

# SEMAT Yesterday, Today and Tomorrow

## An Industry Perspective

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### Abstract

SEMAT Yesterday, Today and Tomorrow provides an historical overview of where SEMAT started, achievements of the past, today's priorities and plans for the future. The paper is aimed primarily at readers from Industry. The focus is on explaining how SEMAT achievements can help the software industry today and in the future.

### SEMAT in the Beginning

In 2009 Ivar Jacobson, Bertrand Meyer and Richard Soley started a new initiative called SEMAT (Software Engineering Method and Theory) with the aim of re-founding software engineering as a rigorous discipline. SEMAT started with a Call for Action in September 2009 [1]. The Call for Action pinpointed the paramount concerns and issues that challenge the field of software engineering including:

- Abundance of methods that are hard to compare
- Dearth of experimental evaluation and validation
- Gap between academic research and industry practice.

The Call for Action then proposed to re-found software engineering based on a solid theory, proven principles, and best practices that:

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

The SEMAT initiative was very soon supported by thousands of individuals around the world, a dozen well-known companies such as IBM, Ericsson, ABB, and about equally many academic institutions such as Florida Atlantic University, KTH Royal Institute of Technology and Peking University.

SEMAT thus established a need to restart on a solid basis, taking advantage of all that has been learned in software engineering theory and practice over the past decades.

In January 2010 a solution was envisioned in a Vision Statement [2]. The Vision Statement proposed a more precise framework than the Call for Action, similar to a “requirement statement” and “roadmap” for furthering the quest to re-found software engineering. It laid out the vision, scope, goals, principles and milestones for the first year.

The vision included creation of a kernel to allow for description of current and future practices and methods in the context of a common platform that enables practice and method comparison, evaluation, composition, simulation, usage, measurement, teaching and research.

The scope of the kernel included essential kernel elements and the kernel language. The kernel would provide a platform for definition of practices and definition of methods as compositions of practices.

In January 2011 the work on the kernel was moved to the OMG according to their regular process for adoption of a standard. This ensured the openness and fairness of the selection process so that results could benefit the entire software engineering community. In June 2011 the RFP was issued [3].

The next section provides a brief historical overview and what was planned to be done.

## **SEMAT Yesterday**

The software community has developed software for more than 60 years. Historically, with some exceptions, every software development team has its own method. Thus it is likely that today there are over 100,000 methods in existence, with most of them never having been described. However, the number of relevant separate practices in use is much smaller. In software engineering literature only a couple of hundred practices have been identified.

In the past, different methods have primarily been described as isolated, conceptual islands. Every method is basically a unique phenomenon, described in its own language and vocabulary and not standing on any widely accepted common ground.

Re-founding software engineering required something that had never been done before: to discover “the widely-agreed kernel”—the common ground of software engineering. Irrespective of the code being written, the software system being built, the solution being constructed, the methods or ways of working employed, or the organizations involved, there is a common ground—a kernel of essential elements that are pervasive (i.e. concepts and qualities always present in any software endeavor). This kernel of essential elements is also referred to as the Essence of Software Engineering and described in the book that goes by the same title [4].

In early 2011, the Vision Statement was updated and significantly expanded to SEMAT-Three Year Vision [5] that presented a picture of where SEMAT wanted to be by early 2014. This document elaborated on the requirements and concept of the kernel as already described in the initial version of the kernel that had been developed by that time. It also planned the outcome of SEMAT to be produced in the three-year period and discussed success factors and measurements for both SEMAT and its stakeholders. The three-year plan focused on two priority areas:

- Defining a kernel of widely agreed elements, and
- Defining a solid theoretical basis

The intention of defining a kernel of widely agreed elements spawned a number of streams of activity:

- Establishing the kernel and the language through the work of OMG.
- Developing kernel-based tools (including open source) to support practitioners’ needs of authoring, comparing, composing, using and measuring practices and methods.
- Setting up a practice marketplace where the practices described in the kernel are published, cataloged and traded.
- Developing curricula for the kernel-aided education of software engineering.
- Writing text books and papers to support the curricular and personal development.

A solid theoretical basis is essential for both academia and software practice. This goal would best be served by research leading to emergence of a General Theory of Software Engineering (GTSE), which is discussed in the next section on SEMAT Today.

Key principles applied in the kernel design include:

- Extensibility: Provide a common base that is useful for all types of software engineering endeavors (small to large project sizes, lightweight to formal lifecycle models, coarse to

detailed methods, tacit to explicit definitions of practices, low to high complexities of software systems, various application domains, and so on).

- **Actionability:** Actively support practitioners (analysts, developers, testers, project leads, etc.) in the conduct of their daily work by providing easy to access guidance that encourages teams to ask the right questions leading to healthy successful software endeavors.
- **Composability:** Enable method building by the composition of practices, so that methods can be quickly assembled by a project team to match their needs, experiences and aspirations. Describing each practice using the common kernel allows teams to find gaps, overlaps, and conflicts among the practices.
- **Adaptability:** Support method adaptability so that practices and methods can be refined and modified during a project to reflect experiences, lessons learned, and changing needs.
- **Scalability:** Support scalability from one product to many, from one team to many, and from one method to many. By describing all the practices and methods used in an organization on the basis of the common kernel, the organization can more easily share common practices, learn new successful practices, train new employees in the use of relevant practices, and enable an employee to quickly adapt to a new team's specific method.

Finding the constituents of the kernel was crucial. In this search the SEMAT volunteers were guided by the notion that, "You have achieved perfection not when there is nothing left to add, but when there is nothing left to take away." Wide acceptance was critical to the ultimate success of the SEMAT initiative. Thus, developing a kernel was not just a technical problem. Equally important was reaching an agreement about the essential elements, what they should contain, and how they should be named.

The kernel was developed by several key members of SEMAT in collaboration with more than twenty active SEMAT participants and packaged into what is now called Essence. In June 2013 Essence was adopted, through the open criticism and revision process of OMG, as the Beta version of the OMG standard called "Essence - Kernel and Language for Software Engineering Methods" [6].

As described in Essence, there are three types of kernel element: alphas, activity spaces and competencies.

- **Alphas** are subjects in a software engineering endeavor whose evolution we want to understand, monitor, direct, and control. Alphas have states and checklists so that we can monitor progress and health to steer the endeavor to a successful conclusion. Checklist

items are not mere “tick-in-the-box” items. They measure critical outcomes each of which contributes to accomplishment of a particular alpha state. Essence identifies seven kernel alphas: stakeholders, opportunity, requirements, team, way of working, work, and software system.

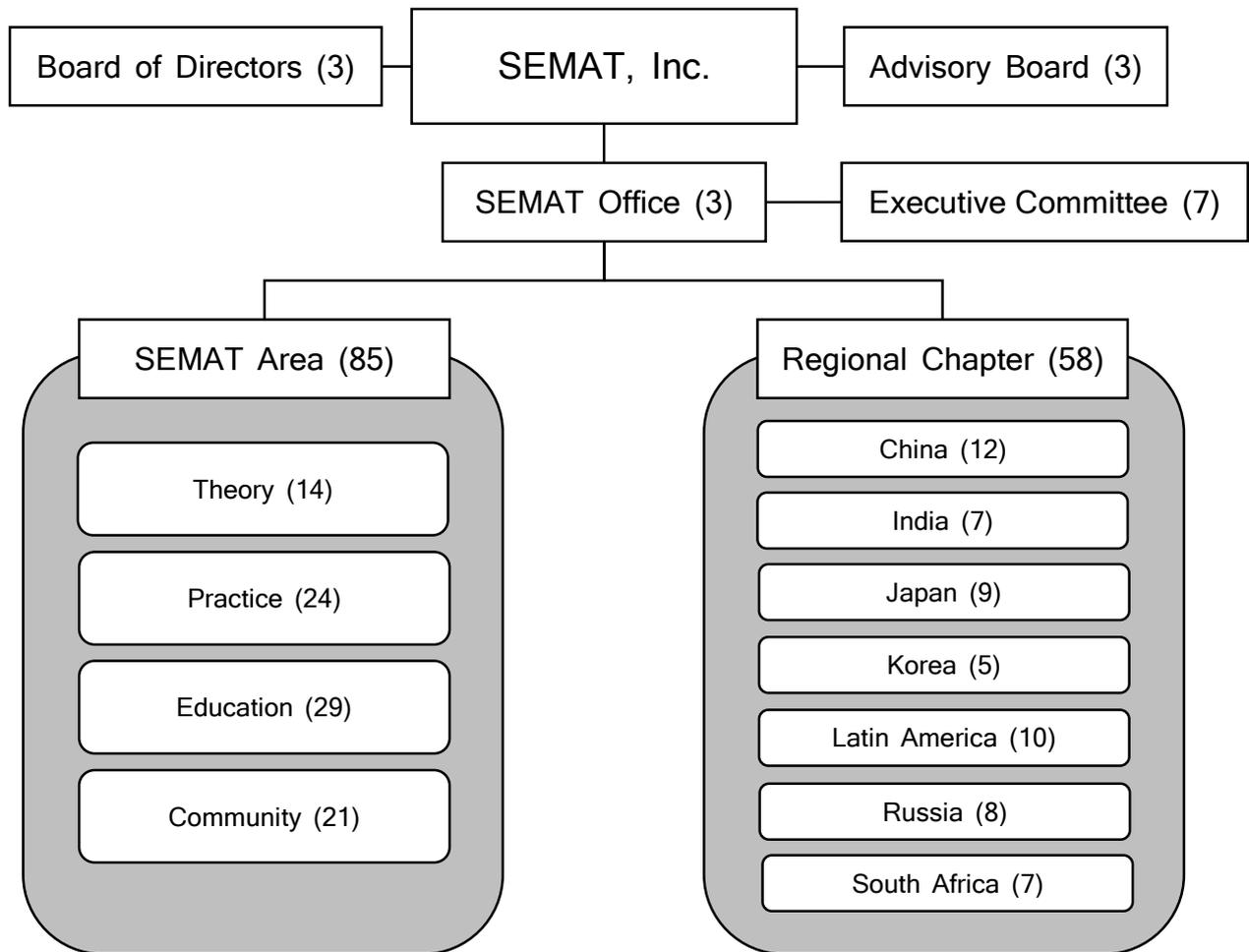
- Activity spaces are placeholders for sets of activities for progressing alphas. The kernel does not prescribe specific activities, but only generic activity spaces as placeholders for endeavor-specific activities. There is no implied order to the execution of activities within activity spaces. The activities are ordered in the context of a particular endeavor and the team’s chosen method. For example, higher levels of concurrent activities occur in agile implementations, and a greater extent of sequential activities in waterfall implementations.
- Competencies are characteristics of a stakeholder or team member that reflects the ability to do work. A competency describes a capability to do a certain job and is graded in terms of a sequence of competency levels ranging from a minimum level of competency to a maximum level. The suggested levels range from 0-assists to 5-innovates.

Important to the understanding of SEMAT is also to recognize what the kernel is not. The Essence kernel is not a new unified methodology, nor a new software process meta-model, nor a new body of knowledge, nor a new modeling language. It is also not a trick to get people to build or buy more tools. It is as simple as a map of what we already have (e.g. teams and projects), what we already do (e.g. specify and implement), what skills we need to have (e.g. developer and tester) and what we already produce (e.g. software systems). The focus is on the essence of what is required for successful software development—irrespective of the way we work or the degree of documentation.

## SEMAT Today

This section provides an overview of SEMAT today and activities being undertaken by the growing SEMAT community. The SEMAT community now comprises almost 2000 supporters [7] and about 100 active participants. Figure 1 shows the SEMAT organization chart. The numbers in parentheses indicate the number of people in each organization unit who regularly and actively participate in the unit’s meetings and projects. (Some participants are active in more than one area and hence the number of active participants does not equal the sum of the numbers on the Figure.)

Figure 1. SEMAT Organization



## SEMAT Practice Area

The Practice area of SEMAT in Figure 1 has been working on the Essence specification and is now working on developing Essence User's Guide and Essence-based Practice Development Guides. The importance of this work is clear, because the outcome will accelerate learning, adoption, training and certification of Essence in industry.

Some books and papers have been written by active members of the Practice area to explain how practitioners can use Essence in their daily work and improve project outcome. It was shown in [4], [8], [9] and [10] that Essence alpha, alpha states and state checklists can be used to evaluate the progress and health of a project independent of employed software engineering method and practices.

Also presented were case studies of actual applications of Essence in the industry. The companies in these studies reported real benefits from using alpha states to check the project progress in a

practice-agnostic way or from defining a set of practices based on the Essence kernel. Participating companies included Fujitsu Services UK [11], a major Japanese consumer electronics company, KPN, Munich Re [12], and a major UK government department, a large Chinese telecommunication-product company and a Chinese Internet media company. Detailed case study reports on those early adopters of Essence are currently in preparation to help new adopters.

## **SEMAT Education Area**

### ***In Industry:***

An Essence tutorial was developed and offered in the SEMAT conference which was co-located with ICSE in San Francisco in May 2013. The one-day workshop on Essence held during the OMG Technical Meeting in Berlin in June 2013 also provided Essence tutorials, usage examples, case studies and tool demos [7].

The South Africa Chapter developed a workshop titled "Using SEMAT Essence for Project Health Check and Action Planning". The workshop's purpose was to introduce delegates to Essence and apply Essence kernel in the context of a software development case study. The Latin America Chapter organized an Essence tutorial in the LACREST conference in Medellin, Columbia in December 2013 [13]. A tutorial was given on "Essence—A Foundation for Software Development Games" in the inauguration meeting of the India Chapter in June 2014. The Korea Chapter had a half-day seminar on Essence in Seoul in August 2014 providing a tutorial on Essence and sharing experiences of applying Essence in IT consulting and software engineering.

IJI currently offers a two-day course on Essence called "Lean and Agile with Serious Games" [14]. Ze Consulting provides Essence consulting in Korea.

Practitioners will soon demand convenient tools that they can use to describe practices in the Essence kernel, to assemble them in-flight into a project method, and to execute the method in daily work. To that end IJI currently offers Practice Workbench and EssWork. IJI also released a mobile app which can be downloaded from Apple App Store for using alpha state cards in project planning and tracking. KnowGravity developed a prototype that integrated Essence alphas in its model-driven enterprise modeling tool called KnowEnterprise.

### ***In Universities:***

Carnegie Mellon University Silicon Valley had 7 project teams using different practices apply Essence alpha states to plan and measure their projects, and they all found Essence helpful to drive healthy progress of their projects regardless of the practices they used. [15]

KTH Royal Institute of Technology in Sweden also employed Essence in two software engineering courses. Students could evaluate strengths and weaknesses of the methods used in their projects by applying alpha state checklists in Essence kernel.

At the University of the Witwatersrand in Johannesburg South Africa, SEMAT is used as a framework against which practices described in classic text books can be brought into context.

The Education area of SEMAT is developing Essence-based teaching materials including lecture notes, scenario-based exercises, practicum projects, and courseware [7].

## **SEMAT Theory Area**

### ***General Theory of Software Engineering***

The Theory area importantly strives to contribute to SEMAT through research on General Theory of Software Engineering (GTSE). The Theory area published an article titled “Where is the Theory for Software Engineering?” in 2012 [16]. Since then, it had held Workshop on GTSE every year co-located with the International Conference on Software Engineering (ICSE). The report on the first GTSE workshop in 2012 appeared in [17]. All accepted papers in the GTSE workshop have been published in ACM/IEEE CS Digital Library.

### ***Awareness and Community Development***

These workshops and publications are drawing increasing attention from industry and academia. Workshop participants are trying to uncover a theoretical basis for software engineering that facilitates better decision-making and better software, explore different types of theories and ways of assembling them into a framework, and eventually meet different theoretical needs of various types of practitioners such as developers, managers and coaches.

## **SEMAT Regional Chapters**

As illustrated in Figure 1, SEMAT has 7 regional chapters.

The Chinese chapter recently assisted the China Software Industry Association (CSIA) in adopting Essence as a pivotal component of its National Quality Plan (2012-2020) for the software industry. This plan, code named Q Plan, aims to improve the quality and international competitiveness of software products in China. Essence will be used to train developers, improve development practices, and measure the quality and maturity of the software industry at three levels: enterprise, product and engineer levels.

A paper on OMG Essence standard was published by Korean Society of Standards and Standardization [18]. The Korean chapter received a government grant for research and development of practices based on Essence and another grant to develop open source tools to support enactment of methods based on the Essence kernel.

In other regions such as Latin America, Russia and South Africa, a number of conferences and workshops have been held to promote Essence and they have received positive responses from the attendants.

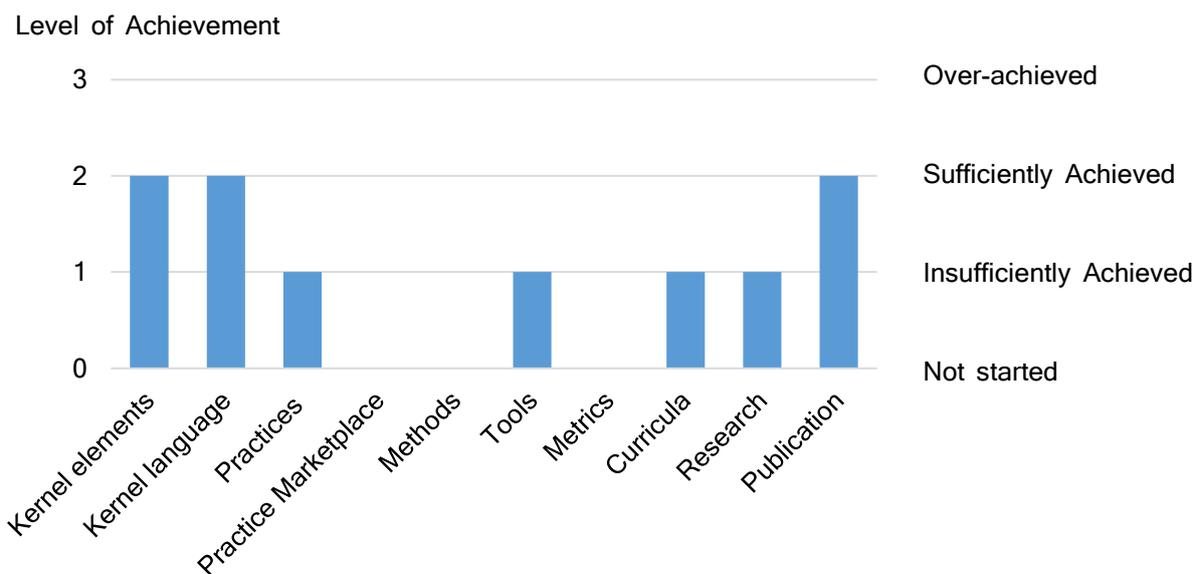
SEMAT developed Essence to be extensible and fit a variety of different types of software engineering endeavors. The Russian chapter of SEMAT is exploiting this extensibility by developing an extension of the Essence kernel to support Systems Engineering that involves embedded software.

Indian chapter was inaugurated in June 2014. About 50 people from both the academia and industry participated in the inauguration meeting held in Kolkata.

## Summary of Where We Stand Today

Figure 2 shows an assessment of the progress so far with respect to the scope, goals, principles and plans expressed in the Vision Statements [2], [5].

Figure 2. SEMAT Achievements by 2013



## SEMAT Tomorrow

The review of SEMAT Today confirms that an impressive and significant amount of work has been done to date with world-wide involvement of around 100 active SEMAT participants. When one considers that these efforts have been aimed at re-founding software engineering, the SEMAT community can be complimented on the progress. After all, it was not just a matter of trying to introduce some new ideas, practices and tools. The objective is to do more than merely reach people who most actively work with methods and practices, but to get SEMAT widely adopted among the estimated 20 million practitioners around the world.

As the evolution of computing technology is accelerating today bringing new trends of mobile, social, cloud computing, big data analytics and Internet of Things to life, opportunities abound for practitioners to innovate software systems and to create disruptive new values. Applying emerging technologies and challenging new opportunities in software development requires new scientific methods and practical disciplines; hence ever-increasing needs to explore, experiment, innovate, enact and adapt practices and methods of software engineering.

Agile methods prevailing in software product development are being extended to address different concerns in IT service delivery and operations leading to new disciplines such as Disciplined Agile Delivery (DAD), DevOps and Scaled Agile Framework (SAFe). Changes in software architecture from Component-Based Architecture to Service-Oriented Architecture, then to Microservices Architecture demand new methods of software engineering, too. The question remains as to how practitioners can easily adopt a new set of practices deemed best for their daily work and challenges, and quickly get productive using them.

A questionnaire survey was conducted in March 2014 to discover why and where practitioners and academicians are applying Essence, what impediments to adopting Essence are being experienced, and so forth [20]. The survey was answered by 140 respondents and revealed that:

- Top three reasons why people are interested in Essence are: (1) I had difficulty in combining practices into a project specific method (52% of respondents), (2) I had difficulty in enacting standard software engineering methods for my organization (48%), and (3) I had difficulty in monitoring and evaluating the progress and health of ongoing projects which employ different methods and practices (43%).
- Top three benefits from using Essence are: (1) I can describe various software engineering practices using the common Essence kernel and language so that they become comparable and integrated into a coherent project method (68%), (2) I can check the progress and health of a software project independent of the software engineering practices used (52%), and (3)

I can use Essence kernel in teaching the foundation of software engineering and show differences and similarities among different software engineering practices (52%).

- Top three impediments to adopting Essence are: (1) It is difficult to find good materials with which to easily learn Essence (50%), (2) I think Essence will help improve our practices significantly, but it is difficult to drive the changes politically (40%), and (3) It is difficult to understand how to apply Essence kernel and language in real situations (37%).
- Top three real-world applications of Essence are: (1) I applied Essence to teaching software engineering (21%), (2) I applied Essence to agile software development projects (20%), and (3) I applied Essence to describing organizational standard methods for software development (14%).

We could conclude that practitioners, once get acquainted, recognize the value of Essence, but we need to provide a lot more aids to ease their adoption of Essence—including Essence user guide, Essence-based practice development guide, Essence-based project management guide, teaching materials, practices written in Essence, tools to describe and assemble practices, tools to enact Essence-based methods, training programs, certification programs, success stories, case studies, and so forth.

## **Standard for the Essence Kernel**

The kernel and language as adopted by OMG are expected to be stable but not static. They will continue to evolve as they go through real applications in the field and as SEMAT collects feedback from the users on which our understanding of software engineering improves.

Essence having been adopted as an open standard by OMG is not the end. In the words of Winston Churchill: “Now this is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning”.

Adoption of the standard was the first step required for SEMAT to reach out to software practitioners and professionals.

Essence will promote and enable a new ecosystem for software engineering practices and methods. To remain relevant to users, we should aggressively and rapidly adapt to feedback from the users. Therefore, a high priority requirement for SEMAT is to set up easily-accessible channels through which to collect users’ feedback and apply governance to prioritize and incorporate important feedback into future versions of the Essence standard.

## **SEMAT Practice Area**

### ***Essence User Guide***

The Essence User Guide aims to explain how Essence is used in different scenarios, and to provide answers to frequently asked questions. Our goal is to release the User's Guide incrementally encouraging user feedback so that future guide updates address priority needs.

A paper titled "Scrum Powered by Essence" [21] has recently been produced to show how an existing practice, Scrum, can be described using the Essence kernel and what benefits over the existing Scrum Guide are achieved by doing so. More and more popular practices will be described using the Essence kernel so that they become comparable and composable by practitioners.

### ***Practice Library and Marketplace***

The practice library will allow people to share, and exchange practices from different domains worldwide and publish them as part of a SEMAT hosted catalogue. A practice marketplace will provide an accessible environment where developers are given appropriate freedom to use their preferred ways of working within their specific context and share innovative ideas.

### ***Tools***

Tools already being developed by IJI and other vendors will continue to be developed. As an example, uEngine Solutions, an open source process engine provider in Korea, has begun developing an Essence-based practice authoring and method orchestration tool, and plans to publish it as open source software. We expect to see major tool vendors providing Essence-based tools integrated with their existing or new tools. It is anticipated that tools for different areas of concern in software development will become interoperable through the vendors' use of the kernel elements and the language. The focus of these tools will be the needs of the practitioner whose primary concern is developing quality software leading to satisfied customers.

### ***Projects in Practice Area***

SEMAT is open to the whole community. Apart from the ongoing projects for developing Essence User Guide and Practice Development Guide for software engineering, we welcome several new areas to be set up in the future. Interests have been demonstrated in the following areas:

- Systems Engineering based on the Essence kernel. The Russian chapter of SEMAT is already working on extending Essence to support systems engineering. It is natural to extend this work to the rest of the SEMAT community. Moreover, a book with modern papers on systems

engineering is on its way edited by Ivar Jacobson and Bud Lawson [19].

- Business Engineering using Essence. One significant user of Essence has extended the kernel to support business development.
- Tool Development to support Essence as an open source project.

## SEMAT Education Area

SEMAT will establish and offer education to help people understand its concepts and put them into practice. Such an education initiative will start in the following areas:

- An introduction to Software Engineering—the basic concepts in the kernel, etc. The book ‘The Essence of Software Engineering’ [4] is an example of what should be developed. E-learning is also expected to play an important role.
- Capturing practices in the Kernel Language—hands-on training on how to write practices by showing examples.
- Assessing Progress and Health—using the kernel and alphas to assess progress and health of software development. There are potentially two different perspectives on this: externally, by the auditor/coach and internally, by the team that drives their own work.
- Building and comparing methods

Based on the existing work in the education area, new and more systematic SEMAT-based foundations for teaching software engineering will emerge, which supports learning in academic and professional environments. Curricula based on the kernel, the language, practices and methods will be developed and used both in computer science and software engineering programs in universities, as well as in education given to practitioners in the industry. A department at a university in Russia is exploring the opportunity of education in software development at high school level, starting from Essence.

Additional textbooks and reference materials to support curricula and personal development based on the kernel and the language will be authored and made publically available. Many books on practices defined using the kernel that target at different level of users will be written to support practitioners in improving their way of working.

## **SEMAT Theory Area**

### ***General Theory of Software Engineering***

The theory will demonstrate the benefits that come with good theories, including goal-oriented decision-making by software engineering practitioners. Such support is predicated on the predictive capabilities of the theory.

SEMAT should be augmented to support the prediction of critical software engineering phenomena. Sample questions that the theory aims to answer include:

- How will project success be affected by changing the way of working?
- How will project success be affected by changing the team structure and characteristics?
- How will project success be affected by changing the content and form of the requirements?

The theory will be solidly based on the Essence language and kernel. Development of a more abstract kernel than the Essence kernel will be pursued so that it encompasses not only software engineering but also systems engineering, business engineering, etc.

### ***Practice-Specific Research***

Apart from developing the GTSE, practice-specific research needs also to be conducted with the intention of answering questions such as:

- Is Scrum described on top of Essence better than the Scrum Guide alone?
- Is pair programming better than peer programming? If yes, under what conditions?
- Are use cases better than user stories? If yes, under what conditions?
- Are components better than objects? If yes, under what conditions?

### ***Awareness and Community Development***

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.

In order to grow a large community, it is important to encourage a diversity of opinions. Attempts

which too forcefully try 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.

## **SEMAT Community Area**

### ***Engaging Our Supporters***

Collateral such as the adopted standard and publications on Essence will be used to ignite the interest of existing signatories and attract more academic and corporate signatories.

An abundant production of intellectual assets such as practices, methods, tools, teaching materials, training materials and research publications seems to be the key to continued growth of SEMAT at this stage of its lifecycle. SEMAT is in imminent need of more participants who are competent in producing Essence-based practices, Essence user guides, practice development guides, glossaries, training materials, interesting blogs, and so forth. As the assets grow, it will attract more users from all over the world.

However, it became evident that there is a limit to securing qualified experts' time if SEMAT keeps depending on only volunteers. It needs some funding to support contributors. Without some minimum funding, it will eventually get into a vicious cycle of slow growth of assets, followed by slow growth of the user base, which in turn will demotivate volunteers from donating their time.

The Community area recently initiated establishing SEMAT as a non-profit organization in the state of Florida, USA. SEMAT, Inc. has been registered and is in the process of developing its bylaws to define its operating rules. Legally incorporated, SEMAT, Inc. will be able to raise more funds to support volunteers who actively participate in developing theories, guidelines and practices.

The Community area is also re-building the SEMAT web site as a platform for community growth. The new website will post news on SEMAT activities and events held by SEMAT and its regional chapters throughout the world, provide a variety of resources such as publications, learning materials, videos, practices and tools, disseminate case studies and success stories, support member interactions via social networks, mailing lists, blogs and collaboration tools, and offer guidance to institutional and individual certifications.

### ***Engaging with Regional Chapters of SEMAT***

The Community area will engage with existing Regional Chapters and facilitate interaction, collaboration and sharing across the chapters. The types of activity involving Regional Chapters include:

- Inviting members of Regional Chapters to actively participate in the various SEMAT Areas.
- Foster the collaboration among educational institutions in different regions to develop and share training courses.
- Helping the chapters to contribute to the practice library.
- Participation of SEMAT leaders in local events such as conferences, symposia, seminars and user groups to encourage researchers and developers in those regions to learn about Essence and how it can help their work.
- Translation in local languages of publications on Essence.

SEMAT will encourage active participants in other regions such as Europe and the USA to organize chapters to expand the population of SEMAT contributors and users. Other unexplored regions such as South Asia and Middle East will also be embraced.

## Conclusion

SEMAT's success will be measured in its ability to positively affect the course of software engineering with individual practitioners as well as corporations. Better, Faster and Happier (BFH) are the indicators to measure success. In the broad sense, 'better' implies lower defect potentials, less rework, and higher levels of defect removal efficiency than today's norms; 'faster' implies quicker development cycles than today's norms; whereas 'happier' implies improved customer and employee satisfaction throughout a multi-year period that encompasses total cost of ownership.

For the practitioner 'better' means your competitive value is higher, you develop better software, and you have experience with more practices. 'Faster' means you learn faster, and you get your job done faster. 'Happier' means you are more self-confident and you can easily move from one organization to the other. For industry 'better' for the executives means you are innovative, you deliver software with high quality and you have objective measures of project health. 'Faster' means reduced delivery time. 'Happier' means satisfied customers and satisfied employees.

SEMAT is set up to re-found software engineering; a goal, which of course is hard to measure, nevertheless we must do it. Eventually we want to measure the impact our products have on the community building better software. The impact can be measured from two aspects that complement each other and yet perhaps overlap in some cases: qualitative measurements and quantitative measurements. We will further elaborate on measurements as we have more measurements to conduct than today.

To conclude, SEMAT is now on its path to implement the grand vision that initiated the community. The road ahead will be filled with the challenges of a frontier expanding community. Challenges are also opportunities. As its success unfolds, SEMAT will significantly change the effectiveness of the software engineering community. SEMAT will give it a new platform from which to more efficiently, carefully, and professionally build software better, faster and happier.

Watts Humphrey may have shown real forethought ahead of the first SEMAT meeting in Zurich, March 2010 when he said: “This meeting in Zurich is likely to be a historic occasion much like the 1968 NATO session in Garmish [22].” SEMAT results are a collective effort from the community for the community. Working together, we are re-founding software engineering.

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