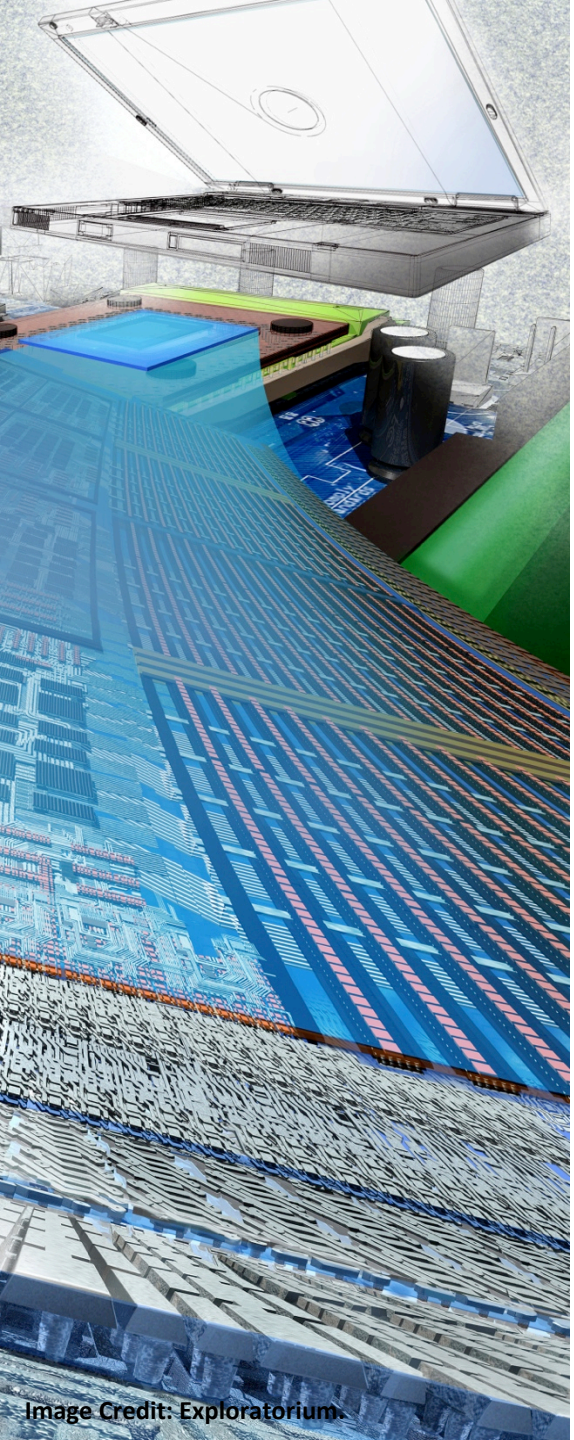


SaTC Welcome

Jim Kurose
Assistant Director, NSF
Computer & Information Science & Engineering

SaTC PI meeting
January 9, 2017

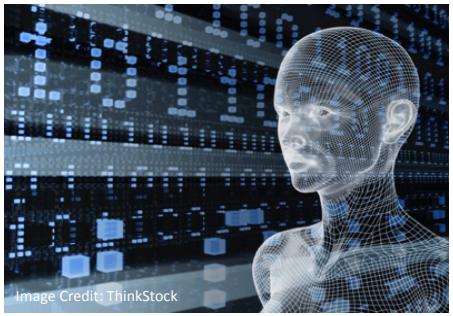

WELCOME

Overview

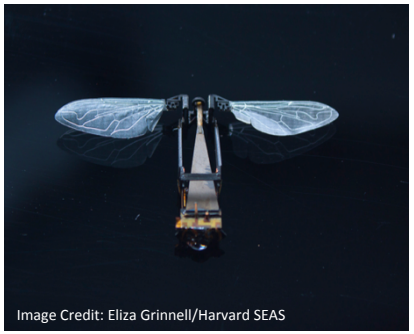
- Introduction
- Secure and Trustworthy Cyberspace (SaTC) program; R&D Strategic plans
- NSF Big Ideas
- Looking Forward

An exciting time to be in CISE!

Big Data



Cybersecurity



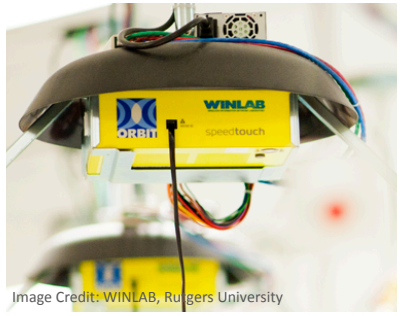
National Robotics Initiative 2.0

Understanding the Brain

National Strategic Computing Initiative

Smart Cities

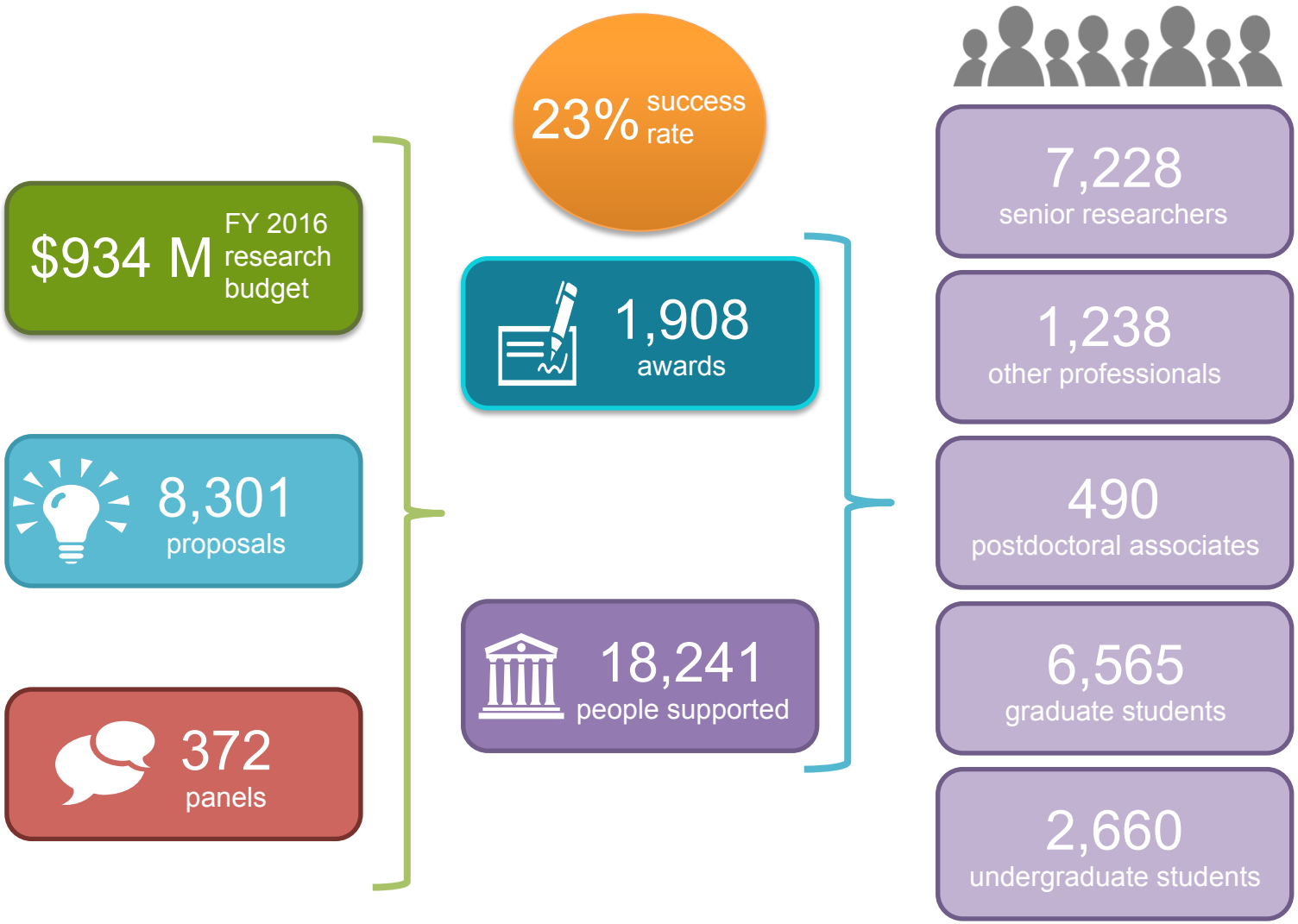
Computer Science for All



Advanced Wireless Research

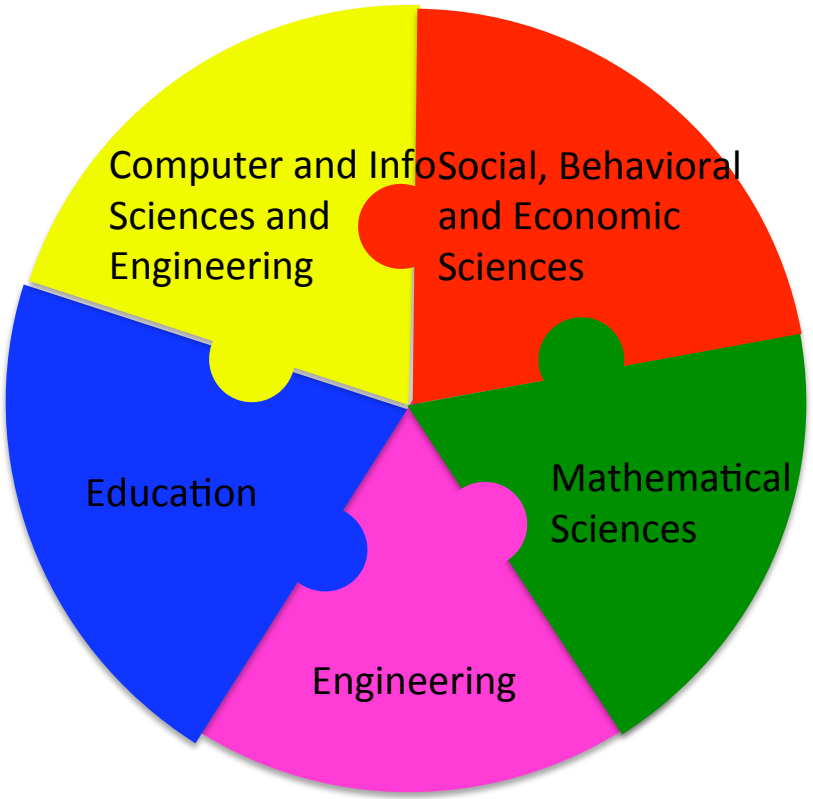
CISE programs and national priorities

CISE by the Numbers: FY 2016



Secure and Trustworthy Cyberspace (SaTC)

- CISE-led (all 4 divisions), with EHR, ENG, MPS, SBE
- Protect cyber-systems from *malicious behavior*, while *preserving privacy* and *promoting usability*
- Comprehensive & multifaceted
- Strong support: Congress, admin
- Investment:
  - ~$75M in awards (FY2016)
  - ~200 new projects (FY2016)
  - ~800 currently active grants



CISE Cybersecurity Partnerships

Industry: ongoing joint solicitations with industry:

- Semiconductor Research Corporation: hardware security ($9M to date)
- Intel: Cyber Physical System security ($8M)
- VMware: Software Defined Infrastructure as a Foundation for Clean-Slate Computing Security ($9M)

International:

- Israel's Binational Science Foundation (BSF) on cybersecurity (~$3M 2015-2016)
- Netherlands Organisation for Scientific Research (NWO) on Privacy ($3M 2016)
- Brazil Ministry of Science, Technology and Innovation (MSTI) on networking and cyber physical systems (NSF 17-024; 2017)

CyberCorps® Scholarship for Service

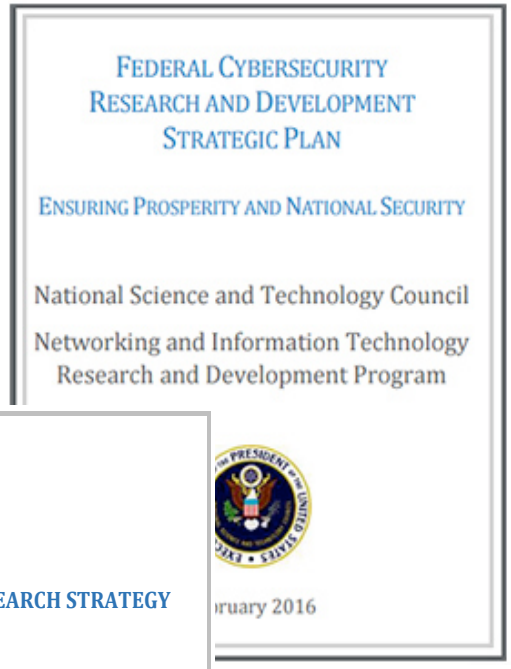
- **Increase, strengthen cadre of federal information assurance professionals**
- **increase the capacity of the United States higher education enterprise** to continue to produce professionals in these fields …
- NSF (EHR, CISE); OPM, DHS
- Two tracks:
  - **Scholarship Track:** scholarships to students; $1M-5M per school
  - **Capacity Building Track:** curriculum, outreach, faculty, institutional, partnerships. $300K-900K/each.

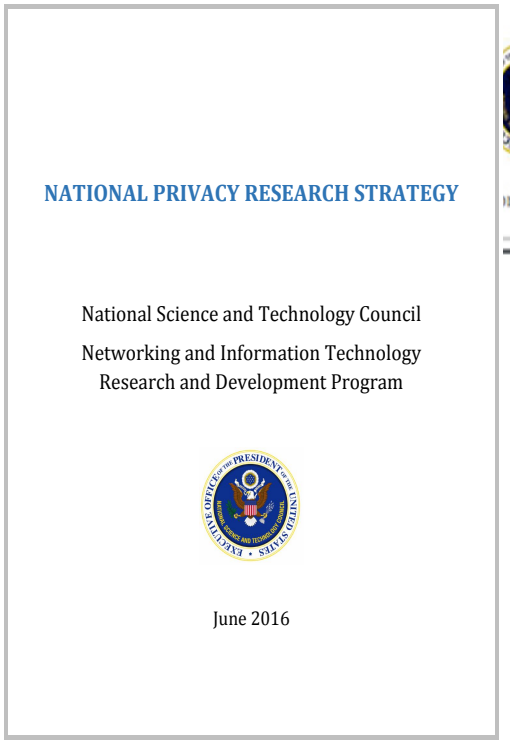
Cybersecurity Across Government

2016 Strategic plans, strategy*:*

- Privacy
- CyberSecurity

Networking and Information Technology R&D WGs: Cybersecurity and Information Assurance R&D Senior Steering Group (CSIA SSG)





NSF “Big Ideas”

Science AAAS

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Better understanding the changing Arctic is one item on a new list of big ideas that should shape the National Science Foundation's work. NASA/Kathryn Hansen

NSF director unveils big ideas, with an eye on the next president and Congress

By Jeffrey Mervis | May. 10, 2016 , 3:30 PM

NSF "Big Ideas"

RESEARCH IDEAS

- Harnessing Data for 21st Century Science and Engineering
- Shaping the new Human – Technology Frontier
- Understanding the Rules of Life: Predicting Phenotype
- The Quantum Leap: Leading the Next Quantum Revolution
- Navigating the New Arctic
- Windows on the Universe: The Era of Multi-messenger Astrophysics

PROCESS IDEAS

- Growing Convergent Research at NSF
- Mid-scale Research Infrastructure
- NSF 2050
- INCLUDES

*Video of NSB presentation and discussion is at:
http://www.tvworldwide.com/events/nsf/160505/globe_show/default_go_archive.cfm?gsid=2957&type=flv&test=0&live=0
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Looking Forward

- 1000 points of light
- Expeditions, Frontiers, grand challenges and "Big Ideas"
- Challenges of inter-disciplinary research fields
- Education: systemic change emphasizing security throughout the curriculum

An exciting time to be in CISE!

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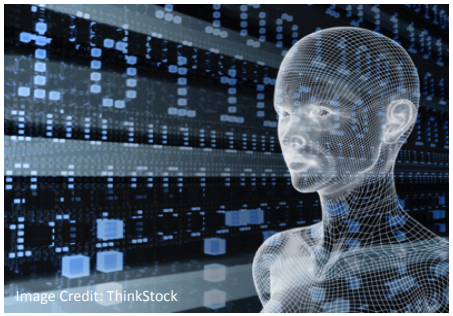

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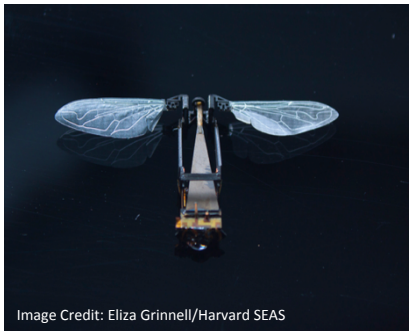

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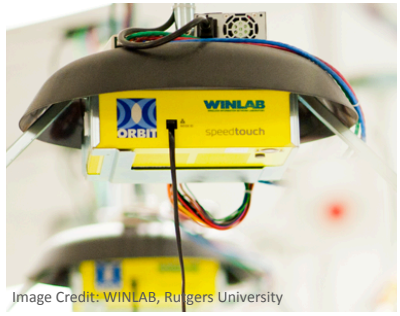

Advanced Wireless Research

CISE programs and national priorities


THANKS!

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Emily Wehby, Vanderbilt

PI meeting PC:

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Michael Donald Bailey, UIUC

Jason Mason, U Michigan

Patrick McDaniel, Penn State U , Chair

Nina Amla, NSF/SaTC

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CISE DDs

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Fil Bartoli, ENG/ECCS

Michael Vogelius, MPS/DMS

Dan Sui, SBE/SES

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Sara Kiesler, SBE/SES

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Yan Solihin, CISE/CNS

Chengshan Xiao, ENG/ECCS

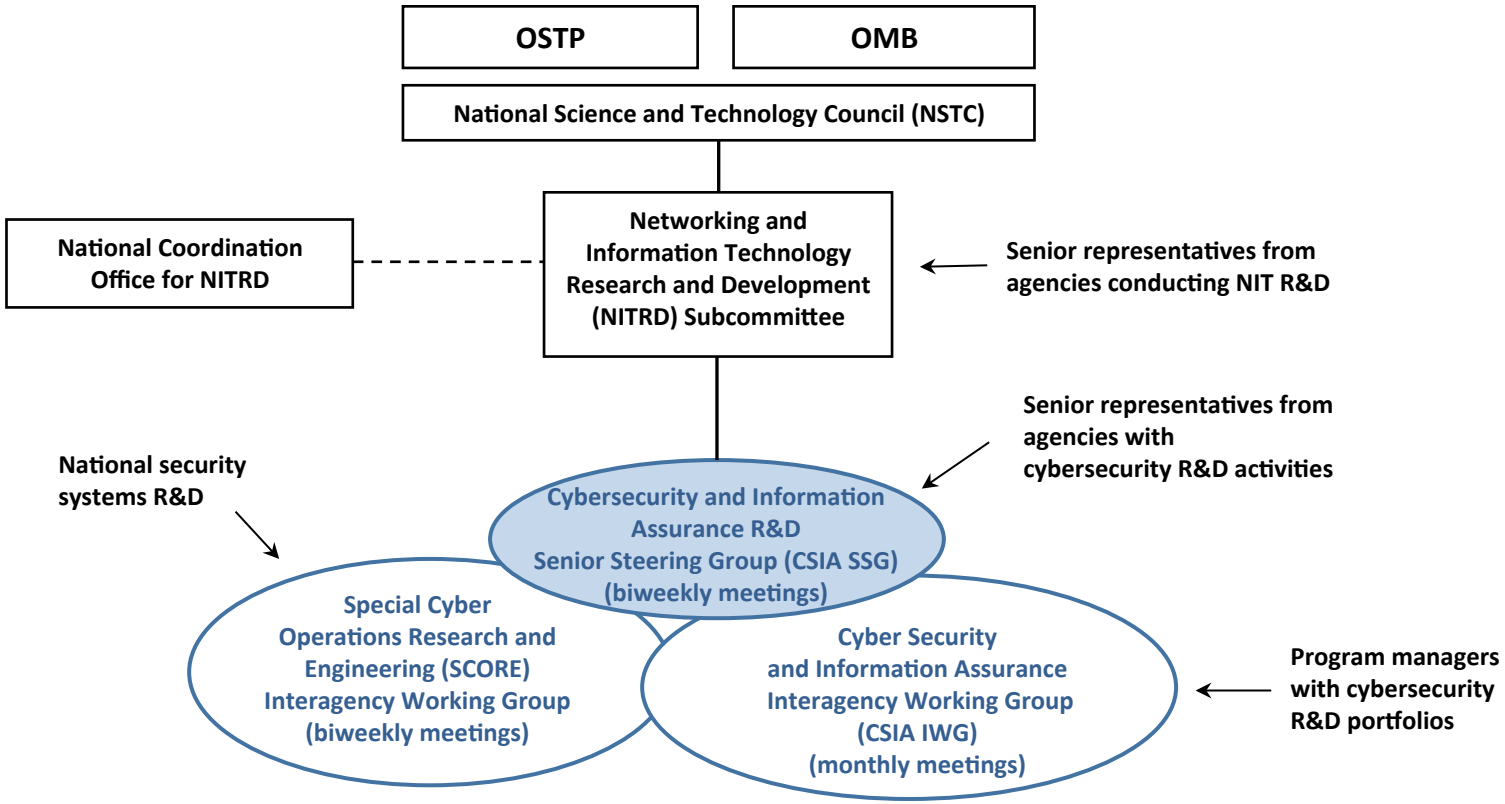
Ralph Wachter, CISE/CNS

Nan Zhang, CISE/IIS

SaTC "Designations"

- ***CORE:*** main focus of the SaTC research program, spanning CISE, ENG, MPS, SBE. Interdisciplinary proposals are welcomed to CORE.
- ***EDU:*** proposals focusing entirely on cybersecurity education (< $300K; 2 years)
- ***STARSS:*** Secure, Trustworthy, Assured and Resilient Semiconductors and Systems (STARSS): proposals focused on hardware security under SRC joint solicication (small only)
- ***Transition to Practice (TTP):*** proposals focused exclusively on transitioning existing research results to practice. *(small, medium only)*

Inter-agency Coordination / Collaboration



Examples of Coordination:

- Development of Strategic Plan for Federal Cybersecruity R&D
- NSF/DHS funding of initial DETER testbed (now DHS)
- NSF/DoE/DHS funding of TCIP center (now graduated to DoE/DHS)
- Joint workshops (e.g., NSF-Treasury, NSF-State, NSF-DHS) to develop research agendas, expose researchers to agency needs – National Privacy Research Forum
- Frequent cross-review of proposals by NSF, DHS, DARPA, ONR, AFOSR, NIST personnel

Scholarship For Service (SFS)

Since FY 2007, approximately $200M awarded

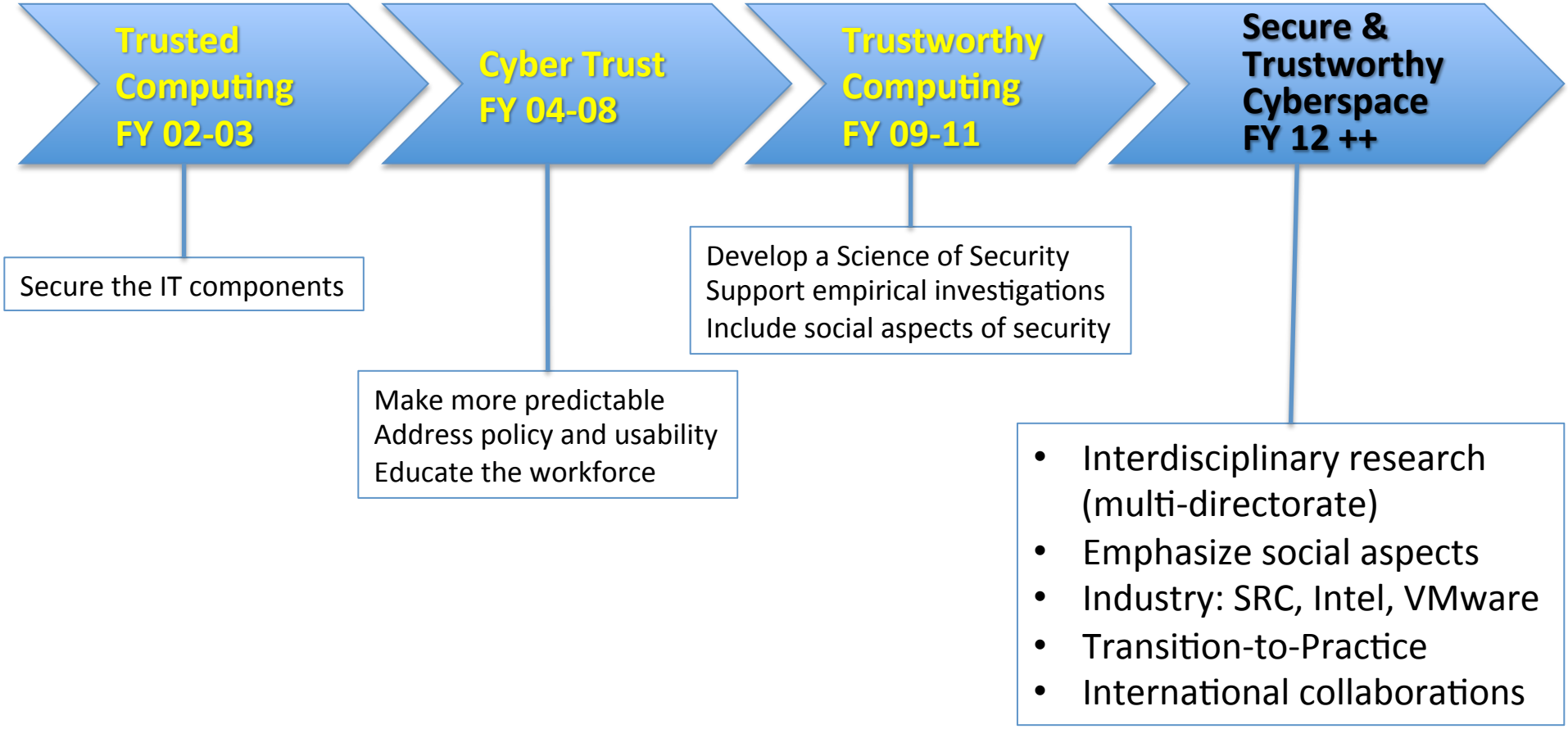
Supporting a total of 1707 students

Graduating Class	
2002	9
2003	75
2004	153
2005	179
2006	172
2007	158
2008	122
2009	86
2010	121
2011	116
2012	175
2013	171
Jan-Sept 2014	170
Total	***1707***

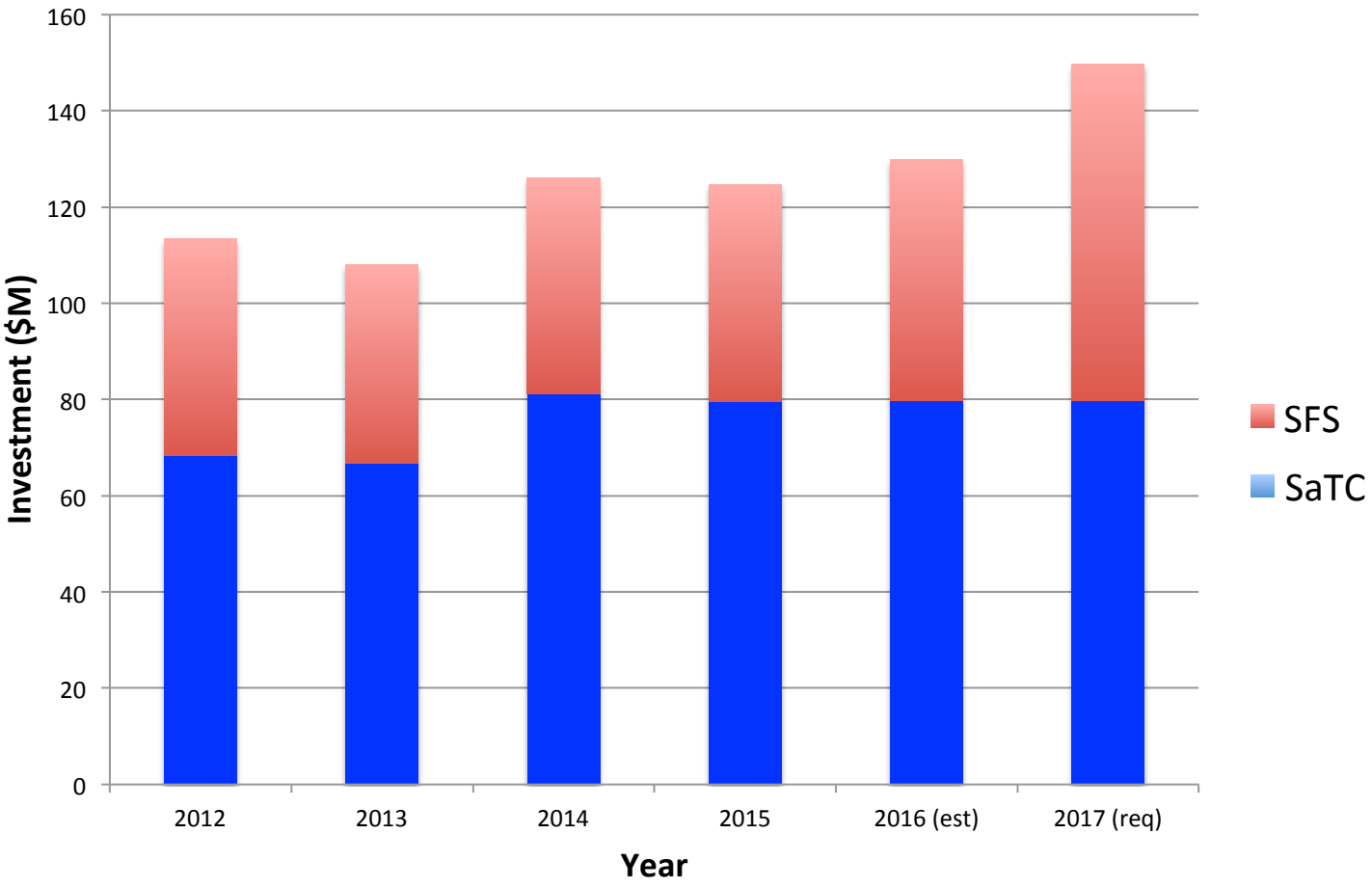
Top 15 Universities (Students Enrolled 2009-2014)	
University of Tulsa	98
Carnegie Mellon University	72
Mississippi State University	60
CSU - San Bernardino	58
Northeastern University	42
University of North Carolina at Charlotte	42
Naval Postgraduate School	41
NYU - Polytechnic	40
Idaho State University	39
University of Illinois at Urbana Champaign	38
Air Force Institute of Technology	36
North Carolina A & T State University	35
Dakota State University	34
University of Nebraska at Omaha	28
University of Texas at Dallas	28
Other 38 universities	523
Total	***1240***

Agency Placement FY 2009-14	
National Security Agency	120
US Navy	66
Mitre Corporation	53
Department of Homeland Security	50
Federal Reserve System	35
State, Local, & Tribal	34
Sandia Laboratory	32
Department of Defense	31
Software Engineering Institute	28
Central Intelligence Agency	27
US Air Force	23
US Army	23
Department of Treasury	21
Department of Justice	20
Lincoln Laboratory	20
Other	129
Total	***712***

SaTC Evolution



SaTC investments: budget



Breadth of SaTC CORE Topic Areas

Access Control	Authentication	Biometrics	Cloud Security	Cryptography
Cyber Physical Systems	Data Science	Economics	Engineering	Forensics
Formal Methods	Internet of Things	Hardware Security	Human Aspects	Intrusion Detection
Mathematical Sciences	Network Security	Privacy	Programming Languages	Social Networks
Social & Behavioral Sciences	Software Security	Statistics	Systems Security	Usability

SaTC: the Right Science at the Right Scale

- **Frontier projects**
  - Large center-scale, multi-disciplinary, multi-organizational, multi-institution
  - Far-reaching research explorations motivated by deep scientific questions and grand challenge problems in security, privacy
  - Total budget: $1.2M to $10M for up to 5years

- **Large projects:**
  - 1.2M to $3M, up to 5 years

- **Medium projects**
  - Support total budgets $500,001 to $1.2M for up to 4 years

- **Small projects**
  - Support total budgets up to $500K total for up to 3 years

- **Faculty Early Career Development (CAREER)**
  - Support: ~ $450K - $500K over 5 years

SaTC Frontiers Portfolio: 2012-2014 (up to $10M/5 years)

Data Privacy

- Privacy Tools for Sharing Research Data (2012)
- Harvard University
- $4.8M for 4 years

Socio-economic

- Beyond Technical Security: Developing an Empirical Basis for Socio-Economic Perspectives (2012)
- UCSD, Berkeley, GMU
- $10M for 5 years

Healthcare

- Enabling Trustworthy Cybersystems for Health and Wellness (2013)
- Dartmouth, UIUC, JHU, Michigan
- $10M for 5 years

Web Privacy

- Towards Effective Web Privacy Notice and Choice: a Multi-disciplinary Perspective (2013)
- CMU, Fordham, Stanford
- $3.75M for 4 years

Trust in Cloud

- Rethinking Security in the Era of Cloud Computing (2013)
- UNC, NCSU, Stony Brook, Duke, Wisconsin-Madison
- $6M for 5 years

Outsourced Computation

- Modular Approach to Cloud Security (2014)
- BU, MIT, Northeastern, U. Connecticut
- $4.9M for 5 years

Program Obfuscation

- Center for Encrypted Functionalities (2014)
- UCLA, Stanford, Columbia, UT, JHU
- $10M for 5 years