

Networking and Information Technology Research and Development (NITRD) Program Review

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December 18, 2020



The NITRD Program Background and Context

- Networking and information technology (NIT) has become part of the fabric of American daily life and underpins our national economic prosperity and security
- The NITRD Program was established when Congress passed the High Performance Computing Act of 1991
- Federal coordinating groups of the NITRD Program:
 - National Science and Technology Council (NSTC) Subcommittee on NITRD
 - Interagency working groups (IWGs) and
 - NITRD National Coordination Office (NCO)



Legislative Requirement for NITRD Program Review

- “Periodic evaluations of the funding, management, coordination, implementation, and activities of the [NITRD] Program” are mandated to be conducted by an advisory committee (Next-Generation Internet Research Act)
- Since 2005, PCAST has been delegated by Executive Order to conduct these reviews
- The last PCAST review of the NITRD Program was conducted in 2015



The NITRD Program's Elements

- NSTC Subcommittee: Senior representatives from 23 Federal agencies that conduct or support NIT R&D plus OMB and OSTP
- NITRD NCO:
 - Provides technical expertise; supports planning, budgeting, assessment, and coordination; and serves as a central point of contact
 - Staff of 15: 1 Federal employee (NCO Director), 14 contractors
- NITRD IWGs:
 - Primary means by which agencies coordinate R&D resources on shared NIT problems
 - Long-term engagement by IWG representatives builds connections and facilitates informal communication and sharing of tacit knowledge across agencies
- NITRD Program Component Areas (PCAs): 11 NITRD-specific budget areas used to categorize and summarize Federal R&D investment in networking and IT



PCAST Approach to the NITRD Program Review

- Evaluated the Federal coordinating groups of the NITRD Program and their activities
 - NITRD NCO
 - NSTC Subcommittee on NITRD
 - 11 NITRD IWGs
- Considered NITRD PCAs
- Assessed emerging trends in NIT



Organization of the Report

- Overview of the NITRD Program
- NITRD Program efforts that responded to 2015 review
- Additional NITRD Program activities since the 2015 review
- Emerging NIT trends relevant to the NITRD Program
- Findings and Recommendations
 - Finding and recommendation 1 address NITRD Program response to 2015 review and NITRD Program overall
 - Findings and recommendations 2-5 address specific emerging trends and areas of national need relevant to NITRD Program



Overview of Findings

1. The NITRD Program—Subcommittee, NCO, and IWGs—is an effective mechanism for advancing a whole-of-government approach to NIT R&D.
2. Multi-sector partnerships in NIT are an emerging trend among peer competitors (China, EU, Japan).
3. Industries of the Future (IoT) have the potential to create economic prosperity while improving security and quality of life for all Americans.
4. Microelectronics are fundamental to virtually all aspects of NIT and underlie the hardware that powers the technologies for which the NITRD Program coordinates Federal R&D efforts.
5. It is essential to expand the number of Americans trained to work in NIT fields at all levels of education and that the U.S. continue to be the beacon for global talent in NIT and renew its emphasis on attracting and retaining these highly skilled individuals.



Recommendation 1: NITRD Program Overall Effectiveness

- The NITRD Program should generally continue as constituted, with the following qualifications:
 - Continue to review PCAs and IWGs regularly, but perhaps every 3 years rather than every 5–6 years
 - Continue to pursue incremental modifications of existing structures (e.g., IWGs, PCAs)
 - When launching new IWGs and PCAs, consider showing clearly which derive from previous entities/categories and which are wholly new



Recommendation 2: Emerging Trend—Multi-sector Partnerships and Translating Research to Practice

- The NITRD Program should identify opportunities for greater multi-sector engagement in its activities.

Examples include:

- Amplify multi-sector outreach and engagement efforts
- Expand the NITRD Program's efforts to track non-U.S. coordinated NIT efforts and collaborate with international efforts where appropriate



Recommendation 3: Emerging Trend—Industries of the Future (lotF)

- The NITRD Program should identify opportunities for improving coordination in lotF areas related to NIT R&D. Examples include:
 - Artificial intelligence—continue coordination efforts between NITRD IWGs and other NSTC bodies
 - Advanced communications networks—continue coordination efforts within the NITRD Program
 - Quantum information science—increase coordination with the NQCO and the NSTC QIS Subcommittee
 - Biotechnology—coordinate with NSTC bodies working in biosciences-related areas
 - Advanced manufacturing—coordinate with the NSTC Subcommittee on Advanced Manufacturing

*More specific groups to coordinate with provided in report



Recommendation 4: Emerging Trend— Microelectronics

- The NITRD Program should incorporate microelectronics R&D explicitly into its coordination activities
 - Via either new or existing IWGs
 - Through stronger coordination between the NITRD Program and the National Nanotechnology Initiative



Recommendation 5: Emerging Trend—NIT-related Workforce and Training

- The NITRD Program should further facilitate coordination to support:
 - STEM education, including PhD fellowships, in NIT
 - Programs at the intersection and convergence of computational science and other fields (referred to as CS+X) at 2-year and 4-year educational institutions
 - Retraining and upskilling the non-technical workforce to participate in the cyber-ready workforce
 - A diverse and inclusive NIT workforce across all levels of technical staff, engineers, and scientists
 - Efforts to attract international students, scientists, and engineers who wish to contribute to NIT R&D in the United States



Acknowledgements

IDA Science and Technology Policy Institute

Brian Zuckerman

Emily Grumbling

Amana Abdurrezak

Logan Pratico

