Information Technology Engineers Skill Standards

Project Manager

Contents

Prepared on December 25, 2000
(Corrected on August 9, 2001)

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1. Overview

1.1 Background of developing the “Information Technology Engineers Skill Standards”

At present, great hopes are placed on information technology as the sources of industry regeneration and new economic growth. This is because the roles of IT have been expanded from the tools for manufacturing cost reduction and service speedup to those for effective collaboration among enterprises and the creation of new industries. From now on, the rise or fall of an enterprise will be determined by quality of computerization investment. It is therefore an urgent matter to bring up engineers who construct advanced information systems and those who utilize them.

In view of this, the Central Academy of Information Technology has repeated a study on how to bring up, evaluate, and select good engineers who can show their practical ability on actual jobs. As a conclusion, the academy decided to establish the “information technology engineers skill standards” centering on the criteria to determine whether the required jobs can be performed adequately or not.

1.2 Significance and objective of developing the “Information Technology Engineers Skill Standards”

The results of surveys that the Central Academy of Information Technology has conducted on information processing engineers have suggested an important issue to be solved in the industrial world and by educational institutions such as schools. The issue is the establishment of the guidelines that clearly define what the industrial and educational worlds are expecting to get. While these guidelines need to define the level of knowledge, skills and capability to be equipped with by IT personnel (engineers) who do the actual jobs in the industrial world, they need to define the models of IT engineers who can be accepted internationally, and the ways how schools and other educational institutions should conduct education training on the basis of these models. One example of the guidelines is the “Skill Standard for IT Engineers” developed by the Northwest Center for Emerging Technologies (NWCET) as part of the establishment of “Skill Standards” by the US Department of Labor.

The “Information Technology Engineers Skill Standards” have been developed as a tool that solves the issue mentioned above, and apply to all the sections of the information technology engineers examinations as criteria to evaluate the skills of engineers who have been brought up. The application of this skill standard is significant for the industrial world in “recruiting human resources with the guaranteed ability to do actual jobs.” For educational institutions such as schools, this is significant for “understanding and confirming the knowledge, ability, and the achievement levels of the engineers required by enterprises.” For government agencies, this is significant for “grasping the technical level of the entire industrial world.”

1.3 Configuration of the “Information Technology Engineers Skill Standards”

The “Information Technology Engineers Skill Standards” is a tool that provides information about knowledge and skill needed to do jobs such as building, operational control, usage and evaluation of IT system in organizations such as corporations. It also provides indicators to determine the outcome of jobs. “Information Technology Engineers Examinations: Overview of the New System” and “Information Technology Engineers Examinations: Scope of Examinations” describe knowledge, technology (technical knowledge), and ability that information processing engineers need to have, and performance indicators (listed in 1), 2), and 3) below). The established skill standards describe these points more specifically by consulting actual jobs.

1) Roles and jobs
2) Expected technical levels
3) Scopes of examinations: examination in the morning and that in the afternoon
   (The above information can be downloaded to access http://www.jitec.jipdec.or.jp/.)

The “Information Technology Engineers Skill Standards” consists of three kinds of technical information described below. In this standard, individual skill standards are established for each examinees classified according to examination categories.

(1) Key activities

This chapter describes jobs that are keys unique to each examination categories. It describes the “roles and jobs” in 1) above more specifically.

(2) Skill criteria

This chapter describes what knowledge and skill should be used to do the key activities in 1) above, and also describe performance indicators to determine what outcome should be obtained. It describes “expected technical levels” in 2) above more specifically.

(3) Body of knowledge

This chapter systematically describes common knowledge independent of examination categories and knowledge needed to do the key activities in 1) above. This chapter also covers the “scopes of examinations” in 3) above.

1.4 Image of a “Project Manager” and Skill Standards

These skill standards are provided to apply the framework of the aforementioned information technology engineers’ skill standards to “project managers.”

(1) Image of applicable persons

In typical information system development projects, the project managers are to be engaged in planning, promoting, and managing the projects as the persons responsible for the information system development projects. The applicable persons are required to have the capabilities to properly understand projects expected in systematization plans, unify the total project awareness, and achieve the target of the projects.

(2) Skill standards

The skill standards below apply to project managers.

1) IT common body of knowledge
2) Project manager
   - Key activities, skill standards, practical body of knowledge, and core body of knowledge

2. Key Activities

The key activities indicate the contents of work assigned as basic jobs for a project manager to smoothly promote an information system development project. In the skill standards, this job area is called the "information system development project management process."

Jobs which belong to the information system development project management process are divied into six basic "activities" shown in Fig.2-1 below.

Project start-up
Project plan development
Project tracking and execution management
Change management
Project close-out
Evaluation of project completion

Fig.2-1 Information system development project management process

Activities are further divided into detailed jobs called "tasks." These skill standards present the information system project management process in the following format:

Activity	Task	Job outline
1. Act 1	1-1 Task 1	x x x x x x x x x x x x x x
	1-2 Task 2	x x x x x x x x x x x x
	1-3 Task 3	x x x x x x x x x x
2. Act 2	2-1 Task 1	x x x x x x x x x x x
	2-2 Task 2	x x x x x x x x x x x x x
	2-3 Task 3	x x x x x x x x x x x x x x
	2-4 Task 4	x x x x x x x x x x x x

The major role of an individual's job as a project manager is to conduct the activities shown in Fig.2-1, including "project plan development," "project tracking and execution management," "change management," "project close-out," and "evaluation of project completion."

(Note) In what order projects are started up differs depending on the enterprises. These skill standards assume that personnel in enterprises that are responsible for project planning will conduct "project start-up" and do not consider this activity to be a key activity of the project manager.

[Information System Development Project Management Process]

Assumptions

(1) Organizations in which an information system is to be developed

Information system development projects can be promoted in enterprises, administrative organs, universities and schools, and various types of organizations. The skill standards employ the generic term “enterprises” to represent such organizations.

(2) Information system development projects and placement of the products

These skill standards assume that an enterprise for which the project manager works will plan a new information system development project and information technology engineers who belong to the information system department of the enterprise will play a major role in the development in cooperation with external information system development enterprises and product vendors.

(3) Standards adopted in enterprises

This term indicates standards that enterprises originally prepare as well as standards that are adopted internationally or domestically or in industries.

(4) Persons/organizations concerned with respect to the information system development project

These skill standards assume that persons/organizations concerned have the following configuration in relation to the information system development project.

Name	Role and configuration
Project plan surveillance organization	Surveys whether or not planned projects are accepted and gives approval.
High-level manager	Takes responsibility for the entire information system. Determines the intent in work to solve important problems in all information system development projects and approves requests.
Project planning manager	Takes responsibility for individual information system development projects.
Project manager	Takes responsibilities of conducting individual information system development projects.
External manager	Manager of an external enterprise to whom information system development is entrusted or a manager of a vender who is asked to deliver products.
User representative	Conveys requests on behalf of the user department.
Project promotion organization	Achieves the purpose and target of information system development projects. • Project team • Project staff (full-time staff and staff assigned in part)
Review executor	Project staff, engineers not belonging to the project, user representatives, etc. act in cooperation with each other in reviewing products.
Person concerned with project evaluation	Evaluates reports received from project managers in periodical or unscheduled meetings and gives guidance and advice with respect to important problems. • User department high-level manager • User representatives • Information department high-level manager • Technical expert • Planning surveillance department (irregular)

[Database system development job process]

Activity	Task	Job outline
1. Project start-up	1-1 Preparation of planning documents for information system development project	The planning manager for the information system development project indicates the significance of a project and documents the overview of resource usage and promotion systems to acquire approval for the promotion of the planned project. The planning document describes the purpose of the project, targets, placement, products, milestones, costs, and necessary resources as an overview and clarifies problems in terms of project execution, risks, and external factors that may affect the project.
	1-2 Application and description of information system development project	The planning manager submits a planning document for the information system development project to describe the contents in response to a request from the surveillance manager. In the planning surveillance organization, selected personnel in charge of surveillance survey the planning project for appropriateness according to the evaluation criteria. Acceptance of the planned project is to be determined not only by the evaluation of the project being applied for but by the importance for the entire enterprise and the possibility of resources, taking into account other planning projects under application.
	1-3 Completion of planning documents for information system development project	After the plan's satisfaction of the evaluation criteria, the planning surveillance organization may add some restrictions or conditions to the contents of the plan, taking into account the limits of the budget and period of completion desired by the enterprise, the quality level being assured, and the allowable amount of resources in use. The planning manager is to determine whether or not restrictions as set will cause serious trouble. After receiving approval from the project surveillance organization, the information system department high-level manager determines and appoints an official project manager. In addition, the high-level manager clarifies duties and authority with respect to the project manager. This planning document serves as the initially requested specifications for the project plan phase and afterwards.

(Note 1) These skill standards assume that the plan for information system development project will be made as an information system development project to be developed and used within the enterprise. However, some system development enterprises may start a project, taking the opportunity to answer a request for a proposal from a client company. In such a case, regarding this activity "project start-up", the planning surveillance organization and planning manager need to be read as a customer procurement manager and sales manager of proposing enterprises, respectively.

(Note 2) The placement and authority of the planning surveillance organization and the scope of responsibility and authority of high-level manager differ depending on the enterprises. In these skill standards, the planning surveillance organization assumes that the high-level manager of the information system department will be transferred the right to appoint project managers by the top management of the enterprise.

(Note 3) In actuality, a candidate for project manager may have opportunities to give advice according to the requests from planning managers at stages of project planning. However, these skill standards do not assume that a candidate for project manager will directly participate in the plan. Therefore, this activity is not carried out by candidates for project manager.

Activity	Task	Job outline
2. Project plan development	2-1 Scope planning	Clarifies the effects to be achieved by a project, problems to be solved, managerial functions to be achieved through the execution of the project, roles and duties of the project promotion organization, and problems to be solved. Also clarifies the scope of the project, and prerequisites of project promotion and constraints, and documents them as scope planning.
	2-2 Establishment of system development policy	Considering the placement of a project, features of system development, and appropriate work efficiency, quality and cost, determines the system life cycle model suitable for the development, basic system development technique to be adopted, system development environment, and development standards (quality assurance, software configuration management, documentation, etc.) to be observed.
	2-3 Definition of scope	Breaks down work to be carried out until the completion of a project into elements at the level of an overview (overview level task). For each overview level task, sets target quality, roughly assigns resources, and documents them as the definition of the scope.
	2-4 Schedule planning	Breaks down overviewed level tasks into smaller tasks that can be easily managed and classifies the work configuration into further detail (detailed level tasks). For each detailed level task, defines the work (work content, necessary man-hours, necessary resources, etc.) in further detail. Taking into account the logical execution for the order of work as well as possible physical order, it estimates the execution period necessary for the work. In addition, it takes into account the margin of work and efforts to reduce the execution period to a logically possible level and for smooth supply of resources, documents a schedule plan.
	2-5 Resource planning	For each detailed level task to be carried out in a project, estimates the required skill, necessary man-hours and necessary resources. In addition, determines the appropriate supply period and the supply amount with respect to the skill, staff, and resources. These items are documented as a resource plan.
	2-6 Organizational staff planning	Specifying roles and duties of a project promotion organization and, taking into account the directivity and features of the project, preparing the policies to promote the organization. To buttress the organization, considers the knowledge, skill, experiences, productivity, directivity, character, and so on to recruit, select, and place members who will achieve the project scenario effectively. Project staff consists of full-time staff and staff participating in the work in part. Engineers are requested from the promotion organization for cooperation in providing information, performing technical consultation and review if necessary. In addition, a plan is made to educate and train staff. These items are documented as an organizational staff plan.
	2-7 Procurement planning	Taking into account the enterprise procurement policies, technologies, work efficiency, work consumption, cost, and so on, makes plans for procurement from external enterprises with respect to system development and system products. Decides procurement request specifications and execution conditions as well as the type of contract and request methods, documenting them as a procurement plan.

Activity	Task	Job outline
	2-8 Cost planning	Adds up costs in detailed level tasks according to the necessary staff, necessary amount of resources, and unit prices and considers necessary incidental expenses necessary for project promotion and margins provided for risks to find the required costs. The total cost is calculated considering the budget limit given when the project is planned as well as the enterprise's budget calculation policy. This policy determines the initial planning cost and is documented as a cost plan.
	2-9 Quality assurance planning	Clarifies the quality level required by users and the degree of satisfaction and considers the quality assurance policy of the enterprise and the quality given by the planning document to set up a target for project quality and quality management items and to determine the methods of quality assurance, procedures to ensure quality, matrix of quality evaluation, development standards to be observed, and so on. In addition, makes plans for software configuration management that are closely related to quality assurance. Finally, checks for appropriateness as a way to ensure quality and then documents the above items as a quality assurance plan.
	2-10 Risk management planning	Identifies all risk factors and evaluates the possibility of the risk's occurrence as well as the effects on the quality, cost, and due date. Estimates the work to reduce risks and plans measures to minimize the effects such risk factors may have. Considering the probability of the occurrence and effects with respect to potential risks, identifies serious risks and estimates the performance with control methods specified and then adds these items to the scheduling plan. Also makes plans for measures with respect to unexpected events and documents them as a risk management plan.
	2-11 Preparation for project planning documents	Makes an entire adjustment for individual plans and prepares and documents a consistency plan. The planning document clarifies the reference values for various management targets, monitoring and tracking methods for project progress status, control methods for promotion while the plan is underway, measures for modification requests, methods to confirm process completion, methods to measure project performance, methods of accepting products by users, methods of confirming project completion, formats for reporting progressive status to persons concerned for evaluation, and frequencies for report generation. After this, the planning document is submitted to the higher-level manager to receive approval from the manager. The higher-level manager then evaluates the contents and determines whether or not the plan is to be carried out. If approval is given, constraints are to be made, if necessary. To make overall evaluations after the completion of the project, evaluation indexes are outlined at that time.

(Note 1) If the scope is determined and a system development policy set up, the first task to be carried out in the project is defined. However, tasks 2-4 to 2-10 above are to be conducted in parallel and with mutual consistency.

(Note 2) Note that cost planning and quality assurance planning differ depending on whether the project is an in-house planning project or an acceptance project. For example, a system development enterprise is assumed to not only tally necessary costs but also to create a cost plan with the concepts of budget calculation characteristic to the enterprise and its strategies and set up a quality target that stresses customer satisfaction and usability.

Activity	Task	Job outline
3. Project Tracking and Execution Management	3-1 Project execution management	A process that displays a project manager's most important mission. When the project is in progress, the process controls the scope, progress, use of resources, costs, quality, organization and personnel, procurement, and risks individually and wholly to achieve a smooth transition. When a request to change the plan is made, the appropriateness of the change is investigated and the plan is actually changed if necessary. In addition, the effects of the change are judged specifically. Efforts are made for improvement, taking into account the appropriateness of the execution management method.
	3-2 Project monitoring and tracking	While comprehending data indicating the progressive status of the project, monitors behavior/phenomena that may hinder the achievement of the plan and tracks factors for abnormal situations if they have been noted or foreseen. The frequency of the monitoring is set up according to the size and complexity of the project. This work is to be carried out to basically find trouble, but monitoring and tracking stress the quality, schedule, scope, resources, and costs.
	3-3 Problem management	Analyzes whether the problems found by a project manager him/herself and questions or problems and proposals presented by a project team, user representatives, etc., have little effect on the project promotion or require changes to the plan. If these problems and questions have little effect, they are judged to be problems within the project scope to consider countermeasures, to estimate the necessary amount of work and necessary resources, to determine the degree of influence, and to solve problems according to the higher-level manager. After the completion of the problem processing, the solution process and final status are recorded and are reported at an evaluation meeting.
	3-4 Process completion evaluation	If processes defined with the schedule plan are completed, evaluates the project staff, team performance, cooperation system, mutual understanding, project management methods, and so on. If the results obtained are not favorable, prepares measures for improvement in and after the next process, and effectively uses the results of evaluation to obtain better results.
	3-5 Project status report	Notifies the project teams and persons concerned with regard to the evaluation of the accurate and complete status of the entire project by providing document information or by holding report meetings. Focusing on the reporting of current circumstances facing the plan, such as quality, costs, schedule, and techniques, the report coves prospects separate from the plan, problems that occurred, and the results of responses to requests for change as important report items.
	3-6 Progress management	For each checkpoint of the progress status that has been set up, evaluates the quantity and quality of work supplied within a certain period and checks the status of the progress in terms of the schedule plan. Establishes prospects as completion approaches. If the work is delayed or is a delay is expected, prepares measures for schedule changes, additional staff and/or resources, etc. Consults with higher-level managers etc. according to the measures, reevaluates the costs and period of completion, and corrects the plan.

Activity	Task	Job outline
	3-7 Resource management	Evaluates resources supplied within a certain period, and checks the supply status, timing, and qualitative and quantitative sufficiency with respect to the resource plan. Establishes prospects as completion approaches. If effects are expected due to a lack of resources, takes measures through the addition of resources. Consults with higher-level managers according to the measures and reevaluates the cost and period of completion and corrects the plan.
	3-8 Organizational staff management	Forms an organization for smooth advancement toward the final goal and target of the project managets to maintain the situation. The staff, project team, and personnel concerned with respect to evaluation are united to improve the total results by making the project active and dynamic. To achieve this, provides costs and time for education and training necessary for improvement of the performance of individuals and the team. In addition, manages the staff so that they remain mentally and physically healthy.
	3-9 Procurement management	When systems are developed and system products are procured from the outside, selects cooperative companies and vendors best-suited to the project conditions. Negotiates with the party with a stance to minimize the risks to both sides. Controls the project promotion process so that parts procured from the outside can fit in with the in-house team to display the same performance. When agreements with those parties are not fixed, works to solve problems as early as possible through discussions held on both sides. If changes to the contents of agreement are made, clarifies the contents of the changes and then modifies the agreement.
	3-10 Cost management	Roughly tracks the expenses supplied within a certain period by comparing them to the budget and tracks the expenses in detail, classifying them by task items. Considering how expenses are determined, estimates the final amount of expenses. If the final amount of expenses is expected to differ significantly from the planned expenses, recognizes the problem and take countermeasures as early as possible.
	3-11 Quality management	Evaluates conformity to procedures for the execution of quality assurance within a certain period as well as the status of achievement of the products in terms of the target quality. If the quality of products does not meet the target, works for the elimination of the differences. If the quality standards need to be improved, handles procedures for requests for changes, prepares the changed standards, or makes corrections. In addition, the same procedures are followed to carry out software configuration management.
	3-12 Risk management	Monitors the status of risk prevention work and the tangibility of potential risks within a certain period and estimates the sign of risk. With the progress of the project, reinvestigates the sufficiency of risk plans, basic policies to handles risks, and countermeasures to make changes to meet practical situations, if necessary. If risks become real, executes the plan for countermeasures by obtaining agreement within the project promotion organization and approval from the higher-level manager. When reporting the project status, handles the report items on the risk plan and its progress as important information.

Activity	Task	Job outline
4. Change management	4-1 Comprehending requests for changes	With respect to the Request For Change (RFC), an enterprise standard where an individual proposes a request for change, it is checked, and it may then be accepted. The RFC is to have the outline of change, reason for the request for change, results of the change, results if the changes are not made, and so on.
	4-2 Analysis and evaluation of contents of the request	After consultation with persons closely related to the request for change, evaluates the results of improvements resulting from changes and effects on the scope, cost, schedule, necessary resources, etc., and determines which actions are to be taken as selected from the acceptance, rejection, reservation, or transfer of the request to a higher-level manager.
	4-3 Approval of changes	Reports the initial determination concerning the request for changes to the personnel related to evaluation and asks higher-level personnel to make a decision. The higher-level manager is to make the final decision for changes by comparing the report and the standards for changes.
	4-4 Execution of changes	If the request for change is approved, the project manager has the project promotion members make the changes. In addition, the results of executing the changes are analyzed and evaluated.
5. Project close-out	5-1 Checking status of project close-out	Investigates the final status and checks for achievement of completion standards, focusing on the functions, performance and quality with respect to the final products including articles procured from external enterprises. When the project ends, all matters except for those suspended until the end are considered to have been solved, and actions for the approved request for change are considered to have been completed.
	5-2 Preparation of project completion report	Documents the status at the time of completion with respect to the status of achievement of the purposes and targets of the project, functions, performance, and quality of final products, differences between the project plan and the actual events, actions for problems, actions for requests for changes, and the project execution management process. The completion report records all remaining problems in a status where they can continue to be resolved.
	5-3 Actions for acceptance of products by users	Hands over all products related to the project to the users and appropriately supports the acceptance work.
	5-4 Report and conclusion of project completion	With the project completion report, explains to the project team, higher-level manager, persons related to evaluation, and the planning monitoring organization about the completion status. Approval from the persons related to evaluation and the planning monitoring organization terminates all activities for the project.
6. Evaluation of project completion	6-1 Evaluation after project completion	Evaluates what results are obtained according to the evaluation index after completion set up with the project planned (regarding the project plan, project execution process, developed system, and results obtained by the team/staff). When the evaluation is done, makes use of numeric data and document information recorded with the progress of the project. In addition, hearings concerning persons concerned are held with questionnaires and other project information prepared in the past is appropriately used, if necessary.

Activity	Task	Job outline
	6-2 Collection, arrangement, and analysis of information regarding actual results and preparation of database	Collects data on actual results in the project promotion process, including man-hours supplied by staff, the amount of assigned resources, term of work, quality, risks, changes, and various problems, and arranges the data classified by work type, process, and project team. Analyzes differences between the plans and the actual results based on this data. Prepares databases from the results of the analysis database and uses them as reference information for standard values and preventive actions to handle faults in later projects. In addition, evaluates via comparison with the actual situation whether or not the obtained data and the evaluation criteria set up in enterprises are effective in situations where intent is decided. Then investigates changes in the evaluation criteria, if necessary.

3. Skill Criteria

The skill criteria correspond to tools (tables) that provide indicators to check the status of achievement of the information system development process described in the key activities by the project manager as to whether or not a series of jobs has been promoted successfully by using proper methods, proper knowledge and proper techniques.

The skill criteria provide indicators to indicate what outcome needs to be obtained (“performance indicators”) as a result of job execution for “tasks” of activities. They also provide knowledge (“required knowledge”) and skill (“required skill”) required to do jobs.

[Note on application of skill criteria]

In this series of skill criteria described on the following pages, the five types of activities except for “project start-up” apply to the project managers.

[Project Manager Skill Criteria]

(Criteria for "2-1" to "6-2" apply to the project managers.)

1. Project start-up

No.	Task	Performance indicators	Required knowledge	Required skill
1-1	Preparation of planning documents for information system development project	• The project planning document is prepared conforming to the standard form of the enterprise. • The purpose, target, products, milestone, cost, resources, subjects and risks of the project are clearly described. • Descriptive key points of the plan can be surveyed easily by the planning department. • An approval is obtained from the higher-level manager who is responsible for the plan. • Review is done amount persons concerned and they agree to the contents.	• Knowledge about the status of the enterprise • Knowledge about information system concept of the enterprise • Knowledge about system overall plan of the enterprise • Knowledge about project resources • Knowledge about project organization • Knowledge about project risk • Knowledge about descriptive format of planning document • Knowledge about documentation	• Ability to objectively evaluates projects from the status and managerial capability of the enterprise as well as relationships with competitive enterprises • Ability to appeal for the necessity of the project • Ability to create a plan taking into account the tendencies in IT • Ability to summarize the contents of plan briefly and efficiently • Ability to describe important items of the plan in such a way that they can be easily understood by others • Ability to get effective advices from others when the planning document is prepared • Ability to explain to higher-level managers about the contents of the plan with persuasiveness
1-2	Application and description of information system development project plan	• The contents of the plan are understood and persons in charge of surveillance having fair standpoint take part in an explanatory meeting of the plan. • In an explanatory meeting of the plan, effective explanations are made focusing on important items. • Appropriate answers are given to questions from the persons responsible for/persons in charge of plan surveillance. • It is checked that constraints given by the planning surveillance organization will not cause major troubles.	• Knowledge about the status of the enterprise • Knowledge about planning surveillance organization • Knowledge about presentation technique	• Ability to explain key points of the planning contents logically and with persuasiveness • Ability to swiftly understand the meanings of questions given by the persons responsible for/persons in charge of plan surveillance

1-3	Completion of planning documents for information system development project	• Items that are requested to be resubmitted are clarified. • The executability in the enterprise is investigated. • It is investigated that constraints requested from the planning surveillance organization do not cause troubles in the project promotion. • A project manager is appointed and his/here role, duties and authority are clarified. • The project manager receives the contents of the plan as the initial request to the project.	• Knowledge about documentation • Knowledge about candidates for project manager	• Ability to exactly understand what the responsible person for/person in charge of planning surveillance points out • Ability to prepare a substitution plan for the constraints requested by the responsible person for/person in charge of planning surveillance • Ability to select a proper project manager, taking into account the features of the project

(Note 1) The skill criteria for the “Project start-up” mainly applies to the responsible person for/person in charge of planning.

(Note 2) Candidates for project manager are assumed not to directly participate in the plan. However, it is desirable that the candidates take part in the reviews on the planning documents, are familiar with their contents, and have opportunities of giving advices to requests, if any, from the responsible persons etc.

2. Project Plan Development

No.	Task	Performance indicators	Required knowledge	Required skill
2-1	Scope planning	• The contents of contribution to the purpose of the enterprise are clarified with respect to projects of the project. • The reference degree of satisfaction is clarified as the quality assurance reference for customers/users. • The roles and duties to be taken by the project promotion organization are clarified. • Project information (products, cost, term, quality, user, size, functions, technologies, risks, etc.) is defined exactly and completely, and the scope is clarified. • Prerequisites and constraints on the project promotion are clarified. • The project plan and problems to be solved with the plan executed are clarified. • Substitution plans are investigated. • The scope management policies are indicated. • The scope plan is documented and reviewed. • The scope plan is approved by persons concerned to the scope plan.	• Knowledge about the project plan • Knowledge about information system development jobs • Knowledge about project evaluation system of enterprises • Knowledge about system quality assurance • Knowledge about system risk • Knowledge about documentation	• Ability to understand the essential request of the project planning document • Ability to describe the entire image of information system development project • Ability to arrange and decide the scope meeting customers'/users' requests • Ability to identify the products of the project • Ability to analyze and integrate the relationships between various development jobs elements and managerial elements • Ability to investigate risks and problems • Ability to understand information system development jobs from its structural viewpoint • Ability to add appropriate priority to development job elements • Ability to rationally explain to the persons concerned with evaluation about the scope plan with persuasiveness • Ability to understand concepts opposite to each other
2-2	Establishment of system development policy	• The system life cycle model suitable for system characteristics is selected. • Experts of information system development participate in the system life cycle model. • The selected system development technologies and system development environments are suitable for system characteristics. • Substitution plans are investigated. • The selected development standards are suitable for system characteristics. • The persons in charge of evaluation approve the system development policies.	• Knowledge about the system life cycle model • Knowledge about system life cycle management • Knowledge about system development technique • Knowledge about system development environment • Knowledge about international standards, Japanese standards, and enterprise standards related to information systems • Knowledge about system quality assurance • Knowledge about system configuration management • Knowledge about documentation in information system development	• Ability to seize the features of systems to be developed • Ability to evaluate system life cycle models • Ability to apply merits of information system development standards to the projects • Ability to indicates optimum resolution policies for problems on the applicable system development • Ability to rationally explain about the development policies with persuasiveness to make them understood • Ability to understand concepts opposite to each other

2-3	Definition of scope	• The entire project up to the work completion is broken down to outlined level tasks. • Outlined level tasks are clearly defined. • Each outlined level task is documented and reviewed as the scope definition. • The persons concerned with evaluation approve the scope definition.	• Knowledge about the work structure of information system development • Knowledge about the methods of breaking down tasks • Knowledge about documentation	• Ability to identify outline level tasks • Ability to roughly estimate outline level tasks • Ability to identify the products of projects • Ability to analyze relationships between outlined level tasks • Ability to seize the structure of information system development work • Ability to rationally explain to the persons concerned with evaluation about the scope definitions with persuasiveness • Ability to understand concepts opposite to each other

2-4	Schedule planning	• Detailed level tasks of proper size that can be easily managed are clearly defined. • Milestones including the completion period of major products and the period of evaluation conferences are defined. • The order of execution is set up, taking into account the interdependent relationships between detailed level tasks. • The period of work execution is appropriately estimated compared with the estimation standards of the enterprise. • Lead time and lag time are estimated as the work execution period. • As the work execution period, the estimated time supports project management, problem solution, and actions against risks. • The work period is set for critical path setup. • An attempt is made to reduce the schedule within the possible logical and physical range. • Substitution plans are investigated. • Schedule risks are documented. • Schedules are documented and reviewed. • The persons in charge of evaluation approves the schedule plan.	• Knowledge about the structure of information system development work • Knowledge about the expression of project flowchart • Knowledge about the methods of breaking down tasks • Knowledge about the standards for estimating work execution period • Knowledge about critical path setup • Knowledge about schedule plan decision support software • Knowledge about documentation	• Ability to describe the entire project • Ability to set up project progress scenarios • Ability to make graphic the relationships between detailed level tasks and to analyze them • Ability to visualize the period necessary for executing tasks between detailed level tasks • Ability to set up the relationships in order of tasks between detailed level tasks to satisfy logical and physical conditions • Ability to identify elements for estimating the execution period of tasks between detailed level tasks • Ability to take into account the application to the work execution periods, taking into account the system characteristics • Ability to assign practically available resources and schedule efficiency • Ability to consider schedule risks • Ability to rationally explain to the persons concerned with evaluation about the schedule plan with persuasiveness • Ability to understand concepts opposite to each other

2-5	Resource planning	• Grounds for using special resources necessary for the project are clarified. • The quality, supply/procurement amount, and period are accurate and complete with respect to necessary resources. • The procurement sources are investigated, analyzed and evaluated. • Substitution plans are investigated. • Resource investment risks are documented. • Documentation of resource plans is reviewed. • The persons concerned with evaluation approve the resource plan.	• Knowledge about hardware • Knowledge about software • Knowledge about skill related to the project • Knowledge about system development environments • Knowledge about facilities used as a working environment • Knowledge about the man-hour estimation • Knowledge about individual skill information of the enterprises • Knowledge about resource plan decision support software • Knowledge about documentation	• Ability to assign necessary resources to detailed tasks • Ability to set up the amount of supply resources and the period efficiently • Ability to consider resource supply risks • Ability to rationally explain to the persons concerned with evaluation about the contents of the resource plan with persuasiveness • Ability to understand concepts opposite to each other
2-6	Organizational staff planning	• The duties and responsibilities of the project organization are clearly defined. • The policies of operating and maintaining the organization are clarified. • The organization is divided into teams of appropriate size, and the duties of the teams, their critical skill and responsibilities are clearly defined. • The right staff are put in the right places, suitable for the features of the project, taking into account the knowledge, skill, experiences, productivity, intention, characters and so on. • Staff having critical skill are assigned to each task. • Substitution plans are investigated. • The organizational structure and staff arrangement risks are documented. • Organizational staff plan is documented and reviewed. • The persons concerned with evaluation approve the organizational staff plan.	• Knowledge about project organizational structure • Knowledge about various types of skill necessary for information system development • Knowledge about the work contents and the characteristics of staff • Knowledge about staff education and training • Knowledge about the labor law system • Knowledge about documentation	• Ability to construct an optimum team structure for the characteristics of the project • Ability to set up conditions necessary for staff candidates (ability, talent, and suitability) • Ability to collect staff • Ability to make sure of the ability, talent and suitability of staff candidates • Ability to collect advisers for the project • Ability to consider staff supply risks • Ability to rationally explain to the persons concerned with evaluation about the organizational staff plan with persuasiveness • Ability to understand concepts opposite to each other

2-7	Procurement planning	• The necessity of procurement from the outsides is made clear. • The current situation of the information system vendor enterprises is investigated. • The characteristics, abilities and actual records requested from the procurement source are made clear. • The procurement specifications are defined exactly and completely. • The form of procurement suitable for the characteristics of the project is investigated. • Procurement risks are documented. • The procurement plan is documented and reviewed. • The persons concerned with evaluation approve the procurement plan.	• Knowledge about outsourcing • Knowledge about information system vendor enterprises • Knowledge about information system development and system products • Knowledge about information system operation • Knowledge about the forms of system development transactions (contract, commission, SI, outsourcing, alliance, etc.) • Knowledge about the procurement source selection standards of the enterprises • Knowledge about SLA • Knowledge about procurement development requirement specifications • Knowledge about inquiry • Knowledge about contract forms • Knowledge about legal constraints • Knowledge about secret work • Knowledge about intellectual property rights • Knowledge about overseas procurement • Knowledge about documentation	• Ability to determine whether or not external procurement is right • Ability to identify the prerequisites and constraints of procurement • Ability to identify the part of external procurement from the procurement standards of the enterprises and features of the project • Ability to evaluate the appropriateness of the procurement specifications • Ability to appropriately combine and select transaction form, taking into account the features of the project • Ability to consider procurement risks • Ability to rationally explain to the persons concerned with evaluation about the procurement plan • Ability to understand concepts opposite to each other
2-8	Cost planning	• The necessity of cost is made clear. • The amount and the time of expenditure are indicated. • The values of initial cost plan are indicated for the project. • Cost risks are documented. • The cost plan is documented and reviewed. • The persons concerned with evaluation approve the cost plan.	• Knowledge about the market price and actual price of resources • Knowledge about cost tantalization • Knowledge about estimated cost items • Knowledge about system cost estimation model • Knowledge about methods of estimating system cost • Knowledge about cost estimation support software • Knowledge about documentation	• Ability to the assignment of necessary amount to each detailed task • Ability to adjust the cost balance between the entire optimization and the partial optimization • Ability to consider cost risks • Ability to rationally explain to the persons concerned with evaluation about the cost plan • Ability to understand concepts opposite to each other

2-9	Quality assurance planning	• An enterprise quality policy is established. • Quality characteristics (necessary and sufficient quality items) required for the project are indicated clearly. • The adopted quality standards function normally. • Document preparation standards related to products of the project are established. • The quality assurance procedure is appropriate and complete. • The system configuration management procedure is appropriate and complete. • How to conduct quality review is specified. • Quality risks are documented. • Quality assurance plan and system configuration management plan are documented and reviewed. • The persons concerned with evaluation approve the quality assurance plan and system configuration management.	• Knowledge about the enterprise quality policy • Knowledge about methods of quality management • Knowledge about quality assurance procedure • Knowledge about system fault (bug) • Knowledge about the quality required by users • Knowledge about system test • Knowledge about system quality evaluation matrix • Knowledge about the verification of system quality • Knowledge about system quality inspection tools • Knowledge about system configuration management • Knowledge about documentation	• Ability to evaluate quality standards • Ability to construct a quality assurance body compared with features of the project • Ability to seize the requirements for true quality for users • Ability to select techniques of checking the degree of user's satisfaction, including prototyping • Ability to trade off between the supply cost for quality assurance and the quality • Ability to rationally explain to the persons concerned with evaluation about the quality assurance and system configuration management plan • Ability to understand concepts opposite to each other
2-10	Risk control planning	• All assumable risks are identified, and effects of the occurrence of risks are evaluated. • Preventive measures against risks are planed and included in detailed level task items. • Actions against unexpected situations are planned. • The occurrence of risks is monitored and tracked, and a management table for control is prepared. • The risk control plan is documented and reviewed. • The persons concerned with evaluation approve the risk control plan.	• Knowledge about risks that may occur in information system development projects • Knowledge about effects of the occurrence of risks • Knowledge about methods of risk control • Knowledge about methods of analyzing risks • Knowledge about techniques of risk quantification • Knowledge about risk evaluation • Knowledge about methods of avoiding risks • Knowledge about plans for unexpected situations • Knowledge about documentation	• Ability to identify the risks assumable from projects • Ability to predict effects of the occurrence of risks • Ability to estimate the probability of the occurrence of risks • Ability to investigate preventive measures against risks, cost supplied for actions against unexpected situations, and tradeoff with damages caused by risks • Ability to prepare substitution plans for actions against unexpected situations • Ability to rationally explain to the persons concerned with evaluation about risk control plans • Ability to understand concepts opposite to each other

2-11	Preparation for project planning documents	• The purpose, target, products and promotion system of projects are clarified. • Effects of products of the project are clarified. • Prerequisites and constraints are clarified to carry out the project. • Reference values are properly and completely defined as the targets of various controls. • Methods of reporting project situations and rules of approving them are clarified. • Rules of approving countermeasures against the occurrence of problems are clarified. • A solution for problems raised with the scope decided is made. • Policies to monitor, track and manage projects are indicated. • Conditions for confirming processes for completion are determined. • Items and methods of measuring project performances are clarified. • Conditions for users to accept products are clarified. • Outline evaluation indexes after the completion of project are prepared. • A project plan is documented and reviewed. • Persons related to the project approve the project plan.	• Knowledge about project scope • Knowledge about project schedule • Knowledge about resources used in projects • Knowledge about staff of project organization • Knowledge about costs for projects • Knowledge about procurement from the outsides • Knowledge about system quality assurance • Knowledge about project risks • Knowledge about standard rules of enterprises related to project progress reports and approval • Knowledge about standard rules of enterprises related to solution and actions to be taken when problems occur • Knowledge about process completion standards of the enterprises • Knowledge about project completion standards of the enterprises • Knowledge about performance indicators when enterprises complete their standard projects • Knowledge about the documentation	• Ability to totalize and adjust all planning elements related to projects and to solve inconsistencies among the planning elements • Ability to make sure of the consistency with requests from project planning documents • Ability to evaluate the executability of projects • Ability to work out monitoring and tracking methods suitable for the features of projects • Ability to make sure of the essential results of processes • Ability to set up an evaluation index outline after completion, used as the base of completion evaluation via comparison with the purpose and target of projects • Ability to rationally explain to the persons concerned with evaluation about the project plan with persuasiveness • Ability to understand concepts opposite to each other

(Note 1) The above tasks 2-4 to 2-10 are carried out in parallel, and the plans are decided keeping them compatible with each other.

(Note 2) The approval system related to project progress reports, the rules of approval, procedures for solving problems raised, and countermeasures are assumed to be determined taking into account the policies of the enterprise, the policies of owners of the information systems, the policies of project fund suppliers, policies requested by users/customers, and characteristics of the project.

3. Project Tracking and Execution Management

No.	Task	Performance indicators	Required knowledge	Required skill
3-1	Project execution management	• The project is controlled so that it can be transitioned as planned. • Necessary measures are taken to correct differences between the plan and the actual record. • All problems actually raised are examined, and countermeasures against them are taken, if necessary. • Preventive measures against risks are checked for practical effect. • If changes in the project are approved, the changes are securely made and effects of them are tracked. • The target achievement status is checked at milestones. • Preventive measures against risks newly identified and plans to cope with them are prepared and actually carried out. • The management system is evaluated and elements excessively controlled are removed. • The status of execution control is exactly reported to the persons concerned with evaluation.	• Knowledge about project plan • Knowledge about procedures to cope with problems actually raised • Knowledge about initially planned values of various management elements • Knowledge about plan change management • Knowledge about progress management • Knowledge about resource management • Knowledge about cost management • Knowledge about quality management • Knowledge about organizational staff management • Knowledge about procurement management • Knowledge about risk management • Knowledge about execution management support software	• Ability to analyze differences between the project plan and the actual record • Ability to feed back necessary items to the project plan with progress of the project via comparison with detailed inspected items • Ability to predict effects of individual problems on the entire progress • Ability to keep the entire progress balanced • Ability to properly evaluate the current situations via comparison with the purpose and target of the project • Ability to identify new risks that appear unexpectedly • Ability to determine effects of changes in the plan and assign priorities to countermeasures • Ability to identify negative effects of excessive management
3-2	Project monitoring and tracking	• Methods of monitoring and tracking all project execution management elements are clarified. • Frequencies in monitoring and tracking are clarified. • All applicable items are tracked and monitored according to the procedure whenever they need to be done. • All abnormal progress and abnormal signs are detected and analyzed, and the situations are documented. • The execution status of preventive measures against risks is monitored.	• Knowledge about collection of project progress status data • Knowledge about problems that may occur in the project • Knowledge about evaluation of schedule progress • Knowledge about evaluation of maintenance of the scope plan • Knowledge about quality evaluation • Knowledge about evaluation of resource supply status • Knowledge about evaluation of actual cost records	• Ability to collect proper data on project progress • Ability to evaluate the frequency of planned monitoring and tracking • Ability to identify abnormal status of monitored items

3-3	Problem management	• All problems in the project in progress are identified, analyzed and documented. • Drafts for problems conform to the standard format of enterprises. • Appropriate information on problems is collected. • Significance of problems is identified and effects are estimated. • Serious problems are handled as items to be changed and managed. • Necessary measures are planned for problems within the scope and executed to solve them. • The potentiality of other similar problems is verified. • The processes of solving all problems that occurred are documented. • Problems in the scope and problems requiring processes for changes are reported to the project team and the persons concerned with evaluation, respectively.	• Knowledge about drafting of problem point • Knowledge about procedures to cope with problems • Knowledge about problems that may occur • Knowledge about techniques to solve the problems	• Ability to determine how important problems that were drafted • Ability to estimate effects that problems made • Ability to collect information to solve problems • Ability to acquire supports and advices from appropriate engineers • Ability to explain to the higher-level managers about the significance of problems
3-4	Process completion evaluation	• At the delivery date specified in the schedule plan, the evaluation is done according to the process completion condition items. • Appropriate representatives from the project promotion organization participate in the reviews. • Information is collected to perform proper reviews and evaluations. • The project staff/teams evaluate the efficiency, load balance, technical standards, cooperation system, mutual understanding, project management system, etc. • Improvement items identified within a process are effectively used in the subsequent process and later. • Reviews and results of evaluations are documented.	• Knowledge about review and evaluation points • Knowledge about how to perform reviews and evaluations	• Ability to conduct the process completion evaluation meeting • Ability to bring out active opinions in evaluation meetings • Ability to collect information contributing to process reviews and evaluations • Ability to prepare proposals for improving problems and to execute them • Ability to evaluate effects of improvements • Ability to bring out active attitudes of the project promotion organization

3-5	Project status report	• Project report is made conforming to the standard form of the enterprises. • The progressive status of projects for plans is evaluated. • Products, progressive processes of projects, organizational activities, results of project management are clearly documented and reported. • Measures for improvement carried out in the processes are described in the planning documents. • Occurrence of serious problems including risks and the results of actions taken are documented and reported. • The execution status of approved change management and the effects are documented and reported.	• Knowledge about project report standards • Knowledge about effects of problems • Knowledge about documentation • Knowledge about presentation	• Ability to analyze progressive status of projects • Ability to exactly and clearly report the status of projects without omitting important items • Ability to promptly understand questions from the persons concerned with evaluation and to make exact answers to them • Ability to exactly understand problems on project progress • Ability to propose substitute plans for the project plans and request the persons concerned with evaluation and higher-level managers to judge the plans or to decide their intent • Ability to recognize the scope of responsibility for the projects • Ability to evaluate the appropriateness of the results of the projects • Ability to evaluate the results of the projects • Ability to understand concepts opposite to each other
3-6	Progress management	• The entire project transitions as planned and the results are obtained. • Tasks are carried out as planned and the results are obtained. • Measures are taken to cope with delay. • For delays that may largely affect the progress of the entire project, a plan for schedule change is made and then carried out after the approval is obtained.	• Knowledge about progress management • Knowledge about procedures for requesting changes • Knowledge about progress management table • Knowledge about progress management support software	• Ability to estimate that delay in the progress in part may affect the entire project • Ability to recover the progress from unbalanced status to the entirely balanced status. • Ability to analyze cause of delay • Ability to plan and perform reassignments of resources when a process delays • Ability to prepare substitution schedules • Ability to see through the progress to the completion

3-7	Resource management	• Resources are supplied, placed and used as planned. • Necessary quantities of resources are used at a necessary time assumed when it is planned. • Resources are optimally used without waste. • When resources are found insufficient, measures against the insufficiency are taken. • If short of resources seriously affect the progress of the entire project, a plan for resource change is made and then carried out after approval is obtained.	• Knowledge about resource operation • Knowledge about procedures for requesting changes • Knowledge about limit of resource usage • Knowledge about resource management support software	• Ability to analyze trends of resource usage • Ability to estimate effects of short of resources • Ability to analyze the cause of short of resources • Ability to understand relationships between resources and the project promotion efficiency • Ability to prepare substitution plans for resources • Ability to control the usage form to achieve optimum use of resources
3-8	Organizational staff management	• Staff satisfying the conditions are put at important points. • The project promotion organization plays specified roles and takes responsibility. • The project promotion organization is operated and continues to perform activities according to the policies. • Project organizational performances are improved and continuously enhanced. • Project staff positively perform their duties with a sense of solidarity. • Additional training is provided to improve inadequate skill, and the effects are documented. • Appropriate project staff take part in a place within the project promotion organization where decision is made.	• Knowledge about forming of project organization • Knowledge about various types of skill used for system development • Knowledge about education and training for staff • Knowledge about health control • Knowledge about the labor law system	• Ability to evaluate project performances • Ability to lead project teams toward the targets • Ability to identify inadequate skill • Ability to work out measures for productivity improvement • Ability to break down a sense of stagnation and vitalize • Ability to improve the morals of staff • Ability to take command of important decision meeting within the projects • Ability to take care of project staff in mind and body • Ability to make active communications between project teams and between staff • Ability to make the standards and rules thoroughly observed

3-9	Procurement management	• An optimum external contractor is selected via comparison with the external procurement selection standards of the enterprise. • Discussion about conditions suitable for project plans is held at the stage of contract negotiation. • Entrusted enterprises have responsible personnel of managerial capabilities. • Members of entrusted enterprises are harmonious with other teams of the project. • Procurement request specifications are executed as planned. • Information is exchanged fully. • If the plan is not fulfilled, proposal for solution from the entrusted company is carried out. • Contract changes are planed and carried out with respect to the work out of the contract scope after approval is obtained. • Information is not leaked.	• Knowledge about system development transactions and contract • Knowledge about information system vendor enterprises • Knowledge about information system development and system products • Knowledge about information system development requirement specifications • Knowledge about SLA • Knowledge about procurement development requirement specifications • Knowledge about transaction negotiation • Knowledge about legal constraints • Knowledge about secret work • Knowledge about intellectual property rights • Knowledge about overseas procurement	• Ability to evaluate procurement items for a match with the purpose and to evaluate the quality • Ability to estimate effects of delay in achievement of procurement requests • Ability to analyze the cause of delay • Ability to point out that agreement items are not fulfilled and to prompt to recover them • Ability to make plans for procurement change • Ability to negotiate about contract for procurement change
3-10	Cost management	• Payment for the cost for the entire project is made as planned. • Payment for each task is made as planned. • When an excess of cost is identified, countermeasures are taken. • For the excess of cost that seriously affects the entire project, a plan for cost change is made and then carried out after the approval is obtained.	• Knowledge about cost analysis • Knowledge about cost estimation model for information system development • Knowledge about techniques of estimating system cost • Knowledge about cost management support software	• Ability to analyze actual records of cost • Ability to estimate effects of excess of cost • Ability to analyze the cause for excess of cost • Ability to logically explain to persons concerned with evaluation about the cause of excess of cost • Ability to prepare countermeasures against excess of cost and substitution plans • Ability to request persons concerned with evaluation and higher-level manager to make decision on the substitution plan for cost • Ability to rationally explain to persons concerned with evaluation about the necessity of cost change with persuasiveness

3-11	Quality management	• Appropriate quality management procedure is carried out. • Products achieve the quality targets set in processes and milestones. • Users participate in checking quality, if necessary. • If the quality is found not to be fulfilled, countermeasures are taken. • If the quality of the entire project is estimated to be affected, plans for changes in quality assurance are made and then carried out after the approval is obtained. • Improvement status involved in changes in the quality plan is checked. • System component items are managed according to the procedure set up.	• Knowledge about quality policies of the enterprises • Knowledge about methods of quality control • Knowledge about quality assurance procedures • Knowledge about system test • Knowledge about system quality evaluation matrix • Knowledge about methods of verifying system quality • Knowledge about system quality inspection tool • Knowledge about system configuration management	• Ability to confirm the true quality required by users • Ability to estimate effects of partially unfulfilled quality on the entire project quality • Ability to analyze the cause of unfulfilled quality • Ability to evaluate the validity of quality evaluation matrix • Ability to make plans for reestablishing quality assurance • Ability to logically explain to persons concerned with evaluation about the cause of unfulfilled quality • Ability to rationally explain to persons concerned with evaluation about the necessity of changes in quality plan
3-12	Risk management	• All elements to which risk management applies are monitored and tracked continuously. • Preventive measures against risks expected as detailed level task items are taken. • Plans to cope with unexpected situations involved in the occurrence of risks are carried out. • After measures are carried out to cope with unexpected situations, the recovery status is checked and the recovery processes are evaluated. • All items involved in the occurrence of risks are appropriately and completely documented. • If new risks are expected in the course of project promotion, preventive measures against risks or plans to cope with unexpected situations are added. • Persons concerned with evaluation receive reports on the occurrence status of risks and changes in risk management.	• Knowledge about risks that may occur in the information system development • Knowledge about effects of the occurrence of risks • Knowledge about methods of managing risks • Knowledge about methods of analyzing risks • Knowledge about techniques of quantifying risks • Knowledge about risk evaluation • Knowledge about methods of avoiding risks • Knowledge about plans to cope with unexpected situations • Knowledge about documentation	• Ability to predict the occurrence of risks • Ability to identify incompleteness of risk plans and prepare additional measures • Ability to identify essential cause of risks that occur and prevent the reoccurrence • Ability to evaluate the results of carrying out risk preventive measures • Ability to direct the execution of plans to cope with unexpected situations • Ability to evaluate the results of carrying out plans to cope with unexpected situations

4. Change management

No.	Task	Performance indicators	Required knowledge	Required skill
4-1	Comprehending requests for changes	• All drafted requests for changes are accepted and stored (made database). • Change request specifications are prepared conforming to the form of the enterprise's standards. • Incidental information related to change requests is collected.	• Knowledge about RFC • Knowledge about decision on the procedures for change requests • Knowledge about effects of change requests	• Ability to determine the appropriateness of RFC descriptive format • Ability to analyze and evaluate RFC and determine the appropriateness of change requests • Ability to check grounded information of change requests for sufficiency
4-2	Analysis and evaluation of contents of requests	• All drafted change requests are analyzed and evaluated, and the policies of actions are determined and documented. • Proper engineers participate in a place where change requests are analyzed and evaluated. • Effects of changes on scope, schedule and cost are estimated. • For requests that cannot be decided, the decision is transferred to the higher-level manager.	• Knowledge about RFC • Knowledge about experienced persons related to requests for changes or information on engineers • Knowledge about decision on procedures for requests for changes	• Ability to appropriately evaluate the contents of requests for changes • Ability to collect detailed information available to determine the importance of requests for changes • Ability to acquire advices from experienced persons • Ability to determine effects via experiences • Ability to use information on past change control • Ability to evaluate the results of changes not made • Ability to balance between the effects of changes and the load of actions • Ability to explain to higher-level managers about requests for changes that cannot be determined
4-3	Approval of changes	• When changes are approved necessary, all requests for the changes are reported to higher-level managers. • Requests for changes are evaluated by persons concerned with evaluation via comparison with the standards, and acceptance, rejection or reservation is decided. • Further detailed analyses are made on important changes. • Accepted requests for changes are appropriately implemented.	• Knowledge about RFC • Knowledge about effects of changes	• Ability to rationally explain to the persons concerned with evaluation about the necessity of changes with persuasiveness

4-4	Execution of changes	• Implementation of changes is reported to all persons that are directly concerned with or influenced by the changes. • The change implementation processes are carefully observed. • The contents of changes are appropriately and completely documented. • The processes of changes and changes after implementation of the changes are reported to the persons concerned with evaluation.	• Knowledge about RFC • Knowledge about the effective range of changes	• Ability to explain effects of changes and what has changed • Ability to observe and evaluate the progress after the implementation of changes

5. Project close-out

No.	Task	Performance indicators	Required knowledge	Required skill
5-1	Checking status of project close-out status	• Except for the rest of the items, the purposes and targets of the project are all achieved. • All products described in the project planning documents are existent. • All products satisfy the required specifications. • Completion standards of the project are satisfied. • Every team of the project promotion organization finishes its work. • Except for the rest of the items, all other problems are solved. • All approved requests for changes are implemented.	• Knowledge about project completion standards of enterprises • Knowledge about procedures for checking the projects for end • Knowledge about the enterprise's standards for storing products	• Ability to make sure of the completion status of projects • Ability to make sure of the appropriateness of completion reports of project teams • Ability to direct the completion of incomplete parts • Ability to determine the appropriateness of the rest of the items
5-2	Preparation of project completion reports	• The execution summary of the entire project is clarified and documented completely. • The cause of differences produced between the initial plan and the completion status is documented. • Effects of executed changes are documented. • The rest of the items are all clarified. • The rest of the items are put in a status where they can be taken over to other projects.	• Knowledge about the enterprise's standards for reporting the completion of projects • Knowledge about the enterprise's standards for performances • Knowledge about documentation	• Ability to summarize the entire project • Ability to evaluate the history of project management processes • Ability to identify important items of the project management processes • Ability to appropriately evaluate performances of the project • Ability to analyze successful factors of the project • Ability to identify dissatisfactions of the project • Ability to propose for methods of coping with the rest of the items

5-3	Actions for acceptance of products by users	• User acceptance conditions with products set up are satisfied.	• Knowledge about delivery of products	• Ability to explain to persons in charge of acceptance about products
5-4	Report and conclusion of project completion	• The completion status of the project is reported to the persons concerned with evaluation. • Approval is obtained by the persons concerned with evaluation for the project via comparison with the project completion standards. • Project end is reported to all persons concerned with evaluation. • Effective information obtained is added as shared information for the enterprise to promote projects.	• Knowledge about presentation • Knowledge about shared information to promote projects	• Ability to explain about important items in the management processes of projects and the completion status briefly by making the points clear. • Ability to give exact answers to questions from persons concerned with evaluation • Ability to identify effective information to promote subsequent projects and later

6. Evaluation of project completion

No.	Task	Performance indicators	Required knowledge	Required skill
6-1	Evaluation after project completion	• Overview of evaluation indexes after the completion of projects is prepared. • When evaluations are conducted, evaluation indexes are added/updated, if necessary. • Evaluations are conducted with respect to the project plans. • Evaluations are conducted with respect to the project execution processes and management methods. • Developed systems are evaluated. • Evaluations are conducted with respect to the results (know-how, knowledge, experiences, etc.) obtained by project staff and teams. • Reference items for the subsequent process and later are identified and documented.	• Knowledge about evaluation indexes after the completion of projects • Knowledge about evaluation information on past project completion	• Ability to collect effective information as evaluations after the completion of projects • Ability to evaluate the quality and level achieved when the project ends • Ability to prepare questionnaires and obtain appropriate evaluation information from users and higher-level managers • Ability to identify effective information obtained in projects
6-2	Collection, arrangement, and analysis of information regarding actual results and preparation of database	• Numeric data is all collected in the project promotion processes and saved so that the data can be easily accessed. • Numeric data is classified and arranged by purposes of analyses and is saved. • Differences between the plan and the actual record are analyzed according to the classified and arranged data. • The results of analyses and lessons are made database. • Information obtained via analysis of numeric data is easily available for the subsequent project and later as reference values. • Obtained data and evaluation criteria set by enterprises are evaluated for appropriateness.	• Knowledge about data arrangement • Knowledge about statistic analyses of data • Knowledge about databases of actual records of projects	• Ability to identify important information useful for project management • Ability to analyze past project data and the project data by comparing them • Ability to arrange numeric value data for a certain purpose • Ability to propose to revise enterprises' evaluation standards

4. Body of Knowledge

The body of knowledge for project managers is settled with problem decision themes and summarized in a layer structure with respect to the knowledge necessary for successful achievement of jobs described in "2 Key activities" and for considerations on measures for solving various problems such as quality deterioration, increased costs, and longer terms of development.

The body of knowledge necessary for project managers consists of the following two types:

1) IT common body of knowledge
2) Project manager practical body of knowledge and core body of knowledge

Since "IT common body of knowledge" applies not only to project managers but also the applicable persons of all test categories, it is described in a separate volume. For further details, refer to the "IT common body of knowledge in the Information technology engineers skill standards."

Project managers are questioned at the following levels about the five types of IT common body of knowledge according to the "scope of questions in the information technology engineers examinations."

"II. Computer system (Level II)"
"III. System development and operation (Level III)"
"VI. Security (Level II)"
"VII. Standardization (Level II)"
"VIII. Computerization and management (Level III)"

"Project manager practical body of knowledge and core body of knowledge" of type 2) summarize knowledge and technologies necessary for project managers to smoothly carry out critical work functions. The following portions are correspond to the practical body of knowledge.

- "B. Project plan development," "C. Project tracking and execution management," "D. Change management," "E. Project close-out," and "F. Evaluation of project completion" related to the flow of projects
- "G. Progress management," "H. Resource management," "I. Organizational staff management," "J. Procurement management," "K. Cost management," "L. Quality management," and "M. Risk management" described classified by elements of project managements
- "N. General management skills" required incidental to project execution management
- "O. Knowledge related to IT project management" that has effects on the productivities and quality of information system development project

"A. Project start-up" is also provided to understand an example of project start-up phase, though this job is not directly carried out by project managers.

Knowledge is not classified as a part corresponding to the "core body of knowledge." However, preparation for the body of knowledge will be wrestled in future.

[Project manager practical body of knowledge and core body of knowledge]

Knowledge field	Major classification	Intermediate classification	Minor classification
A. Project start-up			
	1. Preparation of planning documents for information development project		
		1.1 Selection of participants in project planning	
			1.1.1 Higher-level manager of planning application department (approver within the application department) 1.1.2 Person responsible for planning, and person concerned with planning and writing 1.1.3 Supporters (guidance and advice, and participation in review)
		1.2 Points of project planning	
			1.2.1 Significance of planning (managerial environment, customer needs, needs within enterprises, and effects and influences of achievement) 1.2.2 Use of resources (required resources and promotion system) 1.2.3 Compatibility with the enterprise's strategy (information system conception of enterprice, total plan for systematization) 1.2.4 Features of projects (advancement in terms of usage, advancement in terms of technical aspects, and conformance to laws) 1.2.5 Problems on execution (risks, and internal and external factors) 1.2.6 Descriptive formats planning documents
	2. Application and description of information system development project plan		
		2.1 Planning surveillance organization	
			2.1.1 Placement 2.1.2 Roles, duties and authority 2.1.3 Configuration (person responsible for surveillance and person in charge of surveillance)
		2.2 Project planning explanatory meeting	
			2.2.1 Attendees of the surveillance side (person responsible for surveillance, person in charge of surveillance, user representatives, and special engineers) 2.2.2 Attendees of the application side (person responsible for planning, and person in charge of planning) 2.2.3 Subject for discussion (explanation by the person responsible for planning about the contents, and questions and answers between the surveillance side and the application side)
		2.3 Surveillance of planning documents	
			2.3.1 Planning surveillance standards 2.3.2 Acceptance, rejection and reservation 2.3.3 Items pointed out for plans

	3. Completion of planning documents for information system development project		
		3.1 Resubmitted documents of planning documents	
			3.1.1 Planning surveillance criteria
		3.2 Approval	
			3.2.1 Setup of prerequisites and constraints
		3.3 Appointment of project managers by higher-level managers	
			3.3.1 Conditions and candidates for project managers
			3.3.2 Duties and authority of project managers

(Note) Knowledge field A is not the knowledge that a project manager would need it in practical usage, but something to be understood as an example of start-up phase.

Knowledge field	Major classification	Intermediate classification	Minor classification
B. Project plan development			
	1. Scope planning		
		1.1 Decision of scope (scope of systematization)	
			1.1.1 Technique of user request analysis
			1.1.2 Technique of value analysis
			1.1.3 Technique of system function analysis
			1.1.4 Technique of data analysis
			1.1.5 Technique of quality function development
			1.1.6 Types of risks
			1.1.7 Technique of cost performance analysis
			1.1.8 Technique of forming project organizations
		1.2 Documentation standards for scope plans	
			1.2.1 Significance of projects (actual effects, problems to be solved and managerial functions to be implemented)
			1.2.2 Roles and duties of organization
			1.2.3 Products of project
			1.2.4 Quantitative purposes of projects (cost, term and quality)
			1.2.5 Scope of projects (users, size, functions, technologies, within scope, and out of scope)
			1.2.6 Prerequisites and constraints of project promotion
			1.2.7 Risk information (advanced technologies, skill, management, term, cost and laws)
			1.2.8 Substitution plan (cost performance)
			1.2.9 Scope management policies
			1.2.10 Internal review at the planner side
		1.3 Correction of scope plans and approval criteria	
			1.3.1 Explanation to persons concerned with evaluation
			1.3.2 Correction for items pointed out by persons concerned with evaluation
			1.3.3 Approval criteria (approvers)
	2. Establishment of system development policy		
		2.1 Selection of system development approach	
			2.1.1 Customer/user customer specified approach
			2.1.2 Enterprise's standard approach
			2.1.3 Industrial standard approach
			2.1.4 International standard approach

		2.2 Factors of successful system development	
			2.2.1 Degree of customer/user satisfaction 2.2.2 System life cycle model 2.2.3 System quality 2.2.4 System evaluation matrix 2.2.5 System configuration management
		2.3 Selection of system life cycle model	
			2.3.1 Features of systems to be developed 2.3.2 Types of system life cycle models
	3. Definition of scope		
		3.1 Definitions of outlined level tasks	
			3.1.1 Technique of breaking down work elements (WBS) 3.1.2 Standard WBS of enterprises
		3.2 Documentation standards for scope definitions	
			3.2.1 Description of work element structure (outlined level WBS) 3.2.2 Contents of outlined level tasks (purpose, products, completion standards, day of start/completion, and candidate for person in charge) 3.2.3 Internal review at the planner side
		3.3 Correction and approval criteria for scope definitions	
			3.3.1 Explanation to persons concerned with evaluation 3.3.2 Correction for items pointed out by persons concerned with evaluation 3.3.3 Approval criteria (approvers)
	4. Schedule planning		
		4.1 Schedule plan (For details, see Major classification 1 in Knowledge field G.)	
			4.1.1 Detailed level task definitions 4.1.2 Estimate of job execution period, and job order setup 4.1.3 Standards for documenting schedule plan 4.1.4 Correction of schedule plans, and approval criteria
		4.2 Resource plan (For details, see Major classification 1 in Knowledge field H.)	
			4.2.1 Identification of required resources (Skill, number of staff, and facilities) 4.2.2 Setup of resource supply time 4.2.3 Standards for documenting resource plans 4.2.4 Correction of resource plans, and approval criteria
		4.3 Organizational staff (For details, see Major classification 1 in Knowledge field I)	
			4.3.1 Organization forming 4.3.2 Staff selection 4.3.3 Standards for documenting organizational staff plans 4.3.4 Correction of organizational staff plans, and approval criteria

		4.4 Procurement plan (For details, see Major classification 1 in Knowledge field J.)	
			4.4.1 Feasibility study 4.4.2 Setup of procurement request specification 4.4.3 Standards for documenting procurement plans 4.4.4 Correction of procurement plans, and approval criteria
		4.5 Cost plan (For details, see Major classification 1 in Knowledge field K.)	
			4.5.1 Cost add-up 4.5.2 Preparation of project initial cost plan and cost plan in detailed tasks 4.5.3 Standards for documenting cost plans 4.5.4 Correction of cost plans, and approval criteria
		4.6 Quality management plan (Including software configuration management plan. For details, see Major classification 1 in Knowledge field L.)	
			4.6.1 Approach to quality assurance 4.6.2 Standards for documenting quality assurance plan 4.6.3 Correction of quality assurance plans, and approval criteria
		4.7 Risk management plan (For details, see Major classification 1 in Knowledge field M.)	
			4.7.1 Identification, analysis and quantification of risks 4.7.2 Measures against risks 4.7.3 Standards for documenting control plans 4.7.4 Correction of risk control plans, and approval criteria
	5. Preparation of project planning documents		
		5.1 Integration of information on decision of project plans	
			5.1.1 Project plan support software 5.1.2 Information on persons in charge of project planning, and customer/user information

		5.2 Standards for documenting project plans	
			5.2.1 Overview (Purposes, targets, products, promotion system, and effects of the results) 5.2.2 Assumptions and constraints for execution 5.2.3 Contents of plans (policies and scope) 5.2.4 Reference values of management targets (schedule, resources, organization, staff, procurement, cost, quality and risks) 5.2.5 Report forms (system, methods and contents) 5.2.6 Project monitoring, tracking, and control policies 5.2.7 Performance measurement items and measurement methods 5.2.8 Standards for completion (classified by processes, and for closure) 5.2.9 User acceptance conditions 5.2.10 Outlines of evaluation indexes after completion 5.2.11 Internal reviews at the planner side
		5.3 Correction of project plans, and approval criteria	
			5.3.1 Explanation to persons concerned with evaluation 5.3.2 Correction for items pointed out by persons concerned with evaluation 5.3.3 Approval standards (approver)

Knowledge field	Major classification	Intermediate classification	Minor classification
C. Project tracking and execution management			
	1. Project execution management		
		1.1 Execution management	
			1.1.1 Technique of analyzing project promotion status
			1.1.2 Standards for evaluating project promotion status
			1.1.3 Preventive measures against the occurrence of problems
			1.1.4 Measures for correcting estrangement to observe plans
			1.1.5 Methods of managing appropriate change control
		1.2 Execution management evaluation items	
			1.2.1 Contents of completed jobs
			1.2.2 Milestone arrival status
			1.2.3 Process completion status
			1.2.4 Existence of problems
			1.2.5 Progress status for planning schedule
			1.2.6 Status of cost required
			1.2.7 Execution status of corrections
		1.3 Problems on execution management	
			1.3.1 Lack of proper data on the status of progress
			1.3.2 Insufficiency in required definitions
			1.3.3 Insufficiency in estimating execution period and cost
			1.3.4 Insufficiency in setting standards for job completion
			1.3.5 Insufficiency in execution management
			1.3.6 Insufficiency in setting directions
		1.4 Progress management (For details, see Major classification 2 in Knowledge field G.)	
			1.4.1 Progress monitoring and difference analyses
			1.4.2 Progress report
		1.5 Resource management (For details, see Major classification 2 in Knowledge field H.)	
			1.5.1 Resource management and difference analyses
			1.5.2 Resource plan change
		1.6 Organizational staff management (For details, see Major classification 3 in Knowledge field I.)	
			1.6.1 Construction and management of project progress organization
			1.6.2 Bringing up staff
		1.7 Procurement management (For details, see Major classification 2 in Knowledge field J.)	
			1.7.1 Contract management
			1.7.2 Contract changes

		1.8 Cost management (For details, see Major classification 2 in Knowledge field K.)	
			1.8.1 Cost monitoring and difference analyses 1.8.2 Cost plan change
		1.9 Quality control (For details, see Major classification 2 in Knowledge field L.)	
			1.9.1 Quality review 1.9.2 Quality assurance plan change
		1.10 Risk management (For details, see Major classification 2 in Knowledge field M.)	
			1.10.1 Identification of risks that have occurred 1.10.2 Decision and execution of countermeasures
	2. Project monitoring and tracking		
		2.1 Monitoring and tracking	
			2.1.1 Types of fact data indicating project promotion status 2.1.2 Standards for comparing actual progress with planned schedule 2.1.3 Standards for comparing actually working resources with planned resources 2.1.4 Standards for comparing actual costs with planned costs 2.1.5 Standards for comparing actual quality with planned quality 2.1.6 Methods of managing problems that affect actual records of project promotion 2.1.7 Items to report to persons concerned with evaluation
		2.2 Items to be tracked and monitored	
			2.2.1 Scope, and specification (functions and performances) 2.2.2 Schedule (WBS, activity network, and process table) 2.2.3 Resources (used quantity, and opportunity to use) 2.2.4 Cost 2.2.5 Quantity 2.2.6 Organization and staff 2.2.7 Procurement system and procurement products 2.2.7 Risk
		2.3 Frequency of tracking	
			2.3.1 Regular (weekly, semimonthly, monthly, quarterly) 2.3.2 Milestone, process 2.3.3 Irregular (when requests for changes are made, or when differences between plan and actual record are made)
	3. Problem management		
		3.1 Problem management	
			3.1.1 Methods of collecting information on problems 3.1.2 Methods of analyzing effects of problems 3.1.3 Methods of identifying scope under effects (schedule, costs and quality)

		3.2 Rules of coping with the occurrence of problems	
			3.2.1 Methods of describing the contents of problems by persons who present them (problems, effects and resolution) 3.2.2 Problem evaluation and methods of persons who cope with problems 3.2.3 Methods of deciding the necessity of requests for changes 3.2.4 Methods of carrying out measures against problems 3.2.5 Methods of documenting problem solution processes and final status
		3.3 Problem management forms	
			3.3.1 Problem presentation form 3.3.2 Problem evaluation form 3.3.3 Problem processing form
	4. Process completion evaluation		
		4.1 Evaluation	
			4.1.1 Methods of checking plans for appropriateness 4.1.2 Criteria of evaluating the quality of execution processes (efficiency, and effects of measures) 4.1.3 Criteria of evaluating the quality of process products (adaptability to requests) 4.1.4 Criteria of evaluating products of organizations (positiveness, cooperativeness, collaboration, and technical improvement)
		4.2 Evaluated items	
			4.2.1 All target reference values 4.2.2 All management items 4.2.3 All products 4.2.4 Project management system
		4.3 Evaluation methods	
			4.3.1 Techniques of analyzing differences between plans and actual records 4.3.2 Methods of collecting information for evaluation

	5. Project status report		
		5.1 Arrangement of project status	
			5.1.1 Methods of deciding project status 5.1.2 Methods of evaluating the execution status of major tasks 5.1.3 Methods of representing the present situation of projects 5.1.4 Methods of representing the comparison between plans and actual records (schedule, cost, quality, and technical aspects) 5.1.5 Methods of presenting corrective activities 5.1.6 Methods of representing effects on the performances (transition estimate) of the subsequent project and later 5.1.7 Methods of promoting communications between the project promotion organization and the persons concerned with evaluation 5.1.8 Methods of sharing information between the project promotion organization and the persons concerned with evaluation
		5.2 Criteria of reporting the entire transition of projects	
			5.2.1 Report system (Internal reporting route: team leader, project manager, higher-level manager) (Outer reporting route: persons concerned with evaluation, person responsible for planning, and persons responsible for planning surveillance) 5.2.2 Contents of report (outline, status of time target achievement, differences between plans and actual records, prospect for future, problems and transitions of actions, requests for changes and transition of the execution and requirement for descision to persons concerned with evaluation) 5.2.3 Report points (exactness, timing and accuracy of circumstantial judgment and prospect) 5.2.4 Materials on report (status of progress, EV chart, actual records of cost, supply status of resources, history of coping with requests for changes, and history of coping with problems) 5.2.5 Review within the project promotion organization
		5.3 Project report form and criteria for approval	
			5.3.1 Attendees at report meetings (For details, see Intermediate classification 1.2 in Knowledge field I.) 5.3.2 Explanation about situations by project managers 5.3.3 Effective use of items pointed out by persons concerned with evaluation etc., in the subsequent process and later 5.3.4 Approval criteria (approvers)

Knowledge field	Major classification	Intermediate classification	Minor classification
D. Change management			
	1. Purpose of change management		
		1.1 Necessity of project planning change	
			1.1.1 Factors of plan changes when the project is in progress (inevitability of occurring changes)
			1.1.2 Management when factors of changes occur (exact reflection and infiltration of change points)
		1.2 Balance among requests, costs and schedule for projects	
			1.2.1 Methods of coping with requests from owner of information systems, project fund sponsors, and customers/users
			1.2.2 Methods of assuring and maintaining the stability of project promotion organization
	2. Request For Change (RFC)		
		2.1 Proposal form	
			2.1.1 Summary of the request for change
			2.1.2 Reason for proposing the request for change
			2.1.3 Effects of changes (positive effects, negative effects, and effects when no change is made)
		2.2 Preparation of databases of the request for change	
			2.2.1 System configuration management and compatibility
			2.2.2 Compatibility with problem management
	3. Procedure for managing the request for change		
		3.1 Proposal for the request for change	
			3.1.1 Various types of proposers (project staff, responsible person of external cooperative enterprises, and user representatives)
		3.2 Techniques of analyzing and evaluating requests for changes	
			3.2.1 Methods of analyzing the contents of requests for changes
			3.2.2 Methods of identifying the effects of making changes/no changes (cost, resources, risks, recovery load, and schedule)
			3.2.3 Methods of estimating the effects of making changes
			3.2.4 Methods of estimating the loads of making changes
			3.2.5 Criteria for judging the execution of changes (degree of importance, priority, etc.)
			3.2.6 Methods of identifying the effects of making no changes
			3.2.7 Methods of judging changes (decision of acceptance, rejection or reservation)

		3.3 Supporters for analyzing and evaluating effects	
			3.3.1 Special engineers 3.3.2 Experienced persons 3.3.3 User representatives
		3.4 Evaluation by higher-level managers	
			3.4.1 Standards for deciding changes (acceptance, rejection, reservation, and transfer of decision to persons concerned with evaluation) 3.4.2 Methods of approving changes and of deciding on change plans
		3.5 Execution of changes	
			3.5.1 Notification of changes and methods of updating change databases 3.5.2 Methods of executing and managing changes 3.5.3 Criteria for evaluating effects and results of making changes

Knowledge field	Major classification	Intermediate classification	Minor classification
E. Project close-out			
	1. Checking of status of project close-out		
		1.1 Checking of status of project close-out	
			1.1.1 Checking method by project status report 1.1.2 Verification method by products (development items and their qualities, documents related to development and their qualities)
		1.2 Methods of checking documents related to project management	
		1.3 Checking of procurement completion	
			1.3.1 Methods of checking contract documents (including contract changes) and supplementary documents 1.3.2 Methods of discussing with responsibles from external supporting enterprises regarding to the residual items
	2. Acceptance of projects by users		
		2.1 Criteria for accepting products 2.2 Format of product acceptance documents 2.3 Methods of coping with questions of users	
	3. Standards for documenting project completion reports		
		3.1 Outline of project promotion results 3.2 Achievement status of purpose and target of projects 3.3 Status of final products (clarification of differences (function, performance and quality) between plans and actual records, and of causes) 3.4 Results of project execution management 3.5 Evaluation of project management processes 3.6 History and results of coping with problems 3.7 History and results of coping with requests for changes 3.8 Evaluation of project execution performances 3.9 Items related to products of the projects 3.10 Residual items 3.11 Internal reviews of planners	
	4. Reports of project completion, and criteria for approval		
		4.1 Report to higher-level manager 4.2 Report to persons concerned with evaluation 4.3 Criteria for approval (approver)	

Knowledge field	Major classification	Intermediate classification	Minor classification
F. Evaluation of project completion			
	1. Purpose of evaluation		
		1.1 Seizure of actual record values of projects	
			1.1.1 Actual records classified by detailed level tasks
			1.1.2 Actual records classified by processes
			1.1.3 Actual records classified by development teams
		1.2 Total evaluation of projects	
			1.2.1 Multiple viewpoints of evaluation
			1.2.2 Method of visually expressing the results of evaluation
			1.2.3 Methods of clarifying excellent areas of actual records
			1.2.4 Method of clarifying areas that need to be improved
		1.3 Sharing of project management information	
			1.3.1 Methods of collecting/preparing information for future project plans
			1.3.2 Methods of collecting and preparing information helpful in situations facing to intent decision
			1.3.3 Methods of collecting/preparing useful information for improving project management techniques
	2. Concept of evaluation		
		2.1 Evaluation viewpoint	
			2.1.1 Achievement status of purposes and targets
			2.1.2 Situations where strategies and tactics work effectively
			2.1.3 Situations resulted from changes
			2.1.4 Factors that produce favorable effects
			2.1.5 Items effective for future projects
		2.2 Evaluation steps	
			2.2.1 Methods of setting up purposes and targets of projects
			2.2.2 Methods of creating performance indexes
			2.2.3 Methods of collecting and analyzing project evaluation information (identification of information sources and preparation of questions)
	3. Sharing of evaluation information		
		3.1 Standard values	
			3.1.1 Methods of evaluating and revising standard values (results of analyzing differences)
			3.1.2 Methods of adding standard values

		3.2 Information on learning	3.2.1 Methods of verifying the effectiveness of improvement measures 3.2.2 Usage as the best practice 3.2.3 Benchmarking

Knowledge field	Major classification	Intermediate classification	Minor classification
G. Progress management			
	1. Schedule planning		
		1.1 Definition of detailed level tasks	
			1.1.1 Methods of breaking down work elements (WBS) 1.1.2 Standard methods and change management procedures taken by enterprise related to break-down 1.1.3 Change management procedures taken by enterprises related to tasks 1.1.4 Work definition items (purpose of work, responsibilities and conditions of work leaders, products, conditions for completion, required resources and the quantity, cost, and required term of work)
		1.2 Preparation of master schedule	
			1.2.1 Methods of setting up major milestones (major products and major events)
		1.3 Setup of logical work order	
			1.3.1 Methods of setting up logical work order (identification of dependent relations between works, and decision of order)
		1.4 Estimation of work execution period	
			1.4.1 Resources to be considered for estimating the period (allowable period for which candidate technicians need to participate in the work, necessary skill level, and other resources related to work execution) 1.4.2 Man-hours to be considered for estimating the period (necessary productivities of candidate technicians, man-hours for production, man-hours involved in production (discussion, actions to cope with misunderstandings, expected wait, and unknown events) 1.4.3 Reference information for estimating the period (production information of individual candidates, and actually recorded information on other concurrent projects in progress)
		1.5 Setup of physical work order	
			1.5.1 Methods of investigating the executability of work in parallel 1.5.2 Physical constraint information on work in execution (allowable quantity of supplied resources, period in which resources can be supplied, interlocking with other systems, physical constraint, system revision, etc.) 1.5.3 Methods of setting up physical work order (logical order and physical constraints)

		1.6 Preparation of schedule	
			1.6.1 Methods of setting up logical execution order of detailed level tasks 1.6.2 Methods of considering physical execution order of detailed level tasks 1.6.3 Criteria for estimating work execution period in the enterprises 1.6.4 Technique of setting up critical paths 1.6.5 Criteria for estimating lead time and lag time 1.6.6 Criteria for estimating the time to support management elements 1.6.7 Criteria for estimating the time to cope with problems 1.6.8 Methods of shortening schedule 1.6.9 Methods of leveling the supply of resources 1.6.10 Scheduling techniques 1.6.11 Schedule preparation support software
		1.7 Standards for documenting schedule plans	
			1.7.1 Outline of schedule plan (milestone, working process, due date, resource procurement, cost, and margin) 1.7.2 Schedule diagram (technique of expressing diagrams) 1.7.3 Additional materials of schedule (resource supply, time of expenditure, etc.) 1.7.4 Schedule management plan 1.7.5 Internal review at the planner side
		1.8 Criteria for correcting and approving schedule plans	
			1.8.1 Explanation to persons concerned with evaluation 1.8.2 Correction of items pointed out by persons concerned with evaluation 1.8.3 Criteria for approval (approvers)
	2. Progress management		
		2.1 Progress management	
			2.1.1 Methods of seizing the progressive status of work and estimating for the completion 2.1.2 Methods of identifying problems at the early stage and preparing measures for correction
		2.2 Progress monitoring and tracking	
			2.2.1 Methods of tracking progress (comparison of actual records with the plans classified by WBS work items) 2.2.2 Methods of seizing the progressive status and identifying the necessity of correction

		2.3 Preparation and updates of progress status table	
			2.3.1 Methods of deciding the degree of completion of the current processes and updating the progress 2.3.2 Methods of planning the progress of the next process (entry into the planning table)
		2.4 Analysis of differences in progress	
			2.4.1 Methods of identifying delay in the progress and analyzing the causes 2.4.2 Methods of seizing effects on the entire projects and preparing measures for correction 2.4.3 Methods of prediction for the completion
		2.5 Progress report	
			2.5.1 Methods of arranging progress reports 2.5.2 Methods of reporting to persons concerned with evaluation
		2.6 Schedule change	
			2.6.1 Methods of measuring estrangement from the plan 2.6.2 Methods of changing schedules (preparation of change request specifications, and approval)
	3. Methods and tools of progress management		
		3.1 WBS	
			3.1.1 WBS creation tool
		3.2 Techniques/tools for schedule planning	
			3.2.1 PERT 3.2.2 CPM 3.2.3 Schedule planning decision support/progress management support software
		3.3 Tools for general schedule management	
			3.3.1 Gantt chart 3.3.2 Spread sheet 3.3.3 Earned value table

Knowledge field	Major classification	Intermediate classification	Minor classification
H. Resource management			
	1. Resource plan		
		1.1 Methods of resource planning	
			1.1.1 Policies of the enterprise's resource plan
			1.1.2 Methods of identifying types of necessary resources (identifying necessary resources classified by tasks)
			1.1.3 Methods of calculating the required quantity of resources
			1.1.4 Methods of deciding on the timing of supplying resources
			1.1.5 Consideration points for resource assignments (project scope, schedule, quality, cost performance, available time, installation space, internal procurement/procurement from the outsides, usability, usage form, risks, and substitution plans)
		1.2 Identification of necessary skills	
			1.2.1 Necessary expertise and methods of specifying levels
			1.2.2 Methods of specifying necessary experiences
		1.3 Decision on the number of staff	
			1.3.1 Methods of deciding the total number of tasks
			1.3.2 Methods of deciding the number of man-hours supplied for the tasks
			1.3.3 Methods of considering the efficiency in job assignments (project size and term)
		1.4 Identification of necessary facilities	
			1.4.1 Basic environments of system development (development machine, development tools, and software packages)
			1.4.2 Hardware specific to the projects
			1.4.3 Software specific to the projects
			1.4.4 Working space and place
		1.5 Setup of the timing of supplying resources	
			1.5.1 Methods of specifying the timing of supplying staff classified by skills and the volumes supplied
			1.5.2 Methods of considering skill levels and experiment levels at the time of supply
			1.5.3 Methods of specifying items to be supplied to necessary facilities, the timing of supply, and supply conditions

		1.6 Standards for documenting resource plans	
			1.6.1 Outline of resource plan 1.6.2 Planning table for procuring necessary resources 1.6.3 Timing of supplying staff and the supply volume (technique of visualization) 1.6.4 Timing of supplying resources 1.6.5 Assumed risks (methods of identifying risks: necessary time for resource procurement, inadequate skill, etc.) 1.6.6 Resource management plan 1.6.7 Internal review of the planner's side (sufficiency of resources, assurance of the preparation time for resource procurement, necessity of intensifying the training to cope with inadequate skill, sufficiency of assured staff to prepare documents related to products, etc.)
		1.7 Criteria for correcting and approving resource plans	
			1.7.1 Explanation to persons concerned with evaluation 1.7.2 Collection of items pointed out by persons concerned with evaluation 1.7.3 Criteria for approval (approvers)
	2. Resource management		
		2.1 Tracking of resource supply status	
			2.1.1 Methods of seizing staff having required skills and the status where the necessary number of staff is supplied 2.1.2 Methods of seizing the completion of required facilities and the installation status of facilities 2.1.3 Methods of seizing the status where resources are effectively used
		2.2 Evaluation by comparing the resource plans and the actual records	
			2.2.1 Methods of estimating the effects of differences on the efficiency, cost and schedule 2.2.2 Methods of estimating the prospects
		2.3 Resource plan change	
			2.3.1 Methods of seizing the lack of resources for the plan 2.3.2 Methods of changing resource plans (preparation of specifications for requests for changes, and approval)

Knowledge field	Major classification	Intermediate classification	Minor classification
I. Organizational staff management			
	1. Organization forming		
		1.1 Identification for persons concerned for the projects	
			1.1.1 Chief Information Officer (CIO)
			1.1.2 Planning surveillance organization (person responsible for planning surveillance, and persons in charge of surveillance)
			1.1.3 Representatives of the user departments (higher-level manager, senior system administrator, junior system administrator, general users)
			1.1.4 Higher-level manager of the information system department
			1.1.5 Project staff
			1.1.6 External enterprises (responsible persons and engineers)
			1.1.7 In-house/external technical experts
			1.1.8 Participants in the project reviews
		1.2 Persons concerned with evaluation (holding of evaluation meetings and the attendees)	
			1.2.1 Placement of the evaluation meetings, their roles and responsibilities (Decision on project plan, project execution management, change management, and evaluation of the contents at the process of closure and guidance and advices)
			1.2.2 Members of evaluation meetings (Regular attendees: higher-level manager of the user department, user representatives, higher-level managers of the information department, technical experts Irregular attendees: persons responsible for planning, and persons responsible for planning surveillance)
		1.3 Project promotion organization	
			1.3.1 Methods of defining duties and responsibilities of the project organization
			1.3.2 Methods of deciding project information transmission and report system
			1.3.3 Methods of selecting organizational structure (layer organization, matrix organization, functional organization, etc.)
			1.3.4 Methods of organizing project teams
			1.3.5 Methods of defining duties and responsibilities of respective project teams
			1.3.6 Methods of setting the competency and technical levels of respective teams
			1.3.7 Interfaces with organizations (OBS, and responsibility assignment matrix)
			1.3.8 Technical interfaces
			1.3.9 Methods of placing review organizations for products of the projects

	2. Staff selection		
		2.1 Staff requirements	
			2.1.1 Methods of setting up roles, the contents of work, and responsibilities 2.1.2 Methods of identifying capabilities (expertise, technical skill, human skill, knowledge on jobs, experiences, actual records, and adaptability to project environment)
		2.2 Acquisition and assignments of staff	
			2.2.1 Methods of selecting staff candidates for jobs 2.2.2 Methods of negotiation to acquire staff
		2.3 Standard for documenting organizational staff plan	
			2.3.1 Outline of organizational staff plan 2.3.2 Table of responsibility assignment plan 2.3.3 Table of staff supplying plan 2.3.4 Table of organizational configuration 2.3.5 Staff information (contents of operation, necessary education and training) 2.3.6 Assumed risks (methods of identifying risks: inadequacy of skill, overload, etc.) 2.3.7 Organizational staff management plan 2.3.8 Internal review at the planner side (appropriateness of forming teams, aptitudes of persons responsible for teams, sufficiency of teams' capabilities, sufficiency of the number of staff, properness of the timing with which staff can be supplied, etc.)
		2.4 Criteria for correcting and approving organizational staff plan	
			2.4.1 Explanation to persons concerned with evaluation 2.4.2 Correction of items pointed out by persons concerned with evaluation 2.4.3 Criteria for approval (approvers)
	3. Organizational staff management		
		3.1 Construction of project organization	
			3.1.1 Methods of clarifying policies to operate project promotion organizations 3.1.2 Methods of presenting strategies and targets 3.1.3 Methods of preparing environments for the promotions 3.1.4 Methods of making ripe the consciousness of positive participation
		3.2 Maintenance of project organization	
			3.2.1 Methods of promoting and maintaining the cooperation and harmony among project members 3.2.2 Staff management methods

		3.3 Staff education	
			3.3.1 Methods of evaluating the necessity of educating staff 3.3.2 Methods of preparing staff education plans 3.3.3 Methods of conducting staff education
		3.4 Staff health management	
			3.4.1 Labor Standards Law (Agreement for overtime work, and holiday and late-night work 3.4.2 Industrial Safety and Health Law 3.4.3 Laws concerning the Promotion of Equal Opportunity and Treatment between Men and Women in Employment and Other Welfare Measures for Women Workers and Amendment of Labor Standards Law 3.4.4 Child Care and Family Care Leave Law 3.4.5 Worker Dispatching Law 3.4.6 Workmen's Accident Compensation Insurance Law 3.4.7 Guidelines on the labor sanitation for the Ministry of Labour and VDT work

Knowledge field	Major classification	Intermediate classification	Minor classification
J. Procurement management			
	1. Procurement plan		
		1.1 Feasibility study and investigation	
			1.1.1 External enterprise investigation (SI enterprises, software enterprise, product vendors, reputation, and transaction conditions) 1.1.2 Methods of investigating the selection of internal development or entrusted development (enterprise's procurement policy, technical capabilities, working efficiency, labor saving, costs, observance of due date, and assurance of quality) 1.1.3 Method of contract (types, features and risks of contract, adaptability of projects and product features)
		1.2 Types of contract (features, advantages and disadvantages)	
			1.2.1 Lump-sum contract (Lump Sum) 1.2.2 Entrustment contract 1.2.3 Piece-base contract (Cost Plus Fixed Fee, Cost Plus Percentage) 1.2.4 Incentive contract (Incentive) 1.2.5 Factors for selecting types of contract
		1.3 Determination of procurement request specifications	
			1.3.1 Required functions, performances, and quality 1.3.2 Required techniques, and development standards
		1.4 Procurement plan	
			1.4.1 Methods of selecting criteria for evaluating contract enterprises (weighing, screening, and ranking) 1.4.2 Consideration points on evaluation of contract enterprises (degree of difficulty, required experiences, ability of coping with risks) 1.4.3 Articles of contract (contents of entrustment, term of execution, execution schedule, amount of payment, re-entrustment, scope of guarantee, actions to cope with delay, consultation for specification changes, and duty to observe privilege information)
		1.5 Procurement forms	
			1.5.1 Request For Proposal (RFP) 1.5.2 Request For Quotation (RFQ) 1.5.3 Invitation For Bid (IFB)

		1.6 Standards for documenting procurement plans	
			1.6.1 Outline of procurement plan 1.6.2 Reasons for procurement 1.6.3 Procurement specifications (contents conforming to the articles of the contract) 1.6.4 Procurement methods 1.6.5 Criteria for evaluating procurement sources 1.6.6 Assumed risks (methods of identifying risks: ability, quality, absence of responsible persons and so on) 1.6.7 Procurement management plan 1.6.8 Internal review at the planner side
		1.7 Standards for correcting and approving procurement plans	
			1.7.1 Explanation to persons concerned with evaluation 1.7.2 Correction of items pointed out by persons concerned with evaluation 1.7.3 Criteria for approval (approvers)
	2. Procurement management		
		2.1 Requests	
			2.1.1 Requesting methods (types and features of requests, compatibility with features of projects)
		2.2 Selection of entrusted enterprises	
			2.2.1 Methods of deciding the criteria for selecting and evaluating entrusted enterprises (quality, prices, due date, contents of proposal, actual records of similar projects, managerial contents, harmonious working system, and cooperation after completion)
		2.3 Negotiation for contract	
			2.3.1 Methods of conducting negotiation (initial consultation, start of negotiation, final negotiation, and agreement) 2.3.2 Contents of negotiation (delay, appropriateness, authority, responsible person, and withdrawal) 2.3.3 Business practice (industry and overseas enterprises)
		2.4 Contract management	
			2.4.1 Preparation for surveillance 2.4.2 Methods of carrying out monitoring (status where the contractors carry out the work) 2.4.3 Contract change management 2.4.4 Types of changes (scope change, price change, and removal of ambiguity) 2.4.5 Actions for relief (timely closure, managerial actions for relief, legal actions for relief, and product investigation)

		2.5 Transaction models	
			2.5.1 Contract for software development models (issuance of JEITA (former JEIDA))
			2.5.2 SLCP-JCF98 (common frame 98: Issued by the Material Investigation Meeting of the Ministry of International Trades and Industry)

Knowledge field	Major classification	Intermediate classification	Minor classification
K. Cost management			
	1. Cost plan		
		1.1 Totalization of costs	
			1.1.1 Methods of collecting expense elements
			1.1.2 Methods of identifying necessary resources classified by detailed level task items, and their quantities
			1.1.3 Methods of using actual record prices of similar resources
			1.1.4 Methods of determining unit prices classified by resources (in-house procurement, and procurement from external enterprises)
			1.1.5 Methods of preparing tables for totalizing expenses classified by detailed task items
		1.2 Standards for documenting cost plans	
			1.2.1 Cost plan outline
			1.2.2 Cost planning table
			1.2.3 Initial plan value of cost
			1.2.4 Background of cost
			1.2.5 Table of managing costs and plans classified by detailed level tasks
			1.2.6 Assumed risks
			1.2.7 Cost management plan
			1.2.8 Internal review at the planner side
		1.3 Criteria for correcting and approving cost plans	
			1.3.1 Explanation to persons concerned with evaluation
			1.3.2 Correction of items pointed out by persons concerned with evaluation
			1.3.3 Criteria for approval (approver)
	2. Cost management		
		2.1 Cost management	
			2.1.1 Methods of properly seizing actual records of cost
			2.1.2 Methods of estimating the cost for completion
			2.1.3 Methods of minimizing the excess of cost
		2.2 Monitoring and tracking of cost	
			2.2.1 Methods of tracking the entire cost (major product level)
			2.2.2 Methods of tracking costs classified by detailed level tasks
			2.2.3 Methods of identifying the estrangement from cost plans and analyzing the causes
		2.3 Updates of the table for actual records	
			2.3.1 Methods of seizing the actual cost records in the current process and updating the actual record tables
			2.3.2 Methods of entering cost plans required until the completion

		2.4 Analysis of cost differences	
			2.4.1 Methods of analyzing the causes for differences classified by detailed level tasks 2.4.2 Methods of analyzing the causes for differences in project cost accumulation 2.4.3 Methods of estimating costs required until the completion
		2.5 Cost plan changes	
			2.5.1 Methods of seizing differences between plans and actual records 2.5.2 Methods of changing cost plans (preparation of change request specifications, and approval)
	3. Methods and tools related to cost management		
		3.1 Methods of estimating software cost	
			3.1.1 Algorithmic models (software metrics and cost drivers) 3.1.2 Judgement by experts (Delphi technique, etc.) 3.1.3 Estimating by analogy (actual records of cost of similar projects) 3.1.4 Perkinson's Principle(available resources) 3.1.5 Acceptance-of-order driven price (Price-to-Win: price competition, and customers' budgets) 3.1.6 Top-down estimating (based on functions of product) 3.1.7 Bottom-up estimating (based on components of software)
		3.2 Estimating by software size	
			3.2.1 Number of source code lines (number of code lines + number of comment lines) 3.2.2 Function point (FP) method (external input/output, user interfaces, external interfaces, external files, and internal files) 3.2.3 Halstead man-month calculation (Halstead: number of code lines, and monthly productivity)
		3.3 Software cost estimate models	
			3.3.1 Cost model (system size, and number of cost drivers) 3.3.2 Constraint model (supplied man-hours, duration, and staff level)
		3.4 Practical models	
			3.4.1 COCOMO model 3.4.2 SLIM model
		3.5 Earned value 3.6 C/SPMS (Cost/Schedule Management System) 3.7 Statistic tools 3.8 Cost estimate support software	

Knowledge field	Major classification	Intermediate classification	Minor classification
L. Quality management			
	1. Quality assurance plan (including system configuration management plan)		
		1.1 Quality assurance plan	
			1.1.1 Methods of clarifying the quality scope of projects and the targets
			1.1.2 Methods of clarifying the quality of products and system development process
			1.1.3 Methods of achieving the quality required by the customers/users
			1.1.4 Methodology of quality control (PDCA, standard, techniques, practice, matrix, and tools)
			1.1.5 Considerations of cost and quality tradeoff (degree of the customer's satisfaction and cost for quality assurance, control of cost for quality at the time of development and additional expenses after inappropriateness is found)
			1.1.6 Methods of setting up the preparation standards for products (software, and various types of documents)
			1.1.7 Test methods and methods of inspecting appropriateness
			1.1.8 Methods of selecting inspection tools in the test processes
			1.1.9 Methods of checking and inspecting appropriateness
			1.1.10 Methods of establishing mutual understandings within project teams with respect to quality targets
		1.2 Standards for documenting quality assurance plans	
			1.2.1 Outline of quality plan (reliability, convenience, degree of customer's satisfaction, and usability)
			1.2.2 Criteria for quality evaluation
			1.2.3 Methods of quality assurance
			1.2.4 Education and training plan for quality
			1.2.5 Quality management plan
			1.2.6 Internal review at the planner side
		1.3 System configuration management plan	
			1.3.1 Policies of system configuration management
			1.3.2 Methods of identifying system configuration items
			1.3.3 Methods of configuration management
			1.3.4 Change management standards
			1.3.5 Change management tools

		1.4 Standards for documenting system configuration plans	
			1.4.1 Outline of system configuration plans 1.4.2 Change management standards 1.4.3 System configuration management plan (development, maintenance and maintenance) 1.4.4 Internal reviews at the planner side
		1.5 Criteria for correcting and approving quality assurance plans (including system configuration management)	
			1.5.1 Explanation to persons concerned 1.5.2 Correction of items pointed out by persons concerned 1.5.3 Criteria for approval (approver)
	2. Quality control (including system configuration management)		
		2.1 Points of quality control	
			2.1.1 Methods of guidance for staff to conform to the quality control policies 2.1.2 Methods of pursuing cause for inappropriateness and improving defective processes 2.1.3 Participants in quality reviews (users, experienced persons and so on) 2.1.4 Methods of monitoring matrix
		2.2 Monitoring and control of quality	
			2.2.1 Methods of checking the execution status of quality assurance plans (methodology and conformance to standards) 2.2.2 Methods of monitoring and evaluating the tendencies of the qualities 2.2.3 Methods of preparing action plans to cope with the tendencies of the qualities 2.2.4 Methods of evaluating and changing quality matrix
		2.3 Promotion of quality reviews	
			2.3.1 Methods of checking the designs for appropriateness 2.3.2 Methods of checking functional operation for properness 2.3.3 Methods of checking performance achievement 2.3.4 Methods of checking for appropriateness for the technical standards 2.3.5 Methods of checking the contents of development promotion for effectiveness
		2.4 System configuration management	
			2.4.1 Methods of monitoring and tracking the promotion status of system configuration management 2.4.2 Methods of evaluating the system configuration management for functional effectiveness 2.4.3 Methods of evaluating the degree of effects with respect to proposals for changes
	3. Techniques of quality control		
		3.1 Techniques of design review	
			3.1.1 Walk-through and inspection

		3.2 Techniques and tools of evaluating the qualities	
			3.2.1 Check list, exception report, work sampling, visual inspection 3.2.2 Seven QC tools and new seven QC tools 3.2.3 FTA, FMEA, VA, VE and AHP
		3.3 Techniques of improving reliabilities	
			3.3.1 Markovian model, asynchronous Poisson model, Bayesian model, statistic data analysis model, and fault pad model
		3.4 Bug expectation tools	
			3.4.1 Bug detection accumulation curve, and Gompertz curve
		3.5 Software engineering techniques	
			3.5.1 Test techniques 3.5.2 Software quality matrix 3.5.3 Software quality characteristics 3.5.4 Mathematical verification technique 3.5.5 Software process 3.5.6 Software configuration management technique
	4. Continuous quality improvements and their maintenance		
		4.1 Methods of continuous quality improvement (review of project methodology, and reflection of the improvement measures in the designs 4.2 Methods of continuous configuration managements improvement (review of system configuration management matrix)	

Knowledge field	Major classification	Intermediate classification	Minor classification
M. Risk management			
	1. Risk management plan		
		1.1 Risk identification	
			1.1.1 Assumed risks (risk factors: project scope, complexity of projects, non-experience/unstable technologies, cost estimate, organization, capabilities of management, and due date)
			1.1.2 Risk classification (risk type, and risk classification)
		1.2 Risk analyses	
			1.2.1 Possibilities of occurrence, and methods of analyzing the results
			1.2.2 Analyzed items (resources, staff, cost, organization, performances, timing and environments)
		1.3 Risk measurements (quantification)	
			1.3.1 Methods of estimating the probability of occurrence
			1.3.2 Method of estimating effects of the occurrence on the quality, schedule and cost
			1.3.3 Methods of preparing risk management table (risk factors, probability of the occurrence, effects, and measures for reduction/unexpected situations)
		1.4 Risk evaluation	
			1.4.1 Methods of preparing criteria for risk evaluation (permissibility and prioritization)
			1.4.2 Methods of evaluating risks (difference from the criteria and applicable priorities)
			1.4.3 Methods of evaluating cost performance of risk management
		1.5 Standards for documenting risk management plan	
			1.5.1 Outline of risk management plan
			1.5.2 Execution of (preventive) measures for risk reduction (classified by WBS work items)
			1.5.3 Execution of the plan to cope with unexpected situations (serious risks, schedule, and setup of cost margin)
			1.5.4 Decision of intent to cope with unexpected situations
			1.5.5 Risk management plan (actions to cope with risk trigger, decision of interruption/continuation, and correction of the plans)
			1.5.6 Internal review at the planner side
		1.6 Criteria for correcting and approving risk management plans	
			1.6.1 Explanation to persons concerned
			1.6.2 Correction of items pointed out by persons concerned
			1.6.3 Criteria for approval (approver)

	2. Risk management		
		2.1 Monitoring and tracking of risks	
			2.1.1 Checking the occurrence of risks for possibility (actualization) 2.1.2 Evaluation of changes in the probability of the occurrence of risks 2.1.3 Entry of the situations into the risk management table
		2.2 Risk management	
			2.2.1 Monitoring of the status where measures for risk reduction (prevention) are taken 2.2.2 Reports on the current situation of risks 2.2.3 Changes in the plans to cope with unexpected situations according to the status
		2.3 Actions to be taken when risks occur	
			2.3.1 Methods of specifying risks that occur 2.3.2 Methods of pursuing the causes of occurrence 2.3.3 Methods of investigating and deciding measures against risks 2.3.4 Methods of thinking out measures against the occurrence of new risks and methods of recording them 2.3.5 Methods of documenting risks that occurred and of preparing databases of them
	3. Methods and tools of risk management		
		3.1 Methodology of risk management	
			3.1.1 Boehm method 3.1.2 CRAMM method (CCTA's Risk Analysis and Management Method)
		3.2 Risk analysis technique	
			3.2.1 Probability analysis method, networking method, decision tree, and effect diagram 3.2.2 Monte Carlo method
		3.3 Risk quantification techniques	
			3.3.1 Delphi method 3.3.2 Monte Carlo simulation 3.3.3 Sensibility analysis
		3.4 Risk prevention method	
			3.4.1 Prototyping 3.4.2 Simulation

		3.5 Classification of risks	
			3.5.1 Business (mismatch with market needs, lack of competitiveness, reduction of customer's payability, timing of supply to the market)
			3.5.2 Satisfaction of customers (mismatch with required functions, and inadequate preparations of documents)
			3.5.3 User's/customer's requests (ambiguous requests, delay in decision of requests, and excessive change requests)
			3.5.4 Excessively strict due date
			3.5.5 Technologies (request of functions/performances that cannot be achieved technically, inexperienced techniques, new technologies, and new methodology)
			3.5.6 Poor quality
			3.5.7 Excess in cost
			3.5.8 Erroneous selection of technical approach
			3.5.9 Frequently requested changes
			3.5.10 Inadequate test environments
			3.5.11 Ability of promotion (inadequate knowledge/skill, insufficient education, and lack of understandings on the projects)
			3.5.12 Staff (morale, health, retirement, and lack of mutual understandings)
			3.5.13 Inadequate configuration management
			3.5.14 External factors (quality of products developed in parallel, and quality of independent vendors' products)
			3.5.15 Laws (copyrights, lack of expenses for court)

Knowledge field	Major classification	Intermediate classification	Minor classification
N. General management skills			
	1. Leadership		
		1.1 Concentration of forces to achieve the purposes and targets of projects	
			1.1.1 Presentation of policies and targets of projects (clear achievement targets and innovative spirit) 1.1.2 Organization of dynamic teams (easily manageable scale, and prompt actions to cope with various changes) 1.1.3 Preparation of environments (originality, openability, solidarity, and high morals) 1.1.4 Persuasive explanation and maintenance of influences on project organization 1.1.5 Display of the decision in the situation of intent decision 1.1.6 Formation of a spirit of mutual admiration with respect to the successful results obtained by staff 1.1.7 Setup of targets for individual and teams and spiritual elevation for accomplishment 1.1.8 Motivation of staff for improving the productivity
	2. Thinking power		
		2.1 Rational identification between problems and situations, and grope of solutions to difficult problems	
			2.1.1 Global viewpoint via arrangement and summarization of complicate problems 2.1.2 Totalized preventive measures against the occurrence by seizing signs of risks and the relationships
	3. Ability of coping with problems		
		3.1 Consistent concept, thoughtfulness, and actions with great confidence	
			3.1.1 Appropriate understandings and seizure of problems via proper information 3.1.2 Setup of applicable targets and planning of appropriate strategies 3.1.3 Presentation of substituted proposal and decision with confidence 3.1.4 Judgment with high flexibility with respect to requests for changes
	4. Human relations		
		4.1 Promotion of understandings of staff and mutual understandings among staff	
			4.1.1 Presentation of interest in the abilities of staff 4.1.2 Understandings of different viewpoints and different senses of values 4.1.3 Consideration for staff, and understandings of their characters 4.1.4 Promotion of positive participation in cooperative work among staff

	5. Communication		
		5.1 Seizure of common problems and common interest, and expansion of mutual understandings among persons concerned	
			5.1.1 Promotion of open dialogue 5.1.2 Effective discussions meeting the contents of problems 5.1.3 Collection of information, construction of logic, and development and sharing of methods of transmitting information that receivers can understand easily 5.1.4 Selection of communication media according to the situations
	6. Management of individual and team activities		
		6.1 Forming of organization and staff management to achieve high efficiency and high quality	
			6.1.1 Dynamic and effective rearrangement of staff 6.1.2 Transfer of authority to the team leader and seizure of execution status 6.1.3 Roles of promotion organizations, teams and staff, clarification of responsibilities, and seizure of target situations 6.1.4 Arrangement of leaders at important places, and integration among leaders

Knowledge field	Major classification	Intermediate classification	Minor classification
O. Knowledge on IT project managements			
	1. System life cycle management		
		1.1 Selection of system life cycle models	
			1.1.1 RAD
			1.1.2 Waterfall model
			1.1.3 Repetition type model (waterfall model that allows phase feedback)
			1.1.4 Incremental implementation model (subset division incremental development and total development of construction phase)
			1.1.5 Incremental development and delivery model (subset division incremental development and total development of all phases)
			1.1.6 Prototype model
			1.1.7 Spiral model (repetition of the following processes: request analysis – risk analysis – prototype – user evaluation)
		1.2 Process modeling	
			1.2.1 Static process modeling
			1.2.2 Dynamic process modeling
	2. Software engineering		
		2.1 Capability Maturity Model (CMM)	
			2.1.1 Key process area classified by process maturities (levels 1 to 5)
		2.2 Software quality matrix	
			2.2.1 Software quality indexes
			2.2.2 Halstead software science
			2.2.3 MaCabe complexity matrix
		2.3 Software test	
			2.3.1 Test case, test program, test data
			2.3.2 Black box test and white box test
			2.3.3 Top-down test, bottom-up test, and sandwich test
			2.3.4 Static test and dynamic test
		2.4 Reuse of software	
			2.4.1 Software maintenance
			2.4.2 Software reengineering
			2.4.3 Reverse engineering
			2.4.4 Assurance of software transportation

		2.5 Software configuration management	
			2.5.1 Integrity of software products 2.5.2 Standards of software quality assurance 2.5.3 Assurance of project visibility 2.5.4 Economization of software costs
	3. Standards		
		3.1 ISO/IEC/JTC1/SC7/WG1 - 14 3.2 ISO/IEC 12207 (JIS X 0160): Software Life Cycle Processes 3.3 ISO/IEC DTR 15271 (JIS X 0161): SLCP 3.4 ISO 9001 - 4 (JIS Z 9901) 3.5 ISO/IEC 9126 (JIS X 0129): Software product evaluation 3.6 ISO/IEC 14598: Software product evaluation 3.7 ISO/IEC 15504: Software Process Assessment 3.8 ISO/IEC PDTR 15846: Software Configuration Management 3.9 ISO/IEC DIS 14143-1 - 5: Function Size Measurement 3.10 ISO 10006: Project Management Standards	
	4. Related laws		
		4.1 Transactions of system development operations	
			4.1.1 Civil law (contract, entrustment, dispatch, warranty, and compensation for damages) 4.1.2 Commercial law (inspection of purpose products at time of delivery) 4.1.3 Worker's dispatching law (applicable operations, contents of contract, and dispatching business proprietor's responsibilities) 4.1.4 Tax law (handling of tax matters in the software development) 4.1.5 Tax law concerning revenue stamps 4.1.6 Law concerning prevention against delay of payment for subcontract
		4.2 Intellectual property rights	
			4.2.1 Copyright law (business model, program, document, data base) 4.2.2 Patent law (invention, application, and examination standards) 4.2.3 Industrial property right law (laws concerning practical new design (design), design law (contents), trademark law) 4.2.4 Unfair Competition Prevention Law (sales secrecy)
		4.3 Others	
			4.3.1 Product liability law 4.3.2 Electrical signature law

Information Technology Engineers Skill Standards
Project Manager **Published on December 25, 2000**

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