


Round 1


MIND THE GAP – A TRACE RETRIEVAL SOLUTION

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What is Traceability?

Requirements traceability is the ability to describe and **follow the life of a requirement**, in both a forward and backward direction, i.e. from its origins, through its development and specification, to its subsequent deployment and use, and through periods of ongoing refinement and iteration in any of these phases.”

Gotel and Finkelstein, 1994.



Traceability is of particular concern in safety & mission-critical systems.

Why do you care about tracing?



Standards require it..



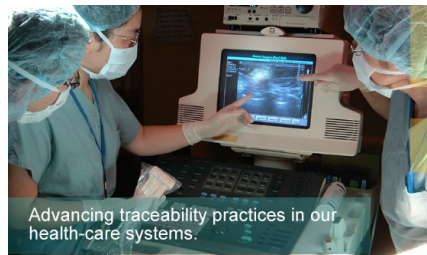
The **Federal Aviation Administration's** (FAA) DO-178B standard specifies that at each and every stage of development "software developers must be able to demonstrate traceability of designs against requirements.

The U.S. **Food and Drug Administration** (FDA) states that traceability analysis must be used to verify that the software design implements all of the specified software requirements, that all aspects of the design are traceable to software requirements, and that all code is linked to established specifications and test procedures.

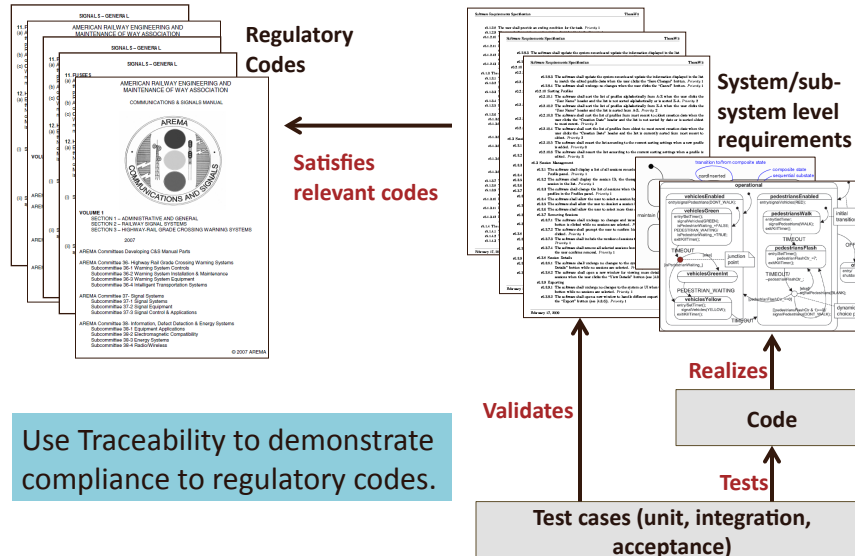
Process improvement initiatives such as CMMI also require traceability.

Supports numerous Software Engineering Tasks

- Requirements validation
- Coverage analysis
- Change impact analysis
- Code comprehension
- Preservation of architectural knowledge
- Test regression selection
- Compliance verification



Example: Regulatory Compliance

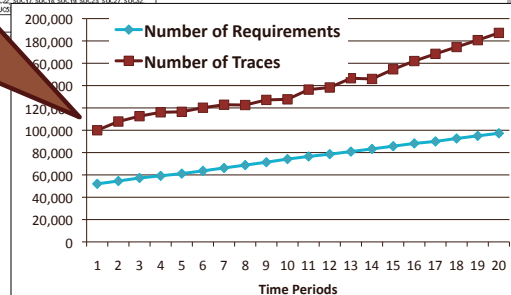


...but

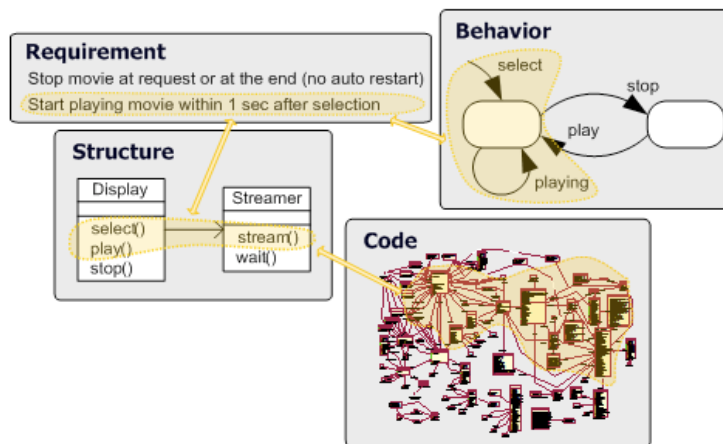
Too much tracing!!

The number of requirements and other artifacts grow quickly as the project progresses.

Excessive numbers of traceability links deteriorate into an unwieldy, inaccurate, tangle of relationships.



Automating Trace Creation



Leverage the fact that **text is everywhere** – in both software and systems-engineering models, and utilize Trace Retrieval methods to generate links.

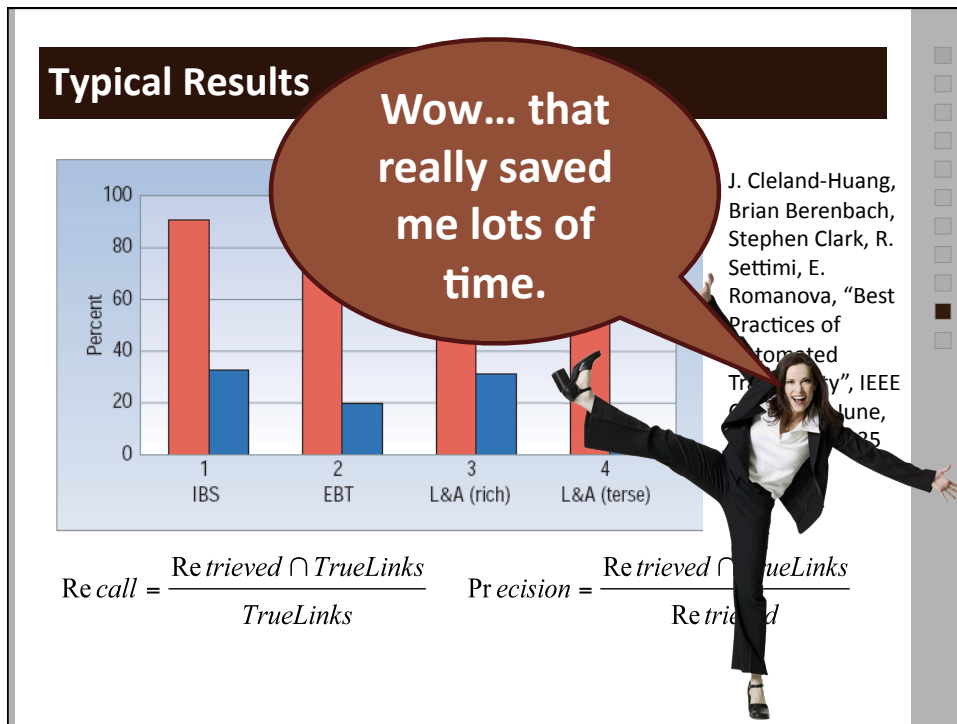
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Several Research Prototypes

The image displays three research prototypes. The first, 'Poirot: TraceMaker', is a web-based interface for document analysis, showing a list of documents with columns for ID, Description, Confidence, and Accept Level. The second, 'Retro', is a web-based interface for document analysis, showing a list of documents with columns for ID, Description, Confidence, and Accept Level. The third, 'TraceLab', is a web-based interface for document analysis, showing a list of documents with columns for ID, Description, Confidence, and Accept Level.

One Example: Poirot

The screenshot shows the 'Poirot: TraceMaker' interface. The top navigation bar includes 'Project', 'Query', 'Artifacts', 'Options', and 'Help'. The main content area displays a table of documents with columns for ID, Description, Confidence, and Accept Level. The table lists documents A201 through A210, with descriptions related to gas supply pipes and gaskets. The right sidebar shows a 'Query modification' section with a text input field for 'Additional words' and a 'Find' button. Below this, there is a 'Click on the underlined term to filter it out' section with a list of terms including 'Joints', 'connections', 'Gasket material', 'neoprene', 'similar', 'material', 'resistant', 'to', 'any', 'action', 'of', 'gas', 'Natural', 'rubber', and 'shall not be used'.



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member login Search...

About CoEST Traceability TraceLab Research Directions Resources

Developing automated tools to minimize the cost and effort of traceability.

Center of Excellence for Software Traceability

The vision of the Center of Excellence for Traceability (CoEST) is to provide leadership for traceability research, education, and practice; promoting the pursuit of excellence from research idea to practice, based on a foundation of innovative, ethical, collaborative work.

Strategic Traceability for Safety-Critical Projects

Strategic Traceability for Safety-Critical Projects

Tackle cutting edge problems in software traceability.

Build a supportive community of researchers.

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With Traceability ~~~



Any
Questions
?


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Round 2

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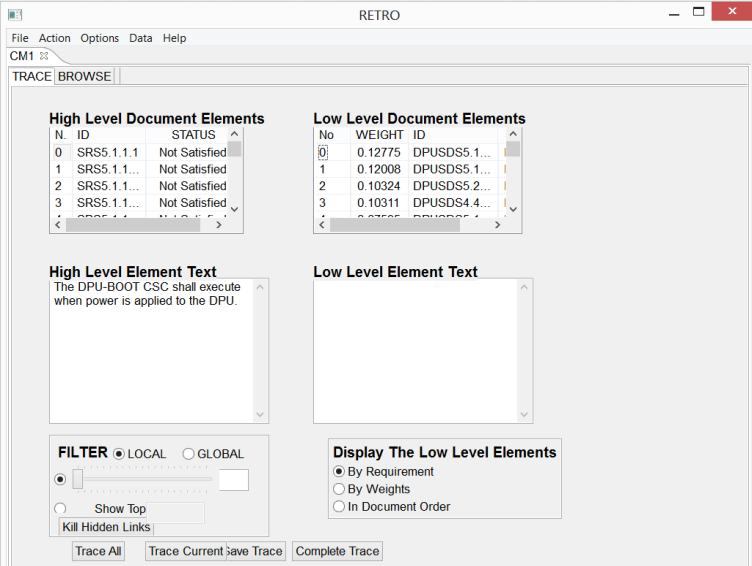
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Retro V2 UI (2010)



N	ID	STATUS
0	SRS5.1.1.1	Not Satisfied
1	SRS5.1.1...	Not Satisfied
2	SRS5.1.1...	Not Satisfied
3	SRS5.1.1...	Not Satisfied

No	WEIGHT	ID
0	0.12775	DPUSDS5.1...
1	0.12008	DPUSDS5.1...
2	0.10324	DPUSDS5.2...
3	0.10311	DPUSDS4.4...

High Level Element Text
The DPU-BOOT CSC shall execute when power is applied to the DPU.

Low Level Element Text

FILTER ☒ LOCAL ☐ GLOBAL

☒ Show Top

Kill Hidden Links

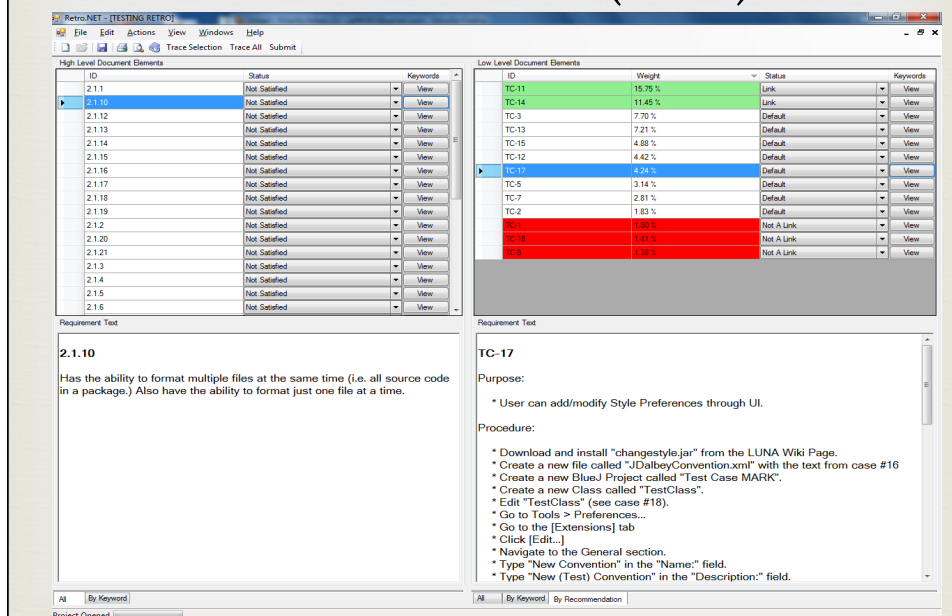
Trace All Trace Current Save Trace Complete Trace

Industry and RETRO



- ✧ Integrated RETRO IR algorithms into proprietary tool (SAIC), undertook pilot study
- ✧ RETRO available via NASA GSFC open source site
 - ✧ Handfuls of downloads and inquiries until policy change
 - ✧ Improved RETRO based on feedback
- ✧ RETRO.net developed to address UI issues

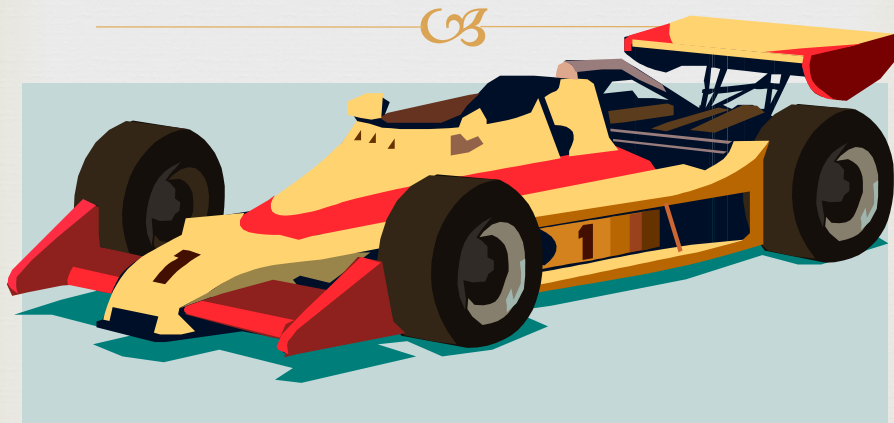
Retro.net UI (2011)



Industry and RETRO (cont'd)

- ❧ Latest version of RETRO.net built to requirements of MTSI in Huntsville, Alabama, USA
 - ❧ Performs IV&V of mission critical systems
 - ❧ US Army's Redstone Arsenal
 - ❧ Classified work
- ❧ Pilot study commenced Winter 2012
- ❧ New version of tool delivered May 2013
- ❧ Stakeholder needs met, and.....

It's fasssstttttt.....



Performance Improvement



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