Aspects of usability in RSE

Jan Bernoth (Universität Potsdam)
Leen Lambers (BTU Cottbus-Senftenberg)
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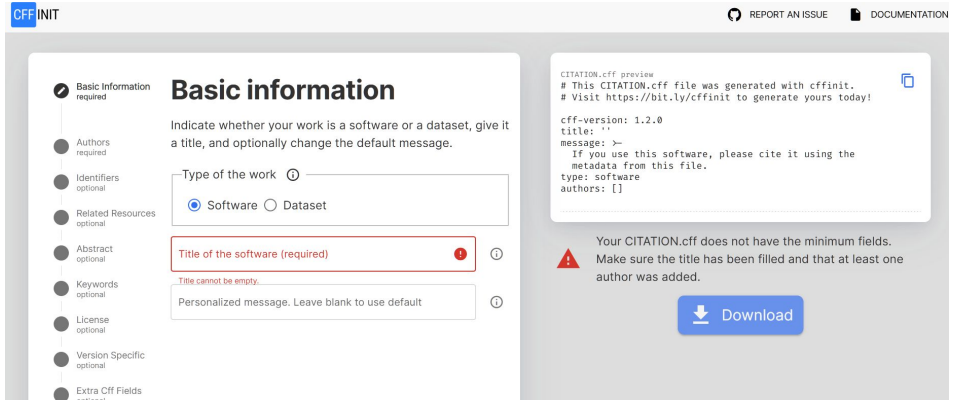
Motivation

- RSEs usually familiar with functional requirements, but **quality requirements** often less well understood [1]
- **Usability** is one of the quality requirements that may be critical for the research software to support its *underlying research goal*

[1] Wiese, I.; Polato, I.; Pinto, G.: Naming the Pain in Developing Scientific Software. IEEE Software 4/37, pp. 75–82, 2020.



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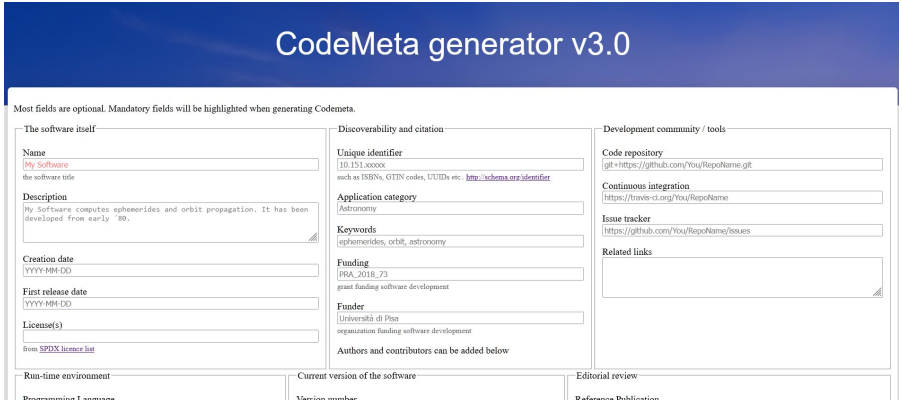


https://codemeta.github.io/codemeta-generator/

Aim of the workshop

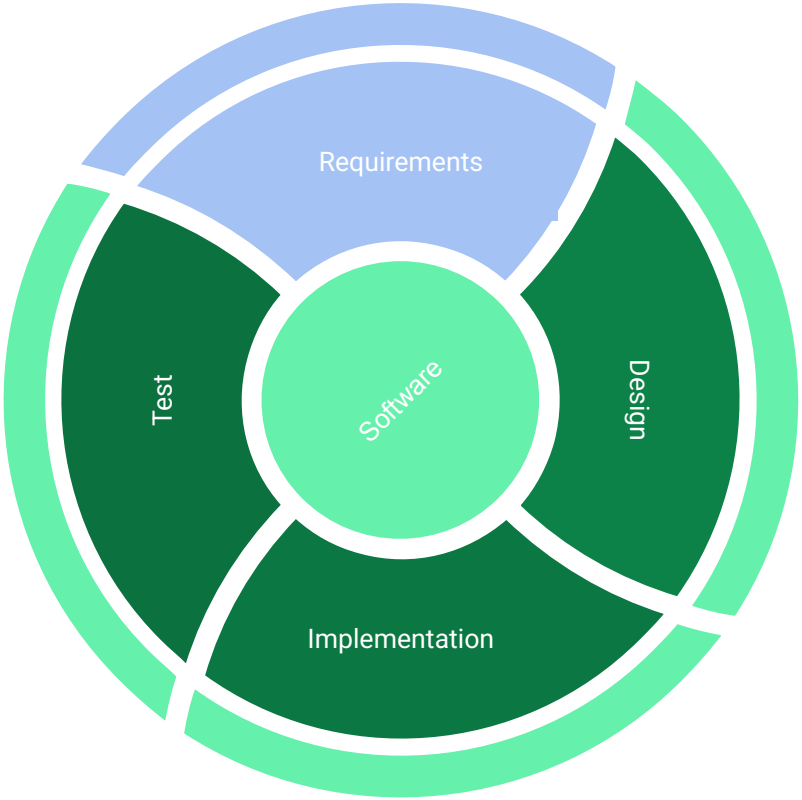
- Study and foster exchange on aspects of usability in RSE
  - **Interaction capability:** capability of a product to be interacted with by specified users to exchange information between a user and a system via the user interface to complete the intended task

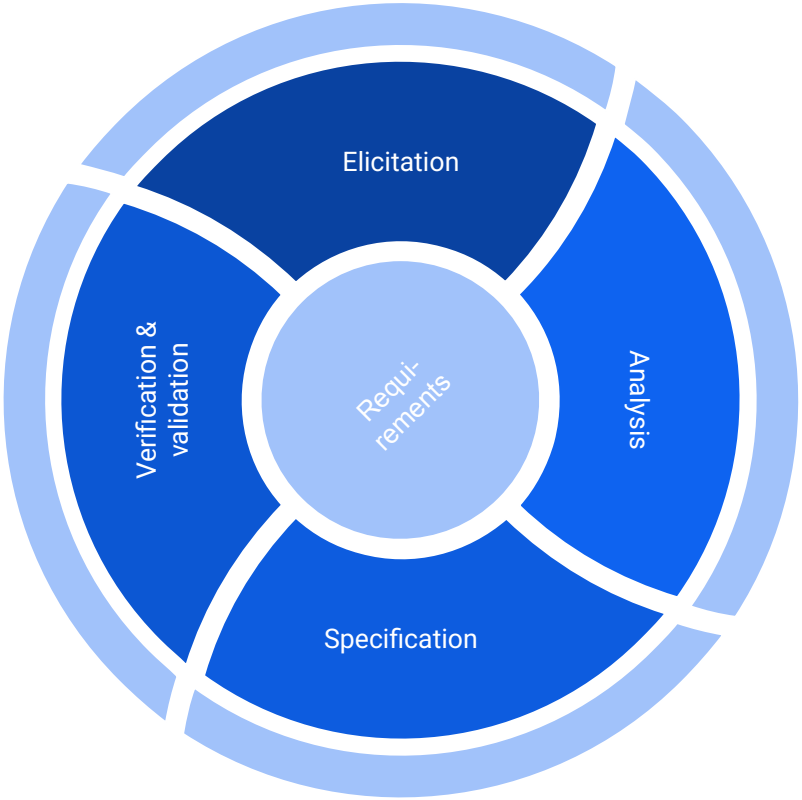
https://iso25000.com/images/figures/iso_25010_en.png

SOFTWARE PRODUCT QUALITY								
FUNCTIONAL SUITABILITY	PERFORMANCE EFFICIENCY	COMPATIBILITY	INTERACTION CAPABILITY	RELIABILITY	SECURITY	MAINTAINABILITY	FLEXIBILITY	SAFETY
FUNCTIONAL COMPLETENESS	TIME BEHAVIOUR	CO-EXISTENCE	APPROPRIATENESS RECOGNIZABILITY	FAULTLESSNESS	CONFIDENTIALITY	MODULARITY	ADAPTABILITY	OPERATIONAL CONSTRAINT
FUNCTIONAL CORRECTNESS	RESOURCE UTILIZATION	INTEROPERABILITY	LEARNABILITY	AVAILABILITY	INTEGRITY	REUSABILITY	SCALABILITY	RISK IDENTIFICATION
FUNCTIONAL APPROPRIATENESS	CAPACITY		OPERABILITY	FAULT TOLERANCE	NON-REPUDIATION	ANALYSABILITY	INSTALLABILITY	FAIL SAFE
			USER ERROR PROTECTION	RECOVERABILITY	ACCOUNTABILITY	MODIFIABILITY	REPLACEABILITY	HAZARD WARNING
			USER ENGAGEMENT		AUTHENTICITY	TESTABILITY		SAFE INTEGRATION
			INCLUSIVITY		RESISTANCE			
			USER ASSISTANCE					
iso25000.com			SELF-DESCRIPTIVENESS					

Aspects of usability

- **Appropriateness recognizability:** capability of a product to be recognized by users as appropriate for their needs
- **Learnability:** capability of a product to have specified users learn to use specified product functions within a specified amount of time
- **Operability:** capability of a product to have functions and attributes that make it easy to operate and control
- **User error protection:** capability of a product to prevent operation errors
- **User engagement:** capability of a product to present functions and information in an inviting and motivating manner encouraging continued interaction
- **Inclusivity:** capability of a product to be utilised by people of various backgrounds
- **User assistance:** capability of a product to be used by people with the widest range of characteristics and capabilities to achieve specified goals in a specified context of use
- **Self-descriptiveness:** capability of a product to present appropriate information, where needed by the user, to make its capabilities and use immediately obvious to the user without excessive interactions with a product or other resources


Requirements
Design
Implementation
Test
Software


Elicitation
Analysis
Specification
Verification & validation
Requi-rements

Usability requirements for research software

Which *research goal* is supported by the research software project?

How does the *research software project* support the research goal?
How does *usability* of the research software project influence the research goal?

Which *users* are relevant for the research software project?
In which *context* is the research software project used?
Which *goals* do users aim to achieve with the research software project?

Which *aspects of usability* are important for the research software project?
How to specify these *usability requirements*?

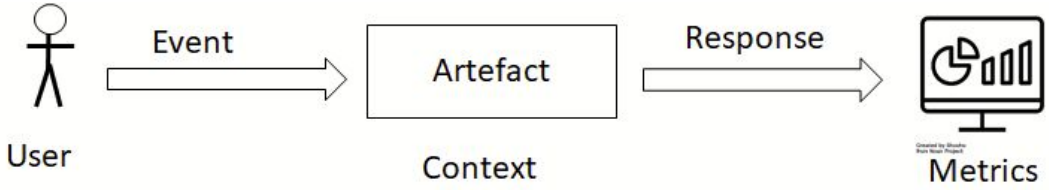
Steering questions

1. Who are the users of the RSE project based on the research goal?

2. Which usability aspects play an important role in the RSE project for these users?

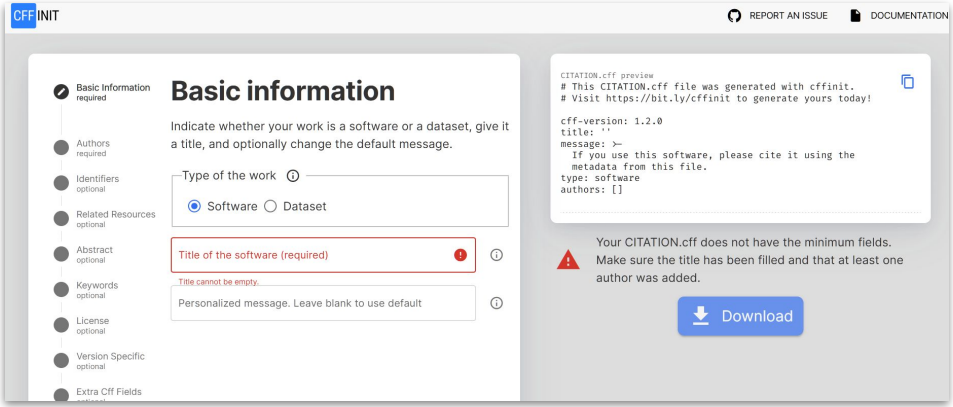
3. How do these usability aspects influence the research goal that the RSE project contributes to?

Quality scenario



If a RSE wants to create meta data for a research software project for the first time, then the RSE is able to do this within 10 minutes without looking up additional resources.

Kazman, Rick; Klein, Mark; & Clements, Paul. *ATAM: Method for Architecture Evaluation*. CMU/SEI-2000-TR-004. Software Engineering Institute. 2000. https://insights.sei.cmu.edu/library/atam-method-for-architecture-evaluation/



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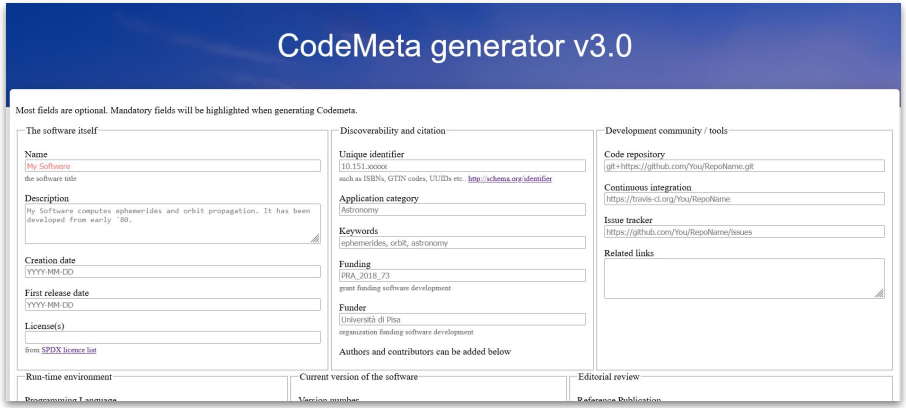

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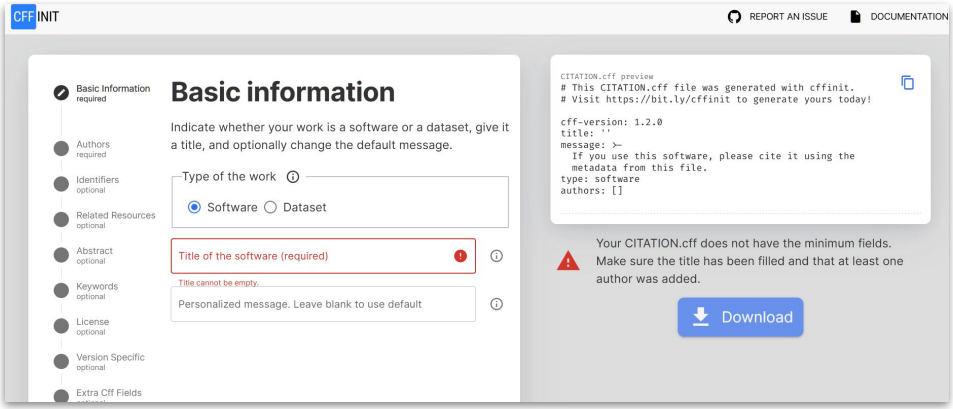
Quality scenario

If a RSE wants to fix an error in the generated meta data for a research software project, then the RSE is able to do this within 10 seconds.



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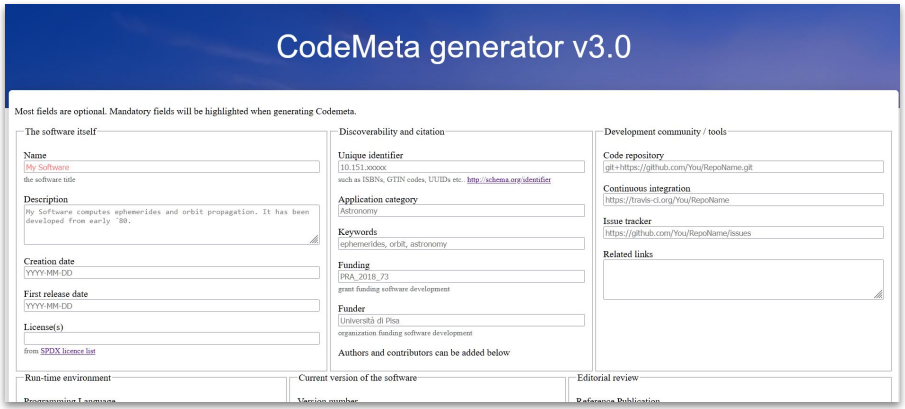

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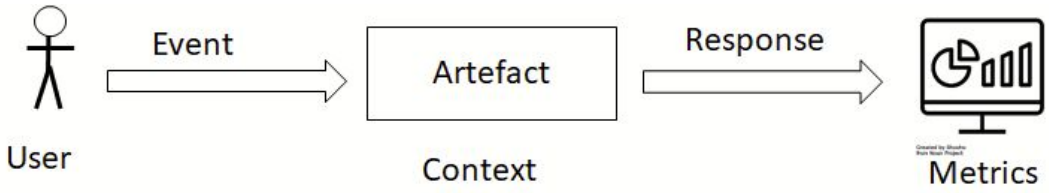
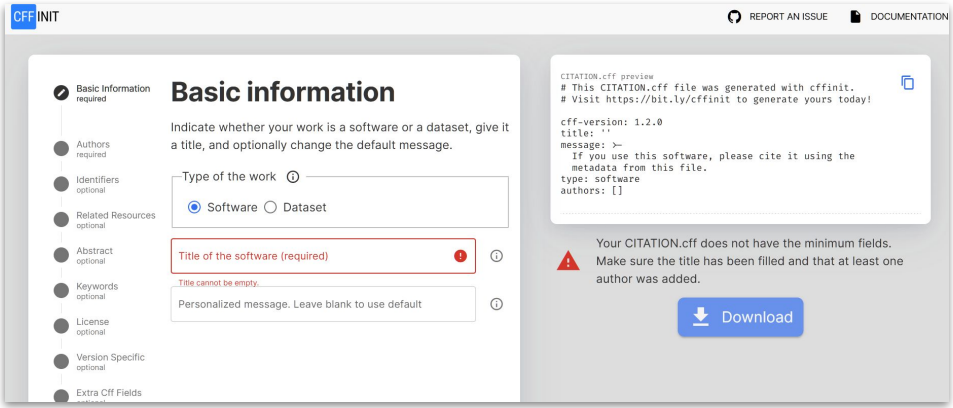
Quality scenario



If a RSE wants to complete partially created meta data for a research software project, then the RSE is able to restart with completion within 5 seconds.



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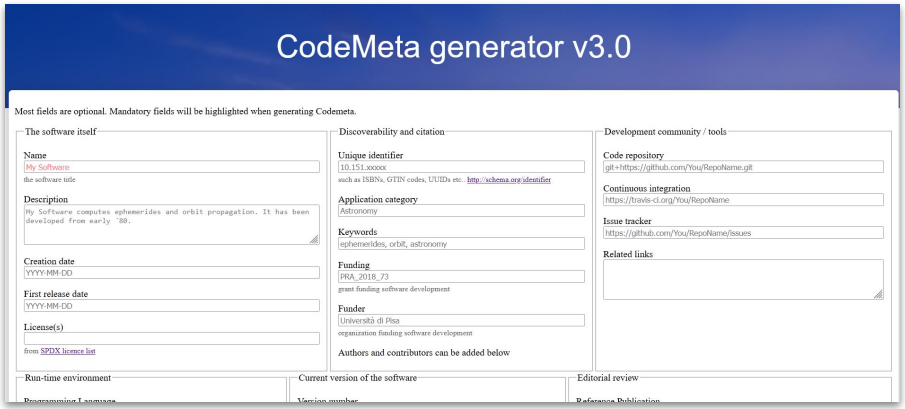

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Workshop organization

1. Intro & motivation
2. Collect RSE projects from participants
    - Research goal & RSE project descriptions
3. Select RSE projects to be further discussed
4. Split into groups per selected RSE project
5. Discussion of steering questions in groups
6. Report results of group discussion
7. Evaluation

Evaluation

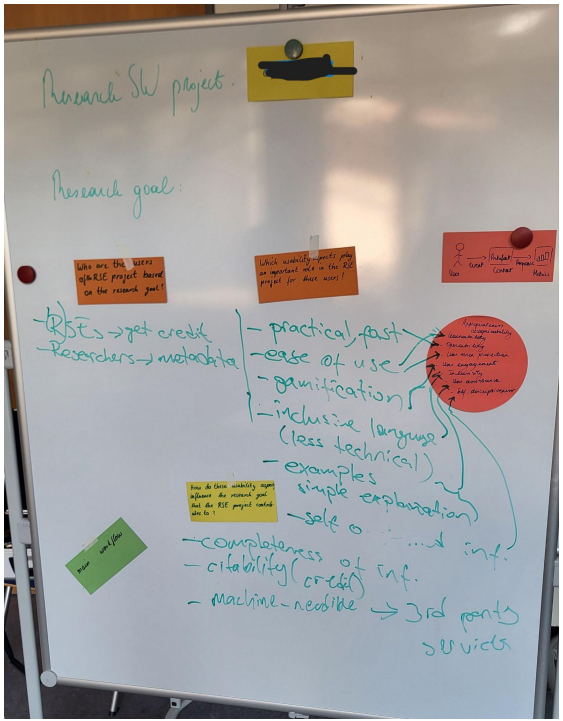
- Which usability aspects are important in the selected RSE projects?

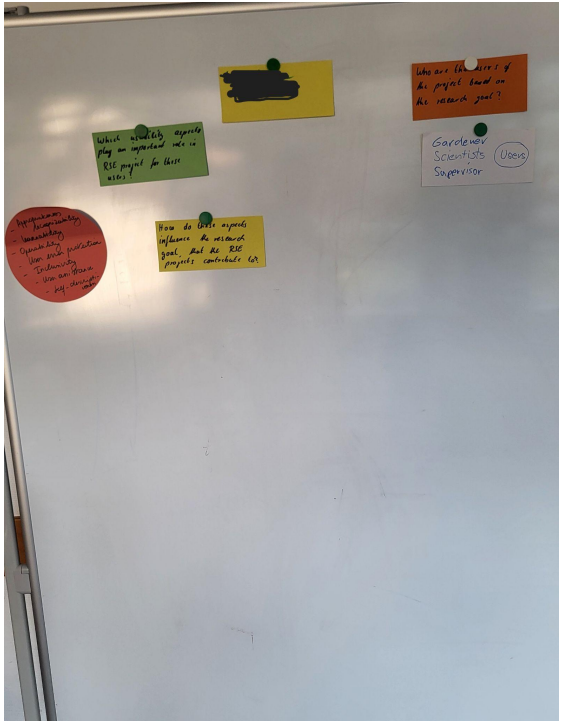
- How can research software engineers be supported with practical software engineering methods to take these usability aspects into account?

Keep in touch...

- If you are interested in collaborating further, ...

Pictures of the results





Pictures of the results (2)