



Egypt-SPIN Newsletter

Issue 1, Jan – Mar 2003

Sponsored by SECC

From the Editor

Welcome to the first issue of Egypt-SPIN newsletter. The newsletter will initially be published every 3 months, but that frequency may change depending upon the level of contribution of the software community. The newsletter's purpose is to provide a mechanism to share information, lessons, and tips to keep the community informed of what is going on in our local community regarding the software process improvement initiatives and events. The newsletter should play a central role in disseminating information and integrating ongoing activities in our software process improvement area.

Our local community is now in the phase of creating shared awareness and developing common understanding of successful implementation approaches. Based on your feed back, comments and suggestions, we are going to make our newsletter more informative. The sustained interest and ownership, which should be shown by the community, will cause the success of Egypt-SPIN newsletter.

If you have any contribution, this would be greatly welcomed and appreciated, please email to mad_abdalla@mcit.gov.eg

The contribution may be articles of case studies, points for discussion, your comments. Also you may suggest new columns of interest or others.

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Steering Committee Meetings Summary

As most of you have been informed that on the 23rd of September, 2002, the SPIN steering committee has been voted for as follows:

Dr. Gamal Aly, SECC

Dr. Ahmed Aly, EDS

Dr. Adel Ghanam, CIT chamber FEI

Dr. Hoda Hosny, AUC

Mr. Magdy Khairallah, DMS

Mr. Mohamed Salama, Fujitsu

Mr. Walid Gad, EHITA

Eng. Madiha Hassan, SPIN coordinator

Egypt-SPIN steering committee holds monthly meeting (normally the first Tuesday of each month). During the period (January – March) 2003, the meetings covered the following topics.

- Egypt requirements of a realistic view to implement software process improvement program.
- How to build appropriate and cost effective mechanism for our software organizations to start / continue its software process improvement programs.
- Focusing on particular common interests encountered by small companies to find incremental model / adopted software quality models for incremental improvement.
- Incentives /Awards for organization applying software process program.
- How to stimulate and coordinate activities between the government, private sector and academia.
- Spreading the culture of software quality between the different actors of the market.
- Maintaining the pace of diffusion and feedback within the community.

The SEPG Conference February 24–27, 2003

Dr. Gamal Aly, SECC Director

I planned to take the opportunity to participate in the Software Engineering Process Group Conference (SEPGSM) which is the premier international conference and exposition for software process professionals who want to take a systematic approach to improving people, process, and technology at their organizations. It was a good opportunity to meet peers to build up communication network with experts working in this domain.

The conference brings together organizations and individuals with diverse experience in the field their main focus is to build quality products

on cost and on schedule, establishing and maintaining continuous improvement efforts, and strategically aligning their organizations with industry leaders.

The SEPG February 24 -27, 2003 is the celebration of the 15th Annual conference. Its theme is "Assuring stability in a global enterprise. The conference was held at Hynes Convention Center, Boston, Massachusetts.

The sessions, presentations, tutorials and panel discussions provided information on software improvement results and activities that contribute to a global enterprise. Tutorials and presentations were divide into the following tracks.

- Level 2 topics.
- Level 3 topics.
- Level 4/5 topics.
- Special topics 1 including TSP, PSP related subjects.
- Special topics 2 including strategic process improvement approaches.
- CMMI topics.

Tutorials were either full day tutorials (7 hours) or half day tutorials (3.5 hours) or presentations (35 minutes).

The full day tutorials covered the following topics : Getting Started with Measurement and analysis , Getting and using the power of senior management support, A software estimation for effort and size, Implementing Quantitative Management at Level 4.

The half day tutorials covered the following topics: Starting a process improvement program, Are you prepared for CMMI, Basic statistics and data sanity, Tools and techniques for analyzing your software data, Meeting the challenges of COTS-Based systems, Applying CMMI in commercial IT, A good idea still requires a good implementation, Integrated project Management – the CMMI collaborative

approach to product development, Integrated CMMI and six sigma in software and systems engineering, SPI team methodology, Planning projects using software architecture, Exploring CMMI – ISO 9001-2000 synergy when developing a process improvement strategy.

The presentation titles were: Accelerating Level 2 of the SW-CMM, Achieving Level 2

and beyond case study, CMM will work for small projects... check this out, Five best practices for any project, Getting started with measurement and Analysis, Going to Level 2 with Level 3 in mind, among others.

Please if any one is interested in details of any presentation I had got a CD with these presentations (222 presentations) the CD is available just email me gmaly@mcit.gov.eg

Egypt-SPIN Upcoming Events

April,2003	Fujitsu SPI Case Study
July, 2003	EDS SPI Case Study
October, 2003	Raya Software Case Study

DMS – CMM CASE STUDY

Mr. Magdy Khairallah

Being a major and pioneer enterprise but not sticking to a well defined standard methodology *DMS* was exposed to face many problems over a history of 20 years. Restructuring such a huge organization necessitates process improvement and reengineering. Thus it has been determined to follow a universal standard to reach the optimum results from process improvement and reengineering namely the required level of maturity for DMS as an organization. Capability Maturity Model (*CMM*) was meticulously selected to be followed as a standard in process improvement and reengineering.

The growing activities of DMS over its *20 years experience* resulted in the existence of many problems. Progress was achieved on various areas starting from only MAINFRAME projects till web-enabled versions; from local market towards global market. The matter which lead to many diversities on various levels; diversities on the level of sectors, software products, projects, locations, development tools and

databases, cultures besides the difficulty in staff distribution and entering the field of software exporting.

The up mentioned problems conducted to the occurrence following aspects:

- Increasing in cost of development, updates, maintenance, quality, project management
- Difficulty management issues such as: planning, tracking, reporting...etc.
- Difficulty to reach smoothly standards of Total Quality Management (TQM)
- Environment where both policies and procedures are mixed with company's culture (not well defined)
- Difficulty to obtain measurements & statistical or quantitative analysis towards more quality assurance and defect analysis

The emergence of such problems makes it necessary to introduce a quality management. In the *last three years* DMS

has been working heavily in *process improvement* of already existing methodologies and procedures aiming at avoiding or minimizing the existing weakness. The exerted effort in this area i.e. process improvement lead to good results but those results were not up to management expectations. Hence *DMS* decided that the organization needs Process Reengineering based on universal standards to double both productivity and quality.

Still in the phase of Process Reengineering as a phase in achieving quality management, *DMS* achieved several steps such as : Enrich knowledge of Human Resources towards Management, Communication Skills, Project Management, Technical Management, Consumer

- The *CMM* was designed to help organizations initiate a *program of Software Process Improvement* through benchmarking their current software
- Focus on a limited set of activities and work aggressively to achieve them, an organization can steadily improve its wide
- Using the *CMM* helps instill culture of software engineering and management excellence.
 - *CMM* does not enforce how you do a process but concentrate on doing the process.
 - *CMM* concentrates on the application of a process and not just filling forms “/ISO” that in most times does not imply that companies are doing them right and on time
 - Using *CMM* helps converting an organization from an Immature Organization to a Mature Organization [the maturity of an organization indicates that: software process is routinely communicated to both the existing staff and new employees, a planned process for work activities on the level of the project and the organization, realistic schedules and budgets, product functionality and quality are usually achieved in time manner]

After selecting the *CMM* guide as a model to follow came the effort needed to pave the

Behavior, Time Management ...others ; Enhance and ensure knowledge of already defined Methodologies / Procedures ; Improve the mechanism applied for having the procedures as part of the workflow ; Prepare an action plan for driving the company and all it's staff to achieve successful Process Reengineering.

Yet the need for a universal standards guide was urgently stressed during performing the activities of Process improvement and reengineering. The Capability Maturity Model (*CMM*) was fastidiously selected to be that guide after meetings and searching and the help of *SECC*. Thus obtaining the *CMM Level 3* certificate by 2003 was settled as a target.

Hereby mentioned some of the reasons for selecting the *CMM* as a guide:

practices and then selecting strategies for orderly improvement of those issues where the organization recognized that the process could be improved.

software process to enable continuous and lasting gains in software process capability.

way for the pre-assessment stage on June 2002. Great attention has been given to the process of transferring the belief in Process Engineering by *DMS* Management to ALL company members. Some of the activities that were done towards applying *CMM* and getting a formal assessment:

- Dedicating a group/committee headed by the company management to drive the company gradually toward *CMM L5 & TQM*
- Concentrate on process reengineering focusing on software process improvement which is the main target.
- Select number of employees to attend *SECC CMM courses*.
- Choose one employee (as restricted by *SECC*) to attend the 1st official *CMM* course (*SEI Introduction to CMM*), followed by selecting another three to attend the 2nd run of the course.
- Mapping *DMS* terminology to *CMM* terminology.
- Identify bottlenecks in the already existing methodologies/procedures.

- Reengineer the process (partially/gradually) according to international standards.
- Start applying as pilot on sample project/department/sector, and monitor the results and continue doing that until it is totally approved and applicable, then it is finalized and announced officially for all staff with the required training on the modifications done (if needed).
- Start a project for Process Asset library and formalize its team.
- Expand the idea of the software project of *Process Asset Library* into Project Management Software applying all DMS methodologies and procedures Internal Training sessions and extensive training about *CMM level 2 & 3 KPA's*, conducted several times to almost all company employees starting by management and down up to ALL EMPLOYEES.
- Make some employees conducted courses on how each KPA content as per *CMM* as well as how this was mapped to our existing methodologies so that they identify the process they are already doing.
- Preparing for the pre assessment with the assessing team – arranging all their needs and coordinating between the company and the team for the availability of all their requirements

The previous efforts and activities were performed to lay the road for the preliminary assessment stage which in its turn focused on *CMM Level 2 and 3 practices*. The outcome of the pre assessment is basically three items namely organization strengths, organization opportunities, and organization recommendations.

DMS strengths are:

- Very motivated and dedicated people
- High morale in the organization
- Good teamwork and team spirit
- People are able to gain experiences in other business and technical areas
- Vision of management for new technologies
- Ownership of organization's methodologies and processes

DMS opportunities are:

- Many policies are not explicitly documented
- Some *CMM*-required procedures are not documented

Recommendations for DMS are:

- Map current methodologies into policies, processes, and procedures as appropriate
- Add guidance information to process and procedure documentation
- Align *DMS* terminology with standard industry terminology (methodologies, inspections, ...)
- Develop an organization level expertise in measurement data analysis in order to link improvements to organization effectiveness (productivity, quality)
- Use Cost of Poor Quality metrics to understand effectiveness of defect management

After the pre assessment stage comes the stage of adjusting *DMS* action plan towards the formal assessment that included the following activities:

- SPI Group meeting with Top Management to agree on the outlines of the SPI plan for the next period
- SPI re-planning for the Future activities
- Revision is Done by *SPI group*, Senior Managers and Top Management
- Collecting all the *DMS* Current documented procedures (Methodologies)
- Mapping between *DMS* methodologies and *CMM* process structure
- Revision is done by *SPI group*, Senior Managers and Top Management
- Update procedures in more details by members of *SPI Group*
- Revision is done by *SPI group*, Senior Managers and Top Management
- Updating *DMS* Process Asset Library
- Continuously Updating Process Asset Library Software

- Re-plan for *DMS* Project Management Software Which gathers the data for all projects.
- Pilot the part finished on some of the projects
- Re-structure the Organization chart to have an entity of Quality Assurance, which will be responsible of *PROCESS QA & PRODUCT QA*
- Review/Update QA procedures in more details by members of SPI Group & QA manager
- Updating *DMS* Process Asset Library & Project Management Software

The following benefits stemmed from the implementation of *CMM* guides:

- Increase in productivity
- Increase in quality of product
- More commitment from the employees toward applying the organization process.
- More accreditation from local and foreign customers.
- Effective management of internal & external projects.
- More realistic data about managing projects all over the company.
- Increasing cost in some areas while decreasing it in other major areas
- Have more control on versions and releases by identifying a general configuration management controller within the QA department helped by representatives in each department.
- Benefit from collecting lessons learned in each project in one database.
- Fewer deviations from the process because of the guidance added, which reduced the misinterpreting of a process depending on experience of staff.
- Increase quality level of *DMS* products after having a separate entity of QA, instead of using the cross QA procedure that used to be applied previously.

As for *DMS* future plans for the quality management and *CMM* formal assessment outlining the following procedures:

- Internal assessments by teams from inside the company by the end of the first quarter of 2003.

- Enhancing the quality assurance procedures to be reach the maximum out of it.
- More focus on increasing the employees' capabilities towards measurements and analysis.
- Focus on expanding *DMS* market toward the international market
- Focus on getting accreditation on *DMS* Egyptian local software.
- Build online portal that force to maintain and implement advanced measurements & metrics to be used as part of *DMS* internal workflow.

What precedes process engineering, introducing process engineering itself, selecting the *CMM* guide, preparation for the *CMM* preliminary assessment, the *CMM* preliminary assessment, *CMM* implementation together with preparation for the *CMM* formal assessment as well as *DMS* future plans based on *CMM* applying are all phases that preceded obtaining *CMM* level 2 and 3 certificate which in itself a way towards achieving managed and controlled business and reaching the highest possible level of performance and product quality

Software Product Quality Engineering for SME

Dr. Adel Ghannam

SMEs Software Companies cannot afford “high –cost” for “after –sales” support. Product quality and speed are their differential edge, and should be tackled at the very early phase of the development. In the same time, the agenda to build embedded quality should be simple enough to fit the resources capabilities of the SME.

This simplicity will come from three main principles:

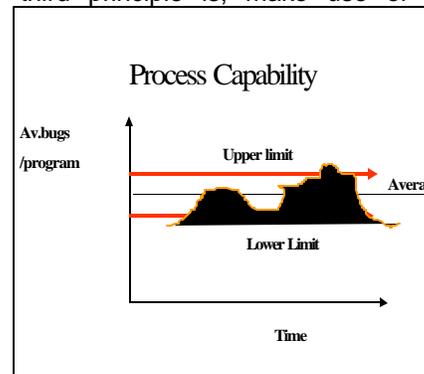
1. Software is an Engineering discipline, and must utilize the long accumulated experience of SME strategy in the manufacturing sector.
2. Design for quality from the beginning. They cannot wait to Re-engineer at the end of the cycle
3. Use the well known “product quality control-QC”, used in the manufacturing, to measure and correct deviation

The first principle , is that, small factories should be focused, and build-to-order. They cannot afford the strategies of Engineer-to-order, or manufacture –to-stock .The first, demands highly skilled Business Analysts and designers, on the other hand, the second demands freezing financial resources, in the form of stock holding. To secure high quality and short response time to customer order, they should adopt the concept of a *Product Line*. A product line is a set of related systems that address a market segment. A product line is built out of a common set of core *components*, as opposed to building each member system separately. Development efforts will take advantage of each other. This means, a powerful opportunity for gaining economies from sharing and reusing knowledge, which is translated in high quality and fast response to customer order.

The second principle is to design for a set of quality metrics to simplify the after sales support. The most important metrics are: reusability (i.e., OOD and component

technology, to allow fixing components, instead of opening a huge one bulk piece of code, and small reusable components will be more trusted- free of bugs); testability (insert probing points in the code); reliability (reduce MTBF- insert some redundancy at critical functions); functional scalability (design to accept future plug –and- play components). Designer in the SMEs should focus on smarter small components that can be assembled, rather than to enrich a single piece of code; Configurability (reduce hard coded functions ,i.e., parameterize the installation and the operation (to reduce demands on your limited manpower)

The third principle is, make use of the



mature QC (manufacturing quality control technique), to manage your measurement program. In QC, each process capability is evaluated in terms of the “ natural process variability”. It is the difference between the upper limit and the lower limit (see the figure—usually referred to as the control chart) and is equal to six sigma (sigma is the standard deviation).

Such a simple model, allows the control of the quality metrics .In other words, whenever the values of the measures become outside the acceptable natural process variability, an investigation will start.

Finally, small is easier, however, should be smart enough to become a part of the global picture.

Book Chapter Review

Process Improvement (Chapter 25) of “Software Engineering”, 6th ed. By Ian Sommerville, Pearson Education, 2001

Dr. Hoda M. Hosny, AUC

Sommerville's "Software Engineering" book is one of the best selling books in Software Engineering (SE) written for undergraduate and graduate students as well as practicing software engineers in industry who constantly need to update their knowledge on new SE techniques. The book presents a broad perspective on software systems engineering, concentrating on widely-used techniques for developing large scale software systems. In its seven parts (a total of 29 chapters) the book covers a wide spectrum of software processes from initial requirements elicitation through to design, development, testing and system evolution.

In the 25th chapter entitled Process Improvement, Sommerville touches on a number of major issues related to Process Improvement, namely: *Process and product quality, Process analysis and modelling, Process measurement, the SEI process capability maturity model (CMM) and Process classification*. A brief summary of the chapter is given below.

In the chapter introduction, the author first explains that process improvement means understanding of existing processes and changing these processes to improve product quality and/or reduce costs and development time. Hence, there is a strong relationship between the quality of the developed software product and the quality of the software process used to create that product. By improving the software process, it is hoped that the related product quality is correspondingly enhanced. Like products, processes also have attributes or characteristics (such as understandability, visibility, supportability, acceptability, reliability, robustness, maintainability and rapidity). He sees that process improvement should always be seen as an activity that is specific to an organization or a part of a larger organization and that successful

process improvement requires organizational commitment and resources. He identifies a number of key stages in the process improvement process : *i. process analysis, ii. improvement identification, iii. process change introduction, iv. process change training and v. change tuning*.

With respect to the first issue, *process and product quality*, he explains that the process/product relationship is less obvious when the product is intangible and dependent on intellectual processes, which cannot be automated, as opposed to manufactured products. He then identifies four factors that affect product quality (namely *i. process quality, ii. development technology, iii. people quality and iv. cost, time and schedule*) in the case of intellectual products (software, books, films ..etc) where quality principally depends on design and he further explains that the influence of these factors depends on the size and type of the project.

As for *process analysis and modeling*, he states that it involves studying existing processes and developing an abstract model of these processes that captures their key characteristics. Hence, the output of process analysis is a process model that may be expressed at a greater or lesser level of detail. Process analysis techniques include : *i. Questionnaires and interviews and ii. Ethnographic studies*. The needed information for process improvement are the activities, deliverables, people, communications, schedules and organizational process that affect the software development process. A detailed process model would therefore be represented with graphical elements that represent activities, processes, deliverables, conditions, roles, exceptions and communication. The timing of the dependencies between activities,

deliverables and communications must also be recorded in a process model.

In the third issue, *process measurement*, he first states that measurements are quantitative data about the software process. He identifies three classes of process metrics that can be collected : *i. the time taken for a particular process to be completed, ii. the resources required for a particular process and iii. the number of occurrences of a particular event (such as the defects discovered during code inspection, the number of requirements changes, average number of lines of code modified in response to a requirements change..etc.)*. He also discusses the GQM (Goal-Question-Metric) paradigm for discovering what is to be measured (as proposed by Basili and Romach in 1988) and states that its major advantage when applied to process improvement is that it separates organizational concerns (the goals) from specific process concerns (the questions).

The fourth issue in the chapter is the *SEI Process Capability Maturity Model (CMM)* which was established to improve the capabilities of the US software industry. He identifies and explains the five levels of the CMM : the initial level, the repeatable level,

the defined level, the managed and the optimized level.

Finally, the author suggests a more general approach to *process classification* that can be applied across a broader spectrum of organizations and projects as opposed to the classification of processes into levels with fairly arbitrary boundaries drawn between these levels. The different types of processes that he identifies are Informal processes, Managed processes, Methodical processes and Improving processes. He states that these classifications do overlap and a process may fall into several classes but that they serve as a basis for multi-dimensional process improvement as they help organizations choose an appropriate process for different types of product development.

Throughout the book Sommerville stresses on the importance of software process improvement which in his view can be implemented in a number of different ways. He mentions in an earlier chapter that it may come about through *process standardization* where the diversity in software processes in an organization is reduced. This leads to improved communication, reduction in training time and makes automated process support more economic.