Establishing and Maintaining a Cybersecurity Program: The GWU EMSE Experience

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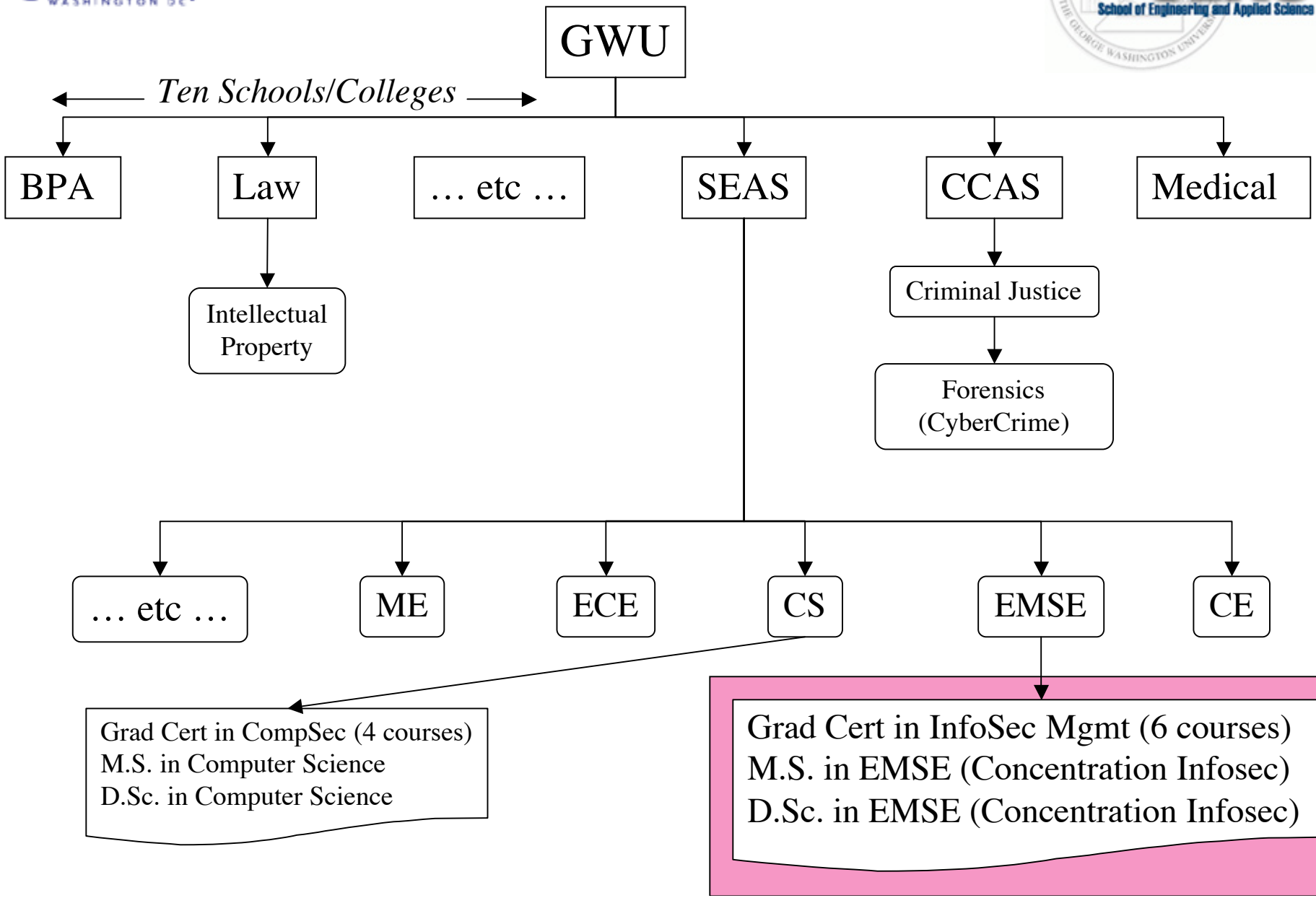
Context Diagram



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 etc etc
- Defenses include security engineering of course offerings
  - Policies, procedures, technologies, practices, and warnings

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