Introduction

Reqts Eng. Process

Architecting Process

Backtracking

Large Iterations

Existing system (architecture)

Enhanced architecture
Introduction - 2

Small Iterations

Twin-peaks model [Neusibeh 01]
Example concerns:

- “We still do not have a clear understanding of the role of software architecture in requirements engineering” [Shekaran 94]
- “Software architecture must be considered during requirements engineering to ensure that requirements are valid, complete, consistent, feasible, etc.” [Mead 94]
- “We need a better understanding of the impact of software architectural choices on the prioritization and evolution of requirements.” [Nusibeh and Easterbrook 00]
Study Overview

• Overall research question:

  – Which requirement characteristics are affected, and to what extent, by the presence or absence of an existing System Architecture (SA)?

• Investigated this question through a controlled empirical study.

• We decomposed the notion of a requirement into specific, measurable, characteristics.
Requirements Characteristics

1) Focus on cost
2) Focus on time
3) Focus on quality
4) Focus on user’s needs
5) Focus on client’s needs
6) Focus on technological needs
7) Testability
8) Implementability
9) Importance
10) Architectural relevance
11) Level of abstraction
12) Requirement type

These characteristics are rooted in the RE literature and practice.
Study Design

SA-Groups: R ------X -------------- O
Non-SA Groups: R ----------------------- O

• R: random assignment.
• X: treatment (i.e., the existing SA)
• O: observation

• Statistically compared each requirement characteristic of both groups to determine differences.

  – Null hypothesis: the presence of a SA has no impact on requirement characteristic of interest.
Requirements Ratings

• Two researchers and one arbitrator rated each of the 12 characteristics for each of the 900+ requirements (10 000+ items).

• Rating process:
  – Examine reqt. title, description, rationale, etc.
  – Examine each characteristic w.r.t the reqt.
  – Assign appropriate rating.

• Ratings: 7-point Likert-scale.
# Results

<table>
<thead>
<tr>
<th>Group</th>
<th>User-needs</th>
<th>Tech. Needs</th>
<th>Arch. Relevance</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>SA</td>
<td>3.26</td>
<td>4.12</td>
<td>4.59</td>
</tr>
<tr>
<td></td>
<td>Non-SA</td>
<td>3.65</td>
<td>3.42</td>
<td>4.12</td>
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<tr>
<td>P-value</td>
<td>Chi-Square</td>
<td>0.050</td>
<td>0.003</td>
<td>0.001</td>
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<tr>
<td>Cohen’s effect size</td>
<td>Large</td>
<td>Large</td>
<td>Large</td>
<td>Large</td>
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</tbody>
</table>
Implications

• The results have implications on:
  – RE process engineering,
  – Alignment with business goals,
  – Further empirical work in RE.
Example Implication - RE Process Engineering

• Findings raise interesting questions:
  
  – Should SA always be used in the RE process as promoted by the literature?
  
  – Could there be some conditions when it would be advisable “not” to use SA in RE?
Conclusions

• The role of SA on RE has not been extensively studied.

• In our initial findings, we found that:
  – *focus on technological needs*,
  – *architectural relevance*,
  – *Importance*
  – *focus on user needs*

were significantly affected by the presence/absence of SA.

• On-going work continues with further analysis of more requirements characteristics.
The End

Any ??????? ?