Tools for Outcomes Assessment of Education and Training in the Software Development Process

David Klappholz
(Moderator)
Stevens Institute of Technology
david@cs.stevens-tech.edu

Lawrence Bernstein
Stevens Institute of Technology
lberstein@ieee.org

Dan Port
USC
dport@sunlight.usc.edu

Peter Dominic
Stevens Institute of Technology
pdominic@cs.stevens-tech.edu

Keywords: attitude toward software engineering, ATSE, student attitude, software process improvement, SPI

Workshop Summary

The purpose of this workshop is to provide university faculty and software development professionals with a background on work already done in developing a tool (ATSE) for measuring students’ attitudes to software process, and to involve them in the exploration of its use and further development. The outcome of this workshop will include guidelines for application of ATSE and other instruments within academic computer science programs and in industrial SPI efforts. The workshop will also involve the participant in the evolution of the various instruments.

The use of software is so pervasive that the success of software development projects in a host of application areas is critical to both the USA’s economy and its defense. Success in software development efforts requires expertise in both software technology (State of the Art) and software development process (State of the Practice, also referred to as software development “best practice.”) It is well understood that a larger fraction of software projects fail than projects in any other branch of engineering. It is further understood that a prime reason for the high failure rate is the lack of acceptance of, even an aversion to, what is perceived by many software developers, particularly those with above-average technology skills, as unnecessarily harsh discipline required by software development process.

It is surprising, therefore, that, while there exist tools for measuring competence in software technology, there exist no tools for measuring competence in software development process. We have embarked on a project directed at producing survey instruments and other tools for use in:

- performing outcomes assessment of the software development process-related aspect of entire undergraduate degree programs in Computer Science
- performing outcomes assessment of industrial SPI (Software Process Improvement) efforts
- determining those process-related skills if any, in which a particular Computer Science curriculum is deficient, and suggesting curriculum changes for overcoming specific deficiencies
- performing outcomes assessment of individual courses in software development process (Software Engineering) and of specific pedagogic approaches/techniques used in such courses
• assessing individual students’ contributions in courses in which students develop software products in teams
• performing outcomes assessment of industry and government SPI (Software Process Improvement) efforts
• determining those process-related skills if any, in which a particular industrial or governmental software development group is deficient, and suggesting specific types of training for overcoming specific deficiencies

Because, as indicated above, it is recognized that a negative attitude toward software process on the part of many software developers is, in large measure, the reason for software development project failures, an especially important part of the proposed work, which we have begun, and made considerable progress on, is the development of a tool – ATSE (Attitude Toward Software Engineering) for measuring students’ attitudes toward software process. Other outcomes-related tools will be used for assessing knowledge of and ability to apply software development best practice. These tools will, thus, cover attitude, knowledge, and behavior.

We have developed a first version of ATSE with input from, and test administrations by, faculty, at USC, Rutgers University, and Monmouth University, and through administrations focus groups, and tutorials at such conferences as CSEE&T 2002. We have begun to validate ATSE with the professional software development community through presentations, administrations, and focus groups at DoD’s STC (Software Technology Conference) 2002, and at meetings of NJSPIN (North Jersey Software Process Improvement Network), LASPIN (Los Angeles Software Process Improvement Network), and Xerox Corporation’s Software Engineering Process Group.