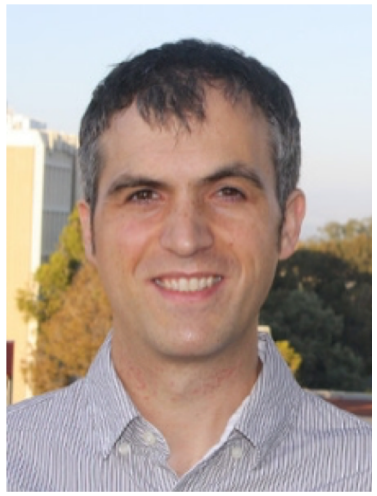
COLLEGE OF ENGINEERING
COMPUTER SCIENCE
VIRGINIA TECH

Decomposing the Rationale of Code Commits: The Software Developers' Perspective

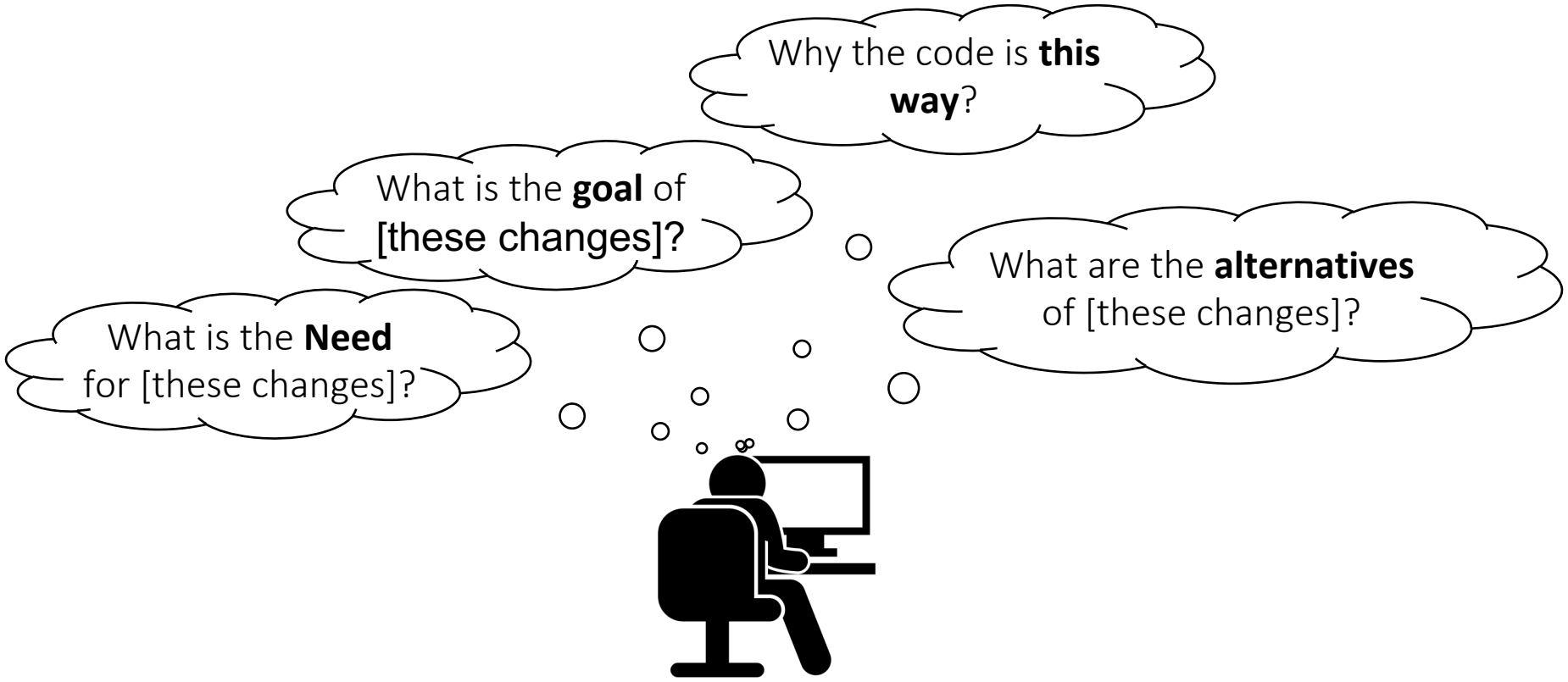
Khadijah Al Safwan



Francisco Servant

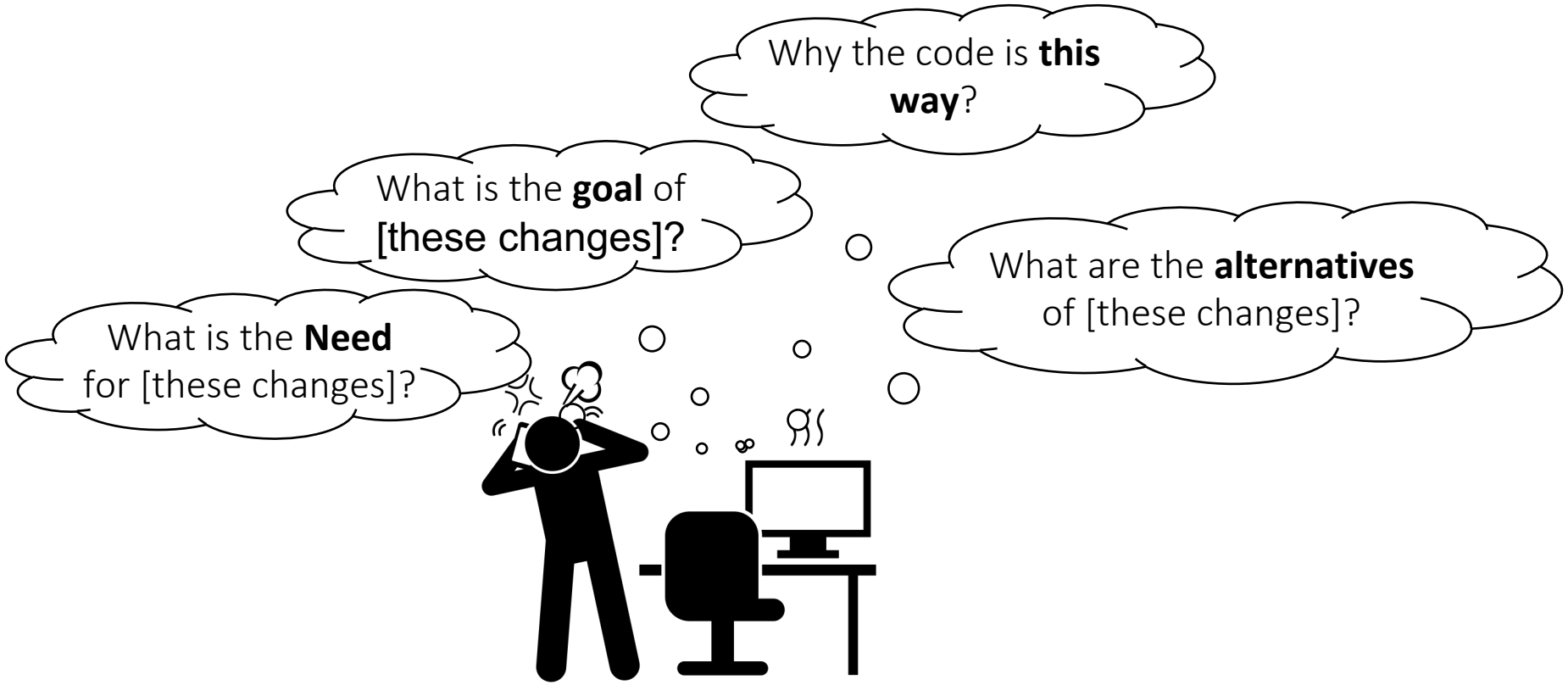
Introduction

What is the rationale behind these code changes?



Introduction

What is the rationale behind these code changes?



Related Work

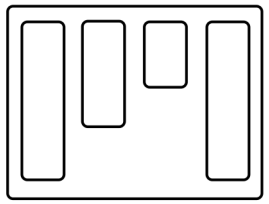
- Rationale in software development life-cycles
  - Software requirements
  - Software design and architecture
  - Software evolution and maintenance
    - Empirical studies

      Ko 07, Burge 08, Fritz 10, LaToza 10, Roehm 12, Tao 12, Maalej 14, Codoban 15, Pascarella 18, Eber 18
    - Capturing rationale

      Kurtanović 17, Alkadhi 18
    - Software/change comprehension tools

      Buse 10, Bradley 11, Cortés-Coy 14, Linares-Vásquez 15, Jiang 17,…

Research Method

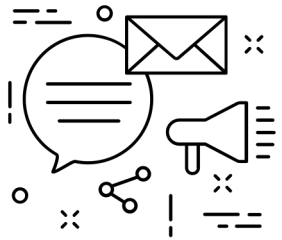


Model of Rationale

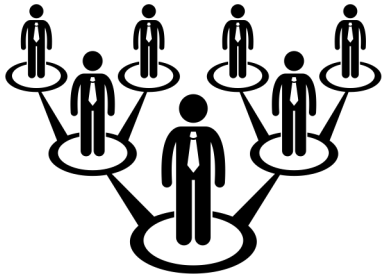
Experience with Rationale

One-to-One Interview

Recruitment

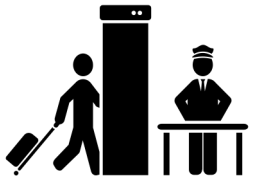


Public Channels



Participant Referrals

Design & Analysis



Screening Questionnaire

One-to-One Interview

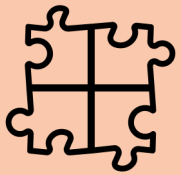
Recruitment

Design & Analysis

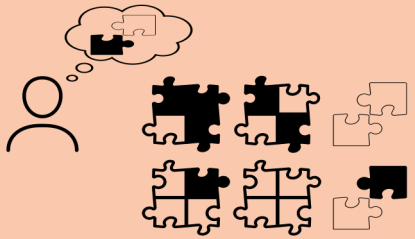
Pilot Interviews

Situations of Rationale Need

Decomposition of Rationale

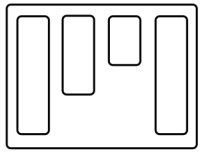


Initial decomposition

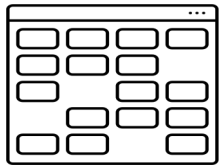


Proposed decomposition

Quantitative Questions



Model of Rationale



Card Sorting

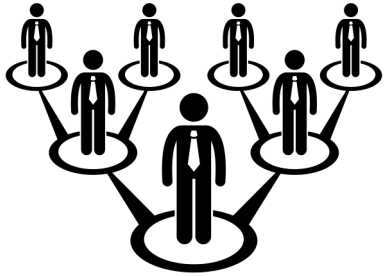
Responses Distribution

Online Survey

Recruitment

Design & Analysis

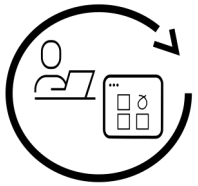
Public Channels



Participant Referrals

Online Survey

Recruitment



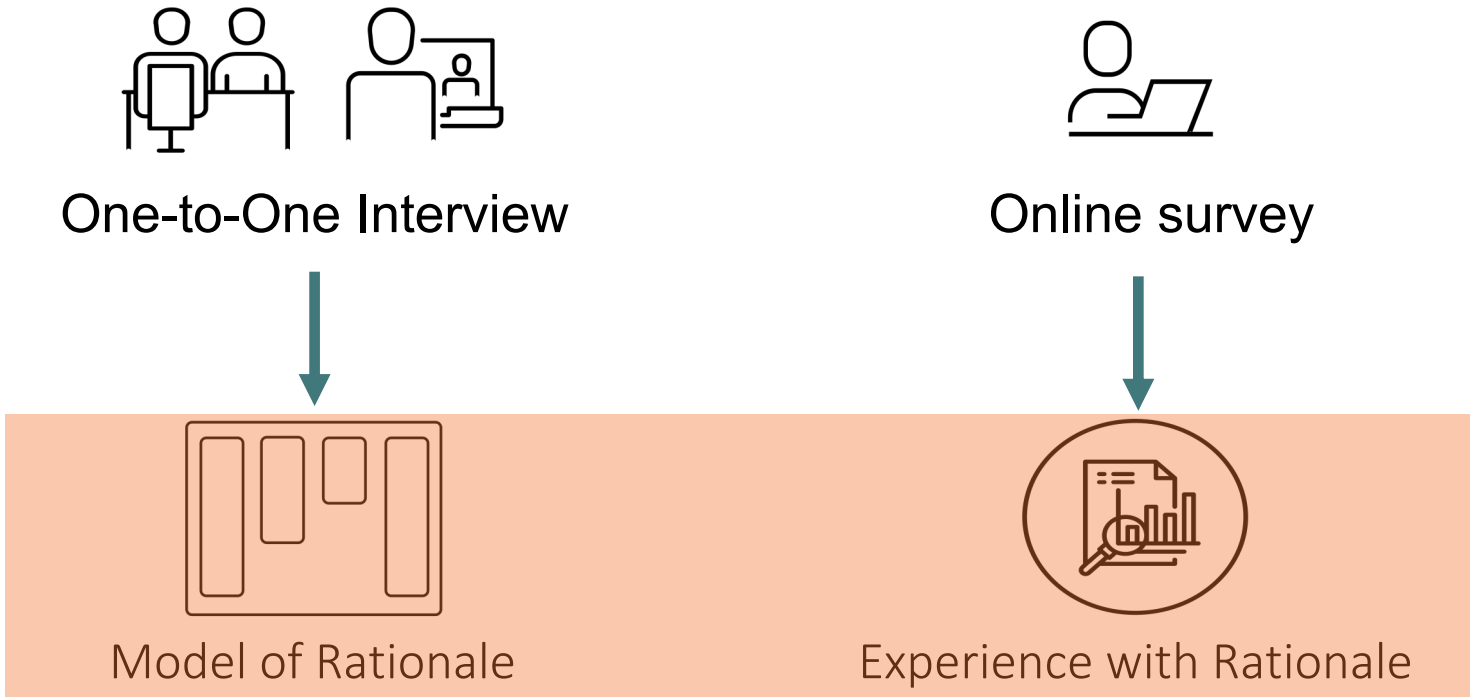
Pilot Surveys

Design & Analysis

Quantitative Questions

Responses Distribution

Results


One-to-One Interview
Online survey
Model of Rationale
Experience with Rationale

Model of Rationale for Code Commits

Goal
Need
Benefits
Constraints
Alternatives
Selected Alternatives
Dependency
Committer
Time
Location
Modifications
Explanation of Modifications
Validation
Maturity Stage
Side Effects

Experience with Rationale

Need | Finding | Recording

(Frequency of Need)

Modifications
Goal
Location
Committer
Time
Need
Explanation of Modifications
Dependency
Benefits
Maturity Stage
Constraints
Validation
Selected Alternatives
Side Effects
Alternatives

Experience with Rationale

Need	Finding	Recording
(Frequency of Need)	(Difficulty of Finding)	

Modifications	Alternatives
Goal	Side Effects
Location	Constraints
Committer	Dependency
Time	Selected Alternatives
Need	Benefits
Explanation of Modifications	Validation
Dependency	Maturity Stage
Benefits	Explanation of Modifications
Maturity Stage	Need
Constraints	Time
Validation	Goal
Selected Alternatives	Location
Side Effects	Modifications
Alternatives	Committer

Experience with Rationale

Need | Finding | Recording

Need (Frequency of Need)	Finding (Frequency of Finding)
Modifications	Committer
Goal	Modifications
Location	Location
Committer	Goal
Time	Time
Need	Need
Explanation of Modifications	Maturity Stage
Dependency	Explanation of Modifications
Benefits	Benefits
Maturity Stage	Dependency
Constraints	Validation
Validation	Selected Alternatives
Selected Alternatives	Constraints
Side Effects	Side Effects
Alternatives	Alternatives

Experience with Rationale

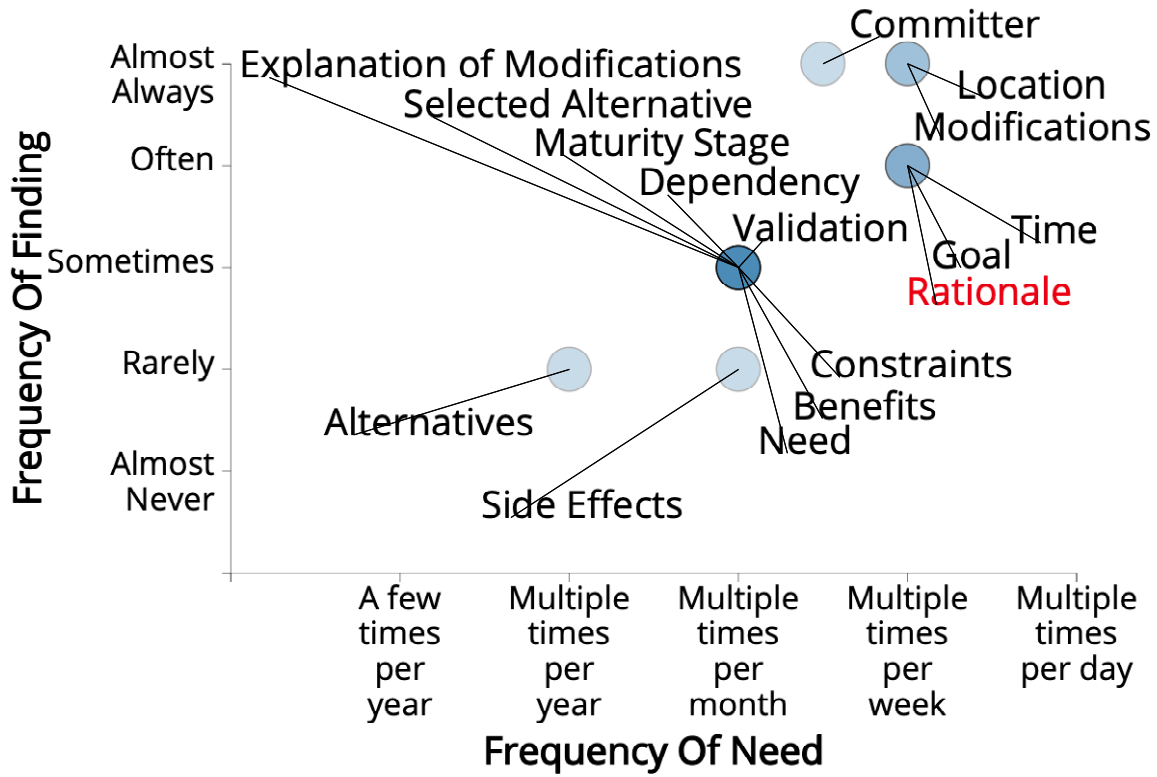
Need (Frequency of Need)	Finding (Frequency of Finding)	Recording (Frequency of Recording)
Modifications	Committer	Goal
Goal	Modifications	Committer
Location	Location	Location
Committer	Goal	Modifications
Time	Time	Time
Need	Need	Need
Explanation of Modifications	Maturity Stage	Explanation of Modifications
Dependency	Explanation of Modifications	Dependency
Benefits	Benefits	Side Effects
Maturity Stage	Dependency	Validation
Constraints	Validation	Benefits
Validation	Selected Alternatives	Maturity Stage
Selected Alternatives	Constraints	Selected Alternatives
Side Effects	Side Effects	Constraints
Alternatives	Alternatives	Alternatives

Experiences Comparison

Need (Frequency of Need)	Finding (Frequency of Finding)	Recording (Frequency of Recording)
Modifications	Committer	Goal
Goal	Modifications	Committer
Location	Location	Location
Committer	Goal	Modifications
Time	Time	Time
Need	Need	Need
Explanation of Modifications	Maturity Stage	Explanation of Modifications
Dependency	Explanation of Modifications	Dependency
Benefits	Benefits	Side Effects
Maturity Stage	Dependency	Validation
Constraints	Validation	Benefits
Validation	Selected Alternatives	Maturity Stage
Selected Alternatives	Constraints	Selected Alternatives
Side Effects	Side Effects	Constraints
Alternatives	Alternatives	Alternatives

Experiences Comparison

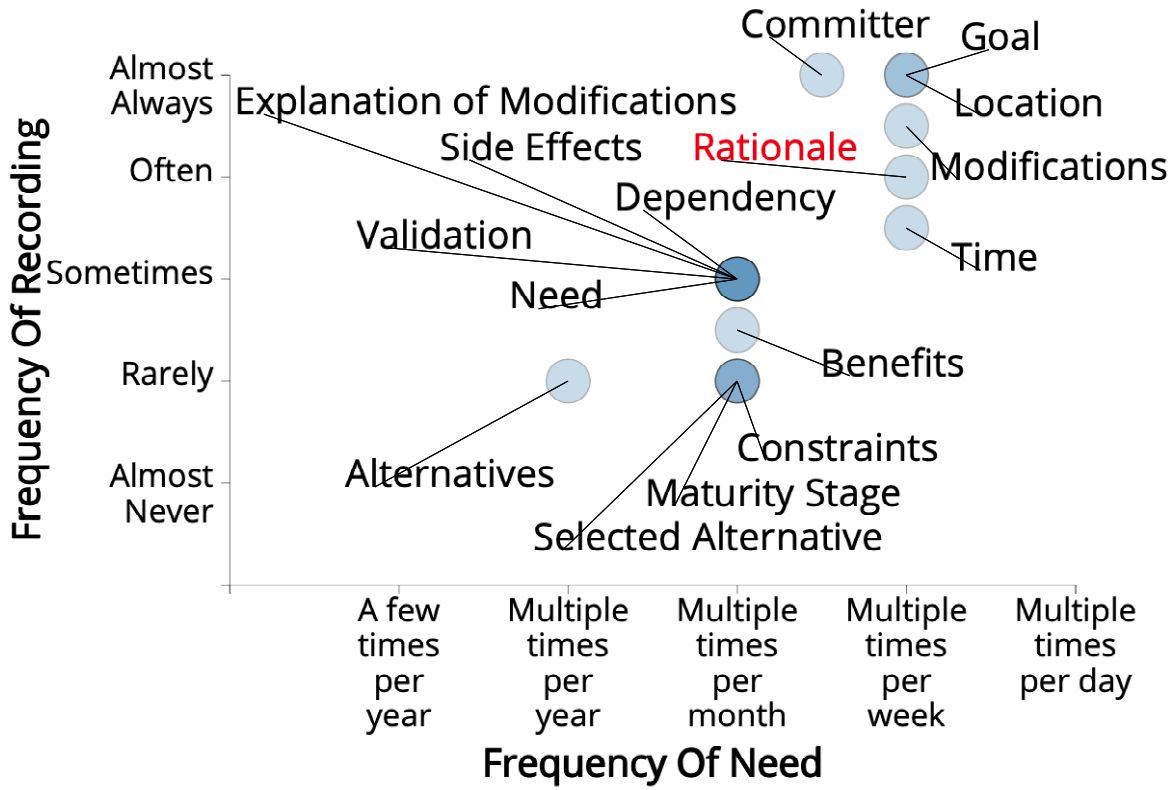
Need | Finding | Recording



Most components only sometimes found even when they are needed multiple times per month

Experiences Comparison

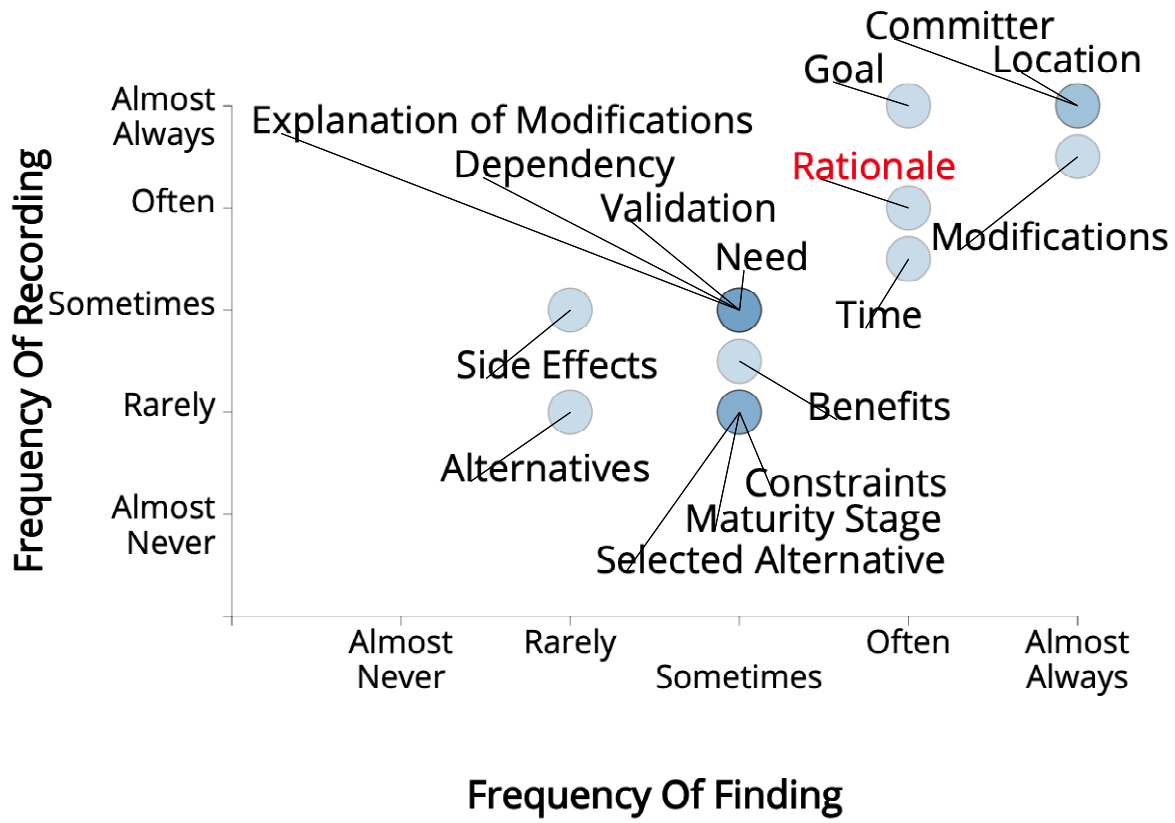
Need | Finding | Recording



Many components are not frequently recorded even if they are needed multiple times per month

Experiences Comparison

Need | Finding | Recording

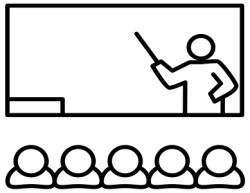


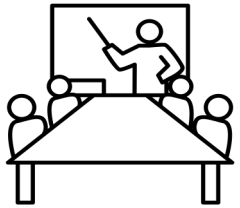
Some components are rarely recorded and sometimes found, but they are the most difficult to find

Implications and Future Work

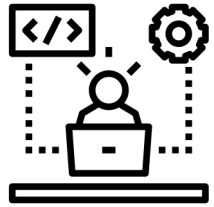
What's next …

Educators

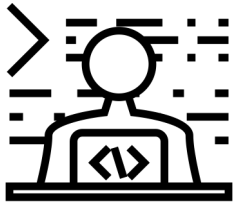




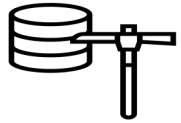
Researchers & Tool Builders



Practitioners



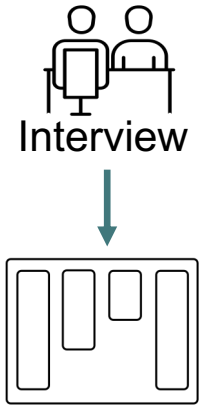
Empirical studies



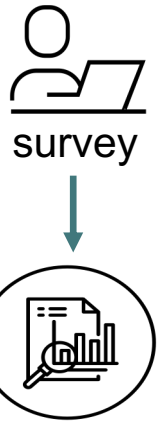
Conclusion

Problem

Solution



Model
of Rationale



Experience
with Rationale

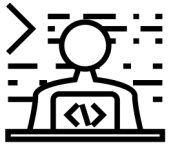
Contribution

Need Finding Recording

Goal
Need
Benefits
Constraints
Alternatives
Selected Alternatives
Dependency
Committer
Time
Location
Modifications
Explanation of Modifications
Validation
Maturity Stage
Side Effects

Implications

Educators



Practitioners

Researchers
& Tool Builders