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SEI TECHNOLOGIES FORUM

Software Engineering Institute | Carnegie Mellon

Software, Security, and Resiliency

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Dr. Paul D. Nielsen is the Director and CEO of Carnegie Mellon University's Software Engineering Institute. Under Dr. Nielsen's leadership, the SEI has expanded its research, doubled its staff and increased its impact in the software engineering community. The SEI now has over 500 valued partnerships with organizations extending its influence globally. Prior to joining SEI in 2004, he served in the U.S. Air Force, retiring as a major general and commander of Air Force research after 32 years of distinguished service. Nielsen is a member of the US National Academy of Engineering (NAE) and a Fellow of both the American Institute of Aeronautics and Astronautics (AIAA) and the Institute for Electrical and Electronics Engineers (IEEE).

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
FEB 2012		**00-00-2012 to 00-00-2012**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Software, Security, and Resiliency	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Carnegie Mellon University ,Software Engineering Institute,Pittsburgh,PA,15213**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**15**	

Software and Complexity

The Rise of Complexity

- Scale
- Interconnectedness
- Autonomy
- Time criticality
- Security
- Safety
- Regulation

How to Handle Complexity

Models

Process

Architecture

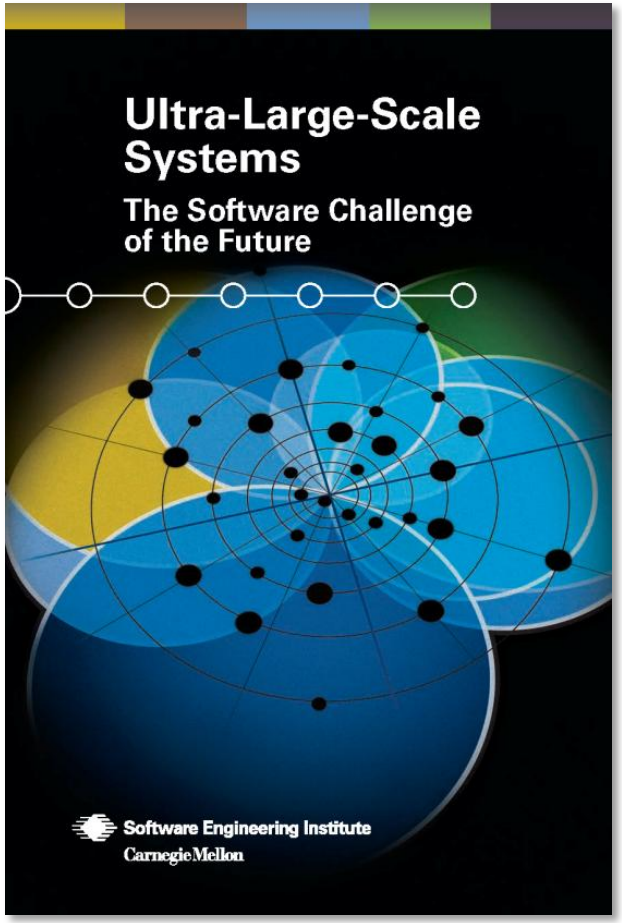
Risk assessment

Resiliency

Evolution

People

Complex Systems at the SEI



The SEI is at the nexus of systems and complexity:

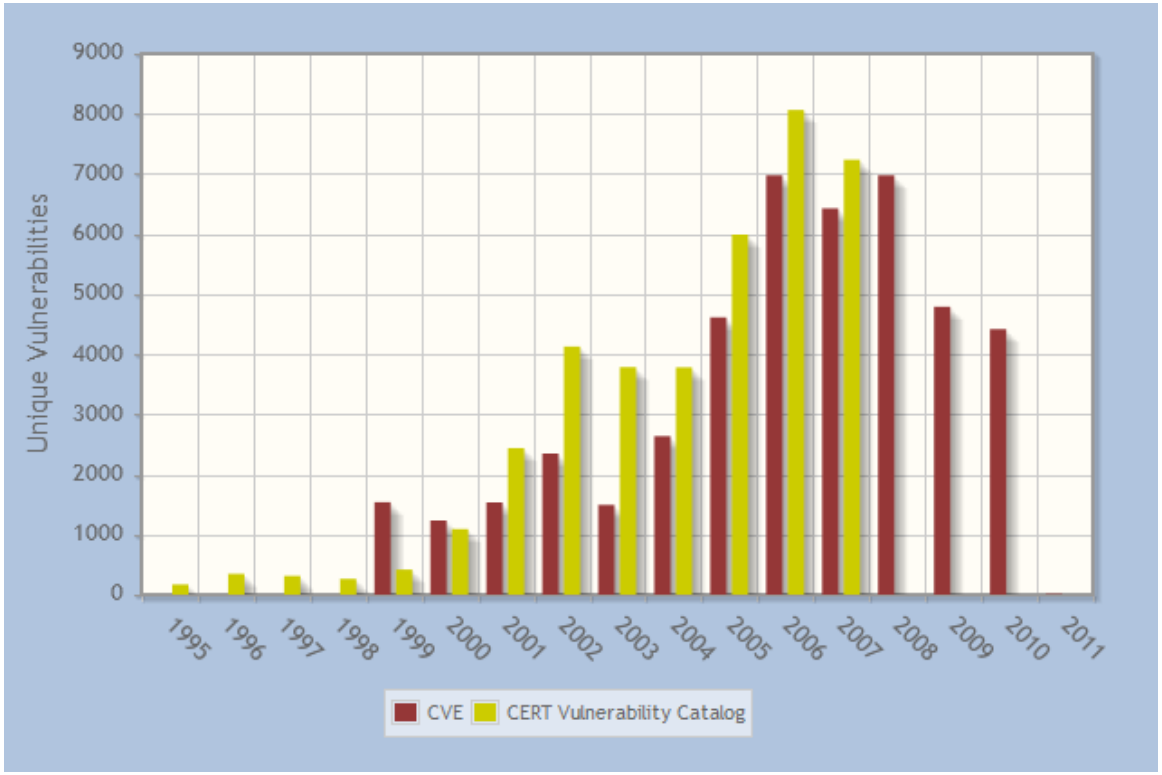
- We study them side-by-side
- For 25 years, we've been helping engineers design and manage software systems
- It's our job to "ring the bell" on the importance of managing complexity

We also appreciate risk and the importance of managing it

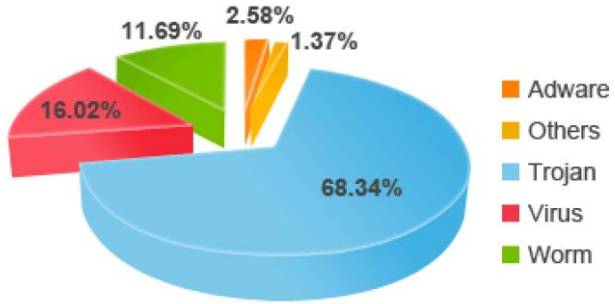
- Continuous risk management
- Mosaic suite of risk management tools
- Multi-view models
- Mission Success in Complex Environments

Security and Risk

Rising Tide of Vulnerabilities, Risk



Unique Vulnerabilities
(from CERT and NIST NVD data)



Recent Pandalabs Analysis of
Malware, Viruses in Circulation

How to Handle Cyber Security Issues

Secure Coding

Malware Identification and Analysis

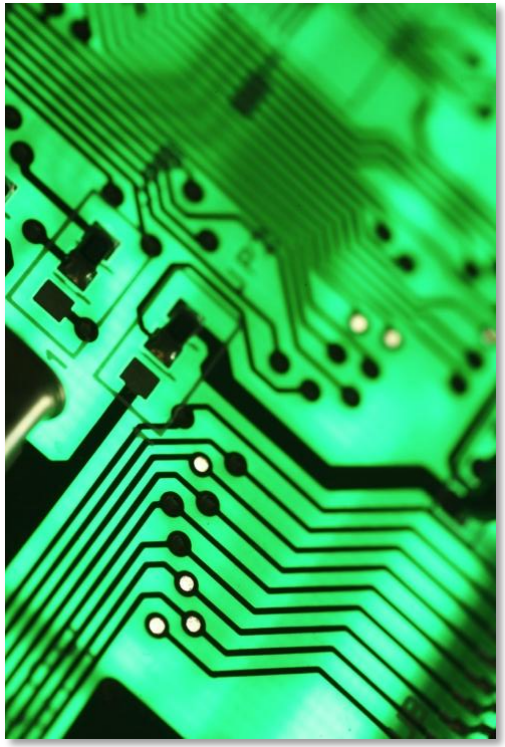
Network Situational Awareness

Recognizing Insider Threats

Modeling Resiliency and Continuity

Resiliency and Continuity

Key Principles of Resiliency (1)



Resilience is the ability to provide and maintain an acceptable level of service in the face of faults and challenges to normal operation.

At SEI, both organizational and software:

- Resilience Maturity Model (RMM)
- Security Quality Requirements Engineering (SQUARE)
- **security "built in"**
- Current blog series topic (http://blog.sei.cmu.edu/)
- **failure scenarios understood, planned for**
- **redundancy is provided for in key areas**
- **capability remains available under adverse conditions**

resilience

Continuity

A key aim of resiliency (and managing operational risk)

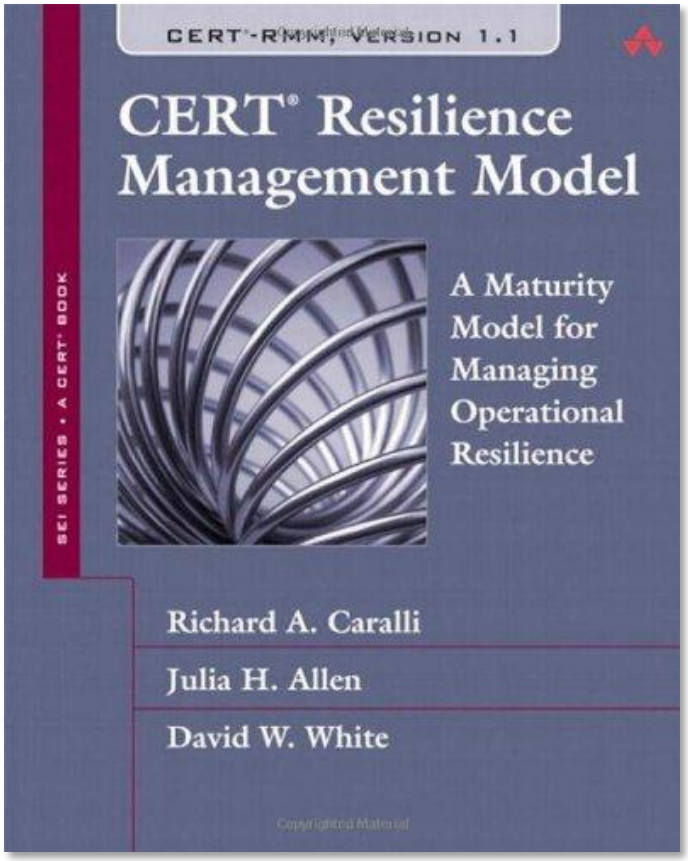
Business Functions:

- Developing and executing continuity plans, recovery plans, and restoration plans

IT Function:

- Developing, implementing, and managing processes to deliver IT services and manage IT infrastructures

Resiliency Maturity Model (1)



What is CERT-RMM?

CERT-RMM is a maturity model for managing and improving operational resilience.

- Guides implementation and management of operational resilience activities
- Converges key operational risk management activities: security, business continuity/disaster recovery, and IT operations
- Defines maturity through capability levels (like CMMI)
- Improves confidence in how an organization responds in times of operational stress

Connecting the Dots

Today's presentations include:

Understanding and coping with complexity & cyber security

- CMMI-SVC: The Strategic Landscape for Service
- Software Acquisition Program Dynamics
- Architectural Implications of Cloud Computing
- The Insider Threat: Lessons Learned from Actual Insider Attacks

Dealing with the smart grid, resiliency and software development

- Smart Grid Maturity Model
- Agile Development and Architecture: Understanding Scale and Risk
- Measuring Operational Resilience
- Team Software Process (TSP)

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