

An Experimental Framework for Japanese Academic-Industry Collaboration in Empirical Software Engineering Research

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Abstract

Effective research in the field of empirical software engineering requires collaboration between academia and industry. However, in Japan, the academic side has traditionally had relatively little access to real software developers for field tests and other studies. Nor has industry had access to expertise accumulated in the academic institutions such as empirical methods, software metrics, and theories and models of software engineering.

The authors are field-testing a framework for such collaboration aimed at resolving this issue.

The poster illustrates this framework in the EASE (Empirical Approach to Software Engineering) project from the viewpoint of its conception, one year of initial use, and future expansion. [1]

1. Introduction

At the beginning of the EASE project in collaboration, several key factors were identified:

1) Leadership

It was considered important which side, academia or industry side, initiated the relationship in the project. For EASE, the academic side was chosen to be the trigger in applying empirical software engineering knowledge accumulated in academia field to software industry.

2) Explicit Product

A key factor for development of collaboration is what each side will supply to the other. In this case, the academic side could supply knowledge, know how, intelligence and some kind of intelligent man power to industry side, but such intangible items would not be as easily recognized. Instead, we decided to supply a newly developed software system. It is a kind of software development management environment which automatically collects and measures quantitative data

from the software development support system. This software platform is the medium for the collaboration.

3) Budget and resources

Generally collaboration projects need initial funding. The Japanese government has provided *seed money* for this project, however, it is provided as a matching fund, requiring industry to put human resources or other resources into the project. This has helped identify core industry partners who supply human resources and software development technology to the project.

4) Physical work place

While either the university campus or the company factory could provide locations for the project, it was considered better for collaboration to establish an independent laboratory for collaborative work. The project thus uses the collaborative lab, university facilities, and industry space in a distributed fashion.

5) Project evolution strategy

A key part of the project is the evolutionary strategy. At present, this has been laid out as three steps:

Step 1: Conceptual work and prototype software platform system development with core university members and core industry companies.

Step 2: Supply initial software platform to a few close industry companies and collect feedback from them. Realize data sharing with this company group, and further development of the software platform.

Step 3: Supply improved software platform more widely and establish a community based on this platform. Realize data sharing in this wide community.

2. Background

The gap between academic research and industry practice may be larger in Japan than in other countries. Collins and Wakoh (2000) describe the historic roots of this gap, and point to major changes in the governmental

policies during the middle and late 1990s which are aimed at changing this. [3]

At the same time, articles point to the need for both academic and industry initiatives in empirical software engineering. Kitchenham and Budgen (2002) identify setting priorities for empirical software engineering based on the needs of industry as one of the major issues in this field. [4] Jeffery and Scott (2002) identify three challenges, the second requiring researchers to extract theory and models from industry practice, which requires academic researchers to work closely with industry. [5]

3. EASE Project

The EASE project for exploring collaboration between academia and industry in empirical software engineering began in April 2003, funded by MEXT with matching funds. Figure 1 shows the framework of the project.

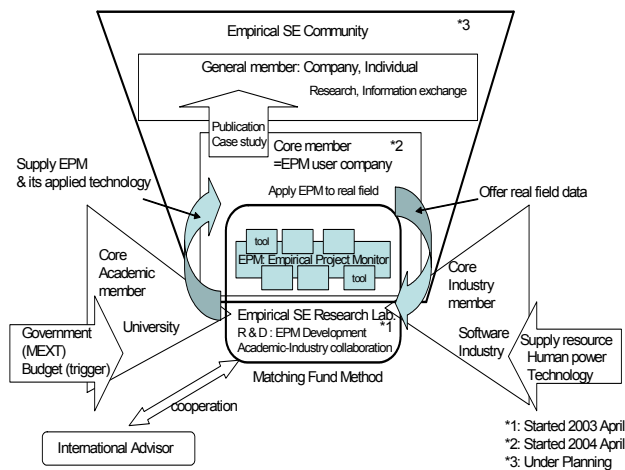


Figure 1. Empirical SE Research Framework

Nara Institute of Science and Technology (NAIST) and Osaka University are the core academic members, with four software companies as the core industry members.

The Empirical Software Engineering Research Laboratory was established for this project in Senri, near Osaka. This has been the center for development of the software platform named the Empirical Project Monitor (EPM). [2]

In Fall 2003, we held the First International EASE Forum in Tokyo to open the project to industry and obtain additional research partners. The project also has obtained oversea advisers to support this project and provide additional expertise in collaboration with industry.

By April 2004, an alpha version of EPM was released to core partners. At this time seven software companies are participating in early adoption of EPM. This includes signing a collaboration research contract between the university and EPM user company. The company agrees

to use EPM with at least one real software development project and to share collected data with the university.

4. Merit of the EASE Project

From the academic side, it becomes easier to access the software industry's real software development field through the medium of EPM. I.e., we gain access to collected data from real software development, and we learn to work with them.

From the industry side, they can get the useful EPM platform for free, and learn to communicate with academic staff. They also have easier access to university research knowledge through the packaged medium of EPM, and through the contacts with academic staff.

5. Future evolution of EASE project

As companies adopt and use EPM, they will want additional functions. The EASE project intends to work with the companies to make EPM a useful tool for them.

The next step is establishing a feedback loop, with companies using EPM, data from EPM being accumulated and analyzed by the EASE project, and results of the analysis being returned to the companies.

Also, the EASE project expects to establish a community of practice for empirical software engineering, based around EPM and the ongoing collaboration between academic and industrial partners.

6. References

1. The EASE Project, <http://www.empirical.jp/>
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3. Collins, S. & Wakoh, H. (2000) Universities and technology transfer in Japan: Recent reforms in historical perspective. *Journal of Technology Transfer* 25 p. 213-222
4. Kitchenham, B., and Budgen, D. (2002) Editorial Special issue: Empirical software engineering. *IEE Proceedings-Software* 149(5) 113.
5. Jeffery, R. & Scott, L. (2002) Has twenty-five years of empirical software engineering made a difference? *Proceedings of the Ninth Asia-Pacific Software Engineering Conference*.