Secure Software Engineering in Higher Education and Professional Societies

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Overview

• Secure Software Assurance
• Higher Education Activities
• Professional Society Activities
  – Organizations
  – Publications
  – Events
• Conclusion
Secure Software Assurance

- Assurance
- Justified Confidence
- Assurance Case
- Uses of Assurance Case
- Body of Knowledge
Assurance

• “Assurance” is used in several ways, but underlying concept is to reduce uncertainty

• To rationally decide to use software in dangerous situation one needs
  – The software
  – Justified confidence in it
Justified Confidence

- To have one’s uncertainty reduced so have justified confidence in a security claim
  - Evidence
  - Arguments that tie evidence to claim
- Implies valid evidence and arguments

Together these make the “assurance case”
Uses of Assurance Case

• Planned assurance case helps determine development plan and activities
• For developer: assurance case contents (so far) need to be adequate at each step
  – Especially release
• Assurance case helps decide purchase and use
Secure Software Assurance BOK

- Body of knowledge document out for review (until Feb. 21st)
  - At buildsecurityin website under Additional Resources
  - (https://buildsecurityin.us-cert.gov/portal/resources/)
- Identifies knowledge and gives references
- Approximately 225 pages
- To be issued in March
- Government, industry, and academic involvement
Higher Education Status

• Depending on how one counts one can identify between two and twenty-two institutions that teach secure software engineering
• Few regular software security courses or programs offered
• Secure Software Assurance body of knowledge out for review
Higher Education Activities

• Naval Post Graduate School
  – Number of Masters theses

• James Madison University
  – Secure Software Engineering Masters

• Carnegie Mellon University
  – CyLab
  – Computer Science Department
  – Software Engineering Institute

• Northeastern University
  – Engineering Secure Software
Example Single Topic Courses

• Purdue
  – Secure Programming
• George Mason University
  – Secure Programming
• Princeton
  – Secure Internet Programming
• Columbia
  – Programming-heavy Network Security
Textbooks

- Only one of the major Software Engineering textbooks treats security
  - Sommerville 7th edition treats critical systems (and safety) at length and security briefly but explicitly in this context

- None of the many Software Quality Assurance texts I have examined treat security in more than passing

Software security books:
- Gasser 1988 last introductory text to emphasize high security
- Few professional books go much beyond programming
Funding for Curricula

- Microsoft has given a number of modest awards to improve education in Trustworthy Computing and Software Engineering
- Federal funding has been quite modest
Professional Society Activities

• Organizations
  – ACM Risks Forum
  – IEEE CS TCSE Committee on Secure Software Engineering
  – NDIA committee on software assurance

• Publications
  – ACM Trans. Info and System Security
  – IEEE Trans. Dependability and Security
  – IEEE Security and Privacy magazine
Events

- Software Engineering for Secure Systems Workshop
- Workshop on Secure Software Engineering Education and Training

Also: DHS Software Assurance Forum, NIST Workshops on tools and metrics, and NDIA Software Assurance events
Professional Examinations

- Canadian Council of Professional Engineers has an elective Software Engineering examination on Security/Safety
- British Computer Society exams mention security under networking and distributed systems topics (not SwE)
- IEEE Computer Society Certified Software Development Professional exam does not currently cover security
  - SWEBOK Guide should add “soon”
Conclusion

• Must have Software and Justified Confidence
• Higher education efforts limited but growing
• Professional society publications and events exist
• Secure Software Assurance body of knowledge out for review