was overseen by Electronic Publishing Specialist Kelly DuBose, both of the Information Dissemination Branch of NSF’s Office of Information and Resource Management.