IEEE CYBER SECURITY

IEEE Cybersecurity Initiative (CybSI)

Accelerating Innovation in Security & Privacy Technologies

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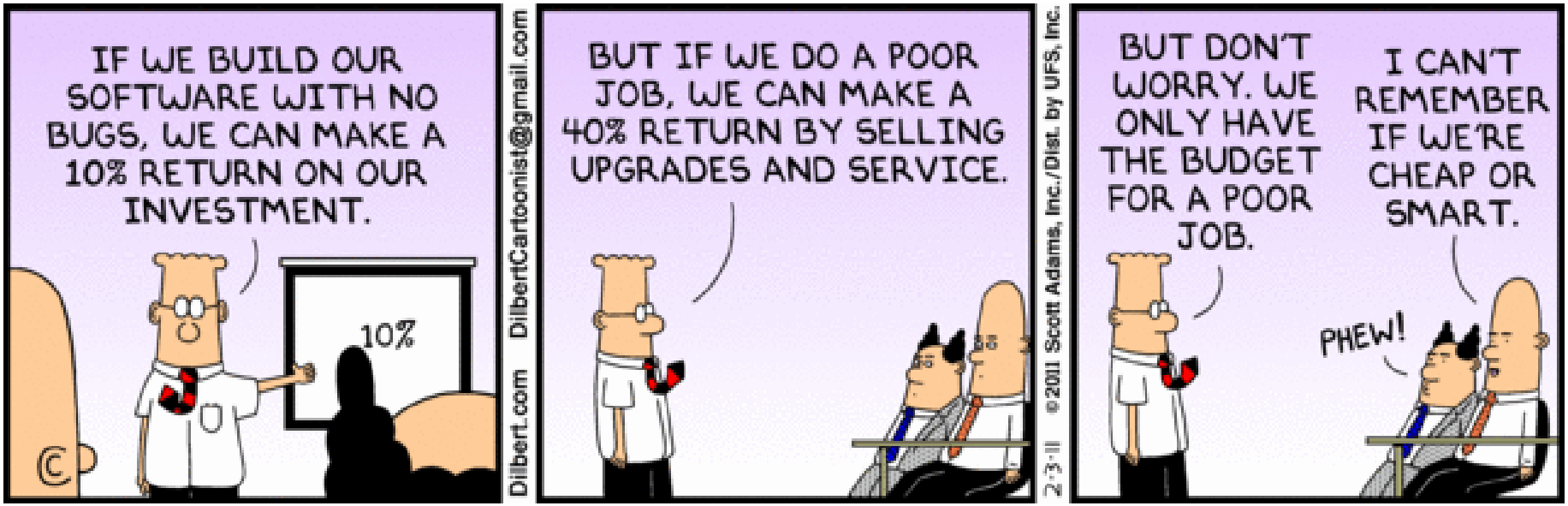
A Challenge for Engineers



http://www.dilbert.com/strips/2011-02-03/

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Today's Presentation

- **Initiative Goal: Accelerate innovative research, development and use of efficient cyber security & privacy technologies that protect commerce, innovation and expression**

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- **Initiative Goal: Accelerate innovative research, development and use of efficient cyber security & privacy technologies that protect commerce, innovation and expression**
  - Overview IEEE & CybSI
  - Center for Secure Design
  - try-cybsi Platform
  - Collaborations

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Overview of IEEE and CybSI

About IEEE(.org)

430,000+
Members

38
Technical Societies

160+
Countries

1,300+
Annual Conferences

3,500,000+
Technical Documents

160+
Top-cited Periodicals

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About IEEE: Global Standards Developer

- Over 900 active standards
- 500+ standards under development
- Over 7,000 individual members and 20,000 standards developers from every continent
- 200+ entity members
- Working with International standards bodies of ISO, IEC and ITU

- IEEE-SA's process is widely respected and aligns with the WTO and OpenStand principles

WORLD TRADE ORGANIZATION

open stand
the modern paradigm for standards

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Security & Privacy Conferences

- **In 2015, IEEE will hold over 900 conferences touching security and privacy. To note are:**
  - International Conference on Information Systems Security and Privacy (9-11 Feb.; France)
  - **36th Annual IEEE Symposium on Privacy and Security (18-20 May; San Jose)**
  - IEEE Conference on Communications and Network Security (28-30 Sept.; Italy)
  - IEEE World Forum on Internet of Things (4-6 Nov.; Switzerland)
  - IEEE International Conference on Identity, Security and Behavior Analysis (23-25 March; Hong Kong)

Security & Privacy Publications

- ***IEEE Security and Privacy* Magazine**
  - Provides articles with both a practical and research bent by the top thinkers in the field along with case studies, tutorials, columns, and in-depth interviews and podcasts for the information security industry

- **IEEE publishes nearly a third of the world's technical literature in electrical engineering, computer science and electronics, including the encryption domain. E.g.:**
  - *Performance Analysis of Data Encryption Algorithms*
  - *Comparison of Data Encryption Algorithms with the Proposed Algorithm: Wireless Security*
  - *Technical Comparison Analysis of Encryption Algorithm On Site-to-Site IPSec VPN*
  - *Impact of Wireless IEEE 802.11n Encryption on Network Performance of Operating Systems*
  - *Comparative Study of Attribute Based Encryption Techniques in Cloud Computing*
  - *Implementation of Advanced Encryption Standards-192 Bit Using Multiple Keys*
  - *A Multi-layer Evolutionary Homomorphic Encryption Approach for Privacy Preserving over Big Data*

IEEE Security-related Standards

Just a sampling:

- **Encryption (IEEE P1363)**
- **Fixed & Removable Storage (IEEE P1619, IEEE P1667)**
- **Printers, copiers, etc. (IEEE P2600)**
- **Provisions of connectionless user data confidentiality by media access independent protocols (IEEE 802.1AE)**
- **MAC security key agreement protocol (P802.1Xbx)**

Cybersecurity Initiative

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Cybersecurity Initiative

- **Goal: Accelerate research, development and use of efficient cyber security & privacy technologies that protect commerce, innovation and expression.**
- **Activities**
  - Center for Secure Design
  - try-cybsi Platform
  - Collaborations

Steering Committee

- **Chair, Greg Shannon, CMU**
  - Network security and anomaly detection
- **IEEE Fellow, Carl Landwehr, George Washington U.**
  - Cybersecurity “building codes”
- **IEEE Fellow, Michael Waidner, Fraunhofer SIT & Darmstadt**
  - Security & privacy architectures
- **IEEE Fellow, Nasir Memon, NYU**
  - Digital forensics
- **IEEE Fellow, Jeff Jaffe, W3C.org**
  - CEO, HTML standards and security
- **Jim DelGrosso, Cigital**
  - Project Lead for Center for Secure Design
- **Jonathan Katz, U. of Maryland**
  - Cryptography
- **Carrie Gates, Dell Research**
  - Empirical/experimental methodswww.laser-workshop.org
- **Celia Merzbacher, Semiconductor Research (SRC.org)**
  - Hardware
- **Kathleen Clark-Fisher, Computer Society**
  - Initiative Director for IEEE

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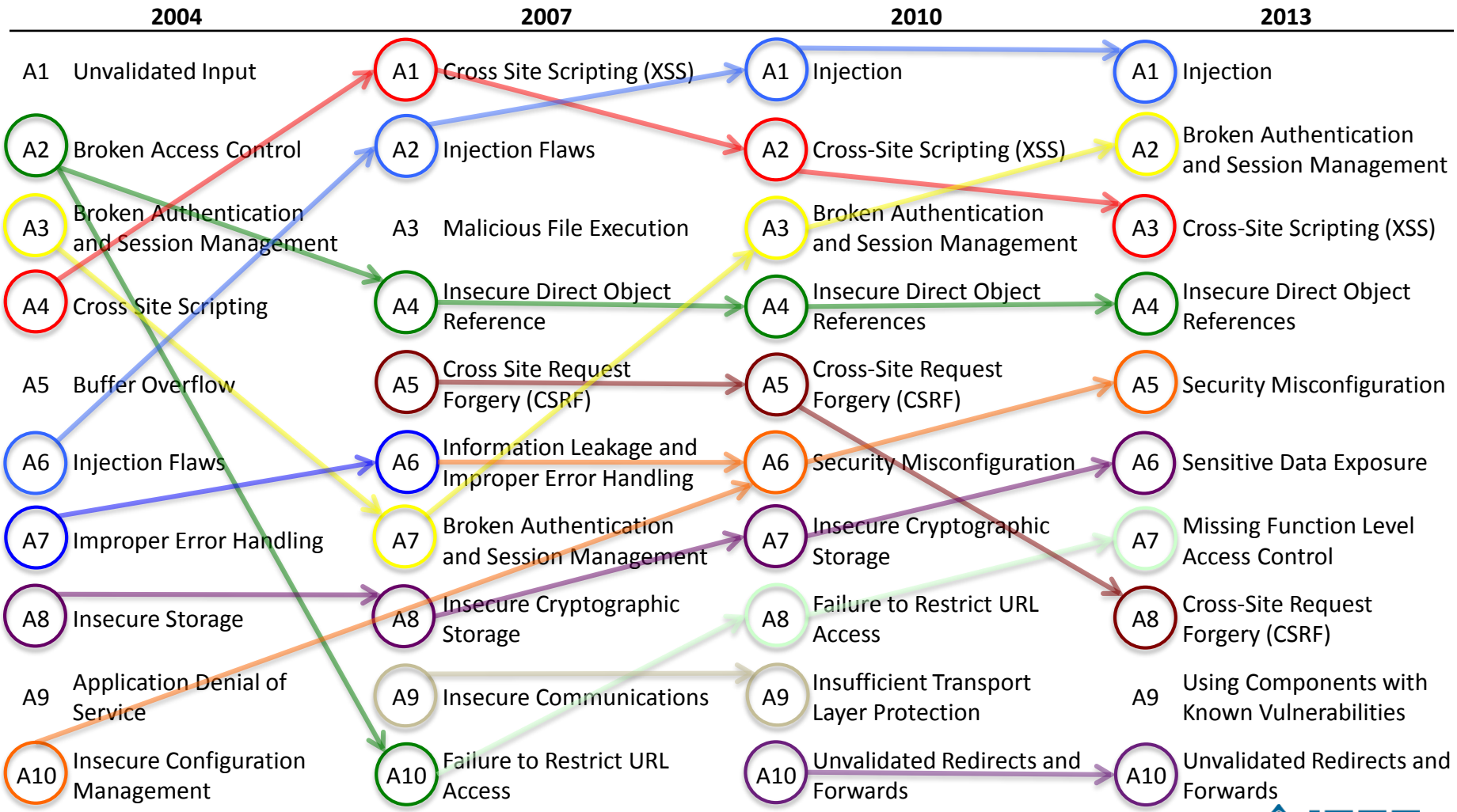
Center for Secure Design

IEEE CENTER FOR SECURE DESIGN

http://cybersecurity.ieee.org/center-for-secure-design.html

Patterns in OWASP Vulnerabilities



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Same/Similar Defects For A Decade

- Injection Attacks
- Broken Authentication and Session Management
- Cross-Site Scripting
- Security Misconfiguration
- Insecure Direct Object References
- Missing Function Level Access Control

Something Needs To Change

- **We have known about these issues for decades**
  - Knowing != Avoiding

- **Even when we document these issues, and provide standards describing what to do, that advice is often not followed**

Avoiding Top Ten Security Flaws (5)

- Earn or give, but never assume, trust
- Use an authentication mechanism that cannot be bypassed or tampered with
- Authorize after you authenticate
- Strictly separate data and control instructions, and never process control instructions received from untrusted sources
- Define an approach that ensures all data are explicitly validated

Avoiding Top Ten Security Flaws (5)

- Use cryptography correctly
- Identify sensitive data and how they should be handled
- Always consider the users
- Understand how integrating external components changes your attack surface
- Be flexible when considering future changes to objects and actors

Design Flaws Results, Next Steps

- **Avoiding the Top 10 Software Security Design Flaws**
  - Iván Arce, Kathleen Clark-Fisher, Neil Daswani, Jim DelGrosso, Danny Dhillon, Christoph Kern, Tadayoshi Kohno, Carl Landwehr, Gary McGraw, Brook Schoenfield, Margo Seltzer, Diomidis Spinellis, Izar Tarandach, and Jacob West
  - cybersecurity.ieee.org/images/files/images/pdf/CybersecurityInitiative-online.pdf
  - Spanish Version in March

- **Workshop on Specific Domains – March 24-26**
  - Tools for avoiding flaws
  - Consider specific domains: automotive, medical, smart grid, etc.
  - Consider Privacy

try-cybsi Platform

Understanding Security & Privacy Technologies and Challenges

- **We've all read or heard about complex technologies, methods and ideas**

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Understanding Security & Privacy Technologies and Challenges

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- Have you tried to use the technology? Reproduce the results? Run the demo?
- **Have you had those fail directly? Or fail to help you understand more?**

try-cybsi Platform

- **Goal: archive, curate and present:**
  cyber security & privacy technical artifacts (code, data, results, exploits, etc.)
  AND
  cyber security & privacy experiences of those
  (examples, demos, experiments, measurements, evaluations)

try-cybsi Platform

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- **try41 Demo**
  - Dendrite example, https://try.lab41.org
  - Uses Docker and OpenStack in a private “cloud”
  - In-Q-Tel funded
  - https://github.com/Lab41/try41

try-cybsi Platform

- **Objectives for 2015**
  - Replicate try41 platform in an accessible cloud
  - 12 experiences (containers) available
  - 1000 completed user experiences
- **Experience possibilities**
  - Input fuzzing technique for command line inputs
  - Examples of buffer overflow
  - Threats mitigated by the new HTST web protocol

try-cybsi Project Plan

- **Q1 2015**
  - Project lead and team formed
  - Contracts in place or process
  - Initial design completed
  - Specific cloud selected
- **Q2 2015**
  - Try41 capability replicated, IOC
  - 1 exemplar container created and available for limited use
  - Tutorial available for creating and ingesting containers
  - 3 containers in development
- **Q3 2015**
  - try-cybsi platform announced with access to 3 exemplar containers – FOC
  - Call for container content creation/submission
  - Ingest 3 new containers
  - Drive users/viewers to containers via narrow PR
- **Q4 2015**
  - Ingest 6 new containers
  - Solicit and award best content/container
  - Drive users/viewers to containers via broad PR

Want to Participate in try-cybsi?

- **Individual**
  - Volunteer for the development/operations team
  - Create content
  - Use content
- **Institution**
  - Provide the compute platform
  - Provide resources to design, develop, instantiate, operate and support

Contact: try-cybsi@sei.cmu.edu

Collaborations

NSF –Workshop to Create a Building Code for Medical Device Software Security

https://sites.google.com/site/bcformdss/home

November 19-21, 2014

New Orleans, Louisiana

Co-organized by C.Landwehr, T.Haigh

IEEE CYBER SECURITY

Cyber Security Policy and Research Institute
THE GEORGE WASHINGTON UNIVERSITY

NSF

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DIMACS / IEEE ESCAPE Workshop

- **Efficient and Scalable Cyber-security using Algorithms Protected by Electricity (ESCAPE)**
  - @CMU in Pittsburgh, June 10-12, 2015
  - Co-organized by Karl Rohloff, Konrad Vesey
  - Considers the research and engineering implications of an IDA study for the IC: That power (electricity) is the dominate consideration in very large computations
- **Implication for NITRD is, can access to power be a strategy for constraining cyber threat proliferation?**

3I – IEEE Internet Initiative

- Goals
  - Mobilize the IEEE global technical community to support an open, transparent and inclusive participatory Internet governance policy process
  - Promote and facilitate the development of trustworthy technology solutions in cyber-security and privacy
  - Help connect the IEEE technical community with the policy community toinform and amplify the voice of the technical community in policy discussion venues
- IEEE Expert in Technology and Policy (ETAP) on Internet Governance, Cybersecurity, Privacy, and Policy
  - May Forum co-incident with Oakand Conference
  - http://sites.ieee.org/etap/

Further Information

- **Website**
  - cybersecurity.ieee.org
  - cybersecurity.ieee.org/center-for-secure-design.html
- **Email**
  - Shannon at cert dot org
  - kclark-fisher at computer dot org
  - try-cybsi@sei.cmu.edu
- **Twitter**
  - @ieeecybsi (overall initiative)
  - @ieeecsd (center for secure design)

Thank You

Questions?