Perspectives on the Software Engineering Process Group

This article looks at the Software Engineering Process Group (SEPG) and its role from several different perspectives within an organization. The article centers on the SEPG at the Defense Finance and Accounting Service, Technology Services Organization (TSO), Kansas City, Mo. The authors represent the director, vice deputy director of the TSO; the project officer of the Marine Corps Total Force System; two experienced SEPG members; and two brand new SEPG members. Each discusses his or her view of the SEPG's role and its activities within the organization.

The Software Engineering Process Group (SEPG) in any organization serves numerous roles from educator to organizational counselor. Its roles change with circumstances and audiences. The SEPG must listen to concerns and successes at all levels of the organization. From these conversations, the SEPG must become a communication channel between different groups and different levels from senior management to practitioner. In performing their duties, the SEPG interacts with people of wide ranging backgrounds. Its success and the success of process improvement efforts depend on its effectiveness with these different groups and activities. How the SEPG is perceived by the organization and its interactions with the organization are vital to process improvement success.

In this article, individuals from the Defense Finance and Accounting Service (DFAS), Technology Services Organization (TSO), Kansas City, Mo., will discuss their perception of the SEPG and the role it fills within the organization.

Experienced SEPG Member *by Paul Kimmerly*
First, an experienced SEPG member writes about the SEPG's role as a communicator and a salesperson.

I was once asked to draw a picture depicting my job. While I am no artist, I tried to represent a chameleon wearing a used-car salesman's plaid jacket and a priest's collar. The SEPG's job may be easy to define in academic terms, but it becomes difficult when observing the practical day-to-day efforts of the group.

I chose a chameleon because the SEPG's job is always changing. The SEPG does not work for a single project or division within the organization; it must work with all of them. To successfully accomplish its goals, the SEPG must know the entire organization and how it works. This goes beyond the formal and overt organizational structure. We must understand the underlying culture and unwritten rules. This helps the SEPG choose which colors to present when working with different areas of the TSO.

To serve as a communication link and coordinator for the TSO's process improvement efforts, the SEPG must be able to find the right ways to approach each layer of the organization. Those layers separate line divisions from support divisions, and managers from practitioners. The SEPG deals with and across all divisions. Just as the chameleon must adapt its colors to its environment, the SEPG must adjust its approach to the organization.

The salesman's plaid jacket helps with the sales aspect of the SEPG's job. As stated above, we need to be persuasive. Our organization has a long history of successful software development. It is sometimes hard for the managers and practitioners to understand why change is necessary or even desired.

After analyzing our audience and knowing which color jacket to wear, the SEPG must work with "clients" to identify their areas of need and find a solution that will fit. One division may need a family cruiser process that is steady and dependable over the long haul. Another may need a sportier model to respond to rapidly changing road conditions. The SEPG must find the model that makes sense to its client. Then, it closes the deal and offers extended service to support the sale.

The insincerity implied by the used-car salesman's jacket is balanced by the priest's collar. Since the SEPG deals with all levels of the organization, establishing an atmosphere of trust is extremely important. The SEPG must listen to managers' confessions and comfort the practitioners' fears. In its communication role, the SEPG brings the concerns and accomplishments of practitioners up to managers, then takes explanations and guidance from the managers back down. To successfully accomplish this, both groups must trust the SEPG to deliver its message honestly and without attribution. By fostering an air of open communication, the SEPG can coordinate improvement efforts throughout the organization.

I have always felt the best description for an SEPG's efforts can be found in the title of a Jimmy Buffett song, *Quietly Making Noise.* The SEPG moves quietly through the organization changing approaches as needed to sell, educate, assist, listen, support, coordinate, and facilitate. By building a series of little connected sounds, the SEPG can build process improvement successes into bigger organizational fanfare.

Director, Vice Deputy Director *by Major Joel Ogren*
The SEPG's activities must align themselves with the organization's goals. To do this, the SEPG must work with senior management. In this section, the TSO's director, vice deputy director talks about his view of the SEPG's efforts.

It is not possible to know everything that you do not know about software process improvement—that is where the SEPG comes into play within our organization. Within the structural concept of our organization, the SEPG works for me; but in reality, it is a support group for the whole organization. At the most abstract level, I hold these people responsible for the organization's software process improvement activities. Once you get beyond the abstract, you realize the level of effort, personal commitment, and professionalism associated with this august group of individuals. The SEPG is a driving force for facilitating the definition, maintenance, and improvement of the software processes used within our organization.

Within the confines of my organizational role, I have watched the SEPG implement and facilitate organizational goals discussed with and defined by senior management. I have also witnessed them gently nudging senior management back inside the box of a defined software process.

The SEPG, by its very nature, is aware of every facet of our organizational process. This is a necessary component of its job. Without this, an SEPG is not empowered to facilitate the necessary changes within its organization. This is similar to the Japanese philosophy of *Kaizen,* which involves your whole organization on a daily basis in its quest to find continuous, measurable improvement in all (business) areas. The SEPG attends many of the management meetings, both at the senior management and project management level. In this role, they clarify the organization's mission and values within the organizational roadmap for process improvement. The SEPG is a tool to help guide the organization along the defined path of the Capability Maturity Model® (CMM).

Key to our view of the Kaizen philosophy is the way we choose our SEPG members, and the way that each member influences the organization. This process starts by selecting credible members of the organization and providing increased education in CMM-related topics. They are more apt to be in tune with the changing current at the grass-roots level of the organization, and can therefore influence the entire organization on a day-to-day basis. If they find that they truly believe in CMM, and what it can do for our organization, they become its staunchest supporters and the greatest influence on each and every member of the organization. Once this occurs, the SEPG naturally takes on a leadership role within the organization, in many cases mentoring their knowledge of CMM processes.

The SEPG's role in project implementation walks hand in hand with the key process areas (KPAs) associated with a CMM Level 3 organization. It compares and contrasts our current practices against the CMM's goals and key practices. While there is no magic formula for this, the SEPG helps the organization manage our processes through measurement. Establishing an implementation plan is done in an ascending hierarchy. This hierarchy begins with a vulnerability assessment, followed by resource analysis, analysis of priorities, education and awareness, a basic measurement of expected outcomes, inserting our current organizational software development plan framework, and finally the senior management decision support for program selection.

The SEPG plays a key part in establishing an enabling structure for process improvement. This is realized through the SEPG's enhanced support functions, which are readily available for the organization's stakeholders. These functions allow the organization to adequately capitalize on the available structure, allowing the organization to manifest through a process of change. The SEPG manages this process of change through metrics. These metrics continue to spell out the strengths and weaknesses of our structure, enabling us to benefit from an informed, proactively managed process improvement methodology.

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The SEPG has built a partnership environment within our organization. By practicing strong communication techniques, the SEPG minimizes conflict and empowers itself at the same time. The SEPG has created a trusted environment that is necessary for widespread information sharing. This also ensures that sanctuary and anonymity are readily available to the stakeholders of the organization, when necessary. These managed efforts are key to the SEPG's success and the organization's process improvement efforts.

A change effort needs a guiding force to begin the change process and enhance the organization's capability to accept the change. Political sponsorship helps improve the acceptance of this change. The SEPG helps facilitate this change through a causal relationship it has developed between the CMM's KPAs and the software developers themselves. It effectively provides assistance in restructuring our processes and policies. It is an effective role model, reinforcing why new behavior is needed. It communicates the vision in a manner that is attainable and provides sustainable successes, both individually and organizationally. The metrics it maintains provide the results that reinforce these new behaviors and values. These new behaviors and values become our baseline for our organization's core competencies. With a strong SEPG in place within our organization, we have realized many tangible as well as intangible benefits.

Project Officer *by Carol Mullins*
After establishing a role in the organization, the SEPG must work with the projects to assist in implementing KPAs within the CMM. This requires support and buy-in of the lead project managers. In this section, a project officer discusses the SEPG's support of her project.

The SEPG in the TSO is more than a group of individuals devoted to working on software process improvement (SPI) activities. This group provides "**s**upport, **e**xpertise, **p**ersuasion, and **g**uidance" as the Marine Corps Total Force System (MCTFS) software developers and managers go about their day-to-day jobs. MCTFS is the largest automated information system maintained and modified by the Kansas City TSO. MCTFS achieved CMM Level 2 in January 1997. Since then, the staff has completed four software releases and a large Year 2000 conversion effort. In December 2000, MCTFS and four other systems within the TSO conducted a CMM-Based Appraisal for Internal Process Improvement; their process capability was rated at CMM Level 3. These efforts would not have been successful without the SEPG's support.

This group collects all the metrics from a variety of sources that are used during the Post Implementation Review (PIR) held at the conclusion of each release. The SEPG also facilitates three separate PIR sessions with practitioners, section managers, and branch managers. It presents the final results and recommendations to me as the project officer. The findings from these sessions combined with the metrics reports help me identify areas in need of improvement. The SEPG's support and impartiality combined with its knowledge of MCTFS has made the PIR a very successful event.

The SEPG provides a level of expertise about software process improvement that cannot be found elsewhere in the TSO. As MCTFS moved along the path to a Level 3 assess-

ment, the SEPG was instrumental in identifying the actions that needed to be taken, the processes that required documentation, and the areas that must be addressed to successfully move forward in our process improvement efforts. The SEPG worked closely with MCTFS management staff reviewing work products to ensure that they were accurate and that they addressed the applicable KPAs. The SEPG relied on SEPG members in other parts of the DFAS organization for alternative ways to approach issues raised by the MCTFS development staff.

The SEPG's metrics expertise, and the support it has provided to MCTFS developers were instrumental in formalizing the methods used to estimate the size and effort of each change to MCTFS. The SEPG started with the estimating spreadsheets built by MCTFS programming staff and modified them to include estimating and tracking features for both size and effort. From these spreadsheets, the SEPG worked with MCTFS managers to develop management summary reports. It has continued to make minor modifications to these spreadsheets, which are now used without exception in all of the development areas within MCTFS.

SEPG members are the first to tell anyone that they are strictly advisors—they help process improvements happen. While that is generally true, there are occasions where their subtle but persistent persuasion leads to some significant changes. The SEPG had been suggesting that the use of burn rate metrics would assist in identifying possible problem projects before they got out of hand. At first, branch and section managers were lukewarm to the idea. Undaunted, the SEPG developed burn rate reports and updated them regularly. They continued to do this and continued to remind the staff of their availability, and even noted items of interest. Slowly, these reports have become a part of the standard tool-set used by MCTFS managers.

As the manager in charge of MCTFS, I must continually strive to balance the software development activities of the MCTFS staff with the need to continually access how we do business, and how we can develop software more effectively and efficiently. The SEPG helps me achieve this balance. Having been software developers before joining the SEPG, each SEPG member provides me with a unique perspective of the impact that new ideas, procedures, or initiatives will have on the staff. This "having-been-there" perspective provides valuable input and often times guides me in making decisions. The SEPG frequently offers me a variety of alternatives as I contemplate new things to try. Again, their guidance has proven to be invaluable.

New SEPG Member *by Shannon Morten*

As part of their efforts, the SEPG must periodically rotate members. This allows the experienced members to return to projects bringing their new process knowledge with them. It also allows the SEPG to keep a project-level focus by bringing in new people from the development staff. In this section, two new SEPG members talk about the transition from being a member of the development staff to being the new person on the SEPG.

"So, what does the SEPG do again?" That was the question I asked after one day in their ranks. I came to the SEPG after serving as a test analyst for MCTFS. During that time, I spent my days searching for needles in haystacks. My first day in the SEPG

was a major eye-opener. Suddenly, I found myself no longer searching for needles, but looking at every haystack in the field!

Based on my experience from having served on the SEPG for several months, I have learned the answer to my initial question. We support the organization by providing assistance in SPI activities, meeting facilitation, and in identifying and addressing its needs. That sounds so general and expansive, but that is what we do. The number of little details that goes into our job every day constantly surprises me. This job did not turn out to be what I expected, but it has proven to be everything I wanted, and everything I did not know I wanted.

I find that my knowledge and experience as a tester along with college courses I have taken provided me with a strong base of knowledge about software development. I can apply this knowledge when we work with each system within the TSO. The attention to detail that I brought with me from test has proven to be a strong asset. I tend to approach my duties from a *techie* point of view instead of a management view. It takes more effort for me to think like management and look at the big picture. I tend to focus on all of the individual pixels on the screen. However, since the SEPG works with all levels of the organization, I have found that my skills complement those held by other members of the group.

After joining SEPG, I discovered that I was involved with SPI activities daily as a practitioner and did not know it. As a tester, whenever a CMM-related acronym was mentioned my flags immediately went up, and I dismissed it as a waste of my time. I had a product to get out after all. SPI should be management's concern, not mine. My first week with the SEPG was a massive eye-opener. I started wondering how I could have been so blind for so long. By stepping back, I can see how process improvement efforts related to what I was doing. Now, I find myself trying to explain this revelation to my fellow practitioners. I often wind up fighting the same battle SEPG fought with me. Some people listen, and some do not. I think that my background gives credence to what I am saying now, and that I can put SPI terms into language that practitioners can understand.

As I learn more about CMM and how to apply it, I am realizing that I am also applying the principles to myself. As a practitioner, I maintained a Level 1 attitude. Funny how it happens this way, but now as an SEPG member, I find my own behavior maturing.

New SEPG Member *by Pamela Yancey*

During my career, I have always sought opportunities to grow professionally, contribute, and make a difference. This led me to become an advocate for Total Quality Management (TQM) in the early 1990's. I knew the concepts were viable, and it seemed like a practical solution to address inefficiencies in an organization, as well as a means to foster teamwork.

When I joined SEPG, I understood CMM principles. I saw how it related to TQM, and I supported the concept wholeheartedly. I was prepared to take an active role as an SEPG member; however, I was unprepared for the emphasis and level of dedication within TSO to improve their software development processes. It was obvious to me from the beginning that

TSO equated implementation of the software-CMM to the success of their business objectives. Time and again, I saw how the TSO was willing to invest the time, effort, and money required to implement a flourishing SPI program.

My first month or so on the SEPG was overwhelming to say the least. The TSO is a collection of widely diverse projects, each with different needs. Quite frankly, after meeting with most of the project managers, I had difficulty seeing a standardized approach to process improvement within such a diverse organization. Besides, I wondered how I would ever become proficient when I felt that I had so much to learn. Though I felt disheartened at times, I continued to remind myself of the apparent success achieved within our organization. I knew that there had to be a connection between the SEPG's efforts and that level of success.

I took more than a few months to fully appreciate my role on the SEPG, and the group's role in the success of our organization's SPI efforts. I discovered that my success on the SEPG depended upon my ability to understand and embrace the diversity of our organization. I also recognized that one of the SEPG's greatest strengths lies in its ability to listen to the needs and concerns of our projects. In turn, the SEPG works with the projects to develop solutions. While these solutions address the projects' needs, they also bring about subtle organizational changes that enable future process improvement efforts. We celebrate these small changes as successes, recognizing that change cannot be approached abruptly or aggressively.

I saw that my role, and that of the SEPG, involves constantly working behind the scenes to promote heightened awareness of SPI and CMM-based process improvement initiatives. The SEPG allows the projects to resolve their unique issues while weaving a consistent thread throughout the organization. To be effective, my contributions are not only based on my expertise, but my ability to support the project managers and their staff. I had to maintain a delicate balance between my ability to provide guidance, direction, and training with my ability to foster support, encouragement, and open communication in all daily activities.

More than a year has passed since I joined the SEPG. I now feel at ease with my role, and feel like I am part of a cohesive team. We share a common commitment and belief in SPI. As a SEPG member, I have the unique opportunity to make a viable contribution to our organization's success in implementing or encouraging continued CMM-based process improvement initiatives. Additionally, I have the opportunity to grow and make a difference in our organization.

Experienced SEPG Member *by Capt. Wendell Bazemore*
Experienced SEPG members have seen the good and the bad. They have brought their project-based knowledge to SEPG and supported the organization and the projects. In this section, an experienced SEPG member talks about what it takes to succeed in supporting process improvement efforts.

Of the many things I've learned during the past two years as an SEPG member, three are most important: aligning SPI initiatives with business goals, the value of metrics for influencing culture change, and the importance of taking a project approach to process improvement initiatives.

The challenge for SEPG is aligning process improvement efforts with the day-to-day and strategic business objectives. Everyone at TSO can relate to the activities involved in developing a quality software product. It is the main thing. Concepts like SPI, CMM, or a certain maturity level may not be as relevant as software baselines, estimates, quality reviews, or defects to the software developer. This is not to downplay the importance of the CMM as a framework for process improvement; however, we (SEPG) have been most successful when we can show the business impact of process improvement initiatives. After all, the main thing is keeping the main thing the main thing.

In terms of influencing behavior change and reinforcing process improvement concepts, we have gotten the most mileage out of our metrics program. There is a perception among some in the SPI community that "you must wait until the organization is well on its way to Level 3 before implementing a metrics program." Indeed, CMM starts talking about the software process database in the Organizational Process Definition KPA. However, based on what I have observed in this organization, I would encourage SEPGs in any organization to begin collecting measures as soon as possible. There is a minimum set of data—effort, schedule, and defect numbers—that will prove useful to any organization. Our metrics program has grown and continues to grow as managers gain confidence in the existing measures and consider other measures that will provide insight into key project issues and concerns.

To enhance the success of the process improvement effort we must treat it like a project. Our organization is like most in that we think in terms of projects. Like company commanders in a rifle battalion, project officers are trusted with carrying out those most important functions of the organization. The TSO's structure supports the project officer's ability to ensure the production of quality software, on time and within budget. That structure includes a strategic plan, a chain of command, milestone reviews, and meetings with senior management. Resources are constantly being evaluated and frequently tradeoffs are made. Recently the TSO capitalized on the existing structure to implement key process initiatives, culminating in a successful assessment for CMM Level 3.

Summary

As you can see, SEPG represents different things to different people. However, there are common themes that run throughout. Communication, coordination, and support appear to be the main SEPG duties. All of the parties above talk about the SEPG's ability to relate to the different levels of the organization in language they understand. This helps the SEPG establish and foster process improvements throughout the organization. In order to do that, the SEPG must coordinate the activities of different areas to ensure the organization is moving in the right direction. This coordination comes from the different forms of support the group provides. The SEPG stands ready with services ranging from metrics analysis and reporting, to meeting facilitation, to counseling. All levels of the organization can benefit from the SEPG's efforts without being able to specifically say what they do. "It depends," is a favorite answer given by the SEPG when a question is asked. It also applies when trying to describe what they do.◆

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