Science of Security

Heather Lucas; Adam Tagert

Secure System Architecture and Analysis

Rigorous Research Methods

Paper Competition

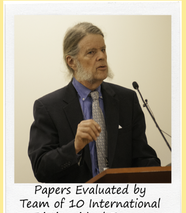
About: The Annual Best Scientific Cybersecurity Paper Competition identifies and recognizes the paper with the best scientific research methods, writing clarity and expected impact.

Impact: The competition gives SoS broad influence in the global cybersecurity research community; it is open to all. It encourages this community to increase scientific quality of research that is needed for building a knowledge base.



Winning Paper: *On One-way Functions and Kolmogorov Complexity* by Yanyi Liu and Rafel Pass. These researchers are at Cornell University and Cornell Tech. This paper demonstrates that one-way functions exist. One-way functions are a assummed building block for asymetric cryptography.

Honorable Mention: *Retrofitting Fine Grain Isolation in the Firefox Renderer* by Sharavan Narayan, et al. These authors developed an isolation method, RLBox, to allow the Firefox web browser to to safely run untrusted libraries. This feature was deployed in Firefox 95.



Papers Evaluated by Team of 10 International Distinguished Experts



Winners Present at NSA when Possible

Award at ISEF

About: Award at the International Science and Engineering Fair (ISEF) recognizes the top high school cybersecurity student researchers. Winning students are invited to present work at NSA and meet with NSA offices relevant to their research.

Impact: Highly visible program showing NSA support for K-12 STEM Education. Inspiring students to do research in cybersecurity and helps recruit the very best for NSA student programs.



ISEF Winners Present at NSA



Presenting Awards



Way to go notes! (about 30)



NSA Booth to Build Relationships

SoS Virtual Syncs

About: Lablet researchers present their latest research to the NSA research community monthly via UWE.

Impact: Supports tech transition of knowledge and relevant research.

About

Science of Security is an innovative and unique approach for NSA to advance security. It is the catalyst for the global community to establish a self-sustaining academic discipline generating the understandings of cyber. This foundational base underpins both the day to day security required by the public, industry and government.

SoS has many non-traditional NSA adjectives:
International; **Open; Public; Unclassified; Attributed to NSA.**

Research

SoS Lablets

About: The SoS Lablets are small multidisciplinary labs at universities. They were competitively selected for research projects with mission relevance. Lablets work on a variety of topics to include the 5 Hard Problems, Cyber Physical Systems and Privacy.

Impact: The Lablets are developing the scientific foundations for cybersecurity that are relevant to mission needs.

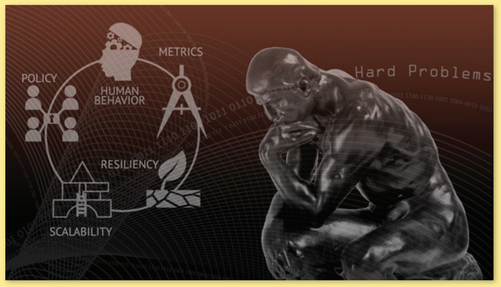
- Carnegie Mellon University — Pittsburgh, PA
- ICSI International Computer Science Institute — Berkeley, CA
- NC State University — Raleigh, NC
- University of Illinois Urbana-Champaign (1867-2017) — Champaign, IL
- KU The University of Kansas — Lawrence, KS
- Vanderbilt University — Nashville, TN

SoS Champions

About: The SoS Champions are designated NSA points of contact for SoS research projects. This person aids in aligning the project to mission needs and applying research results.

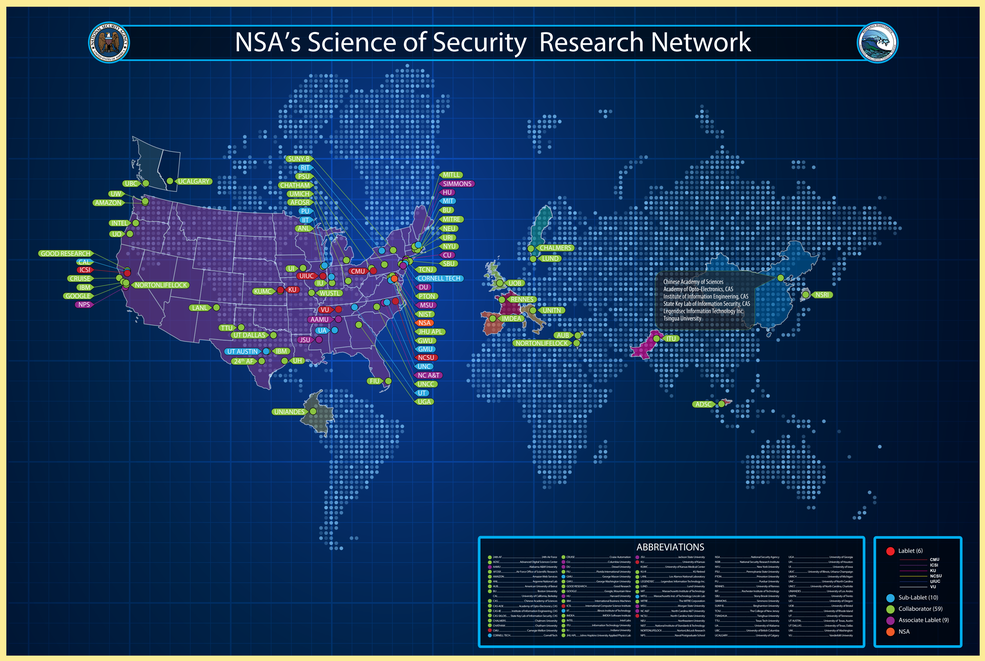
Impact: The champions provide for an ongoing relationship with Lablet researchers, which are a key method of transiting research results.

5 Hard Problems



The 5 Hard Problems are the difficult challenges that SoS is trying to solve. They are 1) Resilient Architectures, 2) Scalability and Composability, 3) Secure Collaboration and Privacy, 4) Metrics, and 5) Understanding and Accounting for Human Behavior.

Core to the SoS program is it's community of interest. Below represents the current SoS research network. Blue dots reflect funded institutions under the Lablet universities. Green dots reflect free collaboration with institutions outside the contract. These connections can be from industry and academia. Map is of connections between 2018 and 2020.



Growing the Community

HoTSoS

About: Hot Topics in Science of Security (HoTSoS) is the annual public conference for foundational security research. HotSoS is virtual and free to attend. Unlike conferences with referred papers, HotSoS is focused on community discussions and presentations of oustanding work.

Impact: Provides the only venue for discussing research papers with a focus on building a science of security. Government, academia, and industry attend to learn and present new research for building a base for security.

HoTSoS '21

- 1,200 Registrations
- First meeting focused on works in progress discussions
- Program Committee of Community Leaders
- 45 Hard Problems Discussions
- Held in April



Broadcast Discussions

Annual Report

Yearly update of SoS: Research Progress; Competitions; Meetings; Publications, etc...

Available digitally on the SoS-VO.



Virtual Organization

About: The SoS Virtual Organization (SoS-VO) is the face for SoS. Publically available program information and access to SoS community events and efforts.

Impact: NSA uses the SoS-VO to build two-way relationships with the broader SoS community.



Visit the SoS VO
https://www.sos-vo.org

SoS-VO Stats

- **2,000** Members
- Over **20,000** items
- Internet Home for
  - Paper Competition
  - HoTSoS
  - ISEF Awards
  - SoS News
- Publications Database
- Forums for Discussions
- Engage with Researchers
- Built on NSF Cyber Physical Systems Virtual Organization Platform

