Principal Research Scientist in the Cybersecurity group at the National Center for Supercomputing Applications

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### Jim's career arc

- > 1995-2001 UW-Madison Ph.D. in Computer Sciences (HTCondor)
- > 2001- NCSA Cybersecurity
- > 2001-2011 TeraGrid: distributed terascale facility
- > 2001-2018 MyProxy: credential management service
- > 2009- CILogon: federated identity service
- > 2011- XSEDE: Extreme Science and Engineering Discovery Environment
- > 2012- Trusted CI: NSF Cybersecurity Center of Excellence
- > 2017-2021 SciTokens: capability-based access to scientific data







# **Trusted CI:** The NSF Cybersecurity Center of Excellence

<u>Our mission</u>: to lead in the development of an NSF Cybersecurity Ecosystem with the workforce, knowledge, processes, and cyberinfrastructure that enables trustworthy science and NSF's vision of a nation that is a global leader in research and innovation.







https://trustedci.org/

### What is Cyberinfrastructure (CI)?

"The comprehensive infrastructure needed to capitalize on dramatic advances in information technology has been termed cyberinfrastructure (CI). Cyberinfrastructure integrates hardware for computing, data and networks, digitally-enabled sensors, observatories and experimental facilities, and an interoperable suite of software and middleware services and tools."

-NSF Cyberinfrastructure Vision for 21st Century Discovery

### Cyberinfrastructure Ecosystem

#### Organizations Universities, schools

Government labs, agencies Research and Medical Centers Libraries, Museums Virtual Organizations Communities

#### Scientific Instruments

Large Facilities, MREFCs,telescopes Colliders, shake Tables Sensor Arrays - Ocean, environment, weather, buildings, climate. etc

#### Data

Databases, Data repositories Collections and Libraries Data Access; storage, navigation management, mining tools, curation

#### Networking

Campus, national, international networks Research and experimental networks End-to-end throughput Cybersecurity

### Maintainability, sustainability, and extensibility



Image credit: NSF

#### Expertise Research and Scholarship Education Learning and Workforce Development Interoperability and operations Cyberscience

Computational Resources

Supercomputers Clouds, Grids, Clusters Visualization Compute services Data Centers

> Software Applications, middleware Software development and support Cybersecurity: access, authorization, authentication

NSF Funds Research and Education across all Fields of Science and Engineering	NSF by the Numbers	
Biological Sciences     Engineering     Image: Angle and Angle angl	\$8.1 billion	FY 2019 Appropriations (does not include mandatory accounts)
Image: Windows and Windows	1,800	Colleges, universities, and other institutions receiving NSF funding in FY 2019
	41,000	Proposals evaluated in FY 2019 through a competitive merit review process
	11,300	Competitive awards funded in FY 2019
	192,000	Proposal reviews conducted in FY 2019
	306,000	Estimated number of people NSF supported directly in FY 2019 (researchers, postdoctoral fellows, trainees, teachers, and students)
	60,000	Students supported by NSF Graduate Research Fellowships since 1952

https://www.nsf.gov/pubs/2020/nsf20003/nsf20003.pdf https://www.nsf.gov/news/speeches/cordova/17/fc170523\_fv18budget.isi

# **NSF Community Benchmarking Survey**

 Survey of 14 NSF Major Facilities & 9 other NSF projects (23 total)
10 of 23 employ 1 Cyber FTE or greater. Others <1 Cyber FTE.</li>
9 of 23 respondents detected at least 1 incident, 4 of whom detected 3 or more incidents.
http://hdl.handle.net/2022/24912



2019 NSF Community Cybersecurity Benchmarking Survey Report

> 10 Jan 2020 For Public Distribution

Scott Russell,1 Kelli Shute

Project Lead, scolruss@indiana.cd



# Cybersecurity Threats to NSF CI Projects

### ➢ Ransomware

- Intellectual Property theft
  - Access to expensive Journal subscriptions
  - Disclosure of proprietary/sensitive information
- > Abuse of resources
  - Cryptocurrency mining
  - Launch of attacks on others





# Preparing for a CI Cybersecurity Career

- Broad coursework/experience/interest/skills:
  - Cybersecurity and
  - Programming or
  - System Administration or
  - Data Management or
  - Bio, Engineering, Humanities, Math, Science, etc.
- TrustedCI@PEARC21 workshop tomorrow morning
- > NSF CyberCorps: Scholarship for Service program
- > NSF Cybersecurity Summit student program





## SFSCon

- Launched in 2017 by Cal Poly Pomona and Trusted CI
- Annual cybersecurity training and professional development event for CyberCorps Scholarship for Service (SFS) students nationwide
- Includes Capture-the-Flag Competition, Job Fair, Resume Clinic, and Professional Career Panel from Federal and State agencies
- In 2019, 105 students from 42 universities participated





https://www.cc-sfscon.com/ https://www.sfs.opm.gov/

### **Annual NSF Cybersecurity Summit**

One day of training and workshops.

- 1.5 days of plenary sessions.
- Lessons learned and success from community.
- October 11-13, 2021 online.
- No registration fee.

https://trustedci.org/summit/



# **Summit Student Programs**

Each NSF Cybersecurity Summit has a Student Program matching students from across the country with mentors and connecting them with NSF science projects and cybersecurity challenges.

https://blog.trustedci.org/search/label/students







### Acknowledgments

Trusted CI is supported by the National Science Foundation under Grants 1234408, 1547272, and 1920430. The views expressed do not necessarily reflect the views of the National Science Foundation or any other organization.

RUSTED CI

Trusted CI activities are made possible thanks to the contributions of a multi-institutional team:

https://trustedci.org/who-we-are/

