Research Directions in Software Process Improvement

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Software process improvement (SPI) has become a driving force in the global software industry. However, it has not become a popular topic of rigorous research, especially at universities. The purposes of this panel discussion are to 1) survey ongoing research efforts around the world, and 2) identify emerging or potential topics of research in this economically important area.

Several specific approaches to process improvement have become popular in the software industry. These include the following:

- Capability Maturity Model – Integrated [1],
- Six Sigma [2],
- Lean Development [3], and
- ISO Standard 9001 [4].

These approaches have evolved or been adapted to software engineering largely without the participation of the academic research community. Does this pose a problem?

My response is yes. One issue that inhibits the deployment of these approaches today is that these approaches are considered competitors. In reality they are all based on very similar concepts and techniques. The packaging obscures the underlying principles. Eliciting and refining underlying principles is the role of science.

Thus far, much of the "research" into the efficiency and effectiveness of these SPI approaches has been performed by the consultants who are promoting them. Academic researchers offer industry the benefits of objectivity and rigor. Ideally, their conclusions are not affected by a vested interest in the outcome of the research. They have more time for and better training in research methods. They can investigate issues more thoroughly than the consultants who are rushing from engagement to engagement.

And there are important issues to investigate – statistical, representational, conceptual, and practical. This panel will highlight some of them.

A common weakness of all of the SPI methods identified earlier is that they do not identify specific best practices within the software domain. At best they identify improvement approaches that work with established engineering practices, or in the case of the CMMI, identify kinds of practices that should exist within the organization.

The idea of "evidence-based software engineering" [5] offers a potential solution. This concept drives from recent experience in medicine. It involves the establishment and dissemination of mechanisms for identifying best practices (treatments) for different situations (medical conditions).

Clearly, the refinement and implementation of an evidence-based approach would require close collaboration between industry and researchers. However, that is a common problem facing researchers in all areas of software process improvement. Researchers require data from and access to industrial projects in order to perform meaningful studies. Progress in SPI research depends on the ability of researchers to establish effective linkages with industry. Consequently, consortia and collaborative research arrangements have mushroomed around the globe in recent years.

The selection of members for this panel reflects a wide range of geographical and research perspectives. While this diversity does not exhaustively cover the reality of SPI research, it is suggestive of the possibilities. The panel members' collective desire is that this discussion will encourage more researchers to enter the vital field of software process improvement.

References

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Proceedings of the 28th Annual International Computer Software and Applications Conference (COMPSAC'04)
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