

An Empirical Study on Project-Specific Traceability Strategies

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Outline

- Motivation
- Interview Study
- Traceability Strategy Assessment Procedure
- Our Results

The Problem Context

- Requirements traceability
 - “.. the ability to follow the life of a requirement in both a forward and backward direction” [Gotel1995]
- Requirements traceability enables
 - Higher project maturity
 - Better product quality
- Requirements traceability strategy
 - Envisioned traceability usage
 - Vision of required traces
 - Project-specific

The Problem That We Studied

- Strategic planning: advantages and disadvantages

“If you don't know where you are going you will never get there.” “Progress, not perfection.”

Are practitioners able to reach effective traceability without strategic planning?

Our Research Questions

- What traceability strategy do practitioners apply in their development project and is this strategy explicitly defined? **[RQ-1]**
- Do practitioners create usable traceability? **[RQ-2]**
- Do practical applied traceability strategies support all project-specific traceability needs? **[RQ-3]**

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Our Case Sampling Methodology

- Assemble a list of potential companies
➔ **85 potential cases**
- Prioritize the list with sampling criteria [Curtis2000]
 - Relevance
 - Potential to generate rich information
 - Generalizable
 - Required resources
 - Ethical issues
- Result
➔ **17 studied cases**

We Conducted Semi-Structured Interviews

- Preparation → Questionnaire
 - General information
(informant's role, company, project ...)
 - Project's requirements traceability
(traces, traced artifacts, trace usage goals, users, tasks)
 - Project's development process
(goals, tasks, actors, tools, input, output)
- Pilot Interview
- Interviews
 - Face-to-face interviews in natural working environment
 - Every interview lasted 3 - 6 hours
 - Semi-structured interviews

Outline

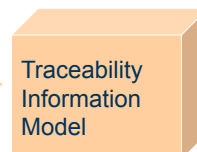
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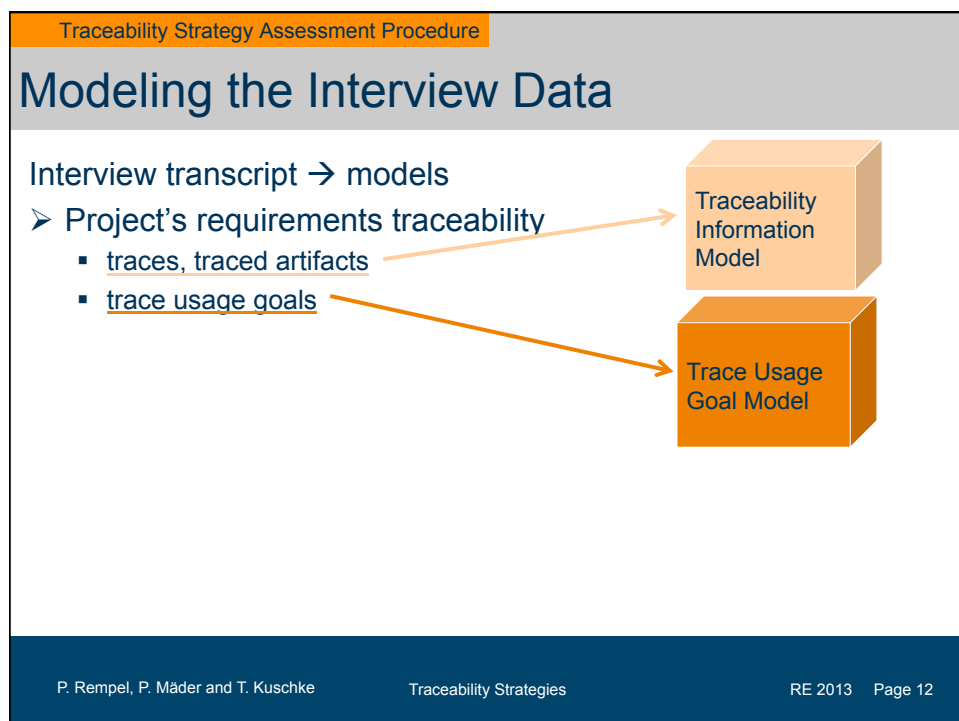
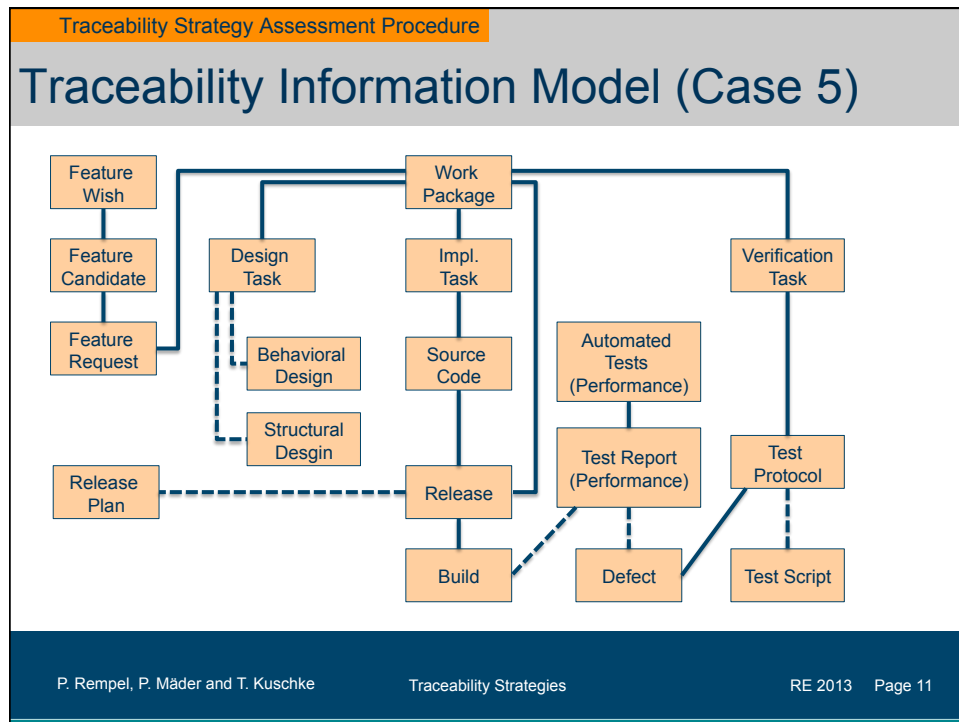
Traceability Strategy Assessment Procedure

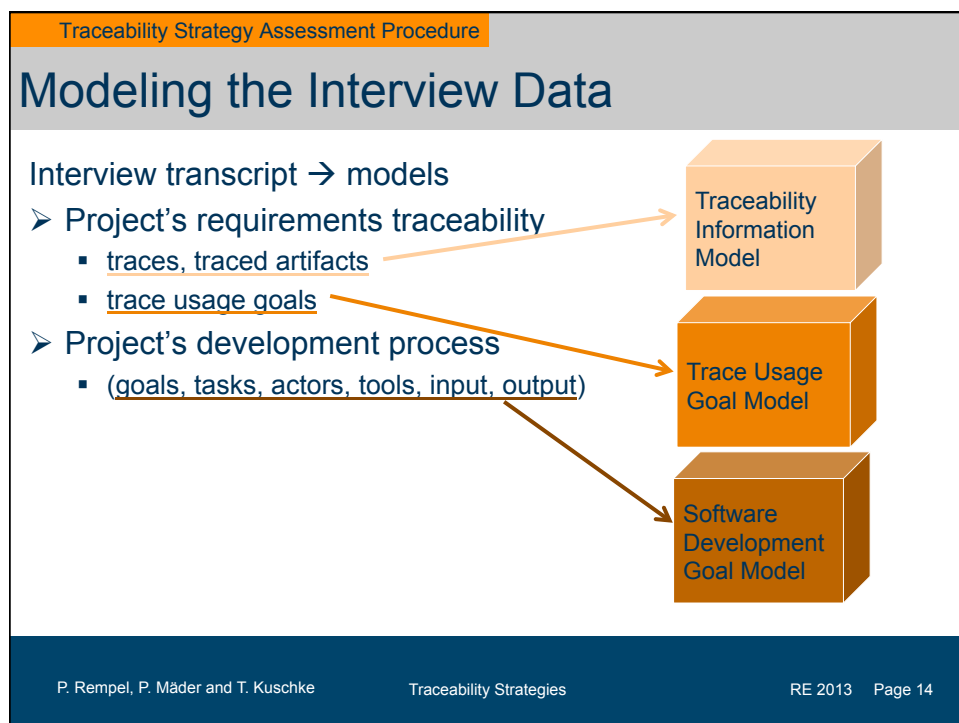
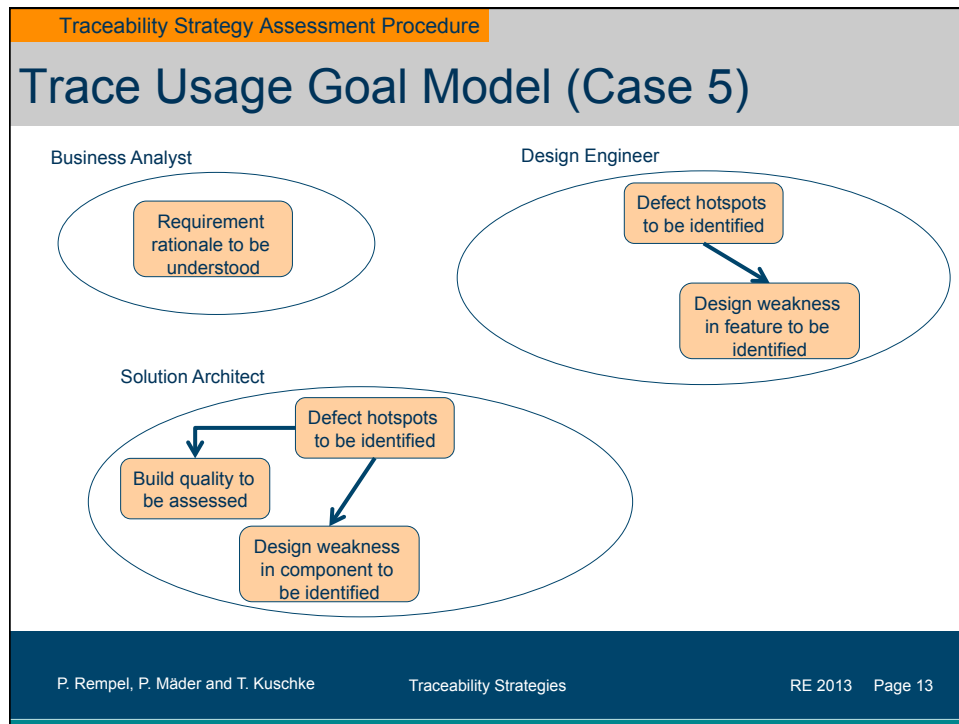
Modeling the Interview Data

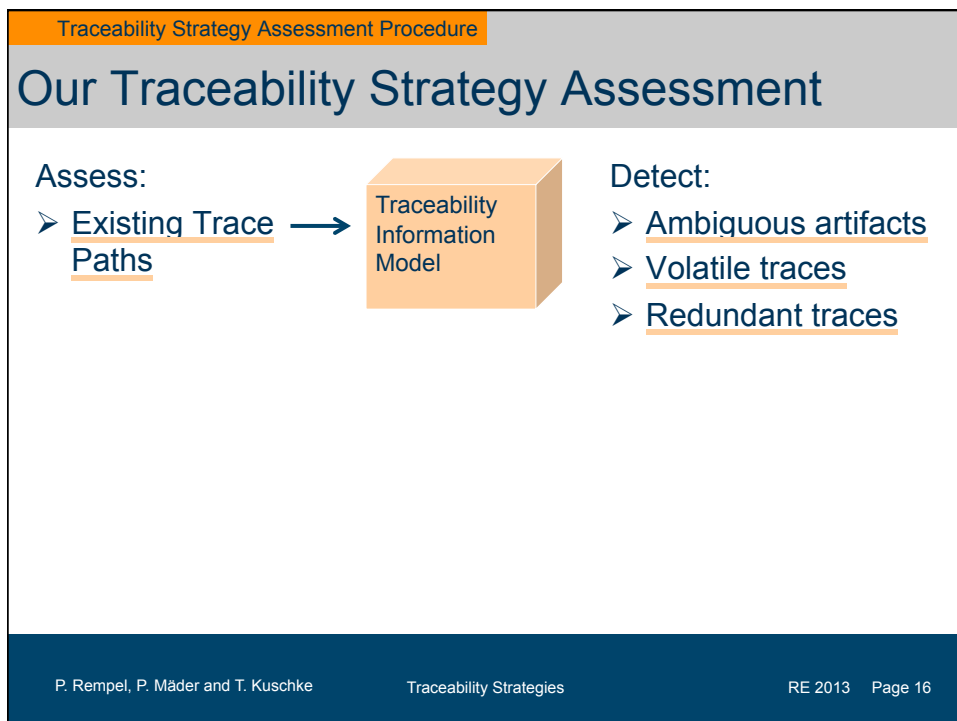
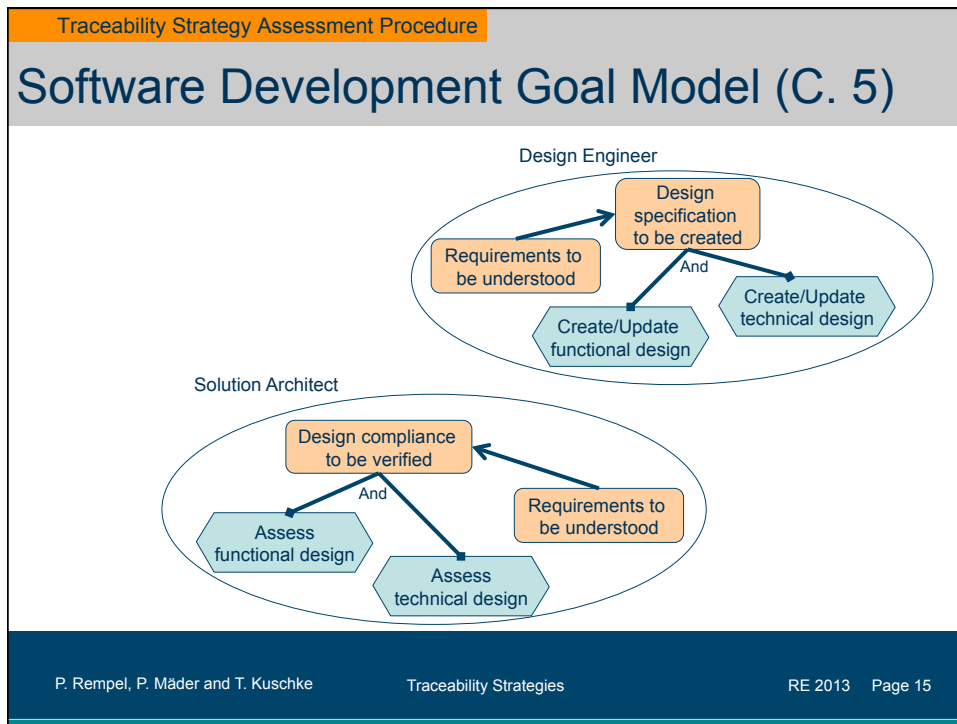
Interview transcript → models

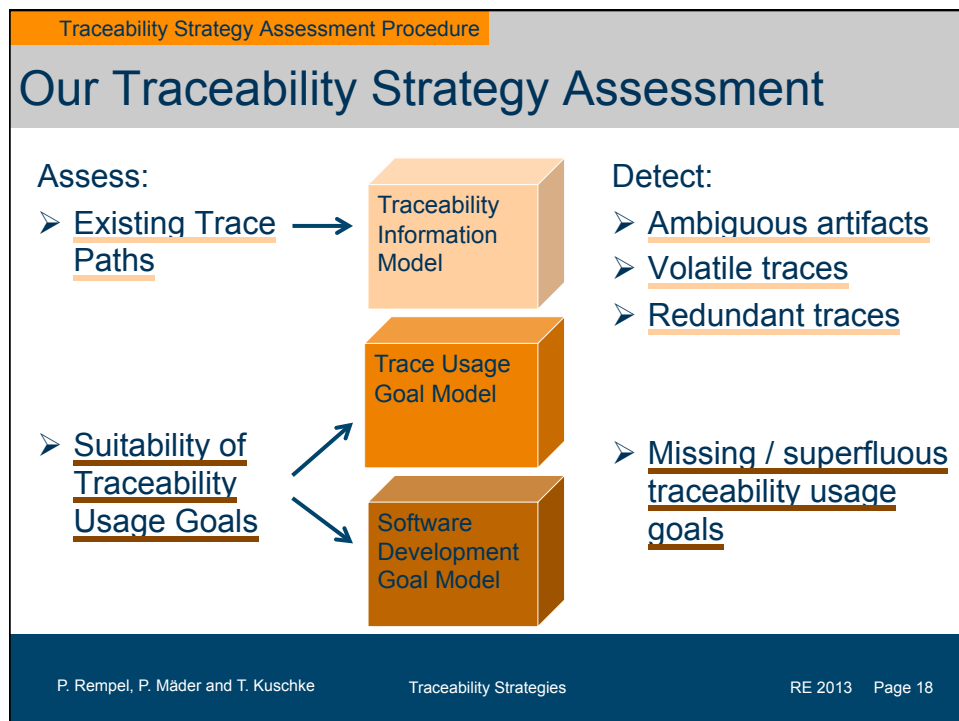
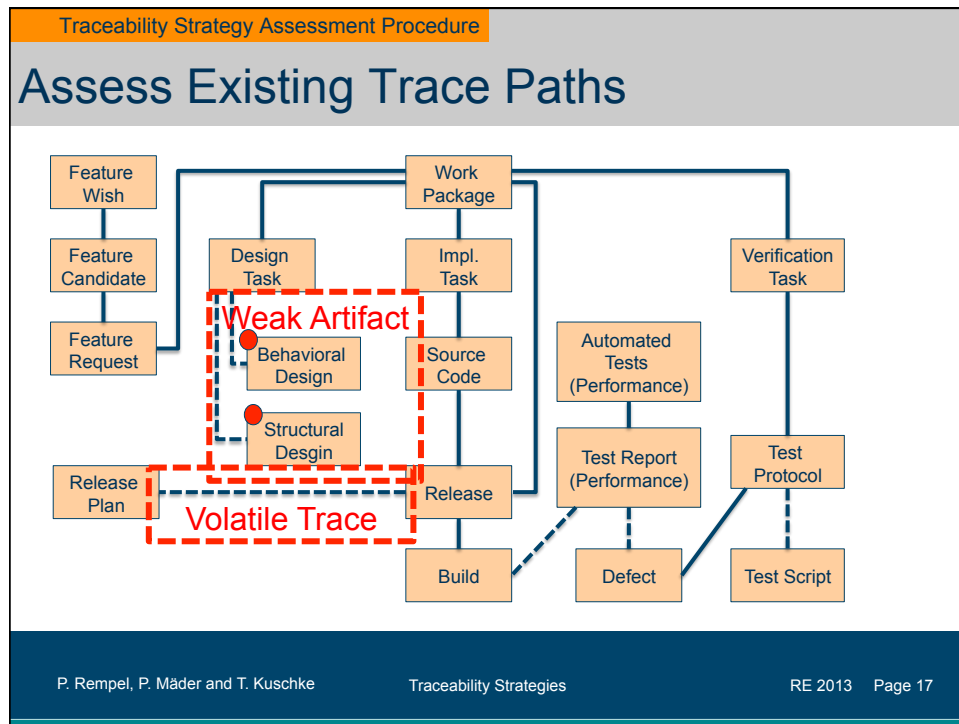
- Project's requirements traceability
 - traces, traced artifacts

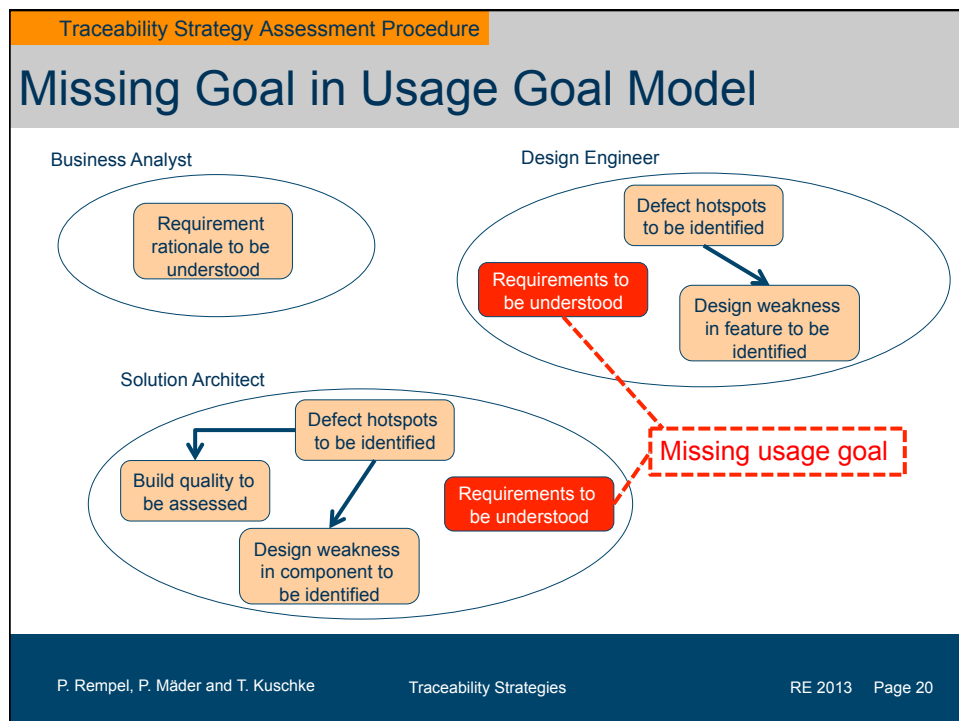
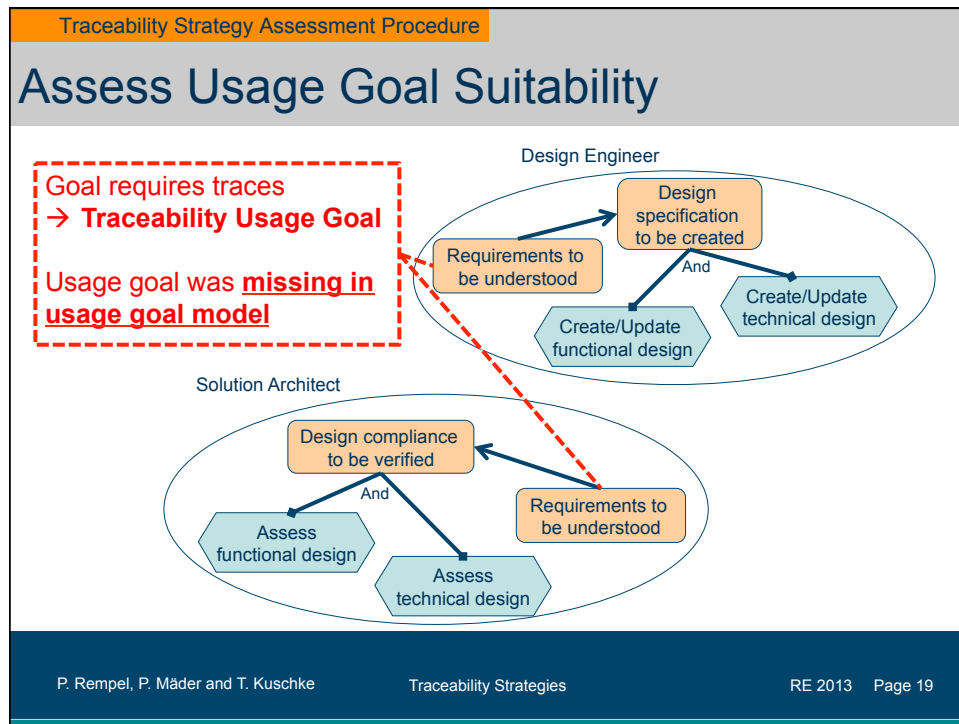


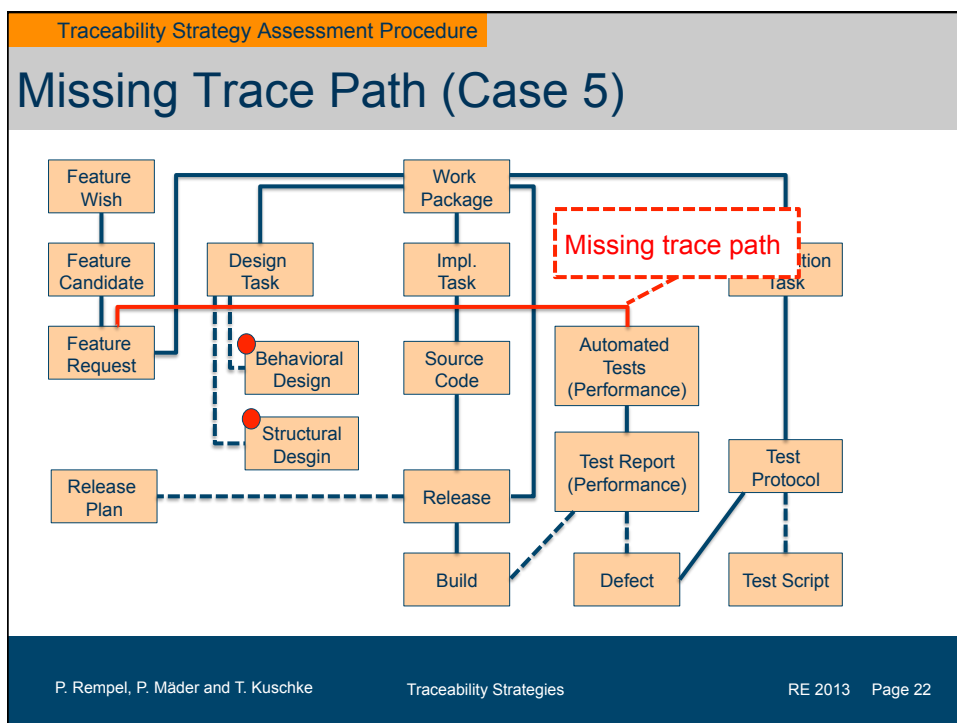
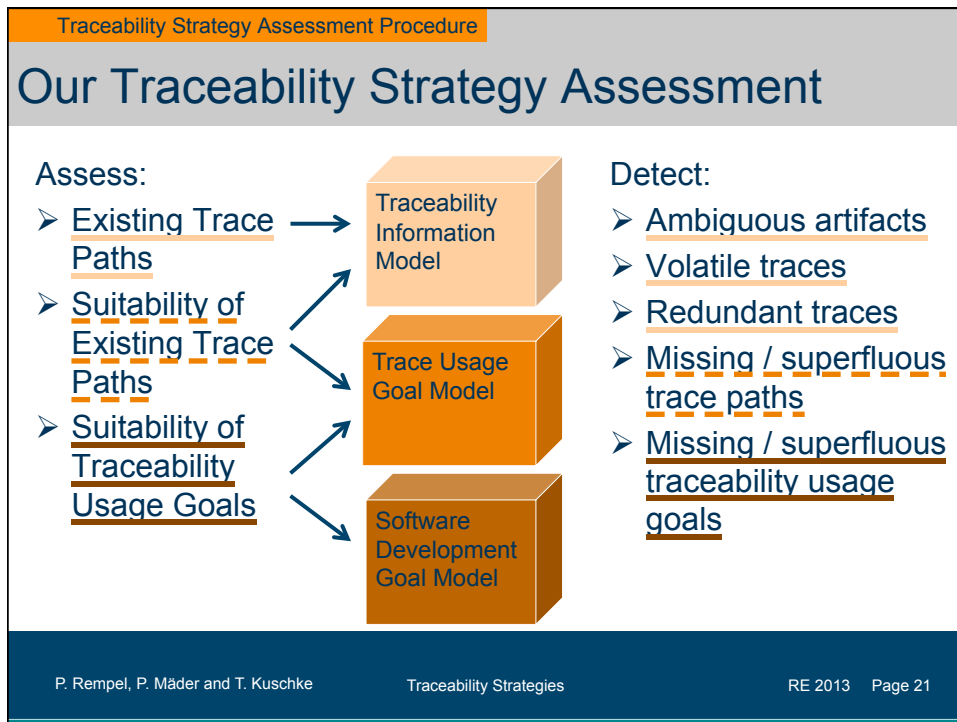












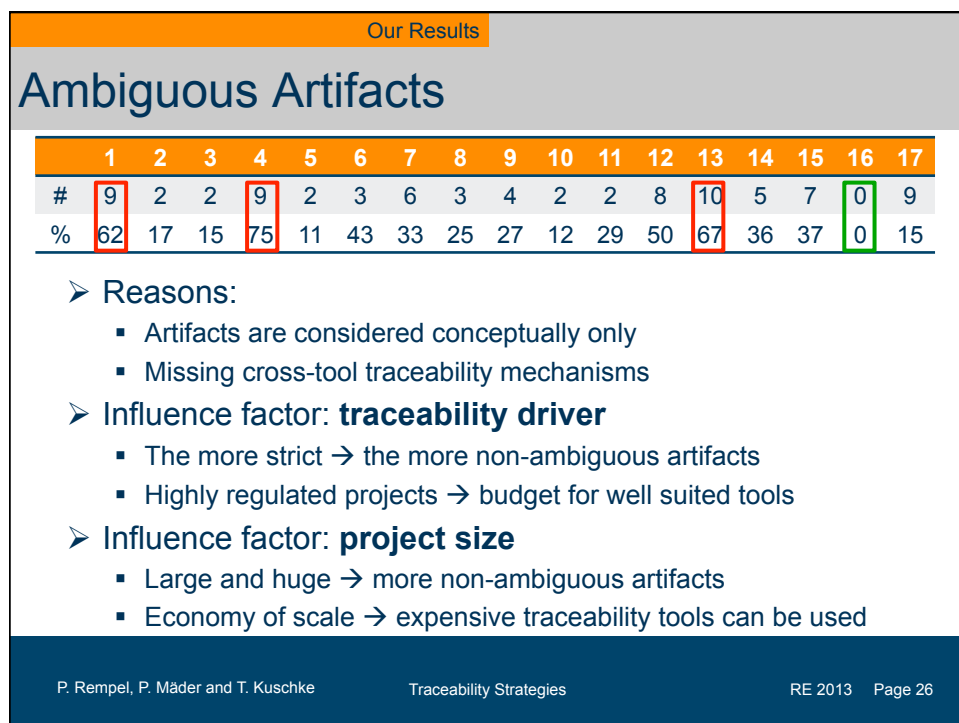
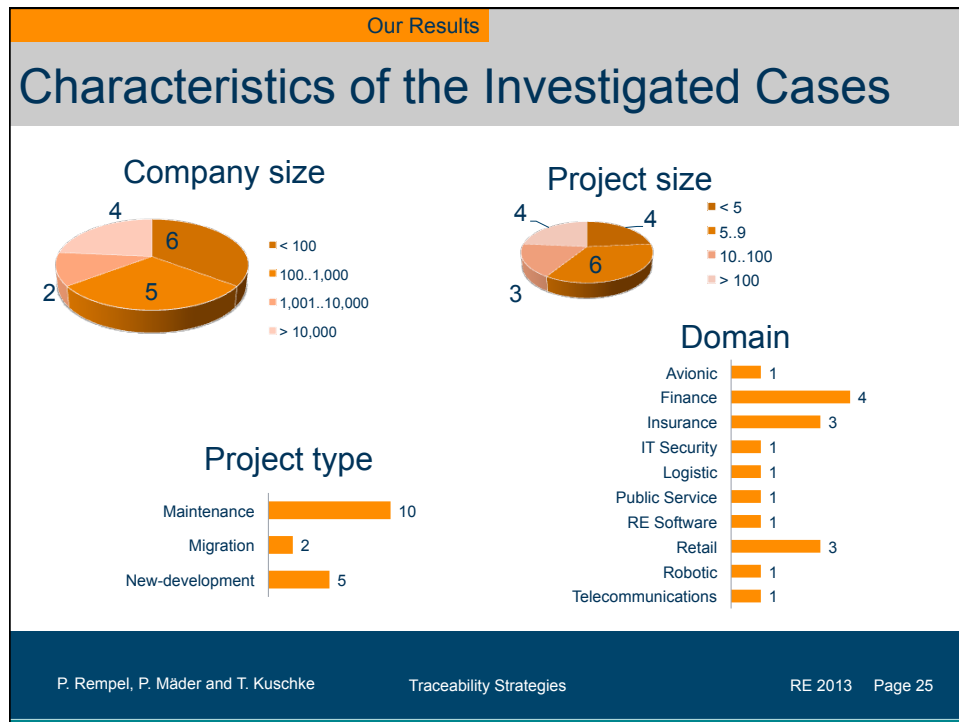
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Our Results

The Problem Classes We Recognized

- Artifact ambiguity problem
 - Ambiguous artifacts
- Trace path ephemerality problem
 - Volatile traces
- Trace path redundancy problem
- Usage goal suitability problem
 - Missing goals
 - Superfluous goals
- Trace path suitability problem
 - Missing trace paths
 - Superfluous trace paths



Our Results

Volatile Traces

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
#	5	4	7	8	7	4	7	3	8	6	3	7	9	7	11	0	10
%	71	29	50	73	32	76	39	23	40	32	60	50	75	58	58	0	56

➤ Reasons

- Traces were not stored in a single repository
- Trace paths were modeled conceptually only

➤ Influence Factor: traceability driver

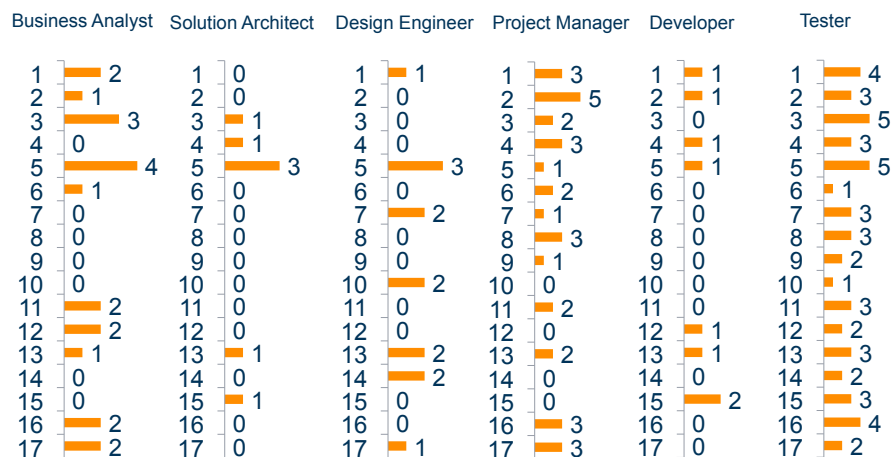
- Cases with more strict drivers tend to have more volatile traces

➤ Influence Factor: project type

- Product-oriented companies considerable less volatile traces

Our Results

Missing Trace Usage Goals



Our Results

What causes „Missing Trace Usage Goals“?

- Reasons
 - Creation of traceability usage goal model extremely challenging
- Influence factor: project role
 - Usage goals were missing mainly for three perspectives:
Business Analyst, Project Manager, Tester

Our Results

Missing Trace Paths

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
#	5	6	6	9	9	7	4	5	2	1	3	6	12	3	9	4	7

- Reasons
 - No Traceability Information Model (TIM) defined
 - Missing trace usage goals

Summary

- Contributions
 - Empirical data from industry
 - Traceability strategy assessment procedure
 - Problem classes
- Limitations
 - Limited number of cases (17)
 - Additional evaluation is required → study to be continued
- Conclusion
 - All projects contained problems
- **Traceability strategies should be defined and assessed in a goal-driven procedure**