

Implementing MSwA2010 at Stevens: Status and Lessons Learned

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Outline

1. Where we started at Stevens
2. Modifications and additions to our MSwE curriculum
3. Lessons Learned
4. Current Status

Where We Started at Stevens

- ▶ Software Engineering: MS and Grad Certs
 - ▶ Consistent with GSwE2009
 - ▶ Underlying strength and focus on reliable and safe systems
- ▶ Systems Engineering Security: MS and Grad Cert
 - ▶ includes 2 useful courses for MSwA:
 - ▶ SES 602 Secure Systems Foundations
 - ▶ SES 603 Secure Systems Laboratory
- ▶ Computer Science: BS, MS, and PhD Degrees
 - ▶ Centers of Academic Excellence in Information Assurance Education and Research

Where we started – cont:

- ▶ **Personnel:**
 - ▶ One faculty member was part of the MSwA curriculum team
 - ▶ Remaining SWE faculty peripherally involved in security
 - ▶ Cybersecurity focused in CS department, Systems Security program
- ▶ **Tipping Point:**
 - ▶ MSwA curriculum was being finalized
 - ▶ Faculty recognized responsibility to ensure that all of our graduates must be able to build trusted software systems
- ▶ **Strategy:**
 - ▶ Integrate software assurance into our core program, to the maximum extent possible

Mapping Topics to Courses

	Courses				
Core Topics	533	540	556	564	...
I.1 Software Lifecycle Processes		✓			
I.2 Software Assurance Processes and Practices		✓+			
...					
6.2 Assured Software Development			*	✓+	
...					

Additions, Refocus, and Modifications

▶ Additions:

- ▶ 1 new course created for program:
 - ▶ **Software Development for Trusted Systems**
- ▶ 2 courses from the Secure Systems Engineering Program

▶ Refocus:

- ▶ Software Reliability and Safety Engineering → **Engineering of Trusted Systems**
- ▶ Engineering of Large Software Systems → **Acquisition and Management of Large Software Systems**

▶ Modifications:

- ▶ New material and deletions in all existing courses (including secure systems engineering ones)
- ▶ All changes consistent with the mission of our program

Result: Our MSwA Program

- ▶ MS in Software Engineering (MSwE) with a concentration in Software Assurance
- ▶ 6 required courses
 - ▶ Required courses from our MSwE program
- ▶ One of 2 tracks, 4 courses each:
 - ▶ Developing Trusted Systems
 - ▶ Managing Trusted Systems
- ▶ Total of 10 required courses

<http://stevens.edu/softwareassurance>

2 New Graduate Certificates

- ▶ **Development of Trusted Software Systems**
 - ▶ 4 courses (may be applied to MSwA)
 - ▶ Assumes some software development experience
- ▶ **Acquisition and Management of Trusted Software Systems**
 - ▶ 4 courses (may be applied to MSwA)
 - ▶ Assumes some familiarity with software engineering practices

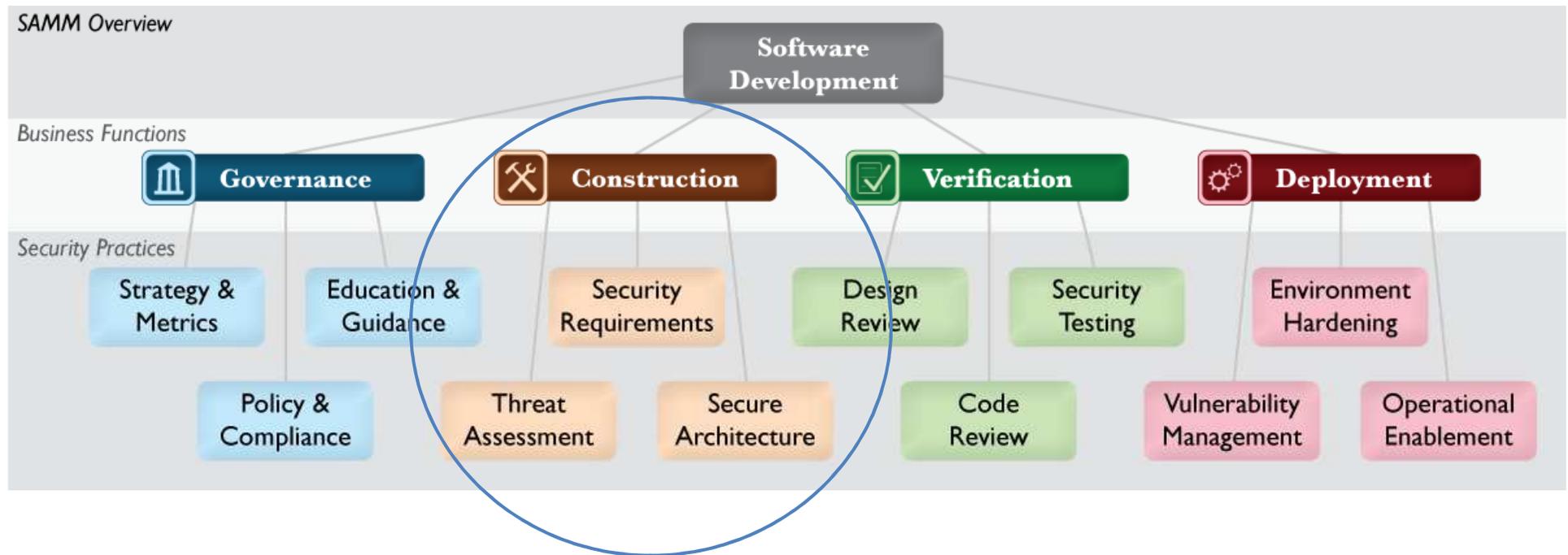
How Did we Fit 7 Courses into 3?

- ▶ We already had a MSwE program that was partially oriented towards assurance and trust
- ▶ We modified some of our existing courses to include some of the new material
- ▶ We created 2 tracks:
 - ▶ Developer track does not include all the management material
 - ▶ Management track does not include all the developer material

Lessons Learned: My opinions

- ▶ Significant effort required of faculty
 - ▶ Finding the right resources and making sense of them
 - ▶ Inconsistencies and apparent holes
 - ▶ Our strategy → reorganization of recommended curriculum → need to have the rearrangements “make sense” in the context of our courses
 - ▶ Learning the material
 - ▶ Level of material
 - Much of security is either extremely high-level (think design principles) and extremely low-level (think XSS attack)
 - Seems like you need to integrate points of knowledge rather than have top-down levels of abstraction
 - ▶ Changes are not necessarily localized
- ▶ The effort isn't always clear and straight forward

Lessons learned (?): I Used Maturity Model (SAMM 1.0) to help prioritize for one course



Areas for improvements

- ▶ Bridging the gap between requirements and architecture/design
- ▶ Examples/ Case studies of system architecture and design
 - ▶ How the security and assurance requirements were met, rather than looking for problems afterward
- ▶ Inconsistent Terminology in Use
- ▶ “Effective and efficient education for the 30,000”
 - ▶ E.g., What does each group really need to know and how can we make it the most approachable
 - ▶ how much can we do without having system-level knowledge requirements?

Current status

- ▶ On the journey
 - ▶ 2 sections of Engineering of Trusted Systems this fall
 - ▶ 1 or 2 sections of Development for Trusted Systems this spring
 - ▶ Changes being migrated into other existing courses
- ▶ Finalizing with the graduate curriculum committee
- ▶ Courses offered in DC, Hoboken, and on-line this spring
 - ▶ Flyers for program and course offerings available outside

Questions?
