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Towards a self-adaptive service-oriented methodology based on extended SOMA

Key words: Service-oriented architecture, Self-adaptive process, Architectural pattern, Quality attribute, Adaptation pattern, Architectural tactic

Corresponding author: Alireza Parvizi-mosaed
E-mail: aparvizi@ce.sharif.edu
ORCID: http://orcid.org/0000-0002-1957-2960

Introduction

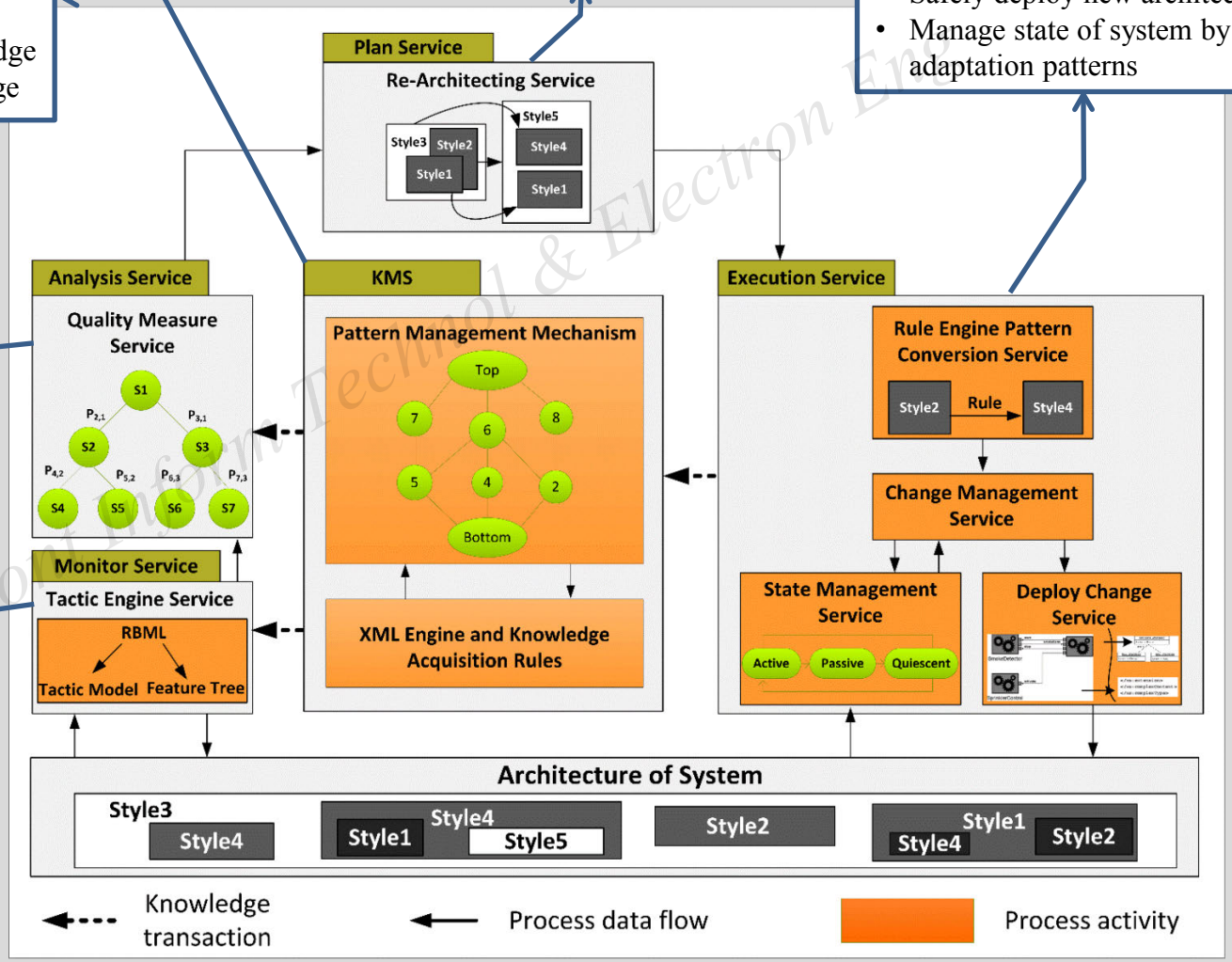
- Maintaining the quality of software architecture at runtime is a major challenge for architects.
- This paper proposes an independent self-adaptive process (SAP) to automate SOMA methodology.
- SAP takes advantage of the MAPE-K model to monitor and analyze the environment, re-plane the architecture, and execute it after detecting any disturbance in the quality of software.

High-level structure of SAP

- Manage unstructured assets
- Relate context to domain
- Manage pattern composition with FCA model
- Implement concepts of knowledge management with XML language

- Change architecture by re-planning pattern compositions

- Convert patterns by Rule Engine service
- Safely deploy new architecture
- Manage state of system by adaptation patterns



- Formulate quality attribute by utility function
- Estimate quality of system by quality measurement tree

- Monitor context of system
- Compose patterns and tactics
- Modeling with RBML
- Analyze trade-off between quality attributes by feature tree

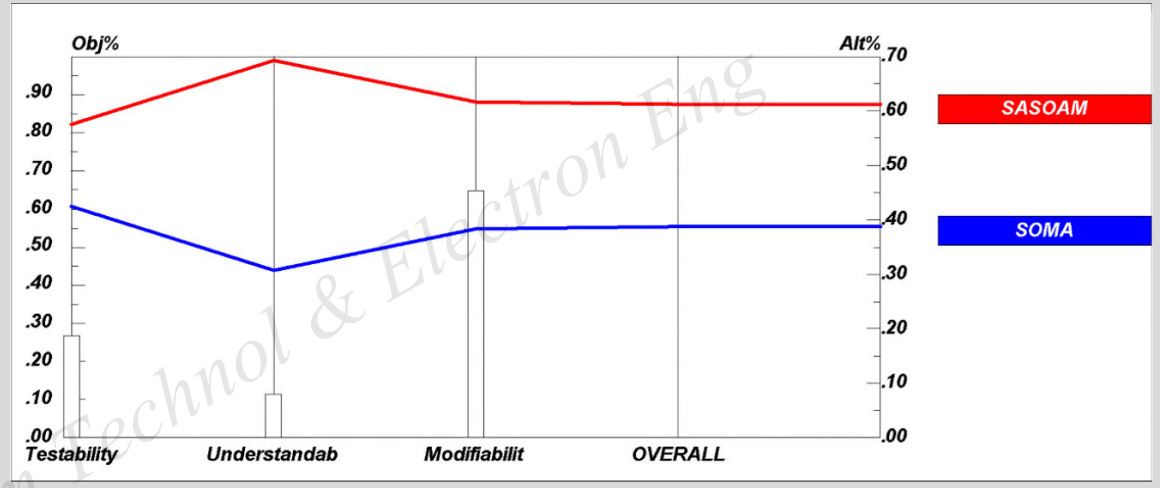
Evaluation

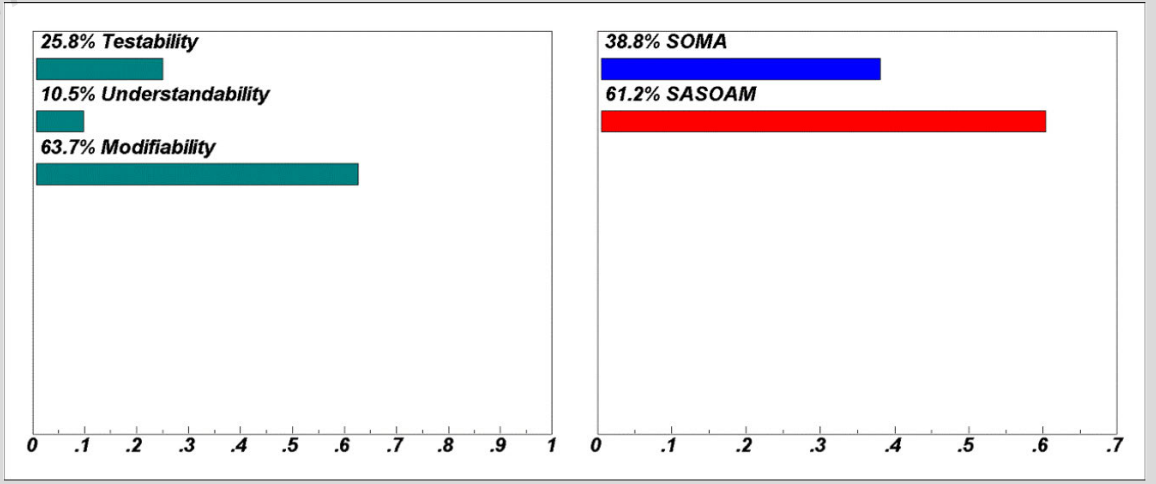
Scenario-based method

- Use the Boehm quality model
- Vote to scenarios by experts
- Maintainability of the proposed methodology is better than SOMA
- Maintainability depends on modifiability more than others

Case study

- The proposed method has been applied to a plug&play weapon system
- Represent practicability of the proposed method





Conclusions

- The proposed method improve self-adaptability of methodologies.
- It modifies quality of systems at runtime.
- It is independent of software development life cycle.
- It makes a meaningful bridge between domain and context of software.
- It improves maintainability of SOMA.
- It is applicable in real case studies.