Establishing and Maintaining a Cybersecurity Program: The GWU EMSE Experience

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The EMSE Program

• History:
  – Began in 1996 with a single class
    • Intro and Overview of Information Security
  – By 1998, had a six class Graduate Certificate Program
    • 18 graduate credit hours
  – By 2001, had a handful Doctoral students
    • Expecting the first one to finish up Spring 2003
  – Effective Fall 2002, MS in EMSE with a Concentration in Infosec Mgmt
    • 36 graduate credit hours, Certificate Program classes comprise core

• To date (Summer 2002):
  – 619 students taken the intro class
  – 135 have completed the Graduate Certificate Program
  – Approximately 100 currently enrolled in Graduate Certificate Program
The Classes

• The Graduate Education Certificate (also the MS Core)
  – EMSE 218: Intro & Overview
    • Everything at a micron deep
  – EMSE 315: Law
    • Contracts, Case law, torts, ethics, etc
  – EMSE 312: Protect (minus Crypto)
    • Personnel, Physical, Ops, Computer, Network, etc
  – EMSE 313: Crypto
    • All crypto, all the time
  – EMSE 314: Detect
    • Audit, monitor, IDS, etc
  – EMSE 316: React/Correct
    • Biz continuity, crisis mgmt, recovery

• The MS Electives (2 of…)
  – EMSE 317: Cybercrime
    • Criminal law, forensics processes
  – EMSE 318: Info Ops
    • Effect of global economy on security
  – EMSE 319: Emerging Issues
    • Wireless security
  – EMSE 320: E-Commerce
    • How to, how to secure

• The EMSE Core requirements for all MS tracks
  – EMSE 212: Mgt of Tech Orgs
  – EMSE 260: F&A for Engr Mgrs
  – EMSE 269: Decision Theory
  – EMSE 283: Systems Engineering
Topics Covered

• The short list:
  – Threats
  – Vulnerability assessments
  – Risk management
  – Secure computing
  – Operational security
  – Admin security
  – Policy
  – Law
  – Ethics
  – Network security
  – Life cycle management
  – Personnel security
  – History of computer security
  – History of comms security
  – Crypto, crypto, crypto

• And more….
  – Common Criteria
  – Rainbow series
  – Auditing
  – Monitoring
  – Intrusion detection systems
  – Crisis management
  – Business continuity planning
  – Resource allocation
  – Security engineering
  – Malicious software
  – Trust
  – Passwords
  – Authentication
  – Access control
  – And still more
What We Don’t Teach

- Computer Science
  - Not a single line of code generated
  - Not a single algorithm developed
- Electrical Engineering
  - Not a single circuit analyzed
- Hands on skills
  - Not a single firewall configured
  - Not a single system administrated
- Hacking
  - Cover the theory in advanced classes but forbid them to do it
- BUT!
  - We do teach them why each and every element of those specialties is a critical component of security engineering and management
Why and How

• Why
  – Huge requirement for education of non-computer science types
    • Weapons acquisition managers
    • Program managers of all other sorts
    • The other engineers increasingly required to work with IT
    • Senior executives forced to deal with security issues
    • Business types in the IT workforce with no computer science background
  – Strongly believe in the systems engineering approach to security in operational environments
    • Solution in real world is not a computer science problem

• How
  – Started small, built over time
  – Used the feedback from students on what worked and what didn’t
    • Continually modify course approach and content
Challenges

• Textbooks
  – Lots of good books out there but not any one just right for our purposes
    • Too much computer science, too much math, too much focus on protection
    • Couldn’t make the students buy 10 books for one class
    • Wrote our own, currently in rewrite
      – Expect to have rewrite done end of summer

• Students Knowledge Base
  – No math, darn little science, incredibly weak writing skills
  – Can’t assume a core base of KSA!!!
    • What’s going wrong at the undergraduate level?
  – Have incorporated basic skill instruction into program:
    • Plagiarism 101
    • Writing 101
    • Speaking 101
    • Logic 101
A Particular Challenge

• **Institutional and Professional Liability**
  – Duty of due care required of educational institutions and professors
    • Legislation, Regulations, Common law
  – Educators have a clear duty to anticipate dangers
  – Educators have a clear duty to protect students from injury
  – Duty may extend to third parties who are foreseeable victims

• **What can go wrong?**
  – Students might get busted
    • Hacking, illicit intercept of comms, exceeding authorized access
  – Civil liability in non-criminal cases
  – Other ills
    • Insider trading, ITAR violations, disclosure of trade secrets, copyright violations, etc

• **Defenses include security engineering of course offerings**
  – Policies, procedures, technologies, practices, and warnings
Contact Information

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