

PM.1 Project startup activities**2 | D | O | _ | A** PM.1.1 Understand user requirements**2 | D | O | _ | A** PM.1.1.1

Initiators evaluate their requirements for software projects resulting mainly from

- business and operations opportunities for growth or improvement;
- deficiencies in existing systems and software requiring modifications.

2 | D | O | _ | A PM.1.1.2

Developers (normally software managers and/or system analysts) discuss with initiators (normally users and/or user management) to obtain a clear understanding of the user requirements for a software project to include the business objectives, proposed type i.e. development or outsource, and the estimated costs and benefits.

1 | D | _ | _ | A PM.1.2 Specify User Requirements**1 | D | _ | _ | A** PM.1.2.1

Following agreement, initiators with the support of developers, specify the user requirements.

PM.A2 provides a document template for preparing the user requirements specifications.

1 | D | _ | _ | A PM.1.3 Nominate SPM**1 | D | _ | _ | A** PM.1.3.1

Software management with the support of users, nominate an SPM from the internal software organization who is available and possesses the necessary project specific and people related skills, knowledge and experience.

1 | D | _ | _ | L PM.1.3.2

The SPM reviews the user requirements and prepares a Stakeholder Chart to identify the people or groups the project deals with including:

- initiators;
- end-users;
- developers;
- subcontractors;

- the prime contractor;
- other sub-system developers.

2 | D _ _ | L PM.1.3.3

With the agreement and support of users, the SPM should also prepare a set of quality objectives for the project and communicate them to the Software Quality Assurance group (normally the Software Quality Assurance manager).

PM.2 Project planning, scheduling and budgeting

I | D _ _ | A PM.2.1 Develop the Software Project Management Plan (SPMP)

I | D _ _ | A PM.2.1.1

The SPM shall develop an SPMP for the project.

PM.A1 provides a document template for building the SPMP.

1 | D _ _ | A PM.2.2 Determine Software Life Cycle (SLC) Approach

1 | D _ _ | L PM.2.2.1

With reference to the user requirements and through discussions with initiators and senior management, the SPM determines the SLC approach that the project will take e.g. Waterfall, Incremental Delivery, Evolutionary and Prototyping.

An elaboration of 4 types of SLC approaches is provided in PM.D.

1 | D _ _ | A PM.2.3 Define deliverables

1 | D _ _ | A PM.2.3.1

The SPM develops a list of the software deliverables that are required to be delivered at each phase of the SLC.

For reference, a standard SLC and its associated phases and major deliverables are shown in Table 1 below. In addition, document templates for producing these deliverables are provided in PM.A.

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 PM.2.3.2

With the agreement of users and specific to the project, other deliverables *should* be added to the list based on the nature of the project.

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 PM.2.4 Define activities

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 PM.2.4.1

Having determined the deliverables and SLC approach the project will take, the SPM determines the activities (for testing requirements, refer Software Testing practice) that will take place within each phase of the SLC

Table 1 below lists the major activities that take place within a standard SLC and should be used as a guide to determine specific project activities.
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Further elaboration of phase activities in Table 1 is provided in PM C.

Table 1 - Summary of Project Life-cycle Phases, Major Activities, Inputs & Outputs

NO	NAME	MAJOR ACTIVITIES	INPUT	OUTPUT
1.	Requirements (RQ)	-Analyze organizational, strategic, business & user Opportunities. -Prioritize opportunities/requests. -Prepare user requests & justifications for IT work.		-User Requirements Document (URD) -User Acceptance Test Plans
2.	Analysis (AN)	-Analyze high-level systems options & recommend approach. -Develop project plan. -Construct functional/logical software & data flow model. -Identify software requirements.	URD	-Software Requirements Document (SRD) -Project Plan -Systems Test Plans
3.	Design (DG)	-Analyze/finalize software components & job streams. -Analyze/finalize logical & physical data base design. -Complete program specifications.	SRD	-Design Specifications (DS) -Test Designs, cases and procedures
4.	Coding (CO)	-Design software modules. -Code software modules. -Conduct unit tests.	DS	-Code (unit tested) -Unit test results
5.	Testing (TS)	-Conduct integration tests. -Conduct system tests.	Code (unit tested)	-Integration & System test results. -Software User Manual (SUM- including Software Operations Manual).
6.	Acceptance (AC)	-Conduct User Acceptance tests	-Code (System Tested) -SUM	-User Acceptance test results. -Software Transfer Document (STD)
7.	Implementation (IM)	-Install Software. -Final acceptance tests.	STD	-Installation results.

1	D		L
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 PM.2.4.2

To determine the final project activities that *should* be included in the Project Plan, the following factors should be considered:

- a) Type of *project* i.e. in-house development,

- outsourcing, package acquisition or a combination,
- b) Type of *development* i.e. new software development or changes to existing software,
- c) Type of *application* e.g. scientific, administrative, real time, batch etc.,
- d) Project *Size* measured in terms of duration, costs and staff etc.,
- e) *Hardware, operating system and programming language standards* selected.

1	D	_	_	L
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PM.2.4.3

For large projects, the SPM should divide the project into various stages with checkpoints at the end of each stage, to facilitate management and control as well as providing for more realistic estimates of each project phase.

Refer sections 6.3.1, 6.4 and 6.4.1 of Practitioner Guide on Project Management and Sections 6.1.3 and 6.1.4 of “Guidelines on Flexibility in Adopting Methodologies” which is available in the Information Technology Services Department (ITSD) of the SAR.

1	D	_	_	A
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PM.2.5 Estimate resources and duration

1	D	_	_	A
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PM.2.5.1

After having determined the deliverables and activities that are required on the project, the next step is for the SPM to:

- a) Define human resources;
- b) Estimate effort
- c) Estimate duration.

1	D	_	_	A
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PM.2.5.2

To define the human resources requirements, the SPM analyzes the work required and define project roles. Examples of project roles are:

- a) Project manager;
- b) Team leader;
- c) Systems Analyst;
- d) Programmer;
- e) Test engineer;
- f) Software (or Systems) librarian;
- g) Software Quality assurance (SQA) engineer or

analyst.

1 | D _ _ | A | PM.2.5.3

The SPM then defines the relationships between the roles to enable effective coordination and control of the project. The following rules should be used when defining organizational structures:

An example of an organization chart for a medium-sized project is provided in Figure 1 below:

- a) Ensure that each member of the team reports to one and only one person i.e. the 'unity of command' principle.
- b) Ensure that each person has no more than seven people reporting directly to him or her i.e. the 'rule of seven' principle.

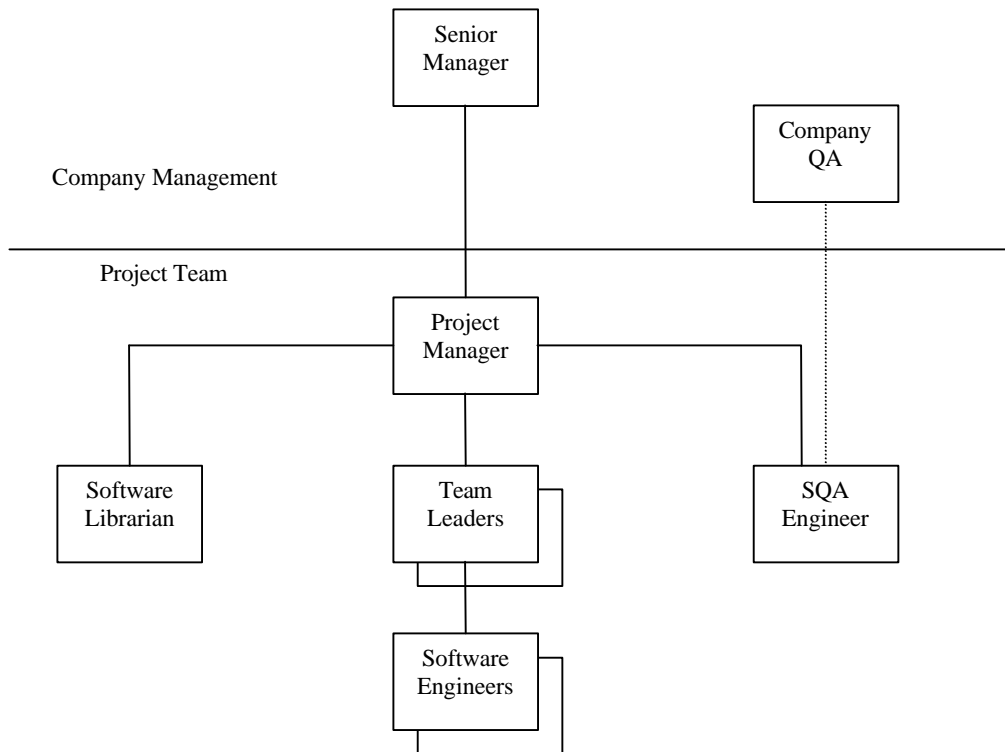


Figure 1: Example of Organization Chart

2 | D _ _ | A | PM.2.5.4

The senior software manager normally defines the activities of the SPM by means of the terms of reference.

2 | D _ _ | A | PM.2.5.5

The SPM is responsible for defining the activities of each member in the project team.

1 | D _ _ | A | PM.2.5.6 Estimating Effort

- a) The SPM, with the assistance of his team and perhaps external experts, makes a detailed analysis of the work involved and provide an estimate of the effort in terms of man-hours, days or months.
- b) Another method for estimating effort is known as Function Point Analysis.
- c) Where possible these estimates should be compared with good historical data and adjusted to take into account factors such as staff experience, project risks, new methods and technology and more efficient work practices.

Refer Section 8.2 of Practitioner Guide on Project Management available in ITSD.

1 | D _ _ | A | PM.2.5.7 Estimating Duration

The SPM then estimates the duration required for performing a piece of work by using effort estimates and factoring in staff productivity data plus practical considerations.

Studies have shown that miscellaneous functions can absorb up to 50% of staff time, reducing staff productivity and lengthening work duration.

2 | D _ _ | A | PM.2.6 Define activity network

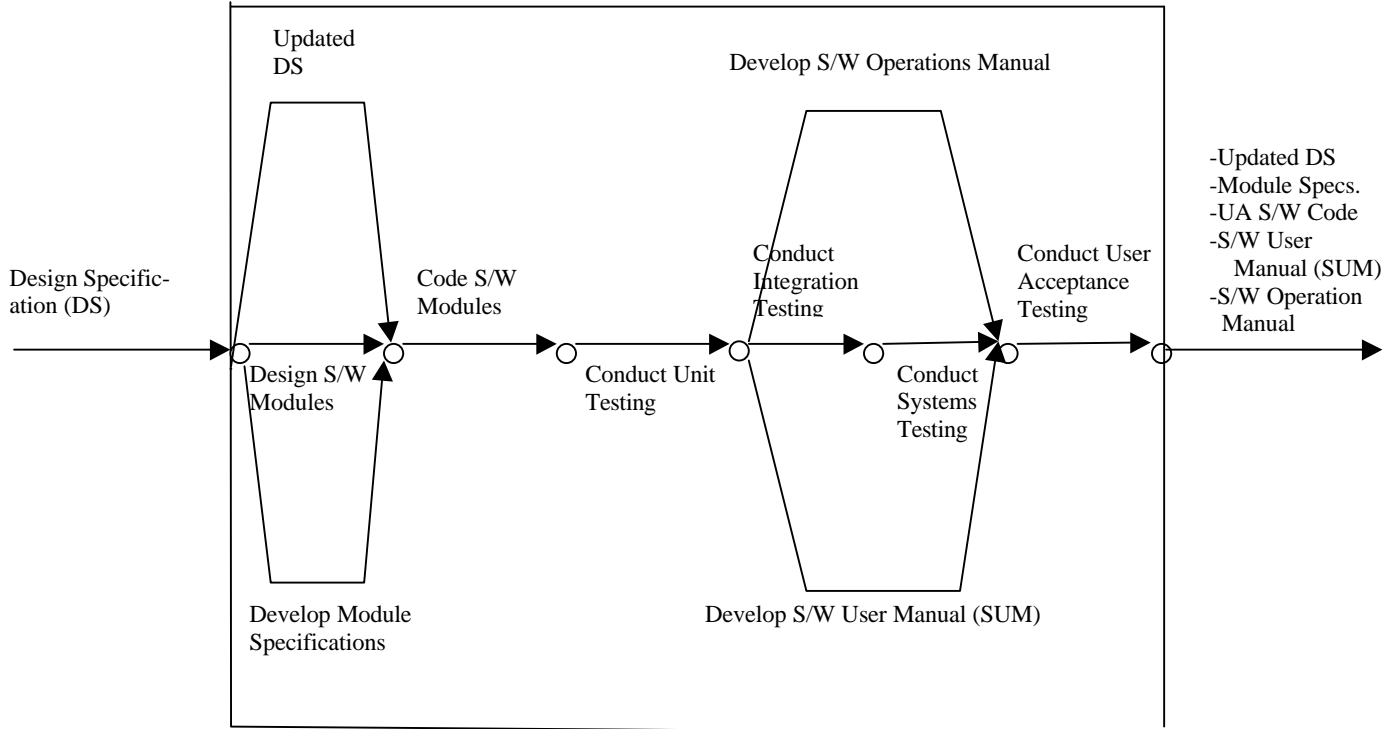
2 | D _ _ | A | PM.2.6.1

The SPM develops a project activity network to serve as a feasible pattern of project activities that takes account of all dependencies.

An example of a project activity network is provided in Figure 2 below.

PM.E provides a description of the considerations that should be taken into account in building the network.

Figure 2: Example of a Project Activity Network – Coding, Testing and Acceptance Phase Activities (High Level)



2 | D _ _ | A | PM.2.7 Plan for project risks

2 | D _ _ | A | PM.2.7.1

The SPM evaluates all the risk factors that may have an impact on the project including consideration of the following common groups of risk factors:

- a) Experience and qualifications of project team;
- b) Experience and qualifications of users;
- c) Maturity of suppliers;
- d) Accuracy of estimates;
- e) The length of the project;
- f) The dependency on key project staff;
- g) The physical location of staff;
- h) The definition and allocation of responsibilities;
- i) The evolution of staff on the project;
- j) Key failure factors from post implementation review records of past projects;
- k) The use of technology, tools, methods and commercial software;
- l) The quality and stability of user requirements, external interfaces and systems.

A discussion of the above risk factor groups that may impact software projects is provided in PM.F Risk Management Guidelines.

2 | **D** _ _ | **A** | PM.2.7.2

Depending on the nature and type of risks being addressed, the SPM should adjust the project plan to include activities that will help mitigate or remove the likelihood of their being realized.

A discussion of the possible actions that can be taken to counteract risks is provided in PM.F Risk Management Guidelines.

3 | **D** _ _ | **A** | PM.2.7.3

The SPM should plan for any contingencies to arrest any foreseeable mishaps that might take place including:

- a) Project development disruption;
- b) Project slippage in cost and schedule;
- c) Reduction in project team communication and morale

3 | **D** _ _ | **A** | PM.2.7.4

The SPM should seek the agreement of users for the need of the contingency plans.

3 | **D** _ _ | **A** | PM.2.7.5

The SPM should include in the SPMP the resource (including costs) requirements to implement any of contingency plans as and when required.

Refer also 'Concept of Creeping Tolerance' of Practitioner Guide on Project Management available in ITSD.

3 | **D** _ _ | **A** | PM.2.8 Plan to measure project processes and products**3** | **D** _ _ | **A** | PM.2.8.1

The SPM should assess the project environment and define the primary goals of the project (e.g. financial targets, quality goals, reliability goals etc.)

3 | **D** _ _ | **A** | PM.2.8.2

The SPM analyzes the primary goals, breaking them down into sub-goals that can be quantitatively measured e.g. 'do not exceed the planned effort in each activity', 'do not exceed the planned time in each activity' etc.

3 | **D** _ _ | **A** | PM.2.8.3

By referencing the sub-goals, the SPM defines metrics e.g.

man-months of effort, for each sub-goal.

3 | D _ _ | A | PM.2.8.4

The SPM should plan into the SPMP the action steps needed to collect the raw metric data as part of project work carried out by staff.

A detailed discussion of the subject of measuring project processes and products is provided in PM.H.

1 | D _ _ | A | PM.2.9 Define schedule

1 | D _ _ | A | PM.2.9.1

The SPM decides on the actual schedule by setting the start and end times for work to be done to:

- a) Comply with time and resource constraints;
- b) Minimize total cost;
- c) Minimize the fragmentation of resource allocations;
- d) Allow for any risks that might belay the project.

2 | D _ _ | A | PM.2.9.2

The SPM should begin with the start and end dates of work affected by time and resource constraints.

2 | D _ _ | A | PM.2.9.3

If the total time to complete the project violates time constraints, the SPM should return to the 'define activities stage' to redefine work, re-estimate resources and duration, and then modify the activity network.

2 | D _ _ | A | PM.2.10 Define total cost

2 | D _ _ | A | PM.2.10.1

The SPM calculates the minimum total costs by summing the costs of all the work required to be carried out.

1 | D _ _ | A | PM.2.10.2

The SPM adds to the total costs any non-labour project costs where applicable:

- a) Tools used to make the end-product;

PM.G provides a list of factors to be taken into account in defining schedule, resource requirements and total costs.

- b) Materials that are used on the project;
- c) Internal facilities e.g. computer and test facilities;
- d) External services e.g. reproduction;
- e) Travel and subsistence;
- f) Packing and shipping;
- g) Insurance.

1 | D | _ | _ | A | PM.2.11 Prepare configuration item list (refer also Software Change Control practice

1 | D | _ | _ | A | PM.2.11.1

The SPM should prepare a list of configuration items that the project will use and that will be subject to change as the project progresses, to the Change Control group (normally the Change Control manager).

1 | D | _ | _ | A | PM.2.12 Complete the project plan

1 | D | _ | _ | A | PM.2.12.1

When the SPMP has been completed, it should be reviewed to secure:

- a) agreement on work activities and schedule with project team members;
- b) agreement and approval on deliverables, resources, costs and schedule with initiators, users and senior software management.

1 | D | _ | _ | A | PM.2.12.2

The SPMP should be adjusted to consider any requirements and/or improvement recommendations resulting from the reviews.

PM.3 Project tracking and reporting

1 | D _ _ | A PM.3.1 Track actual versus plan

1 | D _ _ | A PM.3.1.1

As the project progresses, the SPM reports to initiators and senior software managers on a formal (progress reports, see below) or informal (meetings and discussions) regarding the performance of the project team against plan and discuss any outstanding issues.

1 | D _ _ | A PM.3.1.2

Initiators and senior software managers should analyze progress reports and arrange regular meetings with the SPM to review and assist in addressing issues on the project.

1 | D _ _ | S PM.3.1.3

The SPM should hold frequent discussions with team members to obtain up to date project status and assist in resolving problems.

1 | D _ _ | L PM.3.1.4

Team members should formally report progress to SPM by means of work completion reports and time sheets (see below).

3 | D _ _ | A PM.3.1.5

As and when metric data is collected, the SPM performs an evaluation of the data to measure actual project performance relative to its project goals (also refer to PM.2.8.3).

2 | D _ _ | A PM.3.1.6

The SPM takes appropriate steps to improve the performance of the project by updating the SPMP as necessary to correct deviations from project goals.

3 | D _ _ | A PM.3.1.7

The SPM should monitor project risks and ensure that any contingency plans for project risks are implemented in a timely manner.

3 | D | _ | _ | A | PM.3.1.8

For any changes that impact schedule and resources, the SPM should perform an impact analysis to select the most feasible solution for implementation or escalate to senior management for resolution.

3 | D | _ | _ | A | PM.3.1.9

The SPM should adjust the SPMP for all changes implemented.

1 | D | _ | _ | A | PM.3.2 Prepare and submit Progress Reports

1 | D | _ | _ | A | PM.3.2.1

The SPM prepares and submits to initiators and senior managers routine e.g. monthly, weekly etc., reports that describe:

- a) Technical status;
- b) Resource status;
- c) Schedule status;
- d) Problems;
- e) Financial status;
- f) Updated high-level or abstract of project plan.

1 | D | _ | _ | A | PM.3.2.2

The SPM prepares to answer any questions by and/or obtain input from initiators or senior managers on the phone or in meetings.

A template for preparing progress reports is provided in PM.A9.

1 | D | _ | _ | L | PM.3.3 Prepare, verify and accept Work Completion Reports

1 | D | _ | _ | L | PM.3.3.1

As each piece of work is completed, the responsible team member notifies the SPM either verbally or via a work completion report.

1 | D _ _ | L PM.3.3.2

The SPM verifies work completion status and indicate acceptance of work deliverables.

A template for preparing work completion reports is provided in PM.A.

2 | D _ _ | A PM.3.4 Prepare and use Time Sheets**2 | D _ _ | A** PM.3.4.1

Project team members (PTM) complete time sheets to record the work associated with the expenditure of effort including that spent on the project.

2 | D _ _ | A PM.3.4.2

PTM submit these time sheets on a regular e.g. weekly, to the SPM

2 | D _ _ | A PM.3.4.3

The SPM extracts data from the time sheets to use as input to compile progress reports as well as for other human resource analytical work.

A template for recording time (Time Sheet) is provided in PM.B.

PM.4 Project Closedown Activities**1 | D _ _ | A** PM.4.1 Signoff of project**1 | D _ _ | A** PM.4.1.1

When the system and software has been successfully tested by users (refer to Software Testing Practice), the SPM shall seek agreement and approval from users (normally represented by user management and/or initiators), senior software managers and the software operations group (normally represented by software operations management) to implement the software into the operating environment.

1 | D _ _ | A PM.4.1.2

When agreement has been obtained to implement the

software, the SPM should ensure proper planning and execution of implementation activities.

1 | D _ _ | A | PM.4.1.3

The SPM should ensure that development staff are on hand to support the system after its implementation to fix any unforeseen problems after implementation.

1 | D _ _ | A | PM.4.1.4

When the software has been implemented and running smoothly for a user-agreed period of time, the SPM should obtain the signature(s) of the users (normally represented by user management and/or initiators) and the software operations group (normally represented by software operations management) to indicate successful completion of the software project (refer Post Implementation Support practice).

3 | D _ _ | A | PM.4.2 Conduct post implementation review of project

3 | D _ _ | A | PM.4.2.1

When the software has been implemented and running smoothly for a user-agreed period of time (e.g. three months), the SPM or an independent group e.g. audit or QA , should conduct a post implementation review of the project.

3 | D _ _ | A | PM.4.2.2

The review should be objective and should focus on the adequacy of and the compliance with requirements, standards and procedures, compared with what was delivered and used in major project areas including:

- a) Planning;
- b) Software life cycle activities;
- c) Schedule and budget;
- d) Communication;
- e) Quality of software deliverables;
- f) Customer satisfaction;
- g) Documentation;
- h) Contractor management;
- i) Supplier management;
- j) People management.

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 PM.4.2.3

The reviewer (s) should adhere to the following steps in conducting the review:

- a) Define the terms of reference (TOR) for the review including:
 - the purpose and scope;
 - the project area (s);
 - the products and processes;
 - the review approach that will be adopted;
 - the documentation and records that will be required;
 - a list of groups or persons who will be required to support and participate that could include major stakeholders like initiators, end-users, SPM, project team members etc.;
 - a review schedule.
- b) Distribute and obtain agreement for the TOR from review participants.
- c) Before the review, the reviewer(s) should familiarize with the organization(s) being reviewed, its products and processes.
- d) During the review, the reviewer should fully investigate all problems encountered in the project, document them and make recommendations as to how they may have been avoided.
- e) When investigations are complete, the reviewer (s) should issue a draft review report for comment by the reviewed organization (s) to clarify any misunderstandings and to ensure that findings are accurate.
- f) The review report should contain:
 - restatement of the TOR;
 - the review conclusions;
 - the review recommendations;
 - list of proposed actions.

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 PM.4.2.4

The SPM and/or software management should adopt any of the proposed recommendations in the review report that will improve the performance of future software projects handled by the organization.