“Requirements Traceability refers to the ability to describe & follow the life of a requirement in both a forwards & backwards direction”

(i.e., from its origins, through its development & specification, to its subsequent deployment & use, & through all periods of on-going refinement & iteration in any of these phases)
An Overview...

Research method
Current support
Persistent RT problems
Types of RT
Long term causes of RT problems
Our work

Research Method...

Problem definition & analysis
Introspection on the process

Requirements gathering, analysis & specification

Literature surveys
Tool critiques & use
Focus groups
Questionnaires
Interviews
Observation
Participation
Current Support - Mechanics...

Explicit techniques:

- Cross reference schemes / matrices
- Templates / documents
- ATMS / constraint networks

Implicit approaches:

- Languages
- Models
- Methods

Current Support - Tools...

General purpose tools

Special purpose tools

Workbenches:

- Dedicated
- Conventional upper & lower CASE

Environments (& more):

- Language-based
- Structure-based
- Method-based
- Toolkit-based
Persistent Problems - Why?

Lack consensus about...

(1) What RT is:
   No shared understanding

(2) What causes RT problems:
   Multifaceted problem

(3) What RT is needed for:
   Diverse expectations

(1) No Common Definition...

Examples:

(a) "...the ability to adhere to the business position, project scope & key requirements that have been signed off"

(b) "...the ability to cross-reference items in the requirements specification with items in the design specification"

(c) "...means that specified requirements are mapped onto deliverable components throughout the software engineering process"

Implications:

Emphasis delimits scope of concern

Tools embed different underlying assumptions
(2) Multiple Problem Causes...

Examples:
(a) Coarse granularity of traceable entities
(b) Project longevity
(c) Lack of commitment by all parties

Implications:
Problem statement ambiguity
Tools address different underlying problems

(3) Numerous Expectations...

Examples:
(a) To analyse consistency & completeness
(b) To assess change impact
(c) To see requirements from multiple viewpoints

Implications:
Unclear (user) requirements for RT
Limitations on what RT can achieve
Understanding These Conflicts...

(1) What is RT?  
Generic working definition

(2) What causes RT problems?  
Problem definition & analysis

(3) Why is RT needed?  
Requirements analysis & specification

2 Basic Types of RT...

"Post-RS Traceability is concerned with those aspects of a requirement’s life that result from its inclusion in the RS"
(i.e., requirement deployment)

"Pre-RS Traceability is concerned with those aspects of a requirement’s life prior to its inclusion in the RS"
(i.e., requirement production)
Post-RS Traceability...

Well understood & supported
Remaining problems tackled in formal settings
Limited impact on reducing problems

Pre-RS Traceability...

Poorly understood & supported
Only contributor to problems in formal settings
Instrumental in reducing long term problems
Work Tackling Pre-RS Issues...

Promoting awareness of information requirements:
   Frameworks & activity models / common involvement threads

Obtaining & recording information:
   RE tools / exploratory workbenches

Organising & maintaining information:
   Requirements as modular viable systems / job roles

Accessing & representing information:
   Programmability / context-sensitive & dynamic traces

BUT...

Comprehensive & up to date project information + Sophisticated retrieval & presentation → No RT problems

A Fundamental Working Practice Is...

....mmm.... it can’t do that

Location & access of personnel

To back up / augment
What We Are Doing Is...

Modelling the contribution structure underlying requirements artifacts

Summarising...

Little real progress as poor understanding of RT:
- Influx of similar tools / inflated claims

Multifaceted nature of RT problem:
- Diverse requirements / no single solution

2 types of RT - pre-RS & post-RS:
- Information-based problems / focus on pre-RS

Intrinsic need to locate & access personnel:
- Dynamic modelling of social infrastructure
For Further Details...

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