

# Towards a Framework for Guiding Aspect-Oriented Software Maintenance Empirical Studies

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# Motivation

- AOSD is a “young” paradigm
- Can modularization of crosscutting concerns simplify software maintenance?
- It is increasingly being applied to a wide range of application domains
  - there are a lot of skepticism (risk management)

# The major problem

- Lack of systematic evaluation of the benefits and drawbacks
  - studies, replications and evaluations
- Challenging and time-consuming
  - absence of related work
  - human-based activities
  - technology challenges

# The major reason

- Researches and practitioners are not well equipped
  - frameworks and Benchmarks
    - basic empirical mechanisms
    - advance research
    - technology transfer

# The proposed solution

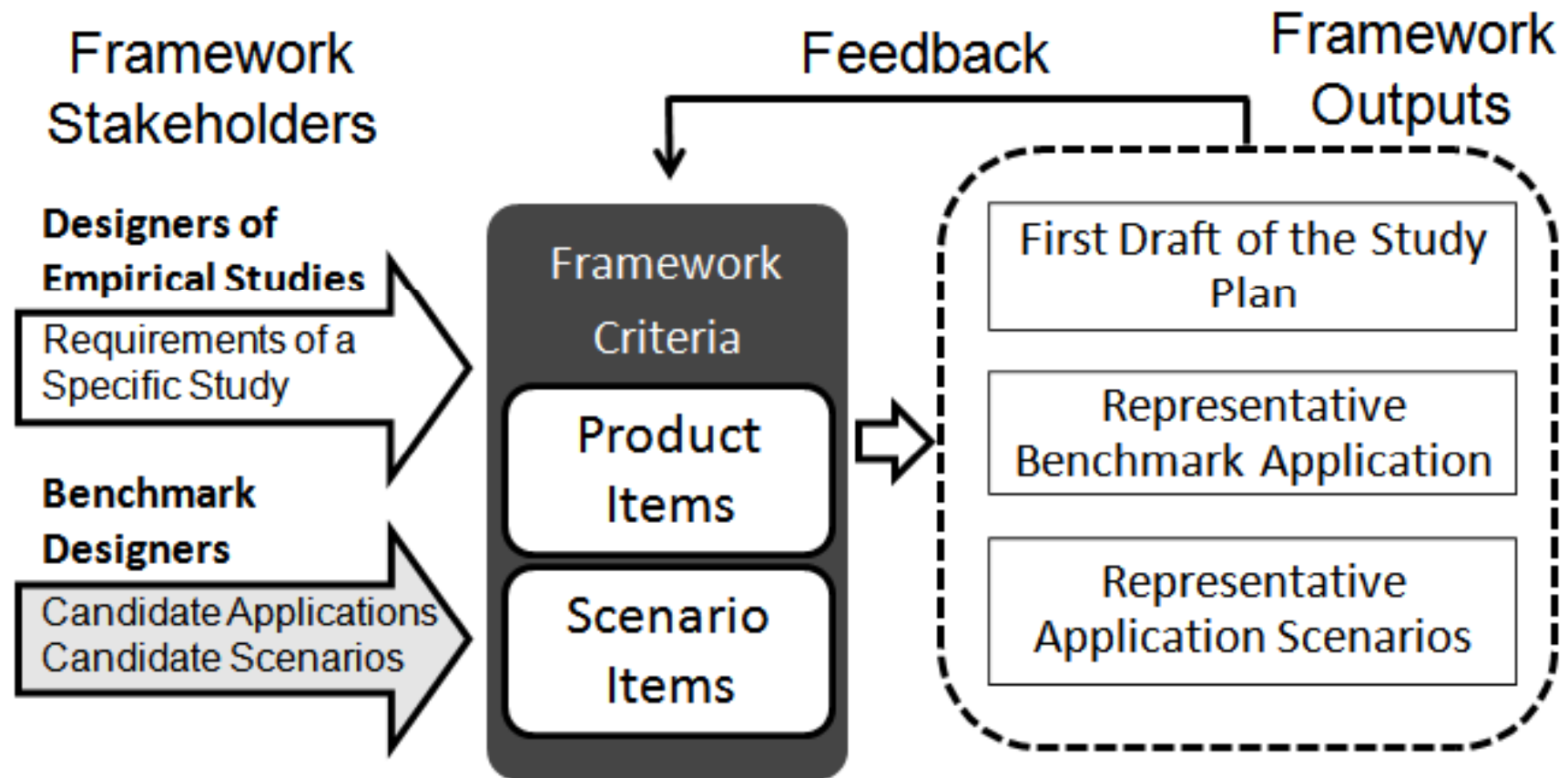
- A framework for guiding AO software maintenance studies
- Supporting the systematic:
  - elaboration, evaluation and replication of empirical studies
  - selection, generation and adaptation of benchmark applications

# The framework

- Defines criteria and guidelines
  - stakeholders with different goals
  - general and specific at the same time
- Three major components
  - Process
  - Product
  - Maintenance Scenarios

**Adaptable** to researchers goals

# The process



# The criteria

- Based and adapted on literature
- Dynamic and extensible
- Product items
  - general and AO attributes
- Maintenance scenarios items

# Evaluation

- A big issue!
- Efficacy
  - planning a new empirical study
    - in the context of AO software maintainability
- Looking for
  - omissions and inaccuracies in empirical studies
  - applications characteristics that adhere to the framework attributes

# Defining a experiment

- Study Goal: assess the maintainability of AO Web-based systems.
- Target application: HealthWatcher
  - real application
  - representative candidate of evolving AO software systems
  - target of several recent studies
  - developed in many programming languages and has multiple releases

# Experiment planning

- *Experiment A*
  - evaluate a previous study plan that generated several releases and scenarios of HW
- *Experiment B*
  - designers of a new experiment want to analyze if the artifacts generated in *Experiment A* could be reuse in their case
  - experimental plan drafts generated

# Experimental settings: Expert vs. Framework User.

- Generation of two plans
  - Expert: without using the framework
  - Postgraduate student: using the framework
- Comparison of both plans
  - how the framework can assist the planning of AO software maintenance studies
  - identify framework benefits and limitations

# Evaluation results

- The framework user made considerations not addressed by the expert
  - scenarios for observing AO architecture instabilities
- Expert plan presented a limited analysis when compared to the another one

The framework suggested a **broader diversity** of maintenance scenarios

# Evaluation results

- Maintenance scenario component
  - Unified Classification of Maintenance Scenarios
    - Expert plan presented ambiguity problems
    - However, anticipated specific architectural stability metrics

The framework addresses  
the **terminology issue**

# Discussion and related work

- On the Symbiosis between Framework and Designers Experience
- Framework Coverage
- Absence of Benchmarking Frameworks for AOSD
- Improving the Body of Knowledge on AO Software Maintenance
- Interplay of Testbeds and Frameworks for AOSD

# Conclusions and ongoing work

- Methodology for designing AO software benchmarks
- Promote information sharing and decrease technology transfer time
- Save time on the quality assessment
- Ongoing work
  - more applications of the framework

If you do experiments, you can help us!!!

Thanks !

Questions ?