What makes a hot topic hot? An NSF Perspective

August 2015

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NSF Mission

Mission:

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

Objective:

create and exploit new concepts in science and engineering and provides global leadership in research and education

Strategic Goal 1:

Transform the Frontiers of Science and Engineering

Strategic Goal 2:

Stimulate Innovation and Address Societal Needs through Research and Education

Strategic Goal 3:

Excel as a Federal Science Agency

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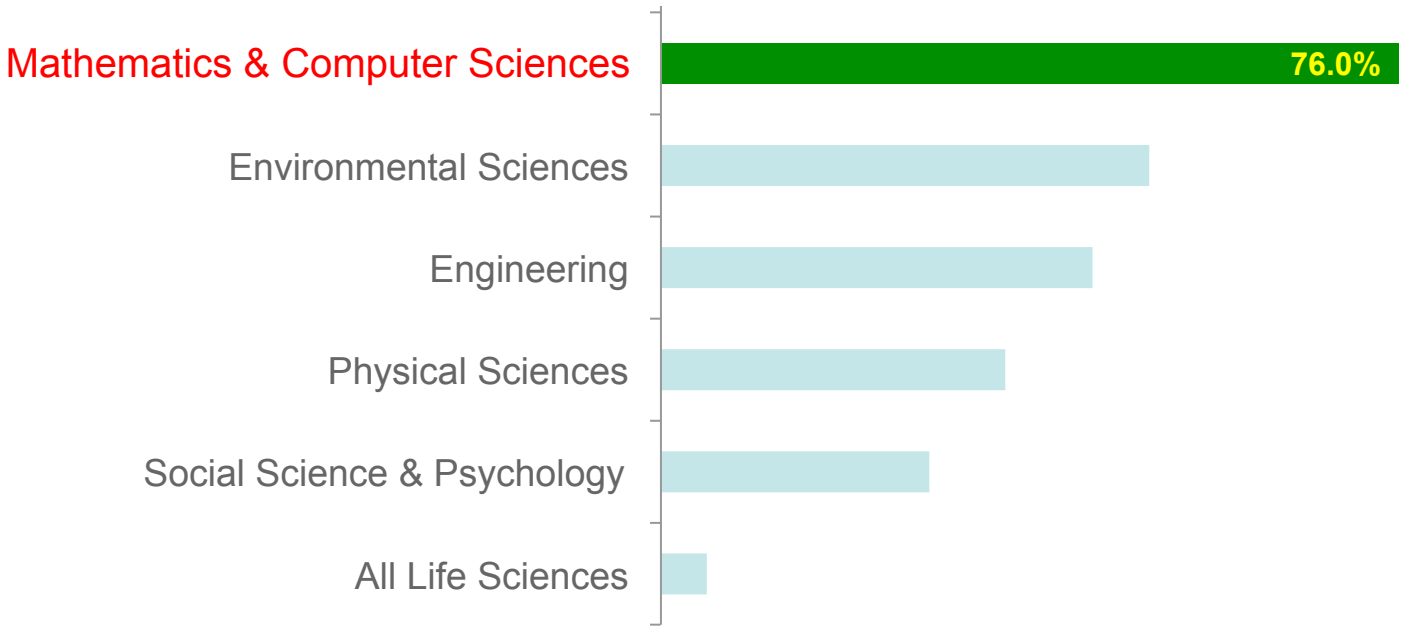
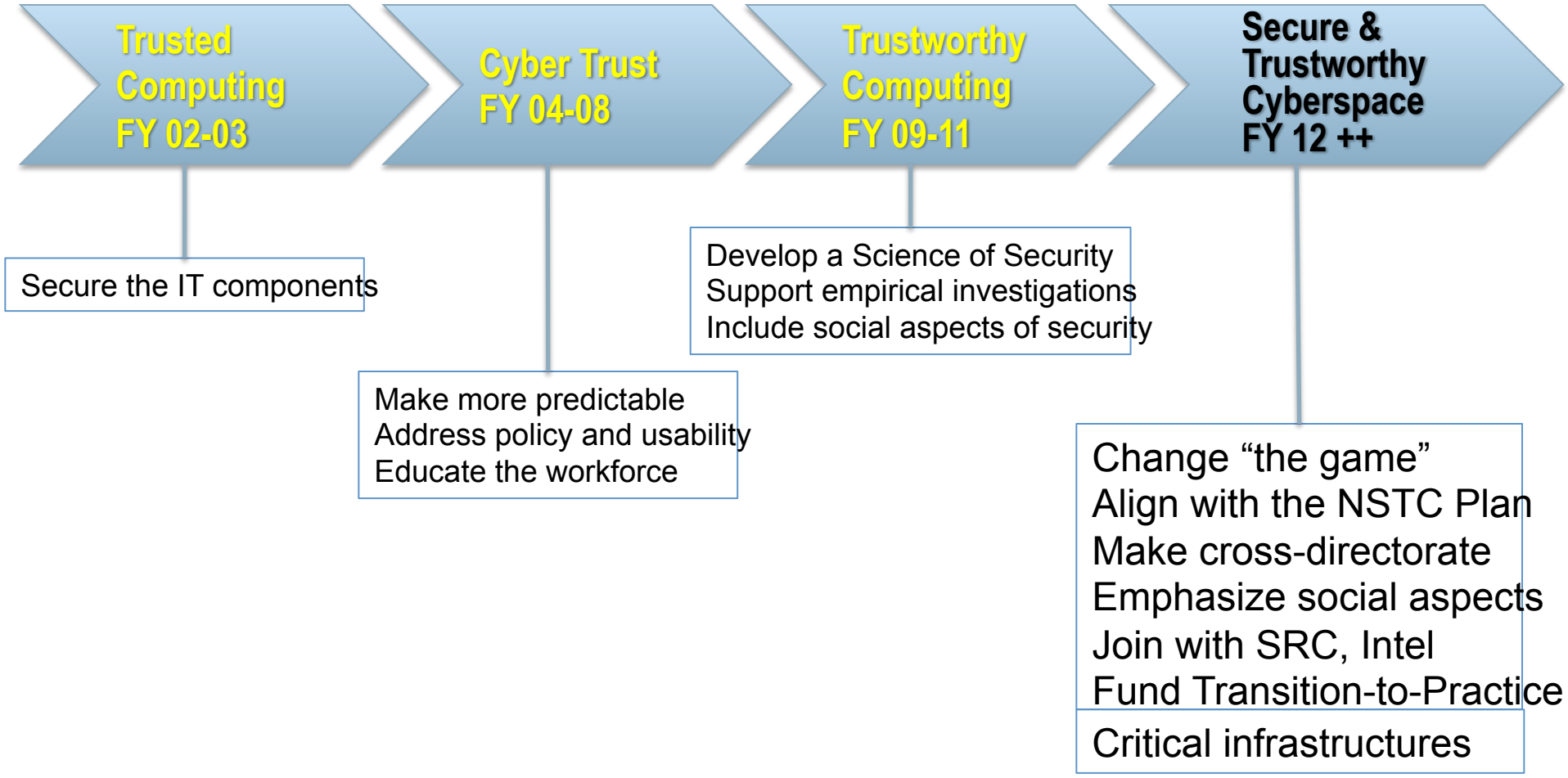
NSF Share of Total Federal Basic Research Support

With an annual budget of about $7 billion, NSF funds approximately 25% of all federally supported basic research conducted by U.S. colleges and universities



Source: NSF

NSF Flagship Cybersecurity Program Evolution



Cybersecurity has a vast scope

Access control
Anti-malware
Anticensorship
Applied cryptography
Authentication
Cellphone network security
Citizen science
Cloud security
Cognitive psychology
Competitions
Cryptographic theory
Cyber physical systems
Cybereconomics
Cyberwar
Digital currencies
Education
Forensics
Formal methods
Governance
Hardware security
Healthcare security
Insider threat
Intrusion detection
Mobile security
Network security
Operating systems
Personalization
Privacy
Provenance
Security usability
Situational awareness
Smart Grid
Social networks
Sociology of security
Software security
Vehicle security
Verifiable computation
Voting systems security
Web security

What makes a topic hot?

You go to your closet and you select out, oh I don't know, that lumpy blue sweater, for instance, because you're trying to tell the world that you take yourself too seriously to care about what you put on your back. But what you don't know is that that sweater is not just blue, it's not turquoise, it's not lapis, it's actually cerulean. You're also blithely unaware of the fact that in 2002, Oscar De La Renta did a collection of cerulean gowns. And then I think it was Yves St Laurent, ... wasn't it, who showed cerulean military jackets? And then cerulean quickly showed up in the collections of 8 different designers. Then it filtered down through the department stores and then trickled on down into some tragic casual corner where you, no doubt, fished it out of some clearance bin. However, that blue represents millions of dollars and countless jobs and so it's sort of comical how you think that you've made a choice that exempts you from the fashion industry when, in fact, you're wearing the sweater that was selected for you by the people in this room.

What Makes a Topic Hot for NSF?

- Radically different approach to solving a problem
- Potential for a transformative result
- A very interdisciplinary approach to solving a problem
- Bottom-up driven: Will your peers think it's hot?
- Generally *not* driven by government needs, because of NSF timeline
- For SaTC, will industry be interested in commercializing?

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Another view

One definition of “hot” is that [a topic] has grabbed our attention. As funders of research, we want to make sure that we address hot topics (to obtain broader impacts) but we also need to successfully build and sustain bodies of knowledge, building on basic principles, organized frameworks, and reasoning methods. These things are not “hot” — they are “cool” :) — they are not grabbing news cycles but help us deal with the hot topics. Universities will have the cool topics in core courses and electives and seminars. A well-trained workforce needs to know the cool topics so they can deal with the hot ones as they come and go. That is VITAL. This prepares them to work on the hot topics, when they arise and become URGENT.

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Hot or Not?

- Encrypted computation
- Privacy
- Cyber physical systems
- SDN security
- Interdisciplinary projects
- Hardware security
- Cloud security
- Anti-censorship
- Big data for security

- Attacks without mitigations
- Intrusion detection
- Buffer overrun attacks
- Password usability
- Single biometric reliability
- Usability studies without real users

Funding Opportunities

- SaTC proposals
  - Solicitation 15-575
  - Medium submissions ($500K-$1.2M, 4 years): Sep 10-16 2015
  - Large submissions ($1.2M-$3.0M, 5 years): Sep 18-24 2015
  - Small submissions ($0-500K,3 years): Nov 4-18 2015
  - Cybersecurity education ($0-300K, 3 years): Dec 3-16 2015
- CRII proposals
  - Solicitation 15-569
  - For faculty in their first two years of an academic/research position (no more than 5 years post-PhD)
  - Up to $175K, 2 years
  - Due date: Sep 30 2015

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Thank you!

- What makes a hot topic? Is it that researchers are inspired by some new idea or approach? Or is it driven by funding from external organizations? And what role does industry play in this? For example, at one point applying machine learning to IDS's was hot, but now, while still researched, the topic itself does not inspire the same kind of fervor that it once did within the research community. Yet it is currently a hot topic within industry, but using the phrase security analytics instead to describe the same underlying techniques. Another example is that continuous authentication / mobile authentication is currently a hot topic. Why? And what role should funding play in developing or encouraging hot topics, versus supporting more basic research? For example, should funding go towards continuous authentication, or should more basic research (e.g., in passwords) be supported?
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- We will encourage discussion on deciding what makes a topic in security "hot", and if having hot topics is good, or if it does a disservice to the security community in general by not supporting the not-hot, yet still unsolved, security research issues.

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