# Software Testing Methodologies

## Requirements Traceability Matrix (RTM)

# What is Traceability Matrix?

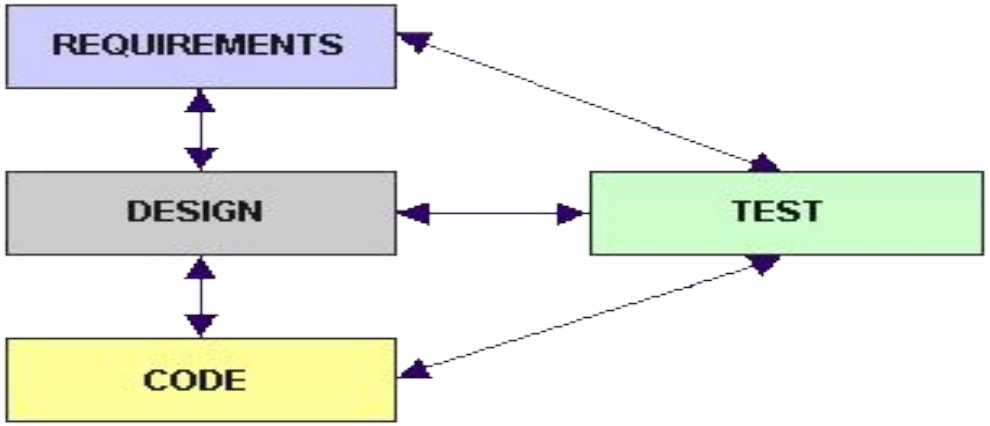
A Traceability Matrix is a means to trace requirements back and forth between the various activities and stages in the project lifecycle

**Forward Requirements Traceability:**

- To trace how a requirement will be tested or implemented

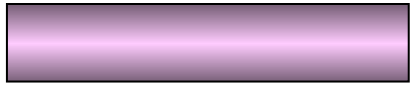
**Backward Requirements Traceability:**

- To trace the origin of Design/Code/Testing activity to its requirement

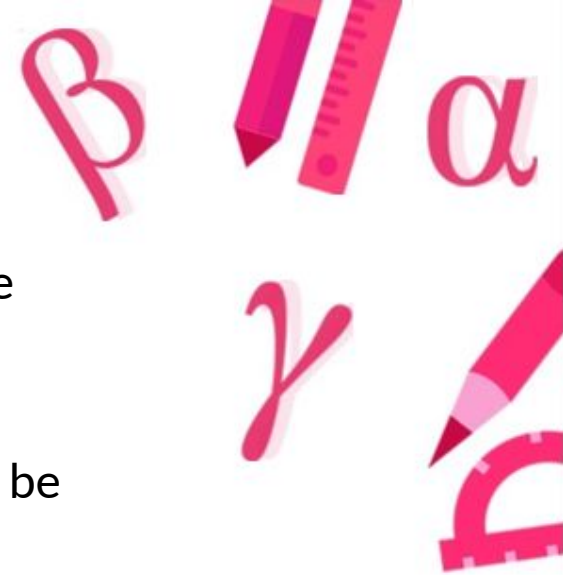


# When is Traceability Matrix Created/Updated?

- Traceability Matrix is Created at the end of Business Study Phase, when requirements are frozen.
- Traceability Matrix is Updated when Design Documents, Coding, Test Plans are completed.

| | | |
|---|---|---|
| Business Study Phase |  | Created |
| Design Phase |  | Updated |
| Build Phase |  | Updated |
| Testing Phase |  | Updated |
| Implementation Phase |  | Updated |

# How is Traceability Matrix Created?



- A Traceability Matrix is created by associating requirements with the deliverables that satisfy them.
- To Create a Requirements Traceability Matrix, the requirements can be taken as listed in the Requirements Specification document. If some requirements are at a very high level, then they should be broken down into more meaningful requirements.
- The Traceability Matrix requires unique identifiers for each requirement and deliverable.
- The relationship of requirements to solution can be one-to-one, one-to-many, many-to-one, or many-to-many.
- In a typical project, Business Analyst will create the Traceability Matrix and it will be updated by the Technical Analyst, Design Lead, Programmers etc. at different stages.

# Traceability Matrix Benefits

- Using a Traceability matrix will help to ensure completeness.
- All lower level deliverables (HLD, LLD etc.) come from higher level requirements (SRS).
- All higher level requirements are allocated to lower level deliverables.
- When software changes occur, the Traceability Matrix makes it relatively easy to evaluate the impact the changes may have on other parts of the development process.
- By maintaining the traceability matrix during the project lifecycle any gaps between requirements and lower level deliverables can be easily identified.

# Traceability Matrix Benefits Contd..

- The Traceability Matrix can be used to Check the coverage of Testing.
- Whenever a design or test phase is completed, a verification exercise should be conducted to ensure that all requirements have been considered; traceability to HLD and LLD documents enables this task to be done efficiently.
- The Traceability Matrix give the project team confidence that all the requirements are being delivered.
- By updating the Traceability Matrix at different stages of a project, any inconsistencies between SRS and Lower Level Deliverables like HLD/LLD will be highlighted and hence Design Document quality will improve.

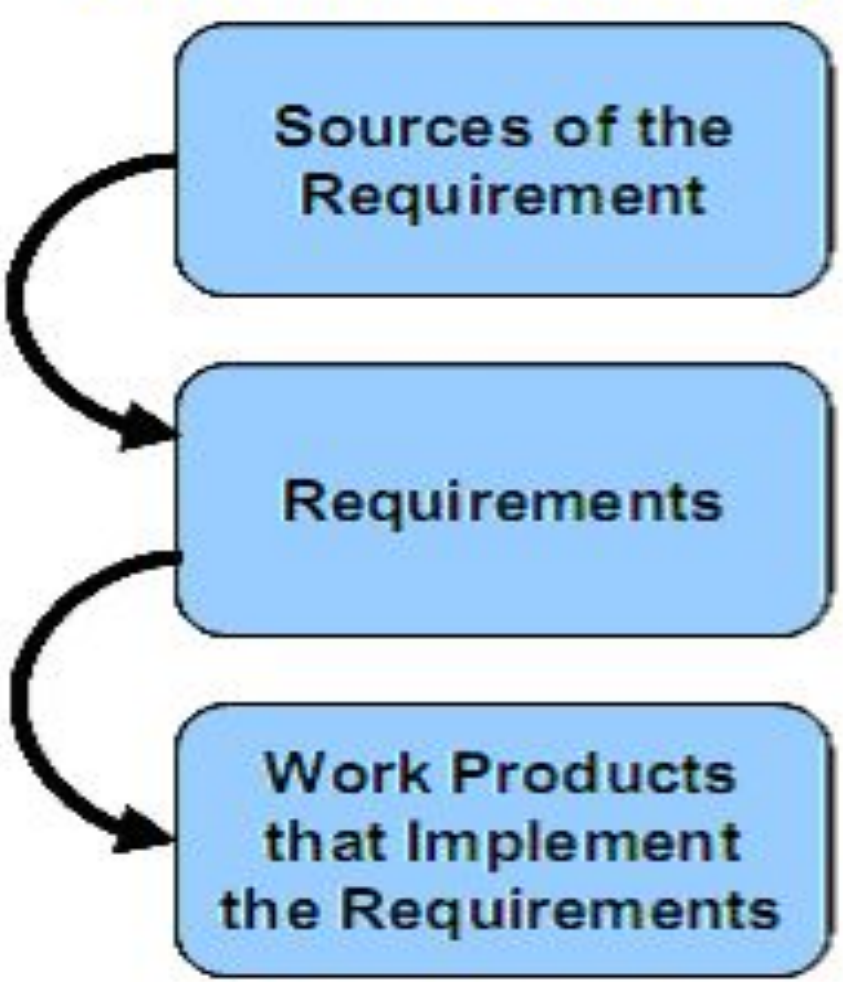
# Requirement Traceability Matrix (RTM)

**Traceability matrix structure:**

- Requirement are associated with the scenarios which in turn associated with test cases.

- Tests are associated with the scenarios which in turn associated with requirements.

# Forward Traceability



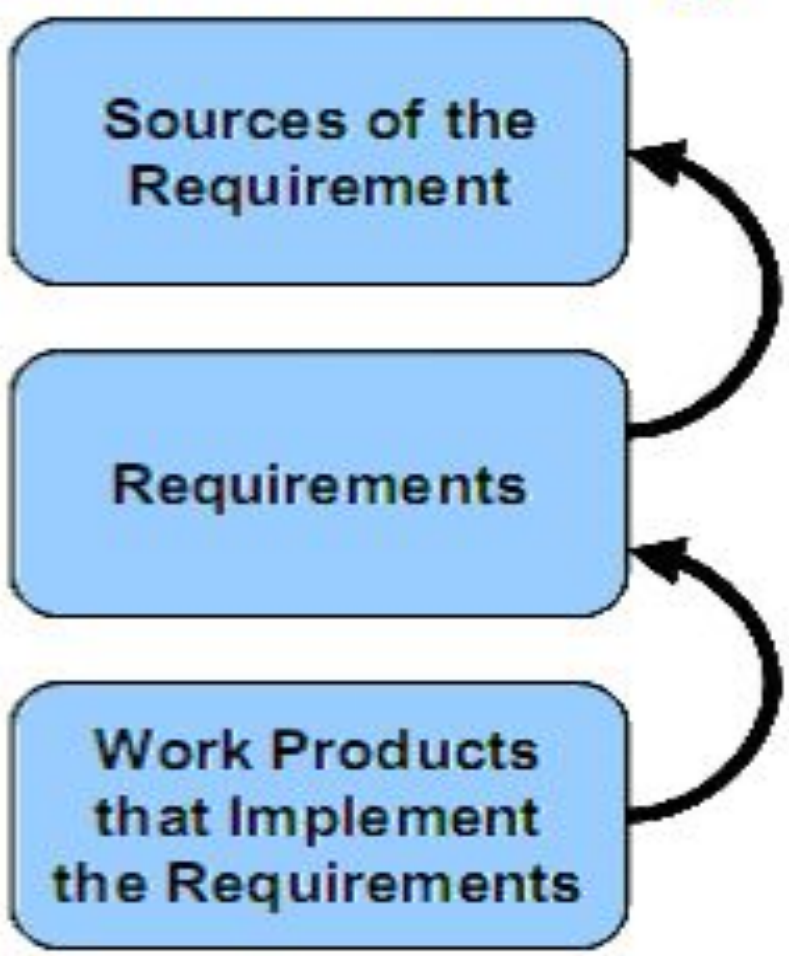
# Types of Requirement Traceability Matrix (RTM)

**Forward Traceability:**

- Tracing the requirements sources to their final product requirement(s) to ensure the completeness of the product requirement specification.

- Tracing each unique product requirement forward into the design that implements that requirement, the code that implements that design and the tests that validate that requirement and so on.

# Backward Traceability



# Types of Requirement Traceability Matrix (RTM)

**Backward Traceability:**

- Tracing each requirement back to its source(s).

- Tracing each unique work product (e.g., design element, object/class, code unit, test) back to its associated requirement.

# Example of Types of RTM

**Example of Forward & Backward Traceability Matrix:**

**Forward Traceability Matrix**

| ID | USER REQUIREMENTS | FORWARD TRACEABILITY |
|---|---|---|
| U2 | Users shall process retirement claims. | S10, S11, S12 |
| U3 | Users shall process survivor claims. | S13 |

**Backward Traceability Matrix**

| ID | FUNCTIONAL REQUIREMENTS | BACKWARD TRACEABILITY |
|---|---|---|
| S10 | The system shall accept requirement data. | U2 |
| S11 | The system shall calculate the amount of retirement. | U2 |
| S12 | The system shall calculate point-to-point travel time. | U2 |
| S13 | The system shall calculate the amount of survivor annuity | U3 |

The example shows forward and backward tracing between user and system requirements. User requirement identifiers begin with "U" and system requirements with "S"

# Contents of RTM

**Contents of Requirement Traceability Matrix:**

- Project ID
- Prepared By
- Total Requirement #
- New Requirement #
- Project Name
- Creation date
- Total Scenarios #
- Modified Requirements #
- Requirement Owner Name
- Modification Date
- Total Test Case #
- Deleted Requirement #

# Contents Of RTM Contd…

**Contents of Requirement Traceability Matrix:**

- Sr.No.
- Requirement ID
- Requirement Description
- Requirement Priority
- Test Scenario ID
- Test Case ID
- Requirement Type
- Request Status
- Module Name
- Sub Module Name
- Baseline Document
- Remarks


# Thankyou!