THE MONITOR

The SEI's TSP Expands into South Africa

In early 2009, Nedbank, one of the four largest banks in South Africa, began exploring whether to adopt the SEI's Team Software Process (TSP) method, a development process that helps software engineering teams improve their performance through planning and tracking their work, establishing goals, and taking ownership of their processes and plans.

Nedbank was part of a South African delegation that went to organizations in Mexico and the United States to speak with practitioners who had implemented TSP. The feedback from these organizations on implementing TSP was very positive. They reported not only improved quality (measured by less time in final test and significant reductions in defects shipped), but also improved performance with respect to the planned schedule.

In July 2009, Nedbank launched a TSP pilot with two software-intensive projects, Extended Trading Branch (ETB) and Real-Time Clearing (RTC). The TSP pilot was initiated in collaboration with the Johannesburg Centre for Software Engineering (JCSE) at the University of Witwatersrand and the SEI.

"The TSP implementation is a national pilot program initiated by the Department of Trade and Industry, and Nedbank is the first organization in the southern hemisphere to do a launch of this revolutionary methodology. It is very thrilling to be part of an initiative of this scale and importance. I am also very excited with the results of the pilot implementation. I am positive that this initiative will go a long way towards bringing radical improvements in the quality of software that we produce," said Tamasin Bossert, business improvement executive at Nedbank.

"We are almost at the end of the TSP pilot in Nedbank. It has been a journey full of excitement, challenges, and lessons learned," said Alok Goswami, project manager for TSP. "All milestones for the TSP pilot implementation have been achieved and the pilot formally closed at the end of June."

The rollout of TSP across additional projects in Nedbank begins in August 2010, Goswami said.

"We have seen some significant improvements and benefits coming out of the TSP pilot implementation. The TSP pilot has generated accurate data at an individual developer level that has been useful in understanding and analyzing various aspects of the project performance. Some of these aspects include the percentage of open tasks, the time spent on individual tasks, defect rates, earned value, and process performance. In addition we have seen a significant reduction in defects during system testing and in production for one of the TSP pilot projects. The teams have demonstrated better management of their project work in terms of estimation, planning and monitoring. We have also seen a reduction in the amount of re-work done," Goswami said.

According to Goswami, the next challenge is to embed the TSP principles at an organizational level. The rollout of TSP in Nedbank needs to be done in such a way that TSP becomes an integral part of the organizational processes used by the projects. To achieve this, it is important to introduce TSP as early as possible in the lifecycle of a project, ensure reuse of TSP trained teams, and integrate TSP principles with other key initiatives currently being run in the organization.

SEI Members from left to right: Kevin R. Andreasen of Hill Air Force Base, Mary Busby of Lockheed Martin, Venkat Koduri of ITP, and William Bettesworth of Honeywell International Aerospace. Thanks to Anna Mosesso for contributing photography.

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TSP in a Non-Software Environment:
The Naval Oceanographic Office (NAVO)

Traditionally, the SEI's Team Software Process (TSP), an approach used by groups of teams to apply integrated team concepts to the engineering of software-intensive systems, has been applied in software settings.

Since 1999, the Systems Integration Division of the Naval Oceanographic Office (NAVO)—an organization that works to optimize sea power by applying relevant oceanographic knowledge in support of U.S. national security—has used the TSP in a non-software setting as well as a software setting.

Lana Cagle, quality advisor and an SEI-certified TSP coach, says that there are currently 15 projects using TSP across the four branches within the Systems Integration Division. They include the management steering group, which uses it to align goals; the division process group; software development; enterprise engineering services; and systems integration.

"We really like the way that it allows you to operate in a disciplined manner. The planning, the team communication, the tracking, and being able to know how well your project is doing because of TSP," explained Cagle. "It's a complete package. It has the training, the scripts, the specifications; it includes a measurement framework for quality as well as planning. It gets to the principle of doing the work right the first time. That is the only way to become efficient and effective."

Performance results of releases between 2006 and 2009 showed the following results:

- system test delivered defects averaged .9 defects per 1,000 lines of code (KLOC)

- customer-delivered defects averaged less than .5 defects per KLOC

On other fronts, a Requisition/Contract Administration Tracking project, which is developing a software application for the NAVO contracts division, reported a 0 percent schedule error for the requirements phase and is on track to do the same with the design phase. The IT group of the Enterprise Engineering Department reduced from 17.5 to 2.7 the number of days to process an engineering change request.

One thing that has been particularly effective has been the management reviews, which are conducted every five weeks, said Cagle, adding that often, when projects are getting started, it's common for individuals to take on unrealistic work loads. The reviews allow managers to be more effective in how they assign work.

"At first, you would see a lot of projects with wide variations in planned and actual earned value mostly because we were not getting in our planned hours," explained Cagle. "Each time we apply TSP, we do gradually see growth and improvement in estimating and applying history—first with individuals, then teams, branches, and as an organization overall. It's been a slow evolution; but we are becoming an effective, efficient division."

Cagle said that NAVO is now looking to pilot several TSP projects across the entire organization.

Tim Chick, a member of the TSP team and senior member of the technical staff at the SEI, said that he and other team members are also working on the creation of a TSP educational track for non-software professionals that includes courses, and coach and mentoring training.

Chick, who is working with Cagle on launching TSP across NAVO, said that they will soon launch three initial pilot projects across the organization.

"We're going to work with them on the three initial pilots. Soon they will be able to begin the transition of TSP technologies across the organization so that they can maintain it themselves," Chick said. "That is the ultimate goal."

Noteworthy Technical Report

The following SEI technical reports and notes have been published. Please visit the accompanying URLs to download a free copy.

Team Software Process (TSP) Coach Mentoring Program Guidebook Version 1.1
Timothy A. Chick, Robert Cannon, James McHale, William Nichols, Marsha Pomeroy-Huff, Jefferson Welch, & Alan Willett

CMU/SEI-2010-SR-016

www.sei.cmu.edu/library/abstracts/reports/10sr016.cfm

This guidebook is designed to explain the steps for becoming an SEI-Certified Team Software Process (TSP) Coach or SEI-Certified TSP Mentor Coach, with emphasis on guiding individuals through the mentoring process. This guidebook defines the structure and format of the mentor and provisional coach relationship, and explains the process steps and evaluation criteria for becoming an SEI-Certified TSP Coach or Mentor Coach.

TSP SYMPOSIUM 2010
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September 20-23, 2010 • Omni William Penn Hotel, Pittsburgh, PA

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September 20, 2010 (TSP Introduction Tutorial)
Exploring the Team Software Process: An Introduction

September 21-23, 2010
Omni William Penn Hotel
Pittsburgh, Pennsylvania

The SEI and Carnegie Mellon University are pleased to announce the fifth Team Software Process (TSP) Symposium, to be held in Pittsburgh, Pennsylvania.

The TSP Symposium is the event where all of the yearly TSP activities will occur. The purpose of the conference is to bring together the seasoned users of the TSP, those involved in its development and transition, and those who are new to the technology and eager to learn more. The attendees will have the opportunity to exchange ideas, concepts, and lessons learned concerning the experiences, best practices, and suggested introduction strategy for the TSP methods and practices.

Symposium Objectives
This symposium will provide a forum for the free exchange of ideas and implementation methodology for TSP, and will afford a unique opportunity to meet with the sponsors, developers, and users of TSP, as well as those offering TSP training, coaching, and implementation assistance.

Who Should Attend
The primary audience for this symposium is those individuals who are using the TSP. It is also suitable for practitioners of the Personal Software Process (PSP). Managers and engineers who are interested in learning more about PSP and TSP should attend. The conference will also be of interest to PSP/TSP instructors and TSP launch coaches and the managers and engineers who work with them.

Two SEI Members to Keynote at TSP Symposium
SEI Members Barry Dwolatzky and David Webb are among the keynotes slated for the TSP Symposium, which will be held September 20-23 in Pittsburgh, PA.

Dwolatzky (see Member Profile on page 5) is director the Joburg Centre for Software Engineering (JCSE) at the University of Witwatersrand in Johannesburg, South Africa, a position he has held since 2007. Dwolatzky is leading efforts to promote the growth and development of the software industry in South Africa. As part of this effort, Dwolatzky has been leading efforts to pilot the SEI's Personal Software Process (PSP) and Team Software Process (TSP) in two companies in South Africa. TSP and PSP teach software engineering teams to plan and track their work, establish goals, and take greater ownership of their processes and plans.

Webb is a senior technical program manager with the 520th Software Maintenance Squadron of the 309th Software Maintenance Group of Hill Air Force Base in Utah. The project manages the software maintenance for a large, embedded weapons systems for the U.S. Air Force. In 2009, Webb's team expanded the use of TSP to the software testing team, the documentation team, and the support team for the Ground Theater Air Control System (GTACS), a deployable ground-based computer network that coordinates radar and communications data signals for ground, airborne, and naval elements. The team's sustainment of more than 3 million lines of GTACS code requires them to change software, hardware, test environments, and documentation.

Also keynoting is Dr. Cynthia Dion-Schwarz, director for information systems in the Office of the Director, Defense Research and Engineering in the Office of the Secretary of Defense.

TSP: A Student's Perspective

Surveyor SRV-1 Blackfin Robot
Courtesy of www.surveyor.com

Carnegie Mellon University's Master of Software Engineering (MSE) program includes a component called "The Studio" that requires students to complete a real-world project for an external client.

Shigeru Sasao, who started the program in the fall of 2008, was part of a group of students who were paired with the SEI's Predictable Assembly for Certifiable Components (PACC) team, which works to predict the behavior of a component-based system prior to implementation, based on the known properties of components. Sasao's team—which included Jonathan Hartje, Saurabh Gupta, Berin Babcock-McConnell, and Sidharth Surana—was charged with creating software for an autonomous controller for a robot named SRV-1. Specifically, the team was asked to create software that would allow a robot to search for and find path markers and then navigate itself through a path based on those markers while identifying targets (and non-targets) along the way.

Sasao and his teammates started working on the project in the fall of 2008, but found that they were struggling with issues like planning their work and tracking it effectively.

"We knew what to do in the big picture, but we weren't sure what to do each week," said Sasao who, prior to enrolling in the MSE program, had worked at a securities firm in Japan, writing software for trading fixed income products.

The team of students decided to try the SEI's Team Software Process (TSP). TSP teaches software developers the skills to make and track plans and produce high-quality products. Groups of developers use TSP to apply integrated team concepts to the engineering of software-intensive systems. TSP builds upon the Personal Software Process(PSP), which teaches individual software engineers how to plan and manage high-quality software development work.

The team spent the entire first week of the summer semester in a launch to build a plan for the upcoming product implementation cycle. This included enumerating the business goals, and from that, creating team goals and a list of tangible outputs that needed to be produced. The team then created a list of tasks for each team member based on those tangible outputs.

"By the end of the TSP launch, we had a very detailed plan; and we were able to do planning and tracking, not just for schedule issues but for quality and budget issues as well," Sasao said.

Most of the spring 2009 semester was dedicated to creating the software architecture, and in the summer, the team began to implement the architecture.

"At that point, we started using the quality aspects of TSP like defect tracking and monitoring. For example, we measured things like phase yield and defect density. It was an extremely effective way to do quality assurance," Sasao explained.

By the end of the summer, the team had written 20,000 lines of code and, through their metrics, detected 85 defects, but were able to capture almost all of them in the early stages of development. When the project reached the system testing phase, only two defects were found, according to Sasao.

"Our team became pretty big advocates of TSP because it worked so well for us. We actually delivered one week early. Up until the middle of spring, we were actually unsure of whether we would be successful or not," Sasao explained, adding that TSP worked for the team because, while they had all learned different techniques for managing software development projects, it was difficult to see how those techniques tied together. "TSP links everything together, and it provides the data so that you can see how everything fits together."

Sasao, who graduated from the MSE program in December, has been working as a research fellow at the SEI and said that he and his team have written a paper about their experiences. It has been accepted for presentation at the 2010 TSP Symposium, which will be held September 20-23 in Pittsburgh.

After graduation, Sasao, who with another student on the team completed the TSP Coach Training course through the SEI, was awarded a one-year MSE Fellowship and has been working with the SEI's Software Measurement and Analysis (SEMA) initiative, and is working as a TSP coach for a new group of MSE students who are working on their studio project.

For more information about the 2010 TSP Symposium, please visit www.sei.cmu.edu/tspsymposium/2010/index.cfm.

Bill Nichols, a member of the SEI's TSP team who worked with Nedbank on the pilots, said that once the two software engineering teams on the projects began estimating their time, they saw an increase in the number of task hours per week (direct time on project tasks) as well as a sharp reduction in defect rates. "People like to do good work. Just a few key measures give them the feedback that they need to track their work and improve their work."

"Their quality improved significantly. They were able to find and remove defects earlier in the process," Nichols said. "There were four delivery cycles. After the initial delivery, there were no further defects found in system tests or production. That was zero defects in deliveries two through four."

"One of the initial challenges that we faced was the reluctance by some team members to adopt the TSP methodology in the project," Tamasin said. "As the pilot progressed, those team members became the biggest ambassadors of TSP implementation! We also executed a number of change management initiatives to ensure that the team members embraced this methodology with enthusiasm and the right attitude."

According to Tamasin, critical success factors included the commitment from Nedbank's management and the role played by the sponsor. From the beginning, the team had access to Nedbank's chief information officer, Fred Swanepoel, on any issues that came up during implementation. As sponsor, he played a pivotal role in terms of guiding the entire initiative from a strategic perspective. He ensured that funding and other resources were made available in time, that all escalations were resolved effectively and, most importantly, that the pilot teams remained motivated throughout the TSP implementation journey.

Barry Dwolatzky
Member Since January 2007

South Africans have always embraced computers , according to Professor Barry Dwolatzky, CEO and Director of the Joburg Centre for Software Engineering (JCSE) at the University of Witwatersrand (Wits) in Johannesburg, South Africa.

"The Computer Society of South Africa was formed in 1957. That's the second one to be formed in the world," Dwolatzky explained, adding that South Africa stayed at the forefront of the international IT industry until the 1970s when sanctions were imposed because of the government's apartheid policies. "In 1994 when Nelson Mandela became president, and we were no longer isolated, we were exposed to this new, highly-competitive world of information technology."

When South Africa reemerged onto the international scene, Dwolatzky said that it could not compete with India, which had "really refined quality and predictability." As a result, many South African companies and government departments that are replacing legacy systems are outsourcing the work to countries like India because it offers greater predictability.

"There is a well-established and local industry, but we are facing huge problems because we are unpredictable," Dwolatzky said. "It's important for South Africa to be a player. It's a huge potential source for creating jobs locally. We have to become competitive and world class, and that's what we are trying to do."

Dwolatzky is leading this effort through the JCSE, which he likens to the SEI in that it is a university-based center trying to transition software engineering best practices into the public domain. According to its website, http://jcse.org.za/, JCSE is a three-way partnership between government, academia, and industry. The JCSE is multifaceted with various programs and facilities positioning it as a focal point of a software development industry for South Africa and the rest of the continent.

As part of this effort, Dwolatzky has been leading efforts to pilot the SEI's Personal Software Process (PSP) and Team Software Process (TSP) in two companies in South Africa. TSP and PSP teach software engineering teams to plan and track their work, establish goals, and take greater ownership of their processes and plans.

 "We found that companies in the United States and Mexico were using it very effectively to drive predictability and quality," Dwolatzky said. Last year, he led efforts to launch TSP teams at two companies, one of them Nedbank, one of the four major banks in South Africa. At Nedbank, one of the TSP pilot projects involved a large maintenance effort that included a team of nine developers and one manager working on a large number of very small COBOL programs that had to work in a complete system. In system testing, there were no defects; and when the software went live in January, there were two production defects, but none traceable to the TSP

team. Instead, they were the result of preexisting problems, according to Dwolatzky.

"This is the first time that Nedbank has seen this level of quality with a large COBOL project. It's also been very predictable. They've made their time targets perfectly," he said.

In the immediate future, Dwolatzky hopes to use TSP as a means for more companies to adopt the SEI's Capability Maturity Model Integration (CMMI) framework.

"We want to grow CMMI, but really first track it through TSP," he said. "We are also very keen to look more broadly at other best-practice models like architecture and the People Capability Maturity Model to see if they can be used to complement TSP and CMMI."

Over the long term, he hopes to make South Africa a player in the global software industry.

"While we could never aspire to compete with a huge player like India, we could look for niche markets and become a world player in terms of niche areas," he said.

Dwolatzky graduated from Wits with a degree in electrical engineering in 1975. He completed his doctorate in this field at Wits in 1979. He has published extensively in more than 40 research journals. He has also written numerous articles on South Africa's IT development issues.

In 1989, after spending a decade in the United Kingdom, he returned to Wits to continue researching and promoting the growth and development of the software industry in South Africa. Since re-joining Wits, he established a new degree program in information engineering and developed a new course-based master's program in software engineering. That program has now become a part of the South African government's skills development framework. In 2005, he was named a finalist for the prestigious Computer Society of South Africa's "IT Personality of the Year."

Through his work with the SEI, he has become a certified CMMI instructor and a PSP instructor. Dwolatzky said that he became an SEI Member because many of the people with whom he works on JCSE's mission are also members.

"We looked very carefully around the world at the groups and universities that were promoting best practices," Dwolatzky said. "All the fingers pointed to Pittsburgh."

To view a video featuring Dwolatzky discussing South Africa's IT Sector, please visit www.softwareengineer.org.za/video-promoting-the-sa-ict-sector/129/

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KEYNOTES
Cynthia Dion-Schwarz, Ph.D., SES – Director, Information Systems & Cyber Security DDR&E
Barry Dwolatzky – Director, Johannesburg Centre for Software Engineering
David Webb – Senior Technical Program Manager, Hill AFB

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