

3rd International Workshop on Conducting Empirical Studies in Industry

(CESI 2015)

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Abstract— Few would deny today the importance of empirical studies in the field of Software Engineering (SE) and, indeed, an increasing number of studies are being conducted involving the software industry. While literature abounds on empirical procedures, relatively little is known about the dynamics and complexity of conducting empirical studies in the software industry. What are the impediments and how to best handle them? This driver underlies the organisation of the third in a series of workshops, CESI 2015. Apart from structured presentations and discussions from academic and industry participants, this workshop (like predecessor workshops) includes a “wall of ideas” session where all participants asynchronously post their ideas on the wall, literally, which are then analysed. As a tangible output, the workshop’s discussions will be summarised in a post-workshop report.

Index Terms—Empirical studies, software industry.

I. INTRODUCTION

An “Empirical study” is an investigation, using established procedures (also called “empirical methods”), for the purpose of gaining knowledge through observation. Empirical methods fall under the broad categories of case studies, scientific experiments and surveys. Investigative questions of interest are posed and related data is gathered and analysed to answer these questions. Briefly, with experiments, we are in search of quantitative, cause-and-effect relationships, involving control of treatment. With case studies, we are in search of qualitative or quantitative relationships among the identified variables in the case under study in the real-world setting (and hence does not involve any control). With surveys, we are in search of qualitative or quantitative responses from a sample representative of the population under study. There are various “research designs” to cater for different investigative situations. Examples include: independent measures, repeated measures, matched pairs, etc.; exploratory case studies, longitudinal case studies, ethnographic studies, action research, etc.; and online surveys, focus groups, interviews, etc. With empirical studies being widely entrenched in fields such as social sciences, psychology, management sciences, and medicine, there is obviously much more in the general literature on empirical

studies than what is hinted above. Still, this brief introduction will suffice for our purpose here.

In so far as Software Engineering (SE) is concerned, empirical studies lie at the heart of this burgeoning field. The quality of these studies is a determinant of the validity of the research findings and proposed solutions (i.e., methods, techniques, tools, etc.) and of the success of the evolution of the SE discipline as a whole. With increased awareness, more and more researchers are conducting empirical research in SE and increasingly so involving the software industry.

While there are established empirical methods in the general literature, relatively little is known about conducting empirical studies involving the software industry. For instance, what pitfalls to avoid when investigating phenomena in an organisation; what challenges to anticipate when evaluating the efficacy of methods and tools in actual projects; what are the *dos* and *don'ts* when conducting practitioner surveys? Such questions abound and they formed a primary trigger for organising this workshop.

Experience suggests that empirical studies conducted in industrial settings are particularly challenging because the actual environments are complex and what is first observable by researchers (typically from academia) may only be a tip of an iceberg. Yet, relevant investigative questions must be formulated, valid constructs need to be defined, trust needs to be in place, relevant and quality data must be gathered within the small time-frames available, industry-relevant results need to be delivered in real-time, etc. In essence, researchers often need to be able to run while they are still learning how to walk.

Building on the results and momentum of the first two CESI workshops, held during ICSE (2013 and 2014), a new element instance was run at ICSE 2015. In addition to the methodological focus of the previous workshops, discussion on tangible outputs in the context of the empirical studies conducted in industry was sought. The idea behind this move is to: (i) further precipitate empirical research in the SE community, and (ii) engage industry participants from the point of view of the utility of the results emanating from empirical studies. A long-term goal of the series of CESI workshops is to create a vibrant research and practice community with a focus

on conducting disciplined empirical studies in industry hoping that their results will lead to improved software engineering practices, techniques, methods, processes, technologies, products/systems and services.

II. THEME, GOALS, PROCEEDINGS AND RESULT

The theme of the CESI series of workshop is thus: “conducting empirical studies in industry”, and the goals listed in this year’s call for papers were:

- Validation of suggestive investigative questions;
- Communication between researchers and practitioners;
- Stakeholder involvement in empirical studies;
- Establishing relationships based on trust and relevance;
- Dealing with threats in organizational settings;
- Interpreting results in industrial contexts;
- Generalising the findings from case studies;
- Designing and conducting a family of studies;
- Impact of industrial settings on the design of, and on conducting, case studies, action research, studies in the field, exploratory studies, longitudinal studies, etc;
- Empirical results and their utility in specific industrial contexts.

III. THE REVIEW PROCESS AND FINAL PROGRAM

There were 16 submissions to the workshop, all of them pertaining to two categories: technical papers and experience reports. One of the papers was desk-rejected for being out of scope. Each of the remaining 15 papers was reviewed by at least three reviewers. The outcome of this process yielded 7 regular papers for presentation in the workshop:

- Sira Vegas; Oscar Dieste; Natalia Juristo: Difficulties in Running Experiments in the Software Industry: Experiences from the Trenches.
- Mathieu Lavallee; Pierre N. Robillard: Planning for the Unknown: Lessons Learned from ten Months of Non-participant Exploratory Observations in the Industry.
- Lutz Prechelt; Franz Zieris; Holger Schmeisky: Difficulty Factors of Obtaining Access for Empirical Studies in Industry.
- Naomi Unkelos-Shpigel; Sofia Sherman; Irit Hadar: Finding the Missing Link to Industry.
- Klaas-Jan Stol; Brian Fitzgerald: A Holistic Overview of Software Engineering Research Strategies.
- Jonatas Ferreira Bastos; Paulo Silveira; Eduardo Santana de Almeida; Silvio Romero de Lemos Meira: Software Product Lines Adoption: An Industrial Case Study.
- Talita Ribeiro; Guilherme Travassos: On the Alignment of Source Code Quality Perspectives through Experimentation: An Industrial Case.

These papers, together with one keynote and 2 invited talks (see next section), were organized into a 4-session program, which included a “wall of ideas” session, as conducted in the first two instances of the CESI workshop. The program, and

other relevant information of the workshop, can be found at the website, <http://www.essi.upc.edu/~franch/cesi2015/>.

IV. INVITED SPEAKERS

The keynote presentation was given by Dr. Dieter Rombach (Software Engineering Chair in the Department of Computer Science at the University of Kaiserslautern; founding and Director of Business Development of the Fraunhofer IESE, Germany). In his presentation, Dr. Rombach described the stumbling blocks towards broader use of case studies, outlining some of the technologies and research needed to overcome these barriers, and sketched a vision of empirical studies in the future.

We also had two invited talks: Prof. Tony Gorschek (Blekinge Institute of Technology, Sweden) presented good practices from real life projects which increase the chance of successful transfer to practice, and Alistair Mavin (Rolls-Royce PLC, UK) shared an industry perspective on the effective application of research in projects.

V. PROGRAM COMMITTEE

Silvia Abrahão, U. Politécnic de Valencia, Spain; Muhammad Ali Babar, U. of Adelaide, Australia; Ayse Bener, Ryerson U., Canada; Dan Berry, U. Waterloo, Canada; Eric Bouwers, Software Improvement Group, The Netherlands; David Callele, Experience First Design Inc., Canada; Juan P. Carvallo, U. del Azuay, Ecuador; Maya Daneva, U. Twente, The Netherlands; Joerg Doerr, Fraunhofer, Germany; Remo Ferrari, Siemens, USA; Luiz Paulo A. Franca, Programare Informática, Brazil; Smita S. Ghaisas, Tata Consultancy Services, India; Paul Gruenbacher, Johannes Kepler U., Austria; John Grundy, Swinburne U. of Technology, Australia; Frank Houdek, Daimler A.G., Germany; Rushikesh K. Joshi, IIT-Bombay, India; Natalia Juristo, U. Politécnic de Madrid, Spain; Kostas Kontogiannis, NTUA, Greece; Zude Li, Central South U., China; Alistair Mavin, Rolls-Royce PLC, UK; Andriy Miranskyy, Ryerson U., Canada; Parastoo Mohagheghi, Norwegian Labour and Welfare Administration, Norway; Aitor Murguzur, Ikerlan, Spain; Shariyar Murtaza, Corcordia U. & Defence, Canada; Robert Nord, CMU, USA; Dewayne Perry, U. Texas, USA; Adam Porter, U. Maryland, USA; T.V. Prabhakar, IIT-Kanpur, India; Lutz Prechelt, Freie U. Berlin, Germany; Bjorn Regnell, Lund U., Sweden; Erik Simmons, Intel, USA; Rakesh Kumar Singh, Siemens, India; Tetsuo Tamai, Hosei U., Japan; John Terzakis, Intel, USA; Marco Torchiano, Politecnico Torino, Italy; Larry Votta, Brincos, USA; Roel Wieringa, U. Twente, The Netherlands; Claes Wohlin, Blekinge Institute of Technology, Sweden; Kentaro Yoshimura, Hitachi, Japan. Xavier de Carlos, Ikerlan, Spain, acted as an external reviewer.

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