"I 've seen the future, and it's software-shaped"
The set-up of a software engineering research infrastructure of the 2010's

A position statement

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Abstract

Software engineering is one of the few disciplines which continue to lack the university hospital of software development. There is no facility specifically designed to enable the research into software development that is realistic and open where data can be freely shared for verification or other purposes. We can keep up debating about the need for setting up such an infrastructure or just go ahead and begin building it. Software Factory is an initiative that I have had in my mind for many years. Shortly put, the Software Factory is a strategic investment to a new infrastructure supporting software engineering research, education and entrepreneurship globally. The reference implementation of the Factory is now in place and it is currently expanding to its global capacity housing up to 150 software engineers by end of 2011. Software Factory of today is not intellectually connected to the earlier undertakes with the same name stemming back in 1980's in Japan or in the US. Rather, it represents the software development of the 2010's. Early results are more than promising. A company born global is about to be launched, research results are quickly emerging and students find it as the place to gain experience!

Introduction

Software is the innovation of 20th century. Despite of rapid advancement in the field since 1950's we keep referring to the 1968 NATO conference where the slogan "software crisis" was coined. Since then, in every decade, new set of buzzwords have been proposed with a claim to solve the principal problems of the field. Software development is today predominantly driven by the minds of teams of people solving the problem at hand. The promises made by formal methods, method engineering, object-orientation, automation, case-tools, re-engineering, re-use, component-based software development, universal modeling approaches, process models and frameworks or even agreed set of standards have fallen short in the hand of software managers, engineers as well as the researchers.

New technologies keep emerging and the way we have perceived the very notion of software is becoming somewhat blurred. Indeed, already today, software has become transparent in our daily lives. You find software close to everything you do in your life. Yet, it remains a mystery how the birth of software comes out systematically, innovatively and without too many defects built-in to the first release of the new software based service.

The future, in any case, is full of software.

Having software for breakfast

Unlike other mature disciplines, the field of software engineering continues to lack a research and

development infrastructure that supports systematic testing of novel software engineering techniques and tools, the seamless integration of current to-date practices and methods to the educational curriculum as well as the means to support ways to grow entrepreneurs from the students with ideas and mindset supportive of the needs of software business.

Software Factory is Department of Computer Science's (in University of Helsinki, Finland) strategic investment to a new infrastructure supporting software engineering research, education and entrepreneurship globally. It has been in full operation since 15.1.2010.

Contrary to the expectations, Software Factory is not intellectually connected to the earlier undertakes with the same name stemming back in 1980's in Japan or in the US. Software Factory, as we speak of it, is not connected to Microsoft's initiative recently under the same name. Rather, Software Factory represents the software development of the 2010's in its capacity to install a new mindset to students and affiliates. This mindset brews entrepreneurial spirit, innovative software and deep thinking what comes to understanding the requirements in the domain of web development.

Software Factory has the slogan: Learn. Share. Grow. Software factory is a unique infrastructure platform where innovative software is being developed. It is in its essence a global & experimental software R&D lab. As a platform it serves for multiple purposes. It is a test bed for software engineering ideas and a source for original basic science research on software development. It is an educational vehicle for universities where the artifacts produced in the factory serve as a teaching material. It is a learning experience for students participating to the operations of the factory. It is designed to deliver an experience of a lifetime for students. In its essence, it is a build-up environment for students having an entrepreneurial mindset and ambition to create a fully operational business-prototype of their idea.

Software Factory houses between 10-15 students working in an inspiring environment, which resembles closely to the actual industrial settings. Students are therefore required to adhere to the pressures apparent in the business environment but at the same time they are educated with modern software technologies, development methods and testing techniques. Factory operates 8-10 months a year and aims to produce to business-driven prototypes for services operating in the Internet clouds.

If only everything in life was as reliable as software

Software factory approaches cloud and software engineering from a three distinct perspectives: Education, Research and Entrepreneurship.

The real smell of education. Education strives to integrate its operations in the teaching of several universities offering a wide-range of real-life data and material for university teachers' use. The global development space makes the learning experience for students something unreachable in typical university settings. In addition to this, the real-life development environment and requirements give the students an opportunity for significant learning gains as opposed to traditional software development projects.

Have research your way. Software factory's research trains effectively PhD students, performs basic and applied research in its operating context and performs tests for evaluating different research methods. Software factory provides a context for PhD students as well as Master's students to pursue their thinking further and challenge the common wisdom. The Software Factory is designed for allowing a multitude of different ways to collect data unseen before. Cross-disciplinary research is part of the field of software engineering. Therefore the factory has an open call for

research proposals to investigate team dynamics, programming psychology and beyond to fully make use of the opportunity at hand. Software Factory's research is built upon highest ethical rules and each research endeavor shall follow the Factory's research protocol as well as the outlined research design.

Got a business? You're in luck. Finland, Europe and the world needs software entrepreneurs to make business out of software applications developed. Each of the Software Factory's development initiative strives to develop a business-prototype for an alpha-test phase when released. The business development cycle lasts for a single Software Factory operational cycle, which is 7 weeks. After the business prototype cycle is finished, the team goes into a process supported by our collaborators in which the aim is to launch a high-expectation entrepreneurship. This includes the procedures for setting up a company, seeking for a funding as well as other means for business development support.

Stop. This software is not ready yet.

The Software Factory operating in University of Helsinki's Kumpula Campus is designed to be a reference laboratory and aims include building up similar infrastructures in the global space. If successful, we are launching a fully operating satellite-hub in Universidad Politécnica de Madrid in Spain in the near future. We continue our future build-up endeavor in India, Australia and Canada. We keep looking for other opportunities around the globe in order to set up a fully operational global software factory by the end of 2010. We believe that our unique approach to this software engineering infrastructure will attract companies and other researchers to share data and build up the cumulative understanding on the complexities of software development and services in the cloud.

Concluding remark

The Software Factory was officially opened after the delivery of its first fully operating business prototype in 4.3.2010. A quote from a senior manager from a global company producing cellular base stations (Nokia Siemens Networks) tells me that we are on the right track:

> "This is exactly the thing that I had in my mind, but you had it already put in practice. All the angles well thought of and first steps already taken. I will remain waiting for the future developments with excitement. Really positive thing!!!!" My guess is that this will remain as one of the most significant steps in University's computer science education."

When reading the quote above, one should remember that if he refers to the specific department where I work in, this will be a challenge since Linus Torvalds, the inventor of Linux studied and worked in the department in the 1990's.

SEMAT can think of how to utilize the global platform for university driven education, research and entrepreneurship in fulfilling its mission of developing the Kernel for software engineering. Moreover, while we have the capability to track & measure close to anything – from brain waves to eye movement and everything in software, this opens up a new avenue for theoretical development and application..