Two Replication Studies for Evaluating Artefact Models in RE: Results and Lessons Learnt

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Context - Artefact-based RE

Activity Orientation

VS

Artefact Orientation
“We do not take even our own observations quite seriously, or accept them as scientific observations, until we have repeated and tested them. Only by such repetitions can we convince ourselves that we are not dealing with a mere isolated coincidence, but with events which, on account of their regularity and reproducibility, are in principle intersubjectively testable.”

[Popper 1959]
Overall Goal & Contribution

• Reliable repository of empirical studies on RE
  – Strengthen an initial theory of expectations

• Two replication studies
  – Strengthen confidence on the benefits and shortcomings of artefact-based RE
  – Deeper insights in artefact-based RE
  – First conclusions on the actual impact of AO on RE

• First steps towards a reliable database
Empirical Evidence for Artefact Orientation: In [5], we report on a case study with a street traffic management business unit from Siemens on the application of an artefact-based requirements engineering approach. We discussed the different benefits and shortcomings of that approach, but remained aware that the empirical evidence is limited to the given classification of benefits [5].
Case Study Results

• Roles
  - Automotive: Project Manager from R&D and Developer
  - Avionics: Project Manager from R&D and Developer from series development

• Case
  - Project ARAMiS: integrated approach for developing and realizing cyber-physical systems (CPS) scenario
  - All partners use the ARAMiS artefact model for documenting RE artefacts
Results - RQ1
Results - RQ1

_Ease of Use:_ “The reference model is clear and understandable”
Results - RQ2 and RQ3
Results - RQ2 and RQ3

Syntactic Consistency: “Elements in the specification are used consistently”
Comparison to the Replication Base

• Both replications:
  – very good ratings in syntactic consistency and completeness
  – high ratings for traceability and ease of perception

• Replication base:
  – Syntactic quality was rated slightly higher
  – Ease of use slight lower

(Working) Hypotheses

A higher level of detail in an artefact model...

H1: ... increases the syntactic quality in the artefacts
H2: ... decreases the ease of use of the approach
Lessons Learnt

• Diversity of information
  – Many specific expert areas need to be captured by artefact model
  – Different domains result in different challenges and priorities for creating artefacts

• Usability Assessment
  – Usability of an artefact model depends on the acceptance of the requirements engineer
  – Usability and syntactic and semantic consistency depend on the tool
Conclusion

• Two replication studies (Automotive and Avionics)
  – Evaluation of usability and quality of an artefact model
    (in comparison to a former reference model)
  – Summary of Results:
    • Both companies perceive the artefact model as better
      than the former reference model
    • Hypothesis confirmed

➡ First step towards an empirical repository on artefact-based RE
➡ Strengthen out confidence in the general benefits of artefact-orientation
You are cordially invited to join us!

We can provide
– Evaluation sheets
– Models & Tools
– Project data

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