

NIST Information Technology Research

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ITL's Purpose

Cultivating Trust in IT
and Metrology

through
measurements,
standards and testing



Influencing a Multi-Trillion Dollar Industry

Cybersecurity

Digital Library of Mathematical Functions

Health IT

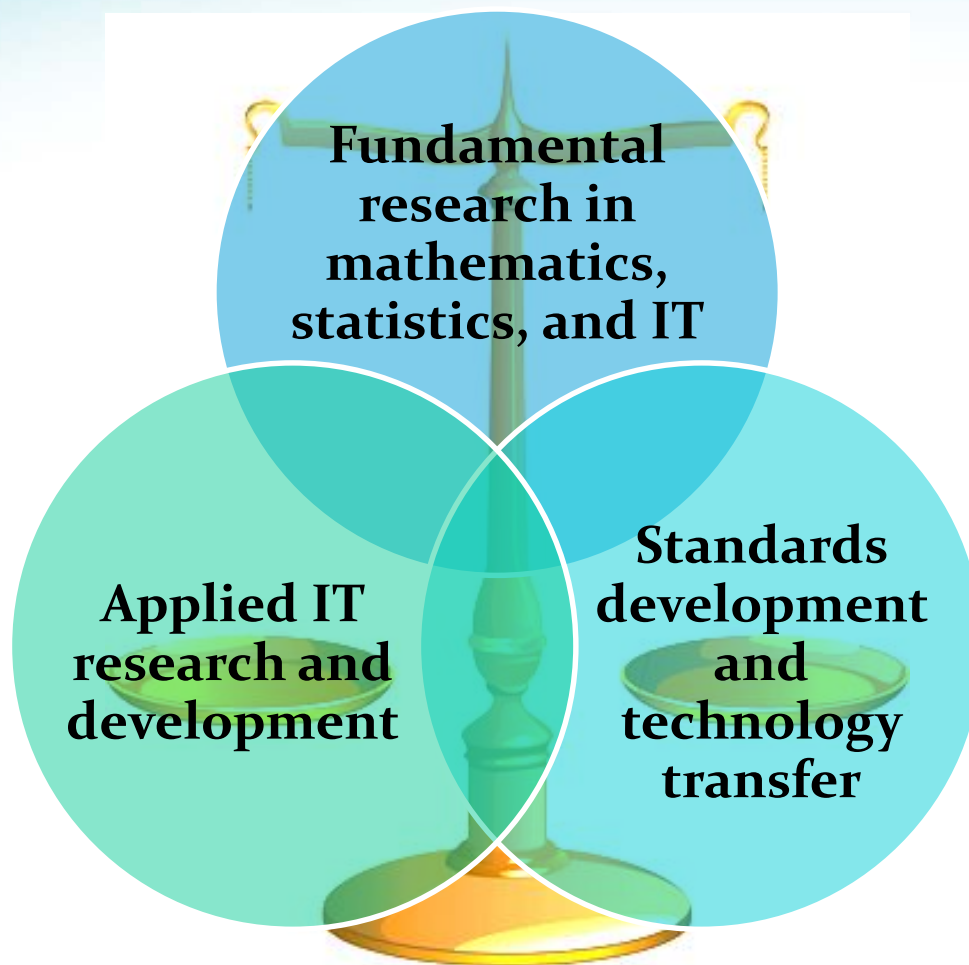
Information Retrieval

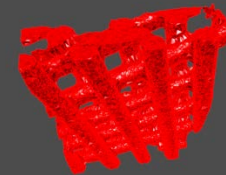
Internet Resilience

Uncertainty Quantification



What Keeps Me Up at Night?





Fundamental Research

***Strategic Goal:** Develop the essential foundations of **computer science, mathematics, statistics, and physical science** that contribute to NIST's role in IT and measurement science.*

- Develop the Foundations of **Measurement Science for IT**
- Develop the Foundations of **IT for Measurement Science**



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Applied Research

***Strategic Goal:** Accelerate IT innovation through the development and application of measurements and related technology and tools.*

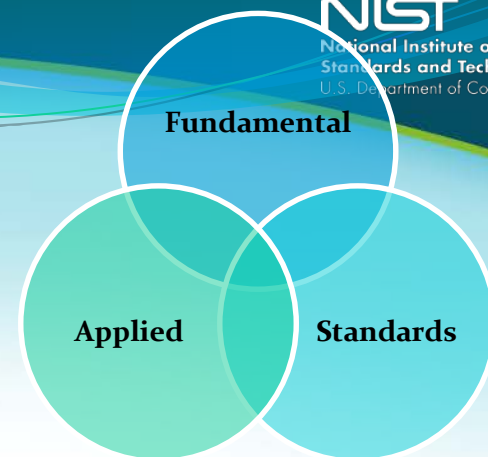
- Accelerate the Development and Adoption of Emerging Information Technologies
- Address National Priorities through IT Research and Tech Transfer
- Strengthen Measurement Science through Mathematics, Statistics, and Computing



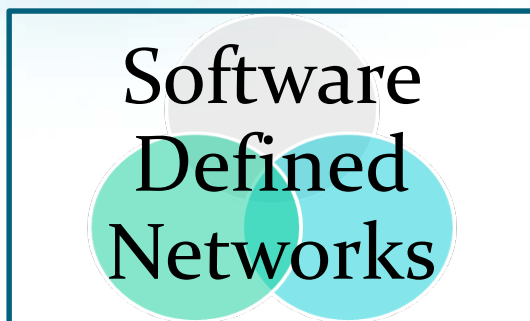
Standards Development & Technology Transfer

***Strategic Goal:** Ensure the products of our research are available to all to promote U.S. innovation and industrial competitiveness, enhance economic security, and improve our quality of life.*

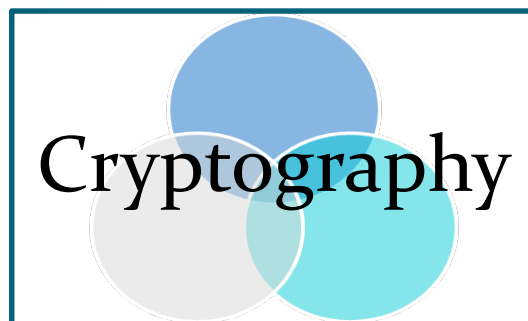
- Catalyze the Development of IT Standards
- Build Communities of Interest in IT Priority Areas
- Collaborate (Academia, Industry, Agencies) in IT, other sectors
- Effectively Communicate ITL's Research Results
- Promote Open Data Access



Priorities in 2015



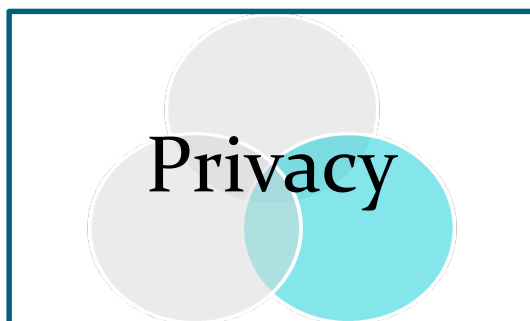
Software
Defined
Networks



Cryptography



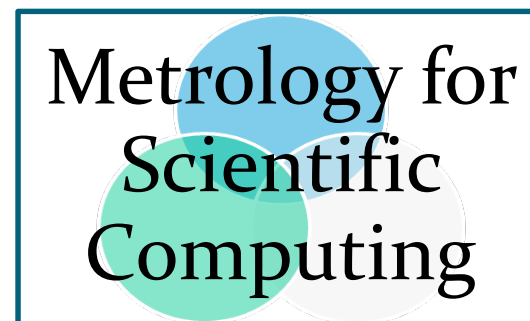
Big Data



Privacy



Software
Assurance



Metrology for
Scientific
Computing

Drivers for Priority Changes

- Fast pace of technology
- Cybersecurity
 - 2015 Cybersprint
 - 2016 Presidential Executive Order establishing Commission on Enhancing National Cybersecurity
 - 2017 Presidential Executive Order on Strengthening the Cybersecurity of Federal Networks and Critical Infrastructure
- Future Computing Technologies and Applications
 - 2015 Presidential Executive Order on Creating a National Strategic Computing Initiative
- Artificial Intelligence
 - National Science and Technology Council
 - Preparing for the Future of Artificial Intelligence
 - National Artificial Intelligence Research and Development Strategic Plan
- VCAT Recommendations

2015 VCAT Recommendations

- Continue maintaining close partnerships with industry, standards and academic partners, both domestic and international.
- Expand collaboration and engagement with small to mid-size organizations
- Develop stronger ties with IT innovation hubs across the country
- 'Lead by example', and remain a world-class IT organization
- Grow technical capacity necessary to address the emergent challenges of IoT/CPS area

Collaborations Across Industry, State/ Local Governments and Academia

- Big Data Public Working Group
- Joint Center for Quantum Information and Computer Science (QuICS)
- National Cybersecurity Center of Excellence
- National Initiative for Cybersecurity Education Working Groups
- Organization of Scientific Area Committees for Forensic Science
- Standards Developing Organizations



JOINT CENTER FOR
QUANTUM INFORMATION
AND COMPUTER SCIENCE



NCCOE
NATIONAL
CYBERSECURITY
CENTER OF
EXCELLENCE



NICE
NATIONAL INITIATIVE FOR
CYBERSECURITY EDUCATION



Organization of
OSAC
Scientific Area Committees
for Forensic Science



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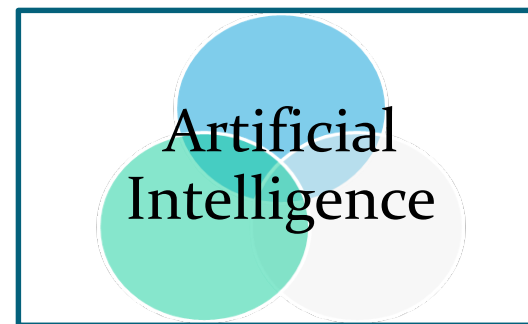
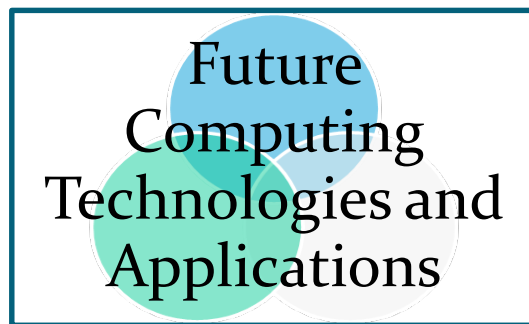
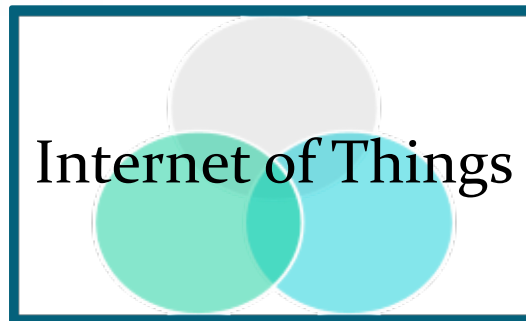
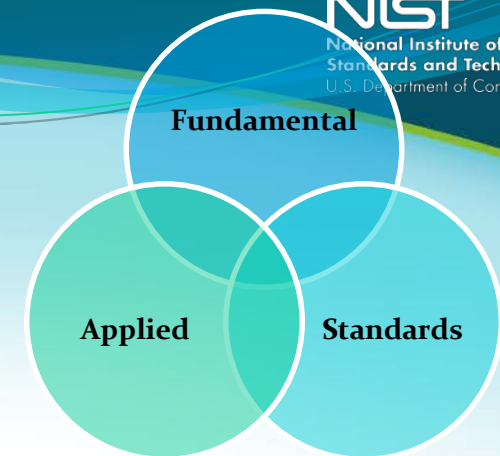
Key External Stakeholders



International collaborations



Priorities in 2017



Goals for 2017 Priorities

- Cybersecurity
 - Cultivate trust in the digital economy
 - Provide expert guidance to help protect IT infrastructure
- IoT (*multi-laboratory activity*)
 - Cultivate trust in IoT by accelerating development of measurements, standards, and guidance
- Reliable Computing
 - Cultivate trust in computing by developing new IT-based metrology
- Future Computing Technologies (*multi-laboratory activity*)
 - Cultivate trust in large-scale computer simulations and data analytics
- AI (*multi-laboratory activity*)
 - Cultivate trust in AI by building an infrastructure for rigorous AI system-level testing

Possible Future Priorities

(2018 and Beyond)

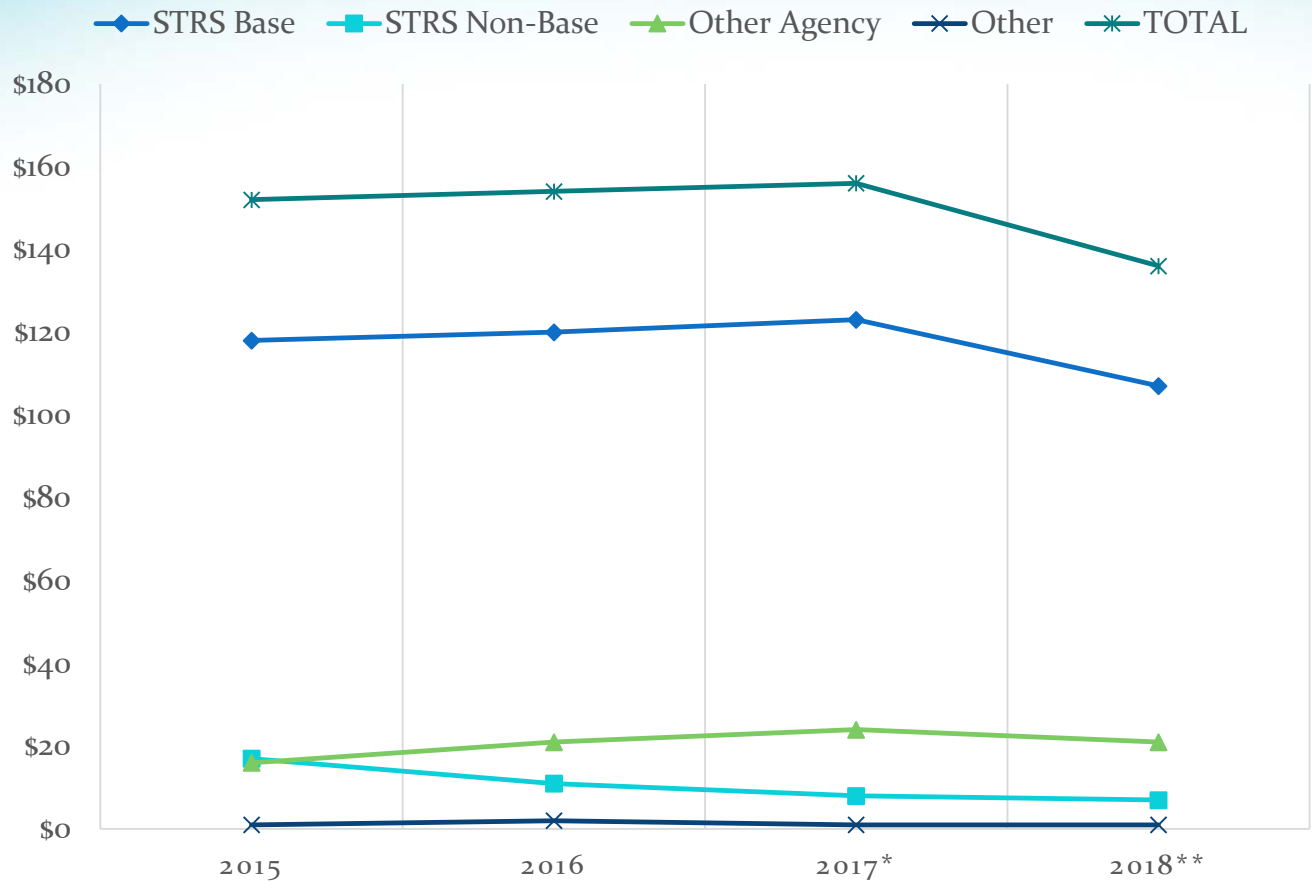
- ADLP Strategic Planning Offsite
 - Data Science (horizontal, cross-cutting, multi-laboratory)
 - Open repositories
 - Data analytics
 - Testing and evaluation
 - Artificial Intelligence / Machine Learning
 - Understanding performance
 - Detection of bias
 - Detection of compromise
- Improving software reliability through Software Metrology
- Cultivating trust in metrology through Uncertainty Quantification (applied mathematics, statistics)

Questions for the VCAT

- Do you agree with the horizontal approach to data science?
- How can we maintain balance between cybersecurity and other IT priorities?
- What questions should NIST address in IoT that we have not asked?
- Are the possible future priorities the right ones? What are we missing?

Backup Material

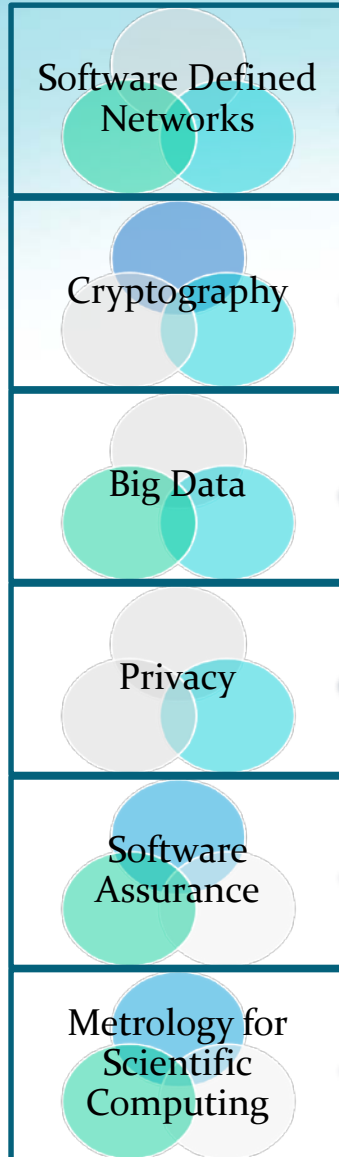
Funding Trends (\$M)



*2017 Estimated to year end expenditure

**2018 President's Budget Proposal

2015 Priorities



2017 Priorities

