

**CEBU INSTITUTE OF TECHNOLOGY
UNIVERSITY**

COLLEGE OF COMPUTER STUDIES

Software Project Management Plan

for

Insert Name of System

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1. Overview

1.1. Project Summary

1.1.1. Purpose, scope and objectives

This subclause of the SPMP shall define the purpose, scope, and objectives of the project and the products to be delivered. This subclause should also describe any considerations of scope or objectives to be excluded from the project or the resulting product. The statement of scope shall be consistent with similar statements in the project agreement and other relevant system-level or business-level documents.

This subclause of the SPMP shall also provide a brief statement of the business or system needs to be satisfied by the project, with a concise summary of the project objectives, the products to be delivered to satisfy those objectives, and the methods by which satisfaction will be determined. The project statement of purpose shall describe the relationship of this project to other projects, and, as appropriate, how this project will be integrated with other projects or ongoing work processes.

A reference to the official statement of product requirements shall be provided in this subclause of the SPMP.

Example 1: HMCPOI Inspection & Management System

HMC Point Of Interest (POI) Inspection & Management System (hereafter HPIMS) development project is a project with a goal of improving the customer's productivity by computerizing his or her job. The job is mainly inspecting, cleansing and manipulating & analyzing the errors in the POI MDB data file provided by the 3rd party content providers.

The scope of this project is to develop a computerized way of doing the customer's job and help to increase his or her productivity and quality of the final product, the deliverable to the next step of the entire process for developing car navigation system.

Therefore, the objective of the project is improving the productivity by replacing customer's time with computer's time and improving the quality of the data input to the next, 'commercializing' step by expanding the coverage of the inspection and applying defined rules.

The system does not include the work to change the POI data to the compressed form for storing.

Example 2: Nirvana National Bank ATM Software Project

The purpose of the project is to analyze the requirements of, design, implement, and maintain the software for both the central bank server and the ATM client machines that will comprise the Nirvana National Bank ATM network, according to the requirements specified by the client.

All activities directly related to the purpose are considered to be in scope. All activities not directly related to the purposes are considered to be out of scope. For example, issues concerning ATM hardware and network availability are not within the scope of this project.

The objectives of the project are as follows:

- complete the project by the project due date
- complete the project within budget
- provide all deliverables identified in section 1.1.3 by the project due date
- fulfill all stated requirements, as in the SRS, of the software product deliverable, which fall into one of the following categories
 - o central bank customer database modifications
 - o interface with central bank computerized accounting system
 - o customer ATM transactions o customer ATM statement
 - o weekly statistical report of ATM operations

1.1.2. Assumptions and constraints

This subclause of the SPMP shall describe the assumptions on which the project is based and imposed constraints on project factors such as the schedule, budget, resources, software to be reused, acquirer software to be incorporated, technology to be employed, and product interfaces to other products.

Example 1: HMCPOI Inspection & Management System

The project shall be finished in August 5, 2005, the end of the third semester of the Master of Software Engineering (MSE) course. All codes shall be written in Java-family language.

The system shall be standalone application in PC environment on MS Windows XP with Microsoft Access DB.

Example 2: Nirvana National Bank ATM Software Project

The project will be planned with the following assumptions:

- this project is a component of a larger project
- this project will deliver only the software components of the larger project
- initial estimates for the project as provided in this SPMP are +/- 40%
- the larger project that this project is a part of has already defined the hardware that the software will run on
- the software products will be Windows NT-based using Windows Open Services Architecture / eXtensions for Financial Services (WOSA/XFS), supporting NNB's desire for an open architecture ATM product
- the ATM hardware has documentation available suitable for interface discovery
- the ATM hardware is defined (4th generation NCR ATM hardware) and detailed
- documentation about the platform will be delivered to Terasoft by June 1, 2004.
- a documented physical ATM computer network is being created in a separate project and will exist between each ATM client and the central bank in time for acceptance testing
- the ATM hardware is being handled as a separate project and will be available in time for the installation phase we will be able to acquire the expertise of two outside consultants from Banks, Etc. to assist with the requirements elicitation and detail design of the ATM client/server software
- this SPMP is submitted as a firm-fixed-price (FFP) bid; the project shall not exceed the established budget consultation with NNB and the Steering Committee comes at no cost to the project
- Terasoft will be able to acquire commitment from the required staff for the duration of their activities. The project will be planned with the following constraints:
 - Budget
 - \$3,000,000 (25% of total \$12,000,000 budget; software portion only)
 - Time
 - one year
 - once the software product is installed on the ATM machines, it will take 30 days for NNB to install the physical ATM machines in their permanent locations
 - Staff
 - two outside consultants from Banks Etc. will be required to assist in the requirements and detail design phases of the project, so as to lend their extensive ATM experience to the project. The consultants will also supplement our team elsewhere, as necessary.
 - Maintenance
 - the software will have to be designed such that maintenance expenses do not exceed \$100,000 per year (software maintenance portion of the total \$600,000 budget)

1.1.3. Project deliverables

This subclause of the SPMP shall list the work products that will be delivered to the acquirer, the delivery dates, delivery locations, and quantities required to satisfy the terms of the project agreement. In addition,

this subclause shall specify the delivery media and any special instructions for packaging and handling. The list of project deliverables may be incorporated into the SPMP directly or by reference to an external document such as a contract data requirements list (CDRL) or a product parts list (PPL).

Example 1: HMCPOI Inspection & Management System

As part of the project, the 4WD team will deliver the following artifacts to the customer:

- A working version of HMC POI Inspection & Management System.
- Code library (and supporting documentation) of the working version of HPIMS.
- Systems Requirement Specification (SRS) document (including a list of features within the scope of the Studio project) and the Quality Assurance requirements.
- Architecture and (high and low level) design documents for customer validation and verification.
- Status reports (throughout the project lifecycle) – on a weekly or case-by-case basis.
- Project Management Artifacts such as the Software Project Management Plan.
- All other artifacts that the team might have generated that add value to the final deliverable.

Example 2: Nirvana National Bank ATM Software Project

All of the items listed in this subsection are the deliverables requested by NNB's ATM project manager that are to be provided prior to completion of the project.

- Software program and library binaries
- Software documentation
 - Installation documentation
 - End-user documentation
 - updates applied to NNB's central bank documentation
- Installation of software program and library binaries on target hardware
- Software training performed against affected users
 - ATM site users (i.e. bank branch staff)
 - ATM site installers
 - Software maintenance team
- Project documentation
 - Software Requirements Specification (SRS)
 - Software Design Specification (SDS)
 - Software Project Management Plan (SPMP)
 - Software Test Plan (STP)
 - Software Quality Assurance Plan (SQAP)
 - Software Configuration Management Plan (SCMP)
 - Software Verification and Validation Plan (SVVP)

1.1.4. Schedule and budget summary

This subclause of the SPMP shall provide a summary of the schedule and budget for the software project. The level of detail should be restricted to an itemization of the major work activities and supporting processes as, for example, those depicted by the top level of the work breakdown structure.

Example 1: HMCPOI Inspection & Management System

The customer contracted for the system development with the university in some budget, so there is no need to mention about it further.

Milestone	Date (initiation / completion)
Project Initiation	September 13, 2004 (initiation)
Requirements elicitation (1 st phase)	October 06, 2004 (initiation)

Risk Management Plan	October 06, 2004 (completion)
Training Plan	October 20, 2004 (completion)
Quality Assurance Plan (1 st phase)	November 24, 2004 (completion)
Estimation Plan	December 01, 2004 (completion)
Quality Assurance Plan (refined)	January 19, 2005 (completion)
Pilot Development	January 19, 2005 (initiation)
Development Plan	February 08, 2005 (completion)
Requirement specification	April 11, 2005 (completion)
UI Prototype (evolutionary)	May 15, 2005 (completion)
Software Architecture & Design	April 30, 2005 (completion)
Implementation (kick-off)	June 01, 2005 (initiation)
Project Completion	August 05, 2005 (completion)

[Table 1.1] Schedule Allocation Plan

1.2. Evolution of plan

This subclause of the SPMP shall specify the plans for producing both scheduled and unscheduled updates to the SPMP. Methods of disseminating the updates shall be specified. This subclause shall also specify the mechanisms used to place the initial version of the SPMP under configuration management and to control subsequent changes to the SPMP.

Example 1: HMCPOI Inspection & Management System

Version	Primary Author(s)	Description of Version	Date Expected
Draft	Jaeha Song	Initial draft created for distribution and review comments	Nov. 12, 2004
Preliminary	Kuyul Noh	Second draft incorporating initial review comments, distributed for final review	Nov. 19, 2004
Prerelease	Changki Kim	Third draft that is about to be released to the customer	Nov. 27, 2004
Final	TBD	First complete draft, which is placed under change control	Dec. 13, 2004
Revision 1	TBD	Revised draft, revised according to the change control process and maintained under change control	TBD
etc.	TBD	TBD	TBD

[Table 1.2] Evolution Plan

2. References

This clause of the SPMP shall provide a complete list of all documents and other sources of information referenced in the SPMP. Each document should be identified by title, report number, date, author, path/name for electronic access, and publishing organization. Other sources of information, such as electronic files, shall be identified using unique identifiers such as date and version number. Any deviations from referenced standards or policies shall be identified and justifications shall be provided.

Example 1: HMCPOI Inspection & Management System

- [1] IEEE Std 1058-1998 IEEE standard for software project management plans
- [2] Karl E. Wiegers SOFTWARE REQUIREMENTS, 2003 Microsoft

Definitions

This clause of the SPMP shall define, or provide references to, documents containing the definition of all terms and acronyms required to properly understand the SPMP.

Example 1: HMCPOI Inspection & Management System

CMU	Carnegie Mellon University
DB	Database
CVS	Concurrent Versions System
DLD	Detailed Level Design
GUI	Graphical User Interface
HMC	Hyundai motors Corporations
HPIMS	HMC POI Inspection and Management System
ICU	Information and Communication University
MDB	Microsoft Access Database file
POI	Point of Interest
RUP	Rational Unified Process
SOW	Statement of Work
SPMP	Software Project Management Plan
SRS	Software Requirements Specification

Project organization

This clause of the SPMP shall identify interfaces to organizational entities external to the project; describe the project's internal organizational structure; and define roles and responsibilities for the project.

Example 1: HMCPOI Inspection & Management System

This clause of the SPMP shall identify interfaces to organizational entities external to the project; describe the project's internal organizational structure; and define roles and responsibilities for the project.

4.1. External structure

This subclause of the SPMP shall describe the organizational boundaries between the project and external entities. This should include, but is not limited to, the following: the parent organization, the acquiring organization, subcontracted organizations, and other organizational entities that interact with the project. Representations such as organizational charts and diagrams may be used to depict the project's external interfaces.

Example 1: HMCPOI Inspection & Management System

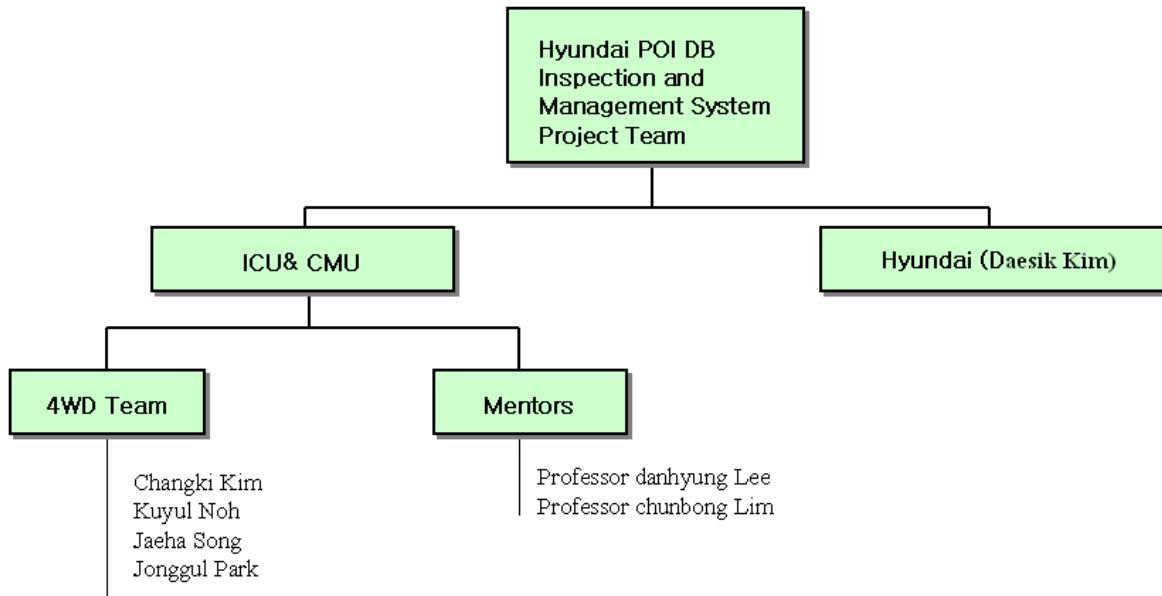


Figure 1 Organization Diagram(Fall 2004)

4.2. Internal structure

This subclause of the SPMP shall describe the internal structure of the project organization to include the interfaces among the units of the software development team. In addition, the organizational interfaces between the project and organizational entities that provide supporting processes, such as configuration management, quality assurance, and verification and validation, shall be specified in this subclause. Graphical devices such as organizational charts or diagrams should be used to depict the lines of authority, responsibility, and communication within the project.

Example 1: HMCPOI Inspection & Management System

This project is to be conducted by 4WD team using the technology learned in the MSE program. The way

the team applies what it learns will be checked and advised by mentors from ICU and CMU faculties so that the team can produce the qualitative product following advanced process.

4.3. Roles and responsibilities

This subclause of the SPMP shall identify and state the nature of each major work activity and supporting process and identify the organizational units that are responsible for those processes and activities. A matrix of work activities and supporting processes vs. organizational units may be used to depict project roles and responsibilities.

S

TEAM MEMBER	ROLE & RESPONSIBILITIES	
	SEM 1	SEM 2
Member 1		
Member 2		
Member 3		
Member 4		
Member 5		

[Table 4.3.1] Role and Responsibilities

Managerial process plans

This clause of the SPMP shall specify the project management processes for the project. This clause shall be consistent with the statement of project scope and shall include the project start-up plan, risk management plan, project work plan, project control plan, and project closeout plan.

5.1. Start-up plan

This subclause of the SPMP shall specify the estimation plan, staffing plan, resource acquisition plan, and training plan. Depending on the size and scope of the project, these plans may be incorporated directly or by reference to other plans.

5.1.1. Estimation plan

This subclause of the SPMP shall specify the cost and schedule for conducting the project as well as methods, tools, and techniques used to estimate project cost, schedule, resource requirements, and associated confidence levels. In addition, the basis of estimation shall be specified to include techniques such as analogy, rule of thumb, or local history and the sources of data. This subclause shall also specify the methods, tools, and techniques that will be used to periodically re-estimate the cost, schedule, and resources needed to complete the project. Re-estimation may be done on a monthly basis and aperiodically as necessary.

Example 1: HMCPOI Inspection & Management System

Jobs for each of the three semesters will be divided into short term phase based on the delivery of the project artifacts and counted as milestones.

Each phase will cover part of the Work Breakdown Structure that was created at the beginning of the project through TSP Launch. Excel-based TSP Support Tool will be used to produce and to track a schedule that includes milestones and resource allocations for the project.

At the beginning of each phase, 4WD team will have TSP Launch to define the tasks and the schedule. 4WD team will assess its status once a week and update and distribute the schedule accordingly. Every artifact will be reviewed by using formal review methods including walkthrough and inspection at the end of each phase.

4WD team will create the schedule together using Excel-based TSP Support Tool. Each team member must fill the every field in the tool upload the file into the main server by every Tuesday. The planning manager will consolidate each file and make a status report. The team lead and the planning manager will assess the effect of the delay, take corrective actions, and update schedule as necessary. The status report and rearranged schedule must be informed at weekly status meeting. 4WD team will notify the customer and mentors of any change affecting the due dates of deliverables.

Example 2: Nirvana National Bank ATM Software Project

Schedule, Cost, and Resource Estimates

An estimation chart showing activities, estimated duration, estimated cost, and estimated resource requirements is included in Appendix B.

Estimation methods

Schedule duration and work estimation for each leaf activity in the Work Breakdown Structure (WBS) will be performed using a combination of the following methods and data sources:

o Resource input

o For the resource(s) identified as being required to complete the activity, the resources will be asked for an estimate of the amount of time required to complete the activity. A detailed estimate

will be requested, broken down into subactivity milestones. Subactivity milestones tied to the “% complete” metric will force a consideration of everything that is involved in the activity as well as providing a basis for EVM monitoring.

o When more than one resource is assigned to the activity, their estimates will be collected independently and, if substantially different, meetings will be held between the project manager and all resources so that an agreement may be reached on a final estimate. This is in the spirit of the wideband delphi approach, but is modified for the size of our organization and tight project schedule.

o Organizational project history data

o Terasoft has been involved in numerous financial software development project in the past.

Data from those that are most relevant will be used to fine-tune the estimates for the activities on this project.

o Contractor project history data

o The contracting company that we use to assist in financial software development project has a substantial project history from which we can draw. The acquisition of two contractors from the company, as outlined in the project staffing plan, will give us access to this data for the purpose of making estimates.

Cost estimation for each activity will be performed by multiplying the amount of work expected by the hourly rate for the resources connected to the activity, multiplied by the percentage of participation that each resource expects to make toward the activity.

The resulting estimates for each leaf activity will be rolled-up to produce an estimate for the larger group of activities that the activity is a part of. The highest-level activity in the WBS (after attaching schedule, resource, and cost estimates) will therefore reflect the schedule and cost estimates for the entire project.

Re-estimation methods

When re-estimation is necessary, it will be performed using the following methods and data sources:

o Resource input

o Estimation of the amount of work remaining in the task will be collected from each resource. A detailed estimate will be requested, showing breakdown of the work remaining along with identifiable subactivity milestones. This will force consideration of all work remaining as well as provide a basis for continued EVM monitoring. Subactivity milestones will be restated, if necessary. A new estimate will be formulated using the same approach as in “Estimation Methods” above.

o Contractor input

o Following resource input, the Banks, Etc. contractors assigned to the project will be asked for an analysis of the work completed to date and the work remaining, as submitted by the involved resource(s). Their comments and feedback will be used to fine-tune the estimate provided by the attached resource(s).

Once new estimates have been collected, and if schedule is adversely affected (+/- 10%), organizational project history data will be used to determine whether or not it would be effective to add additional resources to assist in completing the activity, taking “roll-on” time into consideration.

Re-estimation Schedule

Time has been allocated in the schedule for monthly SPMP updates. Necessary updates to the cost, schedule and resource estimates will be included in these SPMP updates. However, such re-baselining will only take place in extreme circumstances, such as when significant scope change has been introduced.

The purpose of these monthly updates is to force allocated time toward maintaining the SPMP and to provide a schedule on which stakeholders can expect to see updates to the plan. A revised SPMP will be published following each of these update sessions regardless of whether any significant changes have been made so that it is obvious to all involved that the scheduled update has occurred.

Impromptu updates to the estimation plan will be made as necessary and communicated to those affected. In particular, detailed explanation is given below to the handling of communication of these update types:

- o Resource
- o Cost
- o Schedule

Resource

- o If an increase in existing allocation is required
 - o Affected resource
 - o Functional manager of affected resource 17
 - o If addition of internal resources is required
 - o Terasoft CEO

Cost

- o If an increase in costs is required but does not exceed the project budget
 - o Terasoft CEO
- o If an increase in costs is required which exceeds the project budget
 - o Terasoft CEO
 - o ATM Project Manager
- o If a decrease in costs is expected
 - o Teraosft CEO

Schedule

- o If an increase in schedule is required which does not exceed the deadline
 - o Terasoft CEO
- o If an increase in schedule is required which exceeds the deadline
 - o Terasoft CEO
 - o ATM Project Manager
- o If a decrease in schedule is expected
 - o Terasoft CEO

5.1.2. Staffing plan

This subclause of the SPMP shall specify the number of staff required by skill level, the project phases in which the numbers of personnel and types of skills are needed, and the duration of need. In addition, this subclause shall specify the sources of staff personnel; for example by internal transfer, new hire, or contracted. Resource Gantt charts, resource histograms, spreadsheets, and tables may be used to depict the staffing plan by skill level, by project phase, and by aggregations of skill levels and project phases.

[Example 1: HMCPOI Inspection & Management System](#)

Table 5-1 shows the main individuals involved in the TSP Support Tool project and their availability.

Name	Affiliation to project	Fall 2004	Spring 2005	Summer 2005
Changki Kim	MSE Student/Team member	Part Time	Part Time	Full Time
Kuyul Noh	MSE Student/Team member	Part Time	Part Time	Full Time
Jonggul Park	MSE Student/Team member	Part Time	Part Time	Full Time
Jaeha Song	MSE Student/Team member	Part Time	Part Time	Full Time
Choonbong Lim	Mentor	Part Time	Part Time	Part Time
Danhhyung Lee	Mentor	Part Time	Part Time	Part Time
Mel Rosso	Mentor	Part Time	Part Time	Part Time

[\[Table 5.11.2\] Staff Plan](#)

5.1.3. Resource acquisition plan

This subclause of the SPMP shall specify the plan for acquiring the resources in addition to personnel needed to successfully complete the project. The resource acquisition plan should include a description of the resource acquisition process, including assignment of responsibility for all aspects of resource acquisition. The plan should include, but not be limited to, acquisition plans for equipment, computer hardware and software, training, service contracts, transportation, facilities, and administrative and janitorial services. The plan should specify the points in the project schedule when the various acquisition activities will be required. Constraints on acquiring the necessary resources shall be specified. This subclause may be expanded into additional subclauses of the form 5.1.3.x to accommodate acquisition plans for various types of resources to be acquired.

Example 1: HMCPOI Inspection & Management System

4WD team will have access to the computer facilities, books, and software available in MSE program. The team's support manager will lead the team in determining its support needs and in obtaining the needed tools and facilities via the Studio's librarian and tool smith of the course.

Example 2: Nirvana National Bank ATM Software Project

All human resources shall be acquired for the purposes of working on the project by the project manager. The project manager must present the resource requirements in detail to the CEO of Terasoft and the functional managers of each requested resource; the CEO of Terasoft has the ultimate responsibility for approving resources to work on Terasoft's projects.

The project manager shall be responsible for acquiring all non-human resources required by the project. The non-human resources identified as being required for the project are:

• • •

Printing services Computer time for object code generation Computer software purchase Software repository

The acquisition of each non-human resource will be described separately.

Printing Services

Required Dates: 1/10/2005, 1/24/2005

Request By: 12/20/2004 Terasoft uses an outside printing company (Trees, Etc.) for all volume printing requirements. Trees, Etc. requires 3 weeks advance notification for any large volume printing requests in order to schedule our print jobs against those of their other customers. Printing services through Trees, Etc. are requisitioned via Terasoft's administrative assistant.

Computer time for object code generation

Required Dates: 2/4/2005, 2/7/2005, 3/1/2005, 3/30/2005, 4/6/2005

Reserve By: 1/21/2005 Computer time for object code generation is provided in-house at Terasoft and is managed by Barry Bush (Computer System Services). Requests for object code generation must be made 2 weeks in advance through Terasoft's administrative assistant.

Computer software purchase

Required Date: 3/22/2005

Request By: 3/16/2005 Computer software purchases are made by purchase order and are processed through Terasoft's administrative assistant. The administrative assistant will be able to let us know if any existing software licenses are available within Terasoft that may be transferred from other, terminated projects; doing so represents potential cost savings. The administrative assistant will be responsible for selecting the purchase vendor and arranging payment and receipt of products.

Software repository

Required Dates: 3/2/2004, 3/9/2004

Request By: 2/24/2004

Software repository storage space is provided in-house at Terasoft and is managed by Jane Seagal (Repository Manager). Requests for repository storage space must be made 1 week in advance through Terasoft's administrative assistant.

5.1.4. Project staff training plan

This subclause of the SPMP shall specify the training needed to ensure that necessary skill levels in sufficient numbers are available to successfully conduct the software project. The training schedule shall include the types of training to be provided, numbers of personnel to be trained, entry and exit criteria for training, and the training method; for example, lectures, consultations, mentoring, or computer-assisted training. The training plan should include training as needed in both technical and managerial skills.

Example 2: Nirvana National Bank ATM Software Project

No training for Terasoft's project participants will be provided. The project team members are already well-trained in their respective disciplines and each has many years of experience in working with the waterfall lifecycle model and its associated phases. In addition, each member has undergone many hours of training under Terasoft's organizational training initiatives, including training in Personal Software Process (PSP) and Team Software Process (TSP).

In terms of domain-specific knowledge as it relates to the development ATM software, we have accommodated our limited experience in this area by recognizing the need for two consultants from a company with which we have had a good working relationship in the development of financial software. The two consultants whose services we will acquire from Banks, Etc. will fill our knowledge gap in this area.

5.2. Work plan

This clause of the SPMP shall specify the work activities, schedule, resources, and budget details for the software project.

5.2.1. Work activities

This subclause of the SPMP shall specify the various work activities to be performed in the software project. A work breakdown structure shall be used to depict the work activities and the relationships among work activities. Work activities should be decomposed to a level that exposes all project risk factors and allows accurate estimate of resource requirements and schedule duration for each work activity. Work packages should be used to specify, for each work activity, factors such as the necessary resources, estimated duration, work products to be produced, acceptance criteria for the work products, and predecessor and successor work activities. The level of decomposition for different work activities in the work breakdown structure may be different depending on factors such as the quality of the requirements, familiarity of the work, and novelty of the technology to be used.

Example 1: HMCPOI Inspection & Management System

Following table shows our work activities during this course. Detail activities of each semester will be defined in the beginning of the semester.

<input type="checkbox"/> HMC POI Inspection & Management Project	Mon 04-09-13	Fri 05-08-05
<input type="checkbox"/> Project Management	Mon 04-09-13	Fri 05-07-29
<input type="checkbox"/> Process Define	Mon 04-09-13	Fri 04-11-19
Communication Process Define	Mon 04-09-13	Fri 04-09-17
Requirement Management Process Define	Mon 04-09-20	Fri 04-10-01
Risk Management Process Define	Mon 04-10-11	Fri 04-10-22
Configuration Management Process Define	Mon 04-10-25	Fri 04-11-05
Quality Management Process Define	Mon 04-11-08	Fri 04-11-19
<input type="checkbox"/> Schedule Planning	Mon 04-09-13	Wed 04-10-06
WBS Define	Mon 04-09-13	Fri 04-09-24
Duration Define	Thu 04-09-30	Wed 04-10-06
Sequence Define	Thu 04-09-30	Wed 04-10-06
<input type="checkbox"/> Define Role & Allocation	Mon 04-09-13	Fri 04-09-17
Define Role	Mon 04-09-13	Fri 04-09-17
Role Allocation	Mon 04-09-13	Fri 04-09-17
<input type="checkbox"/> Meeting	Thu 04-09-16	Fri 05-07-29
Kick off meeting	Fri 04-09-17	Fri 04-09-17
<input type="checkbox"/> Weekly Meeting	Fri 04-09-17	Fri 05-07-29
<input type="checkbox"/> Client Meeting	Thu 04-09-16	Thu 05-07-21
<input type="checkbox"/> Reflection Meeting	Thu 04-09-30	Thu 05-07-28
<input type="checkbox"/> Training	Mon 04-09-13	Tue 04-10-26
TSP Training	Mon 04-10-11	Tue 04-10-26
EVMS Training	Mon 04-09-13	Mon 04-09-13

<input type="checkbox"/> Presentation	Mon 04-10-18	Thu 05-08-04
<input type="checkbox"/> MOSP of 2004 Fall	Mon 04-10-18	Fri 04-10-29
Make presentation ppt	Mon 04-10-18	Fri 04-10-22
Discuss and revise presentation content	Mon 04-10-25	Tue 04-10-26
Rehersal	Wed 04-10-27	Wed 04-10-27
Presentation	Fri 04-10-29	Fri 04-10-29
<input type="checkbox"/> EOSP of 2004 Fall	Mon 04-12-06	Thu 04-12-16
Make presentation ppt	Mon 04-12-06	Fri 04-12-10
Discuss and revise presentation content	Mon 04-12-13	Tue 04-12-14
Rehersal	Tue 04-12-14	Wed 04-12-15
Presentation	Thu 04-12-16	Thu 04-12-16
MOSP of 2005 Spring	Fri 05-03-04	Fri 05-03-04
EOSP of 2005 Spring	Thu 05-05-05	Thu 05-05-05
MOSP of 2005 Summer	Thu 05-06-30	Thu 05-06-30
EOSP of 2005 Summer	Thu 05-08-04	Thu 05-08-04
<input type="checkbox"/> Presentation for client	Mon 04-12-13	Fri 05-07-29
Intermediate Briefing Preparation	Mon 04-12-13	Thu 04-12-16
Intermediate Briefing	Fri 04-12-17	Fri 04-12-17
Final Briefing Preparation	Mon 05-07-25	Thu 05-07-28
Final Briefing	Fri 05-07-29	Fri 05-07-29

<input type="checkbox"/> Cycle1	Mon 04-09-20	Fri 04-12-10
Launch 1	Mon 04-09-20	Wed 04-09-22
Strategy 1	Mon 04-09-20	Wed 04-09-22
Plan 1	Mon 04-09-20	Fri 04-09-24
<input type="checkbox"/> Requirement Analysis 1	Thu 04-09-30	Fri 04-12-10
<input type="checkbox"/> Feasibility Study	Thu 04-09-30	Thu 04-10-21
Feasibility Study	Thu 04-09-30	Fri 04-10-08
SOW Documentation	Mon 04-10-11	Wed 04-10-20
SOW Review	Thu 04-10-21	Thu 04-10-21
<input type="checkbox"/> Requirement elicitation and Analysis	Mon 04-10-11	Fri 04-10-22
Data Management Module Elicitation	Mon 04-10-11	Wed 04-10-20
Data Inspection Module Elicitation	Mon 04-10-11	Wed 04-10-20
Data Cleansing Module Elicitation	Mon 04-10-11	Wed 04-10-20
Data Analysis Module Elicitation	Mon 04-10-11	Wed 04-10-20
Non Functional Requirement Elicitation	Mon 04-10-11	Wed 04-10-20
Requirement List Review	Thu 04-10-21	Fri 04-10-22
<input type="checkbox"/> Requirements specification	Mon 04-10-25	Wed 04-11-17
Requirement Function Analysis	Mon 04-10-25	Wed 04-10-27
Domain Model Analysis	Mon 04-10-25	Wed 04-10-27
<input type="checkbox"/> Use Case Requirement Modeling	Thu 04-10-28	Fri 04-11-05
Use Case Diagram Modeling	Thu 04-10-28	Fri 04-11-05
Use Case Scenario Modeling	Thu 04-10-28	Fri 04-11-05
<input type="checkbox"/> Use Case Analysis	Mon 04-11-08	Wed 04-11-17
Use Case Static Analysis	Mon 04-11-08	Fri 04-11-12
Use Case Dynamic Analysis	Mon 04-11-08	Fri 04-11-12
VOPC Analysis	Mon 04-11-15	Wed 04-11-17
<input type="checkbox"/> POI Data Schema Modeling	Mon 04-10-25	Fri 04-11-12

POI Data Schema Modeling	Mon 04-10-25	Fri 04-11-12
Legacy POI Data Schema Analysis	Mon 04-10-25	Fri 04-11-05
POI Data Schema Modeling	Mon 04-11-08	Fri 04-11-12
System requirement specification	Mon 04-10-25	Fri 04-11-12
Requirements validation	Mon 04-11-15	Fri 04-12-03
Requirement Documentation Integration	Mon 04-11-15	Fri 04-11-26
Size Estimation	Mon 04-11-15	Fri 04-11-26
SRS Review	Mon 04-11-29	Wed 04-12-01
Refine by feedback	Thu 04-12-02	Fri 04-12-03
Postmortem 1	Mon 04-12-06	Fri 04-12-10
Final Approval	Mon 04-12-06	Fri 04-12-10
Final Report	Mon 04-12-06	Fri 04-12-10
Cycle 2	Mon 05-01-10	Fri 05-05-06
Launch 2	Mon 05-01-10	Fri 05-01-14
Strategy 2	Mon 05-01-10	Fri 05-01-14
Plan 2	Mon 05-01-10	Fri 05-01-14
Requirement Analysis 2	Mon 05-01-17	Fri 05-02-11
Design 2	Mon 05-02-14	Fri 05-04-29
High Level Design	Mon 05-02-14	Fri 05-03-18
Detail Level Design	Mon 05-03-21	Fri 05-04-29
Postmortem 2	Mon 05-05-02	Fri 05-05-06

Cycle 3	Mon 05-05-16	Fri 05-07-29
Launch 3	Mon 05-05-16	Fri 05-05-20
Strategy 3	Mon 05-05-16	Fri 05-05-20
Plan 3	Mon 05-05-16	Fri 05-05-20
Requirement Analysis 3	Mon 05-05-23	Fri 05-05-27
Design 3	Mon 05-05-30	Fri 05-06-03
Implementation	Mon 05-06-06	Fri 05-07-08
Iteration 1	Mon 05-06-06	Fri 05-06-24
Iteration 2	Mon 05-06-27	Fri 05-07-08
Test	Mon 05-07-11	Fri 05-07-22
Integration Test	Mon 05-07-11	Fri 05-07-15
System Test	Mon 05-07-11	Fri 05-07-15
Acceptance Test	Mon 05-07-18	Fri 05-07-22
Postmortem 3	Mon 05-07-25	Fri 05-07-29
Colse	Mon 05-08-01	Fri 05-08-05

5.2.2. Schedule allocation

This subclause of the SPMP shall provide scheduling relationships among work activities in a manner that

depicts the time-sequencing constraints and illustrates opportunities for concurrent work activities. Any constraints on scheduling of particular work activities caused by factors external to the project shall be indicated in the work activity schedule. The schedule should include frequent milestones that can be assessed for achievement using objective indicators to assess the scope and quality of work products completed at those milestones. Techniques for depicting schedule relationships may include milestone charts, activity lists, activity Gantt charts, activity networks, critical path networks, and PERT.

[Example 1: HMCPOI Inspection & Management System](#)

The project duration is constrained to two partial semester; fall and spring, and full semester; the summer, with final deliverables due in the end of August 2005. We will control our schedule with main artifacts.

5.2.3. Resource allocation

This subclause of the SPMP shall provide a detailed itemization of the resources allocated to each major work activity in the project work breakdown structure. Resources shall include the numbers and required skill levels of personnel for each work activity. Resource allocation may include, as appropriate, personnel by skill level and factors such as computing resources, software tools, special testing and simulation facilities, and administrative support. A separate line item should be provided for each type of resource for each work activity. A summary of resource requirements for the various work activities should be collected from the work packages of the work breakdown structure and presented in tabular form.

[Example 1: HMCPOI Inspection & Management System](#)

As a student in the MSE Studio class, each team member has a fixed amount of time available for the project. During the Fall-2004 and Spring-2005 semesters, each student is expected to devote a total of 12 hours per week to the Hyundai POI Inspection & Management project, their MSE Studio roles, and Studio training. This work includes time spent with the mentors and time spent working on any studio-related tasks, such as team meetings, customer meetings, document preparation and inspection, tool development, and others. During the Summer-2005 semester, each student is expected to devote 48 hours per week to the project.

The personnel resources available for the duration of the project along with the schedule constraints are:
4 developers for 12 hours per week each (from September 13, 2004 to December 17, 2004).
4 developers for 12 hours per week each (from January 10, 2005 to May 06, 2005).
4 developers for 48 hours per week each (from May 07, 2004 to August 05, 2004).

During the fall semester, 2004, ICU will support a development server, a desktop PC with Windows 2000 Server OS, for the project during the project life cycle.

During the Spring Semester, 2005, CMU will support a development PC with Windows 2000 Server OS, for the project during Spring Semester. ICU and CMU will provide any other software necessary for the project.

5.2.4. Budget allocation

This subclause of the SPMP shall provide a detailed breakdown of necessary resource budgets for each of the major work activities in the work breakdown structure. The activity budget shall include the estimated cost for activity personnel and may include, as appropriate, costs for factors such as travel, meetings, computing resources, software tools, special testing and simulation facilities, and administrative support. A separate line item shall be provided for each type of resource in each activity budget. The work activity budget may be developed using a spreadsheet and presented in tabular form.

5.3. Control plan

This subclause of the SPMP shall specify the metrics, reporting mechanisms, and control procedures necessary to measure, report, and control the product requirements, the project schedule, budget, and resources, and the quality of work processes and work products. All elements of the control plan should be consistent with the organization's standards, policies, and procedures for project control as well as with

any contractual agreements for project control.

Example 1: HMCPOI Inspection & Management System

This section will specify the metrics, reporting mechanisms, and control procedures necessary to measure, report, and control the product requirements, the project schedule and resources, and the quality of the work processes and work products. All elements of the control plan will be consistent with the MSE program's standards, policies, and the procedures for project control learned in the MSE core courses.

5.3.1. Requirements control plan

This subclause of the SPMP shall specify the control mechanisms for measuring, reporting, and controlling changes to the product requirements. This subclause shall also specify the mechanisms to be used in assessing the impact of requirements changes on product scope and quality, and the impacts of requirements changes on project schedule, budget, resources, and risk factors. Configuration management mechanisms shall include change control procedures and a change control board. Techniques that may be used for requirements control include traceability, prototyping and modeling, impact analysis, and reviews.

Example 1: HMCPOI Inspection & Management System

Requirement will be managed in use case description of SRS as requirements are changed. Every use case description will be controlled in CVS.

More detailed plan is planed at Requirement Management Plan Ver 1.1

5.3.2. Schedule control plan

This subclause of the SPMP shall specify the control mechanisms to be used to measure the progress of work completed at the major and minor project milestones, to compare actual progress to planned progress, and to implement corrective action when actual progress does not conform to planned progress. The schedule control plan shall specify the methods and tools that will be used to measure and control schedule progress. Achievement of schedule milestones should be assessed using objective criteria to measure the scope and quality of work products completed at each milestone.

Example 1: HMCPOI Inspection & Management System

4WD team's planning manager will maintain the schedule in a project document. The planning manager will be responsible for gathering the individual tasks for each team member and making the status report. If schedule is not on track, 4WD team will follow have a schedule control meeting. 4WD team deplaning process is a part of a separate document and it will be maintained.

5.3.3. Budget control plan

This subclause of the SPMP shall specify the control mechanisms to be used to measure the cost of work completed, compare planned cost to budgeted cost, and implement corrective action when actual cost does not conform to budgeted cost. The budget control plan shall specify the intervals at which cost reporting will be done and the methods and tools that will be used to manage the budget. The budget plan should include frequent milestones that can be assessed for achievement using objective indicators to assess the scope and quality of work products completed at those milestones. A mechanism such as earned value tracking should be used to report the budget and schedule plan, schedule progress, and the cost of work completed.

5.3.4. Quality control plan

This subclause of the SPMP shall specify the mechanisms to be used to measure and control the quality of the work processes and the resulting work products. Quality control mechanisms may include quality assurance of work processes, verification and validation, joint reviews, audits, and process assessment.

Example 1: HMCPOI Inspection & Management System

The quality manager will generate a separate Quality Control Plan document. From this document, checklists and other evaluation measures will be determined necessary or otherwise.

Weekly meetings and reviews at the end of each phase will be the main mechanisms that 4WD team will use to control the quality of the work process and the resulting work.

In addition, 4WD team's mentors will monitor quality control throughout the project by the mentoring. Each team member is also assigned an individual mentor who will meet with the student on a regular basis to review individual and group progress and to address any managerial or technical issues or questions. The mentors are encouraged to review the team's work products and to ask questions to determine the health and progress of the project.

More detailed plan is planned at Quality Control Plan Ver 1.1

5.3.5. Reporting plan

This subclause of the SPMP shall specify the reporting mechanisms, report formats, and information flows to be used in communicating the status of requirements, schedule, budget, quality, and other desired or required status metrics within the project and to entities external to the project. The methods, tools, and techniques of communication shall be specified in this subclause. The frequency and detail of communications related to project measurement and control shall be consistent with the project scope, criticality, risk, and visibility.

Example 1: HMCPOI Inspection & Management System

General Reporting

4WD team will use a set of applications and methods available from the MSE program to communicate to the customer, mentors, studio manager, and advisors the status of requirements, schedules, quality, and other desired or required status metrics for the team project.

Internal Reporting

Team members will submit individual Excel-based TSP Support Tool to the planning manager on every Monday. The planning manager will consolidate all files and make one status report. Mentors are invited to attend the weekly status meeting for general status issues. For mentor who cannot attend in meeting, meeting will be recorded and recording file will be sent. Additionally, each team member will have a regularly scheduled one-on-one meeting with the team mentors to discuss any issues in greater detail. At the regular team lead meetings, 4WD team's lead will report to the studio manager regarding the team project's current progress, unresolved issues, and need for assistance.

External Reporting

In addition to the team's ongoing progress reports to the customer, at the end of each semester the team will give MOSP and EOSP for the Studio.

5.3.6. Metrics collection plan

This subclause of the SPMP shall specify the methods, tools, and techniques to be used in collecting and retaining project metrics. The metrics collection plan shall specify the metrics to be collected, the frequency of collection, and the methods to be used in validating, analyzing, and reporting the metrics.

Example 1: HMCPOI Inspection & Management System

Each team member will submit individual Excel-based TSP Support Tool on every Thursday about the developer's individual progress and productivity. Each team member will report on tasks assigned, tasks

done or not done, problems, hours planned, actual hours, and future plans at every weekly status meeting. The planning manager will consolidate the data and will analyze the efforts spent per developer every week.

5.3.7 Risk management plan

This subclause of the SPMP shall specify the risk management plan for identifying, analyzing, and prioritizing project risk factors. This subclause shall also describe the procedures for contingency planning, and the methods to be used in tracking the various risk factors, evaluating changes in the levels of risk factors, and the responses to those changes. The risk management plan shall also specify plans for assessing initial risk factors and the ongoing identification, assessment, and mitigation of risk factors throughout the life cycle of the project. This plan should describe risk management work activities, procedures and schedules for performing those activities, documentation and reporting requirements, organizations and personnel responsible for performing specific activities, and procedures for communicating risks and risk status among the various acquirer, supplier, and subcontractor organizations. Risk factors that should be considered include risks in the acquirer-supplier relationship, contractual risks, technological risks, risks caused by the size and complexity of the product, risks in the development and target environments, risks in personnel acquisition, skill levels and retention, risks to schedule and budget, and risks in achieving acquirer acceptance of the product.

Example 1: HMCPOI Inspection & Management System

The team lead will generate a separate Risk Management Plan document.

Risks will be identified at the beginning of each phase and the team lead will assemble them into a prioritized risks list. That list will be published on the team's project management website. During the weekly status meeting, the team members will raise risks and reassess the prioritized risks and if necessary, revise the list. 4WD team will use "Risk Statement." Team members will determine mitigation plans for all identified risks and tasks that need to be completed and then these risks and tasks will be assigned as action items. The team will monitor high priority risks every week. All risks will be documented by the team.

More detailed plan is planned at Quality Control Plan Ver 1.1

5.3.8 Project closeout plan

This subclause of the SPMP shall contain the plans necessary to ensure orderly closeout of the software project. Items in the closeout plan should include a staff reassignment plan, a plan for archiving project materials, a plan for post-mortem debriefings of project personnel, and preparation of a final report to include lessons learned and analysis of project objectives achieved.

Example 1: HMCPOI Inspection & Management System

4WD team will ensure the proper closeout of the project in July 31, 2005.

6. Technical process plans

This clause of the SPMP shall specify the development process model, the technical methods, tools, and techniques to be used to develop the various work products; plans for establishing and maintaining the project infrastructure; and the product acceptance plan.

6.1 Process Model

This subclause of the SPMP shall define the relationships among major project work activities and supporting processes by specifying the flow of information and work products among activities and functions, the timing of work products to be generated, reviews to be conducted, major milestones to be achieved, baselines to be established, project deliverables to be completed, and required approvals that span the duration of the project. The process model for the project shall include project initiation and project termination activities. To describe the process model, a combination of graphical and textual notations may be used. Any tailoring of an organization's standard process model for a project shall be indicated in this subclause.

Example 1: HMCPOI Inspection & Management System

4WD team will use TSP as a management process and RUP as an engineering process. RUP will be tailored for our project to include the development of various other tasks that have to be done. 4WD team will provide an iteration plan at the beginning of the iteration. The process will be applied to specify the phases of the implementation for the project. The TSP is also used as a guide for the software development team and it has been modified to suit the studio processes. Any deviations from this process will be documented in this section.

General Iterative Approach

4WD team will use an iterative approach to development. Each iteration in RUP will last for a predefined time period and its output will be an intermediate work product or deliverable. The figure below explains the process model that will be adopted for the project. Note, however, that while customer input is not indicated explicitly, we expect regular customer reviews during the project.

Overview of Phases

4WD team will analyze the Excel-based TSP Support Tool and we will use that as management tool. Once the requirements have been clearly defined (the SRS v1.0 should be released), the high-level design phase of the project will commence. After 4WD team has agreed upon a high-level design for the application then the development work will be done in an iterative and evolutionary manner.

Requirements Phase

4WD team will elicit the customer and system requirements by interviewing the customer and studying their documents. Once 4WD team obtains and organizes all the requirements for the system, the scope of the project will be clearly defined. The output of this phase will be SOW and SRS. In the RUP, this phase maps to Requirements workflow.

High-Level Design Phase

During the phase, 4WD team creates the initial architecture and high-level design for the system. The high-level design document will be the deliverable. In the RUP, this phase maps to Analysis & Design workflow.

Implementation Phase

The implementation will be iteratively and evolutionarily extended applying RUP until the requirements stated in the SRS are fulfilled. The exact number of iterations will be determined once the high-level design phase is in progress and a clear idea of the project implementation is available.

Each iteration will contain the following mini-phases:

- Detail Design
- DLD Review
- DLD Inspection
- Code
- Code Review
- Compile
- Code Inspection
- Unit Test

In the RUP, this phase maps to Analysis & Design workflow and Implementation workflow.

Integration and System Test Phase

Once the implementation has been clearly done, integration and system test phase of the project will commence. Integration test should be preceded before system test. System test will satisfy the predefined test goal. In the RUP, this phase maps to Test workflow.

Delivery Phase

The final products from all the project phases, along with the supporting documents, will be given to the customer. In the RUP, this phase maps to Deployment workflow.

Integration and System Test Phase

Once the implementation has been clearly done, integration and system test phase of the project will commence. Integration test should be preceded before system test. System test will satisfy the predefined test goal. In the RUP, this phase maps to Test workflow.

Delivery Phase

The final products from all the project phases, along with the supporting documents, will be given to the customer. In the RUP, this phase maps to Deployment workflow.

6.2 Methods, tools, and techniques

This subclause of the SPMP shall specify the development methodologies, programming languages and other notations, and the tools and techniques to be used to specify, design, build, test, integrate, document, deliver, modify and maintain the project deliverable and nondeliverable work products. In addition, the technical standards, policies, and procedures governing development and/or modification of the work products shall be specified.

Example 1: HMCPOI Inspection & Management System

The methods and techniques listed in this table will be evaluated and applied in specific areas of the project as appropriate:

Category	Methods and Techniques
Requirements Elicitation	Elicitation from existing Excel-based TSP Support Tool Meetings Interviews Brainstorming

Formal Specification and Analysis	Formal models using UML to model structural aspects of the requirements and design Use cases to define requirements
Prototype	Two UI prototypes to validate a technical or design decision. This is different from the development cycle's construction effort, which is geared towards the final deliverable. Pilot system as Iteration 1 to validate a technical or design decision.
Estimation	Function Point method for conversion from Function Point count to effort may be used for size estimation and project scope definition.

[Table 6.2.1] Methods and Techniques

Category	Tools
Operating System	Windows 2000 XP
Development languages and databases	Databases: MDB Language: JAVA
Design	Rational Rose Enterprise Edition
Configuration Management	Visual Source Safe
Document	All document will be written using Microsoft Word
Project Planning and Tracking	Excel-based TSP Support Tool for project planning charts, resources, scheduling and effort allocation

[Table 6.3.1] Methods and Techniques

6.3 Infrastructure Plan

This subclause of the SPMP shall specify the plan for establishing and maintaining the development environment (hardware, operating system, network, and software), and the policies, procedures, standards, and facilities required to conduct the software project. These resources may include workstations, local area networks, software tools for analysis, design, implementation, testing, and project management, desks, office space, and provisions for physical security, administrative personnel, and janitorial services.

Example 1: HMCPOI Inspection & Management System

The studio infrastructure will primarily be considered for development of the project. 4WD team has access to one server (Pentium IV, MS Windows XP). 4WD team can access a common studio server that is used for the team website. All hardware is available in the ICU facilities. In addition, the available resources for 4WD team are copiers, fax machines, meeting rooms, and other standard office equipment.

The MSE studio maintains most of the software products required by the project. However, if there is a need for special software, 4WD team's support manager will contact the studio support manager or customer to obtain the new software.

6.3 Product Acceptance Plan

This subclause of the SPMP shall specify the plan for acquirer acceptance of the deliverable work

products generated by the software project. Objective criteria for determining acceptability of the deliverable work products shall be specified in this plan and a formal agreement of the acceptance criteria shall be signed by representatives of the development organization and the acquiring organization. Any technical processes, methods, or tools required for product acceptance shall be specified in the product acceptance plan. Methods such as testing, demonstration, analysis and inspection should be specified in this plan.

Example 1: HMCPOI Inspection & Management System

The customer will sign appropriate acceptance document accepts every milestone of the project formally. At the end of each phase the customer will install the product and perform an acceptance test. This may result in additional requests for changes and improvements.

7. Supporting process plans

This clause of the SPMP shall contain plans for the supporting processes that span the duration of the software project. These plans shall include, but are not limited to, configuration management, verification and validation, software documentation, quality assurance, reviews and audits, problem resolution, and subcontractor management. Plans for supporting processes shall be developed to a level of detail consistent with the other clauses and subclauses of the SPMP. In particular, the roles, responsibilities, authorities, schedule, budgets, resource requirements, risk factors, and work products for each supporting process shall be specified. The nature and types of supporting processes required may vary from project to project; however, the absence of a configuration management plan, verification and validation plan, quality assurance plan, joint acquirer-supplier review plan, problem resolution plan, or subcontractor management plan shall be explicitly justified in any SPMP that does not include them. Plans for supporting processes may be incorporated directly into the SPMP or incorporated by reference to other plans.

7.1. Configuration management plan

This subclause of the SPMP shall contain the configuration management plan for the software project, to include the methods that will be used to provide configuration identification, control, status accounting, evaluation, and release management. In addition, this subclause shall specify the processes of configuration management to include procedures for initial baselining of work products, logging and analysis of change requests, change control board procedures, tracking of changes in progress, and procedures for notifying concerned parties when baselines are first established or later changed. The configuration management process should be supported by one or more automated configuration management tools.

Example 1: HMCPOI Inspection & Management System

4WD team configuration management plan is a part of a separate document and it will be maintained.

7.2. Verification and validation plan

This subclause of the SPMP shall contain the verification and validation plan for the software project to include scope, tools, techniques, and responsibilities for the verification and validation work activities. The organizational relationships and degrees of independence between development activities and verification and validation activities shall be specified. Verification planning should result in specification of techniques such as traceability, milestone reviews, progress reviews, peer reviews, prototyping, simulation, and modeling. Validation planning should result in specification of techniques such as testing, demonstration, analysis, and inspection. Automated tools to be used in verification and validation should be specified.

Example 1: HMCPOI Inspection & Management System

Several tasks collectively make up continuing activities that go across the different life cycle phases. These general activities are traceability analysis, evaluation, interface analysis, and testing. These activities are horizontal threads that tie together the subsequent phase activities and allow verification to be more effectively conducted.

Traceability analysis

The traceability is the ability to identify the relationships between originating requirements and their resulting system features. It permits tracking forward or backward through the network of interrelationships that are created as requirements are decomposed and refined through a system's life cycle. Traceability allows verification of the properties set forth in the concept and that requirement specifications have been carried forward to the design specification, implemented in the code, included in the test plan and cases, and provided to the customer and user in the resulting system.

Evaluation

Evaluation ascertains the value or worth of an item and help to assure that a system meets its specifications. Evaluations are performed by many persons across all life cycle phases, on both interim and final software products, and may be either a comprehensive or selective assessment of a system. Evaluations are used through all phases and for all type of software products, including user documents, manuals, and other project documents. These may be of many forms, such as text or graphic representations, and in various media, such as paper, magnetic tape, diskette, and computer files. This range of product types and forms requires a large variety of techniques for performing and managing software evaluations.

Interface analysis

When information is passed across a boundary, there is always the possibility of losing some information or alerting the information content. The task of interface analysis serves to ensure the completeness, accuracy, and consistency of these interfaces. Interface requirements at the design and implementation phases should be identified analyzed at the functional, physical, and data interface level. The goal of interface analysis is to evaluate the specific software deliverables (e.g., requirements, design, code) for correct, consistent, complete, and accurate interpretation of the interface requirements.

Testing

In the context of software verification and validation, testing can be defined as the testing that is performed in support of the V&V objectives. These objectives may differ from those of the developer. Testing is performed at several points in the life cycle, starting from the requirement phase up to the test phase. The various test activities are listed below:

Component Testing

Testing conducted to verify the implementation of the design for one software elements or a collection of software elements

Integrating Testing

An orderly progression of testing in which software elements, hardware elements, or both are combined and tested until the entire system has been integrated.

System Testing

The process of testing an integrated hardware and software system to verify that the system meets its specified requirements

Acceptance Test

Formal testing conducted to determine whether or not a system satisfies its acceptance criteria and to enable the customer to determine whether or not to accept the system

This section explains out V&V plan for each phase of software development.

Phase	V&V Input	V&V Tasks	V&V Output
Requirements	SRS Interface requirements documentation User documentation	Requirements traceability analysis Requirements evaluation Requirements interface analysis Test plan generation	Requirements phase tasks reporting Test plan : System - Acceptance
Design	SRS Interface requirements documentation Interface design documentation	Design traceability analysis Design evaluation Interface analysis Test plan generation	Design phase task reporting Test plan Component Integration

	User documentation	Test design generation	Test design Component Integration System acceptance
Implementation	Source Code listing Executable code Interface design documentation User documentation	Code traceability analysis Code evaluation Interface analysis Documentation evaluation Test case generation Test procedure generation Component test execution	Implementation phase task reporting Test cases Component Integration System Acceptance Test procedure Component Integration - System
Test	Source code listing Executable code User documentation	Test procedure generation Integration test execution System test execution Acceptance test execution	Test phase task reporting Test procedure Acceptance Anomaly report V&V phase summary
Installation and Checkout	Installation package	Installation configuration audit V&V final report generation	Installation and checkout phase task reporting

[Table 7.2.2 V&V Plan]

7.3. Documentation plan

This subclause of the SPMP shall contain the documentation plan for the software project, to include plans for generating nondeliverable and deliverable work products. Organizational entities responsible for providing input information, generating, and reviewing the various documents shall be specified in the documentation plan. Non-deliverable work products may include items such as requirements specifications, design documentation, traceability matrices, test plans, meeting minutes and review reports. Deliverable work products may include source code, object code, a user's manual, an on-line help system, a regression test suite, a configuration library and configuration management tool, principles of operation, a maintenance guide, or other items specified in subclause 1.1.3 of the SPMP. The documentation plan should include a list of documents to be prepared, the controlling template or standard for each document, who will prepare it, who will review it, due dates for review copy and initial baseline version, and a distribution list for review copies and baseline versions.

Example 1: HMCPOI Inspection & Management System

There are a number of documents that will be produced during the lifetime of the project. All documents are responsibility of the project team members. The lists of documents that will be created and maintained under version control include:

Statement of Work(SOW)

Software Project Management Plan(SPMP) – defines the project management plan.

Software Requirements Specification(SRS) – defines the functionality that is required by the customer.

Supplementary Specification(SS) - defines the nonfunctionality that is required by the customer.

Architecture

Architecture Tradeoff Analysis Model(ATAM)

Mini-Software Risk Evaluation(SRE) – evaluate software risks.

Use Case Diagram

Use Case Description

Detailed Level Design(DLD) Sequence Diagram

DLD Class Diagram

Entity Relationship Diagram(ERD)

System Integration Plan

Acceptance Confirmation Documentation

Status Report

Test scripts and test results – tests that are executed have to be recorded.

Risk Management Statement – defines risks and each mitigation plan.

Defect log – log of all the defects and their current status.

Metrics log – log of collected metrics data.

Inspection reports – inspection results of all phases of the project.

7.4. Quality assurance plan

This subclause of the SPMP shall provide the plans for assuring that the software project fulfills its commitments to the software process and the software product as specified in the requirements specification, the SPMP, supporting plans, and any standards, procedures, or guidelines to which the process or the product must adhere. Quality assurance procedures may include analysis, inspections, reviews, audits, and assessments. The quality assurance plan should indicate the relationships among the quality assurance, verification and validation, review, audit, configuration management, system engineering, and assessment processes.

7.5. Reviews and audits

This subclause of the SPMP shall specify the schedule, resources, and methods and procedures to be used in conducting project reviews and audits. The plan should specify plans for joint acquirer-supplier reviews, management progress reviews, developer peer reviews, quality assurance audits, and acquirer-conducted reviews and audits. The plan should list the external agencies that approve or regulate any product of the project.

7.6. Problem resolution plan

This subclause of the SPMP shall specify the resources, methods, tools, techniques, and procedures to be used in reporting, analyzing, prioritizing, and processing software problem reports generated during the project. The problem resolution plan should indicate the roles of development, configuration management, the change control board, and verification and validation in problem resolution work activities. Effort devoted to problem reporting,

analysis, and resolution should be separately reported so that rework can be tracked and process improvement accomplished.

7.7. Subcontractor management plan

This subclause of the SPMP shall contain plans for selecting and managing any subcontractors that may contribute work products to the software project. The criteria for selecting subcontractors shall be specified and the management plan for each subcontract shall be generated using a tailored version of this standard. Tailored plans should include the items necessary to ensure successful completion of each subcontract. In particular, requirements management, monitoring of technical progress, schedule and budget control, product acceptance criteria, and risk management procedures shall be included in each subcontractor plan. Additional topics should be added as needed to ensure successful completion of the subcontract. A reference to the official subcontract and prime contractor/subcontractor points of contact shall be specified.

7.8. Process improvement plan

This subclause of the SPMP shall include plans for periodically assessing the project, determining areas for improvement, and implementing improvement plans. The process improvement plan should be closely related to the problem resolution plan; for example, root cause analysis of recurring problems may lead to simple process improvements that can significantly reduce rework during the remainder of the project. Implementation of improvement plans should be examined to identify those processes that can be improved without serious disruptions to an ongoing project and to identify those processes that can best be improved by process improvement initiatives at the organizational level.

Example 1: HMCPOI Inspection & Management System

Process improvement will be done as a part of the final project evaluation and “lessons learned” phase. At that time the process improvement plan will be created. Process improvement plan is maintained in Point PIP document.

8.0 Additional Plans

This clause of the SPMP shall contain additional plans required to satisfy product requirements and contractual terms. Additional plans for a particular project may include plans for assuring that safety, privacy, and security requirements for the product are met, special facilities or equipment, product installation plans, user training plans, integration plans, data conversion plans, system transition plans, product maintenance plans, or product support plans.

9. Plan Annexes

Annexes may be included, either directly or by reference to other documents, to provide supporting details that could detract from the SPMP if included in the body of the SPMP.

10. Index