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President's Council of Advisors on Science and Technology Releases Report on Networking and Information Technology

Reaffirms Importance of Networking and Information Technology for Economic Strength; Identifies Shortcomings in Federal Coordinating Effort, Recommends New Initiatives

The United States is spending considerably less on networking and information technology research than is suggested by official tallies and would benefit from both a larger investment and improved long-term strategic planning in this crucial field of research, according to an independent report released today by the President's Council of Advisors on Science and Technology (PCAST), a group of presidentially appointed experts from academia, non-governmental organizations, and industry.

The report, "Designing a Digital Future: Federally Funded Research and Development in Networking and Information Technology," examines the Nation's Networking and Information Technology Research and Development (NITRD) Program. That 19-year-old program, which encompasses work in more than a dozen Federal agencies, is the primary mechanism by which the Federal government coordinates its investments in unclassified networking and information technology research and development. PCAST examined both the coordinating program and the NITRD research portfolio itself.

The report finds that advances in networking and information technology (NIT) have been key drivers of economic competitiveness and have accelerated the pace of discovery in virtually every area of science and technology. It calls for robust funding of NIT research and development to continue that trend. But it finds that a substantial fraction of the NITRD spending reported by participating agencies is apparently being allocated to activities other than NIT research and development, such as the creation of information technology products and infrastructure expansion in support of research in other fields. Although these activities are valuable, the report concludes, the result is that far less than the $4 billion-plus indicated in the Federal budget is actually being invested in NIT research and development—the important, early-stage innovative work that will be crucial to addressing critical priorities and challenges in the years ahead.

"We're investing less than we think, and less than we need," said PCAST member David Shaw, who co-chaired the working group that helped develop the report. "New support is especially warranted for networking and information technology research that could revolutionize aspects of healthcare, energy and transportation, and cybersecurity," Shaw said. "And if America is to retain its historical position of international leadership, its funding priorities must include high

risk, high reward research with the potential for producing unanticipated, truly transformative advances."

The PCAST report also concludes that, while high-performance computing (HPC) remains critical to national security and economic competitiveness, the most widely followed international rankings of HPC system performance are based on metrics that capture only some of the capabilities that are relevant to America's current national priorities. The report warns that America must not allow disproportionate expenditures for the *procurement* of supercomputers to displace the fundamental *research* that will be required to develop "game-changing" future-generation HPC technologies." The report also emphasizes that other goals are of equal importance to our national competitiveness, including improvements in large-scale data analysis, the development of robotic sensors, novel approaches to more robustly protecting our nation's cyber-infrastructure, and making human-computer interactions more seamless.

To achieve these goals, the report states, the Nation will have to focus more on education and workforce issues relating to networking and information technology. The gap between the demand for and supply of NIT talent is large, the report notes. Closing the gap will require fundamental changes in K-12 education and a significant increase in the number of college graduates in NIT fields.

The report, crafted with input from scores of experts inside and outside of government, concludes that NIT has yielded enormous benefits for the Nation's economic competitiveness, national security, and quality of life. To maintain that momentum it calls for an added NITRD investment of approximately $1 billion per year, some of which may be by achieved by redirecting funds currently being used for NIT activities other than research and development.

Those added funds should be invested in multi-agency programs focused in large part on advances in information technology for health, energy and transportation, and cyber-infrastructure protection, the report concludes, and on advances in core areas of computer science that are of broad applicability such as privacy, large-scale data analysis, innovative sensors and robotics, and advanced human-machine and social collaboration and problem-solving.

"The Federal investment in NIT research and development to date has without question been one of the best investments our Nation has ever made," said Ed Lazowska, Co-chair of the PCAST working group on NITRD. "In order to sustain and improve our quality of life, it is crucial that the United States continue to innovate more rapidly and more creatively than other countries in important areas of NIT."

Finally, PCAST gave positive marks to how well the NITRD program is coordinating the Nation's NITRD portfolio. But it also notes that the program is chartered and staffed to coordinate multi-agency programs, not to develop long-term strategies. To address that need, the report calls for a new mechanism—such as a standing committee of information technology experts—to provide NITRD with strategic vision and leadership as it manages the Federal NIT research and development portfolio.

For more about PCAST, and to view the full report, please visit: www.WhiteHouse.gov/ostp/pcast

PCAST is an advisory group of the Nation's leading scientists and engineers who directly advise the President. PCAST makes policy recommendations in the many areas where understanding of science, technology, and innovation is key to strengthening our economy and forming policies that work for the American people.