IEEE Standard for Software Project Management Plans

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Foreword

(This Foreword is not a part of IEEE Std 1058.1-1987, IEEE Standard for Software Project Management Plans.)

Purpose

This standard specifies the format and contents of software project management plans. It does not specify the exact techniques to be used in developing project plans, nor does it provide examples of project management plans. Each organization that uses this standard should develop a set of practices and procedures to provide detailed guidance for preparing and updating software project management plans based on this standard. These detailed practices and procedures should take into account the environmental, organizational, and political factors that influence application of the standard.

Not all software projects are concerned with development of source code for a new software product. Some software projects consist of a feasibility study and definition of product requirements. Other projects terminate upon completion of product design, and some projects are concerned with major modifications to existing software products. This standard is applicable to all types of software projects; applicability is not limited to projects that develop operational versions of new products. Application of this standard is not limited by project size. Small projects may require less formality in planning than large projects, but all components of this standard should be addressed by every software project.

Software projects are sometimes component parts of larger projects. In these cases, the software project management plan may be a separate component of a larger plan or it may be merged into the system level project management plan.

Overview

This standard contains three sections. Section 1 defines the scope of the standard and provides references to other IEEE standards that should be followed when applying this standard. Section 2 provides definitions of terms that are used throughout the standard. Section 3 contains an overview and a detailed specification of the standard, including required components that must be included, and optional components that may be included in project plans based on this standard. The sequence of project plan elements presented in Section 3 does not imply that project plans should be developed in the order of presentation. In most instances, project plans based on this standard will be developed by repeated iteration and refinement of the various elements in the plan.

Audience

This standard is intended for use by software project managers and other personnel who prepare and update project plans and monitor adherence to those plans.

Evolution of Plans

Developing the initial version of the software project management plan should be one of the first activities to be completed on a software project. As the project evolves, the nature of the work to be done and the decomposition of work will be better understood. The project management plan must be updated periodically to reflect the evolving situation. Thus, each version of the plan should be placed under change control, and each version should contain a schedule for subsequent updates to the plan.

Terminology

This standard follows the IEEE Guide to Standards Development. In particular, the words shall, must, and the imperative form identify mandatory material within the standard. The words should, might, and may identify optional material.

History

The project authorization request for development of this standard was approved by the IEEE Standards Board on December 13, 1984. Modification of the authorization request was approved in September, 1986. Ten meetings were held within the United States and internationally between September, 1984, and September, 1986. These meetings produced the draft submitted for balloting in December, 1986.

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IEEE Standard for Software Project Management Plans

1. Scope and References

1.1 Scope

This standard prescribes the format and content of software project management plans. A software project management plan is the controlling document for managing a software project; it defines the technical and managerial processes necessary to satisfy the project requirements.

This standard may be applied to all types of software projects. Use of this standard is not restricted by the size, complexity, or criticality of the software product. This standard is applicable to all forms of product delivery media, including firmware, embedded systems code, programmable logic arrays, and software-in-silicon. This standard can be applied to any and all segments of a software product lifecycle.

This standard identifies the minimal set of elements that shall appear in all software project management plans. In order to conform to this standard, software project management plans must adhere to the format and content for project plans specified in the standard. However, users of this standard may incorporate other elements by appending additional sections or subsections to their project management plans. In any case, the numbering scheme of the required sections and subsections must adhere to the format specified in this standard. Various sections and subsections of a software project management plan may be included in the plan by direct incorporation or by reference to other plans and documents.

This standard for software project management plans incorporates and subsumes the software development plans described in ANSI/IEEE Std 729-1983 [1] [1] and ANSI/IEEE Std 730-1984 [2].

1.2 References

The standards listed here should be consulted when applying this standard. The latest revisions shall apply.

[1] ANSI/IEEE Std 729-1983, IEEE Standard Glossary of Software Engineering Terminology. [2]

[2] ANSI/IEEE Std 730, IEEE Standard for Software Quality Assurance Plans.

[3] ANSI/IEEE Std 828-1983, IEEE Standard for Software Configuration Management Plans.

[4] ANSI/IEEE Std 829-1983, IEEE Standard for Software Test Documentation.

[5] ANSI/IEEE Std 983-1986, IEEE Guide for Software Quality Assurance Planning.

[6] ANSI/IEEE Std 1012-1986, IEEE Standard for Software Verification and Validation Plans.

2. Definitions

The definitions listed here establish meanings within the context of this standard. Definitions of other terms that may be appropriate within the context of this standard can be found in ANSI/IEEE Std 729-1983 1.

activity: A major unit of work to be completed in achieving the objectives of a software project. An activity

[1] The numbers in brackets correspond to those of the references in 1.2 .

[2] ANSI/IEEE publications are available from the Sales Department, American National Standards Institute, 1430 Broadway, New York, NY 10018; or from the IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331.

has precise starting and ending dates, incorporates a set of tasks to be completed, consumes resources, and results in work products. An activity may contain other activities in a hierarchical manner.

baseline: A work product that has been formally reviewed and agreed upon, and that can be changed only through formal change control procedures. A baseline work product may form the basis for further work activity(s).

customer: The individual or organization that specifies and accepts the project deliverables. The customer may be internal or external to the parent organization of the project, and may or may not be the end user of the software product. A financial transaction between customer and developer is not necessarily implied.

project agreement: A document or set of documents agreed to by the designated authority for the project and the customer. Documents in a project agreement may include some or all of the following: a contract, a statement of work, system engineering specifications, user requirement specifications, functional specifications, the software project management plan, a business plan, or a project charter.

project deliverables: The work product(s) to be delivered to the customer. The quantities, delivery dates, and delivery locations are specified in the project agreement.

project function: An activity that spans the entire duration of a software project. Examples of project functions include project management, configuration management, quality assurance, and verification and validation.

review: A meeting at which a work product or a set of work products is presented to project personnel, managers, users, customers, or other interested parties for comment or approval.

software project: The set of all project functions, activities, and tasks, both technical and managerial, required to satisfy the terms and conditions of the project agreement. A software project may be self-contained or may be part of a larger project. A software project may span only a portion of the software product lifecycle.

software project management: The process of planning, organizing, staffing, monitoring, controlling, and leading a software project.

software project management plan: The controlling document for managing a software project. A software project management plan defines the technical and managerial project functions, activities, and tasks necessary to satisfy the requirements of a software project, as defined in the project agreement.

SPMP: Software project management plan.

task: The smallest unit of work subject to management accountability. A task is a well-defined work assignment for one or more project members. The specification of work to be accomplished in completing a task is documented in a work package. Related tasks are usually grouped to form activities.

work package: A specification for the work to be accomplished in completing an activity or task. A work package defines the work product(s), the staffing requirements, the expected duration, the resources to be used, the acceptance criteria for the work products, the name of the responsible individual, and any special considerations for the work.

work product: Any tangible item that results from a project function, activity, or task. Examples of work products include customer requirements, project plan, functional specifications, design documents, source and object code, users' manuals, installation instructions, test plans, maintenance procedures, meeting minutes, schedules, budgets, and problem reports. Some subset of the work products will form the set of project deliverables.

3. Software Project Management Plans

The individual or organization responsible for a software project shall also be responsible for the software project management plan (hereafter referred to as the SPMP). This section of the standard describes each of the essential elements of a SPMP. These elements shall be ordered in the sequence of sections and subsections prescribed in Table 1.

Table 1—Software Project Management Plan Format

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The ordering of SPMP elements presented in Table 1 is not meant to imply that the sections and subsections must be developed in that order. The order of presentation is intended for ease of use, not as a guide to the order of preparing the various elements of a SPMP. The sections and subsections of a SPMP may be included by direct incorporation or by reference to other plans and documents.

Detailed descriptions of each section and subsection in a SPMP are presented in sections 3.1 through 3.5 of this standard. Certain additional components may be included in a SPMP. Additional components are described in section 3.6.

Each version of a SPMP based on this standard shall contain a title and a revision notice sufficient to uniquely identify the document. Revision information may include the project name, version number of the plan, date of release, approval signature(s), a list of pages that have been changed in the current version of the plan, and a list of version numbers and dates of release of all previous versions of the plan.

The preface of a SPMP based on this standard shall describe the purpose, indicate the scope of activities, and identify the intended audience for the SPMP. A Table of Contents, and lists of the Figures and Tables in the SPMP shall be included in every SPMP, as indicated in Table 1.

3.1 Introduction (Section 1 of the SPMP)

This section of the SPMP shall provide an overview of the project and the product, a list of project deliverables, the plan for development and evolution of the SPMP, reference materials for the SPMP, and definitions and acronyms used within the SPMP.

3.1.1 Project Overview (1.1 of the SPMP)

This subsection of the SPMP shall provide a concise summary of the project objectives, the product to be delivered, major work activities, major work products, major milestones, required resources, and master schedule and budget. The project overview shall also describe the relationship of this project to other projects, as appropriate. This overview shall not be construed as an official statement of product requirements. Reference to the official statement of product requirements shall be provided in this subsection of the SPMP.

3.1.2 Project Deliverables (1.2 of the SPMP)

This subsection of the SPMP shall list all of the items to be delivered to the customer, the delivery dates, delivery locations, and quantities required to satisfy the terms of the project agreement. This list of project deliverables shall not be construed as an official statement of project requirements.

3.1.3 Evolution of the SPMP (1.3 of the SPMP)

This subsection 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 subsection shall also specify the mechanisms used to place the initial version of the SPMP under change control and to control subsequent changes to the SPMP.

3.1.4 Reference Materials (1.4 of the SPMP)

This subsection 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, and publishing organization. Other sources of information, such as electronic files, shall be identified in an unambiguous manner using identifiers such as date and version number. Any deviations from referenced standards or policies shall be identified and justifications shall be provided.

3.1.5 Definitions and Acronyms (1.5 of the SPMP)

This subsection of the SPMP shall define, or provide references to the definition of all terms and acronyms required to properly interpret the SPMP.

3.2 Project Organization (Section 2 of the SPMP)

This section of the SPMP shall specify the process model for the project, describe the project organizational structure, identify organizational boundaries and interfaces, and define individual responsibilities for the various project elements.

3.2.1 Process Model (2.1 of the SPMP)

This subsection of the SPMP shall define the relationships among major project functions and activities by specifying the timing of major milestones, baselines, reviews, work products, project deliverables, and sign-offs that span the project. The process model may be described using a combination of graphical and textual notations. The process model must include project initiation and project termination activities.

3.2.2 Organizational Structure (2.2 of the SPMP)

This subsection of the SPMP shall describe the internal management structure of the project. Graphical devices such as hierarchical organization charts or matrix diagrams may be used to depict the lines of authority, responsibility, and communication within the project.

3.2.3 Organizational Boundaries and Interfaces (2.3 of the SPMP)

This subsection of the SPMP shall describe the administrative and managerial boundaries between the project and each of the following entities: the parent organization, the customer organization, subcontracted organizations, or any other organizational entities that interact with the project. In addition, the administrative and managerial interfaces of the project support functions, such as configuration management, quality assurance, and verification and validation shall be specified in this subsection.

3.2.4 Project Responsibilities (2.4 of the SPMP)

This subsection of the SPMP shall identify and state the nature of each major project function and activity, and identify the individuals who are responsible for those functions and activities. A matrix of functions and activities versus responsible individuals may be used to depict project responsibilities.

3.3 Managerial Process (Section 3 of the SPMP)

This section of the SPMP shall specify management objectives and priorities; project assumptions, dependencies, and constraints; risk management techniques; monitoring and controlling mechanisms to be used; and the staffing plan.

3.3.1 Management Objectives and Priorities (3.1 of the SPMP)

This subsection of the SPMP shall describe the philosophy, goals, and priorities for management activities during the project. Topics to be specified may include, but are not limited to, the frequency and mechanisms of reporting to be used; the relative priorities among requirements, schedule, and budget for this project; risk management procedures to be followed; and a statement of intent to acquire, modify, or use existing software.

3.3.2 Assumptions, Dependencies, and Constraints (3.2 of the SPMP)

This subsection of the SPMP shall state the assumptions on which the project is based, the external events the project is dependent upon, and the constraints under which the project is to be conducted.

3.3.3 Risk Management (3.3 of the SPMP)

This subsection of the SPMP shall identify and assess the risk factors associated with the project. This subsection shall also prescribe mechanisms for tracking the various risk factors and implementing contingency plans. Risk factors that should be considered include contractual risks, technological risks, risks due to size and complexity of the product, risks in personnel acquisition and retention, and risks in achieving customer acceptance of the product.

3.3.4 Monitoring and Controlling Mechanisms (3.4 of the SPMP)

This subsection of the SPMP shall define the reporting mechanisms, report formats, information flows, review and audit mechanisms, and other tools and techniques to be used in monitoring and controlling adherence to the SPMP. Project monitoring should occur at the level of work packages. The relationship of monitoring and controlling mechanisms to the project support functions shall be delineated in this subsection of the SPMP (see 3.4.3).

3.3.5 Staffing Plan (3.5 of the SPMP)

This subsection of the SPMP shall specify the numbers and types of personnel required to conduct the project. Required skill levels, start times, duration of need, and methods for obtaining, training, retaining, and phasing out of personnel shall be specified.

3.4 Technical Process (Section 4 of the SPMP)

This section of the SPMP shall specify the technical methods, tools, and techniques to be used on the project. In addition, the plan for software documentation shall be specified, and plans for project support functions such as quality assurance, configuration management, and verification and validation may be specified.

3.4.1 Methods, Tools, and Techniques (4.1 of the SPMP)

This subsection of the SPMP shall specify the computing system(s), development methodology(s), team structure(s), programming language(s), and other notations, tools, techniques, and methods to be used to specify, design, build, test, integrate, document, deliver, modify or maintain or both (as appropriate) the project deliverables. In addition, the technical standards, policies, and procedures governing development or modification or both of the work products and project deliverables shall be included, either directly or by reference to other documents.

3.4.2 Software Documentation (4.2 of the SPMP)

This subsection of the SPMP shall contain either directly or by reference, the documentation plan for the software project. The documentation plan shall specify the documentation requirements, and the milestones, baselines, reviews, and sign-offs for software documentation. The documentation plan may also contain a style guide, naming conventions and documentation formats. The documentation plan shall provide a summary of the schedule and resource requirements for the documentation effort. ANSI/IEEE Std 829-1983 [4] provides a standard for software test documentation.

3.4.3 Project Support Functions (4.3 of the SPMP)

This subsection of the SPMP shall contain, either directly or by reference, plans for the supporting functions for the software project. These functions may include, but are not limited to, configuration management 3; software quality assurance 2 and 5; and verification and validation 6. Plans for project support functions shall be developed to a level of detail consistent with the other sections of the SPMP. In particular, the responsibilities, resource requirements, schedules, and budgets for each supporting function shall be specified. The nature and type of support functions required will vary from project to project; however, the absence of a software quality assurance, configuration management, or verification and validation plan shall be explicitly justified in project plans that do not include them.

3.5 Work Packages, Schedule, and Budget (Section 5 of the SPMP)

This section of the SPMP shall specify the work packages, identify the dependency relationships among them, state the resource requirements, provide the allocation of budget and resources to work packages, and establish a project schedule.

3.5.1 Work Packages (5.1 of the SPMP)

This subsection of the SPMP shall specify the work packages for the activities and tasks that must be completed in order to satisfy the project agreement. Each work package shall be uniquely identified; identification may be based on a numbering scheme and descriptive titles. A diagram depicting the breakdown of activities into subactivities and tasks (a work breakdown structure) may be used to depict hierarchical relationships among work packages.

3.5.2 Dependencies (5.2 of the SPMP)

This subsection of the SPMP shall specify the ordering relations among work packages to account for interdependencies among them and dependencies on external events. Techniques such as dependency lists, activity networks, and the critical path method may be used to depict dependencies among work packages.

3.5.3 Resource Requirements (5.3 of the SPMP)

This subsection of the SPMP shall provide, as a function of time, estimates of the total resources required to complete the project. Numbers and types of personnel, computer time, support software, computer hardware, office and laboratory facilities, travel, and maintenance requirements for the project resources are typical resources that should be specified.

3.5.4 Budget and Resource Allocation (5.4 of the SPMP)

This subsection of the SPMP shall specify the allocation of budget and resources to the various project functions, activities, and tasks. An earned value scheme may be used to allocate budget and resources, and to track expenditures and resource utilization.

3.5.5 Schedule (5.5 of the SPMP)

This subsection of the SPMP shall provide the schedule for the various project functions, activities, and tasks, taking into account the precedence relations and the required milestone dates. Schedules may be expressed in absolute calendar time or in increments relative to a key project milestone.

3.6 Additional Components

Certain additional components may be required. These may be included by appending additional sections or subsections to the SPMP. However, the numbering scheme for the required sections and subsections must adhere to the format specified in this standard. Additional items of importance on any particular project may include subcontractor management plans, security plans, independent verification and validation plans, training plans, hardware procurement plans, facilities plans, installation plans, data conversion plans, system transition plans, or the product maintenance. If present, additional components must be developed in a format and to a level of detail consistent with the required sections of the SPMP.

3.6.1 Index

An index to the key terms and acronyms used throughout the SPMP is optional, but recommended to improve usability of the SPMP.

3.6.2 Appendices

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