Managing a Company Using TSP Techniques

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This article describes the experience of using techniques from the Team Software ProcessSM (TSPSM) to manage a small software consulting company. The company's management team used TSP techniques to run the organization. The authors describe how the TSP has been adjusted and the lessons learned from this experience.

The Team Software ProcessSM (TSPSM) is designed to facilitate superior performance of software development teams. Although the TSP is designed for the software domain, it is so well defined that it can be used in other domains. For example, the management team of QuarkSoft, a start-up software company, decided to apply TSP techniques to run the company. In particular, they have been using TSP techniques as the baseline process for planning, controlling, and performing the activities of all the members of the management team.

QuarkSoft's management team members have been using the TSP approach for more than 10 months and are very pleased and excited with the results. They are convinced that the TSP has been fundamental for having effective company management. For example, the strategy and objectives for the company are well defined, risk management has been implemented, communication problems have been reduced, realistic plans have been built, and important problems are addressed in a timely manner. Their experience shows that the TSP is a powerful team process that can be customized to improve the performance of teams beyond the software domain.

This article explains the motivation for using the TSP as an executive management process, how the TSP has been adjusted to fit the QuarkSoft management team's needs, and the lessons learned from this experience. The authors assume the reader knows the main concepts and products of the TSP. Please refer to [1, 2] for a description of the TSP.

Background
QuarkSoft is a small start-up company whose core business is outsourcing of software development. Since QuarkSoft's differentiator is quality software development, the company decided to base its operations on the Capability Maturity Model® for Software (SW-CMM®)[3] and chose the Personal Software ProcessSM (PSPSM) [4] and the TSP as the means for implementing the Capability Maturity Model®.

QuarkSoft's staff is organized into a management team that runs the company, a group of software engineers that develop the software, and a small administrative staff that attends to administrative and operational issues.

The management team (MT) is composed of the chief executive officer (CEO), the chief operations officer (COO), the chief financial officer (CFO), the research and development officer, and the software engineering process group (SEPG) chief engineer. The MT is responsible for all business and operation decisions. Major decisions are made by the consensus of the MT members.

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Since the company is relatively small, each MT member has additional duties as compared to traditional companies. Besides overseeing all the operations of the company, the CEO is responsible for marketing, contacting new clients, and closing contracts. In addition to assuring that all projects are on-time, the COO participates in quoting projects, does TSP coaching to internal software development teams, trains new hires in PSP, and ensures that all the engineers are following the TSP. The COO is a Software Engineering Institute-authorized PSP instructor and TSP launch coach. In addition to being in charge of processes, the SEPG chief engineer coordinates quality assurance and configuration management activities, helps train new hires, and makes sure that data are collected.

The Need for TSP
When QuarkSoft was created, the MT used typical management practices. A business plan and a strategic plan were elaborated. The mission, vision, strategic projects, and indicators were defined. These practices worked fine for setting up the company. However, after a couple of months, the business plan no longer represented reality. On the day-to-day activities, the MT started to operate in firefighting mode. They would solve the main problem of the day with no planning at all. The MT realized that without day-to-day planning it was easy to be caught by the urgent problems of the day. This problem-driven management style did not leave time to work on fundamental problems. A new management strategy was necessary.

Start-up companies need to respond rapidly to changes in the business environment to be able to survive [5, 6]. Many outside factors such as market changes, competitors, financial valleys, cancelled contracts, and delayed payments demand prompt attention. Very often, the strategy, planning, and objectives have to change according to these external factors. The business environment demands certain skills from MTs such as good communication, good planning, constant feedback, adaptation to changes, and prompt and accurate information to make decisions.

The TSP's main concepts and techniques provide the foundation to assemble and guide a team with such skills. The decision to use the TSP as the base process for organizing and running the
MT was somewhat natural and aligned with the company culture for two reasons. First, the company has experience using TSP (i.e., TSP is used in all software development projects). Second, most of the MT members (except the CFO) are TSP and PSP trained. Thus, running and managing the company was seen as a project, and the MT as the team to perform it. Making this decision was not difficult; the real challenge was adjusting the TSP to the needs of the MT and to start using it.

Implementation
The first task was to define the general process. The MT agreed on dividing the project into one-month cycles that corresponded to calendar months. Each cycle would start with a re-launch and would end with a post-mortem. The re-launch would take two to four days. During the cycle, the MT would have one-hour weekly status meetings.

The MT has used this TSP approach since July 2001 (cycle one), including six cycles in 2001 (i.e., July to December) and five cycles in 2002 (i.e., January to May).

Adapting the TSP for the MT needs has been a gradual process. During the first two re-launches, the MT focused on making detailed plans for each MT member. Few objectives were set, and no risk analysis was performed.

By cycle three (September 2001), the MT started writing the minutes from weekly meetings, did some data analysis, and started holding post-mortem meetings. In addition, a general meeting was added at the end of the re-launch agenda. All QuarkSoft employees attend this meeting in which the MT presents the current status of the company, the short and long-term plans, and the status of issues and problems of general interest.

By cycle six, the re-launch process had been tailored to meet most of the MT needs. Risk analysis was recognized as an important part of the re-launch, and several forms and standards to report and analyze data had been developed.

Adjusting the TSP for Management
The MT uses the following definitions to facilitate communication, planning, and data collection: Overhead is the time spent in unplanned activities. A available time is the time a MT member is supposed to be in the company (e.g., 40 hours per week). A available task time is the time that each MT member has for planning purposes. As the TSP advocates, the available time is not the same as available task time. Part of the available time is used for answering e-mail and telephone calls, coffee breaks, interruptions, etc.; this time is called dead time. Task time is the time spent on planned activities. Direct total time is the sum of overhead and task time.

Launch and Re-Launc hes
A regular TSP project starts with a launch for the initial cycle and continues with re-launches for each subsequent cycle. As mentioned before, the MT decided to perform only re-launches. However, in January 2002, the MT began the practice of performing a launch for a yearlong period followed by re-launches for each calendar month. During the launch, the MT revisits the company mission, vision, and general strategy, and defines the objectives, strategy, and milestones for the year. Re-launches are for detailed planning for every month.

A typical re-launch lasts three days. It follows the general structure of a TSP launch, i.e. nine sequential meetings. However, the MT re-launch includes only the equivalent of the TSP meeting numbers two (objectives), three (strategy), four (general plan), six (detailed plan), and seven (risk analysis). In addition, other meetings have been added as illustrated in the following bullet points. A typical agenda for a re-launch consists of the following meetings:

- Identify the activities for the cycle, activities for future cycles, and responsibility for each activity.
- Resolve dependencies.
- Define the date and time for weekly meetings and next re-launch.
- Detailed planning (individually).
- Prepare the presentation for the general meeting.
- Hold the general meeting.
- During the review of personal issues, each member of the MT describes personal issues that might be or will be affecting his/her performance such as feeling burnout, a wedding, a vacation, or a new baby.

Risk analysis is fundamental because there are many risks that could lead to bankruptcy or company dissolution. The risk analysis process follows the TSP approach. Risks are sorted according to likelihood and impact. Top risks are considered and activities to mitigate them are defined. Each risk has a responsible person who tracks the status of the risk. Contrary to a regular TSP re-launch, the MT decided to perform risk analysis before detailed planning because the risk analysis might produce a change in the strategy of the cycle.

Running the Plan
After the re-launch, every MT member has a list of the tasks that he or she will perform during the cycle. Each MT member records the time that he/she has spent in each of the planned tasks. When a planned task is finished, the MT member that performed the task gets earned value for it. If the MT member performs an unplanned task, he/she records it as overhead.

Several administrative tasks have been detected. Examples include consolidating MT data; make agendas for weekly, post-mortem, and re-launch meetings; back-up documentation; and keep the project notebook (i.e., a binder with hard copies of all the documents produced) up to date. These tasks have been distributed among members of the MT.

Weekly Status Meetings and Post-Mortem
Weekly meetings follow an agenda. Typical roles for the weekly meetings include the discussion leader for each agenda item, the timekeeper, and the recorder. Minutes are written during the meeting and e-mailed to the MT after the meeting is finished.

The MT modified the TSP weekly status meeting agenda. The major topics of
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Consequently, the roles correspond to the
task time), standards for collecting data,
agendas and minutes, and a checklist to
submit data for consolidation.
It has been necessary to define some
policies. These include rules for setting
deadlines to submit weekly and post-
mortem data, rules to determine the time
an agenda has to be distributed before the
meeting, and rules for canceling or delay-
ing a meeting.

Byproducts
The MT has produced several products
such as a process for preparing post-
mortem data, forms to summarize data
from the cycle (e.g., overhead, task time,
uncompleted tasks), calculation of indica-
tors (e.g., estimation errors, overhead vs.
task time), standards for collecting data,
and submitting data for consolidation.

Lessons Learned
The Process
TSP team member roles (e.g., design man-
ger, customer interface manager, etc.) do
not apply to the MT context. The MT
tried to define new team roles but it was
not worthwhile. The MT realized that
managing the company is their project.

Consequently, the roles correspond to the
job positions (i.e., the CEO, the COO,
etc.). Thus, there was no need to redefine
them. Nevertheless, there are several
administrative activities necessary to man-
gage the team. As mentioned before, these
activities were assigned to MT members.

Work balance is not done as it is typi-
cally done in the TSP because the MT
members have very specific activities.
There are few tasks that can be performed
by more than one team member.
Nevertheless, the MT does some redistrib-
ution of tasks in situations when one
MT member is overloaded and the activities
that he/she has to do are of high priority.

Weekly meetings have been exception-
ally helpful to improve MT communica-
tion. As the company grows, it is difficult
for every MT member to be aware of the
current status of each area of the com-
pany. During weekly meetings, each MT
member presents a summary of major
decisions, initiatives, problems, etc., in
his/her area. This practice has increased
the levels of awareness about the status
of the company and the issues that each MT
member is dealing with.

One aspect that has not been resolved
completely involves timing and meeting
time commitments. Examples of this
issue include submitting data for consoli-
dation on time, starting meetings on time,
and scheduling three full days in a row for
a re-launch. Due to the nature of the
work that the MT members perform, it is
difficult to force them to meet these types
of time commitments.

Collecting time data has been chal-
Ienging. The MT uses the prototype TSP
tool that is provided by the Software
Engineering Institute to collect data. This
prototype is implemented in Microsoft
Excel, which means that the tool is not
very accessible. For example, when MT

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members go away from headquarters,
which is very often, it is impossible to
carry the tool to keep an accurate time
log. This mobility problem has been
addressed by writing down the time log
on a piece of paper; or using a simple
time log tool that runs on hand-held com-
puters, or more drastically, estimating the
times. The inconvenience in all these solu-
tions is re-typing the time log into the
TSP tool.

Re-Launches
Re-launches are very effort demanding; 10-hour workdays and pizza dinners are
common. At the end of the three days,
the MT is really tired. It has been pro-
posed that one day be added to the re-
launch. However, getting three consecu-
tive full days from an executive is difficult.

Getting four days is unrealistic. Other
strategies have been tried with different
levels of success such as having a social
activity at the end of day two, stopping
work at 6 p.m. or starting at 10 a.m. on
one of the three days.

During the early cycles, a considerable
amount of time in re-launch was invested
in detailed planning. Now, the MT spends
more time defining the strategy and
attending to urgent issues. For example,
there are situations when the plan for the
cycle depends on getting a contract. Thus,
performing a good strategy and risk
analysis should be the priority.

One important difference between the
MT and a software team is that there are
fewer interdependencies in the activities
of the MT members. Detailed planning
can be done individually because just a
few interdependencies have to be cleared
out.

Many issues and action items are pro-
duced during weekly meetings and re-
launches and are recorded in the minutes.
However, there are so many issues and
action items that this approach is no
longer adequate. There is a need for
improving the process of tracking and
prioritizing issues and action items.

General
Characterization of quality work has been
an unresolved issue. Quality management
is a fundamental component of the TSP
(e.g., the fifth meeting of a TSP launch).
Moreover, one of the QuarkSoft’s driving
ideas is to work with quality. The MT has
searched for a way to include quality man-
agement in the TSP-adapted process. But,
what does quality mean in the MT work
context? Unfortunately, the MT has not
found a satisfactory answer to this ques-
tion.

MT members have had difficulties in
stabilizing their task time estimates.
Specifically, the CEO time estimates have
varied greatly because among other fac-
tors, he performs many different activities
throughout the cycles. This reduces the
chance to collect historical data on the
same activity. Moreover, some of the
CEO’s tasks do not seem to behave con-
sistently. For example, closing a contract
has a wide range of variability.

The CEO has approached this prob-
lem by shifting from fine granularity es-
timation to coarse granularity estimation in
closing-a-contract estimating. Instead of
estimating the entire time for closing each
contract in full, he uses historical data
from previous contracts to assign a num-
ber of hours to this activity per week.

The COO has adopted a similar
approach. He uses historical data to calculate the average time devoted to supervising a project, then uses this average to estimate the weekly amount of time he would plan for each of the projects he supervises.

The CFO is the only member of the MT who has no previous background on processes. Although she comes from a managerial background, she has been very receptive to the concepts of the TSP and on collecting data. She shows a commitment to improving her estimates. She comments that having detailed plans allows her to better organize her days.

When beginning the second cycle, the MT agreed that its members needed to be up to date in their area of expertise (e.g., the CFO needed to be current in tax reforms, and the COO needed to be current in new technologies). Thus, the MT started planning time every week for what was called continuous education and actualization. However, it did not work; the workload for daily activities was too much. As a result, the MT started using the time scheduled for continuous education for other more important activities. Continuous education still is a major concern, so the MT changed strategies. Nowadays, each MT member is required to give a seminar every cycle that is open to all employees. He/she presents a paper that he/she has read. This practice has been working fine so far.

**Workload**

Detailed planning has been very useful in detecting important issues such as excessive workload, unimportant tasks, identification of critical weeks, company milestones, and major company turning points.

It has been particularly helpful to have data on workloads and direct total time of each MT member. This data has helped put the effort required to run the company in perspective. For example, there have been weeks when a team member has worked more than 50 direct total hours per week (this figure means that he/she has spent at least 60 to 70 hours a week doing company-related activities). It is easier to see when the company is overshadowing the MT member’s life. Working more than 50 direct total hours means that the MT member has had no time for family, social activities, personal care, etc. This fact is important because stressed MT members are less effective. But knowing how much time the MT must commit to the company is still a debatable issue.

**Overhead**

For planning purposes, the MT used an available time of 40 hours per week; a utilization factor of 75 percent, that is, to use 30 hours per week for direct planned tasks (i.e., available task time); and a time of 10 hours for overhead and dead time. After a few cycles, it was clear that each role behaved differently; planning based on those figures was not resulting in accurate estimations.

For example, historical data showed that the CEO invested about 50 percent of his/her direct total time in overhead. For the CFO, COO, and SEPG, the figure was about 30 percent to 40 percent overhead. These numbers were critical, because many important planned activities were not performed. The earned value of the team was consistently below 70 percent and, in some weeks, below 45 percent.

It was decided that the CEO would make his plans with a utilization factor of 50 percent, that is, allocating 20 hours per week for planned activities and the rest for overhead and dead time. For the rest of the team, a utilization factor of 65 percent was decided (i.e., 26 hours per week of available task time). The MT has been producing more realistic plans since these changes were implemented. The team’s weekly earned value has improved, and the overhead decreased.

One interesting issue derived from using these utilization factors is free time. Assume that in a certain week a MT member finished all his/her planned tasks and he/she has no overhead. In other words, he/she has some free time in that week. The MT decided that each member should maintain a pool of tasks. This pool contains tasks that are important but have been delayed for future cycles. Thus, the team member with free time can check his/her pool of tasks and begin doing the one with highest priority according to the cycle’s objectives and strategy.

Another interesting issue that arose from overhead analysis is that there are different types of overhead. In particular, the CEO and COO started collecting transportation data and detected that they invested a lot of travel time visiting customers to conduct negotiations, project supervision, and meetings. They found that in some weeks they invested as much as six hours on transportation (30 percent of the direct task time for the CEO). From this the question arose, “Should the MT charge the customer for this time?” This question is relevant, especially when the client delays a meeting or cancels it at the last minute.

**Conclusions**

MT members produce a wealth of information that can be used effectively to make decisions and to improve team performance. The plan can be adjusted quickly, according to business needs, priorities, and risks. For a start-up company, short-term objectives might change rapidly. The TSP approach to management has allowed the MT to make rapid adjustments to these changes. In addition, having a detailed cycle strategy makes it easier to plan for such things as vacations, conferences, and business trips, or detecting warnings of employee burnout and recommending the best time for vacations for overwhelmed team members.

There has been only one cycle without a re-launch. The re-launch of February 2002 had to be cancelled. The result was a management nightmare. MT members went back to fire-fighting mode, the total direct time increased, several unattended issues caused several important problems, and one MT member declared himself burned out. Moreover, re-launch for cycle three took four days. After this experience, the commitment to do re-launches as planned and to work based on plan has strengthened.

Having the entire team make decisions has been a major advantage. Every MT member knows and decides on the most convenient time to do important things, such as making major investments and purchases, hiring engineers, and scheduling vacations and training.”

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References

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