Improving the Consistency and Usefulness of Architecture Descriptions: Guidelines for Architects

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Key issues:
- Need to support software architecture evolution has been well recognized
- Inconsistencies among multiple architecture descriptions, and between architecture descriptions and the implementation
- Architecture descriptions are not always trusted and used as desired

Goal:
- Examine architectural inconsistencies with a focus on how they evolve over time and can be mitigated using practical guidelines
- Two surveys with 93 and 72 participants

Main findings:
- Consequences of inconsistencies typically arise at later stages, especially if an architecture description concerns multiple teams
- Need to capture emerging elements to keep the architecture description consistent with the implementation
- Consider the current-state and future-state architecture separately
- Limit the upfront architecture to stable decisions, while paying attention to concerns that matter across team borders
- Companies should aim to integrate architects into the teams to capture emerging aspects

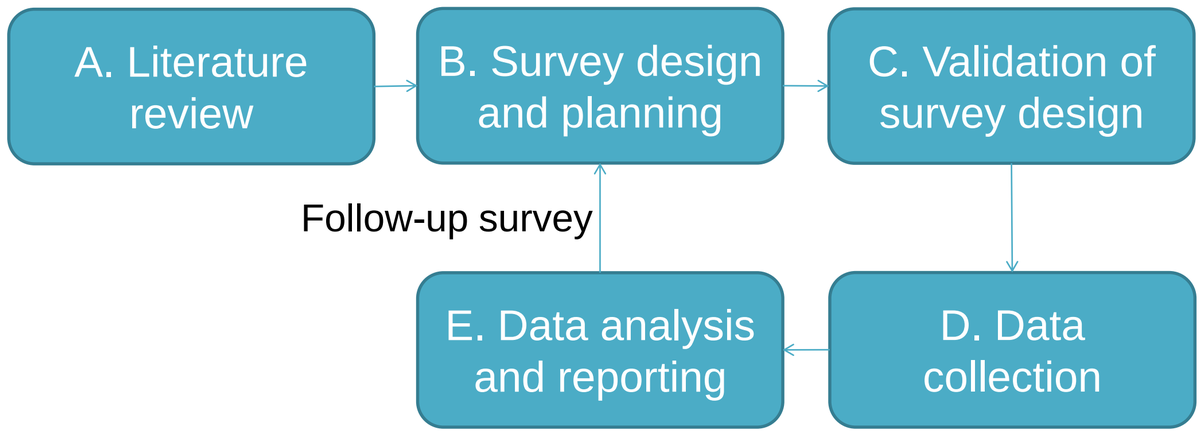
Research Questions

RQ1 What are the types, reasons, and consequences of architectural inconsistencies?

RQ2 How do architecture descriptions and their relation to the implementation change over time?

RQ3 What are guidelines to support practitioners with the management of architecture descriptions?

Research Method



Types, Reasons, Consequences of Architectural Inconsistencies

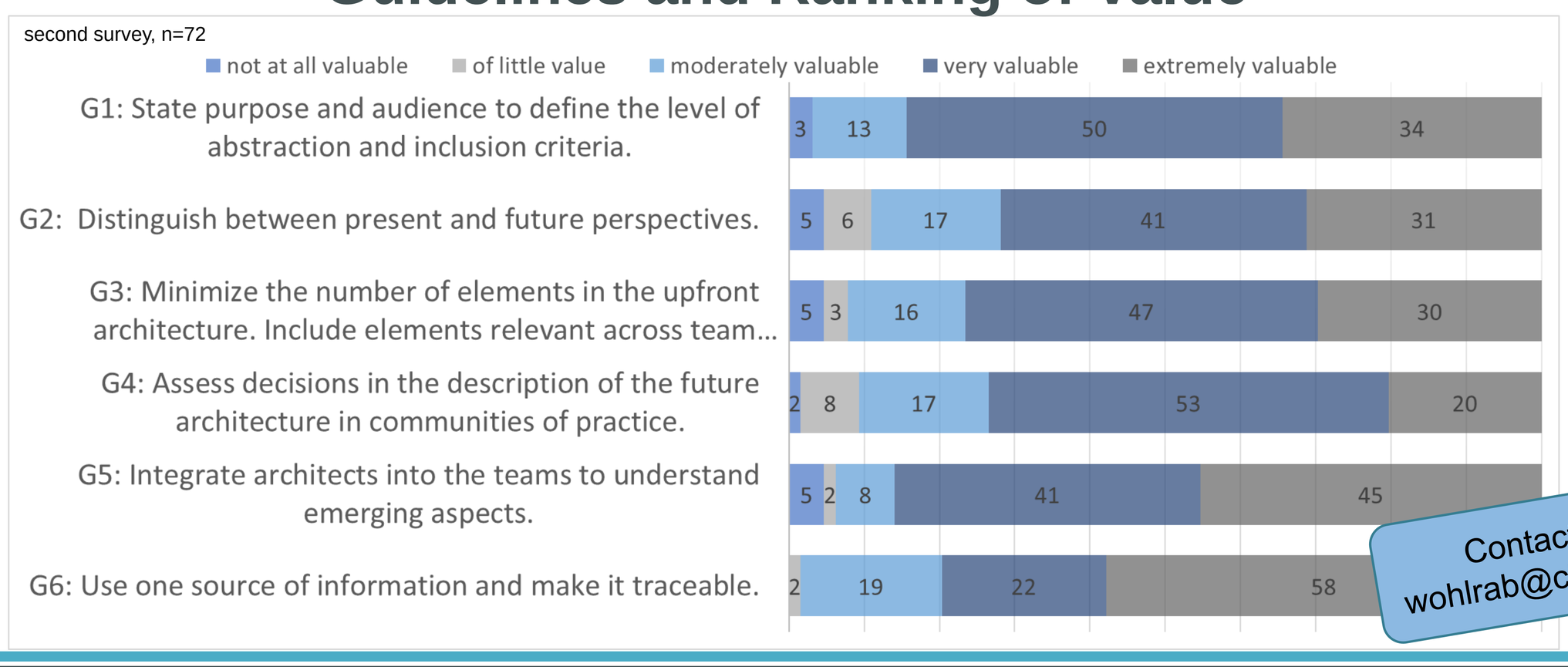
- Critical types of inconsistencies related to (1) Interface specifications, (2) rules and constraints, (3) patterns and guidelines
- Less severe consequences: (4) Wording/language
- 54% lack of time, 26% lack of resources, 54% lack of knowledge
- 75% agree that "inconsistencies are more likely to arise when a change concerns multiple teams"
- Consequences mostly observable at later development stages, runtime, deployment, maintenance

Change of Architecture Descriptions over Time

AUDIENCE, ROLE OF CONSISTENCY AND OF EMERGING ELEMENTS OVER TIME (NUMBERS IN PERCENT, SECOND SURVEY)

	During initial creation of the architecture	During development and design
Architects are the main users	56%	28%
Developers are the main users	22%	54%
Inconsistencies are not a big issue	38%	14%
Need stability/correctness/ consistency among arch. descr.'s	61%	86%
Emerging elements should be planned for and captured	86%	90%

Guidelines and Ranking of Value



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