

TracIMo Data Collection Instruments to Elicit Traceability Goals, Benefits and Challenges

Blinded for review

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This document contains interview guides to collect data that is necessary for the definition of process and traceability goals, to identify metrics to measure if the traceability goals have been achieved, to identify relevant artifacts and link types (Section 1), and to understand how stakeholders interact with traceability (Section 2). It also contains a questionnaire to help assess the benefits of a traceability strategy (Section 3). The information collected can be used in TracIMo in the different steps as described in the corresponding literature.

1 Interview guide to understand the development process and traceability goals

The purpose of this interview guide is:

- To elicit the traceability needs of the company
- To find out how they currently handle traceability management
- To find out what traceability gaps they have (needs) and possible solutions

Note that the interview questions should not necessarily be asked in a sequential manner. The interview can be conducted in a semi-structured way and the interviewer should decide which questions make sense in the context of the interviewee. For instance, it does not make sense to ask questions about how links are stored, if the company has no links at all.

The interview guide aims to answer the following over-arching questions:

1. What are the traceability goals for the company?
2. What are the challenges of establishing traceability in this domain?
3. What are the uses of traceability in this domain?

Before the interview

1. Introduce yourself
2. Introduce the purpose of the interview
3. Ask if it okay to record

Background of the interviewee

1. What is your role in the company? (What do you do?)
2. For how long have you worked in this role?
3. What are other roles that you have had in the past at the company?
4. What development process do you follow? (e.g., V model, Agile, in-between?)

Purpose of traceability

1. What is traceability for you?
2. Why do you need trace links?
3. Apart from the current use case, do you have other areas in your development where you need traceability?

Development artifacts

1. Which artifacts do you have in your development environment?
 - Requirements/Features
 - Models
 - Wikis
 - Code
 - Tests
 - Tickets
 - ... *Ask about tools for each artifact if not mentioned with the artifacts.
2. How are these artifacts related to each other? (Derived, generated, refined, etc.)
3. Do you create trace links between these files? If yes, how is this done? (e.g, through copying IDs from one file to another?)
4. What is the problem with the way the current links are created?
5. In your opinion, what would be a perfect way to create links? Imagine no tool restriction.
6. What do you think about automatic generation of trace links?

Trace link Types

1. Are you aware of the term “link type”?
 - If yes, what link types do you know of?
 - If no, explain what link types are and give examples.
2. In your company, is there a need to have more than one link type or is it enough to have one generic link? If yes, why? And which types?
3. What kind of information should trace links contain?
4. Does it make sense to add meta-data such as created-by, modified-by/on, reason for existence of a trace link, and so on?
5. For your role, are high level trace links better than low level (detailed) trace links? Why?

Creation and maintenance of trace links

1. When should which trace links be created? In a particular step in the development?
2. When should trace links be updated?
 - What should trigger the update?
 - How do you identify which links need to change?
 - Who should update the links?

Communication and Collaboration

1. Do you think traceability information should be shared between teams? If yes, why?
2. How should this information be shared?

Storage of trace links

1. How do you currently store trace links?/ How do you want the links to be stored?
2. Do you version trace links?
3. Are there any challenges with respect to the storage and versioning of trace links?
4. Are there tools that you know of that solve these challenges?

Uses of trace links

1. What do you use the trace links for?
2. Are there links that are only created and not used?
3. Do you have any tools for visualization of your trace links?
 - If yes, on a scale from 1 – 10, how satisfied are you with this visualization?
 - What would it take for a visualization tool to be at 10 on the scale? Which visualization features are important to you?
4. Do you perform or would like to perform any kind of analysis on the trace links?
 - If yes, which kind of analysis? E.g., How the software looks like, dependency between artifacts etc.
 - Do you have tools that can perform analysis on your trace links? If yes, do the tools support custom queries on the trace links?
 - On a scale from 1 – 10, how satisfied are you with these analysis tools?
 - What are the missing features that will put the analysis tools at 10 on the scale?

Measurements

1. What do you think about the effort of establishing trace links? Is it something worthwhile?
2. Can you think of how to measure the quality of trace links? E.g. completeness, correctness
 - Do you currently use any of these?
3. How do you know that you have enough, too little or too much trace links?
4. Are there any standard you follow that mandate you to have trace links?

Conclusion

1. Summarize what we have learned in the interview and ask if the interviewee agrees.
2. Do you feel like you have something to add that we missed in the discussion?
3. Can we contact you with follow-up questions for clarification?
4. Thank the interviewee for participating

2 Interview Questions to Gauge Benefits of Traceability

This interview guide can give us insights into the practices and how the different parties use trace links. The interview thus allows us to gauge the usefulness of the deployed traceability strategy and which practices can be improved. Therefore, we pursue three goals with the interviews:

Goal 1: To find out how traceability practices fit in the process

Goal 3: To understand which traceability practices are performed and how

Goal 2: To elicit the short-term benefits of traceability

Interviews should be conducted with the people filling the roles listed below or having equivalent roles in the organisation or development team. Since some of these roles only consume trace links while others produce and maintain them (indicated with an asterisk), some questions are not applicable to all roles and are marked accordingly.

- QA Engineer (QA)
- Product Owner (PO)
- Frontend Developer (FD)
- Backend Developer (*) (FD)
- Business Analyst (*) (BA)

1. What is your role in the company?
2. How long have you worked in this role?
3. Did you have any other role in this company?
4. Were you aware of the concept of traceability before the introduction by the BA?
5. Do you create or use trace links in your development activities? If yes:
 - 5.1 Which links do you create? (*)
 - 5.2 Which links do you use?
 - 5.3 For which purpose do you use them?
 - 5.4 Do you discuss the links with others in the team?
6. How do the current trace links help to increase awareness of stakeholders that need to be notified in case of a change? (BA)
7. How do the current trace links help to follow the rationale of decisions?
8. Do the current trace links make you more confident when estimating the tasks? (PO, BA, BD)
9. How do the current trace links help you to make better estimation of tasks? (PO, BA, BD)
10. How do the current trace links increase your efficiency of identifying artifacts relevant for a change?
11. How do the current trace links help you to identify dependencies between steps in the development process?
12. How do the current trace links enable you to follow the progress of the task?
13. Do you see any other benefits associated with the links currently introduced? If so, can you describe these benefits?

14. What is your opinion on the type of links currently present in the tool?
 - 14.1 Do the types make sense to you?
 - 14.2 Are there any more link types that you would like to have?
 - 14.3 Are there any link types that you find not useful?
15. Can you estimate how much effort it is to create trace links for a change? (*)
16. What is your opinion on the effort of creating traceability links? (*)
17. Do you see the need to update existing trace links? (*)
 - 17.1 When do you have to update the links? (*)
 - 17.2 How much effort is it to update the links? (*)
18. Now that the initial links are in place, when do you think will be the best time to create more links? (*)
19. Will the trace links introduced change the way you work? For instance, do you need to communicate with more /less people?
20. Do you see any downsides associated with the links? If yes, can you describe these downsides?

3 Questionnaire

This questionnaire can be used to assess the current status of traceability adoption and to gauge the benefits of the new traceability strategy during and after a roll-out. Comparing the values before and after roll-out can yield general insights into the adoption of the newly developed traceability strategy that are independent of the metrics defined for the specific traceability goals.

The questions in this questionnaire are targeted for specific roles, as indicated in parentheses after each question:

- QA Engineer (QA)
- Product Owner (PO)
- Frontend Developer (FD)
- Backend Developer (FD)
- Business Analyst (BA)

If these roles do not exist, equivalent roles should be defined. We suggest to distribute a specialised version of the questionnaire to each role, only containing the relevant questions.

1. When a change is requested, how easy is it for you to identify the stakeholders that should be informed of the change? (BA)

Very Hard Very Easy

2. When a change is made to the system, are all involved stakeholders aware of the change and how it impacts them? (BA)

Not aware at all Very aware

3. How understandable is the rationale behind the decisions about the software?
(BD, FD, QA?)

Not understandable Very understandable

4. To what degree is the decision rationale visible to the team? (BA)

Not visible Very visible

5. How confident are you in estimation of tasks? (BD, BA, PO)

Not confident Very confident

6. How easy is it to identify artifacts connected to a change for a given task?
(BD, FD, BA)

Very Hard Very Easy

7. How easy is it to identify dependencies between different process steps for a
given task? (BD, FD)

Very Hard Very Easy

8. Given a specific task, how easy is it to gauge its progress and current status?
(PO, BA?)

Very Hard Very Easy