Mapping TSP to CMMI

James McHale
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Foreword by
Watts Humphrey and Mike Konrad

April 2005

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FOR THE COMMANDER

Christos Scondras
Chief of Programs, XPK

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Foreword

The SEI produced this technical report for those interested in both CMMI and the TSP and in how these two technologies might be used together to accelerate their process improvement efforts. The report also clarifies some common misconceptions about how these two improvement frameworks support each other.

TSP-CMMI Synergies

When adopting an SEI improvement technology, many organizations mistakenly view it as a stand-alone effort. However, software engineering is a rich and varied field and, as demonstrated by many other fields of engineering and science, there are often important synergistic benefits between seemingly unrelated technical disciplines. To encourage organizations to capitalize on these potential synergies, the SEI has a strategy for relating its improvement activities and for showing its partners and affiliates how its many programs can be used to support and enhance each other. This technical report is an early step in this strategy. It has been produced through the joint efforts of the CMMI and TSP project teams.

Mapping the TSP to CMMI

This report is similar in nature to an earlier SEI technical report mapping TSP practices to the CMM [Davis 02]. At the time of the earlier report, the CMMI framework was well advanced, and the SEI had committed to extending the earlier CMM-TSP mapping to cover CMMI. This is the CMMI-TSP report.

When we originally developed the TSP, we built on the CMM model and established the personal and team practices needed to implement the key CMM process areas that were directly pertinent to development teams. As shown in the earlier technical report, this included a high percentage of the practices at all process maturity levels, with a heavy focus on maturity levels 3 and 4.

However, because the CMM had important gaps, we had to identify and define a family of practices that were not covered by the CMM. These included, for example, risk management, integrated teaming, and distributed engineering. With the improved coverage that CMMI provides in these areas, the close relationship of the TSP and CMMI should be clearer than before. This close relationship has advantages for TSP teams, but it should be particularly valuable to organizations that use the TSP to accelerate their CMMI improvement.

The CMMI-TSP Improvement Strategy

Some people have the mistaken impression that TSP should not be introduced until organizations have reached CMMI level 2 or higher. It is now clear, however, that TSP can help organizations at all maturity levels, and that the sooner TSP is introduced, the better. Adopting TSP has been shown to greatly accelerate CMM process improvement. For example, SEI studies show that the mean time required for organizations to improve from CMM level 2 to CMM level 3 is 22 months and that the mean time to improve from level 3 to level 4 is 28 months. However, a NAVAIR study showed that its AV-8B Joint Systems Support Activity moved from level 2 to level 4 in only 16 months instead of the expected 50.[1] They attributed this rapid pace of improvement to the organization's prior introduction of the TSP. While studies are currently underway, there are not yet any completed studies that document the acceleration achievable in CMMI process improvement through using the TSP. Based on the work done to date, however, the improvement benefits should be at least comparable to those of CMM acceleration with TSP.

Furthermore, the move from level 3 to level 4 has been recognized as the most difficult of all CMM-based improvement steps and it probably will be the most difficult CMMI improvement step. The principal reason for this difficulty may be that the process definitions that many organizations develop for level 3 must be reworked to include process measurement when they move to level 4. Because TSP includes the extensive use of measures, its use both accelerates the level 3 process definition work and also largely eliminates the need to rewrite these processes when moving to level 4. The move from level 3 to level 4 then needs only to address the two level 4 process areas.

The objective of this report is to help process professionals, process managers, project leaders, and organizational management to establish process improvement strategies and plans. If you are not now using TSP, this report will show you why it would be helpful to introduce it in parallel with your CMMI improvement efforts. However, if your organization is already using TSP and if you are planning a CMMI process improvement effort, this report will help you to decide on the most efficient and expeditious way to proceed. In either case, we suggest the use of TSP to guide the project-centered improvements and to concentrate the CMMI improvement effort on the organization-wide responsibilities that are not as completely covered by TSP.

The rest of this foreword assumes that you have a CMMI improvement effort in the planning stages or underway and that you are considering TSP introduction.

[1] NAVAIR News Release ECL200301101, "AV-8B JSSA Team Soars to Level 4." Naval Air Systems Command, Naval Air Warfare Center, Weapons Division, China Lake, CA, January 10, 2003.

Typical Questions about TSP and CMMI

People have asked many questions about the relationship between the TSP and CMMI. Some of the most common questions are the following.

I have been told that TSP should not be introduced until an organization is at level 3 or above. Is that correct?

No. As mentioned earlier, the TSP is helpful to organizations at every CMMI maturity level. Experience demonstrates significant benefits from TSP introduction before or concurrent with the move to CMMI maturity level 3.

We have a crash program underway to get to CMMI level 3 as fast as possible. Should we attempt to introduce TSP at the same time?

That depends on your objective. TSP introduction will improve organizational performance faster than anything else you do. If your objective is solely to reach a given maturity level rather than to improve performance, you may wish to defer TSP introduction. However, by concentrating exclusively on achieving a maturity level rather than focusing on performance improvement, you are likely to get disappointing results. A maturity level focus may lead to a bureaucratic process, and this generally delays real process improvement and damages a development organization's performance rather than enhancing it.

We are moving to CMMI level 2 and replacing our entire development environment. Senior management would also like to introduce TSP at the same time. Technical management is resisting. Should we push ahead with TSP anyway?

Probably not. While some level of change is normal in most organizations, there is a point beyond which change can be destructive. At that point, it is usually wise to limit the pace of change to something that people can tolerate. Remember, the organization must continue to operate productively during the change process.

We have been at CMM level 1 for 10 years and have been unable to make significant improvement progress. Would TSP help us with CMMI improvement?

It very likely would. Generally, the reason that organizations stay stuck at level 1 is that their senior management is unable or unwilling to provide adequate support or to give sufficient priority to the change activities. Since CMMI improvement generally must be implemented in parallel by most parts of an organization, large, entrenched, or highly bureaucratic groups are often extremely difficult to change. Because a TSP-based improvement effort can be focused on a relatively concentrated area, it is easier for management to provide the needed focus on process improvement. However, you still must have senior management support, or no improvement effort is likely to succeed.

Is TSP introduction always successful or does it sometimes fail?

The TSP is not magic. When TSP introduction efforts have failed, it has been for the same reasons that CMMI improvement efforts fail: the management team does not understand or agree with the need to change. At any maturity level, the most common problems are the lack of management support, changes in senior management, or business failures and cutbacks. Generally, when the senior management champions stay in place, both TSP and CMMI improvement efforts succeed.

Final Considerations

It is becoming clear that by using TSP, organizations can greatly accelerate their CMMI process improvement work. However, several additional points should also be considered when deciding whether and how to combine TSP and CMMI improvement efforts.

First, through using TSP, engineers and engineering teams can see the reasons for many of the high-maturity CMMI practices, and they will be more likely to cooperate with and support a CMMI-based process improvement effort. It is much easier to get the support of engineers who have PSP training (part of TSP introduction) and TSP experience.

Second, since the objective of any software process improvement effort is to enhance organizational performance, and since this will require changes in engineering behavior, any improvement effort should be accompanied by steps that demonstrably change engineering behavior. PSP and TSP do this.

Third, a major risk for any improvement effort is that it can become bureaucratic and can impose added demands on the engineers instead of helping them. If, as suggested by this strategy, the group charged with process improvement work treats TSP teams as its customers, this risk will be greatly reduced.

Fourth, even if all of the above points were not enough, TSP can substantially improve the performance of the organization's software groups, even in some groups that have already achieved CMMI maturity level 5 [Brady 04].[2]

Finally, while introducing TSP can greatly facilitate CMMI-based process improvement, this will only be true if it is properly introduced and used. For example, each TSP team should capitalize on the organization's existing processes and should work closely with the established quality assurance, process, configuration management, systems, requirements, and test groups. For the TSP effort to succeed, all of the team members and all of the involved management must be properly trained, the TSP activities must be led and coached by an SEI-authorized TSP coach, and the coach must be available to coach and support the team immediately after the launch. Guidance on TSP training and introduction can be found in *Winning with Software: An Executive Strategy* [Humphrey 02].

[2] Schneider, Kent. Keynote, 3rd Annual CMMI User's Group and Technology Conference, Denver, CO, 2003.

Acknowledgments

We hereby acknowledge the colleagues that helped in various ways to produce this report.

Detailed reviews of the specific practice observations by Mike Konrad and Suzanne Garcia improved the report tremendously. It is no exaggeration to say that we learned a lot about both CMMI and TSP in producing this report, and much of that was due to the clear feedback and insightful questions from the experts.

Our early reviewers, Watts Humphrey and Marsha Pomeroy-Huff, were instrumental in letting us know where we were on the right track and where we had gone off course. Marsha's detailed editorial comments deserve special mention in light of our editor's remark that the initial draft was "wonderfully well written and grammatically correct."

In addition to Watts and Marsha, the balance of the TSP Initiative team at the SEI provided steadfast support, encouragement, and crucial schedule relief. They are: Dan Burton, Kim Campbell, Anita Carleton, Noopur Davis, Caroline Graettinger, Julia Mullaney, Jodie Spielvogle, and Alan Willett.

Support from our chain of command never wavered during the production of this report. Jim Over, head of the TSP Initiative, and Bill Peterson, head of the SEI's Software Engineering Process Management (SEPM) program, have been constant believers in the importance of this work, and managed to push us along steadily without making us feel unduly pressured.

We had the extreme good fortune to have Watts Humphrey and Mike Konrad lend their time and talent to produce a foreword for this report. We hope that the reader finds the balance of the report as useful as their foreword.

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Finally, to the many colleagues in the process improvement community who provided input on specific points, and to the even larger number that have been checking our progress, we thank you for your patience.

Abstract

With the advent of CMMI® (Capability Maturity Model® Integration), development and maintenance organizations are faced with many issues regarding how their current practices, or new practices that they are considering adopting, compare to the new model. The Team Software Process℠ (TSP℠), including the corequisite Personal Software Process℠ (PSP℠), defines a set of project practices that has a growing body of evidence showing highly desirable process performance in terms of delivered product quality, schedule performance, and cost performance. TSP also has a history of favorable coverage with respect to the SW-CMM® (Capability Maturity Model for Software), a major precursor to CMMI, as well as several real-world implementations that have helped organizations to achieve high maturity levels in a relatively short period of time.

This report provides an essential element to facilitate the adoption of the TSP in organizations using CMMI, namely, a mapping of ideal TSP practices into the specific and generic practices of CMMI. By having such a mapping (also known as a gap analysis), those involved with process improvement and appraisal efforts can more easily determine how well the organization or a particular project is implementing the TSP, how well projects using TSP might rate with respect to CMMI, and where and how to fill any gaps in CMMI coverage. Organizations already following an improvement plan based on CMMI may also determine how TSP adoption might help them to achieve broader, deeper, or higher maturity implementations of CMMI goals and practices.

1 Introduction

Capability Maturity Model® Integration (CMMI®) is a reference model consisting of best practice descriptions for a broad range of engineering activities. It is the successor model to the Capability Maturity Model® for Software (SW-CMM), the Systems Engineering Capability Model (SECM) from the Electronics Industries Alliance, and the Integrated Product Development Capability Maturity Model (IPD-CMM) [Chrissis 03]. As a descriptive model, CMMI is well suited for appraisal efforts seeking to determine a particular organization's capabilities within the scope of software, systems, integrated product engineering, or acquisition and for guiding the broad direction of process improvement efforts in these areas of expertise. However, it is not unusual for organizations to struggle when attempting to define operational practices that are both effective in terms of getting the work done and that adequately cover areas of the model targeted for compliance.

The Team Software Process℠ (TSP℠) is a set of defined operational processes originally designed to implement high-maturity project-level practices of the SW-CMM. There is a growing body of evidence showing that TSP performs well in addressing key common goals of both SW-CMM and CMMI, namely, delivery of high-quality software, schedule performance, and cost performance [McAndrews 00, Davis 03]. In addition, TSP processes have been shown on paper to compare well to SW-CMM practices [Davis 02] and also have been demonstrated to be effective in helping real organizations to achieve high maturity on an accelerated basis [Hefley 02, Pracchia 04, Switzer 04]. With the advent of CMMI, the question naturally arises as to how well the TSP compares to the newer model. The purpose of this report is to answer that question, and to do so in a way that enables TSP implementation to be closely coupled with CMMI improvement efforts. The goal is that TSP implementation will enhance and enable the achievement of higher CMMI maturity levels in considerably less time than is commonly reported [SEI 04].

The tables presented in Section 6 constitute the core of the report. These tables, one for each process area (PA), list each specific practice (SP) of CMMI-SE/SW/IPPD v.1.1 [CMMI 02a, CMMI 02b], along with references to particular TSP process elements and practices. For each practice, a score is assigned, as explained in the methodology described in Section 2, along with any relevant notes. The PA tables are grouped by process category: project management, process management, engineering, and support. At the end of each process category

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grouping, an additional table is provided to summarize how the TSP maps into the generic practices (GPs) for that process category.

Sections 3 and 4 of the report provide graphical summaries of the observation scores, grouping the PAs first by process categories per the CMMI continuous representation (Section 3), and then by maturity levels per the CMMI staged representation (Section 4). The TSP process elements referenced in the mapping tables are listed and briefly described in Section 5.

2 Methodology

When determining how to score TSP practices with respect to related CMMI practices, the following guidelines were used to develop scoring values.

- *Avoid the use of SCAMPI class "A" appraisal terminology.* The Standard CMMI Appraisal Method for Process Improvement (SCAMPI[SM]) "A" rules of evidence clearly are not met by a paper exercise such as this, and the authors want to be unequivocal in declaring that this mapping is not a guarantee of SCAMPI compliance when appraisal time comes. Therefore, instead of "Fully/Largely/Partially/Not Implemented," the authors opted for the terminology detailed below. It is the proper activity of the engineering process group (EPG) and the appraisal team to make the determinations required by the SCAMPI method. Readers of the earlier TSP-CMM mapping [Davis 02] will recognize a similarity in terminology between the two reports.
- *Avoid problems encountered in the earlier TSP-CMM mapping.* While many of the ambiguities and overlaps between organizational and project practices that were inherent in the CMM for Software v.1.1 have been resolved in CMMI, of necessity a few still remain. The authors of this report have attempted to avoid labeling clearly good things in the TSP as "Partial," when in fact they are mature project practices that support a desirable organizational activity. Therefore, a rating of "S" for "Supports" was formulated to describe more closely how TSP relates to the model practice, while making it clear that there is more to the practice than what the TSP implements. "Fully addresses" was changed to "Directly addresses" to avoid the problems inherent in questions of whether all of the subpractices of a particular practice have been covered. "Directly" says exactly what is meant, without implying that all subpractices are necessarily implemented.

Table 1: Scoring Terminology Used in the Maps

Score Value	Description
D	Directly addresses; for TSP practices that meet the intent of the CMMI practice without any significant reservations (can be project or organizational practices)
P	Partially addresses; for project-oriented practices that TSP addresses, but with some significant weakness or omission
S	Supports; for organizational practices that TSP is not intended to fulfill completely, but which TSP supports by providing practices that either feed into the CMMI organization-level practice (e.g., data for a measurement repository) or that create a demand for or use the output of such a practice (e.g., tailoring

[SM] SCAMPI is a service mark of Carnegie Mellon University.

Score Value	Description
	criteria)
N	Not addressed; for project-related practices that TSP could and possibly should address but doesn't (i.e., a "gap")
U	Unrated; for organizational practices outside the scope of the TSP (e.g., GP 2.1 Establish an organizational policy)

2.1 Assumptions Behind the Observations

The following assumptions underlie the observations detailed in Sections 6 through 9 of this report.

1. The organization in question used the SEI-recommended TSP introduction strategy for training personnel and launching projects.
2. All projects in the organization are using the TSP for all phases of a "normal" development life cycle (i.e., requirements, architecture, implementation, deployment, and maintenance). Specifically excluded are things such as business planning, business case analysis, and the like.

There is no assumption of a particular maturity level or capability level in any of the observations. However, the interpretation of whether a particular practice is rightly a project-level or organization-level practice remains open, and is one of the major issues with which an EPG must deal on an ongoing basis. The resolution of this issue is also likely to change over time as the organization and its projects work with the TSP process assets and assimilate them into their own ways of doing business.

In general, a lower maturity organization will leave more practices to the projects, but months or years later, many of the same practices for a similar project in the same organization will be performed as organization-level activities by the EPG or other designated group. A higher maturity organization with, by definition, significant experience in process improvement will naturally recognize many practices as standard organizational activities, and TSP teams will treat them as such when defining their working processes.

This report defaults to the assumption that specific practices (SPs) in the project management, engineering, and support categories are project-level activities, with exceptions noted as they occur. Specific practices within the process management category default to the assumption that they are organization level, again with exceptions as noted. All SPs are treated individually, however, with one observation block per SP in the analysis.

Generic practices (GPs) are institutionalization activities, though not necessarily organization-level activities. This report treats the GPs collectively according to the process categories, with each GP having one observation block across all the of the process areas (PAs) within its category. While this approach may be of lesser value in determining how well an idealized TSP implementation rates against CMMI, the intent of the report here is to emphasize that the GPs really are institutionalization activities, that TSP provides many

hooks for true institutionalization, but that the decisions of whether, and how, to push the implementation of individual generic practices down to the team rests with the organization. Also, these decisions should probably relate across the PAs within a category. The approach used here seems to make these points adequately.

3 TSP and the CMMI Process Categories

3.1 Overall

TSP as written covers a large footprint of specific practices across CMMI, as shown in the charts in this section and the next. The charts each show the percentage of SPs addressed, and to what extent they are addressed, with respect to different groupings of either the staged or continuous representations of the model.

TSP as typically implemented incorporates existing practices into a defined, measured process framework. The exact mix of existing practices and TSP practices is therefore different, not only for each organization that implements TSP, but also very often for each project, even within the same organization. In order for the information in this report to be useful, it should be combined with detailed knowledge of an organization's existing practices, possibly gained through a SCAMPI appraisal or other formal method.

Figure 1 shows a summary of TSP coverage of specific practices summarized by process category. For detailed observations of each PA, see Sections 6 through 9.

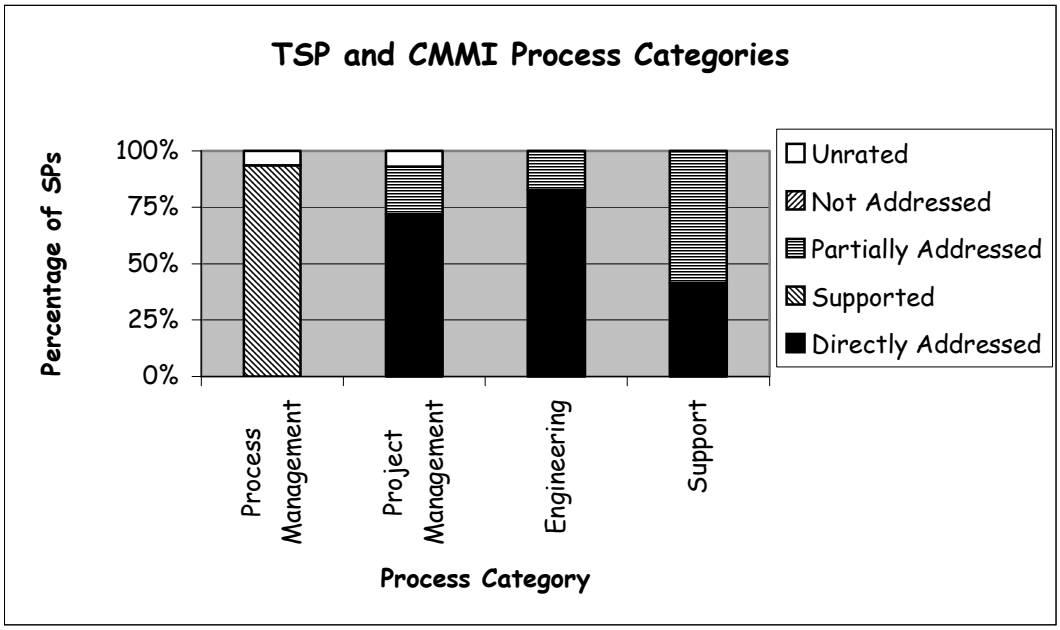

Figure 1: Summary of TSP Project Practice Coverage by Process Category

3.2 Process Management

The process management PAs deal with cross-project activities related to developing, sharing, and adapting processes. Most of these activities are necessarily not specific to the work of a single development project, the domain of the TSP. However, TSP practices support nearly all of these activities, either by providing data and process assets for organizational use, by providing explicit process steps for using organizational assets, or by providing detailed implementations of a group of practices that can serve as an organizational exemplar. Depending on implementation choices made by the organization's EPG, many of these practices could be rated as directly addressed.

Figure 2 shows the percentage of process management specific practices addressed by TSP for each PA. For detailed observations of each PA, see Section 7.

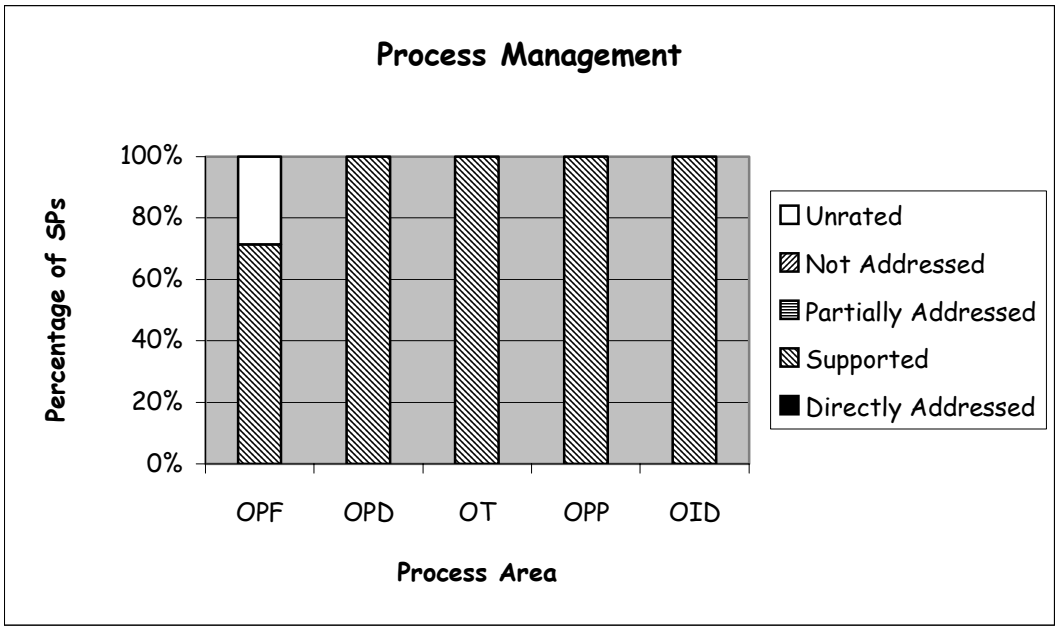

Figure 2: TSP Practice Profile by Process Management PA

3.3 Project Management

The TSP shows remarkable coverage with respect to most of the process areas in the project management category. Much of the strength of the TSP lies in the multiple assets that it brings to bear in planning and tracking a project using data gathered and analyzed by the project team on an ongoing basis. While there is relatively weak coverage with respect to Supplier Agreement Management (SAM) and Integrated Supplier Management (ISM) specific practices, a project team using the TSP and planning to acquire significant components of its delivered product from other groups would likely include such acquisition activities in its planning and engineering processes as necessary.

Figure 3 shows the percentage of project practices addressed by TSP for each PA in the project management category. For detailed observations of each PA, see Section 6.

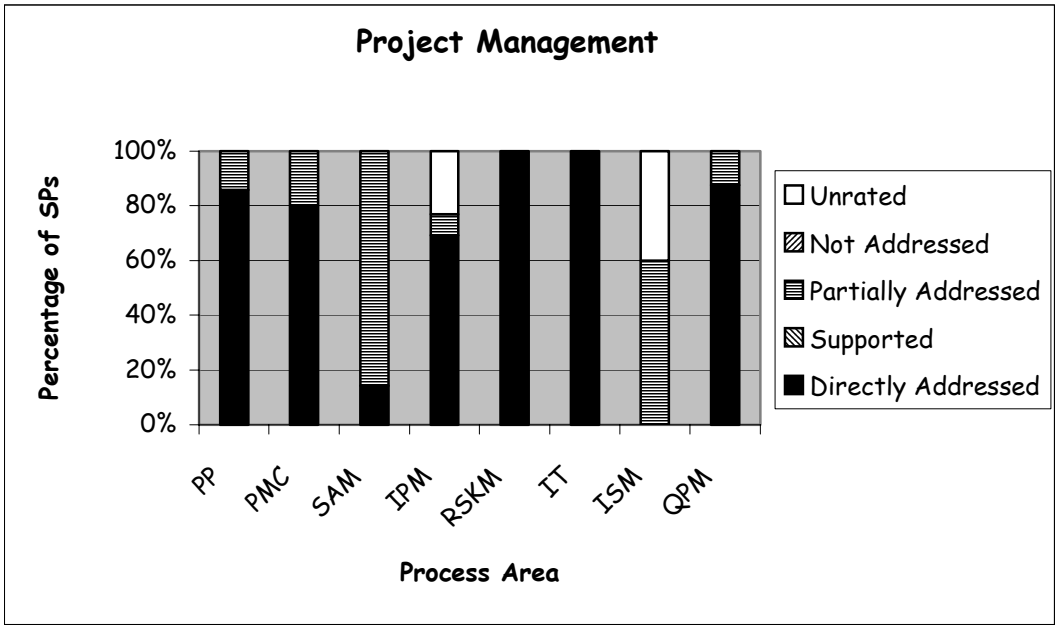

Figure 3: TSP Practice Profile by Project Management PA

3.4 Engineering

When a TSP team plans its engineering activities, it begins at a minimum with the core of TSP development and maintenance life-cycle process assets on which to draw. More often, however, the project team has its own practices, either from prior development cycles or from organizational process assets, to adapt into the defined, measured, and managed framework learned in PSP training and instantiated during the TSP launch. While the chart below reflects strong CMMI coverage using the TSP default development processes, the process group using this report to guide a process improvement effort should take special care to discover the actual engineering processes used.

Figure 4 shows the percentage of specific practices addressed by TSP for each PA in the engineering category. For detailed observations on each PA, see Section 8.

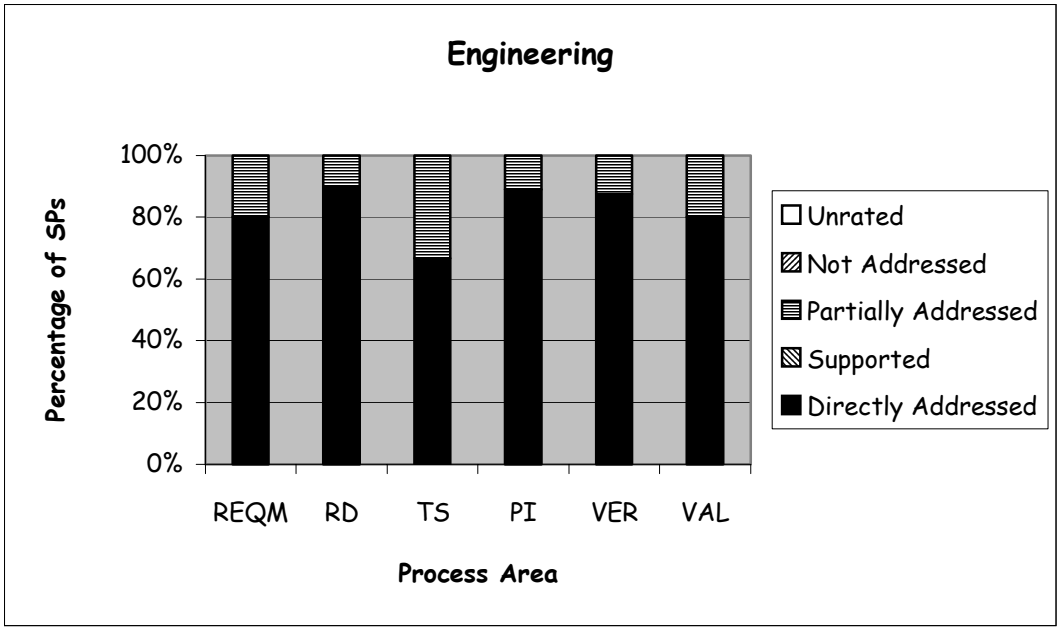

Figure 4: TSP Practice Profile by Engineering PA

3.5 Support

The CMMI support categories can be applied to any process area or process category, and therefore lack the central theme that the other categories possess. There is no particular pattern, therefore, in how the TSP addresses these categories. For example, Measurement and Analysis (MA) shows strong coverage, reflecting the TSP's fundamental alignment with such activities. On the other hand, Organizational Environment for Integration (OEI) deals with activities outside the scope of the typical TSP team, and therefore reflects weak coverage by the TSP.

Figure 5 shows the percentage of project practices addressed by TSP for each PA of the support category. For detailed observations on each PA, see Section 6.

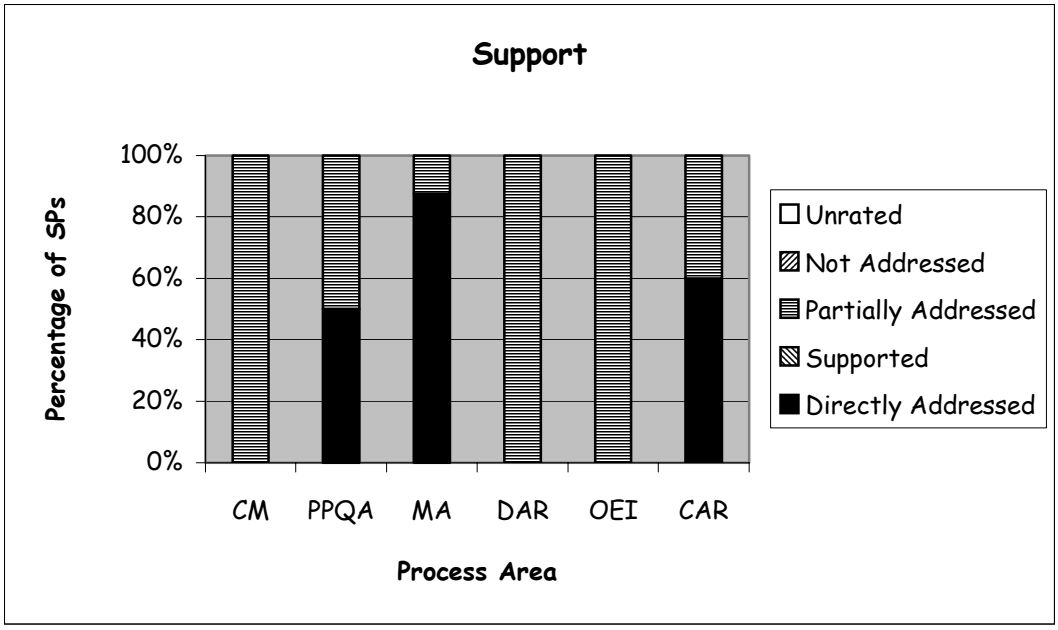

Figure 5: TSP Practice Profile by Support PA

4 TSP and the CMMI Maturity Levels

4.1 TSP and Maturity Level 2

At maturity level 2, the projects in an organization have ensured that requirements are being managed; processes are planned, performed, measured, and controlled to ensure meeting project commitments; suppliers are selected and managed to meet project commitments. This means that commitments are established and reviewed with stakeholders, management has visibility into the status of work products and the delivery of services, work products are appropriately controlled, and these deliverables satisfy their specified process descriptions, standards, and procedures.

The TSP provides specific guidance for Project Planning (PP), Project Monitoring and Control (PMC), Requirements Management (REQM), Measurement and Analysis (MA), and Process and Product Quality Assurance (PPQA). While Supplier Agreement Management (SAM) is not specifically addressed by TSP, the project planning, monitoring, and measurement aspects of TSP provide support for these activities. It is not unusual for an organization using the TSP to start asking their suppliers for TSP-equivalent project planning, tracking, and quality information.

Figure 6 shows the percentage of specific practices addressed by TSP for each PA at maturity level 2. For detailed observations on each PA, see Sections 6, 8, and 9.

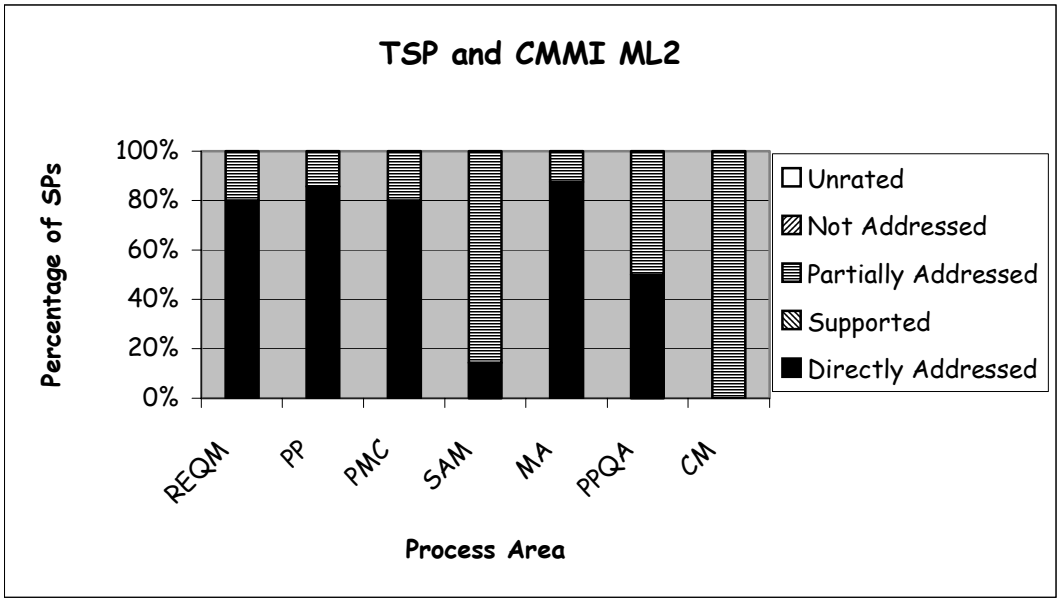

Figure 6: TSP Practice Profile by Maturity Level 2 PA

4.2 TSP and Maturity Level 3

At maturity level 2, it is not unusual for each individual project within an organization to have a different set of management and technical process descriptions, procedures, and standards. As an organization moves towards maturity level 3, a critical distinction becomes evident. At maturity level 3, the standards, process descriptions, and procedures for a project are tailored from the organization's set of standard processes to suit the needs of each project. As a result, the processes that are performed across the organization are consistent, except for the differences allowed by the tailoring guidelines.

The TSP focus is on teams, not organizations. Even if all projects in an organization are using the TSP, there is a need for additional organizational support. (Look at Organizational Process Definition (OPD) for examples of the additional support required.) The TSP provides teams with a robust set of processes and procedures that are usually tailored to meet the team's needs with guidance from a TSP coach. These standard TSP processes can be used to support the creation of an organization's standard set of processes, but they do not fully address all organizational process needs. TSP teams also collect and analyze product and process data, but in order to meet the intent of this PA, there is an additional need for an organizational function that collects and reviews this data and makes it available across the organization. In fact, it is not uncommon for an organization using the TSP for product development to initiate TSP process development projects to address the "organizational PAs" of maturity level 3: Organizational Process Focus (OPF), Organizational Process Definition (OPD), and Organizational Training (OT).

The TSP, along with the PSP, provides specific guidance for Requirements Development (RD), Technical Solution (TS), Product Integration (PI), Verification (VER), Validation (VAL), Risk Management (RSKM), and Integrated Teaming (IT). The TSP launch process, process and product data, and weekly team meetings support and enable Integrated Project Management (IPM), RSKM, and Decision Analysis and Resolution (DAR). While Integrated Supplier Management (ISM) is not specifically addressed by TSP, the project planning, monitoring, and measurement aspects of TSP provide support for its activities. The OPF and OPD process areas are supported by the process elements, process architecture, and process and product data from the TSP. OT is enabled and must be partially implemented by the introduction of TSP, as portions of the organizational training needs are identified, planned, and executed. The TSP launch and status reporting processes support Integrated Project Management for Integrated Product and Process Development (IPM for IPPD, often shortened to IPM-IPPD) and for Organizational Environment for Integration (OEI).

Figure 7 shows the percentage of specific practices addressed by TSP for each PA of maturity level 3. For detailed observations on each PA, see Sections 6 through 9.

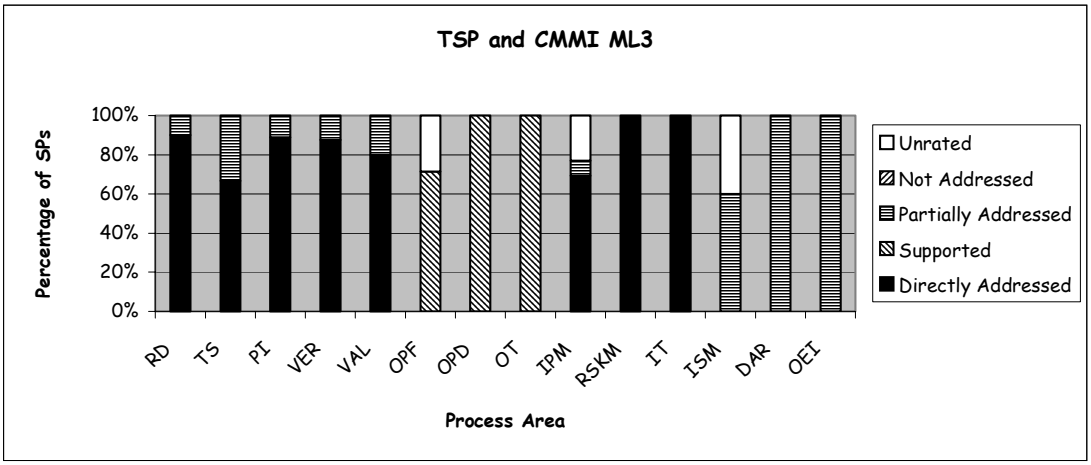

Figure 7: TSP Practices Profile by Maturity Level 3 PA

4.3 TSP and Maturity Level 4

At maturity level 4, the organization and projects establish quantitative objectives for quality and process performance and then use these criteria in managing the projects. Quality and process performance are understood in statistical terms and are managed throughout the life of the processes.

Organizational Process Performance (OPP) derives quantitative objectives for quality and process performance from the organization's business objectives. TSP launch preparation calls for the team to have available the organization's standard processes for use by the team. A typical management goal, communicated in the launch, is to meet certain specified process performance and quality standards.

Quantitative Project Management (QPM) applies quantitative and statistical techniques to the management of process performance and product quality. Quality and process performance objectives for the project are based on those established by the organization. The TSP provides strong support for this process area: quality and process performance are planned, tracked, managed, and understood.

Figure 8 shows the percentage of specific practices addressed by TSP for each PA of maturity level 4. For detailed observations on each PA, see Sections 6 and 7.

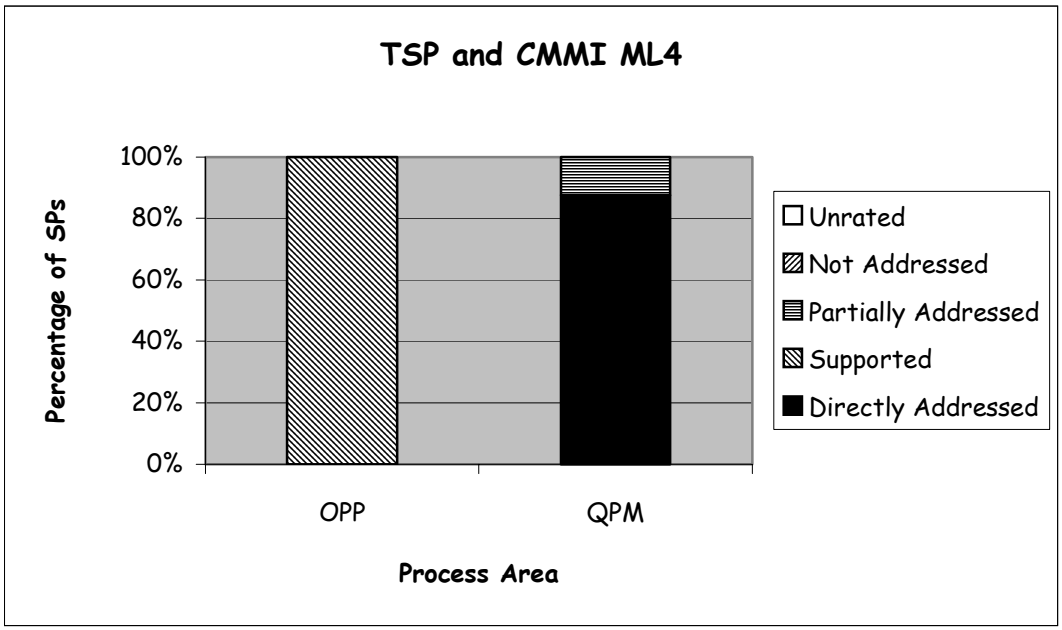

Figure 8: TSP Practice Profile by Maturity Level 4 PA

4.4 TSP and Maturity Level 5

At maturity level 5, processes are continually improved through both incremental and innovative technological improvements that are based on the quantitative understanding achieved at maturity level 4. Organizational Innovation and Deployment (OID) enables the selection and deployment of improvements that can enhance the organization's ability to meet its quality and process performance objectives. Causal Analysis and Resolution (CAR) provides a mechanism for projects to evaluate their processes and to look for improvements that can be implemented.

The TSP explicitly addresses the practices within the Causal Analysis and Resolution (CAR) PA and strongly supports the implementation of the OID practices. Postmortem meetings consolidate and begin to analyze data gathered either during a launch or following a development cycle. Specific problems and suggestions are documented by process improvement proposals (PIPs) during the postmortem or at any time in the life cycle. Future launches and relaunches then typically make relevant adjustments to the project's defined processes. Most organizations implementing the TSP recognize the value of such feedback

from the primary users of the organizational processes and create mechanisms to incorporate the lessons learned so that other project teams may benefit.

Figure 9 shows the percentage of specific practices addressed by TSP for each PA of maturity level 5. For detailed observations on each PA, see Sections 7 and 9.

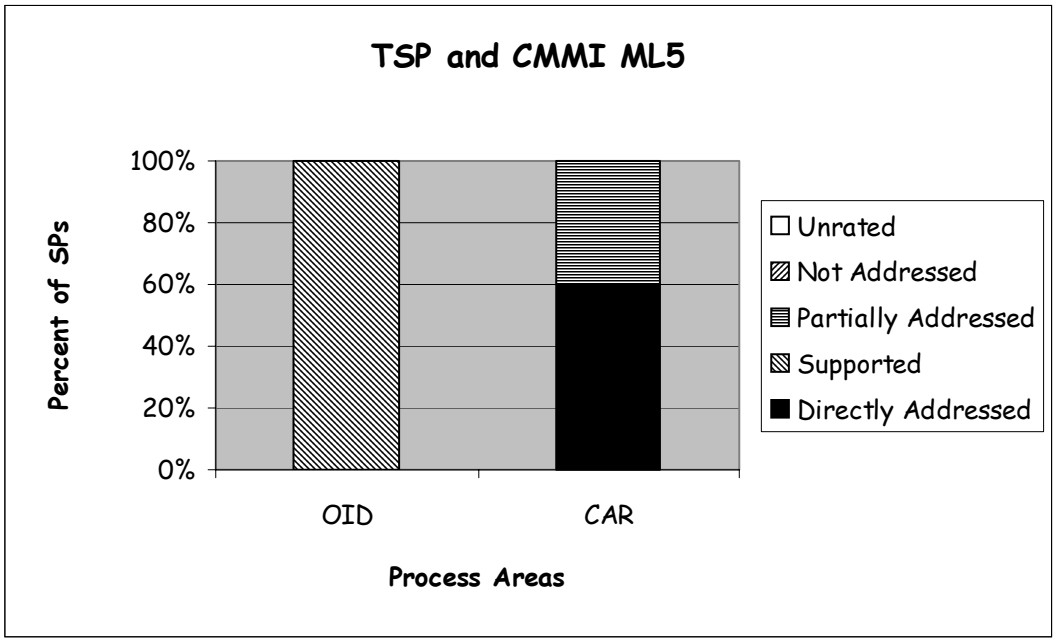

Figure 9: TSP Practice Profile by Maturity Level 5 PA

5 TSP Process Elements

The TSP is defined by a set of process elements that includes the following:

- *scripts* to guide specific work processes
- *forms* to capture specific information generated by enacting one or more scripts or otherwise required by some part of the process
- *role specifications* to guide individuals on a project in performing critical but often non-scripted (possibly non-scriptable) activities
- *other assets* such as the TSP introduction strategy, checklists, guidelines, and specifications not related to roles
- *training courses* and *authorization activities* in the TSP and PSP technologies

These assets, summarized in the table below, are referenced in the "TSP Reference" column in the mapping tables of Section 6.

5.1 Scripts

Grouping / Name	Description	Notes
Launch scripts		
LAU	Team launch: to guide teams in launching a software-intensive project	
LAU1	Launch meeting 1 - launch overview and kick-off	Step 1 in script LAU
LAU2	Launch meeting 2 - roles and goals	Step 2 in script LAU
LAU3	Launch meeting 3 - strategy, process, support	Step 3 in script LAU
LAU4	Launch meeting 4 - overall team plan	Step 4 in script LAU
LAU5	Launch meeting 5 - quality plan	Step 5 in script LAU
LAU6	Launch meeting 6 - detailed next-phase plans	Step 6 in script LAU
LAU7	Launch meeting 7 - risk assessment	Step 7 in script LAU
LAU8	Launch meeting 8 - management meeting preparation	Step 8 in script LAU
LAU9	Launch meeting 9 - wrap-up management meeting	Step 9 in script LAU
LAUPM	Launch postmortem meeting - postmortem on the launch	Step PM in script LAU
REL	Team relaunch	
REL1	Relaunch meeting 1 - status and management update	
Development scripts		
DEV	Overall new development and enhancement process	
MAINT	Overall maintenance and enhancement process	
ANA	Impact analysis process	

Grouping / Name	Description	Notes
HLD	High-level design process	
IMP	Implementation process	
IMP6	Unit test and test development process	Step 6 in script IMP
INS	Inspection process	
PM	Project postmortem process	
REQ	Requirements process	
TEST	Release test process	
TEST1	Product build process	Step 1 in script TEST
TEST2	Integration process	Step 2 in script TEST
TEST3	System test process	Step 3 in script TEST
TESTD	Test defect-handling process	
Other scripts		
MTG	General meeting process	Used as the basis for most meeting scripts
STATUS	Management and customer status meeting	
WEEK	Weekly team meeting	

5.2 Forms

Grouping / Name	Description	Notes
Launch forms	Asterisked (*) items or equivalents are implemented in the TSP workbook (see Section 5.4)	
GOAL	* Team goals	
INV	Process inventory	
ITL	* Issue/risk tracking log	
MTG	Meeting report form	
PIP	Process improvement proposal	
ROLE	* Team role assignment	
ROLEMX	Role assignment matrix	
SCHED	* Schedule planning template	
STRAT	Strategic planning form	
SUMDI	* Defects injected summary	
SUMDR	* Defects removed summary	
SUMP	* Plan summary form	
SUMQ	* Quality summary form	
SUMS	* Program size summary	
SUMT	* Development time summary form	
SUMTASK	* Task plan summary	
TASK	* Task planning template	
Development forms		
DEFECT	Defect reporting form	
INS	Inspection report	
TESTLOG	Test log	

Grouping / Name	Description	Notes
Other forms		
LOGD	* Defect recording log	
LOGT	* Time recording log	
WEEK	* Weekly status report	Modified versions of form WEEK are used in each launch meeting.

5.3 Roles

Grouping / Name	Description	Notes
Role manager specifications	The default set of roles to be assumed by members of the team: customer interface manager, design manager, implementation manager, test manager, planning manager, process manager, quality manager, and support manager	
Customer interface manager	Customer interface manager responsibilities: customer focus, define requirements, manage requirement changes, establish and manage requirement standards, and reporting	A “line” role manager
Design manager	Design manager responsibilities: lead the design, manage design changes, establish and manage design standards, and reporting	A “line” role manager
Implementation manager	Implementation responsibilities: lead the implementation, manage implementation changes, establish and manage the implementation standards, and reporting	A “line” role manager
Test manager	Test manager responsibilities: test planning, test support, test analysis, and reporting	A “line” role manager
Planning manager	Planning manager responsibilities: lead team planning, track team progress, and reporting	A “staff” role manager
Process manager	Process manager responsibilities: process support, tracking, analysis, process problems and process improvement proposal handling and reporting	A “staff” role manager
Quality manager	Quality manager responsibilities: quality support, quality tracking, quality analysis, and reporting	A “staff” role manager
Support manager	Support manager responsibilities: tool support, configuration management, change control, reuse, and reporting	A “staff” role manager
Other role specifications		
Meeting roles	Meeting role descriptions: chairperson, recorder, facilitator/timekeeper, attendees	
Inspection roles	TSP inspection process roles and responsibilities: moderator, producer, recorder, timekeeper, reviewers	
Team leader	TSP team leader responsibilities: leadership, people management, team coaching, quality management, project management, team responsibilities	
Team member	TSP team member roles and responsibilities: personal discipline, personal management, and team responsibilities	

5.4 Other

Grouping / Name	Description	Notes
Preparation checklists		
PREPL	Preparation for launch	
PREPR	Preparation for relaunch	
Launch guidance		
Launch coach	Launch guidelines for the TSP coach	
Marketing	Launch guidelines for marketing management presentation	
Other attendees (2)	Launch guidelines for TSP coach	
Senior Management	Launch guidelines for senior management presentation	
Team leader (2)	Launch guidelines for team leader	
Team members (2)	Launch guidelines for team members	
Other pre-launch assets		
Initial contact letter	TSP launch preparation	
Preparation package cover letter	TSP launch preparation material	
Preparation package instructions	TSP launch preparation material	
Default guidelines		
Planning guidelines	SEI-provided benchmark planning metrics	
Quality guidelines	SEI-provided benchmark quality metrics	
Executive assets		
Plan assessment checklist	Team plan review questions; a quick start for an executive reviewing a TSP team's plan	These assets can be found in *Winning with Software* [Humphrey 02].
Quarterly review checklist	Project review questions; a quick start for senior managers to probe the status of a TSP project	
TSP introduction strategy	A generic procedure and timeline for TSP implementation in an organization	
Other specifications and assets		
NOTEBOOK	Storage for project artifacts	
STATUS	Management status report	
SUMMARY	Project analysis report	
TSP workbook (**i**ndividual and consolidated)	Automated individual and team (consolidated) plans and actuals for size, effort, defects, and schedule; functionally equivalent versions of asterisked (*) items above under Forms are included in the TSP Workbook	Excel-based; provided by the SEI as part of the licensed TSP product suite
Checkpoint Review	A review of the project to date conducted by the TSP coach or other process expert	
Weekly Meeting Minutes	Minutes from weekly team meetings	

5.5 Training

Grouping / Name	Description	Notes
Training and authorization		
SEI training records	SEI-maintained records of everyone reported by SEI-authorized instructors to have finished any of the training classes listed below	
Introduction to Personal Process	Training for team members who are not software engineers (2 days)	
PSP for Engineers	Training for software developers (10 days)	
TSP Executive Seminar	Executive briefing on PSP and TSP, including benefits and the TSP introduction strategy (1 day)	
Managing TSP Teams	Training for people managing TSP teams (3 days)	
PSP Instructor Training	Training to become a PSP instructor (5 days)	Offered only through the SEI; prerequisite is successful completion of *PSP for Engineers*
TSP Launch Coach Training	Training to become a TSP coach (5 days)	Offered only through the SEI; prerequisite is successful completion of *PSP Instructor Training*
TSP coach observation	Observation and mentoring of TSP coach during their first TSP launch (4 or 5 days)	Offered only through the SEI; successful completion necessary for SEI authorization

6 Observations by Process Categories and PAs

6.1 TSP and CMMI Project Management PAs

The Project Management process areas cover the project management activities related to planning, monitoring, and controlling the project. The page numbers for each process area as listed below are from *CMMI: Guidelines for Process Improvement and Product Improvement* [Chrissis 03].

The Project Management category contains the following process areas.

Project Planning	pages 405-428
Project Monitoring and Control	pages 391-404
Integrated Project Management for IPPD	pages 187-216
Risk Management	pages 497-516
Integrated Teaming	pages 231-246
Quantitative Project Management	pages 441-464

6.1.1 Project Planning (PP)

The Project Planning (PP) process area includes developing the project plan, involving stakeholders appropriately, obtaining commitment to the plan, and maintaining the plan. When using an IPPD approach, stakeholders represent not just the technical expertise for product and process development, but also the business implications of the product and process development. Planning begins with requirements that define the product and project. The project plan covers the various project management and engineering activities that will be performed by the project. The project will review other plans that affect the project from various relevant stakeholders and establish commitments with those relevant stakeholders for their contributions to the project.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Estimates of the project planning parameters are established and maintained.				
1.1. Establish a top-level work breakdown structure (WBS) to estimate the scope of the project.	*Scripts*: LAU3 *Forms*: STRAT, SUMS *Roles*: Design manager	The design manager leads the team in identifying the principal products and components of the project in LAU3 and records these on forms STRAT and SUMS.	D	
1.2. Establish and maintain estimates of the attributes of the work products and tasks.	*Scripts*: LAU3, LAU4, LAU5, LAU6 *Forms*: STRAT, SUMQ, SUMS *Roles*: Team leader, planning, design managers	Preliminary estimates are generated in LAU3 and refined as needed in LAU4 and LAU6. Form STRAT is used for developing the estimates in context; form SUMS records results. In LAU5, quality attributes (defect densities and phase yields) are estimated and recorded on form SUMQ. Different steps are led by the team leader, design manager, or planning manager.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.3. Define the project life-cycle phases on which to scope the planning effort.	*Scripts*: LAU3, LAU4, LAU6 *Forms*: STRAT, TASK *Roles*: Team leader, process manager	The team leader leads the team in defining the project development strategy. The process manager leads the definition of the overall development process up to delivery; results are recorded on form STRAT and reflected in TASK plans generated in LAU4 and refined in LAU6.	D	
1.4. Estimate the project effort and cost for the work products and tasks based on estimation rationale.	*Scripts*: LAU3, LAU4, LAU6 *Forms*: STRAT, TASK, TSP workbooks *Roles*: Planning, design managers, team member	Preliminary estimates are made in LAU3 and refined as needed and to the necessary level of detail in LAU4 and LAU6. Forms STRAT and TASK record results. The design or planning manager leads the way in LAU3 and LAU4. Individual team members make adjustments based on personal historical data if available, otherwise on personal estimated productivity.	D	Dollar-based cost estimates are not explicitly called for; however, in practice, teams generate these if required by the organization.
SG2. A project plan is established and maintained as the basis for managing the project.				

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.1. Establish and maintain the project's budget and schedule.	*Scripts*: LAU4, LAU6 *Forms*: TASK, SCHEDULE, TSP workbooks *Roles*: Team leader, planning manager, team member	Script LAU4 develops an overall schedule, while script LAU6 develops detailed individual schedules for the entire team. These are captured first on the team's overall TASK and SCHED forms (LAU4) and then on each individual's TASK and SCHED form (LAU6), and the individual plans are rolled up in the TSP consolidated workbook (LAU6). The team leader or planning manager leads the discussions.	D	A budget is not specifically addressed in monetary terms; expenditures are generally expressed in terms of person-hours on task. In practice, teams generate a monetary budget if management asks for it.
2.2. Identify and analyze project risks.	*Scripts*: LAU7 *Forms*: ITL, team and individual TSP workbooks *Roles*: Team leader	Script LAU7 guides the team explicitly through identifying and making a preliminary analysis of project risks, capturing them on the issue tracking log (ITL), and filing same in the project NOTEBOOK. The team leader leads the discussion.	D	
2.3. Plan for the management of project data.	*Roles*: Planning, support managers *Other:* SUMMARY NOTEBOOK	The planning manager is responsible for maintaining the project NOTEBOOK that holds both launch and ongoing project process data. The SUMMARY specification details a periodic or event-driven rollup of project data.	P/S	Details of how data management is accomplished are not specified by the TSP. If there is no organizational standard in place, the planning or support manager usually sets up a computer-accessible version of the project NOTEBOOK and keeps weekly snapshots of same.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.4. Plan for necessary resources to perform the project.	*Scripts*: PREPL, PREPR, LAU (esp. LAU4, LAU6, LAU8, LAU9), REL *Forms*: TSP workbooks *Roles*: Team leader, team member	Identification of the team leader and project team prior to the launch represents management's initial thoughts on the necessary resources. The launch itself is the vehicle for the team to determine the necessary resources, develop alternative plans if necessary, and obtain management commitment to a particular plan with particular resources.	D	
2.5. Plan for knowledge and skills needed to perform the project.	*Scripts*: PREPL, PREPR LAU3, LAU4, LAU6, LAU7 *Forms*: Team and individual TSP workbooks *Roles*: Team leader, team member	Management is responsible for assigning a competent team leader and adequate staff to a project. The team leader has a specific responsibility to ensure that individuals on the team have the required knowledge and skills to perform their assigned tasks. Individual team members are responsible for arranging for the education and training necessary to do superior work.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.6. Plan the involvement of identified stakeholders.	*Scripts*: LAU, LAU1, LAU9, REL, STATUS *Forms*: TASK, LOGT, LOGD *Roles*: Team leader, role managers	Management is explicitly involved, beginning with the launch and continuing with regular STATUS reports, including the results of relaunches. The team leader and role managers are responsible for involving other stakeholders as necessary and appropriate.	P	There is no explicit guidance in the launch to plan for stakeholder involvement, nor is there a designated place to record such information. However, in practice, ensuring the involvement of relevant parties is a strength of TSP teams. Launches and relaunches are a common point of involvement for relevant stakeholders.
2.7. Establish and maintain the overall project plan content.	*Scripts*: LAU, REL *Forms*: WEEK *Roles*: Team leader, planning manager *Other:* NOTEBOOK	The entire launch sequence and subsequent relaunches create, update, and extend project plan artifacts for inclusion in the project NOTEBOOK. The plan is often revised during execution, both at the individual and team levels. For example, the weekly team meetings (script and form WEEK) result in frequent plan adjustments in response to the team's progress and understanding of the work.	D	See Notes above for SP 2.3.
SG3. Commitments to the plan are established and maintained.				
3.1. Review all plans that affect the project to understand project commitments.	*Scripts*: LAU6, LAU7, LAU8, LAU9 *Forms*: SUMQ, SUMP, SUMS, TASK, SCHED	The quality plan is reviewed in LAU6 after individual plans have been created and consolidated into a team plan. The team reviews its plan against the team's and management's desired goals in LAU6 and LAU8 and creates alternative plans if necessary. During LAU9, the team presents	D	If there are any ancillary plans that affect the team's plan, such as facilities issues or a support group, the team will either secure necessary commitments before they present to management or make the case for their needs during LAU3.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
	Roles: Team leader, team member	the plan and any alternatives and asks for management's approval of a specific plan. Management reviews the plan according to the plan assessment checklist.		
3.2. Reconcile the project plan to reflect available and estimated resources.	*Scripts*: LAU4, LAU6, LAU7, LAU8, LAU9 *Forms*: TASK, SCHED *Roles*: Team leader, team member	The TSP team compares and adjusts its plans frequently against existing and potential resources during the launch (LAU4, LAU6, LAU7, and LAU8). This includes preparation of alternative plans, where appropriate, that make different assumptions about available resources, critical milestone dates, and delivered functionality. In LAU9, management chooses a plan based, among other considerations, on resource availability.	D	
3.3. Obtain commitment from relevant stakeholders responsible for performing and supporting plan execution.	*Scripts*: LAU, REL *Forms*: TASK, LOGT, LOGD *Roles*: Team leader, role managers	The entire launch process elicits commitment by the project team for the team's plan (built in LAU2 to LAU8) to meet management's presented goals and by management to one of the plan alternatives presented by the team (LAU9). Relaunches revisit all commitments for feasibility, potential alternate approaches, and, if necessary, renegotiation with management.	P	TSP projects frequently invite significant stakeholders to participate in launches and typically check with external groups as necessary during the planning process; however, getting commitments from other "relevant stakeholders" is not explicitly called for. For TSP multi-teams, the component teams of a larger project explicitly negotiate commitments to support each other.

6.1.2 Project Monitoring and Control (PMC)

The Project Monitoring and Control (PMC) process area includes monitoring activities and taking corrective actions. The project plan specifies the appropriate level of project monitoring, the frequency of progress reviews, and the measures used to monitor progress. Progress is primarily determined by comparing progress to the plan. When actual status deviates significantly from expected values, corrective actions are taken as appropriate. These actions may include replanning.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Actual performance and progress of the project are monitored against the project plan.				
1.1. Monitor the actual values of the project planning parameters against the project plan.	*Scripts*: WEEK, PM, REL1, STATUS *Forms*: WEEK, TSP workbooks *Roles*: Team leader, planning manager, other role managers	TSP teams typically examine actual values during the weekly status meeting, postmortems, and meeting 1 of relaunches. The team leader or planning manager leads the team in comparing these data to estimates (for productivity and time on task) and the actual work products (for size and defect density). Other role managers weigh in as appropriate.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.2. Monitor commitments against those made in the project plan.	*Scripts*: WEEK, STATUS *Forms*: GOAL, WEEK, PM *Roles*: Team leader, team member, role managers *Other:* Quarterly review checklist	Team members, usually in association with their designated role manager responsibilities and as captured on form GOAL, monitor the team's status with respect to its goals and commitments weekly (WEEK).	D	
1.3. Monitor risks against those identified in the project plan.	*Scripts*: WEEK, STATUS *Forms*: IRTL *Roles*: Role managers	Team members, usually in conjunction with one or more role assignments as captured on form IRTL, monitor the status of identified plan risks weekly and report to the team weekly and management regularly.	D	The team assigns risk monitoring responsibilities in LAU7.
1.4. Monitor the management of project data against the project plan.	*Scripts*: WEEK *Forms*: WEEK, Team and individual TSP workbooks *Roles*: Planning manager	The planning manager is responsible for ensuring that individual program plans are updated weekly and revised as needed and for consolidating these data weekly into a team view.	P/S	Details of how data is managed on an ongoing basis are not specified by the TSP; however, this is clearly a planning manager responsibility.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.5. Monitor stakeholder involvement against the project plan.	*Scripts*: PM, STATUS *Roles*: All role descriptions, esp. team leader	In addition to the launch, the team obtains stakeholder evaluations during the postmortem. The team leader regularly provides status to management and other designated stakeholders. Role managers involve relevant stakeholders during execution of the plan, as required.	P	As in PP SP 2.6 and 3.3, opportunities for stakeholder involvement are obvious and implicitly encouraged, but not explicitly called for outside of the PM activity.
1.6. Periodically review the project's progress, performance, and issues.	*Scripts*: WEEK *Forms*: WEEK, STATUS, SUMMARY *Roles*: Team leader, planning manager, team member *Other:* Quarterly review checklist	The team reviews its status weekly. The team leader reports team data and issues regularly, usually weekly, to management. Management holds quarterly reviews of project status.	D	
1.7. Review the accomplishments and results of the project at selected project milestones.	*Scripts*: PM, REL1 *Forms*: STATUS *Roles*: Team leader, role managers	The team leader reviews current status with the team during REL1 and with management as requested. The team leader and several of the role managers lead a thorough review of the team's performance, processes, and other important aspects of the project during postmortems for each launch cycle and at the end of the project.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
SG2. Corrective actions are managed to closure when the project's performance or results deviate significantly from the plan.				
2.1. Collect and analyze the issues and determine the corrective actions to address the issues.	*Scripts*: WEEK *Forms*: WEEK, associated weekly meeting minutes, IRTL, TSP workbooks *Roles*: Team leader, role managers, team member	Significant deviations from the plan, changes in the status of identified risks, and any other relevant issues are flagged during weekly status meetings. The effect on the achievement of team goals is of paramount concern. Team consensus is typically sought for corrective actions where the solution is not obvious from the data.	D	
2.2. Take corrective action on identified issues.	*Scripts*: WEEK *Forms*: WEEK and weekly meeting minutes, TASK, LOGT, LOGD	The team leader, a designated role manager, or other team members take corrective actions as necessary, usually as a result of decisions made at the weekly meeting (WEEK) and recorded as action items in the minutes.	D	

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
	Roles: Team leader, role managers, team member			
2.3. Manage corrective actions to closure.	*Scripts*: WEEK, meeting minutes *Forms*: IRTL, TASK, LOGT, LOGD *Roles*: Team leader, role managers, team member	The team, led by the team leader or the appropriate role manager, monitors on at least a weekly basis how effective its corrective actions are and whether or not they need to be adjusted. Decisions are recorded either in meeting minutes or on the IRTL.	D	

6.1.3 Integrated Project Management (IPM)

The Integrated Project Management (IPM) process area establishes and maintains the project's defined process that is tailored from the organization's set of standard processes. The project is managed using the project's defined process. The project uses and contributes to the organization's process assets.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
SG1. The project is conducted using a defined process that is tailored from the organization's set of standard processes.				
1.1. Establish and maintain the project's defined process.	*Scripts*: LAU3, PM *Forms*: INV, TASK *Roles*: Team leader, process manager	The team defines its working processes during LAU3, and formally evaluates process effectiveness during the postmortem. Any processes to be created, adapted, or documented for the team's work are captured on form INV. Tasks that reflect these processes are included in one or more team member's TASK plans. The team leader and process manager ensure that the plans reflect the team's defined processes and that the plans and processes are adjusted as necessary to reflect how the work is actually being done.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.2. Use the organizational process assets and measurement repository for estimating and planning the project's activities.	*Scripts:* LAU3, LAU4, LAU5, LAU6 *Forms*: SUMS, SUMP, TASK *Roles*: Team leader, team member *Other*: Launch preparation guidelines, planning and quality guidelines	The TSP uses its own defined processes and guidelines for planning and quality in designated places in LAU3 through LAU6. The preparation guidelines for both the team leader and team members calls for them to "bring any relevant process definition materials you think you will need for this project," and to "agree on which team member will bring a copy of the organization's defined process if there is one, any relevant engineering standards, and the configuration and change control management processes." Relevant organizational data, if available, are used instead of the planning and quality guidelines in LAU4, LAU5, and LAU6.	D/S	This CMMI practice assumes the existence of an organizational practice or practices. TSP as formally defined is a stand-alone process, but one which specifically calls for teams to use or build on organizational processes and facilities, if available.
1.3. Integrate the project plan and the other plans that affect the project to describe the project's defined process.	*Scripts*: LAU3, LAU4, LAU6, LAU8, REL *Forms*: SUMS, SUMP, TASK *Roles*: Team leader, planning and process managers	The overall project plan consolidates individual project plans, a top-down overall project plan, a process plan for developing needed processes, and, if necessary, training plans. Typically the team leader, in combination with the planning and process managers, deals with various aspects of these activities.	D/S	Plans of relevant stakeholders are not explicitly addressed but are typically coordinated by the team leader or appropriate role manager.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.4. Manage the project using the project plan, the other plans that affect the project, and the project's defined process.	*Scripts*: WEEK, STATUS *Forms*: WEEK and associated meeting minutes, team and individual TSP workbooks *Roles*: Team leader, planning and process managers *Other:* NOTEBOOK	The project team, led by the team leader, manages itself as evidenced by the weekly consolidation of individual data, status meetings, notes, and meeting minutes. The planning manager is responsible for the consolidation and meeting minutes, and captures this data weekly in the project NOTEBOOK. The process manager reports as needed on the state of the project's process assets.	D/S	TSP addresses the project plan and the project's defined process, but not explicitly "the other plans." These issues are typically coordinated by the team leader or the appropriate role manager.
1.5. Contribute work products, measures, and documented experiences to the organizational process assets.	*Scripts*: PM, LAUPM *Forms*: TSP workbooks *Roles*: Team member, role managers *Other:* SUMMARY, NOTEBOOK	In addition to deliverable work products, the TSP team gathers and analyzes its process data regularly at postmortems. The SUMMARY report and project NOTEBOOK provide abundant process data and documentation suitable for an organizational measurement repository and process asset library.	D/S	The intent of this practice, namely the availability of work products, measures, and documented experiences, seems to be fulfilled, regardless of the form of the organizational repository.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
SG2. Coordination and collaboration of the project with relevant stakeholders is conducted.				
2.1. Manage the involvement of the relevant stakeholders in the project.	*Scripts*: LAU (esp. LAU1 and LAU9), WEEK, REL *Forms*: STATUS *Roles*: Team leader, role managers	As the principal stakeholders, management and the project team keep each other informed of project status and of changes in plans and/or commitments via the launch/relaunch mechanisms, regular status reporting, and replanning as necessary. The role managers, especially the team leader, deal with other stakeholders as necessary.	D/S	Launch preparations include defining who, aside from senior management and marketing, are relevant stakeholders for the project in question, but only management and marketing are singled out by TSP as "significant." Depending on the particulars of the project and the organization, TSP may completely (D) address these practices or provide a convenient project framework for doing so (S).
2.2. Participate with relevant stakeholders to identify, negotiate, and track critical dependencies.	*Scripts*: WEEK *Forms*: STATUS *Roles*: Team leader, role managers	The team leader is responsible for resolving issues with management and other teams or departments. Some specific stakeholders are handled by the relevant role managers (e.g., quality manager with QA, test manager with a test group, or customer interface manager with an internal or external customer). Team members report weekly to the team on any special dependencies.	D/S	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.3. Resolve issues with relevant stakeholders.	*Forms*: STATUS *Roles*: Team leader, role managers	The team leader is responsible for resolving issues with management and other teams or departments. The relevant role managers may handle some stakeholder interactions (e.g., quality manager with QA, test manager with a test group, customer interface manager with an internal or external customer).	D/S	

6.1.4 Integrated Project Management (IPM SG3, SG4) – IPPD

The Integrated Project Management for IPPD process area also creates the shared vision for the project. This shared vision should align both horizontally and vertically with both the organization's and the integrated team's shared visions, created in the Organizational Environment for Integration (OEI) and Integrated Teaming (IT) process areas, respectively. These shared visions collectively support the coordination and collaboration among stakeholders. Finally, the Integrated Project Management for IPPD process area implements an integrated team structure to perform the work of the project in developing a product. This team structure is typically based on the decomposition of the product itself, much like a work breakdown structure. The activity is accomplished in conjunction with the Integrated Teaming process area.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG3. The project is conducted using the project's shared vision.				
3.1. Identify expectations, constraints, interfaces, and operational conditions applicable to the project's shared vision.	*Scripts*: PREPL, PREPR, LAU1, LAU *Roles*: Team leader, team member *Other*: Senior management and marketing discussion guidelines	The discussion guidelines for management and marketing go beyond a discussion of goals. In addition, constraints on schedule, budget, and resources, access to customers or other domain experts, and other relevant operational conditions are presented. The team questions the presentations to ensure that they understand both the goals and constraints. Other constraints become apparent as plans are worked out over the balance of the launch (LAU).	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
3.2. Establish and maintain a shared vision for the project.	*Scripts*: LAU2, REL1, WEEK *Forms:* GOAL *Roles*: Team leader, role managers, team members	In LAU2, the team discusses management's goals and objectives for the project and comes to consensus on the team's goals, documented on form GOAL. Following the launch and at relaunches, the team leader represents management to the team, and the team to management, to ensure that the shared vision from the initial launch is maintained and to communicate changes to the vision as necessary. Weekly team meetings that review goals and status ensure reinforcement of the vision that was established during the launch.	D	
SG4. The integrated teams needed to execute the project are identified, defined, structured, and tasked.				
4.1. Determine the integrated team structure that will best meet the project objectives and constraints.	TSPm* process assets	For larger projects (defined as having more than 12 to 15 members), TSPm launch preparations include the development of a project strategy that allows preliminary estimates of the number, size, and technical responsibilities of each part of an integrated team.	D	Use of the TSPm assets probably becomes a necessity somewhere in the range of 20 to 30 people. Below that number, fairly obvious adaptations of the TSP (e.g., breaking off subteams to deal with large functional chunks of the system or along

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
4.2. Develop a preliminary distribution of requirements, responsibilities, authorities, tasks, and interfaces to teams in the selected integrated team structure.	TSPm* process assets	The TSPm product strategy captures architecture, system integration, incremental development, prototyping, and technology issues that are then used to make initial team assignments for requirements and interfaces. Management also decides if additional roles and responsibilities beyond the basic TSP roles are necessary.	D	functional specialties) can meet the intent of these practices. As of this writing, the TSPm assets are available from the SEI on a case-by-case basis. * TSPm: The TSP extension for multiple teams. TSPm is recommended beginning when a single team grows larger than 12 to 15 people. These process assets are not referenced elsewhere for two reasons: (1) they are not necessary for understanding how the "single team" TSP relates to CMMI and (2) with the exception of this goal and its practices, the TSPm supplements TSP coverage of specific practices rather than replacing it. (See also IT SP 2.5.)
4.3. Establish and maintain teams in the integrated team structure.	TSPm* process assets	The teams develop integrated plans and working procedures during the TSPm launch, which includes additional meetings daily during the launch to coordinate plans and raise common issues. Weekly meetings by each of the teams, between each of the team leaders and an overall integrated project manager (the leadership team), and between like role managers from each team deal with overall project status and issues.	D	

6.1.5 Risk Management (RSKM)

The Risk Management (RSKM) process area takes a more continuing, forward-looking approach to managing risks with activities that include identification of risk parameters, risk assessments, and risk handling.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
SG1. Preparation for risk management is conducted.				
1.1. Determine risk sources and categories.	*Scripts*: LAU7 *Forms*: IRTL *Roles*: Team leader, team member	LAU7 defines a risk as something that may or may not occur. The project team brainstorms risks in this meeting. While categories can be as broad as the imagination of the project team, the team generally frames risks in terms of the potential effect on the goals set and the plans made during the launch.	P/S	Standard risk taxonomies, either from industry or the organization, are often referenced during the launch, but these are not called for specifically in the TSP scripts.
1.2. Define the parameters used to analyze and categorize risks and the parameters used to control the risk management effort.	*Scripts*: LAU7, WEEK *Forms*: IRTL *Roles*: Team leader, team member	In LAU7, risks are categorized as high, medium, or low in terms of likelihood of occurrence and as having potentially high, medium, or low effect on the achievement of the team's defined goals. In general, team consensus is used to determine these likelihoods and effects. During the weekly team meeting, risks are reviewed for changes in likelihood or likely effect on the project's plans.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.3. Establish and maintain the strategy to be used for risk management.	*Scripts*: LAU7, WEEK, STATUS *Forms:* ITL *Roles*: Team leader, team member	The team identifies and documents risks during each launch and relaunch and assigns significant risks to a team member for tracking and developing of mitigating actions (LAU7). Each team member assigned to a risk is responsible for developing a mitigation plan for the risk, monitoring and reporting on the risk as appropriate at the weekly team meeting, and recommending action to the team, usually during the weekly team meeting (WEEK). The team leader reports on significant risks to management (STATUS).	D	
SG2. Risks are identified and analyzed to determine their relative importance.				
2.1. Identify and document the risks.	*Scripts*: LAU7, WEEK *Forms*: ITL *Roles*: Team leader, team member	In LAU7, the team leader guides the team in the systematic identification and documentation of project risks on ITL. Risks also often arise and are documented during other launch meetings and/or arise during the project and are documented at the weekly team meeting (WEEK).	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.2. Evaluate and categorize each identified risk using the defined risk categories and parameters and determine its relative priority.	*Scripts*: LAU7 *Forms*: ITL *Roles*: Team leader, team member	The team leader leads evaluation and categorization of each risk in terms of high, medium, or low likelihood and high, medium, or low effect on the project plan. Similar risks are generally clustered or collapsed together.	D	
SG3. Risks are handled and mitigated, where appropriate, to reduce adverse impacts on achieving objectives.				
3.1. Develop a risk mitigation plan for the most important risks to the project, as defined by the risk management strategy.	*Scripts*: LAU7 *Forms*: ITL *Roles*: Team leader, team member	All risks rated “high” or “medium” in terms of both likelihood and impact are assigned to a team member or the team leader for development of a mitigation plan and for tracking as appropriate during the project.	D	
3.2. Monitor the status of each risk periodically and implement the risk mitigation plan as appropriate.	*Scripts*: WEEK *Forms*: ITL, STATUS *Roles*: Team leader, team member	Each team member develops a mitigation plan for and monitors assigned risks, reports as necessary during weekly team meetings, and recommends enactment of mitigation actions as appropriate. The team leader reports the status of significant risks to management as necessary.	D	

6.1.6 Integrated Teaming (IT) – IPPD

The Integrated Teaming (IT) process area provides for the formation and sustainment of each integrated team. Part of sustaining the team is the development of the integrated team's shared vision, which must align with the project's and the organization's shared visions, developed in the Integrated Project Management for IPPD and Organizational Environment for Integration (OEI) process areas. The specific practices in the OEI and IT process areas then set the environment for enabling integrated teamwork. In addition, the Integrated Teaming process area interacts with other Project Management processes by supplying team commitments, work plans, and other information that form the basis for managing the project and supporting risk management.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. A team composition that provides the knowledge and skills required to deliver the team's product is established and maintained.				
1.1. Identify and define the team's specific internal tasks to generate the team's expected outputs.	*Scripts*: LAU3, LAU4, LAU6 *Forms*: SUMS, SUMQ, TASK *Roles*: Team leader, team member	Outputs are identified in LAU3, along with a general strategy and high-level process to produce them. The process is instantiated at the team level in LAU4 and at the individual level in LAU6.	D	
1.2. Identify the knowledge, skills, and functional expertise needed to perform team tasks.	*Scripts*: PREPL, PREPR, LAU1, LAU3 *Roles*: Team leader	The TSP introduction sequence requires appropriate training in TSP processes and principles, while ensuring that the training has been delivered is on the PREPL/PREPR checklists. The team is encouraged to ask about	D	

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
	Other: TSP introduction sequence	"expert assistance" during LAU1. The team leader is charged with ensuring that the team members' skills and abilities are consistent with their responsibilities. In LAU3, the team often identifies specific expertise or training needed.		
1.3. Assign the appropriate personnel to be team members based on required knowledge and skills.	*Scripts*: PREPL, PREPR *Forms:* TASK *Roles*: Team leader, team member	Preparation for launch and relaunch includes assigning capable personnel and ensuring that they all receive appropriate PSP and TSP training. The team leader manages project staffing, recruiting, and training and considers team members' interests and abilities in making job assignments. Individual team members arrange for and get the education and training needed to do superior work. Both the assignments and additional professional training typically are reflected in individual TASK plans.	D	
SG2. Operation of the integrated team is governed according to established principles.				
2.1. Establish and maintain a shared vision for the integrated team that is aligned with any overarching or higher level vision.	*Scripts*: PREPL, PREPR, LAU1, LAU2 *Forms*: GOAL	As suggested by the preparation guidelines, in LAU1 management and marketing present the team with the project's goals for the organization and the product, respectively. The team asks	D	

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
	Roles: Team leader, team member *Other*: Launch preparation guidelines	questions to ensure that they understand these goals. In LAU2, the team achieves consensus under the guidance of the team leader and launch coach and formalizes its understanding of these goals and documents them on form GOAL.		
2.2. Establish and maintain a team charter based on the integrated team's shared vision and overall team objectives.	*Scripts*: LAU, LAU2, WEEK *Forms*: WEEK, GOAL *Roles*: Team leader, team member	The team leader and team member role specifications form the groundwork for team interactions. The launches and weekly meetings establish and reinforce the process orientation of using the TSP. The specific goal statements produced by the team in LAU2 and documented on the GOAL form provide direction and focus for daily activities.	D	
2.3. Clearly define and maintain each team member's roles and responsibilities.	*Scripts*: LAU2, ROLE, ROLEMX, WEEK, INS *Forms*: WEEK, GOAL *Roles*: Team leader, team member, role managers	The team leader is assigned by management. All other "manager" roles are negotiated during LAU2 and are captured on ROLE and ROLEMX. Additional team roles may be defined. Some standard processes include special roles (WEEK, INS).	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.4. Establish and maintain integrated team operating procedures.	*Scripts*: LAU3, WEEK *Forms*: INV, MTG, INS *Roles*: Team leader, process manager	Launches and weekly team meetings form the basis of the team's operating procedures. The needs for other processes are identified during the launch and recorded on INV. Certain standard processes such as MTG and INS provide baselines to be used and adapted for the team's needs.	D	
2.5. Establish and maintain collaboration among interfacing teams.	*Forms*: TASK, LOGT, LOGD *Roles:* Team leader, role managers	The team leader is explicitly responsible for interfacing with other teams, delegating well-defined issues to the appropriate role managers, and dealing with others as necessary.	D/S	While standard TSP practice seems adequate for this specific practice, TSPm (the TSP extension for multiple teams) has much more explicit support for cross-team collaboration. (See IPM – IPPD SG4 notes for more information.)

6.1.7 Quantitative Project Management (QPM)

The Quantitative Project Management (QPM) process area applies quantitative and statistical techniques to the management of process performance and product quality. Quality and process performance objectives for the project are based on those established by the organization. The project's defined process comprises, in part, process elements and subprocesses whose process performance can be predicted. At a minimum, the process variation experienced by subprocesses that is critical to achieving the project's quality and process performance objectives is understood. Corrective action is taken when special causes of process variation are identified.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. The project is quantitatively managed using quality and process-performance objectives.				
1.1. Establish and maintain the project's quality and process-performance objectives.	*Scripts*: LAU2, LAU4, LAU5, LAU6, REL *Forms*: GOAL, TSP workbook *Roles:* Team leader, process and quality manager	In the launch, the team establishes quantitative quality objectives for defect densities in late testing phases and/or actual use, along with plans for review rates and yields. LAU2 may also formulate other quality objectives. All plans are subject to revision as the project progresses, especially during relaunches. In LAU4, LAU5, and LAU6, the project plan is built around parameters consistent with achievement of the quality objectives and performance goals set in LAU2. GOAL documents particular responsibilities (typically for the team leader, process manager, or quality manager) for tracking performance against these objectives during the project.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.2. Select the subprocesses that compose the project's defined process based on historical stability and capability data.	*Scripts*: LAU3, LAU4, LAU5, LAU6, REL *Forms*: TSP workbook, esp. SUMQ, TASK, and WEEK *Roles*: All role managers *Other*: Planning and quality guidelines	By default, TSP identifies early defect removal and continuous management of time on task as critical subprocesses. The team may identify others to replace or supplement these during the launch or as the project progresses. The team's defined process from LAU3, as instantiated in LAU4 (TASK), LAU5 (SUMQ), and LAU6 (individual TASK plans) focus on early defect removal. Both consolidated and individual WEEK forms provide the focus for managing time on task throughout the project. In the absence of historical data (as in a first-time launch in an organization), the planning and quality guidelines are used to establish reasonable plans and expectations.	D	
1.3. Select the subprocesses of the project's defined process that will be statistically managed.	*Scripts*: LAU2, LAU3, LAU4, LAU5, LAU6 *Forms*: GOAL, TSP workbook *Roles*: Relevant role managers, team member	Goals established in LAU2 and documented in GOAL drive schedule and quality planning through LAU3, LAU4, LAU5, and LAU6. Schedule goals typically guide both schedule and effort planning, while quality goals guide the quality plan and individual plans to maintain such things as review rates (for both personal reviews and team inspections) and phase ratios at	D	

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
	Other: Planning and quality guidelines	historically "good" levels. Individual planning calls for PSP-level plans for implementation activities. Role managers ensure that the subjects for which they are responsible are adequately addressed.		
1.4. Monitor the project to determine whether the project's objectives for quality and process performance will be satisfied, and identify corrective action as appropriate.	*Scripts*: WEEK, PM, STATUS *Forms*: WEEK and meeting minutes, PIP, SUMMARY *Roles*: Team leader, role managers (esp. quality, planning managers)	Weekly status at the individual and team levels monitors progress against team goals, including process and quality performance. The team leader and planning and quality managers typically have particular responsibilities for tracking performance against defined measurable objectives during the project. Corrective actions are discussed in this context and taken as necessary. During the phase postmortem, the planning and quality managers lead the team in reviewing a wide range of process and quality metrics, evaluating performance against team goals, developing PIPs, and identifying needed processes, training, tools, support, or management actions needed to improve performance in the next phase of the project.	D	
SG2. The performance of selected subprocesses within the project's defined process is statistically managed.				

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.1. Select the measures and analytic techniques to be used in statistically managing the selected subprocesses.	*Scripts*: LAU2, LAU3, INS, WEEK *Forms:* GOAL, TSP workbook *Roles*: Planning, process, and quality managers	A set of base measures comes with use of the TSP (size by component, effort by task and phase, task completion date, defects injected and removed by component and phase). Script INS and its associated form support capture/recapture calculations that estimate remaining defects in a module. The TSP tool provides data collection for these parameters, along with a set of basic analyses. The team decides, either during the launch or at the weekly team meeting, which other measures and analyses may be useful. The role managers, especially the planning, process, and quality managers, may devise additional analyses in response to specific issues.	D	In general, the TSP base measures and the standard analyses made by the TSP workbook provide more information than the team needs to manage itself. It is up to the team to determine what subset of the data it uses to manage critical subprocesses.
2.2. Establish and maintain an understanding of the variation of the selected subprocesses using the selected measures and analytic techniques.	*Scripts*: PM, WEEK *Forms*: SUMMARY, TASK, LOGT, LOGD *Roles*: Team leader, planning, process, and quality managers	The various role managers are charged with analyzing and reporting to the team weekly, and in summary at the postmortem, on their respective views of the process data. The TSP tool provides week-by-week charting for planned vs. actual data on earned value and task hours and by-phase charting for many other process parameters.	P/S	While there is no explicit requirement for "an understanding of the variation…" in the role descriptions, the charts provided by the TSP tool provide useful data that are commonly used as the basis for the team to understand normal variations in their work processes.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.3. Monitor the performance of the selected subprocesses to determine their capability to satisfy their quality and process-performance objectives, and identify corrective action as necessary.	*Scripts*: WEEK, PM, STATUS *Forms*: SUMMARY *Roles*: Team leader, planning manager, process manager, quality manager	See QPM SP 1.4, above.	D	
2.4. Record statistical and quality management data in the organization's measurement repository.	*Scripts*: PM *Forms*: SUMMARY *Roles*: Team leader, planning manager, process manager, quality manager	The postmortem consolidates the available data. The SUMMARY specification provides a convenient framework for making the data available to management and to the rest of the organization. The team leader and planning manager, and the various other role managers as appropriate, are responsible for ensuring the capture and storage of standard TSP data and other relevant information.	P/S	This practice assumes the existence of an organizational measurement repository. While the intent of this specific practice (namely, to record the relevant data) seems to be fulfilled by the TSP practices cited, it is difficult to "record" data in (as opposed to "contribute" to) a repository that does not exist. See notes for IPM SP 1.5 above.

6.2 TSP and Project Management Generic Practices

The generic practices of the project management PAs are presented here collectively, rather than separately with each individual PA, both to aid in understanding how the different TSP process assets work together across related process areas and to emphasize that efficient CMMI implementations often address multiple model practices with fewer actual practices.

Generic Practice	***TSP Reference***	***Process Areas and Observations***	***Rating***
GP 2.1. Establish and maintain an organizational policy for planning and performing the process.		*All Project Management PAs:* Organizational policies are beyond the scope of TSP.	U
GP 2.2. Establish and maintain the plan for performing the process.	*Scripts*: All launch scripts *Forms*: WEEK, STATUS, customized MTG forms for each launch meeting *Roles*: Team leader *Other:* PREPL, PREPR, all launch guidance, all other pre-launch assets	*All:* The launch and relaunch preparation guidelines address all of the specifics of planning for the launch. Scripts LAU and REL contain a generic schedule for a launch and relaunch respectively; these are typically customized to the size of the team, the scope of the project, and organizational constraints. There is an MTG form for each launch meeting containing a nominal agenda and schedule that corresponds to the script for that meeting. *PMC:* The weekly team meetings (WEEK) and regular status meetings with management (STATUS) are the regular mechanisms for monitoring and controlling the project management processes. The team leader typically establishes the schedule for these during the launch. *RSKM:* The agenda for LAU7 and the WEEK and STATUS scripts plan for identifying and tracking project risks.	D

Generic Practice	*TSP Reference*	*Process Areas and Observations*	*Rating*
GP 2.3. Provide resources for performing the process, developing the work products, and providing the services of the process.	*Scripts*: All launch scripts, WEEK *Roles*: Team leader, team member *Other:* All launch guidance	*All:* Launch guidance materials and the launch scripts repeatedly stress the importance of having the team leader and entire project team present for the entire launch and of having a qualified launch coach to guide and facilitate the launch. *PMC:* The WEEK script specifies that the team leader leads the weekly meeting and that all team members regularly attend.	D
GP 2.4. Assign responsibility and authority for performing the process, developing the work products, and providing the services of the process.	*Scripts*: All launch scripts, WEEK *Forms*: ROLE, ROLEMX *Roles*: Team leader, team member, role managers *Other:* PREPL, PREPR	*All:* The launch coach guidelines names the TSP coach as having primary responsibility for ensuring that all participants are prepared for the launch and then enact the launch process properly. The guidelines also call on management to name a team leader. PREPL and PREPR require the naming of a launch coordinator to handle logistic preparations for the launch. During the launch the team leader and most role managers take specific responsibility for certain steps of the launch process as designated in the launch scripts. Role managers are named during LAU2 using ROLEMX and captured on ROLE. *PMC:* The team leader has default responsibility for running the weekly team meeting (WEEK) but sometimes delegates this to a team member, such as the planning manager. Team members are responsible for reporting their own data and reporting to the team according to their role assignments and on status, goals, and risks as assigned. *RSKM:* Risk tracking and development of mitigation plans generally is assigned by role or area of expertise.	D

Generic Practice	***TSP Reference***	***Process Areas and Observations***	***Rating***
GP 2.5. Train the people performing or supporting the process as needed.	*Roles*: Team leader, team member *Other:* All PSP and TSP training	*All:* Training in PSP and TSP skills and principles is specified by the TSP introduction sequence for each role in the chain of command, plus the PSP instructors and TSP coaches. PREPL and PREPR include specific checks that the training has been accomplished. Team members are responsible for ensuring that they have "the education and training needed to do superior work." *QPM:* The mid-term report in PSP training requires that students analyze their own processes, set quantifiable goals, and say how they intend to achieve those goals in the second half of the training. The final report analyzes second-half results, compares them against the mid-term goals, and sets new goals and plans for personal improvement going forward.	D
GP 2.6. Place designated work products of the process under appropriate levels of configuration management.	*Scripts*: All launch scripts, WEEK, many other scripts *Forms*: MTG, WEEK *Roles*: Planning and support managers *Other:* NOTEBOOK	*All:* Plans developed during the launch and updated weekly (especially the consolidated workbook), weekly team meeting minutes, and numerous other artifacts specified throughout the TSP scripts are placed in the project NOTEBOOK by the planning manager. The official form of the NOTEBOOK (e.g., hard copy or electronic) and the level of configuration management it is subject to is up to the team and/or organization. In general, the support manager is responsible for matters involving configuration management.	S
GP 2.7. Identify and involve the relevant stakeholders as planned.	*Scripts:* PREPL, PREPR, PM, STATUS	*All:* The launch preparation scripts (PREPL, PREPR) and other guidance call out senior management and marketing specifically as relevant stakeholders. Each of the launch scripts calls for participation by role. Script PM calls for obtaining stakeholder evaluations as part of a final project postmortem.	S

Generic Practice	*TSP Reference*	*Process Areas and Observations*	*Rating*
	Other: Senior management and marketing preparation guidelines	Script STATUS calls for periodic management and customer status meetings.	
GP 2.8. Monitor and control the process against the plan for performing the process and take appropriate corrective action.	*Scripts*: All launch scripts *Roles*: Team leader	*All:* The TSP launch coach is responsible for facilitating all aspects of a launch or relaunch. *PMC:* The team leader runs the weekly team meeting.	S
GP 2.9. Objectively evaluate adherence of the process against its process description, standards, and procedures, and address noncompliance.	*Scripts*: All launch scripts, PREPL, PREPR *Roles*: Team leader *Other:* Checkpoint review	*All:* The TSP launch coach ensures proper preparation and execution of launch activities and develops a coaching plan for following the team's progress. The coaching plan for a new team usually includes one or more TSP checkpoints that evaluate how well the team and team members are gathering data and managing themselves. Checkpoints also provide individual feedback as deemed necessary by the coach. Any issues that cannot be satisfactorily addressed by the team or team leader are elevated to management for further action.	S
GP 2.10. Review the activities, status, and results of the process with higher level management and resolve issues.	*Scripts*: LAU1, LAU9, STATUS *Other:* Plan assessment checklist, quarterly review checklist	*All:* At LAU1, the TSP coach reviews the launch activities to come with all present, including management and marketing representatives. At LAU9, the team leader summarizes the team's planning activities and presents the team's plan and possible alternative plans to management. *PMC:* The team leader also makes regular STATUS reports up the chain of command during the project and typically prepares and delivers the team's input to quarterly status reviews with senior management.	S

Generic Practice	***TSP Reference***	***Process Areas and Observations***	***Rating***
GP 3.1. Establish and maintain the description of a defined process.	*Scripts*: All launch scripts, WEEK, STATUS	*All:* The referenced scripts, forms, role descriptions, and other guidance taken together are an extensive description of TSP project management processes.	S
	Forms: All launch forms (esp. customized launch MTG forms), WEEK, STATUS		
	Roles: Team leader, team member, role managers		
	Other: All launch guidance, all other pre-launch guidance		
GP 3.2. Collect work products, measures, measurement results, and improvement information derived from planning and performing the process to support the future use and improvement of the organization's processes and process assets.	*Scripts*: All individual launch scripts, PM, WEEK	*All:* Launch artifacts, as specified by the launch scripts, and weekly meeting artifacts, as specified by the WEEK script, are stored in the project NOTEBOOK both for use by the project team and by the organization. At various times, the team leader, process manager, or planning manager is assigned specific responsibilities with respect to collecting such information and storing it in the NOTEBOOK.	S
	Forms: MTG, TSP workbooks		

Generic Practice	***TSP Reference***	*Process Areas and Observations*	*Rating*
	Roles: Team leader, planning and process managers *Other:* NOTEBOOK		
GP 4.1. Establish and maintain quantitative objectives for the process that address quality and process performance based on customer needs and business objectives.	*Scripts*: All launch scripts, esp. LAU, REL	*All:* Launches are generally expected to last four days; relaunches last three days. An expected duration range for individual meetings is contained in each respective script, usually between one and six hours. *PMC:* Weekly status meetings are expected to last about an hour, depending on the size of the team and complexity of the project.	S
GP 4.2. Stabilize the performance of one or more subprocesses to determine the ability of the process to achieve the established quantitative quality and process-performance objectives.		*All:* Project management practices *per se* are not targeted for quantitative management.	N
GP 5.1. Ensure continuous improvement of the process in fulfilling the relevant business objectives of the organization.	*Scripts*: PM, LAUPM *Forms*: PIP *Roles*: Team leader, process manager	*All:* Postmortem (PM) activities can raise issues dealing with any process area. The PIP form is used for capturing process issues and proposed solutions for any process area. Typically PMs occur and PIPs are written within the context of a particular project; however, they can and do address issues in any process area, between process areas, and even outside the scope of CMMI. What TSP does not specify is any kind of specific standard way in which to evaluate and act upon PIPs and other PM issues.	S

Generic Practice	*TSP Reference*	*Process Areas and Observations*	*Rating*
GP 5.2. Identify and correct the root causes of defects and other problems in the process.	*Scripts*: PM, LAUPM *Forms*: PIP *Roles*: Team leader, process manager	*All:* PIPs and PMs sometimes help to identify root causes of defects or other process problems. The TESTD script, while usually used in conjunction with engineering integration and test activities, has also been used to analyze and correct root causes of defects within a particular team's project management practices.	S

7 TSP and CMMI Process Management Process Areas

7.1 Scope of PROCESS

The Process Management process areas contain the cross-project activities related to defining, planning, resourcing, deploying, implementing, monitoring, controlling, appraising, measuring, and improving processes. The page numbers for each process area as listed below are from *CMMI: Guidelines for Process Improvement and Product Improvement* [Chrissis 03].

The Process Management Category contains the following process areas.

Organizational Process Focus	pages 323-340
Organizational Process Definition	pages 307-322
Organizational Training	pages 355-370
Organizational Process Performance	pages 341-354
Organizational Innovation and Deployment	pages 287-306

7.1.1 Organization Process Focus (OPF)

The Organizational Process Focus (OPF) process area helps the organization to plan and implement organizational process improvement based on an understanding of the current strengths and weaknesses of the organization's processes and process assets. Candidate improvements to the organization's processes are obtained through various means. These include process improvement proposals, measurement of the processes, lessons learned in implementing the processes, and results of process appraisals and product evaluation activities.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Strengths, weaknesses, and improvement opportunities for the organization's processes are identified periodically and as needed.				
1.1. Establish and maintain the description of the process needs and objectives for the organization.	*Training:* TSP Executive Seminar *Other:* TSP introduction strategy	During the early stages of introduction and especially during the *TSP Executive Seminar*, organizational needs and objectives are brought to light in order to justify introduction of the TSP.	S	This is more properly an activity for the organization's management team and engineering process group (EPG).
1.2. Appraise the process of the organization periodically and as needed to maintain an understanding of their strengths and weaknesses.			U	This is an activity for the EPG or outside consultant (e.g., a SCAMPI appraisal).

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.3. Identify improvements to the organization's processes and process assets.			U	Again, this is an activity for the EPG. Examples would be organization-level evaluation of PIPs submitted by the TSP teams in an organization, or ideas gleaned from attending an industry conference or reading relevant journals.
SG2. Improvements are planned and implemented, organizational process assets are deployed, and process-related experiences are incorporated into the organizational process assets.				
2.1. Establish and maintain process action plans to address improvements to the organization's processes and process assets.	*Other:* TSP introduction strategy	The TSP introduction strategy is an example of a process action plan. Tailoring the strategy as appropriate, and integrating it with other plans that address other needs, is an essential step in building an organizational improvement plan.	S	This analysis assumes organization-wide deployment of PSP and TSP according to a version of the TSP introduction strategy that is tailored to the particular needs and constraints of the implementing organization. What is missing here is a generic way to address issues that fall outside the scope of the TSP and the introduction strategy. Two obvious examples: What happens after TSP
2.2. Implement process action plans across the organization.	*Forms:* TASK, LOGT, LOGD *Roles:* Team member, role managers	The introduction strategy calls first for pilot projects and then for increasingly broad rollout across the organization on a project-by-project basis.	S	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.3. Deploy organizational process assets across the organization.	*Scripts*: PREPL, PREPR *Roles:* Team member, role managers *Other:* TSP introduction strategy	TSP launch preparations make the baseline TSP assets available to each team. Team members are directed to agree on which team member will bring which organizational process assets that may be available, including the organization's defined process, relevant engineering standards, and configuration management and change control processes.	S	
2.4. Incorporate process-related work products, measures, and improvement information derived from planning and performing the process into the organizational process assets.	*Roles:* Process manager, team member *Other:* TSP introduction strategy	Broad rollout in the introduction strategy calls for implementing lessons learned from pilots and other early projects as the rollout proceeds.	S	

7.1.2 Organization Process Definition (OPD)

The Organizational Process Definition (OPD) process area establishes and maintains the organization's set of standard processes and other assets based on the process needs and objectives of the organization. These other assets include descriptions of processes and process elements, descriptions of life-cycle models, process tailoring guidelines, process-related documentation, and data. Projects tailor the organization's set of standard processes to create their defined processes. The other assets support tailoring as well as implementation of the defined processes. Experiences and work products from performing these defined processes, including measurement data, process descriptions, process artifacts, and lessons learned, are incorporated as appropriate into the organization's set of standard processes and other assets.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. A set of organizational process assets is established and maintained.				
1.1. Establish and maintain the organization's set of standard processes (OSSP).	All TSP process elements listed in Section 5 except for SEI-only offerings	The TSP source materials made available when the TSP is properly licensed constitute a majority of an operational OSSP. This license allows the organization to incorporate and tailor the TSP materials as necessary for internal use.	S	The TSP is not a full-blown OSSP, nor does it attempt to be. Such an entity can be created only by the organization itself.
1.2. Establish and maintain descriptions of the life-cycle models approved for use in the organization.	*Scripts*: DEV, MAINT *Forms*: STRAT, SUMS, TASK *Roles:* Process manager	Scripts DEV and MAINT are example life-cycle descriptions for new development and maintenance activities, respectively. In many places in the standard PSP/TSP training materials, the point is made that a cyclic life-cycle approach is preferred. Forms STRAT and (to a lesser extent) SUMS document the team's chosen strategy, with implementation details showing up in individual and team TASK plans.	S	TSP and the project teams typically provide many potential models during LAU3; however, approving them for organizational use is an EPG and/or management function.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.3. Establish and maintain the tailoring criteria and guidelines for the organization's set of standard processes.	*Scripts*: LAU3 *Roles*: Process manager *Other*: Planning and quality guidelines	LAU3 directs the team to define its working processes. The process manager or other assigned role manager(s) leads the effort to document these processes if they are not finished during the launch. However, there is no formal direction or criteria for tailoring (see note). The planning and quality guidelines substitute for organizational benchmark data that may not exist for early launches in an organization.	S	Much of the tailoring expertise lies with the TSP coaches. Formal criteria and guidelines for tailoring an OSSP are not—and arguably cannot be—part of the TSP, since any practical OSSP, especially its tailoring criteria and guidelines, are unique to an organization.
1.4. Establish and maintain the organization's measurement repository.	*Scripts*: PM *Forms*: TSP workbooks *Roles*: Planning, process, quality, and test managers *Other:* SUMMARY	Raw data are captured in individual and consolidated TSP workbooks from each project team. At postmortems, teams (usually led by one or more of the referenced role managers) consolidate this information. The SUMMARY specification lists standard analyses for schedule, resources, size, productivity, defects, yield, ratios, rates, components, and process.	S	TSP and the project teams provide much of the raw information, but it is up to the EPG or similar organizational group to perform this function.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.5. Establish and maintain the organization's process asset library.	*Scripts*: All TSP scripts	An assumption of this analysis is that TSP is used by all project teams in an organization; thus, all TSP source documents (including the courseware available to SEI-authorized PSP instructors), along with team-produced process assets, constitute a significant part of a *de facto* process asset library.	S	See notes for 1.4 above.
	Forms: All TSP forms			
	Roles: All TSP roles			
	Other: All "other" process assets			
	Training: Introduction to Personal Process, *PSP for Engineers*, *TSP Executive Seminar*, *Managing TSP Teams*			

7.1.3 Organizational Training (OT)

The Organizational Training process area identifies the strategic training needs of the organization as well as the tactical training needs that are common across projects and support groups. In particular, training is developed or obtained to ensure that team members have the skills required to perform the organization's set of standard processes. The main components of training include a managed training-development program, documented plans, personnel with appropriate knowledge, and mechanisms for measuring the effectiveness of the training program.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. A training capability that supports the organization's management and technical roles is established and maintained.				
1.1. Establish and maintain the strategic training needs of the organization.	*Roles*: Team leader, team member	Identifying the need for PSP and TSP training is strategic to the organization implementing TSP; however, there is no formal mechanism for identifying and dealing with other strategic needs.	S	Strategic training needs of the organization are potentially reflected by the aggregate of team training needs, but again there is no formal TSP mechanism to address these needs.
1.2. Determine which training needs are the responsibility of the organization and which will be left to the individual project or support group.	*Scripts:* PREPL, PREPR, LAU1 *Roles*: Team leader, team member *Other:* Senior management discussion guidelines	Senior management preparation does not specifically call for identifying training needs, but such considerations are often brought into the discussion in LAU1.	S	There is no general mechanism in the TSP or the introduction strategy for dealing with non-TSP issues at the organizational level.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
1.3. Establish and maintain an organizational training tactical plan.	*Other*: TSP introduction strategy	Appropriate role-based training in PSP and TSP methods is an integral component of the TSP introduction strategy. Customizing the generic introduction strategy (an essential step in TSP introduction) creates an organizational training plan sensitive to the needs of the organization's rollout of the TSP.	S	The scope of the organizational plan described here obviously covers only PSP and TSP, but does put in place an organizational mechanism that can be used for other training.
1.4. Establish and maintain training capability to address organizational training needs.	*Other*: TSP introduction strategy	The standard introduction strategy specifically calls for developing an internal PSP training/TSP coaching capability suited to the organization's needs.	S	The scope of the training capacity addressed here addresses only PSP and TSP training, but again, an organizational mechanism is put in place for potential future use.
SG2. Training necessary for individuals to perform their roles effectively is provided.				
2.1. Deliver the training following the organizational tactical plan.	*Other*: TSP introduction strategy *Training*: *PSP Instructor Training, TSP Launch Coach Training*	Appropriate role-based training in PSP and TSP methods is an integral component of the TSP introduction strategy. Customizing the generic introduction strategy creates an organizational training plan sensitive to the needs of the organization's rollout of the TSP.	S	

Specific Practice	***TSP Reference***	*Observation*	*Rating*	*Notes*
2.2. Establish and maintain records of organizational training.	*Training*: SEI training records	Use of copyrighted PSP and TSP training materials requires instructors to obtain and transmit training data to the SEI.	S	
2.3. Assess the effectiveness of the organization's training program.	*Other:* TSP coach observation *Training*: *PSP Instructor Training, TSP Launch Coach Training*	PSP assignments in *PSP for Engineers* training demonstrate student understanding throughout the course. Tests at the end of *PSP Instructor Training* and *TSP Launch Coach Training* demonstrate a minimum level of understanding necessary to fulfill those roles. The TSP coach observation ensures that candidate coaches can competently coach a TSP launch. Ultimately, it is the performance of the TSP project teams, and how effective they are in applying the principles of PSP and TSP on the job, that determine the effectiveness of PSP and TSP training.	S	There is no objective assessment or evaluation of management or non-software personnel. There is subjective evaluation by the instructor(s) during the class. A more objective evaluation of effectiveness is limited to PSP instructors and TSP coaches. Evaluation of training beyond PSP and TSP training is beyond the scope of TSP introduction. In the future, SEI may offer more objective evaluation in the form of certification of PSP- and TSP-trained individuals.

7.1.4 Organizational Process Performance (OPP)

The Organizational Process Performance (OPP) process area derives quantitative objectives for quality and process performance from the organization's business objectives. The organization provides projects and support groups with common measures, process performance baselines, and process performance models. These additional organizational assets aid in quantitative project management and statistical management of critical subprocesses for both projects and supporting groups. The organization analyzes the process performance data collected from these defined processes to develop a quantitative understanding of product quality, service quality, and process performance of the organization's set of standard processes.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Baselines and models that characterize the expected process performance of the organization's set of standard processes are established and maintained.				
1.1. Select the processes or process elements in the organization's set of standard processes that are to be included in the organization's process performance analysis.	*Scripts:* LAU1, INS, TESTx, WEEK *Forms:* SUMP, SUMQ, WEEK *Other: PSP for Engineers* training	By default, TSP focuses on (*a*) early defect removal in personal reviews (as taught in PSP training) and team inspections and on how effective these efforts are as indicated by found defect densities in those process phases as compared to test phases (see SUMP and SUMQ) and (*b*) on schedule performance, as indicated by earned value and time on task (WEEK form).	S	Other process elements of interest to the organization may be indicated during the management briefing in LAU1.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.2. Establish and maintain definitions of the measures that are to be included in the organization's process performance analyses.	*Forms*: Team workbooks, STATUS, SUMMARY	Measures used by the organization often do not coincide exactly with those predefined by the TSP, although the raw measures (time on task, task completion date, defects, and product size) as defined by TSP are usually sufficient to compute indicators useful to the organization.	S	TSP computed metrics such as earned value, task hours per week, test defects per KLOC, review rates, yield, and quality profile index (QPI) for components are all candidate metrics for analyzing organizational process performance. There are literally dozens of candidate derived measures from PSP training and the various TSP assets that might be used by the organization.
1.3. Establish and maintain quantitative objectives for quality and process performance for the organization.	*Scripts*: LAU1 *Other*: TSP introduction strategy	The TSP introduction strategy includes planning to establish quantitative expectations for pilot projects, typically including schedule and cost performance and observed defect density at a specified test or delivery point. Appropriate summaries of these expectations are typically provided to the development teams during LAU1.	S	The TSP activities are clearly done at the project level, not the organizational level. However, the introduction strategy does call for the development of a quality policy that often includes such quantitative objectives.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
1.4. Establish and maintain the organization's process performance baselines.	*Roles*: Process manager *Training*: *TSP Executive Seminar* *Other:* Planning and quality guidelines	Exercises in the *TSP Executive Seminar* focus on evaluating potential benchmark candidates and comparing selected benchmarks with other projects. The planning and quality guidelines establish default process performance guidelines.	S	The referenced exercises and training may better address GP2.5 for OPP more than for this practice.
1.5. Establish and maintain the process performance models for the organization's set of standard processes.	*Forms*: TSP workbooks *Roles*: Team leader, process, planning, or quality manager *Other*: Planning and quality guidelines	The planning and quality guidelines, along with the performance model inherent in the TSP workbooks, establish a default performance model. The process manager, planning manager, quality manager, or team leader monitors team performance in light of goals related to the model.	S	Most organizations customize the default performance model implied by the planning and quality guidelines based on their own needs and situation.

7.1.5 Organizational Innovation and Deployment (OID)

The Organizational Innovation and Deployment (OID) process area selects and deploys proposed incremental and innovative improvements that address the organization's ability to meet its quality and process performance objectives. The identification of promising incremental and innovative improvements should involve the participation of an empowered workforce aligned with the business values and objectives of the organization. The selection of improvements to deploy is based on a quantitative understanding of the potential benefits and costs from deploying candidate improvements and the available funding for such deployment.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Process and technology improvements that contribute to meeting quality and process performance objectives are selected.				
1.1. Collect and analyze process- and technology-improvement proposals.	*Scripts*: PM, LAUPM *Forms*: PIP, TASK, LOGT, LOGD *Roles*: Process manager	PIP forms record both process and technology improvement suggestions. The process manager manages the elicitation, gathering, recording, tracking, and handling of the team's PIPs during postmortems and as needed during the project.	S	The TSP focus is at the project level. There is no explicit mechanism or role in TSP for collecting and analyzing PIPs at the organizational level.
1.2. Identify and analyze innovative improvements that could increase the organization's quality and process performance.	*Scripts*: TESTD, LAUPM, PM *Forms*: PIP, TASK, LOGT, LOGD	Innovative improvements are potentially identified on PIP forms, which are solicited during postmortem meetings. TESTD performs an analysis of all integration, system, and acceptance test defects at the project level, and	S	The TSP focus is at the project level. There is no explicit mechanism in TSP to address organizational-level quality and performance issues. However, the decision to use TSP indicates a mechanism, such as a

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
	Roles: Process and quality managers, team member	can lead to identification of potential quality and process performance improvements.		new technology group, that addresses this practice more broadly.
1.3. Pilot process and technology improvements to select which ones to implement.	*Scripts*: LAU3 *Roles*: Process manager, other role managers *Other*: TSP introduction strategy	A piloting strategy is built into the TSP introduction sequence. LAU3 provides a ready opportunity when defining the team's processes to incorporate new process and technology improvements led by the process manager or, depending on the particular innovation, a more relevant role manager.	S	There is no explicit mechanism in the TSP introduction sequence for piloting other specific technologies; however, TSP launches are often used as a mechanism to initiate pilot projects for the use of other processes and technologies.
1.4. Select process- and technology-improvement proposals for deployment across the organization.	*Other*: TSP introduction strategy	Lessons learned during pilot and other early projects during TSP introduction are used to make adjustments during broader rollout in the organization.	S	There is no explicit mechanism in the TSP introduction sequence for selecting other improvement proposals; however, integrating with (for example) a larger process improvement effort like CMMI or the use of another new technology (e.g., UML) is a common management goal given to TSP teams.
SG2. Measurable improvements to the organization's processes and technologies are continually and systematically deployed.				

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.1. Establish and maintain the plans for deploying the selected process and technology improvements.	*Scripts*: LAU3 *Roles*: Process manager *Other*: TSP introduction strategy	The organization's customized TSP introduction plan describes specific steps for deploying the TSP and related technologies (e.g., the TSP tool). LAU3 and the process manager role provide mechanisms for other improvements to be introduced at the project level.	S	With respect to all specific practices under goal SG2: The scope of the introduction strategy by definition is TSP-only. A well-managed implementation strategy that piggybacks other process and technology improvements onto (for example) TSP project launches could fully implement these practices.
2.2. Manage the deployment of the selected processes and technology improvements.	*Other*: STATUS, SUMMARY, TSP introduction strategy, quarterly review checklist	The introduction strategy, specifically the quarterly reviews and regular STATUS and SUMMARY meetings, provide mechanisms for managing TSP deployment in the organization. To the extent that other improvements are being deployed on TSP teams, these same mechanisms may be used for managing those improvements.	S	
2.3. Measure the effects for the deployed process and technology improvements.	*Other*: TSP introduction strategy, quarterly review checklist	The introduction strategy calls for evaluation of early pilot project results (even preliminary results) before proceeding with broad deployment of the TSP. Quarterly reviews are especially useful for management review of deployment effects.	S	Organization-wide measures are not explicitly identified, although there are many available candidates with the TSP.

7.2 TSP and Process Management Generic Practices

At first glance, CMMI generic practices as applied to the process management PAs seem to have little to do with the TSP. However the assumptions made for this report cast the entire set of TSP process assets as a major part of an organization's standard process, making the TSP a crucial piece of an organization's larger process picture. The table below refrains from making any further assumptions and, as such, reflects the fact that only the TSP introduction sequence deals to any great extent with institutionalizing process management for the organization. The observations do, however, reflect the usual case that it is the SEI or some other external agent that often acts as the organization's main resource for developing expectations for and then guiding the introduction efforts, and for helping to evaluate results.

See Appendix B for an alternative approach to the process management PAs. This approach makes one additional assumption: that PSP principles and TSP practices are used to plan, execute, measure, track, and continuously improve the work of the EPG and related groups such as action teams or working groups.

Generic Practice	***TSP Reference***	***Process Area: Observation***	***Rating***
GP 2.1. Establish and maintain an organizational policy for planning and performing the process.		*All:* Out of the scope of TSP.	U
GP 2.2. Establish and maintain the plan for performing the process.	*Other:* TSP introduction strategy	*OPF, OID:* The TSP introduction strategy is an example of a process action plan. Planning for a particular implementation of the strategy probably addresses this practice. *OPD, OT, OPP:* The planning for TSP introduction requires decisions about how to store and make available TSP process assets (OPD); who to train, in what courses, and when to train them (OT); and what the quantitative goals are for the implementation (OPP).	S
GP 2.3. Provide resources for performing the process, developing the work products, and providing the services of the process.	*Other:* TSP introduction strategy	*All:* The TSP coach and PSP instructors are responsible for training executives, managers, team leaders, and the project team, and for launching and coaching the project teams to successful conclusion. Other resources necessary for successful introduction are identified during planning for TSP introduction.	S

Generic Practice	*TSP Reference*	*Process Area: Observation*	*Rating*
GP 2.4. Assign responsibility and authority for performing the process, developing the work products, and providing the services of the process.	*Other:* TSP introduction strategy	*All:* TSP coaches and PSP instructors have a responsibility to the implementing organizations and to the SEI to ensure fidelity in training and implementation during TSP introduction, and to counsel organization personnel in the appropriate usages of the technology. The organization assigns responsibilities and authority as necessary in order to implement the strategy.	S
GP 2.5. Train the people performing or supporting the process as needed.	*Training: PSP for Engineers, TSP Executive Seminar, Managing TSP Teams, Introduction to Personal Process*	*All:* The various PSP and TSP training courses are specified by the TSP introduction strategy. *PSP for Engineers* and *Introduction to Personal Process* introduce the concepts of a defined process, a measurement framework, benchmarking, process definition, quality management, and continuous improvement. The *TSP Executive Seminar* and *Managing TSP Teams* introduce concepts such as organizational benchmarks, data-driven management, and a process culture. EPG members often attend these courses as preparation in implementing and supporting the TSP introduction activities.	S
GP 2.6. Place designated work products of the process under appropriate levels of configuration management.	*Scripts*: LAU3, LAU4, LAU6 *Forms:* TASK, LOGT *Roles*: Process and support managers	*OPF, OPD, OPP:* These PAs are not explicitly addressed by the TSP. However, as early launches typically address organizational benchmarking issues, some launch activities (LAU3, LAU4, LAU6) and follow-through by team members during project execution (TASK, LOGT) probably apply. The process manager and/or support manager are usually involved. *OT:* Standard PSP and TSP course materials are maintained and made available to implementing organizations by the SEI.	S
GP 2.7. Identify and involve the relevant stakeholders as planned.	*Other:* TSP introduction sequence	*All:* Part of planning a successful introduction of the TSP includes identification and involvement of willing managers of pilot projects, early project team members, and affected supporting groups such as test, quality assurance, and training.	S
GP 2.8. Monitor and control the process against the plan for performing the process and take appropriate corrective action.	*Other:* TSP introduction strategy, quarterly review checklist	*All:* The status of PSP and TSP training, and of TSP projects (especially pilot projects) is addressed at planned points during the introduction activities, and usually thereafter at regular management meetings such as quarterly reviews. Quantitative comparisons between TSP projects and with respect to prior projects are typical.	S

Generic Practice	*TSP Reference*	*Process Area: Observation*	*Rating*
GP 2.9. Objectively evaluate adherence of the process against its process description, standards, and procedures, and address noncompliance.	*Other:* TSP introduction strategy	*All:* Once a few pilot projects are underway and running reasonably well, the TSP coach (especially an external coach) often plays more a quality assurance role to the organization's process improvement efforts.	S
GP 2.10. Review the activities, status, and results of the process with higher level management and resolve issues.	*Other:* TSP introduction strategy	*All:* Regular evaluations of introduction activities are typically delivered to sponsoring management by the TSP coach, including training status, pilot status, and benchmark comparisons.	S
GP 3.1. Establish and maintain the description of a defined process.	*Other:* TSP introduction strategy	*All:* The TSP introduction strategy is a defined process for introducing a particular set of disciplined development practices.	S
GP 3.2. Collect work products, measures, measurement results, and improvement information derived from planning and performing the process to support the future use and improvement of the organization's processes and process assets.	*Other:* TSP introduction strategy	*All:* Especially in large, distributed organizations, the lessons learned from TSP introduction at one geographic site or even one business unit are used to inform implementation at other sites and units.	S
GP 4.1. Establish and maintain quantitative objectives for the process that address quality and process performance based on customer needs and business objectives.	*Other:* TSP introduction strategy	*All:* Quantitative expectations for the TSP introduction effort are typically established early in the sequence and inform the effort as it proceeds.	S

Generic Practice	*TSP Reference*	*Process Area: Observation*	*Rating*
GP 4.2. Stabilize the performance of one or more subprocesses to determine the ability of the process to achieve the established quantitative quality and process-performance objectives.	*Other:* TSP introduction strategy	*All:* The TSP introduction strategy is designed to allow most organizations to follow an expected improvement path and achieve quantifiable gains in schedule adherence, cost containment, and delivery quality.	S
GP 5.1. Ensure continuous improvement of the process in fulfilling the relevant business objectives of the organization.	*Scripts*: PM *Forms*: PIP	*All:* A postmortem, usually highly modified from the TSP script, is typically held as initial TSP introduction transitions to wider usage in the organization. Lessons learned are typically captured in PIPs and used to modify the various relevant aspects of the introduction strategy appropriately.	S
GP 5.2. Identify and correct the root causes of defects and other problems in the process.	*Other:* TESTD	*All:* Unexpected problems in TSP introduction often trigger a root-cause analysis not dissimilar to the one described in the TESTD script.	S

8 TSP and CMMI Engineering PAs

8.1 Scope of Engineering Process Areas

Engineering process areas cover the development and maintenance activities that are shared across engineering disciplines (e.g., systems engineering and software engineering). The six process areas in the Engineering process area category have inherent interrelationships. These interrelationships stem from applying a product development process, rather than discipline-specific processes such as software engineering or systems engineering. The page numbers for each PA as listed below are from *CMMI: Guidelines for Process Improvement and Product Improvement* [Chrissis 03].

The Engineering process category contains the following process areas.

Requirements Management	pages 485-496
Requirements Development	pages 465-484
Technical Solution	pages 533-562
Product Integration	pages 371-390
Verification	pages 575-590
Validation	pages 563-574

8.1.1 Requirements Management (REQM)

The Requirements Management (REQM) process area maintains the requirements. It describes activities for obtaining and controlling requirement changes and ensuring that other relevant plans and data are kept current. It provides traceability of requirements from customer, to product, to product component. Requirements Management ensures that changes to requirements are reflected in project plans, activities, and work products. This cycle of changes may impact all of the other Engineering process areas; thus, Requirements Management is a dynamic and often recursive sequence of events. Establishment and maintenance of the Requirements Management process area is fundamental to a controlled and disciplined engineering design process.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Preparation for validation is conducted.				
1.1. Select products and product components to be validated and the validation methods that will be used for each.	*Scripts*: LAU3, LAU4, LAU6, REQ, ANA, TEST, TEST1, TEST2, TEST3 *Forms*: TASK, LOGT, LOGD *Roles*: Customer interface, design, and test managers	System testing is specified early in the project (REQ, ANA) and refined (TEST, TEST3) throughout the project. Early build and integration tests (TEST1, TEST2) incorporate system tests as appropriate. The referenced role managers ensure that the appropriate products, components, and methods are selected and available. Specific tasks appear in individual TASK plans and are logged against in LOGT and LOGD.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.2-2. Establish and maintain the environment needed to support validation.	*Scripts*: LAU3, LAU4, LAU6 *Forms*: TASK, LOGT, LOGD *Roles*: Support, customer interface, design, and test managers	The support manager has the responsibility to ensure that the verification environment is adequate. LAU3 has a specific step for identifying needed items in a support plan. The other referenced role managers communicate their needs and the entire team ensures that their individual TASK plans support the validation effort.	P	No specific activities are called for in any of the scripts to actually "establish and maintain," but it is strongly implied by the support manager role description and the LAU3 activity.
1.3-3. Establish and maintain procedures and criteria for validation.	*Scripts*: LAU3, LAU4, LAU6, REQ, ANA, TEST3 *Forms*: TASK, LOGT, LOGD *Roles*: Customer interface, support, design, implementation, and test managers	A system test plan is developed during requirements development (REQ) or analysis (ANA), refined, and extended as necessary for system test (TEST3). The referenced role managers take responsibility as appropriate for the various aspects of validation.	D	Specific validation criteria are not called for in the scripts but are typically identified throughout the project as appropriate.
SG2. The product or product components are validated to ensure that they are suitable for use in their intended operating environment.				

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.1. Perform validation on the selected products and product components.	*Scripts*: REQ, ANA, TEST1, TEST2, TEST3 *Forms*: TASK, LOGT, LOGD *Roles*: Team member, design, implementation, support, and test managers	TEST1 and TEST2 aim specifically at validating product components, while TEST3 specifies verifying proper operations under normal and abnormal operating conditions, presumably as specified previously in the customer's validated requirements (REQ, ANA). Each role manager ensures that appropriate activities have been included in individual TASK plans.	D	
2.2. Analyze the results of the validation activities and identify issues.	*Scripts*: TEST, TEST1, TEST2, TEST3, TESTD, PM *Forms*: TASK, LOGT, LOGD, SUMP, SUMQ *Roles*: Process, quality, and test managers	The referenced role managers are responsible for specific activities as indicated in the scripts. SUMP, SUMQ, and TASK summarize relevant data gathered in LOGT and LOGD. All test defects are attributed to source (product or test) and, if in the product, further analyzed using TESTD. Postmortems (PM) look specifically at quality and other issues related to validation efforts.	D	

8.1.2 Requirements Development (RD)

The Requirements Development (RD) process area identifies customer needs and translates these needs into product requirements. The set of product requirements is analyzed to produce a high-level conceptual solution. This set of requirements is then allocated to a set of product components. Other requirements that help to define the product are derived and allocated to product components. This set of product and product-component requirements clearly describes the product's performance, design features, verification requirements, etc., in terms that the developer understands and uses.

The Requirements Development process area supplies requirements to the Technical Solution process area, where the requirements are converted into the product architecture, product-component design, and the product component itself (e.g., coding, fabrication). Requirements are also supplied to the Product Integration process area, where product components are assembled and interfaces are verified to ensure that they meet the interface requirements supplied by Requirements Development.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Stakeholder needs, expectations, constraints, and interfaces are collected and translated into customer requirements.				
1.1-1(-2). Identify and collect (elicit) stakeholder needs, expectations, constraints, and interfaces for all phases of the product life cycle.	*Scripts*: LAU1, REQ, ANA *Forms*: TASK, LOGT, LOGD	In LAU1, marketing or some other representative of customer needs presents the critical product requirements. A senior manager presents business needs, management expectations, and	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
	Roles: Customer interface manager, team leader, team member	constraints. Scripts REQ and ANA specify requirements elicitation that may include prototypes and multiple levels of customer interaction. The customer interface manager (and at a higher level, the team leader) are responsible for ensuring that changing customer needs are addressed throughout the life cycle.		
1.2. Transform stakeholder needs, expectations, constraints, and interfaces into customer requirements.	*Scripts*: REQ, ANA *Forms*: TASK, LOGT, LOGD *Roles*: Customer interface manager	Scripts REQ and ANA specify creating or updating a systems requirements specification (SRS). REQ additionally specifies a user manual and system test plan, and ANA calls for an impact analysis with respect to an existing system. The customer interface manager is the project team's lead for customer interactions.	D	
SG2. Customer requirements are refined and elaborated to develop product and product-component requirements.				
2.1. Establish and maintain product and product-component requirements, which are based on the customer requirements.	*Scripts*: REQ, HLD *Forms*: TASK, LOGT *Roles:* Customer interface manager	Script REQ calls for creation of an engineering requirements specification (ERS). The customer interface manager leads the team in the development and evolution of product requirements. Specific tasks typically appear in individual TASK plans and LOGT forms.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.2. Allocate the requirements for each product component.	*Scripts*: HLD *Forms*: TASK, LOGT *Roles*: Design manager	Script HLD essentially describes a process for specifying product components and allocating higher level requirements to them. The design manager leads these efforts for the team. Specific tasks typically appear in individual TASK plans and LOGT forms.	D	
2.3. Identify interface requirements.	*Scripts*: REQ, ANA, HLD *Forms*: TASK, LOGT *Roles*: Customer interface and design managers	Scripts REQ and ANA address user and large system-level interfaces, especially through prototyping. Script HLD addresses interface requirements definition as part of a normal design process. Specific tasks typically appear in individual TASK plans and LOGT forms.	D	
SG3. The requirements are analyzed and validated, and a definition of required functionality is developed.				
3.1. Establish and maintain operational concepts and associated scenarios.	*Scripts*: REQ, ANA *Forms*: TASK, LOGT, LOGD *Roles*: Customer interface and design managers	The SRS, as called for by scripts REQ and ANA, is specified to include normal, abnormal, and recovery behavior and performance, as well as operational and user interfaces. The customer interface and/or design manager typically leads such efforts. Specific tasks should appear in one or more task lists and on LOGT and, in the case of defects found in a use case scenario, on LOGD.	P	There are no details for what the SRS or user manual should contain, but script IMP6 calls for testing all use case scenarios, which implies that they have been created previously.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
3.2. Establish and maintain a definition of required functionality.	*Scripts*: REQ, ANA *Forms*: TASK, LOGT, LOGD *Roles*: Customer interface manager	The SRS, as called for by scripts REQ and ANA, documents the required functionality of the project, sometimes in conjunction with a user interface manual. The customer interface manager typically leads such efforts with support from the team as necessary.	D	
3.3. Analyze requirements to ensure that they are necessary and sufficient.	*Scripts*: REQ, ANA, INS *Forms*: TASK, LOGT, LOGD *Roles*: Customer interface manager, team member	The REQ and ANA scripts refer to user involvement with prototyping and both formal (script INS) and informal reviews to ensure that the requirements are correct and complete. The customer interface manager typically leads such efforts with support from the team as necessary.	D	
3.4-3. Analyze requirements to balance stakeholder needs and constraints.	*Scripts*: LAU1, REQ, ANA *Forms*: TASK, LOGT, LOGD *Roles*: Customer interface and design manager	LAU1 presentations note constraints from both business and product perspectives. The REQ and ANA scripts call for documenting and validating customer needs while capturing and checking assumptions about design, planning, resource, and size assumptions. The customer interface manager or design manager typically leads such efforts with support from the team as necessary.	D	In addition, the entire launch process helps to determine whether stakeholder needs can be met within existing constraints and provides alternatives when they cannot be met.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
3.5(-1)/(-2). Validate requirements to ensure the resulting product will perform (appropriately in its intended-use environment)/(as intended in the user's environment using multiple techniques as appropriate).	*Scripts*: REQ, ANA *Forms*: TASK, LOGT, LOGD *Roles*: Customer interface and design managers	Scripts REQ and ANA call for prototyping and/or simulating "all important specification questions and review[ing] results with systems, marketing, and the customer." Again, the customer interface manager leads requirements efforts for the team. The customer interface manager or design manager typically leads such efforts with support from the team as necessary.	D	

8.1.3 Technical Solution (TS)

The Technical Solution (TS) process area develops technical data packages for the product components that will be used by the Product Integration (PI) and Supplier Agreement Management (SAM) process areas. The examination of alternative solutions, with the intent of selecting the optimum design based on established criteria, is expected. These criteria may be significantly different across products, depending on product type, operational environment, performance requirements, support requirements, and cost or delivery schedules. The task of selecting the final solution makes use of the specific practices in the Decision Analysis and Resolution (DAR) process area.

The Technical Solution process area relies on the specific practices in the Verification process area to perform design verification and peer reviews during design and prior to final build.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Product or product-component solutions are selected from alternative solutions.				
1.1-1(-2). Develop (detailed) alternative solutions and selection criteria.	*Scripts*: LAU3, HLD *Forms*: TASK, LOGT, LOGD *Roles*: Team leader, team member, design manager	Developing alternate solutions is one aspect of high-level design (script HLD). The team leader "challenges the team's and team members' decisions and asks what alternatives they have considered." The design manager has the clear responsibility to lead the project's design efforts, including "using analyses, prototypes, or experiments as appropriate," with product performance and size called out as explicit criteria.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.2. Evolve the operational concept, scenarios, and environments to describe the conditions, operating modes, and operating states specific to each product component.	*Scripts*: REQ, HLD *Forms*: TASK, LOGT, LOGD *Roles*: Customer interface and design managers	REQ implies the development of operational scenarios when eliciting requirements and documents them in a user manual. HLD calls for cyclical development and to "reassess the design, and recycle as needed." The customer interface manager (REQ) and design manager (HLD) are responsible to lead their respective activities. Specific tasks reflecting these activities appear in individual TASK plans and LOGT forms, and "deficiencies" (defects) that might drive design evolution are logged in individual LOGD forms.	D	At the individual level, PSP provides an Operational Scenario template.
1.3. Select the product-component solutions that best satisfy the criteria established.	*Scripts:* HLD *Roles*: Design and implementation managers	HLD calls for cyclical design, multiple levels of review, and rework of the design as necessary. Both the design and implementation managers have duties to ensure compliance with performance and size criteria.	P	This is likely a joint responsibility between the team leader, design manager, and implementation manager. It is not clear in the scripts when this selecting a solution might happen.
SG2. Product or product-component designs are developed.				
2.1. Develop a design for the product or product component.	*Scripts*: LAU3, LAU4, LAU6, HLD, IMP *Forms*: TASK, LOGT, LOGD	The design manager leads the development effort to define architecture down to the component level. Script HLD specifically calls for reviewing requirements and design issues to produce class definitions, relationships, and transition	D	At the individual level, the PSP design templates provide a complete design description for a small stand-alone program.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
	Roles: Team member, design and implementation managers	diagrams. Script IMP calls for producing the detailed designs at a component level. Each team member is responsible (as assigned in LAU6) for completing component designs, with the implementation manager responsible for driving the overall effort.		
2.2-3. Establish and maintain a technical data package.	*Scripts*: HLD, IMP *Forms*: TASK, LOGT, LOGD *Roles*: Design and implementation managers	The design manager and implementation manager lead the development efforts here, including establishing team standards for producing and documenting the design. Scripts call out specific artifacts. For example, script HLD specifies "structural design; development and test strategies; interface, data, and component specifications" and script IMP calls for "any fix prerequisites and corequisites" as documented in the systems design specification (SDS) or specified in the detailed design and unit test plan.	D	The relevant parts of the SDS, along with each component's detailed design, code, and unit test plan, seem to fulfill the description of a technical data package.
2.3-1. Establish and maintain the solution for product-component interfaces.	*Scripts*: REQ, HLD *Forms*: TASK, LOGT, LOGD	REQ describes an ERS that documents system interfaces (both hardware and software). HLD calls out the SDS, which documents interface specifications. The design manager leads all such activities.	D-1 P-3	There are no explicit references back to the criteria, but the design manager would likely take the lead.
2.3-3. Design comprehensive product-component interfaces in terms of established and maintained criteria.	*Roles*: Design manager (see notes)			

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.4. Evaluate whether the product components should be developed, purchased, or reused based on established criteria.	*Scripts*: HLD *Forms*: TASK, LOGT, LOGD *Roles*: Design and support managers	The support manager is the project team's reuse advocate. In script HLD, the development strategy specifically considers reuse.	P	The design manager responsibilities are consistent with leading make-buy-reuse evaluations. The team leader should specifically challenge make-buy-reuse decisions. No specific guidance on purchasing as a design option is provided.
SG3. Product components, and associated support documentation, are implemented from their designs.				
3.1. Implement the design of the product components.	*Scripts*: IMP *Forms*: TASK, LOGT, LOGD *Roles*: Team member, implementation manager	The implementation manager is responsible for leading the team's implementation activities. Script IMP specifies a process similar to PSP2.1 for implementing a given module. Individual modules are implemented by team members, as assigned.	D	At the individual level, "out-of-the-box" PSP practices include detailed design, coding, compiling, and test of stand-alone programs.
3.2. Develop and maintain the end-use documentation.	*Scripts*: REQ *Forms*: TASK, LOGT, LOGD *Roles*: Customer interface manager	Script REQ calls for developing a detailed user manual outline and initial draft. The customer interface manager is responsible for establishing customer training and documentation plans.	D	

8.1.4 Product Integration (PI)

The Product Integration (PI) process area describes generating the best possible integration sequence, managing product component interfaces, integrating product components, and delivering the product to the customer.

Product Integration uses specific practices of both Verification and Validation in implementing the product integration process. Verification checks that the interfaces satisfy the interface requirements, an essential event in the integration process. During product integration in the operational environment, the specific practices of the Validation process area are used.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Preparation for product integration is conducted.				
1.1. Determine the product-component integration sequence.	*Scripts*: HLD, LAU3 *Forms*: TASK, LOGT *Roles*: Design manager	Script HLD calls for defining a component integration sequence and a test sequence. In LAU3, the development strategy is often influenced by potential integration sequence options. The design manager leads HLD and related LAU3 activities. Specific activities appear in individual TASK plans and are logged in individual LOGT forms.	D	
1.2-2. Establish and maintain the environment needed to support the integration of the product components.	*Scripts*: LAU3, LAU4, LAU6 *Forms*: TASK, LOGT	The support manager is generally responsible for ensuring the availability of a suitable development and test environment. The test manager would help to define what that	P	While it is clear that the support manager is responsible, there is little guidance in the scripts for actually establishing and maintaining the integration environment.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
	Roles: Test and support managers	environment is beginning in LAU3, and carrying through LAU4 and LAU6 with specific tasking, captured in individual TASK plans and logged in LOGT, to create and maintain the test environment.		
1.3-3. Establish and maintain procedures and criteria for integration of the product components.	*Scripts*: HLD, TEST, TEST2 *Roles*: Design and test managers, team member	HLD, TEST, and TEST2 each address specific aspects of developing and using the procedures and criteria for integrating components into the final product. The design and test managers are generally responsible for these activities. The implementing developer ensures that the components are of high quality and therefore ready for integration.	D	
SG2. The product-component interfaces, both internal and external, are compatible.				
2.1. Review interface descriptions for coverage and completeness.	*Scripts*: HLD, INS *Forms*: TASK, LOGT, LOGD *Roles*: Design and test managers, team member	HLD calls for a design walkthrough and design inspection (script INS) of the high-level design, including the SDS, that includes interface specifications and integration test sequences. Specific review activities appear on TASK plans and LOGT forms, and defects are logged in the producing team member's LOGD.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.2. Manage internal and external interface definitions, designs, and changes for products and product components.	*Scripts*: LAU3, development scripts *Forms*: TASK, LOGT, LOGD *Roles*: Support and design managers	The design manager is responsible for managing design changes, providing timely relevant information to the change control board (CCB), and leading the project team in estimating and documenting the effect of design changes. Baseline updates, including the SDS, are called for frequently in the development scripts.	D	The CCB, formed during LAU3 and chaired by the support manager, should probably review and approve (or reject) all proposed changes or baseline updates, but this is not explicit anywhere in the scripts.
SG3. Verified product components are assembled and the integrated, verified, and validated product is delivered.				
3.1. Confirm, prior to assembly, that each product component has been properly identified, functions according to its description, and that the product-component interfaces comply with the interface descriptions.	*Scripts*: HLD, IMP, IMP6, TEST, TEST1, TEST2 *Forms*: TASK, LOGT, LOGD *Roles*: Design, implementation, test, and quality managers	The referenced scripts call for multiple levels and types of review and unit testing to ensure that a quality product that meets its design specifications is delivered to integration activities. Product component interfaces are called out specifically for review. TEST2 calls for integrating only high-quality components. The referenced role managers are responsible for leading the scripted activities, as appropriate.	D	The practice lists possible criteria for inspections (script INS).

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
3.2. Assemble product components according to the product integration sequence and available procedures.	*Scripts*: TEST2, HLD *Forms*: TASK, LOGT, LOGD *Roles*: Design, implementation, support, and test managers	TEST2 specifies development and execution of a detailed integration test plan. These activities are the responsibility of the test manager. Higher level decisions are made earlier during HLD, and are usually a design manager responsibility.	D	
3.3. Evaluate assembled product components for interface compatibility.	*Scripts*: TEST2 *Forms*: TASK, LOGT, LOGD *Roles*: Design, implementation, and test managers	In TEST2, integration test plans are reviewed to ensure that interfaces are tested under normal and abnormal conditions, those plans are then executed, and the resultant data are captured and analyzed. The test manager is generally responsible for leading all such activities.	D	
3.4. Package the assembled product or product component and deliver it to the appropriate customer.	*Scripts*: TEST, TEST1, TEST2, TEST3 *Forms*: TASK, LOGT, LOGD *Roles*: Support and test managers	The TEST1, TEST2, and TEST3 (TESTx) scripts call for ensuring that the assembled products are released into the configuration management system. Script TEST sequences the TESTx activities and calls for releasing the built product to the next party in line, whether internal or customer.	D	

8.1.5 Verification (VER)

The Verification (VER) process area ensures that selected work products meet the specified requirements. The Verification process area selects work products and verification methods that will be used to verify work products against specified requirements. Verification is generally an incremental process, starting with product-components verification and usually concluding with verification of fully assembled products.

Verification also addresses peer reviews. Peer reviews are a proven method for removing defects early and provide valuable insight into the work products and product components being developed and maintained.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Preparation for verification is conducted.				
1.1. Select the work products to be verified and the verification methods that will be used for each.	*Scripts*: LAU3, LAU4, LAU5, LAU6, REQ, ANA, HLD, IMP, INS *Forms*: TASK, LOGT, LOGD *Roles*: Team member, quality manager	Specific activities in LAU3, LAU4, LAU5, and LAU6 identify which products will be inspected or otherwise reviewed, how much time will be allocated, numeric targets for yields, and who will perform the verification activities. Specific products are called out in the development scripts REQ, ANA, HLD, and IMP. INS is the script for inspections.	D	PSP training covers several specific design verification techniques that are useful for detailed design inspections.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.2-2. Establish and maintain the environment needed to support verification.	*Scripts*: LAU3, LAU4, LAU6 *Forms*: TASK, LOGT, LOGD *Roles*: Design, implementation, support, and test managers	The support manager has the responsibility to ensure that the verification environment is adequate. LAU3 has a specific step for identifying needed items in a support plan.	P	No specific activities are specified in any of the scripts to actually "establish and maintain," but it is strongly implied by the support manager role description and the LAU3 activity.
1.3-3. Establish and maintain verification procedures and criteria for the selected work products.	*Scripts*: LAU3, LAU4, LAU6, IMP6, TEST, TEST1, TEST2 *Forms*: TASK, LOGT, LOGD *Roles*: Process and test managers, team member	The test manager is responsible for developing, acquiring, or maintaining standards and procedures for the test activities in the referenced scripts. Individual engineers are tasked to develop and execute verification tests, with specific emphasis on user scenarios, as well as logic, interface, error, variable, device, and other tests, as appropriate.	D	
SG2. Peer reviews are performed on selected work products.				
2.1. Prepare for peer reviews of selected work products.	*Scripts*: REQ, ANA, HLD, IMP, INS *Forms*: TASK, LOGT, LOGD	Scripts REQ, ANA, HLD, and IMP call for team inspections of requirements, user documentation, high-level and detailed designs, code, and integration and test plans; all of these are planned for during launches, as appropriate. The	D	

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
	Roles: Quality manager, team member	quality manager has specific responsibility in script INS to ensure that a qualified moderator is available for the inspection. In script INS, the moderator is responsible for ensuring that the work product is ready for inspection.		
2.2. Conduct peer reviews on selected work products and identify issues resulting from the peer review.	*Scripts*: REQ, ANA, HLD, IMP, INS *Forms*: TASK, LOGT, LOGD *Roles*: Quality manager, team member	Scripts REQ, ANA, HLD, and IMP call for team inspections of all levels of requirements and specifications, user documentation, high-level and detailed designs, code, and integration and test plans at specific points in the development process. Inspections are conducted according to script INS.	D	
2.3-2. Analyze data about preparation, conduct, and results of the peer reviews.	*Scripts*: INS, PM *Forms*: INS, TASK, LOGT, LOGD *Roles*: Quality manager	Script INS specifies collection and limited analysis of data on found defects to estimate the number of defects likely remaining in the product, as well as recording time spent preparing for and performing the inspection (all recorded on form INS as well as individual TASK, LOGT and LOGD forms). Phase and project postmortems (script PM) typically compare inspection and test phase data to determine the effectiveness of the inspection process.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
SG3. Selected work products are verified against their specified requirements.				
3.1. Perform verification on the selected work products.	*Scripts*: IMP6, TEST, TEST1, TEST2, TEST3 *Forms*: TASK, LOGT, LOGD *Roles*: Quality manager, team member	From unit test (IMP6) through the various integration and system tests (TEST, TESTx), verification testing is a prominent activity.	D	
3.2-2. Analyze the results of all verification activities and identify corrective action.	*Scripts*: TEST, TESTD, PM *Forms*: TASK, LOGT, LOGD *Roles*: Quality, process, and support managers, team member	TEST calls for review of every integration and test defect using TESTD. The postmortem (PM) analyzes all verification data for opportunities to improve the process and future results. Individual tasks are captured on TASK, and time and defects are logged as appropriate in LOGT and LOGD.	D	

8.1.6 Validation (VAL)

The Validation (VAL) process area incrementally validates products against the customer needs. Validation may be performed in the operational environment or a simulated operational environment. Coordination with the customer on the validation requirements is one of the essential elements of this process area.

The scope of the Validation process area includes validation of products, product components, selected intermediate work processes, and products. The products, product components, selected intermediate work product, or process may require reverification and revalidation. Issues discovered during validation are usually resolved in the Requirements Development or Technical Solution process areas.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Preparation for validation is conducted.				
1.1. Select products and product components to be validated and the validation methods that will be used for each.	*Scripts*: LAU3, LAU4, LAU6, REQ, ANA, TEST, TEST1, TEST2, TEST3 *Forms*: TASK, LOGT, LOGD *Roles*: Customer interface, design, and test managers	System testing is specified early in the project (REQ, ANA) and refined (TEST, TEST3) throughout the project. Early build and integration tests (TEST1, TEST2) incorporate system tests as appropriate. The referenced role managers ensure that the appropriate products, components, and methods are selected and available. Specific tasks appear in individual TASK plans and are logged against in LOGT and LOGD.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.2-2. Establish and maintain the environment needed to support validation.	*Scripts*: LAU3, LAU4, LAU6 *Forms*: TASK, LOGT, LOGD *Roles*: Support, customer interface, design, and test managers	The support manager has the responsibility to ensure that the verification environment is adequate. LAU3 has a specific step for identifying needed items in a support plan. The other referenced role managers communicate their needs and the entire team ensures that their individual TASK plans support the validation effort.	P	No specific activities are called for in any of the scripts to actually "establish and maintain," but it is strongly implied by the support manager role description and the LAU3 activity.
1.3-3. Establish and maintain procedures and criteria for validation.	*Scripts*: LAU3, LAU4, LAU6, REQ, ANA, TEST3 *Forms*: TASK, LOGT, LOGD *Roles*: Customer interface, support, design, implementation, and test managers	A system test plan is developed during requirements development (REQ) or analysis (ANA), refined, and extended as necessary for system test (TEST3). The referenced role managers take responsibility as appropriate for the various aspects of validation.	D	Specific validation criteria are not called for in the scripts but are typically identified throughout the project as appropriate.
SG2. The product or product components are validated to ensure that they are suitable for use in their intended operating environment.				

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.1. Perform validation on the selected products and product components.	*Scripts*: REQ, ANA, TEST1, TEST2, TEST3 *Forms*: TASK, LOGT, LOGD *Roles*: Team member, design, implementation, support, and test managers	TEST1 and TEST2 aim specifically at validating product components, while TEST3 specifies verifying proper operations under normal and abnormal operating conditions, presumably as specified previously in the customer's validated requirements (REQ, ANA). Each role manager ensures that appropriate activities have been included in individual TASK plans.	D	
2.2. Analyze the results of the validation activities and identify issues.	*Scripts*: TEST, TEST1, TEST2, TEST3, TESTD, PM *Forms*: TASK, LOGT, LOGD, SUMP, SUMQ *Roles*: Process, quality, and test managers	The referenced role managers are responsible for specific activities as indicated in the scripts. SUMP, SUMQ, and TASK summarize relevant data gathered in LOGT and LOGD. All test defects are attributed to source (product or test) and, if in the product, further analyzed using TESTD. Postmortems (PM) look specifically at quality and other issues related to validation efforts.	D	

8.2 TSP and Engineering Category Generic Practices

Of all the generic practice groupings, none is more coherent than those of the engineering PAs. From the view of these practices, there is relatively little to distinguish between, for example, establishing and maintaining a plan for performing Requirements Development or for that of developing a Technical Solution. All of these are simply part of the life-cycle activities being planned during the typical TSP launch. Many real-world development life cycles treat the range of the engineering practices as a single continuum, or at least divided in a very different manner than in CMMI, whereas the functional divisions of CMMI are, at least in part, a reflection of a desire to keep any single PA from becoming too large. For the purposes of this report, the result is that TSP's coverage of the generic practices as applied to the engineering PAs is strong and consistent.

Generic Practice	***TSP Reference***	***Process Areas***	***Observation***	***Rating***
GP 2.1. Establish and maintain an organizational policy for planning and performing the process.		*All Engineering PAs:*	Organizational policies are beyond the scope of TSP.	U
GP 2.2. Establish and maintain the plan for performing the process.	*Scripts*: All launch scripts *Forms*: MTG forms customized for each launch meeting	*All:*	The entire TSP launch process is designed to formulate a development plan for those parts of the life cycle for which the assembled team has responsibility. Each individual launch meeting script specifies a step-by-step process for producing high-level plans for the entire project and detailed individual plans for the next phase of the work. Customized MTG forms for each launch meeting specify nominal durations for each step of the process.	S/D
GP 2.3. Provide resources for performing the process, developing the work products, and providing the services of the process.	*Scripts*: LAU4, LAU6, LAU8, LAU9 *Forms*: ROLE *Roles*: Team leader, role managers	*All:*	Management makes a preliminary assignment of resources during launch preparation by assigning the members of the project team. During the launch the team determines what resources are needed to do the work within specified constraints (LAU4, LAU6, LAU8) and if necessary negotiates with management for the resources needed to do the work properly (LAU9). The various role managers and the team leader provide the various process services as needed by the team.	S/D

Generic Practice	*TSP Reference*	*Process Areas*	*Observation*	*Rating*
	Other: PREPL, PREPR			
GP 2.4. Assign responsibility and authority for performing the process, developing the work products, and providing the services of the process.	*Scripts*: DEV, MAINT, LAU2, LAU6, LAU7 *Forms*: ROLE, GOAL, TSP workbooks *Roles*: Team leader, customer interface, design, test, and implementation managers		*All:* The team leader is assigned during launch preparations and ensures, both during the launch and as the project progresses, that the right things are being done by the right people at the right time. The role managers referenced are sometimes called the "line" roles in TSP, reflecting coverage across a normal engineering life cycle: requirements (RD) and requirements management (REQM) (customer interface), design (TS) in terms of architecture and high-level design, implementation (TS and PI) in terms of detailed design and coding, and test (PI, VER, and VAL) as defined in the DEV and/or MAINT scripts. Responsibilities for tracking the team's status against its goals are recorded on form GOAL in LAU2. Individual work assignments are made during LAU6 and recorded in the team and individual workbooks. Risk-tracking responsibilities are made during LAU7.	S/D
GP 2.5. Train the people performing or supporting the process as needed.	*Training: PSP for Engineers*, *An Introduction to Personal Process*, *Managing TSP Teams*		*All:* The team leader and all team members receive appropriate training in PSP and TSP techniques.	S
GP 2.6. Place designated work products of the process under appropriate levels of configuration management.	*Scripts:* ANL, HLD, IMP, REQ, TEST		*All:* The referenced scripts all specify the creation or updating of baselines at critical points throughout the development process and encompassing all of the engineering PA activities. The support manager role description specifically calls for this person to obtain and manage the team's	S

Generic Practice	*TSP Reference*	*Process Areas*	*Observation*	*Rating*
	Roles: Support manager, team leader, "line" roles	configuration management system. The "line" roles (customer interface, design, implementation, test) each have specific responsibilities to keep items in their particular areas under proper configuration management.		
GP 2.7. Identify and involve the relevant stakeholders as planned.	*Scripts:* ANL, REQ, PM *Roles*: Team leader, role managers (esp. customer interface and test managers)	*All:* The project plans, as reflected in the TSP workbooks, typically include involvement by internal customers and collaborating groups as necessary. Specific stakeholder involvement in the development scripts is focused on the front end of the process, involving systems engineering, marketing, and the customer. The team leader, customer interface manager, and test manager have specific responsibilities for involving marketing, management, and the customer as appropriate. The other role managers have more of an implied responsibility to ensure the involvement of other relevant stakeholders as may be necessary in each role's area of responsibility. Script PM calls for a stakeholder survey at the end of every project.		S
GP 2.8. Monitor and control the process against the plan for performing the process and take appropriate corrective action.	*Scripts*: WEEK, STATUS *Forms*: WEEK, STATUS *Roles*: Team leader, planning manager *Other:* Quarterly review checklist	*All:* The weekly team meetings (WEEK) monitor the actual engineering activities against the plan created at the launch, and the team leader reports status to management (STATUS and quarterly reviews). The planning manager consolidates the individual TSP workbooks into a team view of the project, and also typically tracks the status of schedule goals and risks.		S/D

Generic Practice	*TSP Reference*	*Process Areas*	*Observation*	*Rating*
GP 2.9. Objectively evaluate adherence of the process against its process description, standards, and procedures, and address noncompliance.	*Scripts:* PM *Roles*: Team leader, process, quality, and support managers *Other:* TSP checkpoint process		*All:* The team leader, process manager, and quality manager monitor various aspects of process adherence. The postmortem (PM) provides an opportunity for the support manager, process manager, quality manager, and team leader to lead the team in assessing various aspects of its process performance over the preceding phase or the project as a whole. A TSP checkpoint is typically run by a qualified TSP coach to evaluate the team's adherence to its own plan and processes and to provide feedback and coaching in order to perform better on the next project or project cycle.	
GP 2.10. Review the activities, status, and results of the process with higher level management and resolve issues.	*Roles*: Planning manager, team leader *Other:* Quarterly review checklist		*All:* The planning manager consolidates weekly team data for the team's evaluation, and that data is typically presented to management by the team leader along with any issues, risks, or other concerns that may have arisen since prior meetings. In addition, quarterly review meetings with senior management focus on TSP data from every project to ensure that management is kept informed and has prior knowledge of when and where their help might be needed.	S/D

Generic Practice	*TSP Reference*	*Process Areas*	*Observation*	*Rating*
GP 3.1. Establish and maintain the description of a defined process.	*Scripts*: All development scripts *Roles*: Process manager, "line" role managers	*All:* DEV and MAINT describe full life cycles for new development or maintenance projects respectively. They reference other development scripts (see below) that provide more detailed guidance. *REQM/RD:* Scripts REQ and ANA are used for developing new requirements and analyzing changes to existing ones and for keeping requirements baselines current. *TS:* Scripts HLD and IMP guide the development of a technical solution from the requirements developed by REQ or ANA through implementation and unit testing (IMP, IMP6). *PI:* Script TEST1 guides integration of components and fixes into a working system. *VER:* Script TEST (including the referenced TEST1, TEST2, and TEST3) guides various levels of verification testing of the system. Script INS guides formal team inspections. *VAL:* Script TEST3 guides system-level testing under both normal and abnormal operating conditions.		S/D
GP 3.2. Collect work products, measures, measurement results, and improvement information derived from planning and performing the process to support the future use and improvement of the organization's processes and process assets.	*Scripts*: WEEK, PM *Forms*: WEEK, TSP workbooks *Roles*: Team member, role managers	*All:* Time spent and date completed for each task in each team member's TSP workbook is recorded. In addition, depending on the specific task, defect and/or size data may also be recorded. The weekly team-wide consolidation of this data includes dozens of standard views, summaries, and analyses. These data are summarized on the WEEK form and at project postmortems (PM) so as to be useful to the current project and other projects. Various role managers typically focus on one or another aspect of this data (e.g., quality and test managers on the relationship between review, inspection, and test data on particular components, or the design and implementation managers on design size measures and how they relate to final product size) and make such analyses available for organizational learning.		S/D

Generic Practice	*TSP Reference*	*Process Areas*	*Observation*	*Rating*
GP 4.1. Establish and maintain quantitative objectives for the process that address quality and process performance based on customer needs and business objectives.	*Scripts*: LAU5, LAU6, PSP planning and PROBE scripts *Forms*: TSP workbooks *Roles*: Team member, quality manager *Training: PSP for Engineers*		*All:* LAU6 directs team members to make PSP-level plans for each component ready for implementation, which includes setting detailed targets for size, overall effort, balancing that effort to produce a high-quality product, and defect densities in compile and test phases in order to verify high quality. For other tasks team members break work into small, manageable chunks (10 hours or less) and then produce detailed personal and overall task, schedule, and earned value plans. In LAU5, the team sets quantitative quality goals in terms of defect density in test phases, which are then adjusted as necessary in LAU6 in accordance with the detailed personal plans.	S/D
GP 4.2. Stabilize the performance of one or more subprocesses to determine the ability of the process to achieve the established quantitative quality and process-performance objectives.	*Scripts*: WEEK *Forms*: WEEK, TSP workbooks *Roles*: Team leader, planning and quality managers		*All:* The TSP measurement framework and weekly monitoring typically characterizes and helps to stabilize process performance in terms of normalized weekly effort and delivered defect densities. These data are then used to establish future expectations and drive systematic improvement efforts going forward, mainly via the weekly project status meeting (WEEK). The team leader, planning manager, and quality manager typically focus on one or another aspect of the data and guide the team to meet or better the plans that were made during the launch.	S/D
GP 5.1. Ensure continuous improvement of the process in fulfilling the relevant business objectives of the organization.	*Scripts*: PM, LAUPM *Forms*: PIP *Roles*: Team leader, process manager		*All:* Postmortem (PM) activities can raise issues dealing with any process area. The PIP form is used for capturing process issues and proposed solutions for any process area. Typically PMs occur and PIPs are written within the context of a particular project; however they can and do address issues in any process area, between process areas, and even outside the scope of CMMI. What TSP does not specify is any kind of specific standard way in which to evaluate and act upon PIPs and other PM issues.	S

Generic Practice	*TSP Reference*	*Process Areas*	*Observation*	*Rating*
GP 5.2. Identify and correct the root causes of defects and other problems in the process.	*Scripts*: TESTD, PM, LAUPM *Forms*: PIP *Roles*: Team leader, process manager	*All:*	The TEST script calls for enactment of script TESTD for defects found during build, integration, and system test activities, but the processes targeted are potentially anywhere in the engineering life cycle and conceivably outside the scope of the Engineering PAs altogether. PIPs and PMs sometimes help to identify root causes of defects or other process problems.	S

9 TSP and CMMI Support Process Areas

9.1 Scope of SUPPORT

The Support process areas cover the activities that support product development and maintenance. The Support PAs address processes that are used in the context of performing other processes. In general, these PAs address processes that are targeted towards the project, but may also address processes that apply more generally to the organization. For example, Process and Product Quality Assurance can be used with all process areas to provide an objective evaluation of selected processes and work products described in those process areas. The page numbers for each PA as listed below are from *CMMI: Guidelines for Process Improvement and Product Improvement* [Chrissis 03].

The Support process category contains the following process areas.

Configuration Management	pages 157-172
Process and Product Quality Assurance	pages 429-440
Measurement and Analysis	pages 247-266
Decision Analysis and Resolution	pages 173-186
Organizational Environment for Integration	pages 267-286
Causal Analysis and Resolution	pages 143-156

9.1.1 Configuration Management (CM)

The Configuration Management (CM) process area supports all process areas by establishing and maintaining the integrity of work products using configuration management, configuration control, configuration status accounting, and configuration audits. The work products placed under configuration management include the products, acquired products, tools, and other items that are used in creating and describing these work products. Examples of work products that may be placed under configuration management include plans, process descriptions, requirements, design data, drawings, product specifications, code, compilers, product data files, and product technical publications.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Baselines of identified work products are established.				
1.1. Identify the configuration items, components, and related work products that will be placed under configuration management.	*Scripts:* LAU3 *Forms:* SUMS, INV, STRAT, TASK, LOGT, LOGD *Roles:* Support and process managers, "line" role managers, team member	Most configurations items to be developed, including when they are to be baselined, are identified in LAU3 (as captured on the SUMS, STRAT, or INV forms). Each of the named roles has specific configuration management responsibilities at some point in the process for designated work products.	P	Details such as component and unique identifiers are not specifically addressed by the TSP, since there is an assumption that specific organizational practices either are or will be put into place to address such things. In practice, however, the various role managers who have specific responsibilities for specific baselined products usually deal with such details.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.2. Establish and maintain a configuration management and change management system for controlling work products.	*Scripts:* LAU3 *Roles:* Support manager *Other:* PREPL, PREPR	The support manager has specific responsibility for the project's configuration management system and practices. Preparation guidelines call for a designated team member to bring copies of the organization's standard configuration management and change control processes to the launch. Any additional relevant process items needed by the project are identified in LAU3.	P	No guidance is provided as to the type of configuration management system or change procedures. This is typically an idiosyncratic activity in any organization.
1.3. Create or release baselines for internal use and for delivery to the customer.	*Scripts:* REQ, HLD, IMP, TEST1, LAU3 *Forms:* TASK, LOGT, LOGD *Roles:* Support manager, team member	The various high-level scripts call for creating or updating baselines for specific products at specific points in the development process. Specific tasks should be included in TASK plans and logged as appropriate. The support manager chairs the CCB (LAU3), which accepts or rejects proposed changes to baselined products and approves release.	P	
SG2. Changes to the work products under configuration management are tracked and controlled.				

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.1. Track change requests for the configuration items.	*Scripts:* REL1, WEEK *Forms:* TASK, LOGT *Roles:* Support and "line" role managers	Part of the purpose of REL1 is to update the team on customer requirements changes. Role managers responsible for particular configuration items, such as requirements documents (customer interface manager), design artifacts (design manager), code (implementation manager), and test procedures and results (test manager), are specifically tasked to provide timely information to the CCB (chaired by the support manager). The support manager typically reports configuration status at the weekly team meeting (WEEK).	P	The level of detail addressed in the TSP goes more to changes in requirements rather than in specific configuration items. It is the lack of methods for tracking the change requests (rather than the changes requested) that causes this to fall short of a "D" rating.
2.2. Control changes to the configuration items.	*Scripts:* REQ, HLD, IMP, TEST1 *Forms:* TASK, LOGT, LOGD *Roles:* Team leader, design, implementation, support, and, customer interface managers	The referenced scripts have steps for the CCB to authorize the creation or release of baselines. The CCB is chaired by the support manager, typically includes the team leader and design managers, and responds to change requests based partially on input from the other role managers.	P	TSP does not specifically address CCB procedures, although change control procedures are usually identified for creation in LAU3 (if not already in place). The process and support managers have a joint responsibility in this regard.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
SG3. Integrity of baselines is established and maintained.				
3.1. Establish and maintain records describing configuration items.	*Forms:* SUMS, INV, WEEK *Roles:* Planning and support managers *Other:* NOTEBOOK	The launch process initiates this process by creating the SUMS and INV. The support manager reports on configuration status changes at the weekly team meeting. The planning manager would store at least partial information on configuration items in SUMS and project NOTEBOOK.	P	Specific procedures and standards for establishing and maintaining these records would be identified in LAU3, either as needing to be created new or to be used or adapted from organizational standards. Developing or adapting these would be the responsibility of the process manager, while the support manager would actually implement them.
3.2. Perform configuration audits to maintain the integrity of configuration baselines.	*Scripts:* TEST1, TEST2, TEST3 *Forms:* TASK, LOGT, LOGD *Roles:* Process, support, and quality managers, team leader	The TESTx scripts indicate that builds are verified but do not offer specifics on how to perform the audit. Such audits might reasonably be interpreted as falling under the support manager, quality manager, process manager, or team leader roles. The individual TASK, LOGT, and possibly LOGD forms reflect these tasks for whoever is assigned.	P	The scripts and role descriptions partially address the intent of the practice, but the actions mentioned are not in enough detail to be executed in a repeatable manner.

9.1.2 Process and Product Quality Assurance (PPQA)

The Process and Product Quality Assurance (PPQA) process area supports all process areas by providing specific practices for objectively evaluating performed processes, work products, and services against the applicable process descriptions, standards, and procedures and ensuring that any issues arising from these reviews are addressed. Process and Product Quality Assurance supports the delivery of high-quality products and services by providing the project staff and all levels of managers with appropriate visibility into, and feedback on, the processes and associated work products throughout the life of the project.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Adherence of the performed process and associated work products and services to applicable process definitions, standards, and procedures is objectively evaluated.				
1.1. Objectively evaluate the designated performed processes against the applicable process descriptions, standards, and procedures.	*Scripts:* WEEK, MTG, STATUS, PM, checkpoint review *Forms:* TASK, LOGT, LOGD, INS, WEEK, STATUS, SUMMARY, PIP, ITL	Most process scripts are defined and reviewed as necessary by the appropriate role manager(s) and the team. Non-compliances are brought to the team's attention during the weekly meeting and logged in the meeting minutes. Lessons learned are captured in the phase and project post-mortem meetings on PIPs. The Checkpoint Review (usually conducted by an authorized TSP coach) provides an independent view of the team's compliance with TSP practices and their	P	While there is no specific activity in the TSP to review items not specifically called out within the TSP, this is often a duty taken up by one or another of the relevant role managers (e.g., design standards by the design manager, coding standards by the implementation manager), by the process or quality manager in the generic case, or by the team leader.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
	Roles: Team leader, team members, role managers (esp. process and quality)	status against their plan. The team leader has primary responsibility, supported mainly by the process and quality managers, to the organization for ensuring that the work is planned according to a defined process and then completed according to the plan.		
1.2. Objectively evaluate the designated work products and services against the applicable process descriptions, standards, and procedures.	*Scripts:* REQ, HLD, IMP, TEST, TEST1, TEST2, TEST3, TESTD, PM, Checkpoint Review *Forms:* SUMP, SUMQ, INS, TASK, LOGT, LOGD *Roles:* Team leader, test and quality managers	TSP has various mechanisms to evaluate work products and services; how they are implemented will vary from team to team. These activities are reviewed on an individual and team basis and are periodically reviewed with senior management and the TSP coach. Specific activities during development deal directly with work product evaluation, especially inspections (script INS). The quality and test managers have specific responsibilities regarding product quality.	P	The TSP is missing reviews for items not specifically called out within the TSP.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
SG2. Noncompliance issues are objectively tracked and communicated, and resolution is ensured.				
2.1. Communicate quality issues and ensure resolution of noncompliance issues with the staff and managers.	*Scripts:* WEEK, STATUS *Forms:* WEEK, SUMMARY, SUMP, SUMQ *Roles:* Team leader, all role managers (esp. quality, test, and process) *Other:* Quarterly review checklist, NOTEBOOK	Issues and their resolution are tracked during the weekly team meeting (documented on form WEEK) and any other STATUS meetings (documented on form SUMMARY or a form customized to the project or organization). All such documentation eventually is gathered into the project NOTEBOOK. Issues that are not resolvable at the team level are reviewed with management at quarterly review meetings.	D	Non-compliances are not specifically covered in the TSP. However, because the mechanism is fully in place and documented, these issues would be tracked.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.2. Establish and maintain records of the quality assurance activities.	*Scripts:* WEEK, STATUS *Forms:* SUMP, SUMQ, TASK, LOGT, LOGD, SUMMARY *Roles:* Team leader, process and quality managers *Other:* Quarterly review checklist, NOTEBOOK	The team leader, process manager, and quality managers keep track of different quality assurance issues. Information regarding the issues/non-compliances is captured in the weekly team meeting (WEEK) or other STATUS meeting using the SUMP and/or SUMQ and possibly TASK plans, time logs, and defect logs. All such information is captured in the project NOTEBOOK.	D	

9.1.3 Measurement and Analysis (MA)

The Measurement and Analysis (MA) process area supports all process areas by providing specific practices that guide projects and organizations in aligning measurement needs and objectives with a measurement approach that will provide objective results. These results can be used in making informed decisions and taking appropriate corrective actions.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
SG1. Measurement objectives and activities are aligned with identified information needs and objectives.				
1.1. Establish and maintain measurement objectives that are derived from identified information needs and objectives.	*Scripts:* LAU esp. LAU1, LAU2, WEEK *Forms:* GOAL, SUMP, WEEK *Roles:* Team leader, team member, all role managers *Other:* Senior management and marketing launch guidelines	Measurement objectives of TSP are explicit and derive from TSP design goals. They are communicated throughout PSP and TSP training for all roles: deliver a high-quality product (as close to zero customer-discovered defects as possible, measured by defect density, especially through various test phases) on schedule (measured by earned value against the plan). Such objectives are interpreted and typically added to by senior management and marketing during LAU1. The team then refines the objectives and quantifies them where possible during LAU2 on form GOAL. These goals and measures guide the launch and the project going forward.	D	Management goals related to effectively managing schedule, cost (in terms of effort), and quality are usually what drive TSP introduction in an organization.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.2. Specify measures to address the measurement objectives.	*Scripts:* LAU1, LAU2 *Forms:* SUMS, SUMP, TASK, LOGT, LOGD, GOAL *Roles:* Team leader, team members, role managers	Effort (time on task), size, defects, and date complete are the fundamental base measures of the TSP. There are a number of metrics derived from these base measures. The gathering of the base metrics is required in TSP scripts and happens in LOGT (effort), LOGD (defects), TASK (date complete), and SUMS (product size). Additional metrics are requested during LAU1 and/or defined during LAU2 if necessary and captured on form GOAL.	D	
1.3. Specify how measurement data will be obtained and stored.	*Scripts:* Most launch and development scripts *Forms:* TSP workbooks (SUMS, TASK, LOGT, LOGD) *Roles:* Team member, quality, and support managers *Other:* NOTEBOOK	A key TSP principle is the capture of effort, size and defects data at the individual level. Most TSP scripts require the gathering of these base metrics as appropriate, which are captured in TSP individual workbooks, summarized in the TSP consolidated workbook, and stored for later analysis in the project NOTEBOOK.	D	The capability to capture these base measures is fundamental to TSP. However, the TSP does not address the capture of data from all processes.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.4. Specify how measurement data will be analyzed and reported.	*Scripts:* WEEK, STATUS, PM *Forms:* WEEK, STATUS, PIP *Roles:* Planning, process, and quality managers *Other:* SUMMARY, quarterly review checklist	Team data is reviewed by the team during the weekly meeting (WEEK) and analyzed with respect to the team being able to meet its committed goals. Other STATUS meetings are held or SUMMARY reports prepared as necessary. At the end of every development cycle and project the postmortem (PM) compares the team's actuals to its plans and notes any issues or opportunities for improvement (PIPs). Quarterly project reviews usually highlight important data for management.	D	
SG2. Measurement results that address identified information needs and objectives are provided.				
2.1. Obtain specified measurement data.	*Scripts:* Most launch and development scripts *Forms:* SUMS, TASK, LOGT, LOGD, TSP consolidated workbook	Team members collect time and defect data as they perform their tasks, and size information as it becomes available. Other information is usually captured or summarized as necessary by the appropriate role manager (e.g., the quality manager gathers time and defect data for inspections from reviewers, plus size data from the developer). This information is consolidated for use by the team and role managers in the TSP	D	

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
	Roles: Team members, role managers as appropriate	workbooks or elsewhere (e.g., form INS for inspections).		
2.2. Analyze and interpret measurement data.	*Scripts:* WEEK, STATUS, PM *Forms:* TSP consolidated workbook, WEEK *Roles:* Role managers (esp. planning, quality, support, and test)	The team reviews its data on a regular basis (WEEK), at phase and project postmortems (PM), and for other STATUS meetings as necessary. Role managers review team data and perform analyses, as appropriate for their roles.	D	
2.3. Manage and store measurement data, measurement specifications, and analysis results.	*Scripts:* WEEK, PM *Forms:* TSP individual and consolidated workbooks *Roles:* Team leader, team member, all role managers	Team and individual workbooks, team meeting minutes, and postmortem data are captured in the individual and consolidated workbooks, in the weekly meeting minutes, at postmortem meetings, and in the project NOTEBOOK.	D	The exact form of the project NOTEBOOK varies widely, ranging from capturing printed summaries from the TSP workbooks in a physical binder along with other relevant documents to copying snapshots of workbooks on a network disk on a weekly basis to exporting summary data to a corporate database.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
	Other: NOTEBOOK			
2.4. Report results of measurement and analysis activities to all relevant stakeholders.	*Scripts:* WEEK, STATUS, PM *Forms:* WEEK, TSP workbook *Roles:* Team leader, team member, role managers *Other:* Quarterly review checklist	Team data is reviewed by the team during the weekly meeting and reported to management and the customer on a periodic basis. Quarterly project reviews focus heavily on data summarized from the team's own measurements of its activities.	P	"Periodic" is defined by the organization, usually varying anywhere from weekly to quarterly. Provisions for *all* relevant stakeholders are not explicit.

9.1.4 Decision Analysis and Resolution (DAR)

The Decision Analysis and Resolution (DAR) process area supports all process areas by providing a formal evaluation process that ensures that alternatives are compared and the best one is selected to accomplish the goals of the process areas.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
SG1. Decisions are based on an evaluation of alternatives using established criteria.				
1.1. Establish and maintain guidelines to determine which issues are subject to a formal evaluation process.	*Scripts:* All launch scripts, esp. LAU1 and LAU2, WEEK *Forms:* GOAL, launch meeting minutes, WEEK *Roles:* Role managers	TSP does not provide formal guidelines for DAR activities. However, the practices are supported throughout the launch, as plans are constantly being evaluated against the team's goals and constraints. Being unable to meet one or more goals within the constraints forces the team into a decision analysis and resolution activity.	P	The TSP strongly (though informally) supports such activities by providing data to establish criteria for a variety of project management and engineering activities and by the inbuilt TSP bias toward formal process, a quality focus, and data-based decision making. The team leader, role managers, and team members each address issues that impact their areas of responsibility on an ongoing, as-needed basis. In addition to the launch process as an example of DAR principles applied to project management, a smaller, self-contained instance of DAR is the LAU7 script for risk evaluation. LAU7 takes the explicit decision that risks are subject to

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
				formal evaluation by the team (SP 1.1), uses team brainstorming to generate a list of potential risks (SP 1.3), uses established criteria (SP 1.2) for ranking the likelihood and effect of risk realization (SP 1.4), uses the resulting information to decide on which risks need a mitigation strategy (SP 1.5), and either develops mitigation or assigns the risk to a team member or members to do so (SP 1.6).
1.2. Establish and maintain the criteria for evaluating alternatives, and the relative ranking of these criteria.	*Scripts:* LAU1, LAU9 *Roles:* Role managers *Other:* Senior management launch guidelines	The criteria for evaluating alternatives during the launch involve balancing requirements, delivery date, quality, and resource constraints. Ranking of these criteria is covered by the senior manager briefing in LAU1, and possibly revisited during LAU9 if conflicting alternatives arise.	P	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.3. Identify alternative solutions to address issues.	*Scripts:* LAU3, LAU4, LAU5, LAU6, LAU8 *Forms:* INV *Roles:* Team leader, team member, role managers	The team identifies processes that it requires to address technical issues in LAU3 or during execution of their assigned tasks. During LAU4, LAU5, LAU6, and LAU8, if the team is unable to meet one or more goals, alternative plans are generated. Typical alternatives include additional personnel, reduction in or phased delivery of functionality, or schedule relief.	P	
1.4. Select the evaluation methods.	*Scripts:* LAU2-LAU9 *Forms:* WEEK *Roles:* Team lead, team member, role managers	During the launch, the team engages in a collective analysis of planning options and how well the goals defined in LAU2 are met. This includes a preliminary analysis of the schedule and effort required during LAU4, analysis of quality goals during LAU5, a revisited analysis of schedule and effort during LAU6, and analysis of project risks during LAU7. LAU8 addresses issues that have not been resolved previously. The ultimate evaluation is for management in LAU9 after presentation of alternatives by the team.	P	

Specific Practice	***TSP Reference***	*Observation*	*Rating*	*Notes*
1.5. Evaluate alternative solutions using the established criteria and methods.	*Scripts:* LAU6, LAU8, LAU9 *Roles:* Team leader, team member, role managers	Alternative plans are made during the launch (usually in LAU6 or LAU8) if project goals cannot be met under the given constraints. Alternatives are presented to management at LAU9.	P	
1.6. Select solutions from the alternatives based on the evaluation criteria.	Scripts: LAU9 *Forms:* WEEK *Roles:* Team leader, team member, role managers	Management chooses from among alternate plans made by the team based on the criteria presented during LAU1.	P	

9.1.5 Organizational Environment for Integration – IPPD (OEI)

The Organization Environment for Integration (OEI) process area establishes the approach and environment for the implementation of IPPD. The environment is established by obtaining, adapting, or developing processes that facilitate effective integrated team behavior, as well as stakeholder communication and collaboration, creating the organization's shared vision, and managing people to promote integrative behavior. Specific practices of the OEI process area promote both team and individual excellence while enabling the rewarding integration across all business and technical functions in the execution of the projects.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. An infrastructure that maximizes the productivity of people and affects the collaboration necessary for integration is provided.				
1.1. Establish and maintain a shared vision for the organization.	*Scripts:* LAU1 *Roles:* Team leader *Other:* Senior management launch guidelines	An organizational vision is usually communicated by senior management at LAU1. The team leader is responsible for representing management to the team throughout the project.	S	
1.2. Establish and maintain an integrated work environment that supports IPPD by enabling collaboration and concurrent development.	*Scripts:* WEEK, STATUS *Roles:* Team leader, team member	Work environment issues are discussed with the team as required during the weekly meeting and raised with management during status meetings.	S	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.3. Identify the unique skills need to support the IPPD environment.	*Scripts:* LAU, REL *Roles:* Team leader, role managers *Other:* TSP introduction strategy	The TSP Introduction strategy identifies a portion of the required training and the TSP (re)launch provides an operational example that supports the IPPD environment.	S	
SG2. People are managed to nurture the integrative and collaborative behaviors of an IPPD environment.				
2.1. Establish and maintain leadership mechanisms to enable timely collaboration.	*Scripts:* LAU, REL, STATUS *Roles:* Team lead, team member, role managers *Other:* Quarterly review checklist	Management is informed of project status and issues that require their attention on a regular basis. The TSP itself provides mechanisms for decision making, delegation of authority, and raising and communicating risks and issues.	S	TSP informally supports this practice.
2.2. Establish and maintain incentives for adopting and demonstrating integrative and collaborative behaviors at all levels of the organization.	*Script:* WEEK, STATUS	TSP informally supports this practice with procedures for integrated reviews of project status.	S	Incentives need not be financial in nature.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.3. Establish and maintain organizational guidelines to balance team and home organization responsibilities.	*Script:* Launch, REL, LAU1, WEEK *Forms:* TASK, SCHEDULE, WEEK *Roles:* Team leader, team member, role manager	The TSP process, especially launches and periodic relaunches, enables team members to balance commitments by explicitly factoring in the "availability" of individuals to address team responsibilities.	S	TSP informally supports this practice.

9.1.6 Causal Analysis and Resolution (CAR)

Using the Causal Analysis and Resolution (CAR) process area, the project strives to understand the common causes of variation inherent in processes and remove them from the project's processes, as well as to use this knowledge to continually improve the organization's processes. Both the defined processes and the organization's set of standard processes are targets of these improvement activities.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Root causes of defects and other problems are systematically determined.				
1.1. Select the defects and other problems for analysis.	*Scripts:* PM, TEST, TEST1, TEST2, TEST3, TESTD, PIP *Forms:* PIP, TASK, LOGT, LOGD *Roles:* Team leader, team member, role managers	TSP scripts call for the analysis of defects found after unit test. Other problems not related to defects are not specifically addressed. Project organization PIPs may also be selected.	P	
1.2. Perform causal analysis of selected defects and other problems and propose actions to address them.	*Scripts:* TESTD *Forms:* PIP, SUMQ, LOGD *Roles:* Team leader, team member, role managers	The TESTD script is used to analyze defects. Other problems not related to defects are not specifically addressed, but may be handled by PIPs and the appropriate role manager.	D	In practice, the TESTD process is used to analyze other problems identified by PIPs.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
SG2. Root causes of defects and other problems are systematically addressed to prevent their future occurrence.				
2.1. Implement the selected action proposals that were developed in causal analysis.	*Scripts:* LAU3, WEEK, PIP *Forms:* PIP, TASK, LOGT, LOGD *Roles:* Team leader, team member, role managers	PIPs are developed during the execution of the process scripts. The process and quality role managers review the PIPs for implementation into the project's and/or organization's processes.	D	The PIP implementation process is not completely defined in the TSP. Role manager meetings across the organization, for example, could address the widespread implementation of PIP suggestions.
2.2. Evaluate the effect of changes on process performance.	*Scripts:* PM *Forms:* SUMS, TASK, LOGT, LOGD, TSP individual and consolidated workbooks, WEEK *Roles:* Team leader, team member, role managers	Process and defect data are captured at the individual level and consolidated for team use. Team performance is reviewed by the appropriate role manager and by the entire team at the weekly meeting and at the phase or project postmortem.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.3 Record causal analysis and resolution data for use across the project and organization.	*Scripts:* TESTD, PM *Forms:* MTG, PIP *Roles:* Team leader, team member, role manager *Other:* NOTEBOOK	Data from TESTD (from the meeting minutes) and PIP implementation is captured and stored in the project NOTEBOOK.	P	Ensuring use of the data across the organization is out of the scope of the TSP.

9.2 TSP and Support Category Generic Practices

If there are consistent patterns in how TSP relates to generic practices across the PAs of the other process categories, there seems to be no such consistency in how TSP relates to GPs across the PAs of the support category. Where one PA might mirror the explicit strengths of the project management or engineering GPs, another PA may have a more tenuous relationship similar to the process category. Also, many support activities are planned in conjunction with other work items and thus may not be shown explicitly in a process script or an individual developer's TSP workbook. These issues must be considered by the EPG or similar group when using this information to guide a development effort or prepare for a SCAMPI appraisal.

Generic Practice	***TSP Reference***	***Process Areas***	***Observation***	***Rating***
GP 2.1. Establish and maintain an organizational policy for planning and performing the process.		*All Support PAs*	Out of the scope of TSP.	U
GP 2.2. Establish and maintain the plan for performing the process.	*Scripts*: LAU3, LAU4, LAU5, LAU6, REL *Forms*: TASK, LOGT *Roles*: Team leader, team member, role managers *Other:* PREPL, PREPR	*All:* During the TSP launch, plans are established for various project processes. With the exception of some aspects of CM and perhaps PPQA, these PAs are not explicitly addressed. However, the launch process can potentially address these activities and provide a means for completing the planning process. *DAR:* To the extent that the TSP launch is an application of the DAR process, the launch preparation activities establish and maintain a plan for decision analysis and resolution for project planning. See Section 9.1.4 above.		S
GP 2.3. Provide resources for performing the process, developing the work products, and providing the services of the process.	*Scripts*: LAU6 *Forms*: SUMS, TASK	*All:* The team leader and initial team member assignments are made as part of launch preparation. Resources are assigned to project tasks during Meeting 6 of the launch. The team leader and role managers help ensure that the tasks are properly staffed.		S

Generic Practice	*TSP Reference*	*Process Areas*	*Observation*	*Rating*
	Roles: Team leader, team member, role managers			
	Other: PREPL, PREPR			
GP 2.4. Assign responsibility and authority for performing the process, developing the work products, and providing the services of the process.	*Scripts*: LAU2, LAU3, LAU6		*All:* The team leader is assigned during launch preparation. Roles are established during LAU2. Specific task responsibilities are assigned to project tasks during LAU6. The team leader and role managers help ensure that the tasks are properly staffed. *CM:* Project CCB responsibilities are assigned in LAU3. The support manager has specific responsibility for the change control system and heads the CCB. *MA:* The capture of the base TSP measures is the responsibly of all team members. The planning manager has specific responsibility to consolidate the TSP workbooks and maintain the project NOTEBOOK.	S
	Forms: TASK			
	Roles: Team leader, team member, planning and support manager			
	Other: PREPL, PREPR			
GP 2.5. Train the people performing or supporting the process as needed.	*Scripts*: LAU		*All:* The TSP launch provides a means of planning all required training for team members to perform their tasks. The launch process and TSP tool and process training provides the team with a common basis for managing their tasks, including the capture of the measures required by the project.	S
	Forms: TASK, LOGT, LOGD			
	Roles: Team leader, team member			

Generic Practice	*TSP Reference*	*Process Areas*	*Observation*	*Rating*
GP 2.6. Place designated work products of the process under appropriate levels of configuration management.	*Scripts*: LAU *Forms*: TSP workbooks *Roles*: Team member, role managers *Other:* Project NOTEBOOK		*All:* All elements of planning, monitoring, and controlling the project are captured during the launch process and in the daily activities of the team members. All of these items are captured at least weekly in the project NOTEBOOK.	S
GP 2.7. Identify and involve the relevant stakeholders as planned.	*Scripts*: LAU1, LAU9, WEEK *Forms*: WEEK, STATUS *Roles*: Team leader, role managers *Other:* PREPL, PREPR, STATUS		*All:* During the preparation for a launch, the stakeholders are identified, and they usually participate in LAU1 and LAU9. The stakeholders are informed of project status through the interaction with the appropriate role manager and project status reporting mechanisms.	S
GP 2.8. Monitor and control the process against the plan for performing the process and take appropriate corrective action.	*Scripts*: WEEK, STATUS, ITL *Forms*: WEEK *Roles*: TSP coach, team leader, role managers		*All:* The TSP weekly team meeting (WEEK) and weekly STATUS report provide close monitoring of the team's status. Any activities that are more than a week past their due date are usually provided special attention. The team leader and role managers tend to track "non-engineering" items closely, often as project risks.	S

Generic Practice	*TSP Reference*	*Process Areas*	*Observation*	*Rating*
	Other: STATUS, quarterly review checklist			
GP 2.9. Objectively evaluate adherence of the process against its process description, standards, and procedures, and address noncompliance.	*Forms*: TASK, LOGT, LOGD, IRTL *Roles*: Process manager	*All:* The process manager and/or support manager roles are generally accountable and often directly responsible for ensuring that activities take place for the project. The team reviews process nonconformance and process improvement proposals at team meetings.		S
GP 2.10. Review the activities, status, and results of the process with higher level management and resolve issues.	*Scripts*: WEEK, STATUS *Roles*: Team leader *Other:* STATUS, quarterly review checklist	*All:* The team leader reviews project progress weekly with the team and appropriate corrective actions are determined and executed. Status reports are provided to management from these meetings. The project status is also reviewed with senior management at the quarterly project review.		S
GP 3.1. Establish and maintain the description of a defined process.	*Scripts*: LAU3, PIP *Forms*: TASK, PIP *Roles*: Role managers	*All:* During a TSP launch, the team defines and/or agrees to the processes that they will use during that portion of the project. Occasionally additional processes need to be defined, especially for matters involving the support PAs. The relevant role manager ensures that they are defined and agreed to by the team.		S

Generic Practice	*TSP Reference*	*Process Areas*	*Observation*	*Rating*
GP 3.2. Collect work products, measures, measurement results, and improvement information derived from planning and performing the process to support the future use and improvement of the organization's processes and process assets.	*Scripts*: PM *Forms*: TASK, LOGT, LOGD, PIP *Roles*: Team leader, team member		*All:* Project data and artifacts are collected for all tasks defined during the launch. PIPs are written as needed during the project and during postmortems.	S
GP 4.1. Establish and maintain quantitative objectives for the process that address quality and process performance based on customer needs and business objectives.	*Scripts*: LAU2 *Forms*: GOAL *Roles*: Team member		*All:* Quantitative objectives for support activities will typically be specified during the launch (LAU2) only if there is some reason to believe that such objectives are necessary to ensure the quality and the timely and cost-effective delivery of the project's main product. In this case, an appropriate role manager is assigned to track these objectives.	S
GP 4.2. Stabilize the performance of one or more subprocesses to determine the ability of the process to achieve the established quantitative quality and process-performance objectives.	*Scripts*: *Forms*: SUMS, TASK, LOGT, LOGD *Roles*: Role managers		*All:* TSP teams collect data (SUMS, TASK, LOGT, LOGD) to analyze their performance and to meet the projects and organizational goals. As with GP 4.1 above, the team will typically pay attention to this data for support activities if it affects the quality and/or the timely and cost-effective delivery of the project's main product.	S
GP 5.1. Ensure continuous improvement of the process in fulfilling the relevant business objectives of the organization.	*Scripts*: PM *Forms*: PIP *Roles*: Team leader, process manager		*All:* While the TSP focuses on the team and not on the organizational aspect of this practice, continuous improvement of the project's processes and performance is part of the way TSP teams function. Data are gathered and analyzed and process improvement proposals are drafted, reviewed, and implemented as the team strives to meet its commitments and goals. These efforts can easily be rolled into an organizational view.	S

Generic Practice	*TSP Reference*	*Process Areas*	*Observation*	*Rating*
GP 5.2. Identify and correct the root causes of defects and other problems in the process.	*Scripts*: TESTD *Forms*: PIP, TSP workbook (SUMP, SUMQ, status and quality charts) *Roles*: Team leader, process and quality managers	*All:* TSP teams collect data to support the identification and analysis of project-related problems. Team members perform analysis of their own and team data to identify problems and to propose process improvements. Root cause analysis meetings are held as necessary over a wide range of issues.		S

10 Summary

The results documented in this report show clearly that TSP can instantiate a majority of the project-oriented specific practices of CMMI. In addition, many of the organization-oriented specific and generic practices of the model are supported at various levels by TSP practices. One must remember, however, that this is an *idealized* case, a paper exercise intended to guide the efforts of a process group when implementing TSP within the larger context of CMMI-based process improvement.

For this analysis to be useful in practical terms, the implementing group must take into account the realities of their unique situation, including the size and duration of typical projects, what and how to adapt to project sizes and durations at the limits of the usual variation, and what and how to adapt to the processes implemented outside the scope of single projects. TSP has seen significant successes at dramatically improving the results of individual projects, but the business of CMMI is improving the results of all projects in an organization. Working together, these two technologies hold the promise of rapid, measurable, and sustainable process improvement beyond the immediate reach of one or the other.

Appendix A: Supplier Management Process Areas

While the TSP does not directly address the Supplier Management activities, with a little thought, the practices from its two process areas can be planned, monitored, and analyzed using the TSP practices and principles. In general, the "Observation" column in the tables below indicates likely behavior by an experienced TSP team in dealing with potential and actual suppliers and the products and product components acquired from such suppliers.

Figure 10 shows the percentage of Supplier Management specific practices addressed by TSP for each PA. For detailed observations of each PA, see below.

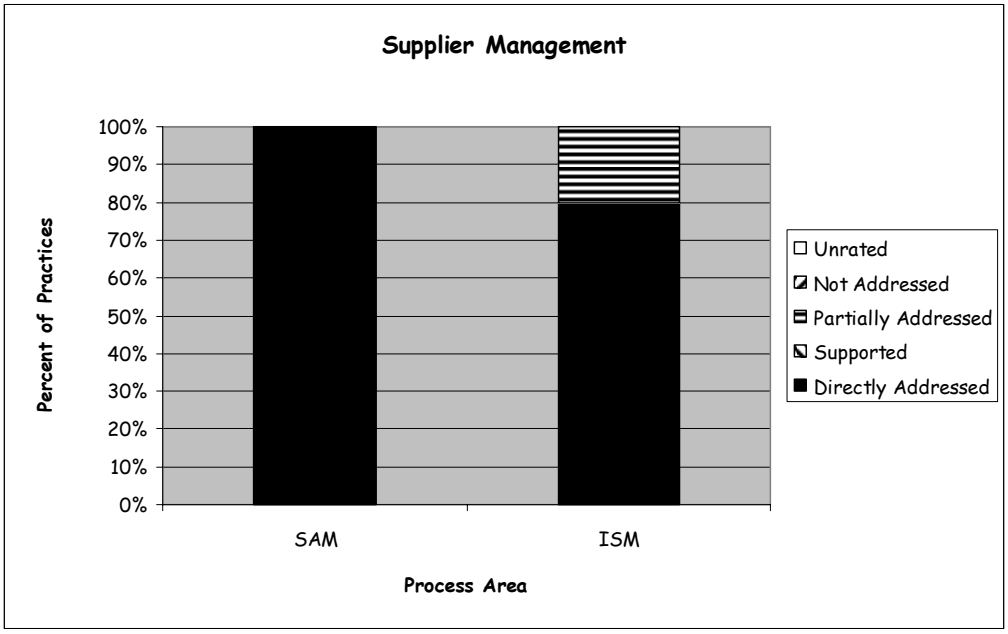

Figure 10: TSP Practices Profile for Supplier Management Process Areas

Supplier Agreement Management (SAM)

The Supplier Agreement Management (SAM) process area addresses the need of the project to effectively acquire those portions of work that are produced by suppliers. Once a product component is identified and the supplier who will produce it is selected, a supplier agreement that will be used to manage the supplier is established and maintained. The supplier's progress and performance are monitored. Acceptance reviews and tests are conducted on the supplier-produced product component.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
SG1. Agreements with the suppliers are established and maintained.				
1.1. Determine the type of acquisition for each product or product component to be acquired.	*Scripts:* LAU1, LAU3, LAU4, LAU6, LAU7, LAU8, HLD *Forms:* TASK, LOGT, LOGD *Roles:* Team leader, design manager	Management directive (LAU1), the development strategy (LAU3), the need to develop alternative solutions (LAU4, LAU6, LAU8), or risk mitigation (LAU7) for the project may determine a need for an outside supplier. The design manager would be responsible for HLD activities to determine which products or components would be built by or obtained from a supplier. The team leader would be involved in decisions to determine acquisition type.	D	
1.2 Select suppliers based on an evaluation of their ability to meet the specified requirements and established criteria.	*Scripts:* LAU4, LAU6, LAU7 *Forms:* TASK, LOGT, LOGD	If a supplier is needed, tasks to determine viable suppliers would be placed in the team's project plan (LAU4, TASK, LAU6, and LAU7) and monitored (TASK, LOGT, LOGD). The team	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
	Roles: Team leader, support manager	leader and design manager, at a minimum, would likely be involved in supplier selection.		
1.3 Establish and maintain formal agreements with the supplier.	*Forms:* TASK, LOGT, LOGD *Roles:* Team leader, support manager	If a supplier is needed, tasks to determine viable suppliers would be placed in the team's project plan (LAU4, TASK, LAU6, and LAU7) and monitored (TASK, LOGT, LOGD). The team leader or support manager is typically responsible for monitoring such activities for the team.	D	
SG2. Agreements with the suppliers are satisfied by both the project and the supplier.				
2.1. Review candidate COTS products to ensure they satisfy the specified requirements that are covered under the supplier agreement.	*Scripts:* HLD, IMP *Forms:* TASK, TSP workbooks *Roles:* Design and implementation managers	Individual TASK plans would likely include investigations of COTS products and would be tracked in individual workbooks. Tailored versions of HLD and/or IMP would reflect a customized design approach. The design or implementation managers would typically lead or coordinate such activities.	D	
2.2 Perform activities with the supplier as specified in the supplier agreement.	*Scripts:* WEEK, STATUS *Forms:* TASK, TSP workbooks	The supplier agreement activities would be reflected in one or more TASK plans and reflected in the corresponding TSP workbooks. Significant activities would be reported by one	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
	Roles: Team member, role managers	or more team members in the weekly meeting (WEEK), often in conjunction with one or more of the role manager functions. Problems and milestones would likely be reported during the weekly STATUS meeting.		
2.3 Ensure that the supplier agreement is satisfied before accepting the acquired product.	*Scripts:* WEEK, STATUS, IMP *Forms:* TASK, TSP workbooks *Roles:* Team leader, team member, role managers	Tasks for testing of supplier products would be reflected in individual TASK plans, probably during an implementation phase (IMP), and tracked in the TSP workbooks. Status of those tasks would be reviewed in the weekly team meeting (WEEK) and STATUS meeting. The various affected role managers would likely be involved. The team leader typically has final approval authority.	D	
2.4 Transition the acquired products from the supplier to the project.	*Scripts:* IMP, TEST1, TEST2 *Forms:* TASK, TSP workbooks *Roles:* Test and implementation managers	This would typically be an implementation (IMP) or build/integration (TEST1, TEST2) activity reflected in one or more TASK plans and tracked in the TSP workbook. The implementation or test manager would take responsibility for completion of these activities.	D	

Integrated Supplier Management (ISM)

The Integrated Supplier Management (ISM) process proactively identifies sources of products that may be used to satisfy project requirements and monitors the selected supplier's work products and processes, while maintaining a cooperative project-supplier relationship. The specific practices of the Integrated Supplier Management process area cover selecting potential sources of products, evaluating those sources to select suppliers, monitoring selected supplier processes and work products, and revising the supplier agreement or relationship as appropriate. The Integrated Supplier Management process area works closely with the Supplier Agreement Management process area during the supplier selection process. Integrated Supplier Management also shares monitoring information with the Engineering and Support process areas in the form of technical solution, product integration, and validation data, as well as process and product quality assurance and configuration management data.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Potential sources of products that best fit the needs of the project are identified, analyzed, and selected.				
1.1. Identify and analyze potential sources of products that may be used to satisfy the project's requirements.	*Scripts:* REQ, HLD *Forms:* TASK, TSP workbooks *Roles:* Customer interface and design managers	The customer interface and/or design managers would likely take the lead in these activities during requirements development (REQ) or high-level design (HLD). Tasks would be reflected in one or more individual TASK plans and tracked in the TSP workbooks.	D	
1.2 Use a formal evaluation process to determine which sources of custom-made and off-the-shelf products to use.	*Scripts:* LAU3 *Forms:* TASK, TSP workbooks *Roles:* Process and design manager	The design manager would identify the need for such a process (LAU3) and later lead its creation and usage. The process manager would ensure that it is documented properly and used to create individual tasks (TASK). The tasks would be tracked in the TSP workbooks.	D	This is a good opportunity for the design manager to define and use Decision Analysis and Resolution (DAR) principles to define an evaluation process.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
SG2. Work is coordinated with suppliers to ensure the supplier agreement is executed appropriately.				
2.1. Monitor and analyze selected processes used by the supplier.	*Scripts:* WEEK, STATUS, PM *Forms:* TASK, LOGT, LOGD *Roles:* Team leader, role managers	Supplier status and progress would be reviewed at the weekly team meeting (WEEK, STATUS) and reviewed with senior management. Any in-project monitoring and analysis of supplier processes would likely be coordinated through the team leader and one or more role managers. During the project postmortem (PM), supplier performance would also be analyzed.	D	
2.2 For custom-made products, evaluate selected supplier work products.	*Scripts:* IMP, TEST1, TEST2 *Forms:* TASK, TSP workbooks *Roles:* Team leader, test, and implementation managers	Evaluations would typically take place in an implementation (IMP), build (TEST1), or integration (TEST2) phase, reflected in individual TASK plans, and tracked in individual TSP workbooks. The implementation and/or test managers would lead the evaluation.	D	
2.3 Revise the supplier agreement or relationship, as appropriate, to reflect changes in conditions.	*Forms:* TASK, TSP workbooks *Roles:* Team leader, role managers	If required, such tasks would likely fall to the team leader, unless they became frequent enough to be reduced to routine. In this case, they would likely fall to one of the role managers and be reflected in one or more individual TASK plans and tracked in the TSP workbook.	D	

TSP and Supplier Management Generic Practices

Generic Practice	*TSP Reference*	*Observation*	*Rating*
GP 2.1. Establish and maintain an organizational policy for planning and performing the process.		Out of the scope of TSP.	U
GP 2.2. Establish and maintain the plan for performing the process.	*Scripts*: LAU3, LAU4, LAU6, WEEK *Forms*: TASK	Needed processes are identified in LAU3, sizes and efforts of activities are estimated in LAU4, and activities are assigned in LAU6 and reflected in individual TASK plans.	S
GP 2.3. Provide resources for performing the process, developing the work products, and providing the services of the process.	*Scripts*: LAU6 *Forms*: TASK, SUMS	Resources are assigned to project tasks during Meeting 6 of the launch (TASK, SUMS, and LAU6). The team leader and role managers help to ensure that the tasks are properly staffed.	S
GP 2.4. Assign responsibility and authority for performing the process, developing the work products, and providing the services of the process.	*Scripts*: LAU2, LAU6 *Forms*: TASK *Roles*: Role managers	Role responsibilities are assigned during LAU2, and individual project tasks are assigned during Meeting 6 of the launch (LAU6) and captured on individual TASK forms.	S
GP 2.5. Train the people performing or supporting the process as needed.	*Training: Introduction to Personal Process*, specific TSP process and tool training	While specific training in supplier issues is not part of PSP and TSP training, the *Introduction to Personal Process* course may be helpful in introducing a defined, planned, and measured process into a supplier relationship.	S

Generic Practice	*TSP Reference*	*Observation*	*Rating*
GP 2.6. Place designated work products of the process under appropriate levels of configuration management.	*Scripts*: TEST1, TEST2 *Roles*: Process manager	TEST1 and TEST2 designate updates in configuration management that would presumably include any products or product components acquired from suppliers and built or integrated through the testing processes. The process manager is responsible for ensuring that relevant processes are properly documented and controlled.	S
GP 2.7. Identify and involve the relevant stakeholders as planned.	*Scripts*: LAU1, LAU9, WEEK, STATUS *Roles*: Team leader, role managers	During the preparation for a (re)launch, the stakeholders are identified, and they usually participate in LAU1 and LAU9. The stakeholders are informed of project status through interaction with the team leader or appropriate role manager and through the project status reporting mechanisms (WEEK or, more likely, STATUS).	S
GP 2.8. Monitor and control the process against the plan for performing the process and take appropriate corrective action.	*Scripts*: WEEK, STATUS *Roles*: Team leader, role managers *Other:* Quarterly review checklist	Significant supplier activities are reported to the team at least weekly by the appropriate role manager at the weekly team meeting (WEEK). Important status and risks are reported up the chain of command by the team leader (STATUS and quarterly review). The TSP coach may also monitor the processes for supplier interactions, evaluate results, and suggest improvements.	S
GP 2.9. Objectively evaluate adherence of the process against its process description, standards, and procedures, and address noncompliance.	*Scripts:* WEEK *Forms*: PIP, WEEK *Roles*: Process manager	The process manager or the responsible role manager is generally accountable for enacting processes involving the supplier. The team reviews process issues and process improvement proposals (PIPs) at team meetings (WEEK) and probably in postmortems as well if the issues significantly affect attainment of team goals.	S

Generic Practice	***TSP Reference***	***Observation***	***Rating***
GP 2.10. Review the activities, status, and results of the process with higher level management and resolve issues.	*Scripts*: WEEK, STATUS *Roles*: Team leader, role managers *Other:* Quarterly review checklist	The project reviews progress weekly with the team and appropriate corrective actions are determined and executed (WEEK). STATUS reports are provided to management from these meetings. The project status is also reviewed with senior management at the quarterly project review.	S
GP 3.1. Establish and maintain the description of a defined process.	*Scripts*: LAU3, PIP *Forms*: TASK, TSP workbooks, PIP *Roles*: Team leader, role managers	During a TSP launch, the team defines its own processes, or the appropriate role manager agrees to acquire or develop the processes that the team will use during that portion of the project (LAU3). Occasionally, additional processes may need to be defined; in this case, tasks are created and the team process manager ensures that they are defined and agreed to by the team (TASK and TSP workbooks). Individual team members may submit PIPs to help refine the processes.	S
GP 3.2. Collect work products, measures, measurement results, and improvement information derived from planning and performing the process to support the future use and improvement of the organization's processes and process assets.	*Scripts*: PIP, PM *Forms*: TASK, TSP workbooks, PIP *Roles*: Team leader, team member, role managers	While project data and artifacts are not required to be placed in an organizational repository by the TSP, the project does collect project process and product data (TASK and TSP workbooks), PIPs, and phase and project postmortem (PM) data that can be used to augment the organization's assets.	S

Generic Practice	*TSP Reference*	*Observation*	*Rating*
GP 4.1. Establish and maintain quantitative objectives for the process that address quality and process performance based on customer needs and business objectives.	*Scripts*: LAU1, LAU2, WEEK, PM *Forms*: TSP workbooks *Roles*: Team leader, team member, role managers	During a TSP launch, management and the team establish quantitative objectives for selected processes, and work products are established (LAU1, LAU2) and then monitored as the project plan is executed (WEEK, TSP workbooks) and when the project is complete (PM). Supplier management may be among these targeted processes.	S
GP 4.2. Stabilize the performance of one or more subprocesses to determine the ability of the process to achieve the established quantitative quality and process-performance objectives.	*Scripts:* WEEK, PM *Forms*: TSP workbooks *Roles*: Team members, role managers	TSP teams may collect data (TSP workbooks) to enable analysis of their performance of supplier management activities and to meet the project's and organizational goals. Team members and role managers perform this analysis and inform the team of process performance at weekly meetings (WEEK) and/or a phase or project PM.	S
GP 5.1. Ensure continuous improvement of the process in fulfilling the relevant business objectives of the organization.	*Scripts:* PM *Forms*: PIP, TSP workbooks *Roles*: Team leader, team member, role manager	While the TSP focuses on the team and not on the organizational aspect of supplier management, continuous improvement of the project's processes and performance is part of the way that TSP teams function. Data are gathered and analyzed; process improvement proposals are drafted, reviewed, and implemented as the team strives to meet its commitments and goals. These efforts can easily be rolled into an organizational view.	S

Generic Practice	***TSP Reference***	***Observation***	***Rating***
GP 5.2. Identify and correct the root causes of defects and other problems in the process.	*Scripts*: TESTD *Forms*: PIP, TSP workbook *Roles*: Team member, role managers	TSP teams collect data (TSP workbooks) to support the identification and analysis of project-related problems (PIP, TESTD) with supplier interactions. Team members and appropriate role managers perform analyses of their own and team data to identify and possibly find the root causes of problems.	S

Appendix B: Process Management Process Areas Using TSP as the Implementation Method

One of the assumptions for the main body of these observations was that all projects in the organization are using the TSP for all phases of a "normal" development life cycle (i.e., requirements, architecture, implementation, deployment, and maintenance). Several organizations have started to use the TSP for non-targeted applications, such as planning and executing their organizational process improvement activities and their organizational training. This appendix provides observations for the Process Management PAs when TSP practices and principles are adapted to plan and execute the associated specific practices plus the generic practices across the category. The analysis does not include generic practices in the other categories, although those could easily be included in the scope of a process group's work plans.

Figure 11 shows the percentage of process management specific practices addressed by TSP for each PA when the TSP is used to plan and execute the practices. Detailed observations of each PA follow.

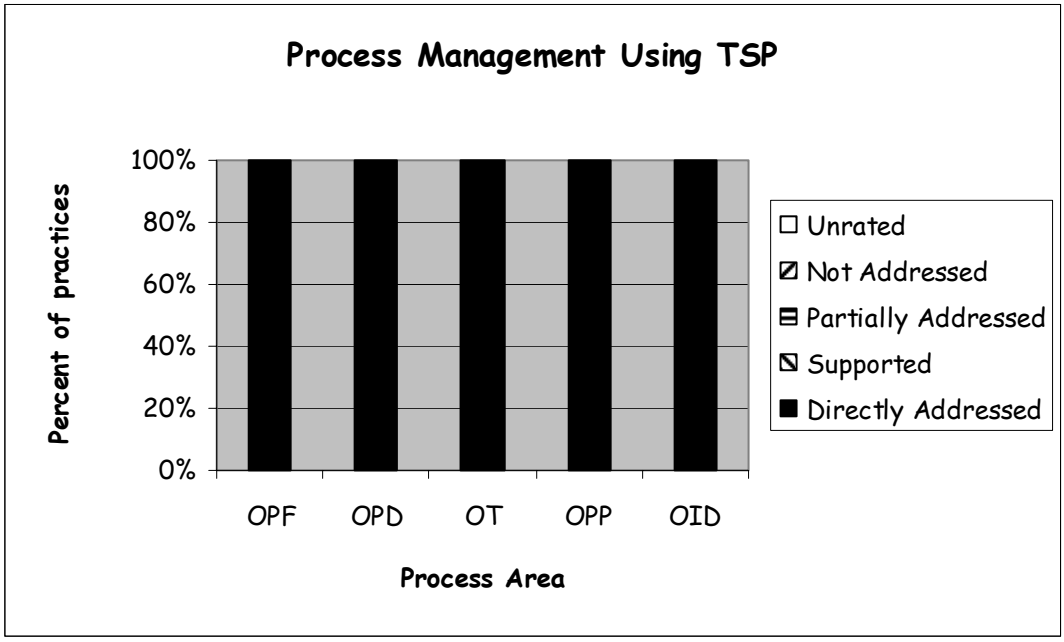

Figure 11: TSP Practices Profile for Process Management PAs When TSP Is Used as the Implementation Method

Organization Process Focus (OPF)

The Organization Process Focus process area helps the organization to plan and implement organizational process improvement based on an understanding of the current strengths and weaknesses of the organization's processes and process assets. Candidate improvements to the organization's processes are obtained through various means. These include process improvement proposals, measurement of the processes, lessons learned in implementing the processes, and results of process appraisals and product evaluation activities.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Strengths, weaknesses, and improvement opportunities for the organization's processes are identified periodically and as needed.				
1.1. Establish and maintain the description of the process needs and objectives for the organization.	*Scripts:* LAU1, LAU3 *Forms:* INV *Other*: *TSP Executive Seminar*, TSP introduction strategy	Organization process needs are examined and documented in the launch (LAU3, INV). Management objectives (LAU1) typically define process-performance objectives. Development strategy identifies how the process gaps are to be addressed. The *TSP Executive Seminar*, when conducted for a single customer as part of the TSP introduction strategy, includes a preliminary planning session at which the objectives for TSP introduction are set.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.2. Appraise the processes of the organization periodically and as needed to maintain an understanding of their strengths and weaknesses.	*Forms*: SUMS, TASK, LOGT, LOGD *Roles:* Team leader, team members, role managers	Organizational appraisals are planned for as required during the launch (SUMS, TASK). Planned and actual data for these activities are captured in the TSP workbook (TASK, SUMS, LOGT, and LOGD) by various team members.	D	A typical management goal for an engineering process group (EPG) is to have an organizational appraisal by a given date with certain desired results.
1.3. Identify improvements to the organization's processes and process assets.	*Scripts:* PIP, PM *Forms:* SUMS, TASK, LOGT, LOGD, SUMMARY *Roles:* Team leader, team member, role managers *Other:* EPG CCB	Candidate improvement ideas will come from projects and the larger organization to the EPG in the form of PIPs and from analysis of organization and project data (TASK, LOGT, LOGD, SUMMARY, and PM). The EPG CCB reviews the improvement proposals and identifies likely candidates for implementation.	D	
SG2. Improvements are planned and implemented, organizational process assets are deployed, and process-related experiences are incorporated into the organizational process assets.				

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.1. Establish and maintain process action plans to address improvements to the organization's processes and process assets.	*Scripts:* LAU *Forms:* INV, SUMS, TASK, LOGT, LOGD, WEEK	The launch of the EPG includes identification of process action teams (PATs) to address specific issues (e.g., establishment of the OSSP, including how process assets are documented, stored, accessed, and updated). Strategies to close gaps are developed (LAU3). Processes for how the PATs function are established (LAU3, INV, TASK), and PAT tasks are planned (SUMS, TASK) and reviewed (LAU9). Planned and actual data for these activities are captured in the TSP workbook (TASK, SUMS, LOGT, LOGD), reviewed weekly (WEEK), and updated as necessary.	D	
2.2. Implement process action plans across the organization.	*Scripts:* WEEK *Forms:* WEEK, SUMS, TASK, LOGT, LOGD *Roles:* Team member	All tasks for targeted PATs are executed and progress is reviewed weekly (WEEK). Progress and risks/issues of PATs are tracked in the TSP workbook (TASK, LOGT, LOGD, SUMS) by the EPG and PAT members.	D	
2.3. Deploy organizational process assets across the organization.	*Forms:* TASK, LOGT, LOGD, SUMS, INV	The procedures to develop and deploy process assets are reflected as tasks in the TASK plan. Process data for these tasks are captured in the TSP workbook (TASK, LOGT, LOGD, SUMS). Custom scripts may be developed for repeated tasks.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.4. Incorporate process-related work products, measures, and improvement information derived from planning and performing the process into the organizational process assets.	*Forms:* TASK, TSP workbooks *Other:* EPG CCB	Improvement ideas and work artifacts and data come from various sources (see SP 1.3 above). The EPG CCB reviews the improvement proposals and the EPG and PAT members develop needed assets and incorporate approved proposals as reflected in individual TASK plans and the TSP workbooks.	D	The EPG would have to set up the infrastructure to perform these tasks, probably a set of activities planned and executed during an initial development cycle for the EPG.

Organization Process Definition (OPD)

The Organizational Process Definition process area establishes and maintains the organization's set of standard processes and other assets based on the process needs and objectives of the organization. These other assets include descriptions of processes and process elements, descriptions of life-cycle models, process tailoring guidelines, process-related documentation, and data. Projects tailor the organization's set of standard processes to create their defined processes. The other assets support tailoring as well as implementation of the defined processes. Experiences and work products from performing these defined processes, including measurement data, process descriptions, process artifacts, and lessons learned, are incorporated as appropriate into the organization's set of standard processes and other assets.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. A set of organizational process assets is established and maintained.				
1.1. Establish and maintain the organization's set of standard processes.	*Scripts*: All TSP scripts *Forms*: All TSP forms *Roles*: All TSP roles *Other:* All "other" process assets except SEI-only items	The TSP source materials made available when the TSP is properly licensed are likely to constitute a majority of the initial OSSP. EPG members develop additional necessary assets and deploy all OSSP process elements according to plans made during a launch, possibly using a document like this one to guide their plans and efforts.	D	It is unlikely that TSP would cover all process assets required to satisfy the PAs within CMMI.
1.2. Establish and maintain descriptions of the life-cycle models approved for use in the organization.	*Scripts*: DEV, MAINT *Forms*: STRAT, SUMS, TASK,	TSP scripts define two default life-cycle models (DEV, MAINT). TASK plans will reflect the work of adapting these for local use or for documenting and/or adapting local practices into a proper life-cycle description. TSP workbooks	D	Project teams would use these descriptions and tailoring guidelines (from OPD 1.3) to select their development life cycles during initial project launches.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
	LOGT, LOGD *Roles:* Process manager	capture the execution data for these tasks (TASK, SUMS, LOGT, and LOGD).		
1.3. Establish and maintain the tailoring criteria and guidelines for the organization's set of standard processes.	*Forms:* TASK, LOGD, LOGT, SUMS *Training: TSP Launch Coach Training* *Other:* TSP Planning and Quality Guidelines	Lessons learned from TSP pilot projects are used to develop the tailoring guidelines. These plans are instantiated in SUMS and TASK in the EPG's TSP workbooks. The workbooks capture the execution data for these tasks (TASK, SUMS, LOGT, and LOGD).	D	Much of the tailoring expertise lies with the TSP coaches. Formal criteria and guidelines for tailoring an OSSP are not part of the TSP.
1.4. Establish and maintain the organization's measurement repository.	*Scripts*: PM, LAUPM *Forms*: TASK, LOGT, LOGD SUMMARY *Roles*: Planning, process, quality, and test managers	The project NOTEBOOK, STATUS, and SUMMARY forms summarize project-level information that is consolidated and used to update the default planning and quality guidelines on a regular basis. The EPG plans for these tasks during their launch. Planned and actual data for these activities are captured in the TSP workbook (TASK, SUMS, LOGT, and LOGD).	D	An initial EPG launch will likely include tasks to define and implement the organization's information repository. There is also likely to be a need to define other measures not specifically addressed by the PSP/TSP, such as for CM or OPF activities.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.5. Establish and maintain the organization's process asset library.	*Scripts*: All TSP scripts *Forms*: All TSP forms *Roles*: All TSP roles *Other:* All "other" process assets *Training: Introduction to Personal Process, PSP for Engineers, TSP Executive Seminar, Managing TSP Teams*	The EPG uses the TSP assets as the foundation of the process asset library (PAL) are included in the SEPG workbook. Periodic launches typically develop a strategy and needed processes to plan the work of creating and maintaining the PAL. Planned and actual data for these activities are captured in the TSP workbook (TASK, SUMS, LOGT, and LOGD).	D	See Notes on SP 1.4 above.

Organizational Training (OT)

The Organizational Training process area identifies the strategic training needs of the organization, as well as the tactical training needs that are common across projects and support groups. In particular, training is developed or obtained to develop the skills required to perform the organization's set of standard processes. The main components of training include a managed training-development program, documented plans, personnel with appropriate knowledge, and mechanisms for measuring the effectiveness of the training program. The observations in this section assume the formation of a process action team (PAT) under the direction of the EPG charged with establishing and maintaining both the training needs of the organization and the capabilities to fulfill those needs.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. A training capability that supports the organization's management and technical roles is established and maintained.				
1.1. Establish and maintain the strategic training needs of the organization.	*Scripts/ Forms:* OT team launch artifacts, PM artifacts, PIPs *Other:* TSP introduction sequence	A PAT dedicated to Organizational Training (OT) matters is a likely to be formed by the EPG. The OT team launches separately or possibly in conjunction with an EPG launch/relaunch. Plans and tasks to discover, develop, and maintain the organization's training needs are included in the OT PAT workbooks. Planned and actual data for these activities are captured in the TSP workbook (TASK, SUMS, LOGT, and LOGD).	D	Postmortems from other projects and PIPs from across the organization may point in the direction of some strategic training needs for an organization. LAU1 of the OT PAT launch may also provide information from senior management on strategic training needs. The TSP introduction sequence very often identifies PSP, TSP, and CMMI among the strategic training needs of the organization.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.2. Determine which training needs are the responsibility of the organization and which will be left to the individual project or support group.	*Scripts:* LAU3, PREPL, PREPR, WEEK, PM *Forms:* WEEK, TASK *Roles*: Team leader, team member	Project teams, including the team leader and individual team members, are responsible for determining the training needs of their team members. This can occur during launch preparation (PREPL, PREPR), during the launch (especially LAU3), or during the project and documented in the weekly meeting (WEEK) or in a postmortem (PM). The OT team reviews these and organizational needs. Any required tasks are added to the OT team workbook.	D	
1.3. Establish and maintain an organizational training tactical plan.	*Scripts:* LAU, REL, WEEK *Forms:* WEEK, SUMS, TASK, LOGT, LOGD *Other*: TSP introduction strategy	Plans and tasks to develop and maintain the organization's tactical training plan are developed in the OT PAT launch (LAU) and updated based on results reported in weekly meetings (WEEK) and relaunches (REL) and in response to requests from TSP projects (see OT SP 1.1 notes above). Planned and actual data for these activities are captured in the TSP workbook (TASK, SUMS, LOGT, and LOGD). An early version of such a tactical plan is included in the plan for TSP introduction.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.4. Establish and maintain a training capability to address organizational training needs.	*Forms:* OT PAT launch artifacts, SUMS, TASK, LOGT, LOGD *Other*: TSP introduction strategy	Plans and tasks to develop and maintain the organization's training capability, whether internal, external, or a combination of these, are created during the OT PAT launch. Planned and actual data for these activities are captured in the TSP workbook (TASK, SUMS, LOGT, and LOGD). The TSP introduction sequence strongly encourages the implementing organization to develop and maintain internal PSP training and TSP coaching capabilities, and specifies the course and authorization sequence for these capabilities.	D	Obviously the training needs of the organization will change over time as TSP is first introduced and then becomes widespread in the organization. The EPG or OT PAT must adapt to these changing needs, which should be reflected in the activities captured in their TSP workbooks and related artifacts.
SG2. Training necessary for individuals to perform their roles effectively is provided.				
2.1. Deliver the training following the organizational tactical plan.	*Forms:* SUMS, TASK, LOGT, LOGD	Actual data for these activities are captured in the TSP workbook (TASK, SUMS, LOGT, and LOGD).	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.2. Establish and maintain records of organizational training.	*Scripts:* LAU, WEEK *Forms:* WEEK, SUMS, TASK, LOGT, LOGD	The OT PAT plans for these activities during its launch and tracks them in the OT workbooks. Use of copyrighted PSP and TSP training materials requires reporting training data to the SEI, which maintains records of this training. Planned and actual data for these activities are captured in the TSP workbook (TASK, SUMS, LOGT, and LOGD). OT PAT tasks usually include creation, collection, and maintenance of such training data for all organizational training. The OT PAT or EPG weekly meeting typically reports summary training data.	D	
2.3. Assess the effectiveness of the organization's training program.	*Scripts:* WEEK *Forms:* WEEK, TSP workbooks *Roles*: PSP instructor, TSP coach, team leader	Plans/tasks to assess the organization's training capability are included in the OT PAT workbook, and status is reviewed at weekly meetings (WEEK). In addition, PSP instructors regularly assess the effectiveness of training when grading PSP assignments and when summarizing class results to the class, to the sponsoring manager, and to the OT PAT.	D	

Organizational Process Performance (OPP)

The Organizational Process Performance process area derives quantitative objectives for quality and process performance from the organization's business objectives. The organization provides projects and support groups with common measures, process performance baselines, and process performance models. These additional organizational support assets support quantitative project management and statistical management of critical subprocesses for both projects and support groups. The organization analyzes the process performance data collected from these defined processes to develop a quantitative understanding of product quality, service quality, and process performance of the organization's set of standard processes.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Baselines and models that characterize the expected process performance of the organization's set of standard processes are established and maintained.				
1.1. Select the processes or process elements in the organization's set of standard processes that are to be included in the organization's process performance analysis.	*Forms:* SUMS, TASK, LOGT, LOGD *Other:* Planning and quality guidelines	The EPG typically selects a mixture of the TSP process assets and existing organizational assets, based on lessons learned during TSP pilot projects. Plans and tasks to perform this evaluation and selection process are included in the team workbook, and planned and actual data for these activities are captured in the individual TSP workbook (TASK, SUMS, LOGT, and LOGD).	D	The team may be directed to certain processes or process elements by management in LAU1. Typically these are "known good" elements of existing organizational processes that have a proven track record from previous projects.

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.2. Establish and maintain definitions of the measures that are to be included in the organization's process performance analyses.	*Scripts:* LAU3, LAU4, LAU5, LAU6, PM *Forms:* SUMS, SUMP, SUMQ, TASK, LOGT, LOGD *Roles*: Team leader, team member	Basic PSP/TSP defines a standard set of base measures to be captured: product size, time spent by process phase, defects injected and removed by process phase, and task completion date. Dozens of derived measures are readily available depending on the organization's business objectives and how those objectives might translate to the measures available.	D	For example, earned value, task hours per week, test defects per KLOC, review rates, yield, and quality profile index (QPI) components are all candidate metrics for analyzing organizational process performance. There are literally dozens of candidate derived measures from PSP training and the various TSP assets that might be used by the organization.
1.3. Establish and maintain quantitative objectives for quality and process performance for the organization.	*Scripts:* LAU1, LAU2 *Other:* TSP introduction strategy	Typically management presents quantitative business objectives to the EPG in LAU1 of the EPG launch. These objectives are interpreted first during LAU2 when the EPG develops their team's goals, and then on an ongoing basis as TSP introduction proceeds and as the relationship between business objectives and the organization's quality and process performance evolves.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.4. Establish and maintain the organization's process performance baselines.	*Scripts:* LAU *Forms:* SUMS, TASK, LOGT, LOGD *Other:* TSP introduction strategy	Organizational baselines, if they do not already exist, are established by TSP introduction (i.e. pilot project results). As the EPG accumulates a record of organizational performance using the TSP, process baselines are adjusted to reflect current realities. Plans and tasks for these activities are included in the team workbook during the EPG launch (LAU), and planned and actual data are captured in the individual TSP workbook (TASK, SUMS, LOGT, and LOGD).	D	
1.5. Establish and maintain the process performance models for the organization's set of standard processes.	*Scripts:* LAU1, LAU3, LAU4, LAU5, LAU6, PM *Forms:* SUMS, TASK, LOGT, LOGD *Other:* TSP introduction strategy	The process performance model underlying the TSP is calibrated to the organization during TSP introduction. As the EPG aids adaptation, rollout, and institutionalization of TSP across the organization, the model is adjusted to reflect how TSP, as implemented, performs. Plans and tasks to establish and maintain the process performance models are determined first during the EPG launch (LAU) and then during postmortems, relaunches, and ongoing analysis of project results. Planned and actual data for these activities are captured in the TSP workbook (TASK, SUMS, LOGT, and LOGD).	D	Most organizations customize the default TSP process performance model based on their own needs and situation. Experience to date indicates that the default TSP model reflects the general truth that product size and quality (measured as defect density during late test phases) are the major drivers of process performance.

Organizational Innovation and Deployment (OID)

The Organizational Innovation and Deployment process area selects and deploys proposed incremental and innovative improvements that address the organization's ability to meet its quality and process-performance objectives. The identification of promising incremental and innovative improvements should involve the participation of an empowered workforce aligned with the business values and objectives of the organization. The selection of improvements to deploy is based on a quantitative understanding of the potential benefits and costs from deploying candidate improvements and the available funding for such deployment.

Specific Practice	***TSP Reference***	***Observation***	***Rating***	***Notes***
SG1. Process and technology improvements that contribute to meeting quality and process performance objectives are selected.				
1.1. Collect and analyze process- and technology-improvement proposals.	*Scripts:* PIP, PM, LAUPM, TESTD *Forms:* EPG individual and team workbooks *Roles*: Team leader, team member, role managers (esp. process manager)	PIPs record both process and technology improvement suggestions. The process manager manages the elicitation, gathering, recording, tracking, and handling of the team's PIPs throughout the development cycle and especially at formal evaluation activities (LAUPM, PM). PIPs are also often generated in the context of a TESTD activity. The EPG plans and tracks activities to evaluate these PIPs (TASK, LOGT, LOGD, and SUMS).	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
1.2. Identify and analyze innovative improvements that could increase the organization's quality and process performance.	*Forms:* SUMS, TASK, LOGT *Roles*: EPG CCB (typically team leader and design, implementation, and support managers)	As part of PIP evaluation, the EPG examines PIPs and other improvement artifacts and data from individual projects. The EPG CCB reviews and approves improvement proposals with management oversight. These activities are documented in the EPG project SUMS and individual tasks reflected in individual TASK plans and time logs (LOGT).	D	
1.3. Pilot process and technology improvements to select which ones to implement.	*Scripts:* PM *Roles*: Team leader, process manager, other role managers	Working with the projects, typically through the team leader, process manager, and other role managers as appropriate, the EPG monitors, guides, and evaluates process and technology improvements. Results of the pilot activities are reviewed as they proceed and in project postmortems (PM) with the team.	D	A piloting strategy is fundamental to the TSP introduction sequence.
1.4. Select process- and technology-improvement proposals for deployment across the organization.	*Roles:* EPG CCB (same as OID SP 1.2 above)	Results of piloted process and technology improvements are evaluated by the EPG CCB and recommended for approval by management.	D	The process performance model in OPP provides critical evaluation criteria. DAR and CAR practices are commonly used.
SG2. Measurable improvements to the organization's processes and technologies are continually and systematically deployed.				

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.1. Establish and maintain the plans for deploying the selected process and technology improvements.	*Scripts:* LAU, REL *Forms:* All launch assets (esp. individual and consolidated TSP workbooks) *Roles*: Team leader, team members, role managers	Planning for the deployment of innovations is the main purpose of EPG launches and relaunches. Managers of or senior technical leaders from the development staff may function as marketing representatives. Plans are captured in the individual and consolidated TSP workbooks.	D	Adapting and implementing the features of the "standard" TSP process assets for use by the EPG is a valuable opportunity for the EPG to model desired behaviors for developers and for the organization as a whole.
2.2. Manage the deployment of the selected processes and technology improvements.	*Scripts:* WEEK, STATUS *Forms:* WEEK, SUMMARY, TSP workbooks *Roles*: Team leader *Other:* Quarterly review checklist	EPG members execute against the tasks in their individual TSP workbooks and report status to the team at the weekly meeting (WEEK). The team leader makes STATUS reports to management weekly or on some other regular basis as required. Results are described in SUMMARY reports. The team leader of the EPG participates in quarterly reviews just like any other project team leader.	D	

Specific Practice	*TSP Reference*	*Observation*	*Rating*	*Notes*
2.3. Measure the effects of the deployed process and technology improvements.	*Scripts:* WEEK, PM *Forms:* TSP consolidated workbooks *Roles*: Role managers (esp. process manager)	The EPG reviews consolidated TSP workbooks from project teams across the organization, usually with special attention to data from teams using recently deployed improvements. Specific evaluations depend on the improvements, but the EPG process manager is typically involved with the process managers and other affected role managers from the implementing development teams to evaluate and tune the improvements.	D	

TSP and Process Management Using TSP Generic Practices

The generic practices become an interesting and potentially valuable source of information and inspiration to the EPG that chooses to use TSP to implement CMMI best practices. For example, while TSP normally avoids dealing with policy issues, one central task facing an EPG is what policies to recommend, possibly in draft form, for a management steering group or equivalent entity. Such policy statements will typically range beyond process management and into the other process categories. The same may be said for most GPs in the other process areas where TSP typically provides only supporting practices. It then falls to the EPG or a designated PAT to devise standard organizational practice.

Generic Practice	***TSP Reference***	***Observation***	***Rating***
GP 2.1. Establish and maintain an organizational policy for planning and performing the process.		*All:* While policies are out of the scope of TSP under normal circumstances, it often becomes the work of the EPG, in the circumstances described in this appendix, to draft policy statements for management discussion and approval.	S
GP 2.2. Establish and maintain the plan for performing the process.	*Scripts*: LAU, REL *Forms*: TSP workbooks (esp. SUMS, SUMQ, TASK, SCHED)	*All:* The EPG, OT PAT, and any other process action teams designated by management or the EPG follow the standard launch and relaunch scripts, resulting in an overall plan or collection of plans to address organizational process issues. These plans will be reflected in the TSP consolidated and individual workbooks created during the launch, specifically in SUMS, SUMQ, TASK, and SCHED.	D

Generic Practice	*TSP Reference*	*Observation*	*Rating*
GP 2.3. Provide resources for performing the process, developing the work products, and providing the services of the process.	*Scripts*: PREPL, PREPR, LAU6 *Forms*: SUMS, TASK *Roles*: Team leader, team member, role managers	*All:* EPG and PAT members are initially assigned during launch/relaunch preparations (PREPL, PREPR). Team members are assigned to specific project tasks (SUMS, TASK) during LAU6. Any discrepancies between needed and actual staff are negotiated between the affected team and management, beginning formally in LAU9 and possibly informally much earlier in the launch. The team leader and role managers help to ensure that the tasks are properly staffed, first during the launch, and then during project execution.	D
GP 2.4. Assign responsibility and authority for performing the process, developing the work products, and providing the services of the process.	*Scripts*: PREPL, LAU6 *Forms*: TASK, SUMS *Roles*: Team leader, team member, role managers	The EPG team leader and leaders of the various PATs are identified during preparations for the various launches (PREPL) and relaunches (PREPR). Individual role managers are assigned during LAU2 of the launches. (Note: Because this is not a targeted application of TSP, adaptation and customization of the roles is to be expected to an extent not typically seen in the "normal" TSP team.) The team leader(s) and role managers are responsible to ensure that the tasks are properly staffed. During the (re)launch process, team members participate in defining, understanding, and accepting their individual responsibilities.	D

Generic Practice	***TSP Reference***	*Observation*	*Rating*
GP 2.5. Train the people performing or supporting the process as needed.	*Scripts*: PM, PREPL, PREPR, WEEK *Other:* TSP introduction strategy, *Managing TSP Teams*, *Introduction to Personal Process*, specific TSP process and tool training	EPG and PAT members typically receive *Introduction to Personal Process* and *Managing TSP Teams* training as a minimum, and a few take the full range of PSP and TSP training specified by the TSP introduction strategy. Additional training identified during launch/relaunch preparations (PREPL, PREPR) or during and after the project (WEEK, PM) is built into project plans either directly by accounting for training in individual TSP workbooks during launches/relaunches or indirectly by reducing available hours at specific calendar times.	S
GP 2.6. Place designated work products of the process under appropriate levels of configuration management.	*Scripts*: LAU3, WEEK *Forms*: TSP workbooks, WEEK *Roles*: Team leader, support manager *Other:* NOTEBOOK	Team plans and weekly status (WEEK) are captured on the TSP workbooks and other launch artifacts and stored in the various project NOTEBOOKs for the EPG and each PAT. LAU3 for each launch activity identifies what work products should be placed under configuration management and when this happens during development.	S

Generic Practice	*TSP Reference*	*Observation*	*Rating*
GP 2.7. Identify and involve the relevant stakeholders as planned.	*Scripts*: PREPL, PREPR, LAU1, LAU9, WEEK, STATUS *Roles*: Team leader, role managers *Other:* Quarterly review checklist	During the preparation for a (re)launch, relevant stakeholders are identified during launch/relaunch preparations and usually participate in meetings 1 and 9 (LAU1, LAU9) at a minimum. Stakeholders are informed of project status through interaction with the appropriate role manager and project status reporting mechanisms (STATUS, quarterly review checklist), and in fact may take part directly in EPG and PAT work.	S
GP 2.8. Monitor and control the process against the plan for performing the process and take appropriate corrective action.	*Scripts*: WEEK, STATUS *Forms*: WEEK, TASK, SUMS *Roles*: Team leader, role managers *Other:* Quarterly review checklist	The team leader and the team as a whole monitor performance against goals and risks at the weekly team meeting (WEEK). Status against plan is reviewed and project-specific role manager reports support this activity (WEEK, TASK, SUMS) for their respective areas of cognizance. STATUS reports and quarterly reviews ensure that the entire management chain is aware of current performance, issues, and risks.	D

Generic Practice	*TSP Reference*	*Observation*	*Rating*
GP 2.9. Objectively evaluate adherence of the process against its process description, standards, and procedures, and address noncompliance.	*Forms*: PIP, all process artifacts *Roles*: Process manager *Other:* Checkpoint review	The process manager role is accountable and often responsible for ensuring that these activities take place. The EPG or PAT reviews process nonconformance issues and PIPs at team meetings or some other scheduled event, and may engage an outside TSP coach to perform a checkpoint review to discover issues that the team itself may not be able to address on its own.	S
GP 2.10. Review the activities, status, and results of the process with higher level management and resolve issues.	*Scripts*: STATUS *Forms*: WEEK, SUMS, SUMP, SUMQ *Roles*: Team leader, role managers *Other:* Quarterly review checklist	The EPG or PAT reviews progress weekly and appropriate corrective actions are determined and executed. STATUS reports are provided to management based on project data (WEEK, SUMS, SUMP, SUMQ). Quarterly reviews summarize project status for senior management.	S

Generic Practice	***TSP Reference***	***Observation***	***Rating***
GP 3.1. Establish and maintain the description of a defined process.	*Scripts*: LAU3, PIP *Forms*: INV, TASK, SUMS *Roles*: Team leader, role managers (esp. process manager)	During LAU3, the team defines or adapts the processes that they will use during that portion of the project. Occasionally, additional processes that need to be defined are captured (INV). In this case, tasks are created and usually assigned to the relevant role manager. The process manager is responsible for overall coordination of creation and maintenance of these tasks, ensuring that they are defined, documented, and agreed to by the team.	S
GP 3.2. Collect work products, measures, measurement results, and improvement information derived from planning and performing the process to support the future use and improvement of the organization's processes and process assets.	*Scripts*: LAU, REL *Forms*: TASK, SCHED, LOGT, LOGD, SUMS, PIP	Both during launches and relaunches (LAU, REL) and while executing assigned process management tasks, EPG and PAT members model the behaviors that they are asking of other development projects. Data from individual and consolidated TSP workbooks (TASK, SCHED, LOGT, LOGD, SUMS), from PIPs, and from the many other generated artifacts often prove persuasive to otherwise reluctant development teams, especially when they are analyzed and used to improve the process in the future.	S
GP 4.1. Establish and maintain quantitative objectives for the process that address quality and process performance based on customer needs and business objectives.	*Scripts*: LAU1, LAU2, LAU3, LAU5, LAU9 *Forms*: WEEK, SUMS, SUMP, SUMQ	During a launch, management and the team establish quantitative objectives for selected processes, and work products are established (LAU1, LAU2, LAU3, LAU5, LAU9) and then monitored (WEEK, SUMS, SUMP, and SUMQ) as the project plan is executed, usually by either the planning or quality managers, or possibly one of the other role managers as appropriate.	S

Generic Practice	*TSP Reference*	*Observation*	*Rating*
	Roles: Role managers (esp. planning or process)		
GP 4.2. Stabilize the performance of one or more subprocesses to determine the ability of the process to achieve the established quantitative quality and process-performance objectives.	*Forms*: GOAL, SUMS, TASK, LOGT, LOGD, WEEK, SUMP, SUMQ *Roles*: Team leader, team member, role manager *Other:* Earned value (EV) charts, review rate charts, defect injection/ removal charts	TSP teams collect data (SUMS, TASK, LOGT, and LOGD) to analyze their performance (WEEK, SUMP, SUMQ) and to meet project and organizational goals (GOAL). The team leader, team members, and role managers perform relevant analyses with the aide of various charts and graphs (see "Other") and inform the team about process performance, especially particularly good or worrisome aspects, along with recommendations concerning what, if anything, to do about them.	S
GP 5.1. Ensure continuous improvement of the process in fulfilling the relevant business objectives of the organization.	*Scripts:* TESTD, PM *Forms*: PIP *Roles*: Team leader, team member	This is the mission of the EPG and its subsidiary PATs. While the EPG/PATs perform TESTD activities and postmortems (PMs) and write PIPs for their own processes and those of other TSP teams in the organization, the fundamental underlying obligation of each team leader and team member is to ensure that the organization is learning and improving constantly in terms of meeting its business objectives.	S

Generic Practice	*TSP Reference*	*Observation*	*Rating*
GP 5.2. Identify and correct the root causes of defects and other problems in the process.	*Scripts*: TESTD *Forms*: SUMS, TASK, LOGT, LOGD, PIP	TSP teams collect data (SUMS, TASK, LOGT, LOGD) to support the identification and analysis of project-related problems, and capture such problems and proposed solutions on PIPs.	S

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13. ABSTRACT (MAXIMUM 200 WORDS)

With the advent of CMMI® (Capability Maturity Model® Integration), development and maintenance organizations are faced with many issues regarding how their current practices, or new practices that they are considering adopting, compare to the new model. The Team Software Process℠ (TSP℠), including the corequisite Personal Software Process℠ (PSP℠), defines a set of project practices that has a growing body of evidence showing highly desirable process performance in terms of delivered product quality, schedule performance, and cost performance. TSP also has a history of favorable coverage with respect to the SW-CMM® (Capability Maturity Model for Software), a major precursor to CMMI, as well as several real-world implementations that have helped organizations to achieve high maturity levels in a relatively short period of time.

This report provides an essential element to facilitate the adoption of the TSP in organizations using CMMI, namely, a mapping of ideal TSP practices into the specific and generic practices of CMMI. By having such a mapping (also known as a gap analysis), those involved with process improvement and appraisal efforts can more easily determine how well the organization or a particular project is implementing the TSP, how well projects using TSP might rate with respect to CMMI, and where and how to fill any gaps in CMMI coverage. Organizations already following an improvement plan based on CMMI may also determine how TSP adoption might help them to achieve broader, deeper, or higher maturity implementations of CMMI goals and practices.

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