

REQUIREMENT MANAGEMENT

Requirement Management

- The process of **managing change to the requirements** for a system
- Requirements need to be elicited, analyzed, negotiated, specified, validated, tracked, and changed/updated during the life of a project.
- All of this has to take place **within a controlled environment** so that each requirement can be traced back to a specific need and also traced to a function/feature/piece of code in the system being developed.
- ***Requirements Management**" is the control framework that governs this process "*

Requirement Management

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- Requirement Management process must ensure that:
 - Negotiations between the stakeholders and project team are facilitated.
 - All requirements are fully negotiated, defined & prioritized b/n the stakeholders.
 - A coherent and complete requirements document is issued, agreed upon and kept up to date during the lifecycle of the project.
 - Commitment to the requirements is given by all stakeholders.
 - Any changes to requirements during the project lifecycle are reviewed, verified, negotiated, approved and implemented.
 - All changes are fully tracked and traceable.
 - All requirements are mapped to test cases; source code; design. This traceability is bidirectional.

Requirements Management Tools

- A **requirements management tool** is a software system that helps you manage the various manually intensive tasks in the requirements development and requirements management processes.
- Good requirements management tools (RM Tools) can help your team to save time and increase their productivity among other benefits.

When to Use Requirements Management Tools

- Based on ***Number of Requirements:***
 - Small projects with less than 200 requirements can be usually managed using spreadsheets, wikis or simple databases
 - Medium-sized projects with 200-2000 requirements usually need to look for a commercial tool
 - Large projects with over 2000 requirements necessitate the use of robust commercial requirements management tools

When to Use Requirements Management Tools

- Based on ***Size of Project Team:***
 - For projects with less than 5 personnel all of whom are co-located, a commercial requirements management tool is often not needed.
 - Larger teams, especially teams distributed across multiple cities or even countries, can often benefit immensely from using good requirements management tools.

Types of Requirements Management Tools

- **Heavyweight Requirements Management Tools**
 - IBM Rational RequisitePro
- **Middleweight Requirement Management Tools**
 - Accompa Requirements Management Tool
- **Lightweight Requirement Management Tools**
 - Spread Sheets

Requirements management tool support

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- A database system for storing requirements.
- Document analysis and generation facilities to help construct a requirements database and to help create requirements documents.
- **Change management facilities** which help ensure that changes are properly assessed and costed.
- Traceability facilities which help requirements engineers find dependencies between system requirements.

Stable and volatile requirements

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- **Requirements changes** occur while the requirements are being elicited, analysed & validated and after the system has gone into service
- Some requirements are usually more subject to change than others
 - **Stable requirements** are concerned with the essence/core of a system and its application domain.
E.g. hospital will always have Dr.
 - They change more slowly than volatile requirements

Requirements identification

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- It is essential for requirements management that **every requirement should have a unique identification**
- The most common approach is requirements numbering based on **chapter/section** in the requirements document
- Problems with this are:
 - Numbers cannot be unambiguously assigned until the document is complete
 - Assigning chapter/section numbers is an **implicit classification** of the requirement. This can mislead readers of the document into thinking that the most important relationships are with requirements in the same section.

Requirements identification techniques

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□ Dynamic renumbering

- Some word processing systems allow for automatic renumbering of paragraphs and the inclusion of cross-references.
- As you re-organise your document and add new requirements, the system keeps track of the cross-reference and automatically renumbers your requirement depending on its chapter, section and position within the section

Requirements identification techniques

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□ Database record identification

- When a requirement is identified it is entered in a requirements database and a **database record identifier is assigned**.
- This database identifier is used in all subsequent references to the requirement

□ Symbolic identification

- Requirements can be identified by giving them a symbolic name which is associated with the requirement itself.
- For example, EFF-1, EFF-2, EFF-3 may be used for requirements which relate to system efficiency

Storing requirements

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- Requirements have to be stored in such a way that they can be accessed easily and related to other system requirements
- Possible storage techniques are
 - In one or more word processor files - requirements are stored in the requirements document
 - In a specially designed requirements database

Word processor documents

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□ Advantages

- Requirements are all stored in the same place
- Requirements may be accessed by anyone with the right word processor
- It is easy to produce the final requirements document

□ Disadvantages

- Requirements dependencies must be externally maintained
- Search facilities are limited
- Not possible to link requirements with proposed requirements changes
- Not possible to have version control on individual requirements
- No automated navigation from one requirement to another

Requirements database

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- Each requirement is represented as one or more database entities
- Database query language is used to access requirements
- Advantages
 - Good query and navigation facilities
 - Support for change and version management
- Disadvantages
 - Readers may not have the software/skills to access the requirements database
 - The link between the database and the requirements document must be maintained

Requirements DB - choice factors

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- The statement of requirements
 - If there is a need to store more than just simple text, a database with multimedia capabilities may have to be used.
- The number of requirements
 - Larger systems usually need a database which is designed to manage a very large volume of data running on a specialised database server.
- Teamwork, team distribution and computer support
 - If the requirements are developed by a distributed team of people, perhaps from different organisations, you need a database which provides for remote, multi-site access.

What is a Change Management Process

- A Change Management Process is a method by which changes to the project (e.g. to the scope, deliverables, timescales or resources) are formally defined, evaluated and approved prior to implementation
- The process entails **completing a variety of control procedures** to ensure that, if implemented, the change will cause minimal impact to the objectives of the project.

What is a Change Management Process

- A Change Management Process is **used to ensure that every change identified** is formally:
 - Communicated
 - Documented
 - Reviewed
 - Approved
 - Implemented

When to use a Change Management Process

- Any change to the project during the Execution phase will need to be formally managed as part of the Change Management Process.
- Without a formal Change Management Process in place, the objective of delivering a solution within 'time, cost and quality' may be compromised.
- The Change Management Process is terminated only when the Execution phase of the project is completed (i.e. just prior to Project Closure).

Identify and Submit Change Request

- This process provides the ability for **any member of the project team to submit a request for a change to the project.**
- The Change Requester:
 - **Identifies a requirement for change** to any aspect of the project (e.g. scope, deliverables, timescales and organization) ©
 - **Completes a Change Request Form (CRF)** and distributes the form to the Project Manager.

Identify and Submit Change Request

- The CRF summarizes the change:
 - Description
 - Reasons
 - Benefits
 - Costs
 - Impacts
 - Any supporting documentation
 - Approvals

Review Change Request

- The **Project Manager** reviews the CRF & determines whether or not additional information is required for the **Change Control Board** to assess the full impact of the change to the project time, scope and cost.
- The decision will be based on factors, such as:
 - Number of change options presented
 - Feasibility and benefits of the change
 - Complexity and/or difficulty of the change options requested
 - Scale of the change solutions proposed.
- The Project Manager will record the **CRF details** in the **Change Log** to track the status of the change request.

Approve Change Request

- The Project Manager will forward the **Change Request From** and any supporting documentation to the **Change Control Board (CCB)** for review and final approval.
- The CCB will determine the **feasibility** of this change by examining factors, such as:
 - Risk to the project in implementing the change
 - Risk to the project in NOT implementing the change
 - Impact on the project in implementing the change (time, resources, finance, quality).

Approve Change Request

- After a formal review, the CCB may:
 - Reject the change
 - Request more information related to the change
 - Approve the change as requested
 - Approve the change subject to specified conditions.

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Implement and Close Change Request

- If the **change is approved**, the following will occur:
 - An implementation date of the change will be identified
 - A test of the change will be scheduled and performed
 - The change will be implemented
 - The implementation of the change will be reviewed and deemed successful or corrective actions taken
 - The success of the change implementation will be communicated to all parties
 - The change request will be closed on the Change Log

Change Management Documents

□ **Change Request Form**

- The 'Change Request Form' is used to **identify and describe a proposed change to the project.**

□ **Change Log**

- The 'Change Log' is the log where all requests for **changes are registered and tracked through to resolution.**

Traceability

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- Traceability information is information which helps you assess the impact of requirements change.
- It links related requirements and other system representations.

Traceability tables

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- Traceability tables show the relationships between requirements or between requirements and design components
- Requirements are listed along the horizontal and vertical axes and relationships between requirements are marked in the table cells
- Traceability tables for showing requirements dependencies should be defined with requirement numbers used to label the rows and columns of the table

A traceability table

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Depends-on

	R1	R2	R3	R4	R5	R6
R1			*	*		
R2					*	*
R3				*	*	
R4		*				
R5						*
R6						

Traceability list

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- If a relatively small number of requirements have to be managed (up to 250, say), traceability tables can be implemented using a spreadsheet
- Traceability lists are simple lists of relationships which can be implemented as text or as simple tables

Requirement	Depends-on
R1	R3, R4
R2	R5, R6
R3	R4, R5
R4	R2
R5	R6



The End