

## Computing Research in the FY 2015 Budget

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### HIGHLIGHTS

- Funding for the Networking and Information Technology Research and Development (NITRD) program would decrease 2.9 percent, to \$3.8 billion, in the President’s FY 2015 budget request versus the FY 2014 enacted level.
- Legislation updating the NITRD program, adding a 5-year strategic planning activity and periodic external review for the program, has been included in a high-profile House effort to reauthorize the America COMPETES Act.
- Federal NITRD agencies would adopt greater focus on five key areas of the NITRD research portfolio for FY 2015 under the President’s plan: Big Data; Cybersecurity; Cyber Physical Systems; Social Computing; and Privacy.

### INTRODUCTION AND BACKGROUND

The importance of computing research in enabling the new economy is well documented. The resulting advances in information technology have led to significant improvements in product design, development and distribution for American industry, provided instant communications for people worldwide, and enabled new scientific disciplines like bioinformatics and nanotechnology.

Information technology has also changed the conduct of research. Innovations in computing and networking technologies are enabling scientific discovery across every scientific discipline – from mapping the human brain to modeling climatic change. Researchers, faced with research problems that are ever more complex and interdisciplinary in

nature, are using IT to collaborate across the globe, simulate experiments, visualize large and complex datasets, and collect and manage massive amounts of data.

As of FY 2015, the federal IT R&D effort is now a \$3.8 billion multi-agency enterprise called the Networking and Information Technology Research and Development (NITRD) program, coordinated by the Interagency Working Group on Information Technology Research and Development within the National Science and Technology Council (NSTC). NITRD is the successor of the High Performance Computing and Communications Program established by Congress in 1991. NITRD agencies now coordinate research in eight Program Component Areas: High End Computing Infrastructure and Applications; High End Computing Research and Development; Human Computer Interaction and Information Management; Large Scale Networking; Software Design and Productivity; High Confidence Software and Systems; Social, Economic, and Workforce Implications of IT; and Cyber Security and Information Assurance. The NSF is the lead agency out of 13 NITRD member agencies.

#### **CURRENT POLICY ENVIRONMENT**

Over the last several Congresses, members of the House Committee on Science, Space and Technology have attempted to reauthorize the Networking and Information Technology R&D Program with the goal of improving coordination among the 13 participating agencies and providing for systematic, effective external review of the program. In March of 2013, the Committee – and ultimately the House – passed the most recent version of this effort, the Advancing America’s Networking and Information Technology Research and Development Act (H.R. 967), but it has so far failed to get consideration in the Senate.

In an effort to get the bill further consideration, House Science, Space and Technology Subcommittee on Research and Education Chair Larry Buchson (R-IN) included the full text of the bill in the Frontiers in Innovation, Research, Science and Technology Act of 2014 (FIRST Act, H.R. 4186), the committee’s high-profile effort to reauthorize portions of the America COMPETES Act of 2007.

The bill, which comprises Title V of the FIRST Act, is largely based on the recommendations of the most recent review of the NITRD program by the President’s Council of Advisors on Science and Technology

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(PCAST), released in December 2010. The bill has at its core two elements: a requirement that the National Coordination Office (NCO) for NITRD begin a five-year strategic planning process that is then revisited every three years; and a requirement that an independent external advisory committee of experts in information technology review the program every three years, evaluate its progress towards its goals, and suggest new or different areas of research focus.

In addition to the strategic plan and advisory committee provisions in the bill, the bill would also create a new activity in the NITRD program called “Large-scale Research in Areas of National Importance” for IT research in areas that aid “national economic competitiveness and other societal benefits;” it would add a new research area in cyber-physical systems and create a new University/Industry Task Force to develop ways to pursue that research collaboratively; and it would create a new Interagency Working Group to develop policies and funding mechanisms around the use of cloud computing services in federally funded research. It also emphasizes education issues among the NITRD participating agencies, especially with respect to increasing the participation of underrepresented groups and women in computing fields.

For its part, the Administration has highlighted five particular areas of the NITRD research portfolio for priority in the FY 2015 budget: a focus on Big Data to understand the challenges and tap the opportunities presented by the fast-growing volume of large and complex collections of digital data; Cybersecurity R&D; Cyber Physical Systems, or the intersection between computing and the physical world; Social Computing, understanding the wide range of systems that promote interactions between large numbers of individuals at different scales; and Privacy R&D, including a research agenda in the foundations of privacy.

### **FY 2015 BUDGET REQUEST**

The NITRD FY 2015 budget request is a total of \$3.79 billion, a decrease of \$144 million, or approximately 2.9 percent, below FY 2014 expenditures of \$3.9 billion.

*National Science Foundation.* The National Science Foundation (NSF) would spend \$1.16 billion on NITRD research in FY 2015, a decrease of \$2 million, or 0.2 percent, over its FY 2014 enacted level.

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The hub of NSF's NITRD activity is the foundation's Computing and Information Science and Engineering (CISE) directorate, which would account for \$893 million of NSF's NITRD-related funding in FY 2015, a decrease of \$65 million (or 0.07 percent) below FY 2014 enacted levels.

CISE continues to lead or participate in a number of the agency's crosscutting initiatives, including Cyber-Enabled Materials, Manufacturing, and Smart Systems (CEMMS) which receives \$81.5 million; Cyberinfrastructure Framework for the 21<sup>st</sup> Century (CIF21) which receives \$80 million; Cognitive Neuroscience, which receives \$5.65 million; Enhancing Access to the Radio Spectrum (EARS), which receives \$9 million; NSF Innovation Corps (I-Corps), which receives \$10 million; NSF Research Traineeships (NRT), which receives \$7.59 million; Secure and Trustworthy Cyberspace (SaTC) which receives \$67 million; and Science, Engineering, and Education for Sustainability (SEES) programs which receive \$11 million. As well, CISE has two crosscutting investments: Exploiting Parallelism and Scalability (XPS) and Smart and Connected Health; both have requests for \$15 million.

In addition, CISE and NSF's Directorate for Education & Human Resources (EHR) are operating a joint activity called Science and Technology, Engineering, and Mathematics, including Computing (STEM-C) Partnerships. This is a consolidation of the Computing Education for the 21<sup>st</sup> Century (CE21) program and Math and Science Partnerships (MSP) program. STEM-C would have a \$12 million investment from CISE.

***Department of Defense.*** Overall funding for IT R&D at the Department of Defense would decrease by 11.6 percent in FY 2015 compared to FY 2014 enacted levels, to a total of \$1.097 billion. At DARPA, basic (6.1) computing research in the Mathematics and Computer Science account would increase by \$23 million to \$114 million; the Cyber Sciences account would increase by \$2 million to \$28 million; and the Transformative Sciences account would receive a cut of over \$10.5 million to \$32 million. In the applied (6.2) area, Information and Communications Technology would decrease by nearly \$66 million to \$334 million, while Cognitive Computing would be zeroed out with the completion of the last two programs in FY 2014. By all appearances, the Cognitive Computing cut is being rolled into the 6.1 accounts.

***Health and Human Services (HHS).*** The National Institutes of Health (NIH) constitutes the bulk of funding in IT R&D at HHS. For FY 2015,

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the Administration is seeking \$536 million in IT R&D funding, flat funding in comparison to FY 2014.

***Department of Energy (DOE).*** IT R&D activities in DOE's Office of Science, National Nuclear Security Administration (NNSA), the Office of Nuclear Energy, the Advanced Research Projects Agency-Energy (ARPA-E), and Electricity Delivery and Energy Reliability programs constitute DOE's participation in NITRD. Under the President's plan DOE NITRD funding would reach \$620 million, an increase of 9.5 percent, or \$54 million, over FY 2014.

***Department of Commerce (DOC).*** The DOC request for FY 2015 contains \$157 million in NITRD funding, from the National Oceanic and Atmospheric Administration (NOAA) and the National Institute of Standards and Technology (NIST). This is an increase of \$11 million, or 7.5 percent, over the enacted FY14 funding level.

NIST IT R&D efforts include working with industry, educational, and government organizations to make IT systems more useable, secure, scalable, and interoperable. In addition, NIST works to apply IT to specialized areas like biotechnology and manufacturing, and to encourage industry to accelerate development of IT innovations.

NOAA supports IT research in emerging computer technologies for improved climate modeling and weather forecasting, and for improved communications technologies to disseminate weather products and warnings to emergency responders, policymakers, and the general public.

***Department of Homeland Security (DHS).*** DHS requests \$79 million in NITRD funding in FY 2015, a decrease of \$12.5 million, or 13.6 percent, over FY 2014.

***National Aeronautics and Space Administration (NASA).*** The Administration's request for NASA for FY 2015 is \$109 million, which constitutes a decrease of \$7 million, or 5.6 percent, over FY 2014 levels.

***Environmental Protection Agency (EPA).*** EPA IT R&D would receive \$6.3 million in FY 2015 under the President's plan, the same amount as it received in FY 2014. EPA uses its IT funding to support technologies that facilitate ecosystem modeling, risk assessment, and environmental decision making at the federal, state, and local levels.

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***National Archives and Records Administration (NARA)***. NARA requests \$0.2 million in FY 2015, the same amount as requested in FY 2014.

***Department of Transportation (DOT)***. DOT requests \$1.5 million, the same amount as FY 2014.