

# Automated Traceability

Team Presentation in **Requirements Engineering II**

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# Automated Traceability -- Agenda

- Background and Problems in Traceability
- Automated Traceability as a Possible Approach
- Question 1:  
**How can traceability links be automatically generated?**
- Question 2:  
**How effective are current traceability link recovery techniques?**
- Question 3 (*to conclude*):  
**Can and should humans be replaced for defining traceability?**
- Discussion

# Background and Problems in Traceability

## **Requirements Traceability is useful and important!**

*(Ingram et al, 2012)*

- Conducting impact analysis
- Tracking project progress
- Reconstructing earlier decisions
- Avoid rework
- *etc.*

## **But many organizations fail to implement effective traceability practices!**

*(Cleland-Huang et al, 2007; Hayes et al, 2007)*

- Due to time pressure
- Difficulties with traceability links,  
e.g. RTMs are “boring” and error-prone, often do not get done.
- Assumption that cost exceeds benefit

# Automated Traceability as a Possible Approach

## **Automated Traceability helps**

*As for the example of RETRO (Hayes et al, 2007)*

- Find more correct links
- Take less time

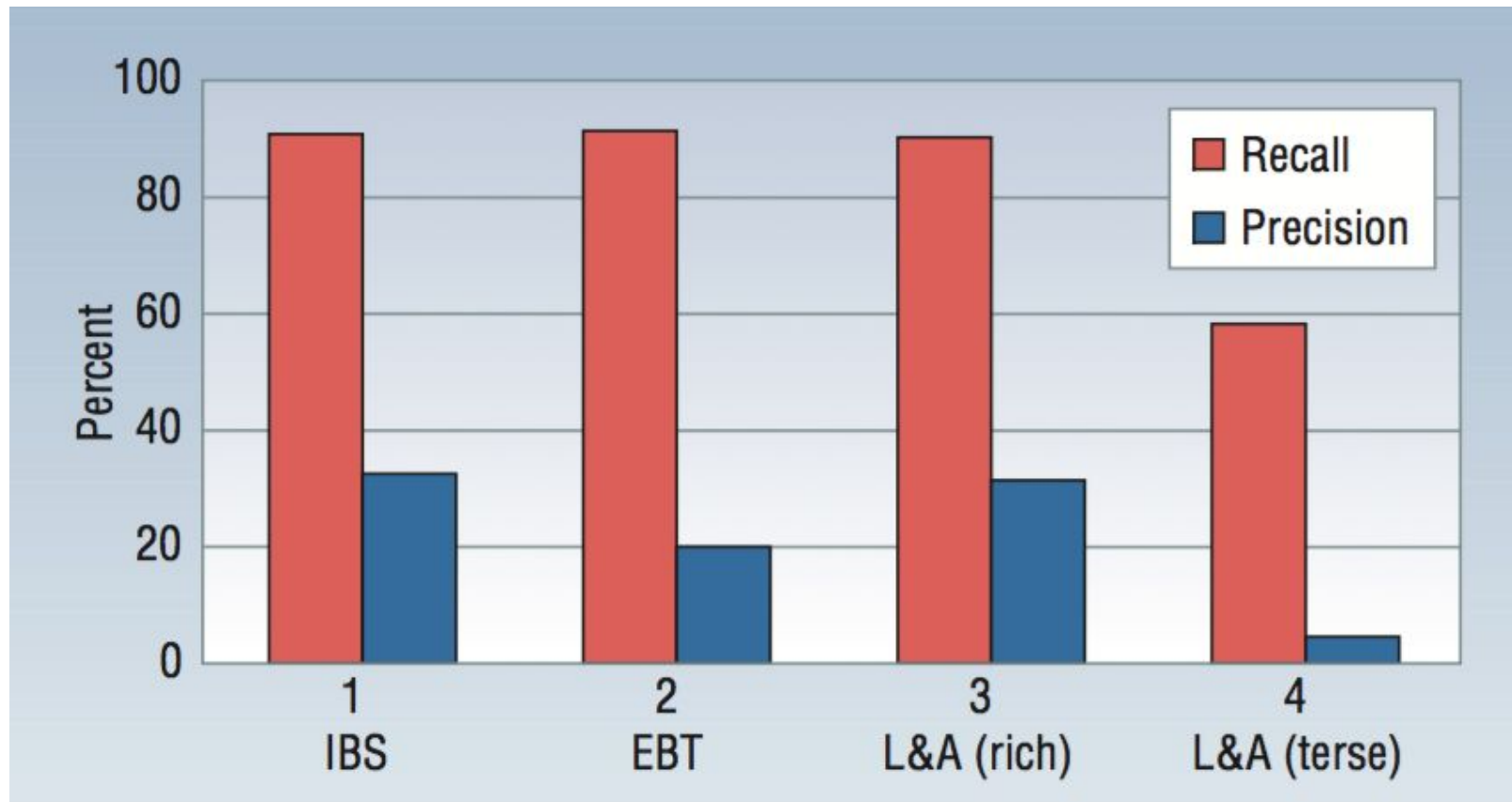
... Facing the problem of difficulties with traceability links.

# Question 1: How can traceability links be automatically generated?

- Information Retrieval
  - Obtaining information resources relevant to an information need
  - from a collection of information resources.
    - Requirements documentation,
    - UML documents,
    - source code, etc.
  - Establish links based on the similarity of terms across documents
- Text Mining
  - Algorithms aiming for revealing structures in poorly structured texts
  - by statistical and linguistic means.
- Some best practices
  - Environment: Limit granularity
  - Generally: Use well defined project glossary
  - Quality requirements (unambiguous, complete, consistent, etc.)
- Examples of purposes
  - Build and maintain a requirements trace matrix
  - Providing after-the-fact traceability in legacy documents

## Question 2: How effective are current traceability link recovery techniques?

- Tradeoff between recall and precision



# Question 3: Can and should humans be replaced for defining traceability?

## Automated Traceability

*does not replace humans,  
but reduces work done by humans.*

## Case Study at the University of Kentucky

- Requirements Tracing On target (RETRO)

|           | Automated | Manual    |
|-----------|-----------|-----------|
| Recall    | 70.1%     | 33%       |
| Precision | 12.8%     | 24.2%     |
| Time      | 41.8 min  | 120.66min |

# Thank you.

Questions?

Discussion

- In what cases could Automated Traceability be more expensive than Manual Traceability?
- What risks in terms of Automated Traceability can you imagine? Or are there only benefits?
- Can you think of any other part of Requirements Engineering which can be automated?