

truy xuất nguồn gốc

Requirement Traceability Matrix



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Why Requirement Traceability Matrix?



Discussion Point

- Why we need to learn Requirement Traceability Matrix?



Instructions & Duration

- The participants will discuss and understand, about Requirement Traceability Matrix and types of Requirement Traceability Matrix



10 Mins

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Agenda

- Meaning of Requirements Traceability
- Forward Traceability and Backward Traceability
- Requirements Traceability and Test Case Mapping
- Deciding on Test Coverage

Requirement Traceability Matrix

Requirement Traceability Matrix

- A requirements traceability matrix is a document that demonstrates the relationship between requirements and other artifacts

Forward Traceability

- Forward traceability ensures proper direction of the evolving product and indicates the completeness of the subsequent implementation.

Backward Traceability

- Backwards traceability helps ensure that the evolving product remains on the correct track with regards to the original and/or evolving requirements.

Bi-Directional Traceability

- Bi-Directional Traceability contains both Forward & Backward Traceability.

Benefits & Disadvantages

- Explains the advantages and disadvantages of RTM

Sample Traceability Matrix

- Sample traceability matrix and template is given for understanding purpose.

Requirement Traceability Matrix

Requirement
Traceability
Matrix

Forward
Traceability

Backward
Traceability

Bi-
Directional
Traceability

Benefits &
Disadvanta
ges

Sample
Traceabilit
y Matrix

Requirements traceability identifies and documents the lineage of each requirement, including its backward traceability (derivation), its forward traceability (allocation) and its relationship to other requirements. Traceability is used to help ensure solution conformance to requirements and to assist in scope and change management, risk management, time management, cost management, and communication management. It is also used to detect missing functionality or to identify if implemented functionality is not supported by a specific requirement.

dòng dõi

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Requirement Traceability Matrix

Requirement
Traceability
Matrix

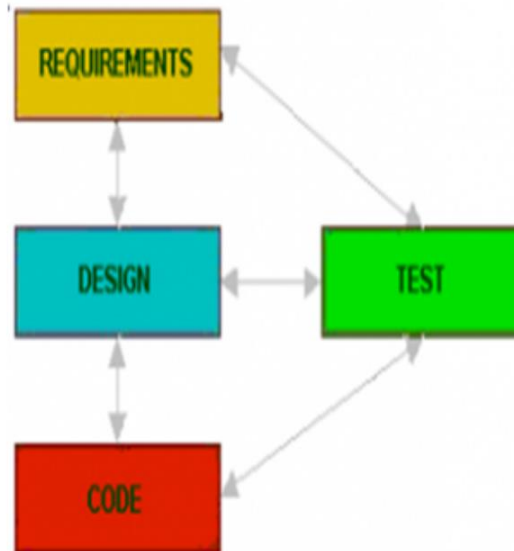
Forward
Traceability

Backward
Traceability

Bi-
Directional
Traceability

Benefits &
Disadvanta
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Sample
Traceabilit
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Forward & Backward Traceability

Requirement
Traceability
Matrix

Forward
Traceability

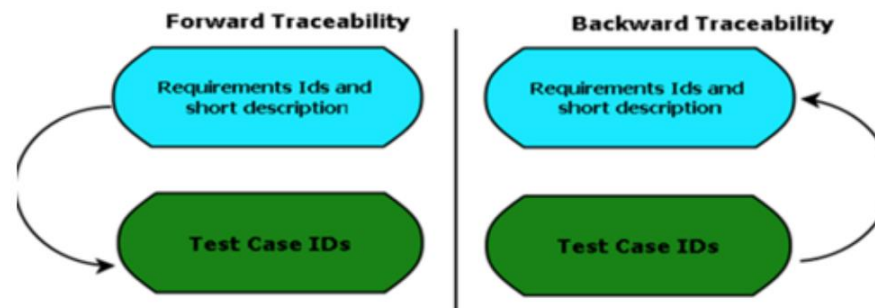
Backward
Traceability

Bi-
Directional
Traceability

Benefits &
Disadvanta
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Sample
Traceabilit
y Matrix

- Types of Traceability Matrix:
- Forward Traceability – Mapping of Requirements to Test cases
- Backward Traceability – Mapping of Test Cases to Requirements



Forward Traceability

Requirement
Traceability
Matrix

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Benefits &
Disadvanta
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Sample
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- Forward traceability ensures proper direction of the evolving product and indicates the completeness of the subsequent implementation. For example, if a business rule can't be traced forward to one or more business processes (use cases) then the product requirements specification is incomplete and the resulting product may not meet the needs of the business.
- If a use case cannot be traced forward to its associated architectural design elements, then the architectural design is not complete and so on.
- If, on the other hand, there are changes in the business environment (e.g., a business rule change or a standard change), and good forward traceability has been maintained, that change can be traced forward to the associated requirements and all of the work products that are impacted by that change.

Forward Traceability

Requirement
Traceability
Matrix

Forward
Traceability

Backward
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Bi-
Directional
Traceability

Benefits &
Disadvanta
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Sample
Traceabilit
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- This greatly reduces the amount of effort required to do a thorough job of impact analysis. It also reduces the risk that one of the affected work products is forgotten, resulting in an incomplete implementation of the change.

Backward Traceability

Requirement
Traceability
Matrix

Forward
Traceability

Backward
Traceability

Bi-
Directional
Traceability

Benefits &
Disadvanta
ges

Sample
Traceabilit
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- Backwards traceability helps ensure that the evolving product remains on the correct track with regards to the original and/or evolving requirements. The objective is to ensure that we are not expanding the scope of the project by adding design elements, code, tests or other work products that are not specified in the requirements.
- If there is a change needed in the implementation or if the developers come up with a creative, new technical solution, the change/solution should be traced backwards to the requirements and the business needs to ensure that it is within the scope of the desired product. For example, if there is a work product element that doesn't trace backwards to the product requirements, there may be a possibility that there is a missing requirement because the work product element really is needed.

Backward Traceability

Requirement
Traceability
Matrix

Forward
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Bi-
Directional
Traceability

Benefits &
Disadvanta
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Sample
Traceabilit
y Matrix

- The second possibility is that something has been added to the functionality that should not be part of the product.
- Another benefit of backward traceability comes when a defect is identified. One has to question if it is just a code defect or does it trace back to a defect in the design or requirements? If it's a design or requirements defect, what other work products might be impacted by the defect?

Bi-Directional Traceability

Requirement
Traceability
Matrix

Bi-Directional Traceability contains both Forward & Backward Traceability. Through Backward Traceability Matrix, we can see that test cases are mapped with which requirements.

Forward
Traceability

This will help us in identifying if there are **test cases that do not trace to any coverage item**— in which case the test case is **not required** and should be removed (or maybe a specification like a requirement or two should be added!). This “backward” Traceability is also very helpful if you want to identify that a particular test case is covering how many requirements?

Backward
Traceability


Bi-
Directional
Traceability

Benefits &
Disadvantages

Through Forward Traceability – we can check that requirements are covered in which test cases? Whether the requirements are covered in the test cases or not?

Sample
Traceability
Matrix

Forward Traceability Matrix ensures – We are building the Right Product.
Backward Traceability Matrix ensures – We are Building the Product Right.



Traceability matrix is the answer of the following questions of any Software Project:

**Requirement
Traceability
Matrix**

**Forward
Traceability**

**Backward
Traceability**

**Bi-
Directional
Traceability**

**Benefits &
Disadvanta
ges**

**Sample
Traceabilit
y Matrix**

- How is it feasible to ensure, for each phase of the SDLC, that I have correctly accounted for all the customer's needs?
- How can I certify that the final software product meets the customer's needs? Now we can only make sure requirements are captured in the test cases by traceability matrix.

Benefits of using Traceability Matrix

Requirement
Traceability
Matrix

- Make obvious to the client that the software is being developed as per the requirements.

Forward
Traceability

- To make sure that all requirements included in the test cases

Backward
Traceability

- To make sure that developers are not creating features that no one has requested

Bi-
Directional
Traceability

- Easy to identify the missing functionalities.
- If there is a change request for a requirement, then we can easily find out which test cases need to update.

Benefits &
Disadvantages

- The completed system may have “Extra” functionality that may have not been specified in the design specification, resulting in wastage of manpower, time and effort.

Sample
Traceability
Matrix

Disadvantages of not using Traceability Matrix

Requirement
Traceability
Matrix

Forward
Traceability

Backward
Traceability

Bi-
Directional
Traceability

Benefits &
Disadvanta
ges

Sample
Traceabilit
y Matrix

No traceability or Incomplete Traceability Results into:

1. Poor or unknown test coverage, more defects found in production
2. It will lead to miss some bugs in earlier test cycles which may arise in later test cycles. Then a lot of discussions arguments with other teams and managers before release.
3. Difficult project planning and tracking, misunderstandings between different teams over project dependencies, delays, etc

Sample Traceability Matrix describing the relationships between Development

Requirement Traceability Matrix

Forward Traceability

Backward Traceability

Bi-Directional Traceability

Benefits & Disadvantages

Sample Traceability Matrix

| Process | Use Case | Business Rules | Design Specification | Source Code Files | Test Cases |
|-------------------------------------|----------------------------------|----------------------------|---|--------------------|---|
| Foreign Exchange Rates Load Process | Load FX Rates FX FS1.1.1 | BR001, BR005, BR011, BR024 | FX Rates Load Design Specifications section DS2.1 | FXReuters.PRG | Test Case No.: 1.1.1 to 1.1.10 (Reference: FXRate_Load Tests.Doc) |
| Foreign Exchange Trade Input | Input FX Trade FS2.1.1 | BR004 | FX Trade Input Design Specifications DS2.2 | FXTradeInput.PRG | Test Case No.: 2.1.1 to 2.1.10 (Reference: FXTrade_Input Tests.Doc) |
| Foreign Exchange Trade Confirmation | Confirm FX Trade FS3.1.1 | BR003, BR007 | FX Trade Input Design Specifications DS3.2 | FXTradeConfirm.PRG | Test Case No.: 3.1.1 to 3.1.10 (Reference: FX_Confirmation Tests.Doc) |
| Foreign Exchange Trade Settlement | Settle FX Trade Input FS4.1.1 | BR002, BR003, BR019 | FX Trade Input Design Specifications DS2.2 | FXTradeSettle.PRG | Test Case No.: 4.1.1 to 4.1.10 (Reference: FX_Settlement Tests.Doc) |

Why is it necessary to use a traceability matrix?

Requirement
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Forward
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Benefits &
Disadvanta
ges

Sample
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y Matrix

- Tracking all the requirements outlined in the functional specification document and checking whether all the requirements have been met by the end product can be a cumbersome and a laborious process. Not surprisingly, many enterprise quality systems, such as CMMi, Six Sigma or ISO 9000, require organizations to have formal traceability procedures.
- Traceability Matrix is an industry-accepted format for tracking requirements. It provides a convenient format that helps to visually represent associations between user requirements for the system built and the work products (project artifacts) developed and implemented to verify those requirements.
- These work products include use cases, business rules, data and GUI requirements, design specifications, software code, test plans, test results and other artifacts of the systems development process.

Requirements Traceability Matrix ... Contd

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Matrix

Forward
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Directional
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Benefits &
Disadvanta
ges

Sample
Traceabilit
y Matrix

- ✓ Requirements Traceability Matrix Template Instructions:
- ✓ This document presents the requirements traceability matrix (RTM) for the Project Name [workspace/workgroup] and provides traceability between the [workspace/workgroup] approved requirements, design specifications, and test scripts.
- ✓ The table below displays the RTM for the requirements that were approved for inclusion in [Application Name/Version]. The following information is provided for each requirement:
 - ✓ 1. Requirement ID
 - ✓ 2. Risks
 - ✓ 3. Requirement Type (User or System)
 - ✓ 4. Requirement Description
 - ✓ 5. Trace to User Requirement/Trace From System Requirement
 - ✓ 6. Trace to Design Specification
 - ✓ 7. UT * Unit Test Cases
 - ✓ 8. IT * Integration Test Cases
 - ✓ 9. ST * System Test Cases
 - ✓ 10. UAT * User Acceptance Test Cases
 - ✓ 11. Trace to Test Script

Requirements Traceability Matrix ... Contd

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Directional
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Benefits &
Disadvanta
ges

Sample
Traceabilit
y Matrix

- ✓ The following is the sample Template of Requirements Traceability Matrix

| Req ID | Risks | Req Type | Req Description | Trace to User Requirement/Trace From System Requirement | Trace to Design Specification | UT | IT | ST | UAT | Trace to Test Script |
|--------|-------|----------|-----------------|---|-------------------------------|----|----|----|-----|----------------------|
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Requirements Traceability Matrix ... Contd

➤ *The following is the sample Template of Requirements Traceability Matrix.*

| Req ID | Risks | Req Type | Req Description | Trace to User Requirement/Trace From System Requirement | Trace to Design Specification | UT | IT | ST | UAT | Trace to Test Script |
|--------|-------|----------|-----------------|---|-------------------------------|----|----|----|-----|----------------------|
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Why Requirement Traceability Matrix?



Discussion Point

- What is Forward Traceability ?
- What is Backward Traceability?
- What is Bi Directional Traceability?



Instructions & Duration

- The participants will discuss and understand, about types of Requirement Traceability Matrix



10 Mins

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