Requirements
Verification and Validation

In4Mtx 113
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Agenda

- Definitions of V&V
- Why do we care?
- Verification Methods
- VCRMs
- Verification Techniques
  - Success Criteria
  - Early Verification Planning in the RE Process
- What Makes Requirements Verification Difficult
Definitions

• Verification:
  • The process of determining whether or not the products of a given phase of the software development cycle fulfill the requirements established during the previous phase.

• Validation:
  • The process of evaluating software at the end of the software development process to ensure compliance with software requirements.

These definitions are taken from: Verifying and validating software requirements and design specifications. Boehm, BW IEEE Software. Vol. 1, no. 1, pp. 75-88. 1984
Basically...

- Verification: "Am I building the product right?"
- Validation: "Am I building the right product?"
Why do we care?

Data/Models In

Requirements Database

Outputs

Directly Drives

Verifies
Remember this process?

Figure 5.1 – Requirements inspection, review, and consolidation

Your testers are key stakeholders
Verification Methods

- Industry accepted methods are:
  - Test
  - Analysis
  - Demonstration
  - Inspection
  - S

Any guesses to the “S” in T.A.D.I.S?
VCRM

- Verification Cross Reference Matrix

- Supplemental to the RD

- This will be required on any RD you’ll ever produce.
  - Guarantee it: 100%

- Can be combined with the Requirements Traceability Matrix
## Sample VCRM

<table>
<thead>
<tr>
<th>Req ID</th>
<th>Requirement</th>
<th>Verification Method</th>
<th>Allocation</th>
<th>Success Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The train doors shall remain closed during all operational activities.</td>
<td>D, T</td>
<td>Controller SW</td>
<td>Once ground speed &gt;= 1mph, train doors lock and remain closed.</td>
</tr>
<tr>
<td>2</td>
<td>The train doors shall open when the train is stopped.</td>
<td>D, T</td>
<td>Controller SW</td>
<td>Once ground speed = = 0mph, the train doors open.</td>
</tr>
</tbody>
</table>
| 3      | The train door activator sensor shall alert the front train deck when the train door is open. | T, I                | Sensor SW     | Test 1: Train Doors Open: Sensors shall detect position of train doors as open, and sends a notification to the front deck.  
Test 2: Train Doors Closed: Sensors detect position of train doors, and sends a notification to the front deck. Inspect front deck display panel for train doors status. |
Requirements Verification Techniques

Data/Models In

Requirements Database

- √ VCRM
- √ Success Criteria
- √ Tester Access
- √ RTM

Output VCRM

A

B

Basis for testing activities
Difficulties

- Remembering to think like a tester.

- Compliance:
  - Planning
  - Approach
  - Coordination of VCRM
    - Includes Peer Reviews