

SECURE AND TRUSTWORTHY CYBERSPACE (SATC)

\$113,750,000
-\$16,030,000 / -12.3%

Overview

In today's increasingly networked, distributed, and asynchronous world, cybersecurity involves hardware, software, networks, data, people, and integration with the physical world. Society's overwhelming reliance on this complex cyberspace has, however, exposed its fragility and vulnerabilities as corporations, agencies, national infrastructure, and individuals have been victims of cyber-attacks. Achieving a truly secure cyberspace requires addressing not only challenging scientific and engineering problems involving many components of a system but also vulnerabilities that arise from human behaviors and choices. Examining the fundamentals of security and privacy as a multidisciplinary subject can lead to fundamentally new ways to design, build, and operate cyber systems; protect existing and future infrastructure; and motivate and educate individuals about cybersecurity. This requires expertise across computer science; engineering; statistics; mathematics; the social, behavioral, and economics sciences; and education, as well as the transition of new concepts and technologies into practice.

Secure and Trustworthy Cyberspace (SaTC) is a seven-year investment area, spanning FY 2014-FY 2020. However, NSF's emphasis on cybersecurity research is expected to continue beyond FY 2020 because it constitutes an enduring challenge for science and engineering research and education that must evolve constantly to address new threats.

Outcomes from SaTC will include development of an organized, cohesive scientific foundation for the body of knowledge that informs the field of cybersecurity and privacy; improved understanding of the root causes of current threats; development of foundational countermeasures, including approaches that leverage designed-in security, moving target defense, tailored trustworthy spaces, and cyber-economic and behavioral incentives; and the establishment of recommendations for new instructional materials, degree programs, and educational pathways. In particular, foundational research in SaTC will lead to a research community pursuing a broad and deep multidisciplinary research portfolio spanning cybersecurity and privacy, whose results underlie methods for secure critical infrastructure. Ultimately, through SaTC, NSF expects to produce an innovation ecosystem that ensures new and existing technologies are secure from attack and users' information is protected from violations of privacy despite the new attack surfaces these technologies present. Similarly, the creation of a workforce and citizenry with an understanding of cybersecurity and privacy issues is an anticipated impact of NSF's support of activities related to the education and training of cybersecurity researchers and professionals.

Goals

- **Goal 1: Foundational Research**
Develop the scientific theory, methodologies, and tools necessary to the development of trustworthy and usable secure systems and appropriate privacy safeguards.
- **Goal 2: Accelerating Transition to Practice**
Transition successful basic research results and commercial innovations into early adoption and use, allowing NSF cyberinfrastructure to serve as a premier proving ground and state-of-the-art environment for advancing cybersecurity solutions and moving them into technical and organizational practice.
- **Goal 3: Education and Preparation of Cybersecurity Researchers and Professionals**
Increase the number of qualified students entering the fields of information assurance and cybersecurity, and enhance the capacity of higher education to produce professionals in these fields to meet the needs of our increasingly technological society. This includes NSF's investment in the CyberCorps®: Scholarship for Service (SfS) program, which supports cybersecurity education and workforce development.

FY 2018 Investments

Goal 1: Foundational Research

- Refine the SaTC program solicitation in FY 2018, including a request for Frontier projects, which are center-scale, multi-disciplinary, multi-organizational projects that provide high-level visibility to grand challenge research areas in cybersecurity.
- Fund innovative projects that advance the science of cybersecurity and privacy, as well as security for big data analytics, cloud computing, and cyber-physical systems. NSF will also support cutting-edge cybersecurity and privacy topics, including redefining cyber forensics, data science for security, privacy-aware big data management and mining, ethics for trustworthy cyberspace, theory and science for obfuscation, and information-oriented security.
- Build upon existing partnerships with other federal agencies, industry, and international organizations to more effectively achieve the long-term goals related to SaTC.
- Pursue efforts to grow the cybersecurity research community to include more researchers who cross the boundaries between computer science; engineering; statistics; mathematics; and the social, behavioral, and economic sciences.

Goal 2: Accelerating Transition to Practice (TTP)

- Focus on transitioning to practice the research results that are ready for experimental deployment, early adoption, commercial innovation, or implementation in cyberinfrastructure through support of TTP projects.
- Support at least one experimental testbed to enable cybersecurity researchers to experiment in realistic environments.

Goal 3: Education and Preparation of Cybersecurity Researchers and Professionals

- Support research and development in cybersecurity education to encourage and test innovative approaches for the preparation of cybersecurity professionals in formal and informal settings. This effort will include support for the development and assessment of learning modules and approaches for cybersecurity education that can be incorporated into existing computer science instruction; quantitative and scientific literacy curricula; and science and engineering programs for undergraduate and graduate students (e.g. SfS) who will need basic understandings of cybersecurity relevant to their domains.
- Promote the development of, and related research about, new curricula and learning opportunities to augment the cybersecurity workforce with focused efforts to recruit and retain underrepresented minorities, women, first-generation students, low-income students, and veterans.

Secure and Trustworthy Cyberspace

Funding by Directorate

(Dollars in Millions)

Dir/Office	FY 2016 Actual	FY 2017 (TBD)	FY 2018 Request
CISE	\$70.90	-	\$65.50
EHR	49.98	-	40.00
ENG	3.25	-	3.25
MPS	1.64	-	1.00
SBE	4.00	-	4.00
Total, SaTC	\$129.78	-	\$113.75