Quarterly Newsletter
October 2018 Issue

NITRD Leads IT

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

NITRD Spotlight

The National Science and Technology Council (NSTC)

Chloe Kontos, Executive Director, NSTC

The Networking and Information Technology Research and Development (NITRD) Program has operated for 25 years under the oversight of the President's National Science and Technology Council (NSTC) by way of its NITRD Subcommittee. Working through its committees and subcommittees, the NSTC establishes and coordinates the Nation's science and technology research and development (R&D) policies and programs across all Federal agencies that perform or fund R&D.

With new direction from NSTC, NITRD's chain of command and mission changed in noteworthy ways this summer. As of July 2018, the NITRD Subcommittee reports to a new NTSC committee, the Committee on Science and Technology Enterprise (CSTE), co-chaired by France Córdova, NSF; Paul Dabber, DOE; and Walter Copan, NIST. This Committee complements NSTC's five other primary committees by working to intensify the Federal Government's focus on rapidly, vigorously, and efficiently translating R&D innovation to products and processes that address high-priority areas of national concern and sustain the Nation's economic competitiveness.

In concert with this change in structural oversight, the NSTC renewed the NITRD Subcommittee's charter on July 29 through the end of March 2021 with an emphasis on transitioning networking and information technology R&D into practical use. That emphasis in the charter applies in particular to securing the Nation's critical cyber infrastructures and to advancing emerging and future artificial intelligence and computing technologies for the Nation's benefit.

Director's Corner

Kamie Roberts, NCO Director and Co-chair, NITRD Subcommittee

When the time is right

I am thrilled to be the NITRD NCO Director! I have participated in NITRD for many years, leading involvement from my home agency, NIST, where I have also been honored to work directly with several past NITRD Directors, including Chris Greer (2007-2009), Chuck Romine (2007), and my friend and mentor, Cita Furlani (2000-2002). Interestingly, not since Cita's tenure as NCO Director, 16 years ago, has there been a female NCO Director—until now, of course, which leads me to my recent attendance at the Grace Hopper Celebration (GHC) in Houston, TX. My first GHC in 2007 was attended by about 1500 women. At the 2018 GHC, I celebrated diversity in computing with 22,000 (!) others, learning to empower everyone, lift others up, and unlock each other's potential, without attention to race, gender, ethnic group, age, personality, education, background, etc. We have come a long way, but there is still much to do. Everyone wins when we have an inclusive image of a STEM professional: this allows us to increase the talent pool, foster critical STEM skills among the broader community, and promote a healthier, more culturally-sensitive workplace. An inclusive workforce provides a rich set of perspectives that enable innovation and creative discovery.

I'm proud to say the NITRD Co-chairs and the NCO are committed to an inclusive NITRD, and so I challenge you with this question: What will **you** do today to empower a co-worker, neighbor, relative, or friend?

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If you are a woman technologist in government, please consider joining the Systers in Government Group, a online forum for women involved in technical aspects of computing in government. Please join at: http: //systers.org/mailman/listinfo/systers-gov.

NITRD Highlights

Big Data IWG Workshop Summary and Recommendations on Measuring the Impact of Digital Repositories

July 20: The Big Data (BD) Interagency Working Group (IWG) released a summary of its workshop *Measuring the Impact of Digital Repositories*. The goals of the workshop, held February 28–March 1, 2017, were to identify current assessment metrics, tools, and methodologies that are effective, and to identify the issues, obstacles, and tools that require additional R&D. The BD IWG also released recommendations for future R&D on this topic as a result of the workshop discussions and reviews of existing literature. More information

SPSQ IWG Workshop on Reducing Software Defects and Vulnerabilities

July 23: A summary of the Software Productivity, Sustainability, and Quality IWG's *Workshop on Reducing Software Defects and Vulnerabilities*, held October 15–16, 2016, has been published on the NITRD website. The workshop convened experts from the software and security engineering communities in Government, academia, and the private sector to explore the R&D challenges and opportunities at the intersection of software development and software security. The summary is organized into 4 themes containing a total of 13 issues for reducing software defects and vulnerabilities.

FY2019 NITRD Supplement to the President's Budget

On August 21, 2018, the *FY2019 NITRD Supplement to the President's Budget* was released. This document provides details on the President's FY2019 Budget Request to Congress for $5.28 billion for the NITRD Program. There are 21 formal NITRD member agencies and over 40 other Federal agencies with IT interests participating in the networking, computing, and information-technology R&D coordinated through the NITRD Program. The FY2019 NITRD Budget Supplement reports investments for FY2017, FY2018 estimates, and requested funding levels for FY2019 by agency and Program Component Area . These investments can be tracked through the NITRD Dashboard visualization tools.

FY2019 Federal Cybersecurity Roadmap

The *FY2019 Federal Cybersecurity R&D Stategic Plan Implementation Roadmap* was released on August 21, 2018, as an appendix to the FY2019 NITRD Budget Supplement. The Cybersecurity Roadmap lists key Fedreal programs that directly address elements of the 2016 Federal Cybersecurity R&D Strategic Plan. This document is provided per statutory requirement pursuant to the Cybersecurity Enhancement Act of 2014.

Broadband Resource Guide

On September 4, The Broadband Research and Development (BRD) Group released its Broadband Resource Guide, housed on the NITRD website. While reliable broadband connectivity has brought economic, health, and educational benefits to many Americans, disparities in nationwide broadband access, adoption, and usage remain. The Guide lists Federal broadband R&D resources and collaboration opportunities, with links to current Federal programs and other activities that support research and development and data collection on broadband network communication. More about the BRD Group

NITRD FY2020 Program Component Areas

NITRD's FY2020 Program Component Areas (PCAs) and their definitions were approved on September 18, 2018. These PCAs include the new Artificial Intelligence R&D PCA. The PCAs are the primary focus areas in which the NITRD Interagency Working Groups coordinate their research activities and plans, and are the investment categories used in the annual NITRD Budget Supplements. More information on the NITRD PCAs

Operationalizing Software-Defined Networks

On September 24, The Large Scale Networking (LSN) Interagency Working Group (IWG) released a summary of its workshop *Operationalizing Software-Defined Networks* (SDNs). The report summarizes the key needs for "operationalizing" SDNs that were discussed at the September 18-20, 2017, workshop. The workshop brought together Federal, private, and academic stakeholders to discuss paths forward to realizing an economic, secure, and manageable operational SDN infrastructure able to rapidly adjust to the evolving communication and computing needs of science, engineering, and commerce. More about the SDN Workshop

NITRD IWG for Artificial Intelligence (AI) R&D publishes RFI in Federal Register

On September 26, 2018, The NITRD AI R&D IWG published a Request for Information on updates to the *2016 National Artificial Intelligence Research and Development Strategic Plan* in the Federal Register. This RFI seeks input from the public by October 26, 2018, on whether the strategic plan should be revised and, if so, the ways in which it may be improved. The RFI lays out the seven strategic aims of the 2016 Plan for the public to consider when submitting inputs. Read the AI RFI Federal Register Notice.

NITRD Talks

The multiagency NITRD Program, through its Interagency Working Groups, regularly hosts invited experts from academia and industry to share information and engage in discussions on R&D that address key challenges and questions directly related to the national R&D priorties of the Administration and Federal agencies. NITRD IWGs have hosted the following talks since July 2018:

- **LSN-MAGIC (October–August 2018):** The LSN-MAGIC group has been conducting an in-depth examination of the impact of and challenges related to DevOps through a series of four focused speaker sessions. See the list of topics and speakers at DevOps sessions.
- **BRD (September 27):** Volker Fessmann (Transportation Research Specialist, Federal Highway Administration (FHWA) – Office of Safety Research and Development, U.S. Department of Transportation), *Dedicated Short-range Communications (DSRC) and Spectrum Policy*.
- **LSN-JET (September 18):** Patty Giuntoli (ESnet6 Project Director) *ESnet6 Project Overview*.
- **WSRD (September 13)** The WSRD IWG Workshop X: *Security from a Wireless Spectrum Perspective: Technology Innovation and Policy Research Needs* hosted the following talks: *IMSI Exchange over the air for LTE Access Network* by Munawwar Sohul and Jeffrey Reed (Virginia Tech)**;** *Putting Wireless Signal Security in a System Security Context* by Ward Trappe (Rutgers)*;* *5G NR Jamming, Spoofing, and Sniffing: Threat Assessment and Mitigation* by Vuk Marojevic (Virginia Tech); Marc Lichtman (Vencore Labs); Raghunandan Rao and Jeffrey Reed (Wireless@Virginia Tech); Roger Piqueras Jover (Bloomberg LP)*;* and *Vulnerabilities of LTE to RF Interference and Spoofing* by Mina Labib, Vuk Marojevic, Carl Dietrich, and Jeffrey Reed (Wireless@Virginia Tech).
- **Big Data (August 23**): Shelley Stall (American Geophysical Union (AGU)), *Enabling FAIR Data in the Earth, Space, Environmental Sciences*.
- **AI R&D (August 20):** Gil Alterovitz (faculty member at Harvard/MIT and the Computational Health Informatics Program at Boston Children's Hospital Presidential Innovation Fellow) and Justin Koufopoulos (Presidential Innovation Fellow at NIH), *Natural Language Processing (NLP) at the Agency Interface; Watch the video*.
- **LSN-JET (August 17):** *The Quilt Network Security Cookbook (v. 7)* was presented by members of The Quilt (a coalition of U.S. regional nonprofit research and education networks) at the LSN-JET meeting.
- **WSRD (July 23):** Larry Alder and Mark Gibson, Commerce Spectrum Management Advisory Committee (CSMAC Co-Chairs), *CSMAC*; Sara Yost (National Instruments), *5G Roadmap*; and Dennis Roberson (FCC-TAC), *FCC Technological Advisory Council: Overview / Update*.
- **HEC (July 19):** Michael A. Heroux (Sandia National Laboratories), *The Exascale Computing Project Software Stack*.

Upcoming Events

Keep an eye on NITRD.gov for details on upcoming conferences, meetings, and workshops of interest.

- **October 29–30:** Workshop *The Convergence of High Performance Computing, Big Data, and Machine Learning*.
- **November 13:** Supercomputing 2018 - HEC IWG Birds-of-a-Feather: *What the heck is HEC?*

NITRD Agency Corner

Defense Advanced Research Projects Agency (DARPA) Information Innovation Office (I2O)

Dr. Brian Pierce, I2O Office Director
Dr. John Everett, I2O Deputy Director

For sixty years, the Defense Advanced Research Projects Agency (DARPA) has held to a singular and enduring mission: to make pivotal investments in breakthrough technologies for national security. Working with innovators inside and outside of government, DARPA has repeatedly delivered on that mission, transforming revolutionary concepts, and even seeming impossibilities, into practical capabilities. The ultimate results have included not only game-changing military capabilities such as precision weapons and stealth technology, but also such icons of modern civilian society such as the Internet, automated voice recognition and language translation, and Global Positioning System receivers small enough to embed in myriad consumer devices.

Modern society depends on information, and information depends on information systems. Timely, insightful, reliable, and relevant information is essential, particularly for national security. One of DARPA's six technical offices, the Information Innovation Office (I2O) sponsors basic and applied research in three thrust areas to ensure information advantage for the U.S. and its allies:

- Symbiosis. I2O envisions a future in which machines are more than just tools that execute human-programmed rules or generalize from human-curated data sets. Instead, we see machines becoming partners in problem solving. Enabling computing systems in this manner is of critical importance because sensors, information systems, and communication systems generate data at rates far beyond what humans can assimilate and understand for enabling effective action. I2O seeks to develop and incorporate these technologies into military systems that collaborate with warfighters to facilitate better decision making in complex, time-critical, battlefield environments; enable a shared understanding of massive, incomplete, and contradictory information; and allow unmanned systems to operate with higher degrees of autonomy while assisting the warfighter with critical missions.
- Analytics. The human domain is an increasingly important aspect of military strategy. This is the result of populations being able to interact on a global scale through the connectedness provided by the Internet, social media, and other information ecosystems. We need analytical tools and technologies that rapidly transform the data and information from these ecosystems into effective courses of action for conflict resolution, stabilization, and other complex challenges. I2O seeks to research and develop tools and technologies capable of enabling an emerging data-centric paradigm: collect/curate data emphasizing the human domain but inclusive of all other domains; analyze data for entities, relationships, and trends; synthesize models for situational awareness, prediction, and intervention; and engage allies, stakeholders, and adversaries through appropriate channels.
- Cyber. Direct cyber threats against our information systems have grown in sophistication and number. Adversaries have at their disposal a growing diversity of means (including advanced persistent threats, botnets, denial of service attacks, and other sophisticated capabilities) with which to threaten critical infrastructure, embedded computing systems, cyber-physical systems, and enterprise information systems. I2O's strategy aims to deter cyber attack, focusing on three capabilities: cyber resilience, cyber situational awareness, and cyber calibrated response. Cyber resilience refers to fortifying the information and operational technology used in networks and systems to ensure operation through a cyber attack or enable rapid recovery from such an attack. Cyber situational awareness focuses on the subtle or overt escalations of cyber conflict intensity and adversary attacks, which must be detected, understood, and attributed in a timely fashion. Finally, the U.S. must have the ability to mount an accurate, timely, effective, and appropriately scaled cyber response to any cyber attack. As such, the third capability focuses on developing a response that is calibrated to discourage further escalation.

About the NITRD Program

The NITRD Program is the Nation's primary source of federally funded research and development (R&D) on networking and information technology (IT). The NITRD Program seeks to maximize interagency coordination in providing the R&D foundations for continued U.S. technological leadership and meeting the needs of the Federal Government for advanced IT.

Now in its 27th year, the NITRD Program is one of the oldest and largest of the formal Federal programs that engage multiple agencies in coordination activities. It was established by the High-Performance Computing Act of 1991 (P.L. 102-194) and reauthorized by Congress in the American Innovation and Competitiveness Act of 2017 (P.L. 114-329). The NITRD Program provides a framework and mechanisms for coordination among the Federal agencies that support advanced IT R&D and report IT research budgets in the NITRD crosscut. Many other agencies with IT interests also participate in NITRD activities. More information is available on https://www.nitrd.gov.

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