

Creating a Reference Curriculum for Graduate Software Engineering Education

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Office of the Under Secretary of Defense
Acquisition, Technology and Logistics
Systems and Software Engineering



Stevens Institute of Technology
School of Engineering
Applied Systems Thinking Institute

Findings

DoD Software Industrial Base Study

- Software complexity is growing exponentially in DoD projects
- There are concerns with finding qualified developers
 - One choke point is at the mid-upper tier software manager
- Software education enrollment has experienced a 6 year decreasing trend
- Software job categories are not standardized
 - Poorly defined, and do not generally reflect actual responsibilities
 - Poor quality developers (weak links) at any level increase program risk

There is no commonly accepted structure or content for graduate software engineering education - each university is on its own to establish its curriculum

Study Recommendations

- Investigate certifications for software engineers
- Implement outreach to academia and other domestic and foreign institutions to foster engineering talent
- Foster education, training, and mentorship

Way Ahead

- Develop a software engineering reference curriculum
 - Advance it to address current and future SE/SWE issues
 - Establish core competencies for software engineers
- Partnership effort with Government/Industry/Academia
 - Community development, adoption and promulgation

Brief Description

- OUSD(AT&L)/SSE sponsored
- Led by Stevens Institute of Technology
- Seeking partners and stakeholders:
 - The industrial and government workforce who are the customers of SWE graduate education
 - Academics who provide SWE and SE graduate education
 - Professional societies with a vested interest in SWE and SE graduate education
- The project addresses
 - Inconsistencies in software graduate degrees
 - Poor definition of labor categories and software expertise
 - The divide between systems and software engineers in industry, government, and academia
- The project will integrate SE principles and practices into the SWE curriculum.

Action and Contact

- We are seeking additional organizations who are interested in joining the team.
- Some ideas:
 - NDIA participate by sending representative to Early Start Team
 - NDIA assist by providing a recommended universities, based upon defense industry recruiting
 - Additional comments?
- Please contact Art Pyster at art.pyster@stevens.edu or at 703-717-8110 to find out more and to join the team.

The Approach

- Develop a database of existing graduate SWE programs
 - Analyze trends, commonly taught competencies, domain-specific information is included in current programs.
- Launch a collaborative website for partners and stakeholders
- Establish a small Early Start Team and hold a workshop in late summer to begin to develop an early draft curriculum,
 - Leveraging the analysis of existing graduate SWE programs
 - Advancing with SW/SE issues and needs
- Develop the initial draft curriculum
 - Courses and competencies
- Establish a much larger Core Team with broad representation from the stakeholder communities
 - Hold workshop to review the initial draft
 - Update curriculum and competencies
 - Develop plan to refine, accept, and promulgate it

Background

- Software drives the performance of virtually all major DOD (and civilian) systems.
- Being able to produce software that can be trusted as reliable, secure, safe, correct, and available while being delivered on-time and within budget is a major challenge for both the government and contractors.
- Many steps must be taken to meet that challenge - including ensuring our workforce is well educated in software engineering principles and practices.