Supporting Architectural Decision Making for Systems-of-Systems Design under Uncertainty

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Uncertainty of Architectural Decision Making

Sources of *uncertainty*:

- various design alternatives, variants with different quality attributes exist
- documentations or reusable architectural decisions are in informal & narrative style
- competing requirements - often vague and imprecise - need to be balanced

For recurring design issues resolving the uncertainty of decision making is complex and time-consuming.

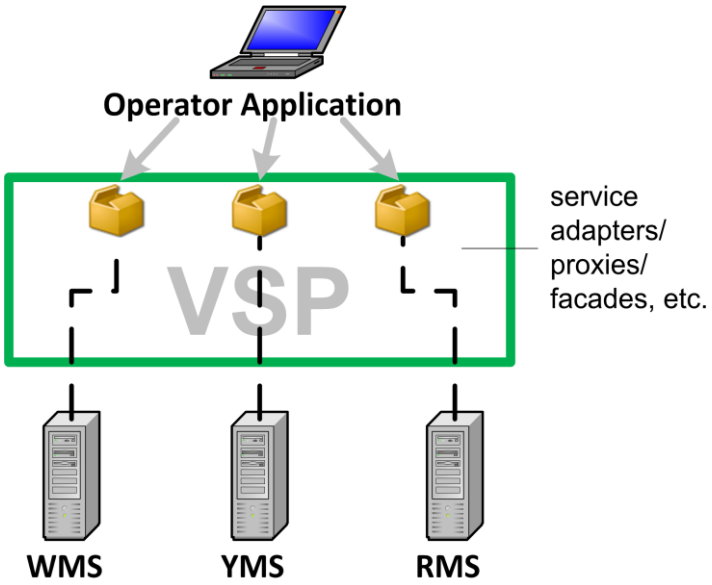
Research Challenges

RQ1: How to resolve the inherent uncertainty in architectural decision making?

RQ2: How to adapt application-generic architectural decisions to technology and system specific contexts?

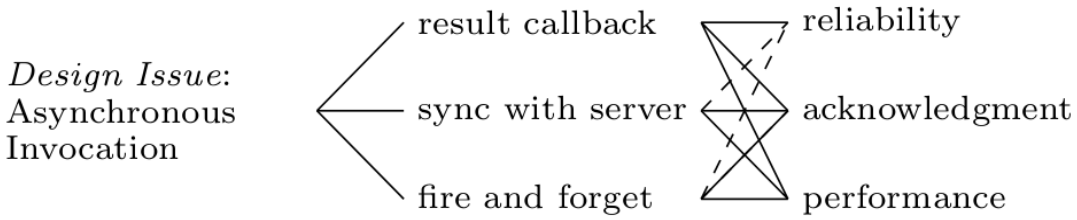
RQ3: How to provide (semi-)automated support for making and documenting reusable architectural decisions?

Motivating Case

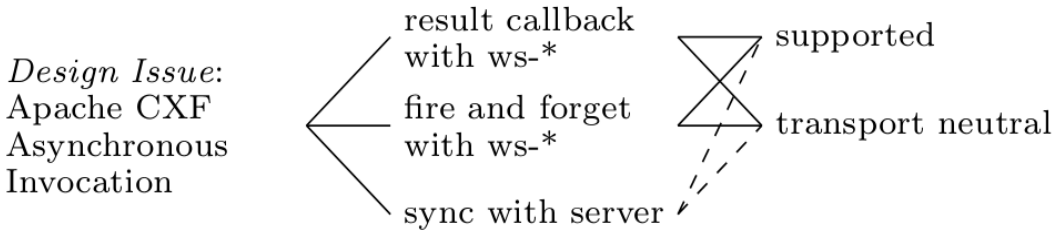


Service-based platform integration in a warehouse

Application-generic architectural decision



Application-specific architectural decision

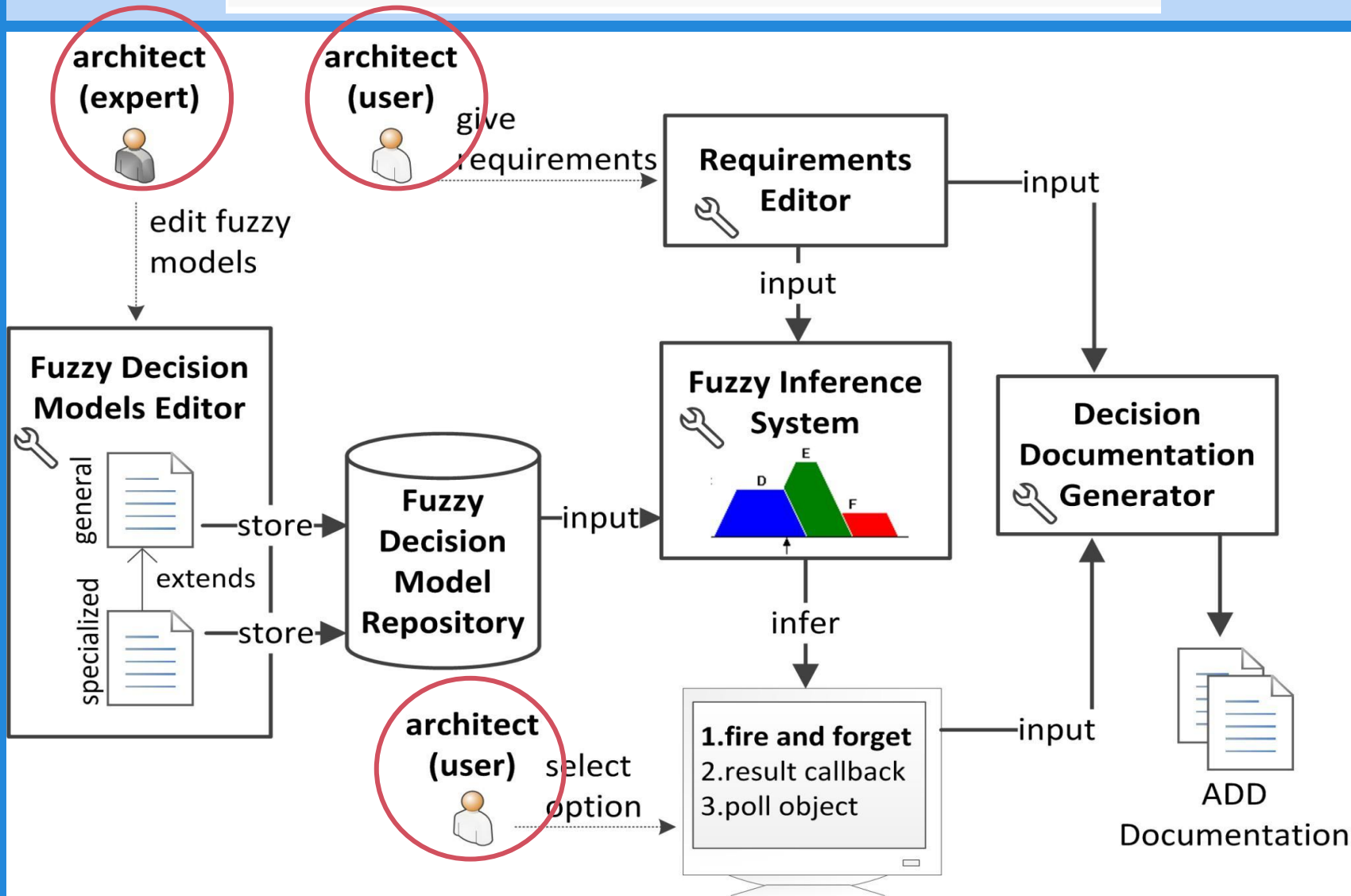


Approach Overview

```
attributes
    reliab
    acknow
end
```

- result_callback
- poll_object
- messaging
- sync_result

```
if performance
      result_ca                                    edium then
```



Conclusions & Future Plans

Semi-automated guidance for **recurring** architectural decisions under **uncertainty**, so that architects have more time for design issues that require creative thinking.

We plan to…

- Apply our approach for other design spaces
- Evaluate complexity, efficiency and usability with practitioners
- Consider inter-decision dependencies
- Give feedback to fuzzy expert system from existing decisions

Thank you for your attention!

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https://swa.univie.ac.at/Software_Architecture