1

An Analysis of the Requirements Traceability Problem

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2

To Avoid Initial Questions...

"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)

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3

An Overview...

Research method

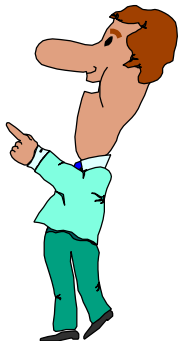
Current support

Persistent RT problems

Types of RT

Long term causes of RT problems

Our work



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Research Method...

Literature surveys

Tool critiques & use

Focus groups

Questionnaires

Interviews

Observation

Participation

Problem definition

& analysis

Requirements

gathering, analysis

& specification

Introspection

on the

process

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Current Support - Mechanics...

Explicit techniques:

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

Implicit approcahes:

- Languages
- Models
- Methods

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Current Support - Tools...

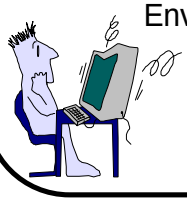
General purpose tools

Special purpose tools

Workbenches:

- Dedicated
- Conventional upper & lower CASE

Environments (& more):



- Language-based
- Structure-based
- Method-based
- Toolkit-based

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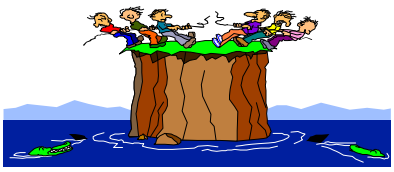
Persistent Problems - Why?

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

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(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

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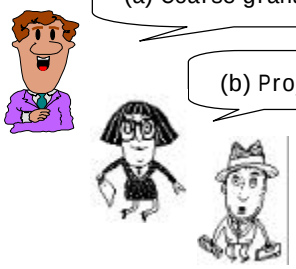
(2) Multiple Problem Causes...

Examples:



Implications:

Problem statement ambiguity

Tools address different underlying problems

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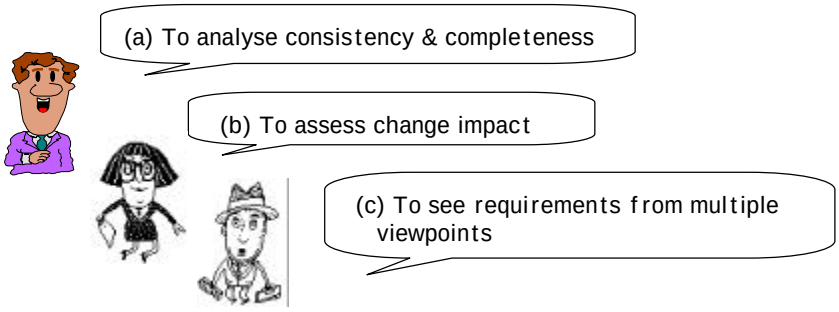
(3) Numerous Expectations...

Examples:



Implications:

Unclear (user) requirements for RT

Limitations on what RT can achieve

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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

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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)

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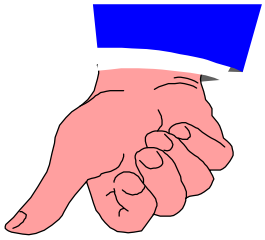
Post-RS Traceability...



Well understood & supported

Remaining problems tackled in formal settings

Limited impact on reducing problems

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Pre-RS Traceability...

Poorly understood & supported

Only contributor to problems in formal settings

Instrumental in reducing long term problems

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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

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A Fundamental Working Practice Is...

Location & access of personnel

To back up / augment

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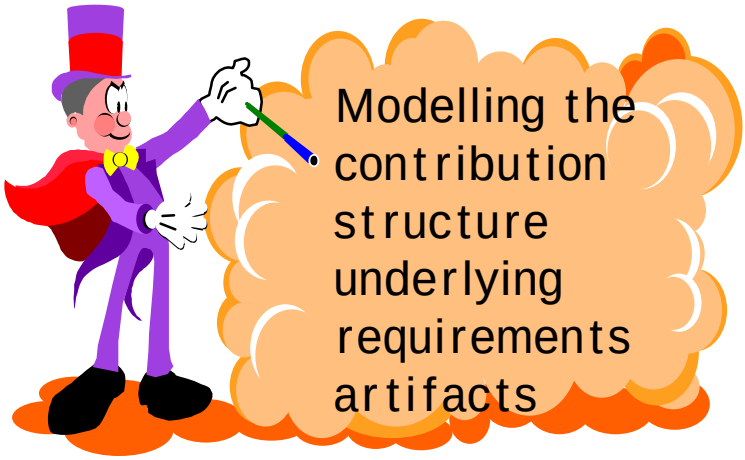
What We Are Doing Is...



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18

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

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For Further Details...

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