SEMAT – Moving forward

Ivar Jacobson, June Sung Park, Shihong Huang
May 01, 2013

Contributors: Arne Berre, Michael Goedicke, Pontus Johnson, Mira Kajko-Mattsson, Paul McMahon, Ian Spence, and SEMAT chapter chairs – they are Zhong Chen (China), Carlos Mario Zapata Jaramillo (Latin America), Barry Dwolatsky (South Africa), Boris Pozin (Russia), and Hironori Washizaki (Japan)

Disclaimer: This paper is a work document to be discussed within the SEMAT executive committee and within the different chapters of SEMAT.

1   Introduction

In the Semat Three Year Vision [1] we described the objectives of SEMAT. The first step was to develop a foundation for software engineering consisting of a kernel and a language to define methods, practices and kernel elements. Such a foundation, called Essence, has been developed and it is expected that Essence will become a standard be adopted by OMG during 2013. The first part of the three-year vision has been fulfilled. Now it is time to start working on the next steps of SEMAT. Particularly, we need to work on three areas:

1. Practice area: for example, working on a practice library on top of the kernel, requirements of SEMAT, the development of tools, the development of courses in software engineering, etc.
2. Theory area: for example, the development of a general theory of software engineering, and research in software engineering.
3. Community area: for example, making SEMAT a legal entity, seeking funding, and growing the community.

The following sections discuss these three areas respectively.

2   Practice Area

Leaders: Paul McMahon and Ian Spence.
In this area the most prioritized projects are the following:

2.1   Essence User Guide

What are the different scenarios in which Essence can be used? This user guide is quite an important document of Essence, which is worked upon as part of the Finalization Task Force in getting Essence adopted as an OMG standard.

2.2   Practice library

Once the kernel and language are stabilizing, we need to collect many example practices for everybody to share. We will set up a practice library to allow people to exchange practices from different domains worldwide and to publish them as part of a SEMAT hosted catalogue.

The objective of this practice library is to collect, for example, 25 practices on top of the kernel. Establishing this library is fundamental to the industry.

2.3   Tools

The creation of an open source project based on Eclipse has been discussed. We need to start an open source project where at least one tool will be developed that supports Essence similar to Agile/Scrum/Kanban open source tools available today (e.g. JIRA, SeeNowDo, etc...)

2.4   Education

SEMAT should create and offer education to help people understand its concepts and put them into practice. Such an education can start from the following areas:

a.   An introduction to Software Engineering – the basic concepts in the kernel etc. The book 'The Essence of Software Engineering' [2] is an example of what should be developed. E-learning is also expected to play an important role.

b.   Capturing practices in the Kernel Language – hands-on training on how to write practices by showing examples.

c.   Assessing Progress and Health – using the kernel and alphas to assess progress and health of software development. There are probably two different perspectives on this 1) externally, by the auditor/coach and 2) internally, by the team that drives their own work.

d.   Building and comparing methods

Note: The training courses would naturally lead to text-books and other publications. The academia is now in dire need of training material for Essence. The Essence book and the OMG submission can serve as the foundation for such training material. Some training has already been developed at Florida Atlantic University, at Oslo University and at KTH (in Stockholm). At UDE/paluno (Essen Germany) online training will be developed as well.

3   Theory Area

Leaders: Michael Goedicke and Pontus Johnson

3.1   Awareness and Community building

An important part of SEMAT is that a general theory of software engineering is planned to emerge. As argued extensively elsewhere (e.g. in the IEEE Software article by Pontus, Mathias and Ivar), the benefits of such theories are difficult to overestimate. However, awareness of this fact is low in the software engineering community. Therefore, in order to fully realize the theoretical potential of SEMAT, there is a need to build awareness of the importance of theory in the software engineering community.

The series of workshops held under the title SEMAT Workshop on a General Theory of Software Engineering (GTSE) are a key component in such awareness building. By gathering a community of researchers interested in the development of general software engineering theory, momentum can be created, and the issue can receive the public attention it deserves. First indications of such effort can be seen (e.g., invitations to give talks, attendance to the workshop series etc.) and there is good chance that this development will be a sustainable effort in software engineering community.

In order to build a large community, it is important to encourage a diversity of opinions. Too forceful attempts to guide the thinking of the solicited researchers will most likely

result in them abandoning the SEMAT community. SEMAT can in this area thus best act as a platform for an open discussion on general theories. The main goal in this sub-activity is thus to promote community awareness of the benefits of general theories.

3.2   A SEMAT general theory of software engineering

In addition to community awareness building, which is an organizational task, we also want to contribute with a SEMAT general theory of software engineering. This theory should be solidly based on the Essence language and kernel, but should demonstrate the benefits that come with good theories. In particular, the theory should support software engineering practitioner's' goal-oriented decision-making. As argued elsewhere, such support is predicated on the predictive capabilities of the theory. Thus, SEMAT should be augmented to allow the prediction of critical software engineering phenomena. Sample questions that the theory aims to answer including the following:

   a.   How will project success be affected by changing the way of working?
   b.   How will project success be affected by changing the team structure and characteristics?
   c.   How will project success be affected by changing the content and form of the requirements?
   d.   How will project success be affected by changing ...?

The GTSE workshop series assists in the development of the SEMAT general software engineering theory by engaging a larger community in the search for, development of, and evaluation of promising theories, which may be used as a base for the SEMAT theory.

3.3   Practice-specific research

Apart from looking for a general theory of software engineering, practice specific research also needs to be conducted. Those specific research aims to answer questions such as "Is pair programming better than peer programming", "are use cases better than user stories", "components better than just objects". This kind of research can serve as a test bed for the theories we are going to develop under Section 3.2.

4   Community Area

Leaders: June Sung Park and Shihong Huang

4.1   Making SEMAT a Legal Entity

SEMAT is not yet a legal entity, which could be a prerequisite to get funding from different resources. There are different ways of accomplishing this goal. One is through OMG, but without being tightly connected to OMG. An example reference http://www.cloud-council.org/. Funding is a very important factor. Recently, June Sung Park as the principle investor has secured a research grant for $100,000 from the Ministry of Trade, Industry and Energy in to KAIST for setting up the Korea Chapter of SEMAT, and contributing to further development and OMG standardization of Essence. Other similar efforts should be made from different sectors of the SEMAT community. Funding could come from many sources and in different format. For example, one could

be from corporate signatories. They could pay a fee of between $5,000 and $100,000, a business model that we can learn from OMG.

4.2   Engaging our signatories

The adoption of the new standard will help to create interest from the community. The Essence book will ignite the interest. The Essence book has been translated into Chinese, Spanish, Portuguese and it is being translated into Russian. The number of academic and corporate signatories also needs to grow.

4.3   Establishing more chapters of SEMAT

We have now chapters in the following regions: China, Latin America, South Africa, Russia. Chapters in Japan and Korea are under formation. The most important task is to engaging the chapters and to stimulate activities of the chapters.. Workshops are an attractive way to get chapters involved.

4.4   Publications

Publication, publication, publication…and books about the language and more books about usage of Essence …all are needed to stimulate the community.
The CACM paper http://queue.acm.org/detail.cfm?id=2389616 has been downloaded around 20,000 times.

5   SEMAT Regional Chapters

Apart from the work going on in the general SEMAT community, significant work has been done in the different regional chapters of SEMAT.

5.1   China (established in April 2011).

Chairman: Zhong Chen

Activities

The Essence book was translated into Chinese and will be published soon. Based on the book, SEMAT China will organize several activities among colleagues and communities either together with publishers or with CSIA and CSDN (China Software Development Network). Training courses will be provided in summer 2013 among software engineering instructors.

China Chapter is encouraging researchers and developers in China to get more involved with SEMAT Theory and Practice R&D through research funding support from local government or industry. China chapter also actively participate in China Software Engineering Standard Summit and others venues to enhance the collaborations between China and international SEMAT communities.

Future Work

China Chapter is planning to establish a practice library by collecting several typical practices used in industry. It will develop a certification program and propose it to establish an international SEMAT standard. Moreover, it will initiate tool development.

 China Chapter will grow its membership national wide based on a legal entity. This legal entity could be established either by branches of SEMAT international or being hosted in CSIA or CCF.

5.2   Latin America (established in August 2011).

Chairman: Carlos Mario Zapata Jaramillo

Activities

The main activities the Latin American chapter has done are related to the dissemination of the SEMAT message in local region. They have held two Latin American Symposium of Software Engineering, in Medellín and Lima, respectively. Some other presentations in important conferences and universities are part of this strategy. The chapter also has worked on the Spanish and Portuguese translations of the Essence book and other important documents related to SEMAT. It has created a set of experience-based games as a teaching tool. The chapter has worked with industry to present SEMAT, especially in Colombia, Argentina, Brazil, and Chile. The Latin American Chapter has contributed to the proposal submission to the OMG

Future Work

The chapter will define and start the work with Ph.D. and M.Sc. students with research related to Semat: some economy aspects, the unification of the practice concept, the representation of several methods and practices on the kernel, and so on. They have given tutorials in some Latin American conferences and they will enhance the Semat-based games. They also start the work with curriculum modifications with the new ways of teaching with the SEMAT kernel, by employing activities like games, crossword puzzles, and others. Finally, they promote the creation of a Latin American Journal about Software Engineering, and it is expected to be one of the main channels for sharing work.

5.3   South Africa (established in May 2012).

Chairman: Barry Dwolatzky

Activities

At a meeting in Johannesburg, South Africa, in May 2012 it was decided to form a local SEMAT Chapter. Attendees at the meeting included a cross section of South Africa's software engineering community consisting of both academics and practitioners. The meeting expressed the view that there were opportunities to find ways of giving SEMAT's "Grand Vision" a South African software industry context. By having a local SEMAT Chapter the South African software engineering community hopes to make its voice heard. The Chapter believes it can be a contributor to new thinking in software engineering practice and theory, not merely a consumer.

In its first year of operation the South African SEMAT Chapter formed an executive committee, held several "technical" meetings - at which key issues and challenges facing Software Engineering were discussed – and launched a local website (www.semat.org.za).

Future work

A work plan has been developed with the aim of strengthening the Chapter's contribution to the growth of SEMAT both locally and internationally. Within SEMAT's Practice Area, the South African Chapter will give special focus to the Education theme.

5.4   Russia (established in Dec 2012).

Chairman: Boris Pozin

Activities

The Russia Chapter has now about 20 members actively involved in SEMAT. It carried out a few seminars at universities (with translation through Internet), big companies, started trainings for students in 4 universities. It started translation of CACM paper and the Essence book and looking for translation of OMG Essence (selected parts).

Future Work

The chapter is preparing the 3rd conference "Actual problems of system and software engineering" in June 2013 where ESSENCE Workshop is on the agenda, and a workshop of Essence collocated with the conference SECR in November 2013. The chapter is looking for project of using ESSENCE for description of distributed software maintenance processes in big organization in 2013. It has close collaboration with INCOSE Russian Chapter that realizes project of harmonization of Essence with other standardization recommendations.

5.5   Japan (established in April 2013).

Chairman: Hironori Washizaki

Activities

SEMAT Japan Chapter has a balanced committee consisting of academia and industry practitioners, from web-service development to safety critical embedded software world.

Future Work

SEMAT kernel, by basing on a simple and neutral platform, will encourage sound and constructive discussions and actions for better software development methods and theory behind practices crosscutting through different contexts.

Japan has one million software engineers in the industry (a quarter of which is in embedded system development), and it is expected the chapter will contribute to the SEMAT community by publishing its idea in Japan, nurture the local community, gather industry data, and explore methods, practices and theory behind them in order to improve how we work to make better software and to make engineers' life more energized to boost business innovation via software.

References

[1] Ivar Jacobson, Shihong Huang, Mira Kajko-Mattsson, Paul McMahon, Ed Seymour. "Semat - Three Year Vision" Programming and Computer Software 38(1): 1-12 (2012), Springer 2012.

[2] Jacobson, I., Pan-Wei Ng, McMahon, P., Spence, I. and Lidman S. The Essence of Software Engineering—Applying the SEMAT Kernel. Addison Wesley, Jan. 2013.