

NATIONAL
SCIENCE
FOUNDATION

FISCAL
YEAR
2018

BUDGET
REQUEST



IRENE QUALTERS
DIRECTOR, CISE/OAC
JUNE 6, 2017

Computer & Information Science & Engineering



Outline



- **Core research**
- **Research cyberinfrastructure**
- **National priorities**
- **Partnerships**



National Science Foundation's Mission

“To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense...”





National Science Foundation

GOLD STANDARD IN MERIT REVIEW

Research proposals submitted to NSF are subjected to a rigorous merit review system – impartial, competitive, and transparent – ensuring that each proposal meets the highest standards of intellectual merit and broader impact on society. NSF’s merit review process is widely regarded as the gold standard of scientific review and has been emulated in numerous countries around the world.

\$7.3 billion NSF FY 2015 Budget Request

94% Funds research, education and related activities

INPUT



50,000
Proposals evaluated through competitive review process



38,000
Reviewers, including external experts and program staff



233,000
Total number of reviews, each proposal evaluated multiple times

OUTPUT



10,800
Competitive awards funded



1,922
U.S. colleges, universities, and other institutions receiving NSF funding



299,000
Estimated number of researchers, postdoctoral fellows, trainees, teachers and students NSF supports directly

IMPACT



47,800
Students supported by NSF Graduate Research Fellowships since 1952



210+
Number of Nobel Laureates supported by NSF



NSF-Supported Research
has spurred economic activity and improved the quality of life for all Americans



STEM Workforce Development
supports students, teachers and tools to enable the development of a diverse and highly qualified science and technology workforce

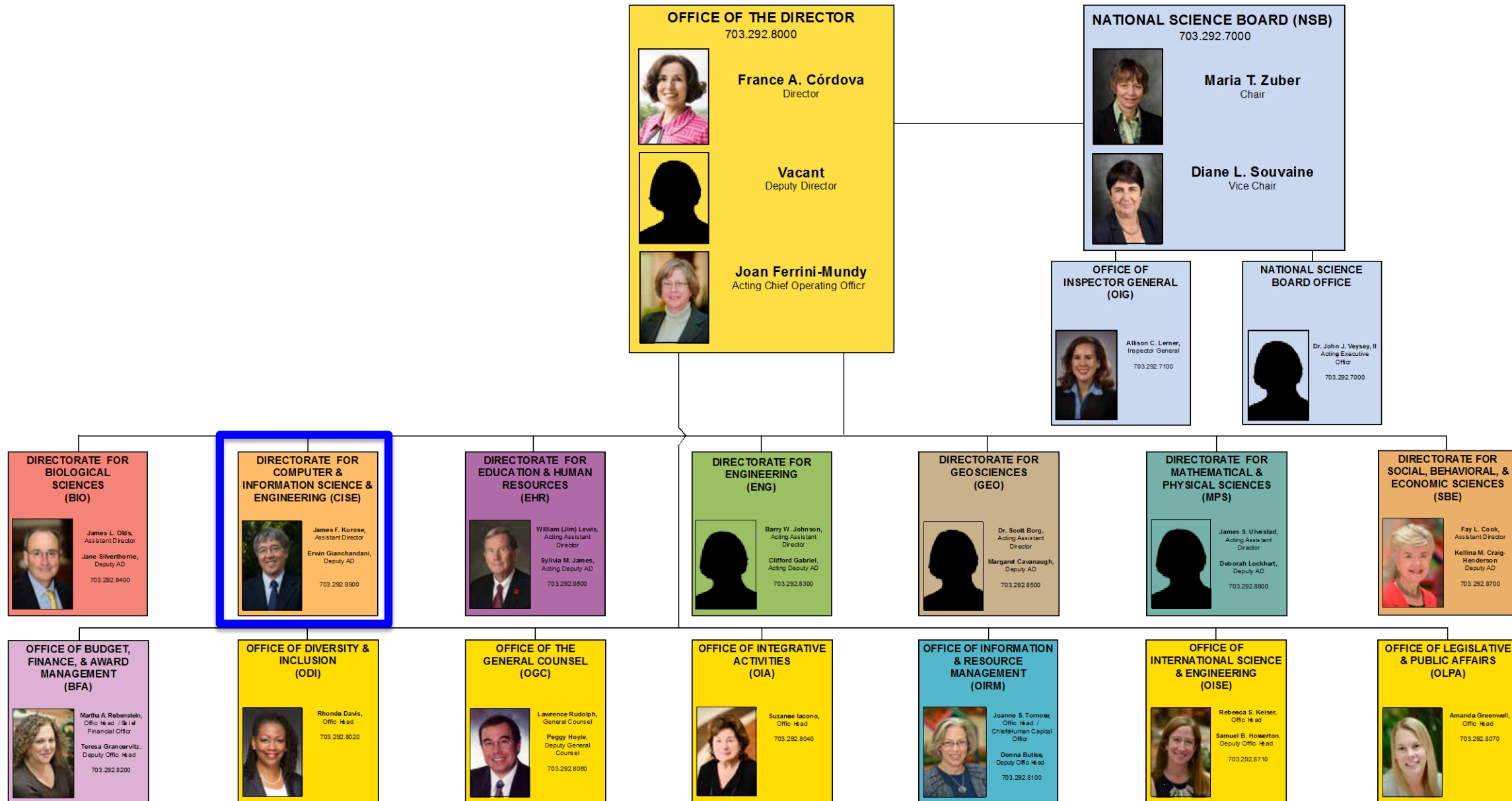
Figures other than Budget Request represent FY 2013 actuals



NSF Supports All of Science & Engineering



NATIONAL SCIENCE FOUNDATION



National Science Foundation
4201 Wilson Boulevard
Arlington, Virginia 22230
TEL: 703.292.5111 | FIRS: 800.877.8339 | TDD: 800.281.8749

CISE's Economic and Societal Context

- CISE is at the center of an ongoing societal transformation and will be for decades to come.
- Advances in computing, communications and information technologies, and cyberinfrastructure:
 - accelerate the pace of discovery and innovation; and
 - are crucial to achieving national and societal priorities.



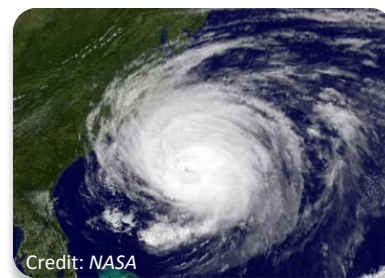
Credit: ThinkStock

(Cyber) Security



Credit: Calvin In, UT, Austin

Education & Lifelong Learning



Credit: NASA

Environment



Credit: Public domain

Health & Wellbeing



Credit: Matt Pepper, NSF

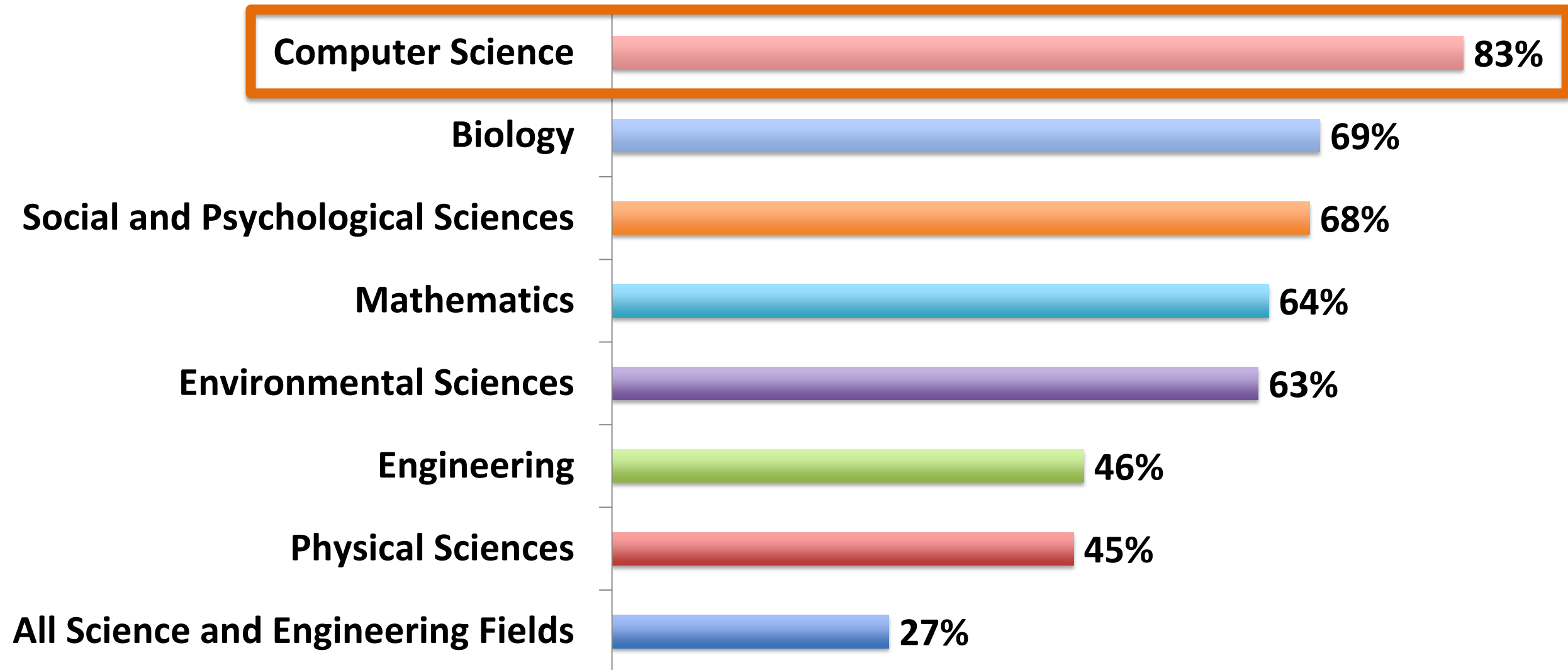
Smart & Connected Communities





NSF Support of Academic Basic Research

(as a percentage of total federal support)

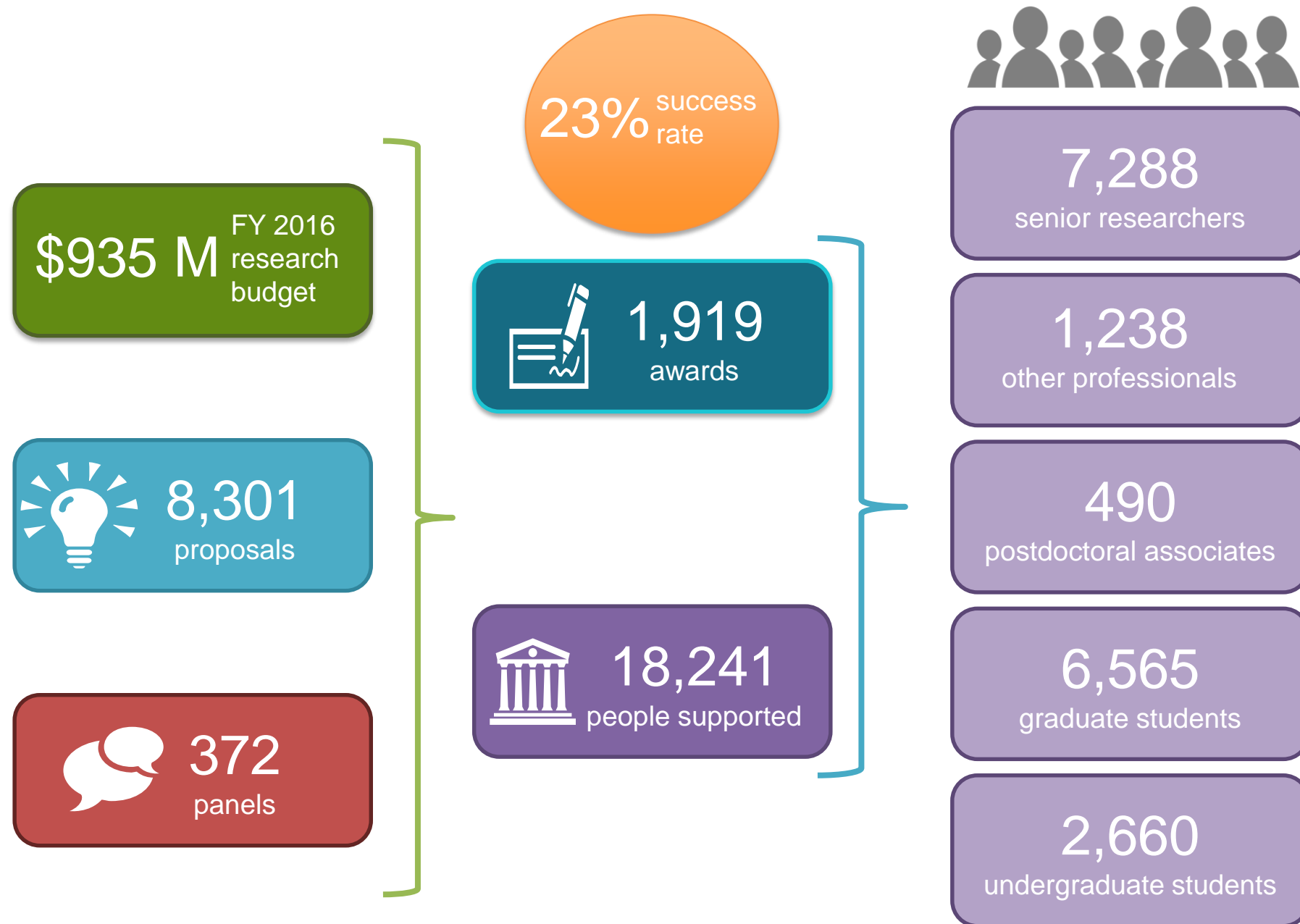


Note: Biology includes Biological Science and Environmental Science. Biology and Psychological Sciences exclude National Institutes of Health funding from the total amount of federal support.

Source: NSF/National Center for Science and Engineering Statistics, Survey of Federal Funds for Research and Development



CISE by the Numbers: FY 2016



CISE Mission

Exploring the frontiers of computing

- Promote progress of CISE research and education
- Advance the development and use of cyberinfrastructure
- Promote understanding of principles and uses of advanced computer, communications, and information systems in support of societal priorities
- Contribute to universal, transparent, and affordable participation in a knowledge-based society

These frontiers have interfaces with all the sciences, engineering, education and humanities and a strong emphasis on innovation for society.



Outline



- **Core research**
- **Research cyberinfrastructure**
- **National priorities**
- **Partnerships**



FY 2018 Budget Request



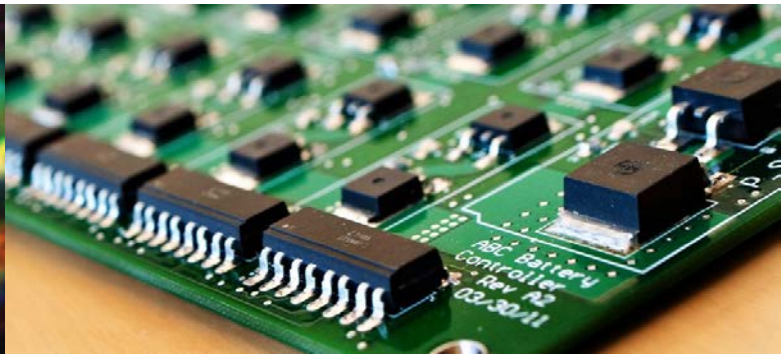
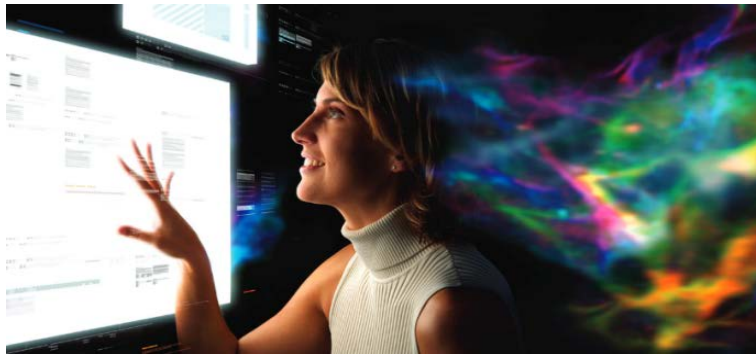
- **NSF**
 - FY 2018 Budget Request: \$6,653 M
Comparison to FY 2016 Actual:
-\$841 M, -11.2%
- **CISE**
 - FY 2018 Budget Request: \$839 M
 - Comparison to FY 2016 Actual:
-\$96 M, -10.3%



FY 2018 Budget Request for CISE

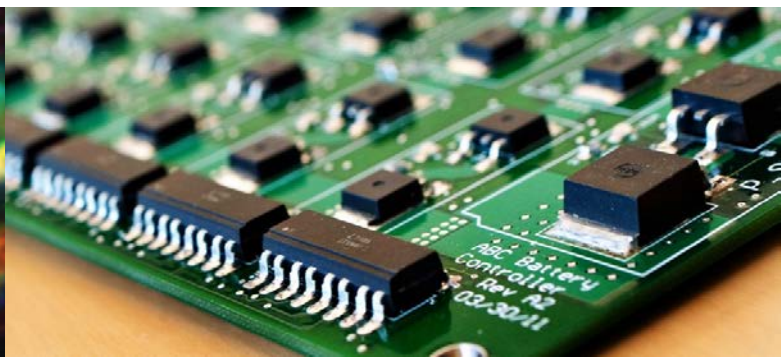
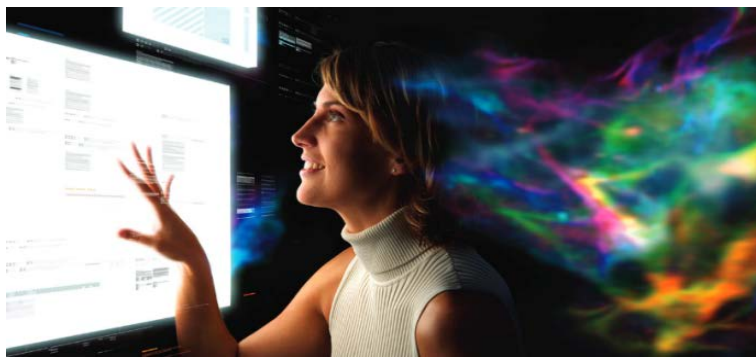
CISE Funding
(Dollars in Millions)

	FY 2016 Actual	FY 2017 (TBD)	FY 2018 Request	Change Over FY 2016 Actual	
				Amount	Percent
Office of Advanced Cyberinfrastructure (OAC)	\$222.19	-	\$199.31	-\$22.88	-10.3%
Computing and Communication Foundations (CC)	194.13	-	174.14	-19.99	-10.3%
Computer and Network Systems (CNS)	230.99	-	207.21	-23.78	-10.3%
Information and Intelligent Systems (IIS)	194.80	-	174.75	-20.05	-10.3%
Information Technology Research (ITR)	93.09	-	83.51	-9.58	-10.3%
Total	\$935.20	-	\$838.92	-\$96.28	-10.3%



Principles Underlying the Budget Request for CISE

- Honor ongoing commitments (existing awards).
- Investments in core research programs are maintained.
- Investments across the breadth of the research cyberinfrastructure ecosystem continue.
- Commitment to national priorities continue.
- CISE remains committed to building and nurturing partnerships.



CISE Investments Address National Priorities



Credit: CCC and SIGACT CATCS

Big Data



Credit: ThinkStock

Cybersecurity



Credit: ThinkStock

Understanding the Brain



Credit: Texas Advanced Computing Center

National Strategic Computing Initiative



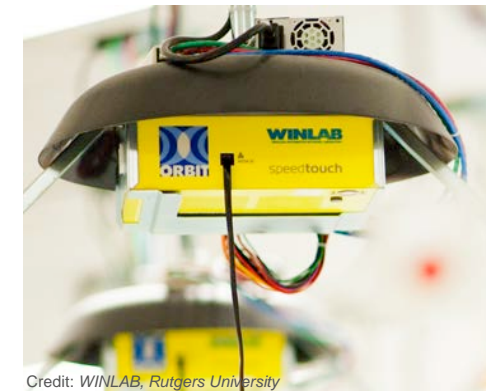
Credit: US Ignite, Inc.

Smart Cities



Credit: Eliza Grinnell/Harvard SEAS

Robotics



Credit: WINLAB, Rutgers University

Advanced Wireless Research



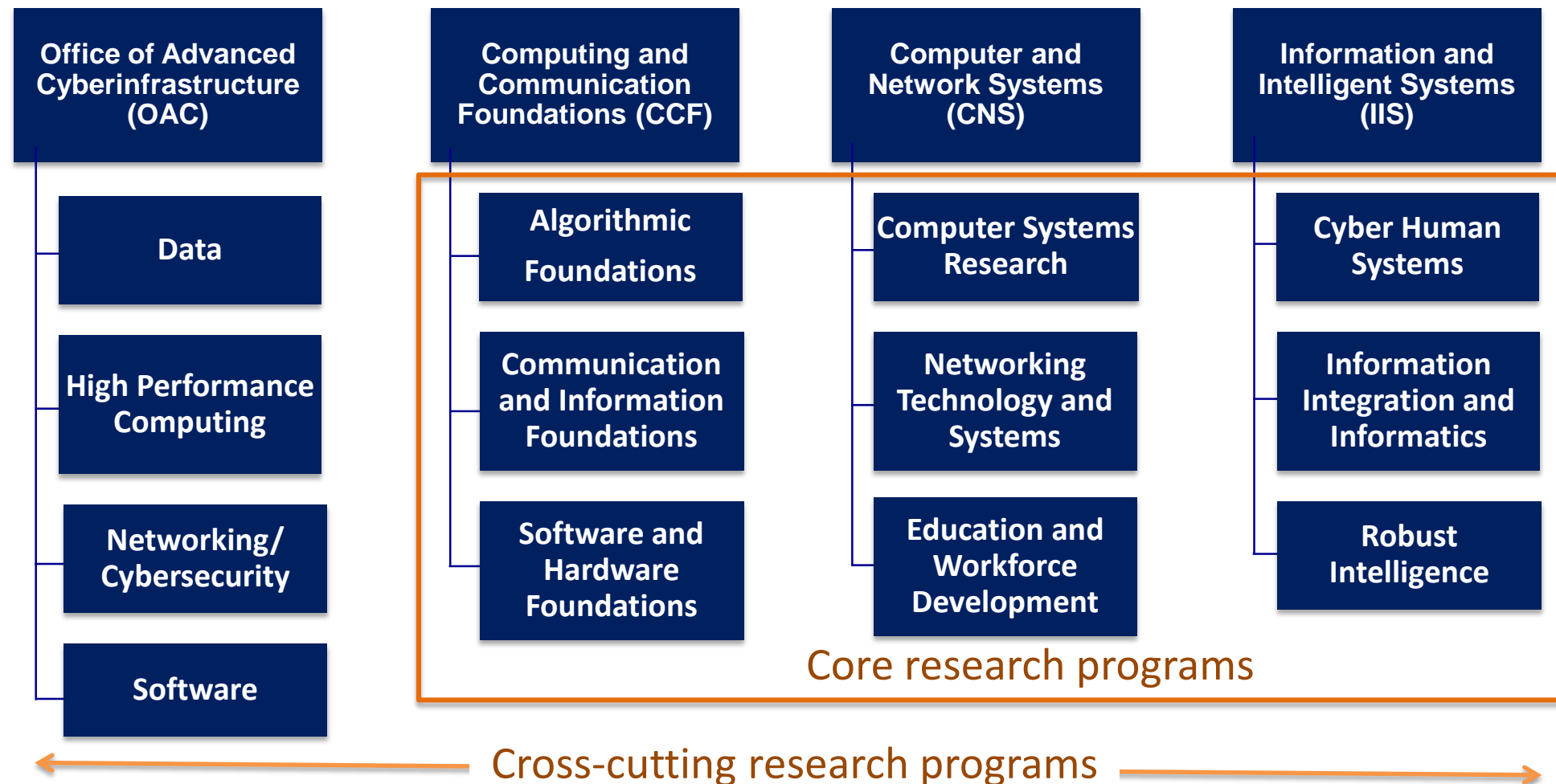
Credit: Carolyn Lin, University of Texas, Austin

Computer Science Education

CISE Research Investments

Exploring the frontiers of computing

- Strong commitment to core/fundamental research – the heart of what we do.
- Cast a broad net & let the best ideas surface.
- Engage with our community to develop new research directions.



Harnessing the Data Revolution (HDR)

Enabling 21st-century science, engineering, and education to move toward effective use of digital data to advance discovery

CISE Investment: \$50.0M

- Promote foundational research in critical techniques, technologies
- Support data-intensive science with innovative, reusable data and knowledge infrastructure
- Enable/incent science community to address data governance, lifecycle issues
- Educate data-savvy workforce of scientists, engineers, educators



Transdisciplinary Research in Principles of Data Science (TRIPODS)

CISE Investment: \$2.0M

- Bring together statistics, mathematics, and theoretical computer science communities to develop the theoretical foundations of data science through integrated research and training activities:
 - All projects must involve significant, integral participation by all three communities.
- Phase I will support the development of small collaborative Institutes.
- Phase II (to be described in an anticipated future solicitation, subject to availability of funds) will support a smaller number of larger Institutes, selected from the Phase I Institutes via a second competitive proposal process.
- Cross-Directorate Solicitation: CISE, MPS.



Critical Techniques, Technologies and Methodologies for Advancing Foundations and Applications of Big Data Sciences and Engineering (BIGDATA)

Developing techniques to manage and analyze data

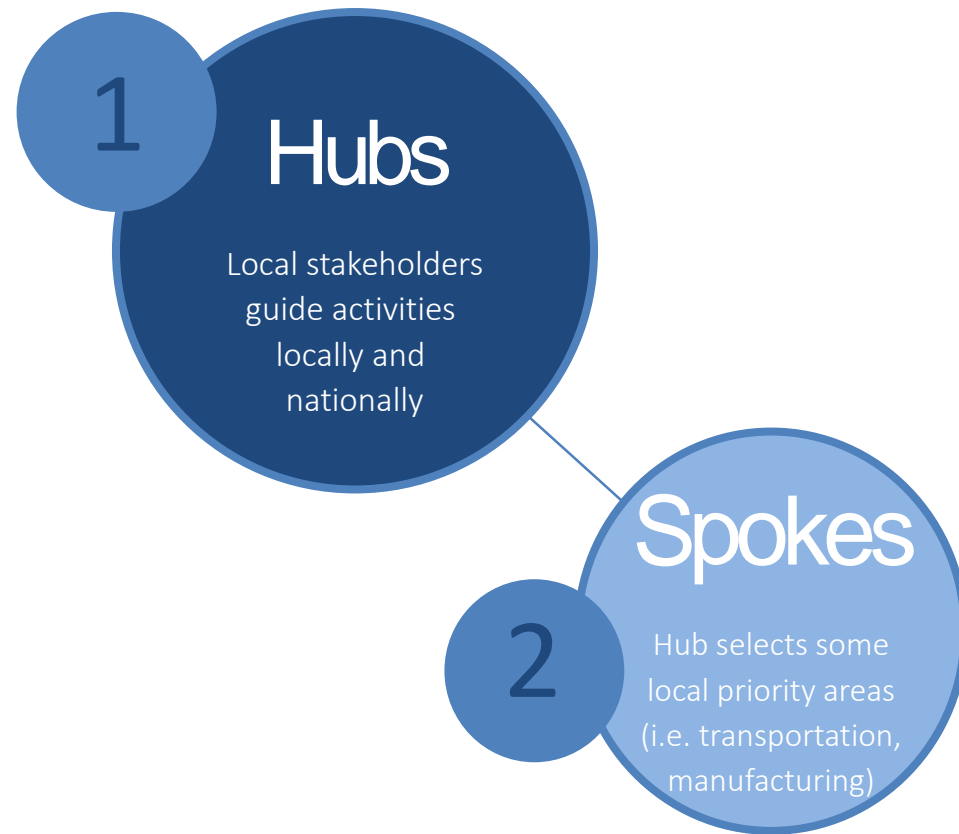
CISE Investment: \$18.0M

- Cornerstone of interagency Big Data R&D effort, launched March 2012.
- Two categories for submission:
 - **Foundations:** Encourages fundamental techniques, theories, methodologies and technologies of broad applicability.
 - **Innovative Applications:** Encourages novel techniques, methodologies, and technologies of interest to at least one specific application (special requirements).
- Cross-Directorate, Cross-Agency, and Cross-sector: CISE, BIO, EHR, ENG, GEO, MPS, and SBE; OFR; AWS, Google, and Microsoft.

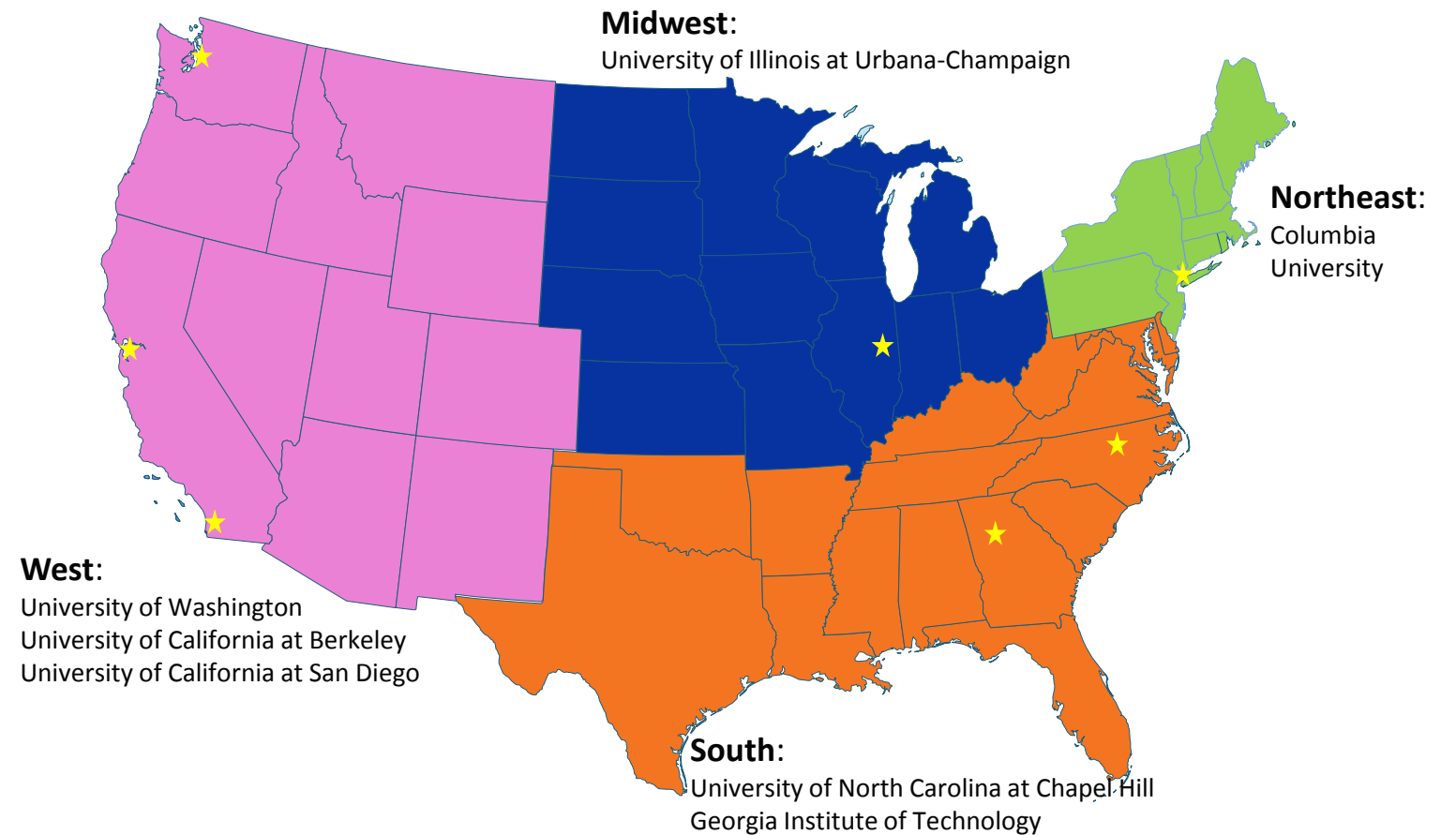


Big Data Regional Innovation Hubs & Spokes Ecosystem

A nationwide network for data innovation



BD Spokes: FY 2018 ~ \$8M is anticipated.



Secure and Trustworthy Cyberspace (SaTC)

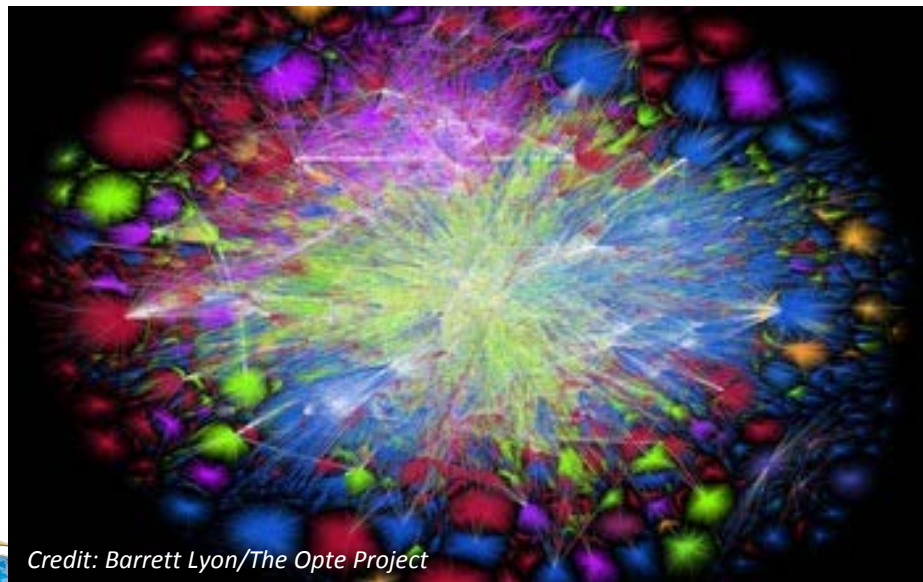
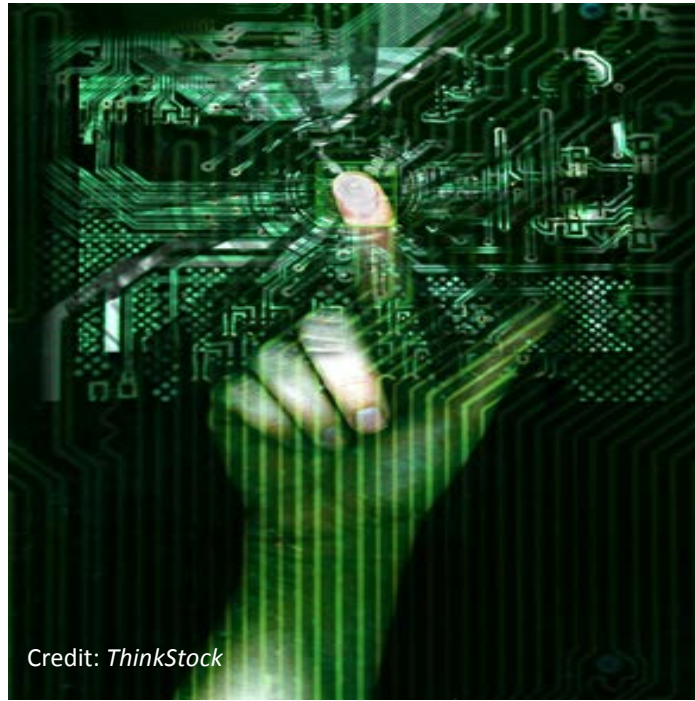
Securing our Nation's cyberspace

CISE Investment: \$65.50M

- Partnership among CISE, EHR, ENG, MPS, and SBE
- Aligned with *2016 Federal Cybersecurity Research and Development Strategic Plan and National Privacy Research Strategy*.
- Aims to support fundamental scientific advances and technologies to protect cyber-systems from malicious behavior, while preserving privacy and promoting usability.
- Emerging areas:
 - Experimental testbeds
 - Science of privacy
 - Network and cloud security



FY 2016 SaTC Solicitation



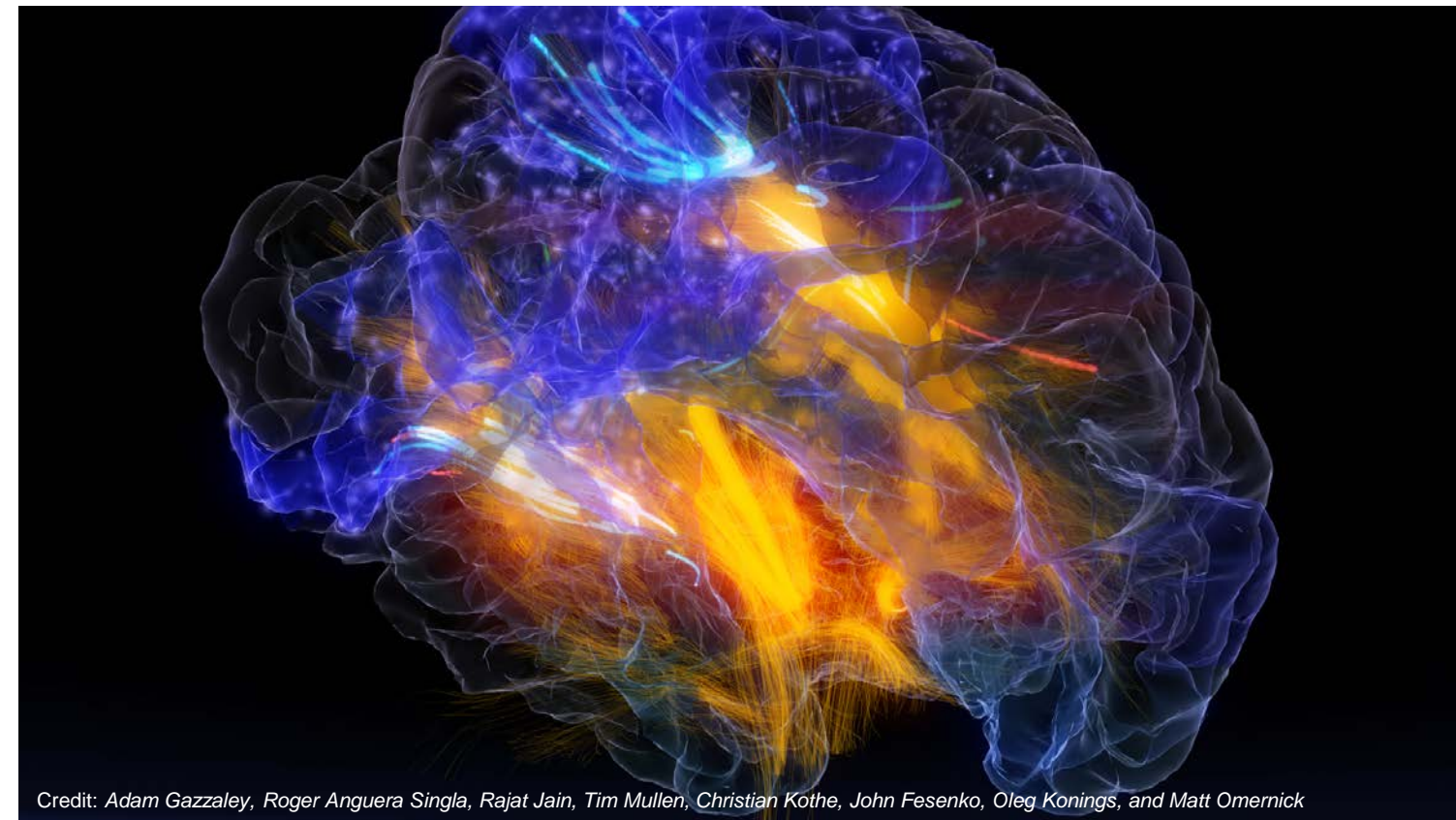
- SaTC solicitation designations:
 - Trustworthy Computing Systems
 - Social, Behavioral and Economic Sciences
 - *Secure, Trustworthy, Assured and Resilient Semiconductors and Systems (STARSS), jointly offered with the Semiconductor Research Corporation (SRC)*
 - Transition to Practice (TTP)
- Cybersecurity education

Understanding the Brain (UtB)

Improving understanding of the brain

CISE Investment: \$22.15M

- Partnership among all NSF directorates
- CISE emphases:
 - Collaborative Research in Computational Neuroscience (CRCNS) in collaboration with NIH, Germany, France, and Israel
 - Integrative Strategies for Understanding Neural and Cognitive Systems (NSF-NCS) with CISE, EHR, ENG and SBE
 - MIT STC: *Center for Brains, Minds and Machines: The Science and the Technology for Intelligence*
 - CISE Robust Intelligence Core Research



Credit: Adam Gazzaley, Roger Anquera Singla, Rajat Jain, Tim Mullen, Christian Kothe, John Fesenko, Oleg Konings, and Matt Omernick



Smart & Connected Communities (S&CC)

Improving quality of life, health, well-being and learning in communities

CISE Investment: \$16.50M

- Partnership among CISE, EHR, ENG, GEO, SBE
- Supports research and research capacity-building activities that integrate multiple disciplinary perspectives with meaningful community engagement to enhance smart and connected communities.
- Aims to enhance the understanding of and support for the design of smart and connected communities to improve the quality of life within them and to build research communities to address the challenges and opportunities of present and future smart and connected communities.

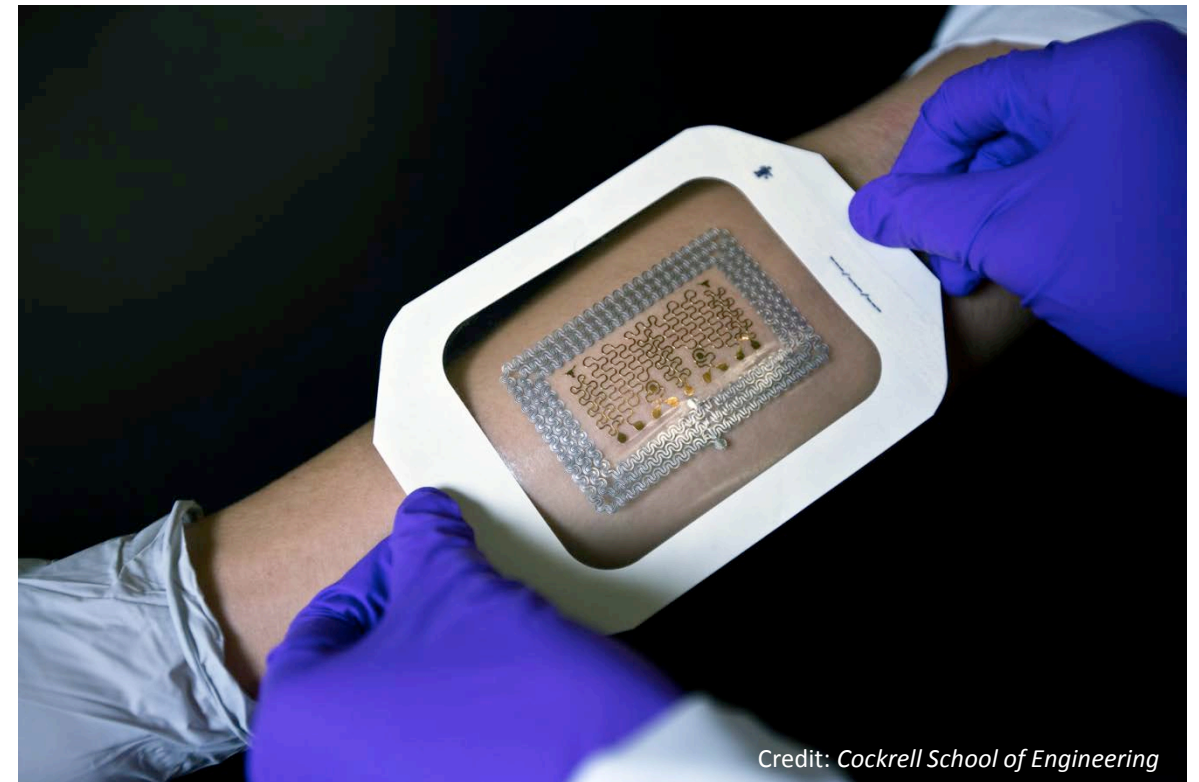


Smart and Connected Health

Transforming healthcare knowledge, delivery, and quality of life through IT

CISE Investment: \$11.0M

- Partnership with NIH and among CISE, ENG, SBE
- Supports research to accelerate the development and use of innovative approaches to transform healthcare.
- Encourages breakthrough ideas in a variety of areas of value to health, such as sensor technology, networking, information and machine learning technology, decision support systems, modeling of behavioral and cognitive processes, as well as system and process modeling



Credit: Cockrell School of Engineering



Cyber-Physical Systems (CPS)

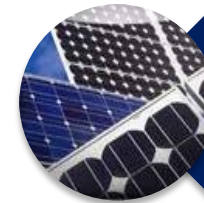
*Deeply integrating computation, communication,
and control into physical systems*

CISE Investment: \$25.0M

- Partnership between CISE, ENG
- Multi-agency commitments: NSF, DHS, DOT, NASA, NIH, USDA
- Aims to develop the core system science needed to engineer complex cyber-physical systems.
- Serves multiple application areas and key national priorities.
- Includes *Transition to Practice* option



Transportation



Energy and Industrial Automation



Healthcare and Biomedical



Critical Infrastructure



National Robotics Initiative (NRI) 2.0

Developing the next generation of collaborative robots to enhance personal safety, health, and productivity

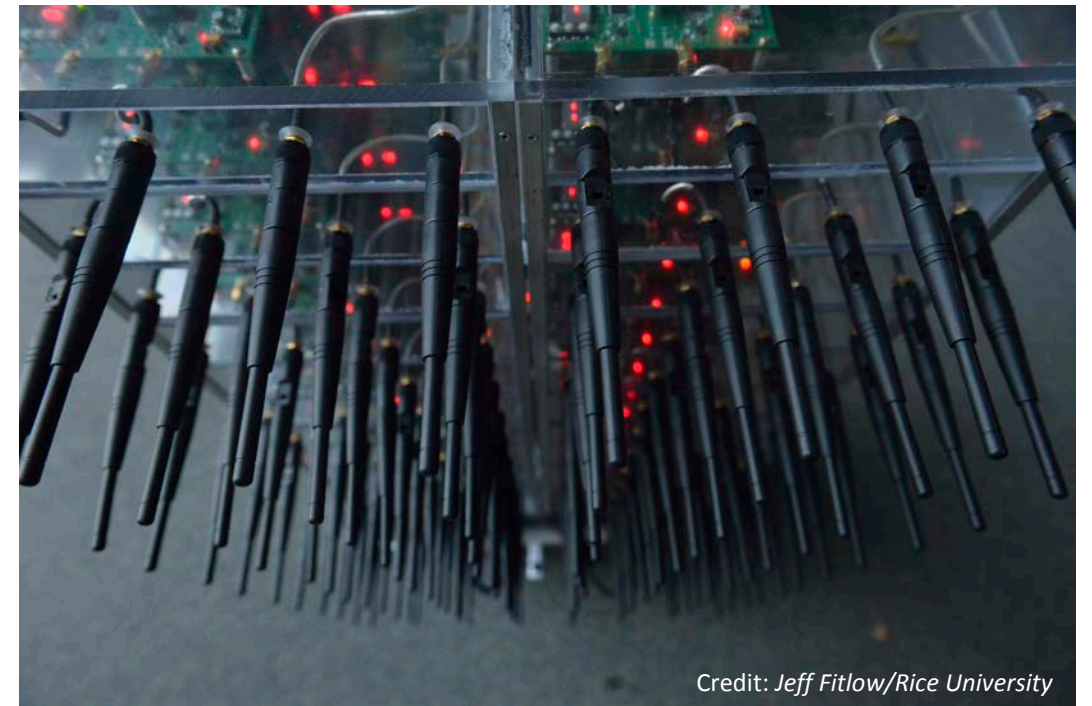
CISE Investment: \$19.50M

- Partnership among CISE, EHR, ENG, SBE
- Multi-agency commitments: NSF, DOD, DOE, and USDA
- Aims to accelerate the development and use of collaborative robots, co-robots.
- NRI 2.0: Ubiquitous Collaborative Robots expands the scale and variety of collaborative interactions



Advanced Wireless Research

- Multi-agency effort.
- Aims to sustain U.S. leadership in wireless communications and technology.
- Significant NSF investment to:
 - Establish platforms for advanced wireless research (PAWR);
 - Support fundamental research enabling advanced wireless technologies; and
 - Catalyze academic, industry, and community leaders to work together to prototype innovative wireless systems.



Platforms for Advanced Wireless Research (PAWR)

- Platforms enabling at-scale experimentation on advanced wireless technology (e.g., robust new wireless devices, communication techniques, networks, systems, and services).
- PAWR Project Office established (PPO; US Ignite, Inc.; Northeastern University) to lead design, development, deployment, and initial operations of a set of research platforms.
- Platforms will be supported by public and private partners:
 - \$50M NSF/CISE .
 - \$50M in-cash & in-kind contributions from Industry Consortium of 24 leading technology co's & assoc's.
 - First RFP for platforms deadline: June 9th, 2017.



NOKIA Bell Labs

SAMSUNG

KEYSIGHT TECHNOLOGIES

NATIONAL INSTRUMENTS

Sprint

ORACLE

JUNIPER NETWORKS

COMMSCOPE

VIAXI

INTERDIGITAL

intel

QUALCOMM

AT&T

T-Mobile

verizon

ctia
Everything Wireless

htc

SSC

CARLSON WIRELESS TECHNOLOGIES

atis

TA
ADVANCING GLOBAL COMMUNICATIONS

ERICSSON

Anritsu

FiberTower



Computer Science for All (CSforAll)

NSF investments in education research lay the groundwork for rigorous and engaging CS education for all students across the U.S.

CISE Investment: \$10.0M

- Building on investment and foundation laid by NSF over past 10 years.
- Aims to enable *all* students to have access to high-quality CS education in preK-12.
- Continuing to grow the knowledge base and capacity for rigorous, engaging CS education and scalable and sustainable models of professional development for educators.



Credit: Georgia Computes! Georgia Tech



Computer Science Undergraduate Education

Knowledge of computer science is essential for solving critical problems across every discipline and domain

CISE Investment: \$2.0M

- Increasing undergraduate enrollments
- Growing interest in CS+X approaches
- Dynamic industry needs
- Builds on REvolutionizing engineering and computer science Departments (RED)
 - Pursuing significant sustainable changes to prepare students to solve 21st-century challenges
 - Under the Improving Undergraduate STEM Education (IUSE) framework



Cyberlearning and Future Learning Technologies

Improving learning by integrating technologies with knowledge about how people learn

CISE Investment: \$6.50M

- Participation between CISE and EHR
- Program emphases:
 - Advancing understanding of how people learn in technology-rich learning environments
 - New emphasis on use of technologies based in artificial intelligence, cognitive aids, and learning science: to support adult retraining and continuing education, enabling increased employability in higher-paying jobs.



NSF Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (NSF INCLUDES)

Broadening participation for those typically underrepresented in STEM fields

CISE Investment: \$1.78M

- Partnership among all NSF directorates
- Preparation, participation, and advancement of those traditionally underserved and/or underrepresented in STEM
- Builds on CISE's efforts in Broadening Participation in Computing



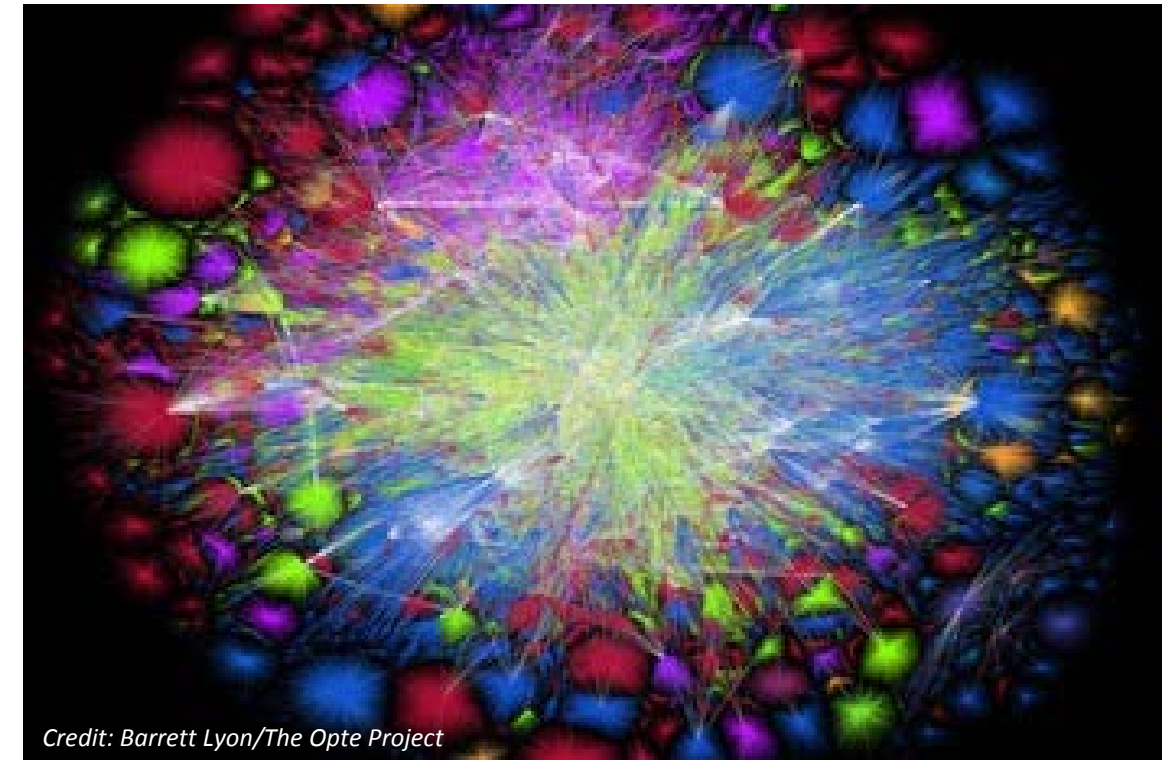
Credit: John C. Williams, Humanoid Engineering & Intelligent Robotics (HEIR) Lab, Marquette University



Continued Investments in CISE's Center-Scale Activities

Exploring scientific frontiers that promise transformative innovations in computing

- **Expeditions in Computing (up to \$10M, up to 5 years)**
 - Pursue transformative research agendas that promise to accelerate discovery at frontiers of computer and information science and engineering.
- **Frontier projects**
 - **CPS (\$1.0M - \$7M for up to 5 years):** clearly identify and address critical CPS science, engineering or technological challenges that cannot be achieved by a set of smaller projects.
 - **SaTC (\$1.2M - \$10M for up to 5 years):** large, multi-disciplinary, multi-organizational, and/or multi-institutional projects provide high-level visibility to grand challenge research areas in cybersecurity.

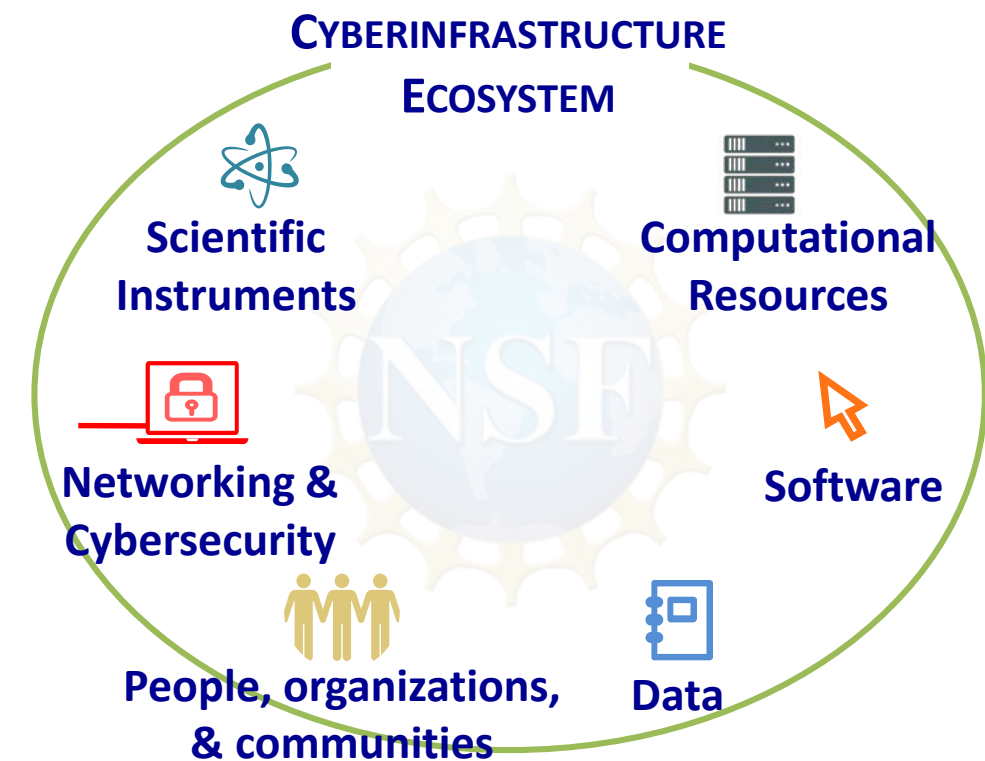


National Strategic Computing Initiative (NSCI)

Maximizing benefits of HPC for scientific discovery and economic competitiveness

CISE Investment: \$97.0M

- Multi-agency partners: DOD, DOE, NSF lead
- Partnership among CISE (co-lead), MPS (co-lead), ENG, and GEO
- NSF role emphasizes :
 - Increase coherence between technology base used for modeling/simulation and for data analytics;
 - Establish viable path forward for HPC systems in post-Moore's Law era; and
 - Increase capacity, capability, and sustainability of an enduring national HPC ecosystem.



Towards a Leadership-Class Computing Facility

CISE Investment: \$60.0M

- Supports unique services, resources needed to advance the most computationally-intensive scientific and engineering research frontiers.
- Calls for at least 2-3x time-to-solution performance improvement over Blue Waters.
- Directly responds to recommendation from recent NAS study (*Future Directions for NSF Advanced Computing Infrastructure to Support U.S. Science in 2017-2020*): “provide one or more systems for applications that require a single, large, tightly coupled parallel computer.”
- Dual purpose:
 - Five-year, high-capability production resource for science and engineering (Phase 1).
 - System for scientific & engineering evaluation that will inform design of a Phase 2 leadership-class system.



Partnerships are Critical



CISE's Commitment to Research, Education & Infrastructure

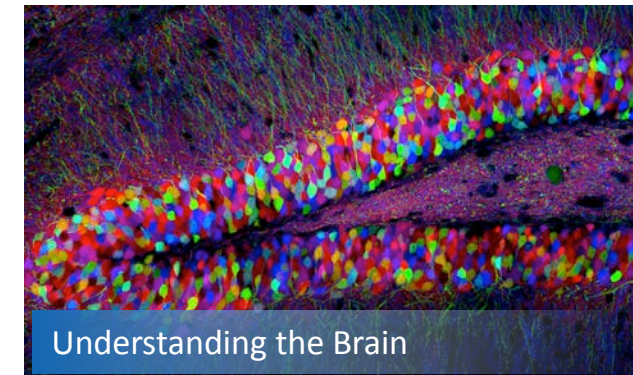
- CISE: **rich intellectual agenda** – highly creative, highly interactive, with enormous possibilities for changing the world!
- Balanced portfolio of activities
- Thriving basic research community foundational for long-term **discovery & innovation, economic prosperity, national security**
- Growing investment in **cyberinfrastructure** is crucial to accelerating scientific discovery and engineering innovation across all disciplines
- Investments in **research, education, and infrastructure** have returned exceptional dividends to our Nation



Outline



NSF Addresses National Priorities through Support of Fundamental Research



....and thus requires a highly capable, highly interoperable Research Infrastructure



CI is threaded throughout NSF “Big Ideas”

RESEARCH IDEAS

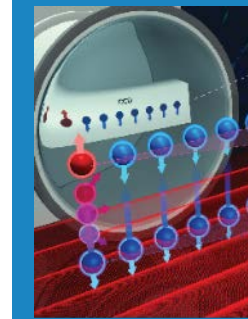


Harnessing Data for 21st Century Science and Engineering

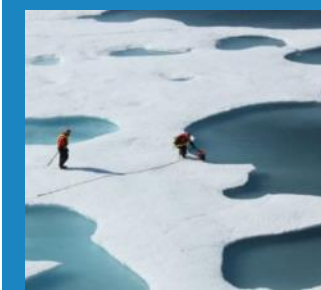
Work at the Human-Technology Frontier: Shaping the Future



Windows on the Universe: The Era of Multi-messenger Astrophysics



The Quantum Leap: Leading the Next Quantum Revolution



Navigating the New Arctic

Understanding the Rules of Life: Predicting Phenotype



PROCESS IDEAS

Mid-scale Research Infrastructure



NSF 2050: Seeding Innovation



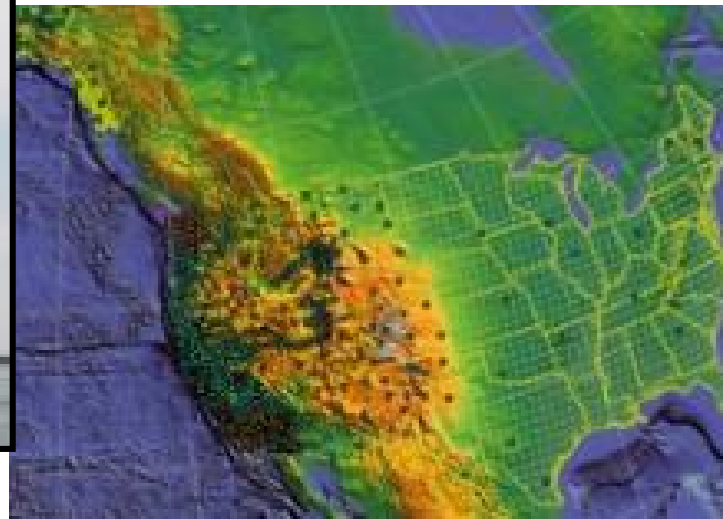
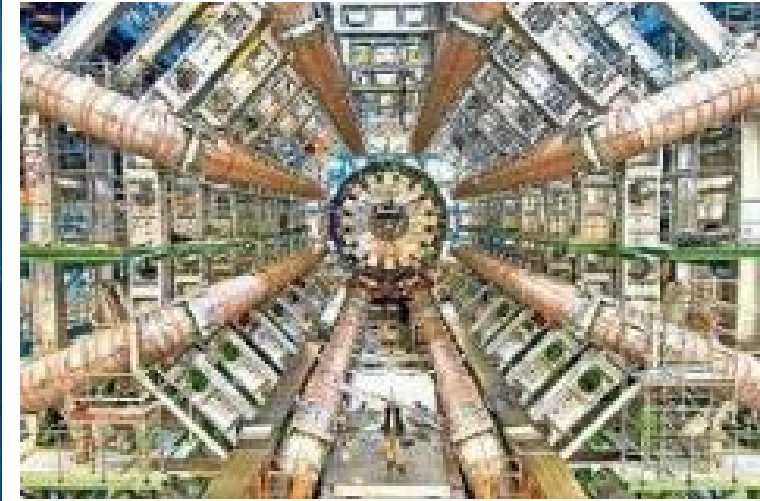
Growing Convergent Research at NSF



NSF-INCLUDES: Enhancing Science and Engineering through Diversity



Facilities are Increasingly CI Intensive ... and dependent on highly connective CI



Community input is critical to NSF CI planning

Accelerating Science into the Future

Future Directions of NSF Advanced Computational Infrastructure to Support US Science in 2017 – 2022

- National Academy of Sciences (NAS) Final Report (2016)
- <http://www.nap.edu/catalog/21886/future-directions-for-nsf-advanced-computing-infrastructure-to-support-us-science-and-engineering-in-2017-2020>

National Strategic Computing Initiative (2016)

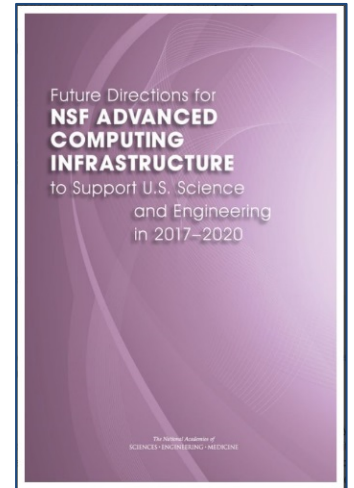
- Community Workshops, RFIs, Reports, Plan, Interagency coordination
- <http://nsf.gov/cise/nsci/>

NSF Advisory Committee on Cyberinfrastructure (ACCI)

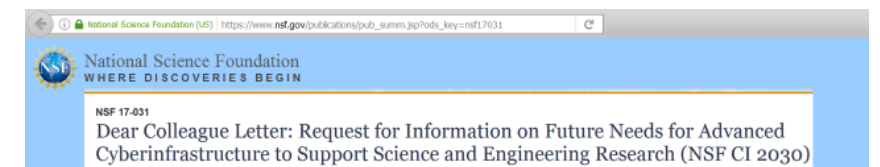
- Co-chairs: Thom Dunning/UW, Gwen Jacobs/UH
- Working Groups: LWD, Data, Software, Research CI Strategy
- <http://www.nsf.gov/cise/aci/advisory.jsp>

NSF 17-031 Dear Colleague Letter (CI 2030)

- Request for Information : CI Vision and strategy to uniquely enable research
- Closed April 5, 2017
- <https://www.nsf.gov/pubs/2017/nsf17031/nsf17031.jsp>



Final report Co-chairs:
W. Gropp/UIUC
R. Harrison/Stony Brook



- NSF is launching an effort to refresh the Foundation's cyberinfrastructure vision and strategy, as the current activity, *Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21)*, enters its final year.
- Through this Request for Information, NSF invites contributions from the research community to inform this planning effort.
- We request input on scientific challenges, associated cyberinfrastructure needs, and bold forward-looking ideas to advance science and engineering frontiers over the next decade and beyond.
- Deadline for submissions: April 5, 2017, 5:00 PM ET.
- Questions about this RFI? Send to nsfci2030rfi@nsf.gov.

<https://www.nsf.gov/pubs/2017/nsf17031/nsf17031.jsp>



Office of Advanced Cyberinfrastructure Program Staff

**Office of
Advanced Cyberinfrastructure
(OAC)**

Office Director: Irene Qualters
Office Deputy Director: A. Friedlander
Public Access: [vacant]
Cooperative Agreements: Alejandro Suarez

High Performance Computing
R. Eigenmann
E. Walker
R. Chaddock

Data
A. Walton
R. Chaddock

Science Advisor
Cross-cutting programs
W. Miller

Networking/ Cybersecurity
K. Thompson
A. Nikolich

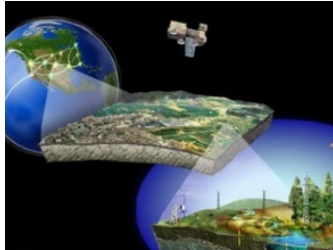
Software
R. Ramnath
V. Chaudhary

Learning & Workforce
Development
S. Prasad



OAC supports *Research* Cyberinfrastructure to uniquely enable collaboration and discovery frontiers at all scales

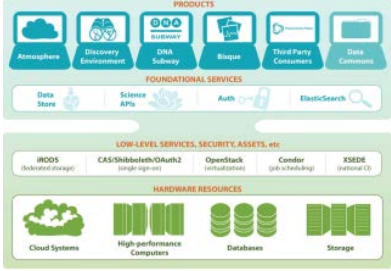
Shared resources, capabilities & services across the scientific workflow



CI-Enabled Instrumentation



Computing Resources



Gateways, Hubs, and Services



Data Networks, Cybersecurity



Coordination & User support

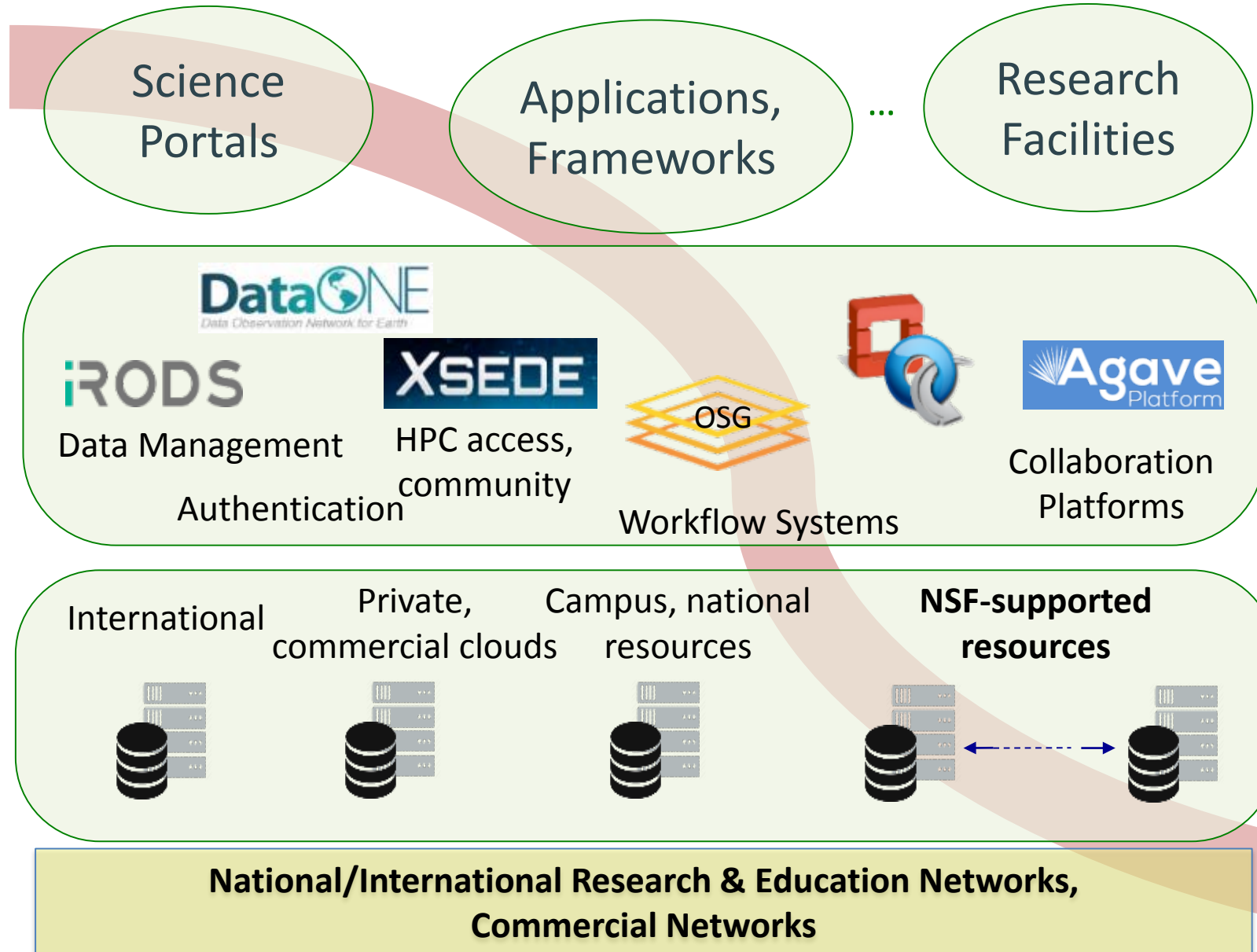


Software, Applications, Workflow Systems



CI-rich discovery pathways and communities demand diverse and dynamic approaches

Measurement



Science Portals

Applications, Frameworks

Research Facilities

DataONE
Data Observation Network for Earth

iRODS

Data Management
Authentication

XSEDE

HPC access,
community

OSG

Workflow Systems



Agave
Platform

Collaboration
Platforms

International



Private,
commercial clouds



Campus, national
resources



NSF-supported
resources



National/International Research & Education Networks,
Commercial Networks

**Discipline-specific
Environments**

**Integrative Services
("Middleware")**

**"Foundational"
CI Resources**

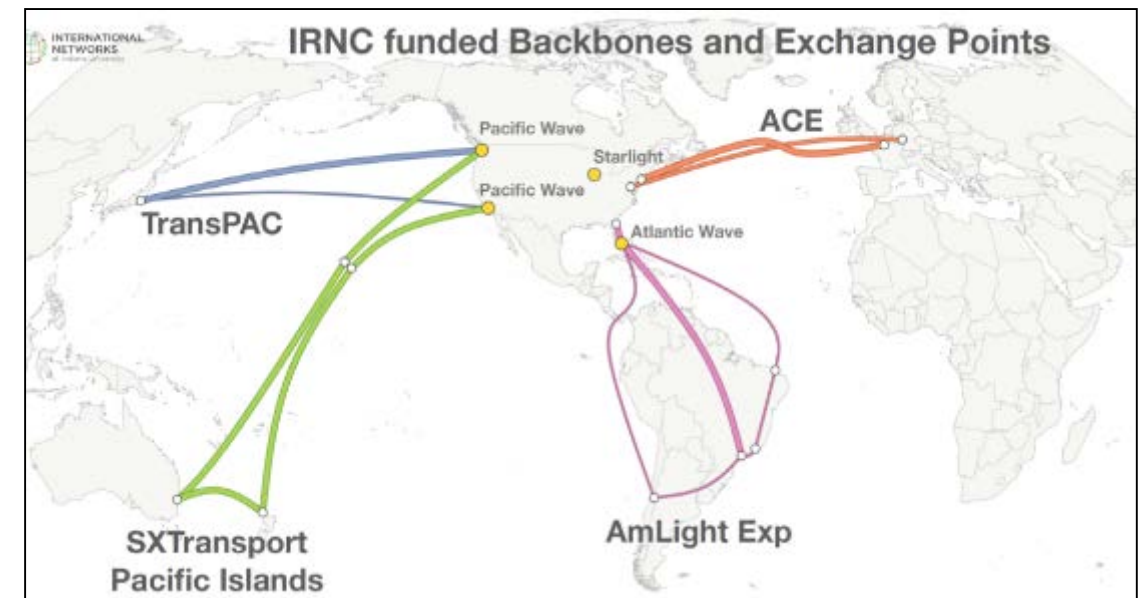
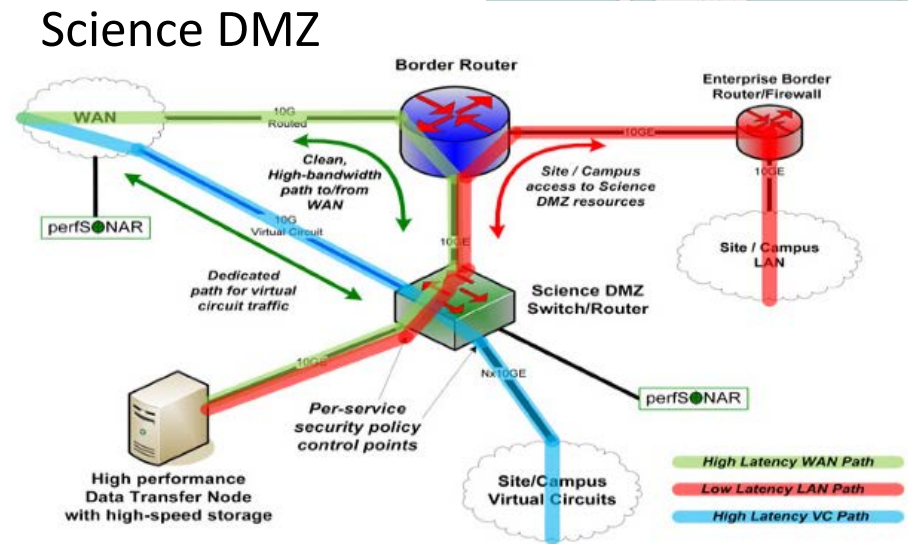
Discovery



CISE/OAC Networking Programs



- **Fundamental layer** that enables scientific discovery at the institutional, regional and global collaborative levels.
- **Campus Cyberinfrastructure (CC*)**. Upgrading and accelerating campus networking (10/100Gbps). Re-designing campus border to Science DMZs. Innovation, + much more.
- **International R&E Network Connections (IRNC)**. Link U.S. research with peer networks in other world regions. Supports all R&E US data flows (not just NSF-funded).



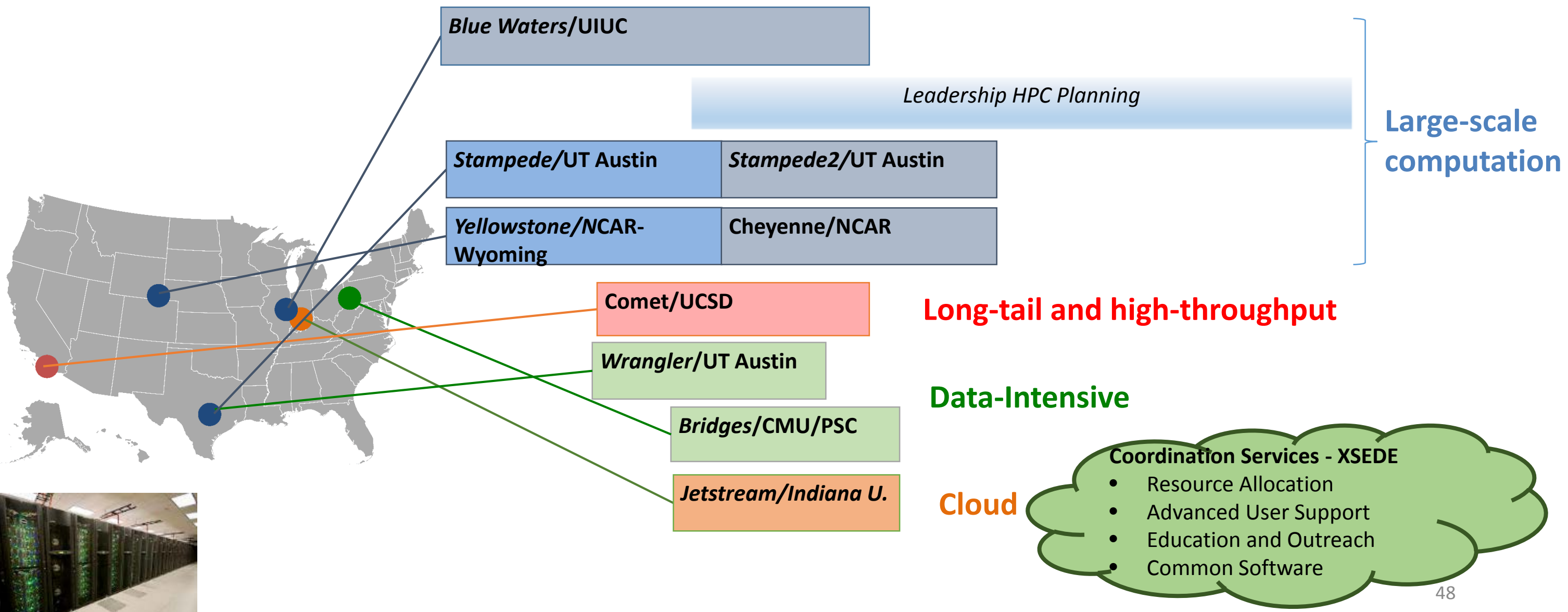
Aug 2016, Virtualization & Network infrastructure assistance to DrukREN, Bhutan



NSF-supported National Computing Resources

Complements Larger Aggregate Investments from Universities and other Agencies

2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 ...



OAC Cybersecurity

- **Cybersecurity Center of Excellence (CCoE)** – formerly Center for Trustworthy Scientific CI, www.trustedci.org.
 - Site reviews, code reviews, architecture reviews. Example engagements: Gemini, US Antarctic Program, LSST, OOI, LIGO, DKIST, NEON, Pegasus, PerfSonar, ...
 - Open Science Cyber Risk Profile – asset/impact oriented approach for open science (DoE, NIH, NSF). Joint effort of CCoE & ESNet
- **Cybersecurity Innovation for Cyberinfrastructure (CICI)**. Topics: Secure and Resilient Architecture, Secure Data Provenance, Regional Cybersecurity
- **Secure and Trustworthy Cyberspace (SaTC)**. – Cross-directorate program. OAC funds later stage/applied security projects that can secure scientific CI. Several “Transition to Practice” projects co-funded by Dept. of Homeland Security.
- **Annual Large Facilities Cybersecurity Summit**. ~120 attendees from NSF-funded science facilities. Next Summit: August 2017.

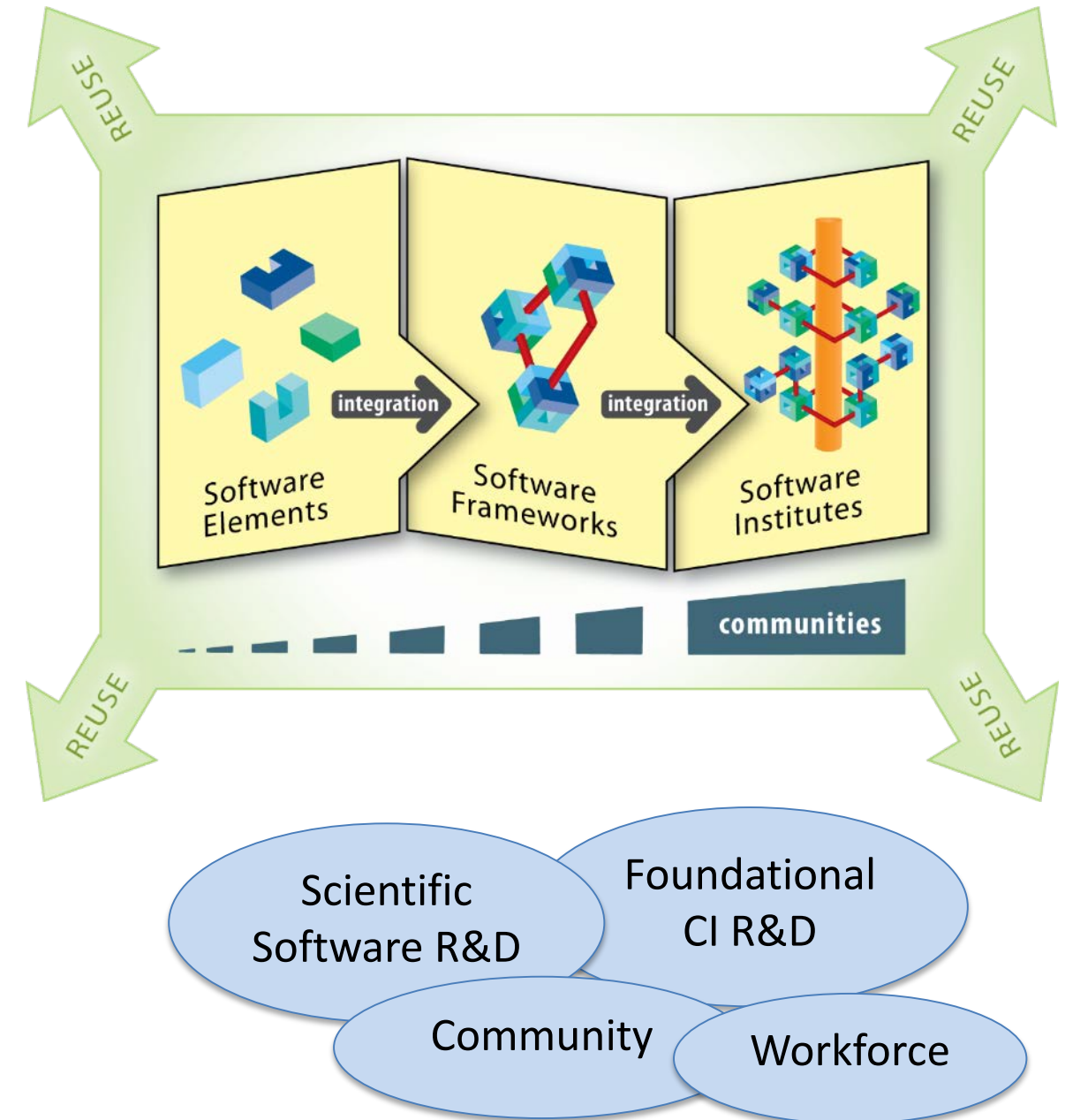


Example: Bro Intrusion
Prevention/Detection
software



OAC Software Investments

- **Goal:** Catalyze and support reusable, robust software-intensive ecosystems to advance research
- **Flagship - Software Infrastructure for Sustained Innovation (SI2).** *Elements* (\$500K/3 yrs), *Frameworks* (\$1M/yr 3-5 yrs), *Institutes* (\$3-\$5m/yr 5-10 yrs).
- **Software “pipeline”:**
 - R&D programs (SPX, CDS&E, DMREF, CRISP, Venture, ...)
 - → Development and deployment (SI2)
 - → Outcomes: Sustainability, open source community, institutional support, education, SAAS, IP licensing, ...



OAC Learning & Workforce Development



Communities of Concern



CI Contributors, Cyber-scientists

Develop new CI



CI Professionals

Deploy & support CI



CI Users

Exploit CI

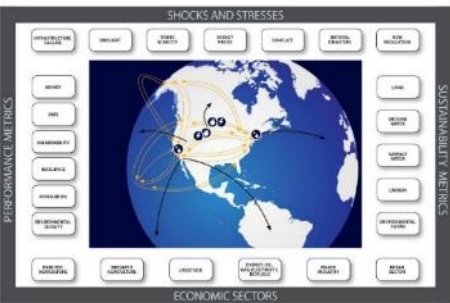
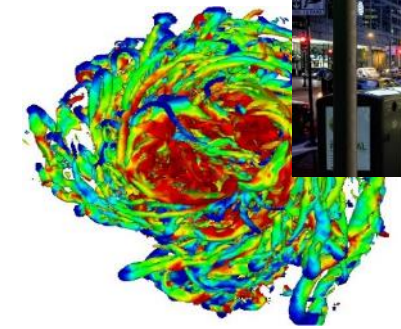
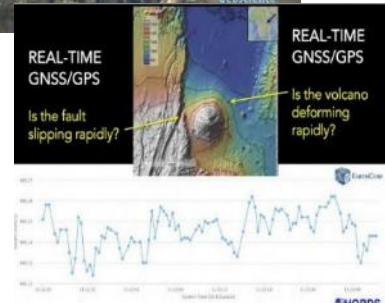
New! CyberTraining - *Training-based Workforce Development for Advanced Cyberinfrastructure* (NSF 17-507)

- ***Informal, scalable*** training models and pilot activities - on topics in advanced CI, and computational and data-enabled science & engineering.
- OAC leads, with MPS, ENG, GEO, EHR/DGE, and CISE/CCF.
- \$300K-500K over 1-3 years.
- **3 Tracks:** **1:** CI Professionals. **2:** CI Contributors/Users in domain science and engineering. **3:** Undergraduate Computational & Data Science User Literacy.
- Excellent community response in the inaugural round.
- Next Deadline: ***October 2017***

OAC Data Infrastructure: Accelerating Science, Building Community

Data Infrastructure

- **Data Building Blocks (DIBBs).** Funds CI/discipline collaborations, cross-disciplinary infrastructure, built on recognized capabilities, tangible products.
 - First PI meeting, Jan 2017 on Results, Challenges, Future Directions, and Gaps to inform future investments.
- **CC* collaboration.** Example topics: multi-institution, cloud resources, sharing mechanisms.
- **EarthCube.** Collaboration with NSF GEO. Topics: Building new communities, innovative interoperable solutions that link and integrate resources, new capabilities for data capture, discovery, access, processing and analysis.
- **Innovations at the Nexus of Food, Energy and Water Systems (INFEWS).** NSF cross-cutting activity.





Thanks!

