# Control

## Implementing and Monitoring Control Plan

With a foundation for upgrading to Solaris 8 from Solaris 2.5.1 in place, LM would need control measures in place for implementing and monitoring the upgrade.

Solaris 8 should signal an overall minor improvement in the system’s health and performance over 2.5.1. Although this upgrade would constitute such a small part in the software architecture, the amount of bugs in the system should decrease as a result. With simultaneous evolving baselines and general instability in the software, directly correlating bugs produced after implementing Solaris 8 may be difficult, however, forensic analysis of bug causes could reveal the root software problem(s) product(s). The most effective, direct way to measure the enhancements gained by upgrading to Solaris 8 would be analyzing number of bugs and their sources as well as system health/performance.

If Solaris 2.5.1 was ever a limiting factor in system health/performance, measuring effects of upgrading to Solaris 8 could be as simple as measuring how often Solaris 8 was the limiting performance factor and by what deficit compared to Solaris 2.5.1.

Many technical measures could be assessed at a system level, however, demonstrating the measures directly tie in may be difficult. To counteract this, engineers could be surveyed and encouraged to report any issues/bugs they find with the upgraded Solaris 8 software. Engineers working with the software everyday may find issues with the software that support the measures and could give leads on which measures may need further analysis to evaluate the effectiveness of the upgrade. For example, if a software engineer noticed that the distribution of central processing units (CPUs) across the hardware is not the same as before the upgrade, this could prompt further investigation to determine if Solaris is causing issues. The engineers would be more in tune with the correlations in a systems-of-systems context to determine how Solaris 8 affects TBMCS even if there is not measures in place to support their hunches at the time.

From base to base, audits by configuration management personnel could determine the progress of each base’s upgrade to Solaris 8. During this time period, reporting by each base of their experience with the upgrade process to Solaris 8 would be extremely important for better assessment of the upgrade’s impact. If one base is reporting performance issues during the upgrade process but no other base has, the problem may not lie with the software upgrade as much as the software/hardware configuration at that particular base. If multiple bases are reporting slower performance times and common hardware/software integration issues during the upgrade process, this may signal a systematic process issue with the upgrade.

If during the upgrade to Solaris 8 major issues arise that can be directly attributed to the software, the immediate action is to isolate the problem(s) with the software as quick as possible and cut it off from the rest of the system. If the upgrade is affecting every base’s performance, the bases who haven’t upgraded their software to Solaris 8 will continue with Solaris 2.5.1 until the problem(s) is found and fixed. If one base runs into a major problem that is significantly affecting testing as a direct result of Solaris 8, that base will be isolated from the rest of the system until the problem(s) can be found and fixed. Depending on the indicated problem, shutting down the system temporarily may be necessitated. If a bug in the new software upgrade allows for unauthorized personnel to enter into TBMCS this would warrant such measures. Condition indicators and performance indicators should reveal similar to slightly improved metrics after the upgrade. Any measures not supporting this will warrant further investigation.

## Measured Progress and Success

During the implementation of Solaris 8 and months to years afterwards, bugs, performance, and user satisfaction should stabilize to better metrics. While Solaris may not be directly responsible for defects, it contributes to the software environment.

During implementation, the process control may be monitored by checklists and maintenance guidelines. Checklists could address testing each function used in Solaris 2.5.1 to see if those same functions work the same in Solaris 8, documenting any discrepancies so the information may be distributed program-wide. Each step of operation if not already documented from 2.5.1 may be documented for 8. If steps of operation are in place for 2.5.1, the steps may be updated for slight variances with 8. Separate documentation may overview the new information and uses in Solaris 8. Maintenance guidelines could provide useful sources of information for what to do for common problems encountered during the upgrade and troubleshooting for engineers still familiarizing themselves with the update.

LM could sub-contract with technicians working for Sun/Oracle during the initial implementation stages to ensure the upgrade goes smoothly and have subject matter experts on hand to address any shortcomings or troubleshooting. The technicians could give estimations as to what to expect performance-wise from the upgrade and even what health/performance measures LM should look out for to determine the success of the upgrade.

Most handedly, improvements may be measured by employee satisfaction with the upgrade. Employees should enjoy the benefits the most when working with Solaris 8. Employee’s time spent in Solaris 8 could potentially be tracked. This may give indicators of success if employees are spending less time overall using Solaris 8, indicating its advanced features lessened the time needed to use it. Upgrades to software in general should not cause system malfunctions, however, the end-users can experience the upgrades’ functionality and flow their opinions of it out to higher management.

Within 3-6 months after upgrading at each base, LM should have gathered enough data to resolve any conflicts with the upgrade. Any issues with the upgrade would most likely be discovered at that point in time. TBMCS could continue moving forward with its operational tests with LM feeling confident Solaris 8 is not causing system integration issues.

## Organizational Improvements for Success

Building on the future success of upgrading to Solaris 8, TBMCS would benefit from more timely software upgrade practices. Rather than making the jump from Solaris 2.5.1 to Solaris 8, practices could be put in place so TBMCS would be prepared for each Solaris version update as they are released.

During the upgrade process, a minimum of one computer at each base could be running Solaris 8 while not connected to the TBMCS network. By doing so, engineers who would work with the technology would have opportunities to familiarize themselves with the differences before their base of operations received the upgrade embedded in their systems. This could apply with any new software upgrades, programs, and applications introduced throughout the TBMCS life cycle.

After upgrading to Solaris 8, training materials could be put together to highlight the differences in capabilities and uses. Most engineers would be familiar with its 2.5.1 predecessor and would only need to know the fundamental changes in the upgrade.

Better integration and configuration management practices could be put in place. LM did not have their systems engineering practices worked out well with the government which resulted in testing delays, repeated tests, botched tests, etc. LM may have benefited from implementing more isolated tests and having the bugs/defects worked out well with those before advancing to full system operational tests. On a process level, this would result in a quick, spinal, iterative approach that worked later on in the life cycle of the product.

TBMCS struggled in delivering the proper resources to trainees. The trainees often cited lack of operational knowledge by the facilitator as an inhibiting factor. Training facilitators could benefit from active involvement during the testing of the TBMCS to get a more fundamental understanding of the system. More resources could be procured for the facilitators to learn from. The facilitators themselves could go through the training process to figure out where their knowledge or transferring of knowledge may be lacking.