

Re-founding Software Engineering Practice

The SEMAT Initiative

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Abstract— In 2009 a group of leading international Software Engineering (SE) thinkers, authors and methodologists began collaborating on an initiative to “Re-found” Software Engineering. Ivar Jacobson (Use Cases, UML, RUP), Bertrand Meyer (Design-by-Contract and the OO Language Eiffel) and Richard Soley (CEO of the Object Management Group (OMG)) established the SEMAT (Software Engineering Method and Theory) Initiative. Supporters of the initiative have signed a declaration somewhat reminiscent of the famous Agile Manifesto. Over the past two years a great deal of work has been carried out on defining the “kernel of widely-agreed elements”. It holds out the promise of fundamentally changing the discipline of software engineering. This short paper describes the current status of SEMAT and explores opportunities for the SA Software Engineering community to become active participants in this initiative.

Keywords- Software Engineering, SEMAT, Methods, Practice, Kernel

I. INTRODUCTION

The discipline of Software Engineering has its origins at two conferences in 1968 and 1969 organized in Garmisch, Germany by the NATO Science Committee [1]. These conferences were held in response to the so-called “software crisis” – most software development projects being undertaken at that time were costing more than expected, taking longer than planned and being delivered with large numbers of defects.

More than forty years later the “software crisis” still remains a concern for all of those involved in the acquisition and production of large and medium sized software systems. With this in mind three prominent figures in the field of Software Engineering agreed in September 2009 to collaborate in an initiative called SEMAT (Software Engineering Method and Theory). Ivar Jacobson, known as the developer of Use cases, UML and the Rational Unified Process (RUP), got together with Bertrand Meyer, the prominent Swiss-based computer scientist and creator of the Eiffel language, and Richard Soley, CEO of the influential Object Management Group (OMG) to form the “Troika”. They described the state of Software Engineering as follows [2]:

Software engineering is gravely hampered today by immature practices. Specific problems include:

- *The prevalence of fads more typical of fashion industry than of an engineering discipline.*
- *The lack of a sound, widely accepted theoretical basis.*
- *The huge number of methods and method variants, with differences little understood and artificially magnified.*
- *The lack of credible experimental evaluation and validation.*
- *The split between industry practice and academic research.*

They issued the following “Grand Vision” [2]:

“We support a process to refound software engineering based on a solid theory, proven principles and best practices that:

- *Include a kernel of widely-agreed elements, extensible for specific uses*
- *Addresses both technology and people issues*
- *Are supported by industry, academia, researchers and users*
- *Support extension in the face of changing requirements and technology”*

In the months that followed the issuing of this declaration, over 30 of the leading figures in Software Engineering added their signatures to this call for a revolution in their discipline. The list includes pillars of the establishment such as Bill Curtis (CMMI and People CMM), Barry Boehm (COCOMO and the Spiral Model) and Ed Yourdan (Structured Analysis and OO Analysis and Design). Several leaders of the Agile movement are also on the list including Ken Schwaber (Scrum) and Scott Ambler (Agile Unified Process). (see [2] for current list of signatories).

Watts Humphrey, father of CMM, PSP and TSP attended the first meeting of SEMAT in Zurich in 2010 and said that “This meeting is likely to be an historical occasion, much like the meeting in Garmisch in 1968”.

II. THE STRUCTURE OF SEMAT

The founders of SEMAT, Jacobson, Meyer and Soley, decided to ensure that the initiative is as broad-based and inclusive as possible. The three of them constitute an Advisory Board tasked with over-seeing and promoting the initiative. They are supported by an eight-member Executive Committee chaired by Paul McMahon (author of several articles on the relationship between Agile development and process improvement and a book on “Virtual Project Management”). All participants of these structures are volunteers.

Support for SEMAT has come from prominent individual, corporate and academic “signatories” plus a growing list of “supporters” all of whom have signed up on the SEMAT website [2]. By 12th May 2012 there were 1679 signed up supporters from all over the world.

The structure of SEMAT also caters for regional Chapters. The first two chapters are from Latin America and China. A third chapter was established when a South African Chapter was launched in Johannesburg on Tuesday 8th May 2012 and in Cape Town on 9th May. (See below).

III. THE WORK OF SEMAT

The initial focus of SEMAT has been around three ‘tracks’: Language, Kernel and Practices. A major effort has gone into “the Kernel”.

In describing the Kernel Ivar Jacobson [3] quotes the artist Michelangelo: *"In every block of marble I see a statue as plain as though it stood before me, shaped and perfect in attitude and action. I have only to hew away the rough walls that imprison the lovely apparition to reveal it to the other eyes as mine see it."* Jacobson believes that at the heart of all software development methods and practices is a core of commonly agreed elements – the Kernel.

Over the past year the SEMAT Initiative has focused on finding this Kernel – “hew[ing] away the rough walls” that represent all of those parts of software engineering that represents the fads and fashions to expose a widely-agreed essence of the discipline.

The result is that the SEMAT working group tasked with this work believes it is now possible to show that all software development “methods” are composed of “practices”, which, in turn, are described using “kernel elements”. These elements are a “stripped-down, lightweight set of definitions that capture the essence of effective, scalable software engineering in a practice independent way.” [4]. Jacobson points out that while there are over 100,000 software engineering methods, there are only about 250 practices required to define them. SEMAT has so far identified only 7 kernel elements, or “Alphas” [4]. These Alphas are called:

- Opportunity
- Stakeholders
- Requirements

- Software System
- Work
- Team
- Way of Working

Work has also started on developing a formal language that can be used to describe Methods, Practices and the Kernel.

Having defined a Kernel, and having shown that its Alphas can be used to describe hundreds of different practices, which can then describe various methods, SEMAT is now engaged in defining a standard.

The aim is to have OMG, the influential standards body involved in the creation of enterprise integration standards, recognize the SEMAT kernel as a standard. In June 2011 OMG issued a Request for Proposals (RFP) covering the “Foundation for the Agile Creation and Enactment of Software Engineering Methods (FACESEM)” [5]. On 20th February 2012 SEMAT submitted a response entitled “Essence – Kernel and Language for Software Engineering” [6]. This submission is now being reviewed and considered by OMG.

IV. MAKING SOUTH AFRICA’S IMPACT ON SEMAT

South Africa has a long-established and vibrant software development community. Since the 1950’s software engineers in South Africa and from South Africa have made their mark as innovators and pioneers. In the crucially important area of software engineering methods and practice we have largely been consumers of ideas that have originated elsewhere.

The SEMAT Initiative, with its aim of re-founding Software Engineering, provides a wonderful opportunity for South Africans to express themselves. With this in mind a Chapter of SEMAT – only the third in the world – was launched on 8th May 2012.

The objectives of the Chapter have been defined as follows:

- Work to promote the Grand Vision (see above) in South Africa
- Act as a conduit bringing information about SEMAT deliberations and activities internationally to the SA Software Engineering community
- Critically review all SEMAT information and deliberations
- Ensure that the SA Software Community is not merely a consumer of SEMAT-related information, but that it claims its status as collaborators and originators of this information
- Find ways to involve all regions in South and Southern Africa
- Develop local research and educational initiatives in support of the SEMAT objectives

An Advisory Board has been set up consisting of Ivar Jacobson and Prof Barry Dwolatzky (Head of Software Engineering at

Wits University and Director of the Joburg Centre for Software Engineering (JCSE)). Membership of an Executive Committee and a Programme of Activities are currently being discussed.

V. CONCLUSION

SEMAT is a bold and ambitious initiative. It begins with a “Grand Vision” that has found amazingly widespread support. There is now a great deal of effort required to achieve this Vision. This work has barely started.

Academics and practitioners, Agilists and process freaks, gurus and students, all have a unique opportunity to put aside differences and collaborate in achieving a genuine re-founding of software engineering as a discipline.

The newly-formed South African Chapter of SEMAT can provide a platform for the local software engineering community to make its mark on this international initiative. This is a call to action – I hope that we respond.

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