**CEBU INSTITUTE OF TECHNOLOGY**

**UNIVERSITY**

COLLEGE OF COMPUTER STUDIES

**Software Project Management Plan**

*for*

CyberKids

**TABLE OF CONTENTS**

[**1.**](#_mppubrbheir) **OVERVIEW 4**

[1.1.](#_2tyealylmmih) Project Summary 4

[*1.1.1. Purpose, scope and objectives 4*](#_nyvcev3ks5vs)

[*1.1.2. Assumptions and constraints 5*](#_8d6wxnpv7sjr)

[*1.1.3. Project deliverables 5*](#_3qnqw8u9feue)

[*1.1.4. Schedule and budget summary 6*](#_ijbur2hm4bc8)

[1.2.](#_r2riww65pbfa) Evolution of plan 7

[**2.**](#_a3jtprrqt6g2) **REFERENCES 9**

[**3.**](#_6fkjwx879vmn) **DEFINITIONS 10**

[**4.**](#_mjvmauiz5xiu) **PROJECT ORGANIZATION 11**

[4.1.](#_13v3k8jtg45q) External structure 11

[4.2.](#_eddlx5akyyl7) Internal structure 11

[4.3. Roles and responsibilities 12](#_f539i3npgpeg)

[**5.**](#_jxnlnhpt9zzc) **MANAGERIAL PROCESS PLANS 13**

[5.1.](#_1bva65hy2vq8) Start-up plan 13

[*5.1.1.*](#_z1hqt5x2llp9) *Estimation plan 13*

[*5.1.2.*](#_32pq3e2uti0j) *Staffing plan 15*

[*5.1.3. Resource acquisition plan 15*](#_du9v9o7ws7yp)

[*5.1.4. Project staff training plan 16*](#_cvvco82tmzvq)

[5.2.](#_j1a2kr8e441b) Work plan 17

[*5.2.1.*](#_a92nsk84p8n6) *Work activities 17*

[*5.2.2.*](#_a1t0rnu5z2h6) *Schedule allocation 21*

[*5.2.3. Resource allocation 22*](#_40c2t8e4ov5a)

[*5.2.4. Budget allocation 22*](#_mz08uqzh45s4)

[5.3. Control plan 22](#_jbzvkkexu7eq)

[*5.3.1. Requirements control plan 23*](#_fxpip9o2nrg5)

[*5.3.2. Schedule control plan 23*](#_hbcwcey47rv0)

[*5.3.3. Budget control plan 23*](#_8sxjvf34qm6y)

[*5.3.4. Quality control plan 23*](#_2nwza1fexyv8)

[*5.3.5. Reporting plan 24*](#_tggkgvg7nfh7)

[*5.3.6. Metrics collection plan 24*](#_pt96wif47ptd)

[*5.3.7 Risk management plan 24*](#_u4ayayc1kenc)

[*5.3.8 Project closeout plan 25*](#_dinowt7lgm81)

[**6. TECHNICAL PROCESS PLANS 26**](#_xtwmj6wojahc)

[6.1 Process Model 26](#_1zgf05l5b0y4)

[6.2 Methods, tools, and techniques 27](#_kfpmfg48v6qh)

[6.3 Infrastructure Plan 28](#_lzw74pcx4pzj)

[6.3 Product Acceptance Plan 28](#_2t801w9b5mv)

[**7. SUPPORTING PROCESS PLANS 30**](#_pgia5jnkdo67)

[7.1. Configuration management plan 30](#_pnx7ncve8qgl)

[7.2. Verification and validation plan 30](#_jneeba6nkjxi)

[7.3. Documentation plan 32](#_bakriun3zfk)

[7.4. Quality assurance plan 33](#_jihipb7cy8a5)

[7.5. Reviews and audits 33](#_1ver0829bwr)

[7.6. Problem resolution plan 33](#_lmw5wgy80iy3)

[7.7. Subcontractor management plan 33](#_5g73owxp8won)

[7.8. Process improvement plan 34](#_otddjqtx89h6)

[8.0 Additional Plans 34](#_4vx7e1l8lz1z)

[**9. PLAN ANNEXES 35**](#_om3jjle83oey)

[**10. INDEX 36**](#_tpxn2kgbuwkw)

# **Overview**

## ***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, whichfall 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

o $3,000,000 (25% of total $12,000,000 budget; software portion only)

* Time

o one year

o 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

o 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

o 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

o Installation documentation

o End-user documentation

o updates applied to NNB’s central bank documentation

• Installation of software program and library binaries on target hardware

• Software training performed against affected users

o ATM site users (i.e. bank branch staff)

o ATM site installers

o Software maintenance team

• Project documentation

o Software Requirements Specification (SRS)

o Software Design Specification (SDS)

o Software Project Management Plan (SPMP)

o Software Test Plan (STP)

o Software Quality Assurance Plan (SQAP)

o Software Configuration Management Plan (SCMP)

o 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 (1st phase) | October 06, 2004 (initiation) |
| Risk Management Plan | October 06, 2004 (completion) |
| Training Plan | October 20, 2004 (completion) |
| Quality Assurance Plan (1st 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*

## ***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*

# **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.

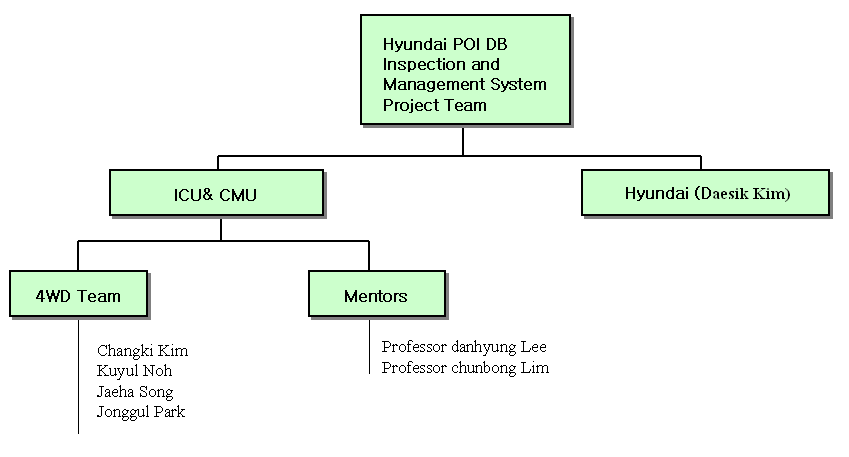
Example 1: HMCPOI Inspection & Management System

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.

## ***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)*

## ***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 section explains how we planned and managed the CyberKids project. It includes how we estimated the time and resources needed, how the team was organized, the resources we used, how we trained the team, what work activities we did, and how everything was scheduled.

## ***Start-up plan***

### ***Estimation plan***

We used a simple method to estimate how much time each task would take. The team listed down all the tasks and gave rough time estimates based on how long similar tasks took before or how difficult they were. Everyone shared their own guesses, then we talked and agreed on a final estimate for each task.

We used:

* A shared spreadsheet to track time estimates and progress
* Weekly updates to change time estimates if something took longer or shorter than expected

Time Estimates:

* 12–48 hours per week, depending on school load and deadlines
* Project divided into:
  + Alpha version – March
  + Beta version – May
  + Final version – August

We also planned time for testing, fixing problems, and adding small improvements. We reviewed all time estimates every week in a team meeting and made changes if needed.

### ***Staffing plan***

The project was completed by five students, each with different responsibilities. Everyone worked on both coding and documentation, but each member focused on a main role:

| Name | Affiliation to project | Fall 2004 |
| --- | --- | --- |
| J | MSE Student/Team member | Part Time |
| Kuyul Noh | MSE Student/Team member | Part Time |
| Jonggul Park | MSE Student/Team member | Part Time |
| Jaeha Song | MSE Student/Team member | Part Time |
| Choonbong Lim | Mentor | Part Time |

### ***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

22Software 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.

## ***Work plan***

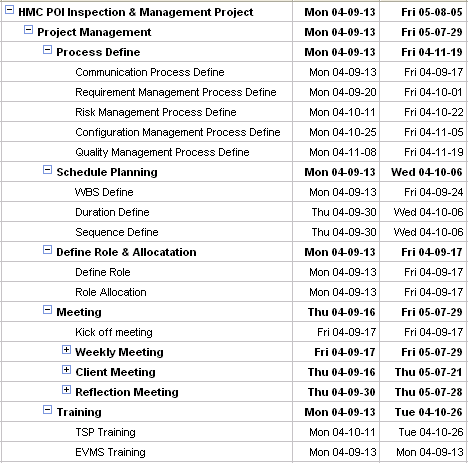
This clause of the SPMP shall specify the work activities, schedule, resources, and budget details for the software project.

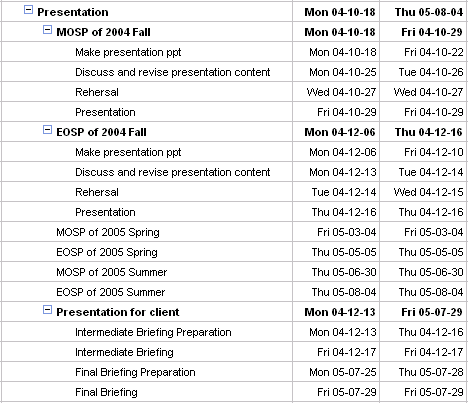
### ***Work activities***

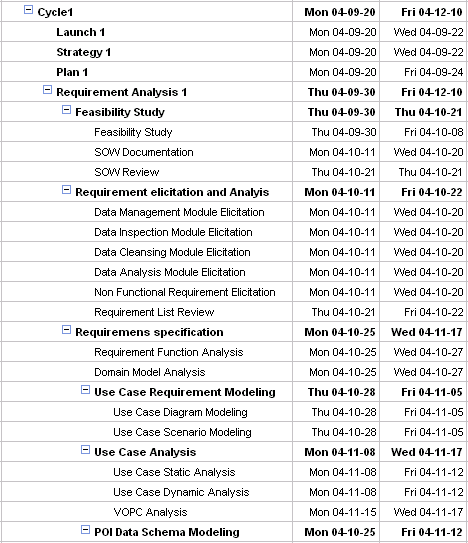
This subclause of the SPMP shall specify the various work activities to be performed in the software project. A work breakdown structure shall be used to depict the work activities and the relationships among work activities. Work activities should be decomposed to a level that exposes all project risk 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.

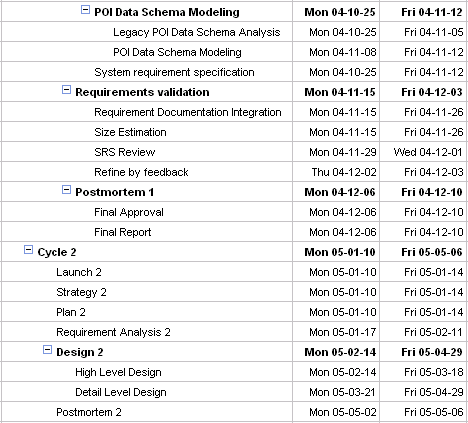
Example 1: HMCPOI Inspection & Management System

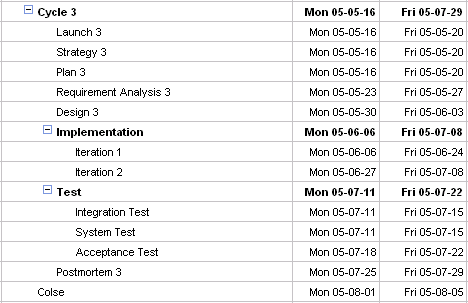
Following table shows our work activities during this course. Detail activities of each semester will be defined in the beginning of the semester.

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### ***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 planed 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 planed 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***

The CyberKids development team will adopt an iterative and incremental development model, combining Agile Scrum with Waterfall planning for early project phases. Each iteration will focus on building, testing, and refining one or more functionalities, allowing continuous integration of feedback from stakeholders, particularly teachers and student users.

Each module will pass through the following phases:

* Requirements Phase
* High-Level Design Phase
* Implementation Phase
* Integration and System Test Phase
* Delivery Phase

1. **Game Mission Module**

#### Requirements Phase

* Identify key cybersecurity topics (data sharing, password strength, phishing detection).
* Define three core game levels:
  1. Data Leak Investigation
  2. Password Fortress Defense
  3. Cyber Escape Room

#### High-Level Design Phase

* Design game mechanics and logic for each level.
* Create mockups for drag-and-drop categorization, chest collection mechanics, and phishing detection UI.
* Choose Roblox as the game engine and define interactions with the backend for saving progress.

#### Implementation Phase

* Use LibGDX to build level-specific game mechanics.
* Integrate profile tracking via RESTful APIs to store time spent and completion status.
* Enable level unlocking based on progress.

#### Integration and System Test Phase

* Perform functional testing for each level.
* Test saving of game states and transitions between levels.
* Validate that progress is accurately stored in student profiles.

#### Delivery Phase

* Deploy the game module in the integrated system.
* Conduct student testing for feedback and engagement.
* Demonstrate game features and scoring logic to Teacher Rosario.

1. **Leaderboard & Scoring System**

#### Requirements Phase

* Define leaderboard structure: Top scores for Grade 5 and Grade 6.
* Determine scoring criteria (e.g., time efficiency, level completion).
* Identify required achievements and badge categories.

#### High-Level Design Phase

* Design leaderboard UI and scoring algorithm.  
  Plan backend tables to record scores, timestamps, and badges.
* Determine filters for student category and grade level.

#### Implementation Phase

* Build leaderboard component in React for real-time display.
* Implement backend logic for score computation and ranking.
* Update student profiles with high scores and achievements.

#### Integration and System Test Phase

* Test leaderboard updates after game completion.
* Validate filters and sorting logic (e.g., by grade).
* Simulate concurrent users and check data consistency.

1. **Teacher Dashboard**

#### Requirements Phase

* Gather feedback from Teacher Rosario regarding required insights: class progress, individual performance, and top achievers.
* Define data points: time spent, levels completed, leaderboard positions.

#### High-Level Design Phase

* Design dashboard interface with summary tiles, student tables, and filters.
* Plan API endpoints for retrieving class-wide and individual data.  
  Define teacher permissions (read-only access, no data editing).

#### Implementation Phase

* Build dashboard frontend in React with Material UI.
* Develop backend endpoints in Spring Boot to return aggregated performance data.
* Integrate with the database for real-time updates.

#### Integration and System Test Phase

* Validate dashboard accuracy using dummy and real student data.
* Test teacher access and UI responsiveness.
* Simulate class-wide data loads to check performance.

#### Delivery Phase

* Deliver and demonstrate teacher dashboard functionality.
* Provide a guide for teachers on how to interpret data.
* Finalize and submit documentation on monitoring student engagement.

## ***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*’*ssupport 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 with signing 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. There general activities are traceability analysis, evaluation, interface analysis, and testing. These activities are horizontal threads that ties 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 preformed 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  User documentation | Design traceability analysis  Design evaluation  Interface analysis  Test plan generation  Test design generation | Design phase task reporting  Test plan  Component  Integration  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 Statemenet – 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 – insepction 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**