Deploying TSP on a National Scale
Software Solutions Division

Project Motivation: Positioning Mexico's International Software Industry

Mexico is the United States' second-largest trade partner; however, the Mexican software industry does not yet compete effectively for a share of the U.S. software market. For example, Mexico's Program for the Software Industry Development (Prosoft) has reported that in 2007 India sold $30 billion in software services to the United States compared to $900 million sold by Mexico. As the market continues to grow, Mexico has the opportunity to increase its participation. And Mexico has a strategy to accomplish this.

The leaders in global software development outsourcing, India and China, have a cost advantage because of relatively low wages. Rather than compete with low developer wages, an alternative is to improve productivity and product quality. The Mexican government, in part through Prosoft, has launched an aggressive program to build a national reputation as a provider of information technology products and services. The initiative will develop competitive human capital, strengthen the local industry, enhance process capabilities, improve quality assurance, and promote strategic alliances with foreign companies. A key to this program is the introduction of the Carnegie Mellon® Software Engineering Institute Team Software Process℠ (TSP℠).

The worldwide software industry needs to improve cost and schedule management, cycle time, and product quality. Improving performance in these areas and developing the workforce capability are important Prosoft goals. Previous reports from the SEI have documented the success of TSP in producing high-quality products on time and within budget. TSP operationally implements high-performing development processes. These processes are managed by trained individuals and teams.

Personal Software Process℠ Training

Proper training is an essential aspect of TSP implementation. Developers undergo an intense training: either the two-week course, PSP I and PSP II, or the new one-week course, PSP Fundamentals with the second week, PSP Advanced, coming at a later time. In the course they learn to measure, estimate, plan, and develop using sound principles. The training allows the developers to practice these skills with programming exercises. The improvement in product quality at the completion of training is both substantial and remarkably consistent. Others involved in project work and management are also trained to participate on or manage these teams.

How TSP and PSP Work

These Mexican TSP pilot projects included nine project teams from five organizations delivering software as an outsource product. This outsourcing group is distinct from projects that produce either a commercial or internal-use software product. Typically, outsourcing projects have less control of their software development strategies, time tables, and start dates. This proved to be a significant challenge in the initial planning and training phase of TSP rollout.

Project Results

Industry benchmark data show that more than half of all software projects were either more than 100% late or cancelled. These Mexican TSP pilot projects delivered their products an average of only 2% later than planned. The schedule error for these teams ranged from 27% earlier than planned to 45% late. This compares very favorably with industry benchmark data. Among the TSP pilots launched in Mexico, none were cancelled and several projects had no defects in system or acceptance tests.

The following figures summarize the product and project results from the pilot teams and compare them to both a TSP benchmark group and an industry benchmark. Unlike the benchmarks, all Mexican TSP projects are pilots. Several of these Mexican projects are very small or have teams that have been trained only through PSP Fundamentals.

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TSP System Test Quality Comparison

TSP System Test Performance Comparison
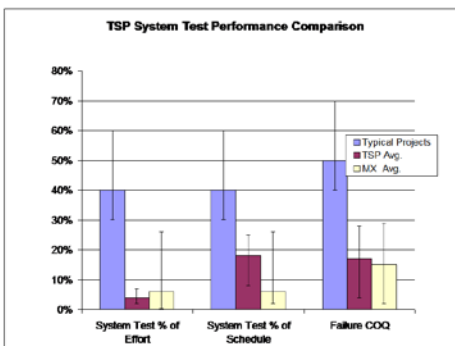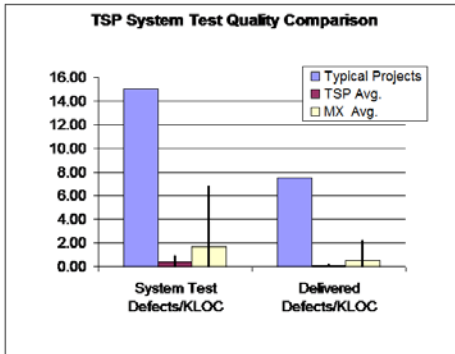
Although the numbers are impressive enough, the development staff and management also speak positively about their experiences performing the work. Developers prefer the work environment of a TSP team. Management likes the depth of data and the reliability of status reports. Worker retention was also enhanced.

During the initial TSP rollout phases, a number of challenges are common:

- the up-front cost in both time and money
- resistance from developers
- management support of self-directed teams
- appropriate use of detailed data
- training and supporting high-quality TSP coaching

These problems are not unique to Mexico, but some are more relevant. An important issue for Mexico is the number of small and medium-sized enterprises (SMEs) that cannot afford the initial training. The SEI has developed a new PSP training course, PSP Fundamentals, to reduce the time and cost required to launch teams.

Next Steps: Scaling Up

TSP had been demonstrated to work for Mexican companies. Rolling out on a national level, however, is not only challenging, but unprecedented. In addition to the practical problems of the rollout, national success depends on visibility and recognition of the accomplishments. Steps include

- training Mexican university professors so that they can train PSP developers, which will significantly reduce the start-up costs for SMEs
- developing TSP as a cost-effective way to implement CMMI®
- certifying and recognizing companies that effectively use TSP
- developing ways to train sufficient coaches and instructors to satisfy the nation's growing needs

TSP as a path to CMMI accomplishes two purposes. First, it provides a cost-effective way to implement CMMI practices and evaluate maturity. The effectiveness of TSP in small settings will be especially helpful to the Mexican SMEs. Second, CMMI maturity ratings provide widely respected recognition of Mexican commitment to process and quality. CMMI

is recognized in the international market, and a CMMI appraisal is required to enter this market. Because CMMI can be expensive and time consuming to implement, TSP accelerates implementation, reduces cost, and improves implementation quality. TSP does not replace CMMI but rather implements many CMMI practices effectively and enhances CMMI effectiveness. Certifying organizations for TSP use will also support project goals in several ways. It will

- advertise both process commitment and actual results
- differentiate Mexican companies in the international market
- verify that Prosoft funds are appropriately spent

For more information, access the full report *Deploying TSP on a National Scale: An Experience Report from Pilot Projects in Mexico* at www.sei.cmu.edu/reports/09tr011.pdf

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