Perspectives on Global Software Development: Special Issue on Profes 2007

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The field of software engineering has evolved significantly over the past decades. It can be argued that software has become the vital element of any system or service. Interestingly, even in the field of automotive industry, 90% of recent innovations stem from software and electronics (ITEA2 2005). Ever since the classic NATO conference in 1968, however, software has been argued to be in some state of crisis. From the 1990s, the crisis has been labeled as a chronic one. It is quite evident that several attempts to improve the state of software industry have taken place with varying levels of success. Software process improvement approaches have been developed since many decades ago. The results have been impressive, on the one hand, but many problems still exist. As an example, the business impact of software process improvement endeavors has been difficult to pinpoint, several of the improvement initiatives appear to fall short of their goals, and overemphasis on comparing processes with fixed reference models may lead an organization astray regarding the product or service perspective. The Profes conference series was established in 1999 to provide a venue for industry and academia to present and discuss the shift from model-based improvement to a product-oriented perspective in the field of software engineering and software process improvement. This includes a context-oriented understanding of the process-product relationships.

Recently, the focus in practice and, consequently, in research has been on viewing software development as a global endeavor rather than a local one. There are several reasons for this. To name but a few: The distribution of software development enables the optimum use of competence regardless of the geographical location. The large software-intensive organizations operate in the global space and market, which makes distribution a necessity rather than a choice. On the positive side, distribution enables the development of software and services close to the prominent market area. Despite these relatively clear advantages and

benefits, global software development has brought with it several challenges due to increased complexity and cultural as well as technology issues. These challenges are now being tackled by means of research taking place in Europe and elsewhere as witnessed by this special issue of Profes conference research papers.

Profes Conference series was established at the end of European IST project called PROFES (PROduct Focused Software process improvement) for disseminating the research results of the project area to industry. The PROFES Consortium included the members from the original development teams of GQM (Goal-Question-Metrics) (Basili et al. 1994), BOOTSTRAP software process assessment and improvement methodology (Kuvaja P. et al. 1994), and SPICE project (Paulk M. & Konrad M. 1994) results, thus having a good expertise to establish "a marriage between process and product measurement, modeling, assessment and improvement" in the context and product quality improvement. The consortium had also industrial companies producing embedded systems in medical electronics, petroleum industry and telecom.

The first Profes Conference in 1999 (Scientific proceedings available on-line at http://www.vtt.fi/inf/pdf/symposiums/1999/S195.pdf) stated the main focus of the conference and collected 153 participants out of which about 70% came from industry and represented 21 countries covering all continents. The most well-known keynote speaker was Professor Watts H. Humphrey from the Software Engineering Institute at Carnegie-Mellon University. The subsequent PROFES Conferences collected even more participants, kept the high degree of industrial participation and covering increasing amount of countries world-wide. Therefore, the purpose of the conference to serve as a bridge between industry and academia has been successfully fulfilled and the conference has become an international institution for publishing high-quality research papers and recent industrial experiences in the area of process improvement driven by product quality and product development. The previous PROFES Conferences has been held in Finland, Germany, Holland and Japan.

The Profes 2007 conference was held in Riga, Latvia on July 2-4, 2007. The program included one day dedicated to topical tutorials and two days for the research and experience tracks. Competition in the research track was tough due to many high-quality and interesting paper contributions. Altogether, 56 papers were submitted of which 30 were selected for presentation at the conference. The present editors would like to extend their acknowledgment to the active participants, the insightful keynote speakers, and the hardworking program committee for their time and dedication in making the 8th Profes

conference a success. Out of the 30 papers, the eight best papers were invited to submit a journal version for the SPIP special issue. Each journal candidate was reviewed independently by three reviewers. Consequently, based on the review results, five articles were selected for inclusion in the special issue and fully revised based on reviewers' comments. The current editors would like to especially acknowledge the authors' dedication in revising their papers carefully. In the following we provide brief introductions to the articles included.

In *Understanding a Lack of Trust in Global Software Teams: A Multiple Case Study*, Nils Brede Moe and Darja Ŝmite address the challenges of global software development that are related to trust. A multiple-case study with four global software development projects is described, which aims at analyzing the reasons and effects of a lack of trust. Data from qualitative interviews with project participants, post-mortem meetings, and project problem reports was used. Roughly speaking, the results from the study indicate that poor socio-cultural fit, inconsistency and disparaties in work practices, and a lack of conflict handling mechanisms are among the key influence factors. Based on the study, several effects could be identified, e.g., decrease in productivity, prioritization of individual goals over group goals, and decreased information exchange. Finally, the article provides recommendations for improving and maintaining trust in global teams.

In *A State-of-the-Practice Study on Communication and Coordination between Chinese Software Suppliers and Their Global Outsourcers*, Jianquang Ma, Jingyue Li, Weibing Chen, Reidar Conradi, Junzhong Ji, and Chunnian Liu address global software development from the perspective of Chinese suppliers. The article presents a questionnaire-based survey with data from 53 projects. The survey characterizes the following three aspects of interest in real projects: differences in natural language, communication channels, and overtime work. One result for this context is that differences in natural language do not seem to be a critical factor for project success. Further results are, roughly speaking, that different communication channels are used for different activities (such as development, management, requirements elicitation), and that overtime is mainly caused by requirements or schedule changes or overoptimistic estimations at the beginning of a project. Based on these findings, recommendations for organizing global software development from the supplier perspective are provided.

In *Demotivators of Software Process Improvement: An Empirical Investigation*, Mahmood Niazi, Muhammad Ali Babar, and Molin Mark Katugampola address global software development from the perspective of software process improvement (SPI) in Vietnam. The article presents a study aimed at identifying and determining the individual importance of factors that hinder the success of SPI programs in Vietnam. The study consists of a questionnaire-based survey with data from 10 organizations. Among other issues, lack of resources, lack of standards, and project managers' lack of technical knowledge were identified as SPI demotivators. The study results were compared with results from a study performed in the UK. This reveals potentially different SPI-impacting factors between the two countries, e.g., the low awareness of SPI programs among higher management in Vietnam and, as a consequence, problems with 'low process priority'. It is expected that the findings will help to understand demotivating factors better and assist in designing new SPI programs.

In *Performing Operational Release Planning, Re-Planning and Risk Analysis using a System Dynamics Simulation Model*, Ahmed Al-Emran and Dietmar Pfahl address the issue of operational release planning, i.e., assigning resources to feature development tasks such that total release duration is minimized under given constraints. The relevance of this topic with respect to global software development is manifold, e.g., resources are typically distributed over several locations with heterogeneous competence, productivity, availability, and communication capabilities. The article focuses on planning, re-planning, and risk analysis of the development of a single software release and describes support for decision making. The chosen approach consists of a methodology with a simulation model at its core. The applicability of the model is illustrated with scenarios containing data from industrial applications.

In *Impact of Pair Programmuing on thoroughness and fault detection of Unit Test Suites*, Lech Madeyski highlights the issue that selection and use of technology in specific contexts should be based on empirical evidence. This is especially important in critical, large, and globally distributed projects in order to control and mitigate risks. In addition, the study emphasizes the importance of the development context for the effects of a certain study. Different contexts (such as different cultures in different countries) can lead to different effects and such kind of knowledge is very helpful for planning. The article describes a controlled experiment that compares pair programming with solo programming with respect to the thoroughness and fault detection effectiveness of unit test suites in the context of a

course with European MSc students. The results obtained do not support the anecdotical opinion regarding the positive impact of pair programming on the thoroughness or fault detection effectiveness of unit tests for the chosen context.

The role of software is not likely to diminish in the future. Philips has presented data that shows that the growth of software has surpassed the famous Moore's Law in certain product categories (ITEA2 2005). We, as software researchers, are facing a challenge that may require a novel view to software engineering altogether. Whether it is Kuhnian type of paradigm shift or merely a modification in the protective research belt as Lakatos has argued, only time will tell. Profes will continue to be a premier conference for product-focused software process improvement. The upcoming conference, the Profes 2008, will be organized in Rome, Italy in June 2008 (http://www.profes2008.org).

References

Basili, V.R., Caldiera, C., Rombach, H.D., Goal Question Metric Paradigm, Encyclopedia of Software engineering (Marciniak, J.J., editor), Volume 1, John Wiley & Sons, 1994, pp. 528 − 532.

ITEA 2 (2005). European leadership in software intensive systems and services: The case for ITEA 2. (electronically available at http://www.itea-office.org/itea_2_blue_book_downl)

Kuvaja P. et al. (1994), Kuvaja, P., Similä, J., Krzanik, L., Bicego, A., Koch, G., and Saukkonen, S., Software Process Assessment and Improvement. The BOOTSTRAP Approach. Blackwell Business, Oxford, UK, and Cambridge, MA 1994.

Paulk M. & Konrad M. 1994, Paulk, M.C., and Konrad, M.D., An overview of ISO's SPICE project. American Programmer (February 1994).