

REQUIREMENTS MANAGEMENT

~~An Engineering~~A Project Management Process Area at Maturity Level 2

Purpose

The purpose of Requirements Management (REQM) is to manage ~~the~~ requirements of the project's products and product components and to identify inconsistencies between those requirements and the project's plans and work products.

Introductory Notes

Requirements management processes manage all requirements received or generated by the project, including both technical and nontechnical requirements as well as ~~those~~ requirements levied on the project by the organization. ~~In particular, if the Requirements Development process area is implemented, its processes will generate product and product component requirements that will also be managed by the requirements management processes.~~

In particular, all requirements that the customer and service provider have approved are addressed in the Requirements Management process area.

Throughout the process areas, where ~~we use~~ the terms "product" and "product component" are used, their intended meanings also encompass services, service systems, and their components. ~~When the Requirements Management, Requirements Development, and Technical Solution process areas are all implemented, their associated processes may be closely tied and be performed concurrently.~~

The written agreement can take the form of a service level agreement (SLA), performance work statement (PWS), statement of objectives (SOO), statement of work (SOW), or other type of agreement. The written agreement may be part of a contract, a memorandum of agreement, an approved requirements document, or some other form.

The written agreement may have to be established while service provision is ongoing. The intent of Requirements Management is to repeat the service agreement process during the service period to support a positive relationship between the service provider and the customer while meeting the needs of both. Requirements management processes should encourage open communication without retribution.

The customer may be internal or external to the service provider's organization.

Sources and considerations for service requirements include mission-related performance goals and objectives (found in strategic plans and

employee performance plans), monitoring capability, current performance levels and service levels, constraints identified during selection of design solutions, and requirements derived from designing the service system (e.g., reliability, maintainability, availability, supportability, safety and health, mission operations, lifecycle cost, obsolescence management).

Other considerations affecting service requirements may stem from the customer's agreements with other suppliers (e.g., the customer's underpinning contracts, operational level agreements, memoranda of agreement, subcontracts).

The project takes appropriate steps to ensure that the ~~agreed-on~~ set of approved requirements is managed to support the planning and execution needs of the project. When a project receives requirements from an approved requirements provider, ~~the these~~ requirements are reviewed with the requirements provider to resolve issues and prevent misunderstanding before ~~the~~ requirements are incorporated into ~~the project's~~ project plans. Once the requirements provider and the requirements receiver reach an agreement, commitment to the requirements is obtained from ~~the~~ project participants. The project manages changes to ~~the~~ requirements as they evolve and identifies ~~any~~ inconsistencies that occur among ~~the~~ plans, work products, and requirements.

Part of ~~the management of managing~~ requirements is ~~to document~~ documenting requirements changes and ~~their~~ rationale and ~~to maintain~~ maintaining bidirectional traceability between source requirements and all product and product component requirements. (See the definition of "bidirectional traceability" in the glossary.)

All ~~development~~ projects have requirements. In the case of ~~a project that is focused on~~ maintenance activities, ~~the changes to the product or product components~~ are based on changes to the existing requirements, design, or implementation. The requirements changes, if any, might be documented in change requests from the customer or users, or they might take the form of new requirements received from the requirements development process. Regardless of their source or form, the maintenance activities that are driven by changes to requirements are managed accordingly.

Related Process Areas

SSD Addition

Refer to the Requirements Service System Development process area for more information about ~~transforming~~ developing and analyzing stakeholder ~~needs into product requirements and deciding how to allocate or distribute requirements among the product components.~~

Refer to the ~~Technical Solution~~ Strategic Service Management process area for more information about ~~transforming requirements into technical solutions.~~

~~Refer to the Project Planning process area for more information about how project establishing and maintaining standard services in concert with strategic needs and plans reflect requirements and need to be revised as requirements change.~~

Refer to the Configuration Management process area for more information about establishing baselines and tracking and controlling changes ~~to configuration documentation for requirements.~~

Refer to the Project Monitoring and Control process area for more information about ~~tracking and controlling the activities and work products that are based on the requirements~~ monitoring the project against the plan and taking appropriate managing corrective action to closure.

~~Refer to the Project Planning process area for more information about establishing and maintaining plans that define project activities.~~

Refer to the Risk Management process area for more information about identifying and ~~handling~~ analyzing risks ~~associated with requirements.~~

Specific Goal and Practice Summary

SG 1 Manage Requirements

- SP 1.1 ~~Obtain an Understanding of~~ Understand Requirements
- SP 1.2 Obtain Commitment to Requirements
- SP 1.3 Manage Requirements Changes
- SP 1.4 Maintain Bidirectional Traceability of Requirements
- SP 1.5 Identify Inconsistencies Between Project Work and Requirements

Specific Practices by Goal

SG 1 Manage Requirements

Requirements are managed and inconsistencies with project plans and work products are identified.

The project maintains a current and approved set of requirements over the life of the project by doing the following:

- Managing all changes to ~~the~~ requirements
- Maintaining ~~the~~ relationships among ~~the~~ requirements, ~~the~~ project plans, and ~~the~~ work products
- Identifying inconsistencies among ~~the~~ requirements, ~~the~~ project plans, and ~~the~~ work products
- Taking corrective action

~~Refer to~~ the Technical Solution Service Delivery, Strategic Service Management, or Incident Resolution and Prevention process ~~area for~~

more information about determining the feasibility of the areas are implemented, their processes will generate stakeholder requirements.

Refer to the Requirements Development process area for more information about ensuring that they will also be managed by requirements reflect the needs and expectations of the customer management processes.

Refer to the Project Monitoring and Control process area for more information about taking managing corrective action to closure.

SP 1.1 **Obtain an Understanding of Understand Requirements**

Develop an understanding with the requirements providers on the meaning of the requirements.

As the project matures and requirements are derived, all activities or disciplines will receive requirements. To avoid requirements creep, criteria are established to designate appropriate channels, or official sources, from which to receive requirements. ~~The Those~~ receiving ~~activities requirements~~ conduct analyses of ~~the requirements them~~ with the ~~requirements~~ provider to ensure that a compatible, shared understanding is reached on the meaning of ~~the~~ requirements. The result of ~~this analysis these analyses~~ and dialog is an ~~agreed-to~~ set of approved requirements.

Typical Work Products

1. Lists of criteria for distinguishing appropriate requirements providers
2. Criteria for evaluation and acceptance of requirements
3. Results of analyses against criteria
4. An ~~agreed-to~~ set of approved requirements

Subpractices

1. Establish criteria for distinguishing appropriate requirements providers.
2. Establish objective criteria for the evaluation and acceptance of requirements.

SSD Addition

Refer to the Service System Development process area for more information about analyzing and validating requirements.

Lack of evaluation and acceptance criteria often results in inadequate verification, costly rework, or customer rejection.

Examples of evaluation and acceptance criteria include the following:

- Clearly and properly stated
- Complete
- Consistent with each one another
- Uniquely identified
- Appropriate to implement
- Verifiable (i.e., testable)
- Traceable
- Achievable with current or planned capability

3. Analyze requirements to ensure that ~~the~~ established criteria are met.
4. Reach an understanding of ~~the~~ requirements with ~~the~~ requirements provider/providers so that ~~the~~ project participants can commit to them.

SP 1.2 Obtain Commitment to Requirements

Obtain commitment to ~~the~~ requirements from ~~the~~ project participants.

Refer to the Project Monitoring and Control process area for more information about monitoring ~~the~~ commitments ~~made~~.

IPPD Addition

~~When integrated teams are formed, the project participants are the integrated teams and their members. Commitment to the requirement for interacting with other integrated teams is as important for each integrated team as its commitments to product and other project requirements.~~

~~Whereas the~~The previous specific practice dealt with reaching an understanding with ~~the~~ requirements providers, ~~this.~~ This specific practice deals with agreements and commitments among those who ~~have to~~must carry out ~~the~~ activities necessary to implement ~~the~~ requirements. Requirements evolve throughout the project, ~~especially as described by the specific practices of the Requirements Development process area and the Technical Solution process area.~~ As ~~the~~ requirements evolve, this specific practice ensures that project participants commit to the current, ~~and~~ approved requirements and the resulting changes in project plans, activities, and work products.

Typical Work Products

1. Requirements impact assessments
2. Documented commitments to requirements and requirements changes

Subpractices

1. Assess the impact of requirements on existing commitments.

The impact on the project participants should be evaluated when the requirements change or at the start of a new requirement.

2. Negotiate and record commitments.

Changes to existing commitments should be negotiated before project participants commit to ~~the~~ new requirement or requirement change.

SP 1.3 Manage Requirements Changes

Manage changes to ~~the~~ requirements as they evolve during the project.

Refer to the Configuration Management process area for more information about ~~maintaining tracking and controlling the requirements baseline and on making the requirements and change data available to the project changes.~~

~~During the project, requirements~~ Requirements change for a variety of reasons (e.g., breaches of service levels). As needs change and as work proceeds, ~~additional requirements are derived and~~ changes may have to be made to ~~the~~ existing requirements. It is essential to manage these additions and changes efficiently and effectively. To effectively analyze the impact of ~~the~~ changes, it is necessary that the source of each requirement is known and the rationale for ~~any the~~ change is documented. The project ~~manager~~ may, however, want to track appropriate measures of requirements volatility to judge whether new or revised controls are necessary.

Typical Work Products

1. Requirements status
2. Requirements database
3. Requirements decision database

Subpractices

1. Document all requirements and requirements changes that are given to or generated by the project.
2. Maintain ~~the~~ requirements change history ~~with, including~~ the rationale for ~~the~~ changes.

Maintaining the change history helps to track requirements volatility.

3. Evaluate the impact of requirement changes from the standpoint of relevant stakeholders.
4. Make ~~the~~ requirements and change data available to the project.

SP 1.4 Maintain Bidirectional Traceability of Requirements

Maintain bidirectional traceability among ~~the~~ requirements and work products.

The intent of this specific practice is to maintain the bidirectional traceability of requirements for each level of product decomposition. (See the definition of “bidirectional traceability” in the glossary.) When ~~the~~ requirements are managed well, traceability can be established from ~~the a~~ source requirement to its lower level requirements and from ~~the those~~ lower level requirements back to their source requirements. Such bidirectional traceability helps to determine ~~that whether~~ all source requirements have been completely addressed and ~~that whether~~ all lower level requirements can be traced to a valid source.

Requirements traceability can also cover ~~the~~ relationships to other entities such as intermediate and final work products, changes in design documentation, and test plans. ~~The traceability~~ Traceability can cover horizontal relationships, such as across interfaces, as well as vertical relationships. Traceability is particularly needed in conducting when assessing the impact assessment of requirements changes on ~~the project's project~~ activities and work products.

In a service environment, you should be able to trace stakeholder requirements to the elements of the delivered service and supporting service system that were developed from those requirements or other requirements derived from stakeholder requirements. Conversely, elements of the delivered service and supporting service system should be traceable back to the stakeholder requirements they meet.

Such bidirectional traceability is not always automated. It can be done manually using spreadsheets, databases, and other common tools.

Examples of what aspects of traceability to consider include the following:

- Scope of traceability: The boundaries within which traceability is needed
- Definition of traceability of service: The service elements that need logical relationships
- Type of traceability: When horizontal and vertical traceability is needed
- Integrated service environment: The scope of traceability applied in an organization in which tangible products or product elements are integral elements of services and services are the primary focus of the organization

Typical Work Products

1. Requirements traceability matrix
2. Requirements tracking system

Subpractices

1. Maintain requirements traceability to ensure that the source of lower level (i.e., derived) requirements is documented.
2. Maintain requirements traceability from a requirement to its derived requirements and allocation to functions, interfaces, objects, people, processes, and work products.
3. Generate ~~the a~~ requirements traceability matrix.

A traceability matrix might have the list of stakeholder requirements and derived requirements on one axis. The other axis might list all of the components of the service system, including people and consumables. The intersections of the rows and columns would indicate where a particular requirement applies to the parts of the service system.

SP 1.5 Identify Inconsistencies Between Project Work and Requirements

Identify inconsistencies between the project plans and work products and the requirements.

Refer to the Project Monitoring and Control process area for more information about monitoring ~~and controlling~~ the project ~~plans and work products for consistency with requirements and taking corrective actions when necessary against the plan.~~

This specific practice finds ~~the~~ inconsistencies between ~~the~~ requirements and ~~the~~ project plans and work products and initiates ~~the~~ corrective ~~action actions~~ to ~~fix resolve~~ them.

Typical Work Products

1. Documentation of inconsistencies between requirements and project plans and work products, including sources, and conditions, and rationale
2. Corrective actions

Subpractices

1. Review ~~the project's project~~ plans, activities, and work products for consistency with ~~the~~ requirements and ~~the~~ changes made to them.
2. Identify the source of the inconsistency ~~and the rationale.~~
3. Identify changes that need to must be made to ~~the~~ plans and work products resulting from changes to the requirements baseline.
4. Initiate corrective actions.

Generic Practices by Goal

Continuous Only

GG 1 — Achieve Specific Goals

The process supports and enables achievement of the specific goals of the process area by transforming identifiable input work products to produce identifiable output work products.

GP 1.1 — Perform Specific Practices

Perform the specific practices of the requirements management process to develop work products and provide services to achieve the specific goals of the process area.

Continuous Only

GG 2 Institutionalize a Managed Process

The process is institutionalized as a managed process.

GP 2.1 Establish an Organizational Policy

Establish and maintain an organizational policy for planning and performing the requirements management process.

Elaboration:

This policy establishes organizational expectations for managing requirements and identifying inconsistencies between the requirements and the project plans and work products.

GP 2.2 Plan the Process

Establish and maintain the plan for performing the requirements management process.

Elaboration:

This plan for performing the requirements management process can be part of (or referenced by) the project plan as described in the Project Planning process area.

GP 2.3 Provide Resources

Provide adequate resources for performing the requirements management process, developing the work products, and providing the services of the process.

Elaboration:

Examples of resources provided include the following tools:

- Requirements tracking tools
- Traceability tools

GP 2.4 Assign Responsibility

Assign responsibility and authority for performing the process, developing the work products, and providing the services of the requirements management process.

GP 2.5 Train People

Train the people performing or supporting the requirements management process as needed.

Elaboration:

Examples of training topics include the following:

- Application domain
- Requirements definition, analysis, review, and management
- Requirements management tools
- Configuration management
- Negotiation and conflict resolution

GP 2.6 — Manage Configurations

Place designated work products of the requirements management process under appropriate levels of control.

Elaboration:

Examples of work products placed under control include the following:

- Requirements
- Requirements traceability matrix

GP 2.7 — Identify and Involve Relevant Stakeholders

Identify and involve the relevant stakeholders of the requirements management process as planned.

Elaboration:

Select relevant stakeholders from customers, end users, developers, producers, testers, suppliers, marketers, maintainers, disposal personnel, and others who may be affected by, or may affect, the product as well as the process.

Examples of activities for stakeholder involvement include the following:

- Resolving issues on the understanding of the requirements
- Assessing the impact of requirements changes
- Communicating the bidirectional traceability
- Identifying inconsistencies among project plans, work products, and requirements

GP 2.8 — Monitor and Control the Process

Monitor and control the requirements management process against the plan for performing the process and take appropriate corrective action.

Elaboration:

Examples of measures and work products used in monitoring and controlling include the following:

- Requirements volatility (percentage of requirements changed)
- Schedule for coordination of requirements
- Schedule for analysis of a proposed requirements change

GP 2.9 — Objectively Evaluate Adherence

Objectively evaluate adherence of the requirements management process against its process description, standards, and procedures, and address noncompliance.

Elaboration:

Examples of activities reviewed include the following:

- Managing requirements
- Identifying inconsistencies among project plans, work products, and requirements

Examples of work products reviewed include the following:

- Requirements
- Requirements traceability matrix

GP 2.10 — Review Status with Higher Level Management

Review the activities, status, and results of the requirements management process with higher level management and resolve issues.

Elaboration:

Proposed changes to commitments to be made external to the organization are reviewed with higher level management to ensure that all commitments can be accomplished.

Staged-Only

GG3 and its practices do not apply for a maturity level 2 rating, but do apply for a maturity level 3 rating and above.

Continuous/Maturity Levels 3 – 5 Only

GG 3 — Institutionalize a Defined Process

The process is institutionalized as a defined process.

GP 3.1 — Establish a Defined Process

Establish and maintain the description of a defined requirements management process.

GP 3.2 — Collect Improvement Information

Collect work products, measures, measurement results, and improvement information derived from planning and performing the requirements management process to support the future use and improvement of the organization's processes and process assets.

Elaboration:

Examples of work products, measures, measurement results, and improvement information include the following:

- Requirements traceability matrix
- Number of unfunded requirements changes after baselining
- Lessons learned in resolving ambiguous requirements

Continuous Only

GG 4 — Institutionalize a Quantitatively Managed Process

The process is institutionalized as a quantitatively managed process.

GP 4.1 — Establish Quantitative Objectives for the Process

Establish and maintain quantitative objectives for the requirements management process, which address quality and process performance, based on customer needs and business objectives.

GP 4.2 — Stabilize Subprocess Performance

Stabilize the performance of one or more subprocesses to determine the ability of the requirements management process to achieve the established quantitative quality and process performance objectives.

Continuous-Only

GG 5 — Institutionalize an Optimizing Process

The process is institutionalized as an optimizing process.

GP 5.1 — Ensure Continuous Process Improvement

Ensure continuous improvement of the requirements management process in fulfilling the relevant business objectives of the organization.

GP 5.2 — Correct Root Causes of Problems

Identify and correct the root causes of defects and other problems in the requirements management process.

readlines