

Project Management Planning

Top-Level Requirements Specification

Initial Release	1.0
Date:	January 1997

Importance of Project Requirements

Requirements definition is one of the most crucial steps in the process of creating a project. Without well-defined requirements, managers cannot plan a project, developers and integrators do not know what to build, customers do not know what to expect, and there is no way to validate that the system as built satisfies the needs of the organization.

What is a Requirements Process?

The disciplined application of proven methods and tools to describe a proposed systems intended behavior and its associate constraints.

When are Requirements Defined?

System requirements evolve over time. At each stage of the project, additional information is derived and documented. At the onset of the concept phase, for instance, basic business needs are expressed and documented. Over time, these needs are refined and developed into functional user requirements and are later developed into detailed technical specifications.

During project planning, technical requirements must be understood in enough detail to develop project budgets and define resources needed to implement the solution. Requirements are reviewed, the project team strives to understand the requirements, and the requirements are refined further, if necessary.

A project team should never commit to the project activities list, schedule, or budget to build something unless it is well defined. If requirements will be defined in later stages of a development effort, the final, detailed project plan can only cover that portion of the project where the requirements are defined. Initial planning can occur for later phases, but a plan cannot be finalized until the requirements for the system are clear.

At project startup, requirements are reviewed to ensure that they are clear and that the development team has a full understanding of the requirements. Areas where additional definition is required are noted and logged as action items.

During the design phase, detailed design specifications are developed based upon the functional requirements and the defined scope of the project. These detailed specifications are used to define the specific technical approach and implementation that will be used to fulfill system requirements.

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Requirements Specifications

The requirements specifications involve many layers of specification, but starts with a Business Needs Identification Statement. This is a very high level document that describes the top level needs that the system must meet. The statements are high level and may be met by a combination of automated and manual processes. For example, a Business Needs Requirement might be: "The system must support timely payment of invoices."

A functional specification describes the hardware and software requirements needed to perform defined functions. It is based upon the Business Needs Statement and further defines those business needs into technical requirements. The functional requirements express more specifically how business needs might be met. For example: "Invoices must be created weekly based on input received from the order processing system."

The functional specification defines requirements in terms of inputs, outputs, and behavior of the system. External interfaces are also defined. Non-functional requirements and constraints, such as performance, portability, standards compliance, and reliability are also defined in a system specification.

Who Defines Requirements?

Requirements definition is a difficult task. People often have difficulty expressing needs without immediately attempting to define the solution. It is also difficult to conceptualize how new automation will affect a task that is currently being done manually or with older technology.

Requirements definition is also a communication intensive process, and, unfortunately, engineers and users have different vocabularies, backgrounds, and preferences. This makes the specification process difficult.

To successfully define the requirements of a system, the requirements process includes, and is focused on, the intended users. There are various techniques that can be used to derive the requirements, including interviewing users, observing users conducting their tasks, and holding Joint Application Design (JAD) sessions, where users and analysts interactively explore requirements in a directed session.

For more complex systems and for projects with requirement definition issues, prototyping of user screens and reports can help facilitate the communication process. With a prototype, users can see samples of how the system will operate, and the developers can provide detailed information that the user group can comprehend.

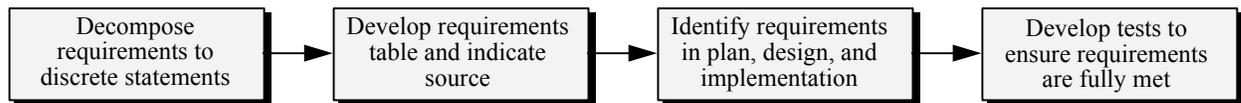
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Requirements Traceability

The state organization will define processes for requirements traceability. The requirements traceability process ensures that the requirements defined in the functional specification are carried through the planning, execution, and testing phases. The traceability process involves the following steps:



Requirements traceability is facilitated by decomposing requirements from a document format to a list or table format. Often requirements that are not decomposed result in some ambiguities, such as:

- Multiple requirements may be embedded in a single sentence.
- Compound conditions to requirements may exist in a single sentence (such as, and/or conditions).
- Requirements may not be testable as written.
- Requirements may be inconsistent.

By placing each requirement as an individual statement that can be tracked and accounted for, the project team can ensure that stated needs of the system can be traced. The first traceability occurs when the WBS is completed. Each requirement is reviewed to ensure that there is a task defined for fulfilling that requirement. Allocation of requirements to the WBS helps define the WBS element and indicates the scope of work covered by the item. This definition allows for a more careful estimate of schedule, budget, and resources in the planning phase.

A sample requirements traceability table is shown below:

Required ID	Requirement	Prop Ref	WBS Ref	Spec Ref	Comments
HLP_0010	The system shall incorporate a well defined help function	2.2.10 2.4.2	S01230	SSS 3.2.6.4	
UI_0010	Function key macros and /or other shortcut techniques shall be provided for "power users"	2.2.10	S01230.1	SSS 3.2.6.4	What other techniques should be considered
SEC_0010	The system shall require each user to sign on to the system with a password	2.2.10 2.4.2	S01230	SSS 3.2.6.1	

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Numbering each requirement with a unique identifier further facilitates reference to the requirement for the purposes of contract, engineering, quality assurance, and project management. Quantifying non-testable requirements by adding clarification verbiage and assumptions facilitates the project over its life cycle.

Where appropriate, columns can also be added that assign the requirement to a category for sorting. Also, as the project progresses, there can be references to the test plans and procedures, and a compliance field can be entered to define which requirements have been fulfilled and tested.

This requirements analysis process allows specific requirements to be uniquely identified and serves as a common method between developers, customers, and the project management team. It facilitates general communication, traceability, and provides a method for controlling requirements changes.

Approvals

Requirements documents are approved by the project team, the users, and the state organization management. Specifications are baselined at the start of the project. Detailed specifications developed in the project execution phase are baselined at approval.

Managing Requirements Changes

A change control process is developed to ensure that the scope of a project does not change uncontrollably as discussed in *Configuration Management*.

References:

The requirements traceability form is included in the Project Plan, as defined in Template Form: PM 01.