SATURN 2008
Architecture Evaluation:
Experiences in Using SEI’ ATAM

ATAM method to evaluate a software testing automation solution

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Conceptual Flow of the ATAM

Business Drivers
Quality Attributes
Scenarios

Software Architecture
Architectural Approaches
Architectural Decisions

Analysis
Tradeoffs
Sensitivity Points
Non-Risks
Risks

Risk Themes
 impacts
distilled into
## ATAM Evaluation Steps

<table>
<thead>
<tr>
<th>Phase 0 – Start-up and partnership</th>
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<tr>
<td>S1 – Present ATAM</td>
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<td>S0 – Prepare for phase 2</td>
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<tr>
<td>S2 – Describe candidate system</td>
<td>S2 – Present Business Drivers</td>
<td>S1 to S6 (Phase 1), with complete team</td>
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<tr>
<td>S3 – Make Go/No-Go decision</td>
<td>S3 – Present the architecture</td>
<td>S7 – Prioritizing scenarios</td>
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<tr>
<td>S4 – Negotiate Statement of Work</td>
<td>S4 – Identify architecture approaches</td>
<td>P6 – Analyze architectural approaches</td>
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<tr>
<td>S5 – Form core evaluation team</td>
<td>S5 – Generate Quality Attribute Utility tree</td>
<td>P9 – Present results</td>
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<td>S6 – Hold evaluation team kick-off</td>
<td>S6 – Analyze architectural approaches</td>
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<td>S7 – Prepare for phase 1</td>
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<tr>
<td>S8 – Review the Architecture</td>
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</table>

## Changes to the ATAM process

- **Business Drivers**: Processes Considered at Phase 0 - Preparation
- **Quality Attributes**: distilled into
- **Scenarios**: Non-Risks
- **Architectural Approaches**: Sensitivity Points
- **Architectural Decisions**: Risks
- **Analysis**: Tradeoffs
- **Software Architecture**: Risk Themes
Changes to the ATAM steps

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<td>Architectural approaches</td>
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<td>S7.2 – Generate preview of</td>
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<td>Quality Attribute Utility Tree</td>
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<td>S7.3 – Link Architecture view x</td>
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<td>Scenarios</td>
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<td>S7.4 – Adjust documentation</td>
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<td>S7.5 – Review the Architecture</td>
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Steps Included to help determine the right level of documentation

Recurring steps

Changes to the ATAM Steps

- **S7.1 – Prepare preview of Architectural approaches**
  - **Responsible**: Software Architect, Evaluation Team Leader
  - **Activity**: Based on the Business Requirements create the first version of architectural approaches list
  - **Target**: Identify all architectural approaches necessary to cover the business requirements
Changes to the ATAM Steps

- S7.2 – Generate Quality Attribute Tree preview
  - Responsible: Software Architect and Evaluation Team Leader
  - Activity: Create the first version of the Utility Tree
  - Target: Identify the quality attributes candidates to check visibility in the architectural documentation

Utility Tree Preview – 2nd Level

- Utility
  - Functionality
    - Suitability
    - Accuracy
  - Usability
    - Understandability
    - Operability
    - Learnability

- Decrease maintainance by rework 75%
- Increase scripts reuse
- Garantee evidences and results collection after
- Lessen learning curve by 50%
- Control over scripts executions in order to garante business event adherence
- Lessen B2K specialists dependency
Changes to the ATAM Steps

• S7.3 – Link Architecture View x Quality Attributes Candidates

  • **Responsible:** Software Architect and Evaluation Team Leader
  
  • **Activity:** Identify the architecture views necessary to support each scenario evaluation
  
  • **Target:** Analyze if the documented architectural views are enough for an evaluation.
  • Identify additional documentation to proceed with evaluation

Changes to the ATAM Steps

• S7.4 – Adjust documentation

  • **Responsible:** Software Architect

  • **Activity:** Create and adjust the documentation based on step 7.3 outputs

  • **Target:** Lessen big documentation gaps in the middle of an evaluation.
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**Link between Scenario and SAD session**

**ATAM - Scenario 1**

<table>
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<tr>
<th>Attribute(s) (*)</th>
<th>Functionality – Suitability</th>
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<tr>
<td>Scenario 1</td>
<td>Decrease scripts maintenance rework by 75%</td>
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**Environment**

Normal Operation

**Stimulus**

Software functionality change

**Response**

Scripts maintenance must have minimum impact whenever a software code is changed

**Architectural View(s) used to support this scenario analysis (SAD section)**

- P0 - S2 - Output2 - SAD Automacao Testes - Section 3.2

**Architectural decision**

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<th>Tradeoff</th>
<th>Risks</th>
<th>Non-risks</th>
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<tr>
<td>The “Test case manager” process will not be changed to handle multiple objects</td>
<td>S1</td>
<td>-</td>
<td>R1, R2</td>
</tr>
<tr>
<td>Database will be changed to consolidate the object maps</td>
<td>S2</td>
<td>T1</td>
<td>R3</td>
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Changes to the ATAM Steps

- Link between scenarios and SAD

- **Responsible:** Software Architect

- **Activity:** Create a link for each scenarios and the architectural views that support the analysis

- **Target:** Create a quick reference to the software architecture documentation. The Software architecture documentation is updated once.
Lessons Learned

➢ Lack of Software Architecture knowledge

*Team was educated on Software Architecture Principles and practices (2 weeks training)*

- Software architecture definition
- Importance of software architecture
- Influences over Software Architecture
- SW architecture evaluation benefits
- ATAM method presented
- Roles of a software architect
- 2 recycling sessions to consolidate knowledge

Lessons Learned

➢ Preview of Architectural approaches

- All business requirements were linked to one or more architectural approaches
- The links were used to test architectural views coverage

Preview of Quality Attribute Tree

- First List of Quality Attributes helped checking the documentation level necessary for evaluation.
Lessons Learned

- Difficulties to define the right level of documentation

  - Documentation was not enough for evaluation
  - The company architect had to study the application architecture to complete the documentation
  - ATAM steps (4, 5, 6 and 8) used to evaluate the documentation in the preparation phase.
  - The documentation level was checked considering the links (Business requirements x Architectural approaches x Architectural views at SAD)
  - 3 documentation reviews performed before starting the evaluation at phase 0

- 1 documentation review performed at phase 1
- 1 documentation review performed at phase 2
- Depends on Team knowledge
- Links between scenarios and SAD sessions lessened the time spent to use the architecture documentation during the evaluation
- The links made the software architect explanation easier
Lessons Learned

- SAD Template used as
  - A guideline
  - Template for self-studying
  - Documentation standard

Metrics

- Architectural documentation reviews: 3
- Scenarios identified: 41
- Scenarios prioritized: 7
- Architectural views: 4
- Risks: 17
- Non-Risks: 14
- Trade-offs: 10
- Evaluation Team: 7 people
- Effort in days: Phase 0 – 1 month
  - Phase 1 – 2 days
  - Phase 2 – 5 days
  - Final Report – 1 day
Acknowledgments

Evaluation team at Fidelity

- Ary Gonçalves
- Camila Guizin Cortes
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- Thiago Ferreira

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