Vulnerability Disclosure

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National SCADA Test Bed DoE-OE

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Idaho National Laboratory

Department of Energy-Office of Electricity Delivery and Energy Reliability: National SCADA Test Bed Program

Mission

Support industry and government efforts to enhance control systems cyber security in the energy infrastructure

Key INL activities are **cyber Vulnerability Assessments** (testing) and **Industry Outreach** (including training)

- Over 22 assessments in lab and on site ranging from 275 to 800 hours of cyber security researchers in addition to control systems and network engineer hours per each assessment
- Common vulnerabilities analyzed

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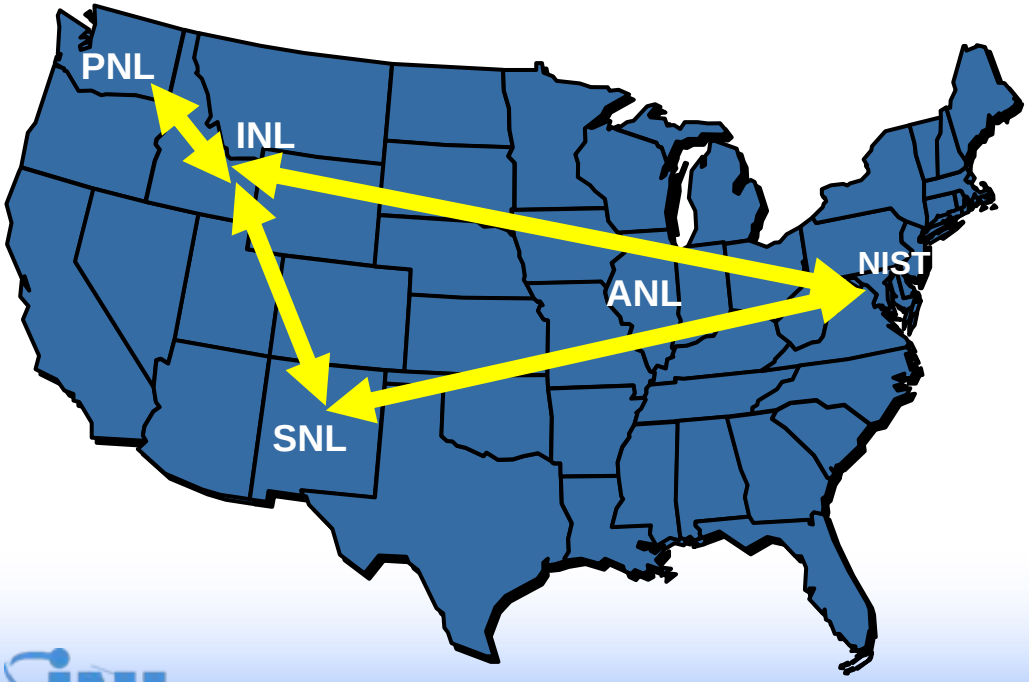
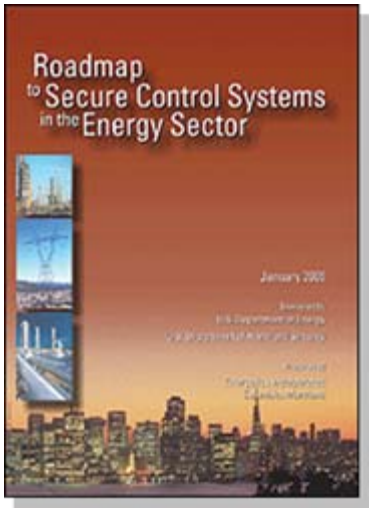
National SCADA Test Bed

DOE multi-laboratory program designed to:

Support industry and government efforts to enhance control systems cyber security across the energy infrastructure





Key Program Areas

Assess and mitigate energy control systems vulnerabilities

Develop advanced secure control systems technologies

Support development of standards and best practices

Conduct outreach and awareness

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Vulnerability Disclosure – Government Sponsored

- Time to public disclosure for CERT/Coordinating Center (CERT/CC) is normally 45 days
  - More serious vulnerabilities are coordinated with US-CERT for disclosure[1]
  - Trending of Vulnerabilities

From the FAQ: Our work is funded primarily by the U.S. Department of Defense and the Department of Homeland Security, along with a number of other federal civil agencies.

[1] CERT/CC Vulnerability Disclosure Policy, http://www.cert.org/kb/vul_disclc

Cataloged vulnerabilities

Year	Total vulnerabilities cataloged	From direct reports
Q1-Q2, 2008	4,110	196
2007	7,236	357
2006	8,064	345
2005	5,990	213
2004	3,780	170
2003	3,784	191
2002	4,129	343
2001	2,437	153

Vulnerability Disclosure – Government Sponsored - continuted

The US-CERT time to disclose varies for control systems based vulnerabilities

- US-CERT provides a more timely alert to control system vulnerabilities to users that register for through the secure portal
- While other more IT centric vulnerabilities are publish the same day as public disclosure

http://www.kb.cert.org/CERT_WEB/services/vul-notes.nsf/id/476345

The CitectSCADA buffer overflow (VU#476345) vulnerability it was one month from public disclosure to US-CERT published notes

Vulnerability Discovery - Who

- Security Firms – Core Security discovered two Citect vulnerabilities and one Wonderware vulnerability this year

  http://www.coresecurity.com/index.php5?module=ContentMod&action=item&id=2312

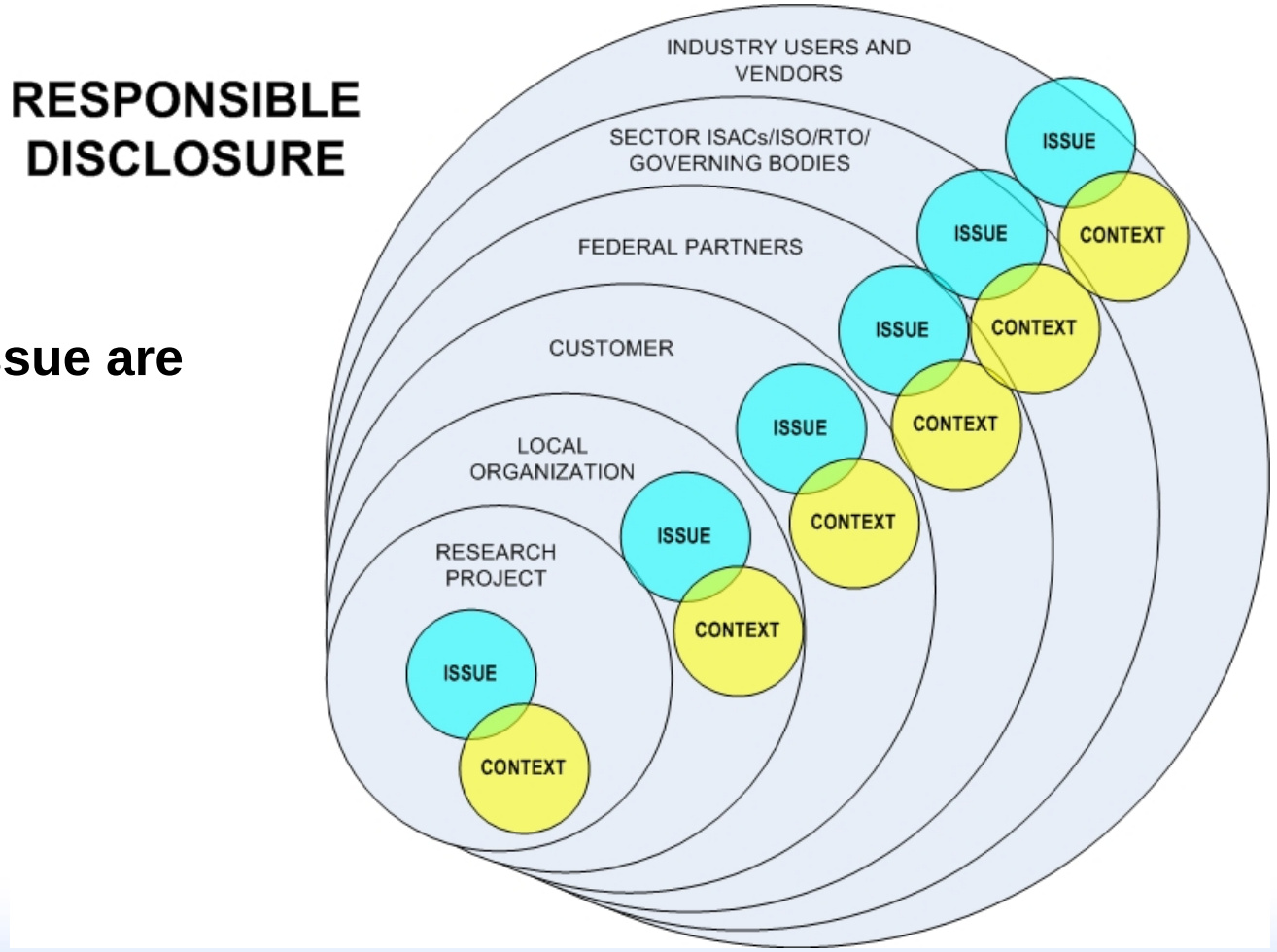
- Hackers – OPC vulnerability at BlackHat 2007
  http://www.eweek.com/c/a/Security/Hole-Found-in-Protocol-Handling-Vital-National-Infrastructure/
- Protected Entities – DHS-NCSD-CSSP Control System Security Program and DOE-OE National SCADA Test Bed and others
- Vendor – Rarely disclosed prior to release notes
- End User – Disclosed to Vendor

Stakeholders Perspectives

- Discoverer – wants disclosure or not
- Vendor – varies on culture normally all share with customers after fix
- Government – Want to promote better secure systems while protecting infrastructure owned by private entities
- End User – want to know prior to mitigations developed to apply defense in depth or other temporary protections

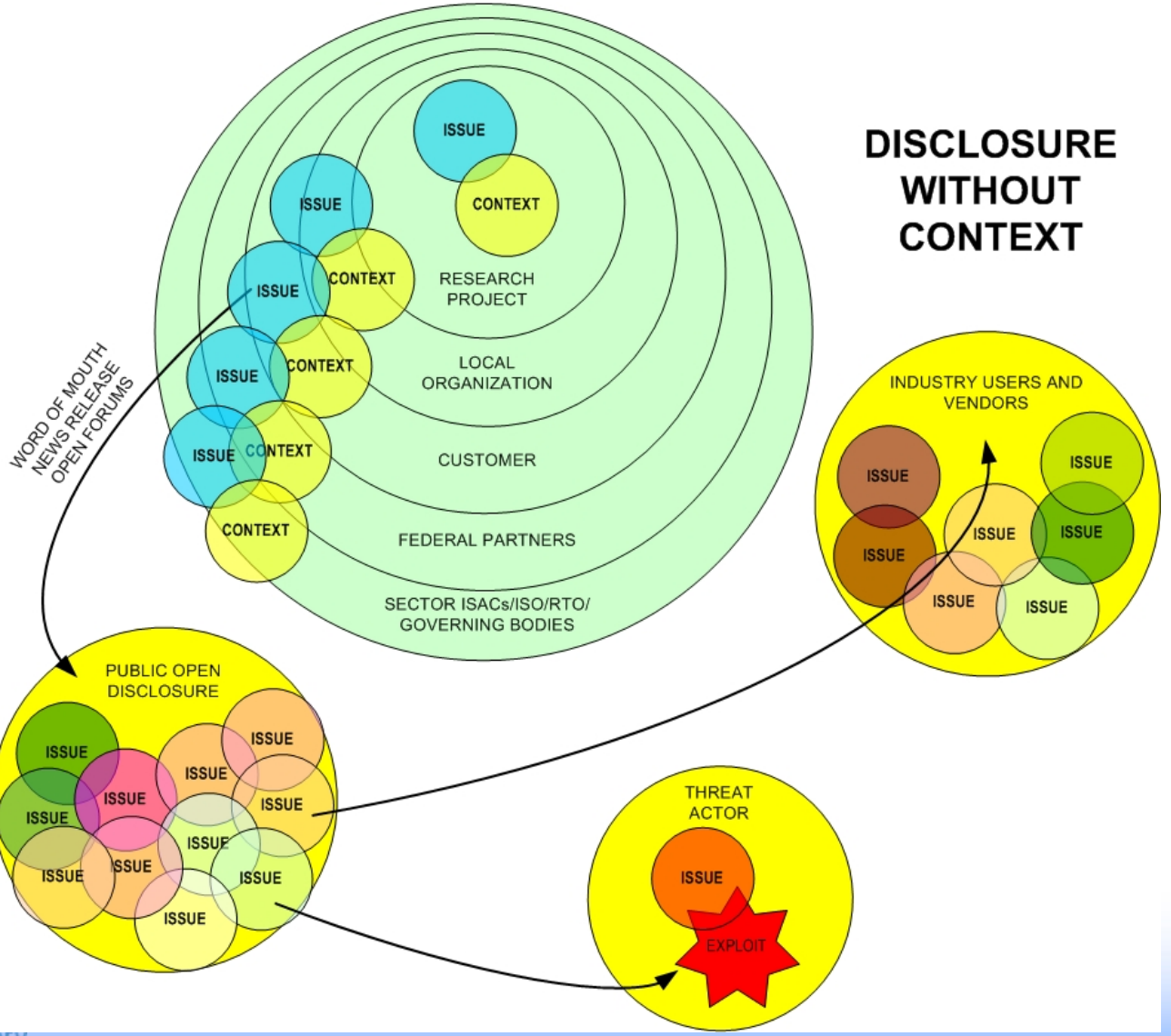
Responsible Disclosure

Context and vulnerability issue are coupled



Responsible Disclosure

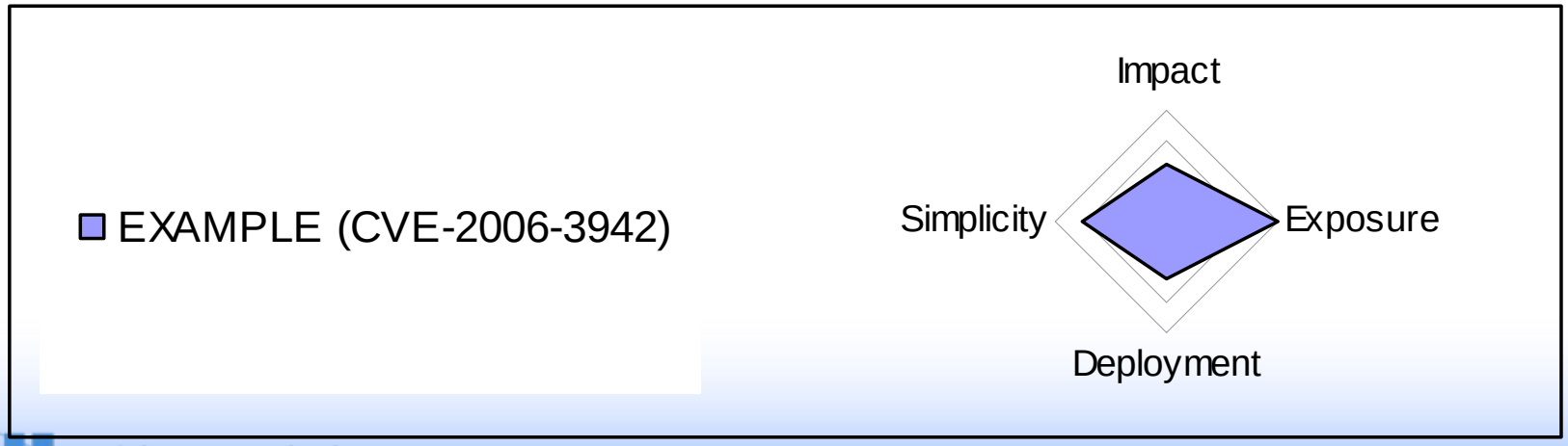
- Vulnerability Issue gets more attention and strays from context



Vulnerability Characterization

Attack Surface Example

- Impact (Medium) will cause a denial of service (crash) if successfully exploited
- Exposure (High) can be exploited by an unauthenticated attacker having network access only
- Deployment (Medium) exists in a configuration that is present in some U.S. critical infrastructure control system applications
- Simplicity (Moderately High) has its exploit code publicly available for use with automated exploit tools



Concluding Recommendations

- Use discloser process that includes context and characterization of the vulnerability
- Asset owners need to do their own characterization of vulnerabilities specific to architectures
- Mine the large knowledge base of vulnerabilities for control systems
- Create more independent and open testing facilities
- Require government co-sponsored testing to open up information after aged
- Analyzed aged information for trending back to asset owners

Resources Available

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