Traceability via Artificial Intelligence

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Agenda

• Introduction
• What is Traceability
• Status Quo
• NLP and Algorithms
• Trace Assist, Suspect Assist
• Questions
Bottom Line Up Front

- Current Traceability Matrices Are Excel or Requirements Tool Based
- Laborious, Time Consuming Effort
- Use of NLP and Advanced Algorithms
- Advanced User Interfaces
- Increase in Project/Program Fidelity
Traceability

- Defined by IEEE:
  1. The degree to which a relationship can be established between two or more products of the development process, especially in terms of parent child relationships.
  2. The discernable association among two or more logical entities such as requirements, system elements, verifications, and tasks.
It’s More Than Requirements

• The ability to describe and follow the life of a requirement in both a forwards and backwards directions throughout the life of the project.

• How high level requirements can be transformed into low level requirements.

• Traceability is more than just requirements.
  • Design Specifications
  • Test Cases
  • Verification and Validation
  • Measures
  • Characteristics
Status Quo

- Traceability Matrices
- Excel, CSV
- Requirements Tools (COTS)
NLP and Advanced Algorithms

Natural Language Processing

- Information engineering
- Interactions between human and computer languages
- How computers process large amounts of natural language data

Algorithms

- Unsupervised
- Semi-supervised learning
- Supervised learning
Trace Assist

- Traceability Matrix
  - Artificial Intelligence
  - Identify X and Y Axes
  - Define Relationship
  - Run Trace Assist
  - Review Descriptions
  - Make Relationships
Suspect Assist

- Traceability Matrix
- Artificial Intelligence
- Identify X and Y Axes
- Define Relationship
- Run Suspect Assist
- Review Descriptions
- Remove Relationships

### Traceability Matrix Example

<table>
<thead>
<tr>
<th>Requirement</th>
<th>M.5 Music Service</th>
<th>Relationship Type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.10 Song/Artist Reviews</strong></td>
<td>X</td>
<td>traced to</td>
</tr>
<tr>
<td><strong>1.10.1 The user shall be able to review song...</strong></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>1.11 Search Music</strong></td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td><strong>1.11.1 A user shall be able to search using...</strong></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>1.11.2 A user shall be able to search under...</strong></td>
<td>X X</td>
<td></td>
</tr>
<tr>
<td><strong>1.11.3 A user shall be able to search by art...</strong></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>1.11.4 A user shall be able to search for ar...</strong></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>1.12 Social Media</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Example rows for clarity, full matrix not shown)
Intelligence View

• Intelligence View
  • Analyzes progress of project
  • Uses heuristics
• Automated
  • Updated when saved
  • Artificial Intelligence
• NLP
• HIS

• Fidelity
Questions