



TRUST: Team for Research in Ubiquitous Secure Technologies

An Overview

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http://trust.eecs.berkeley.edu



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Attacks are growing in sophistication



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Attack Incidents

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NSF

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The Internet in 1980



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The Internet Today

http://cm.bell-labs.com/who/ches/map/gallery/index.html







Bad Code + Big Networks = Problems



Geographic spread of Sapphire worm 30 minutes after release

Source: http://www.caida.org

- CodeRed worm (Summer 2001)
 - Infected 360,000 hosts in 10 hours (CRv2)
- Sapphire/Slammer worm (Spring 2003)
 - 90% of Internet scanned in <10mins





Technology Generations of Information Assurance









TRUST worthy Systems

- More than an Information Technology issue
- Complicated interdependencies and composition issues
 - Spans security, systems, and social, legal and economic sciences
 - Cyber security for computer networks
 - Critical infrastructure protection
 - Economic policy, privacy
- *TRUST*: "holistic" interdisciplinary systems view of security, software technology, analysis of complex interacting systems, economic, legal, and public policy issues
- Goals:
 - Composition and computer security for component technologies
 - Integrate and evaluate on testbeds
 - Address societal objectives for stakeholders in real systems









Research Agenda

- Security Science (Schneider)
 - Software Security (Mitchell)
 - Trusted Platforms (Boneh)
 - Applied Cryptography Protocols (Wagner)
 - Network Security (Joseph)
- Systems Science (Schmidt)
 - Interdependency Modeling and Analysis (Anantharam)
 - Secure Network Embedded Systems (Wicker)
 - Model Based Integration of Trusted Components (Sztipanovits)
 - Secure Information Management Tools (Birman)
- Social, Economic and Legal Considerations (Samuelson)
 - Economics, Public Policy and Societal Challenges (Varian)
 - Digital Forensics and Privacy (Tygar)
 - Human computer Interfaces and Security (Reiter)

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Broad Research Vision



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Integration of Research Agenda

- Four testbeds chosen to be responsive to national needs: Computer and network security, Critical infrastructure protection, Privacy (Sztipanovits coordinator)
 - Integration testbed
 - Secure Network Embedded Systems
 - Planet Lab (Culler)
 - Cyber Defense Technology Experimental Research testbed (DETER) (Benzel/Joseph/Sastry)
- Technical Management Plan through time sensitive internal deliverables of software, systems among team members
- Exchange of scientific personnel among team members
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Education Program Vision

- Security must be consciously engineered into new and legacy critical infrastructure systems
- Every component level needs rethinking and education: need to build in *TRUST: security science, systems science and social, legal, economic considerations* into every course in undergrad and grad curricula ("liberal" technologically literate education)
- Summer school, hallmark of TRUST for hottest new research
- Repositorying content developed
- Evaluation of Effectiveness





Education Evaluation Metrics

| Goal | Objective | Metrics | Frequency |
|------------------------|------------------|---|-----------|
| K-12 Education | K-6 education | School visits, Educational material, Teacher education | Bi-annual |
| | 6-12 education | Science fairs, Trust lectures, University visits | Bi-annual |
| Undergrad Education | Security Modules | Education Materials, Repository, Classroom testing | Annual |
| | Security Course | Education Materials, Repository, Classroom testing | Annual |
| | Capstone Course | Education Materials, Repository, Classroom testing, Cyber Clinic usage | Annual |
| Graduate Education | Security Course | Education Materials, Repository, Classroom testing | Annual |
| | Seminar Courses | Respository | Bi-annual |

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Outreach Vision and Goals

It is an oft quoted adage that security is as strong as the weakest link. Our aim is to have no weak links left in the education of our society about the technical, compositional, privacy, economic and legal aspects of trusted information systems. We will begin locally but spread our outreach as far as we can along as many diverse axes as we can.

Current outreach and diversity efforts are piecemeal. We have a comprehensive solution

- K-6, 6-12 school outreach
- Summer research for HBCU/HSIfaculty
- Curriculum development for HBCU/HSIfaculty
- Undergrad Research Opportunities
- Grad Research Opportunities
- Summer Immersion Institute for women
- Community Outreach



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Knowledge Transfer Vision: *TRUST* as a Public Private Partnership

- TRUST as trusted intermediary between industry, government, non-profit and academia for answering hard questions:
 - Who will pay for security
 - Should the Feds play the role of market maker
 - Roadmaps for guiding investment
 - The role of regulation/insurance
- Open dissemination of research:
 - Publications and software
 - Short courses

VANDERBILT Cornell University

Carnegie Mellon

- Public lectures and forums
- Curriculum development and courses



Berkelev

STANFORD





Key Infrastructures Chosen for Transition

- Electric Power Infrastructures: SCADA networks and their evolution, wireless sensor network testbed at Oak Ridge, DoE's DC net
- Financial Infrastructures: key partnerships with Secret Service and Treasury, USPS and financial institutions
- DoD's Global Information Grid (GIG): key partnerships with Air Force (JBI), Command and Control (Constellation) networks







Leadership and Outreach to other groups

- EU-IST and US partnerships in dependability and TRUST
- OSTP/DHS/Treasury/DoE/DoD workshops
- Workshops for venture partners
- Special issues of ACM/IEEE/...
- ESCHER, a non-profit for repositorying TRUST software
- ACM-SIGBED
- Partnerships with Singapore (Nanyang) and Taiwan (National Chiao Tong and National Taiwan University)



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