Issues Dealing with NFRs across the Contractual Divide

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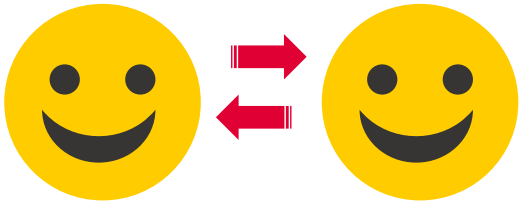
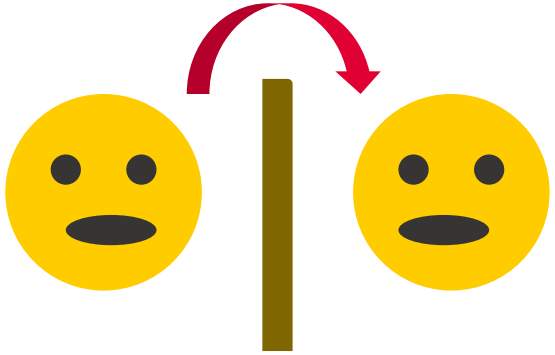
Dealing with NFRs across the Contractual Divide

Ideal world: stakeholders and designers cooperate towards common goals in win-win situation



Commercial reality: formal customer/supplier relationships place severe limitations on information exchange between stakeholders and designers.



Questions

- What are the effects of these limitations on optimal quantification of Non-Functional Requirements?
- How can we deal with these limitations?

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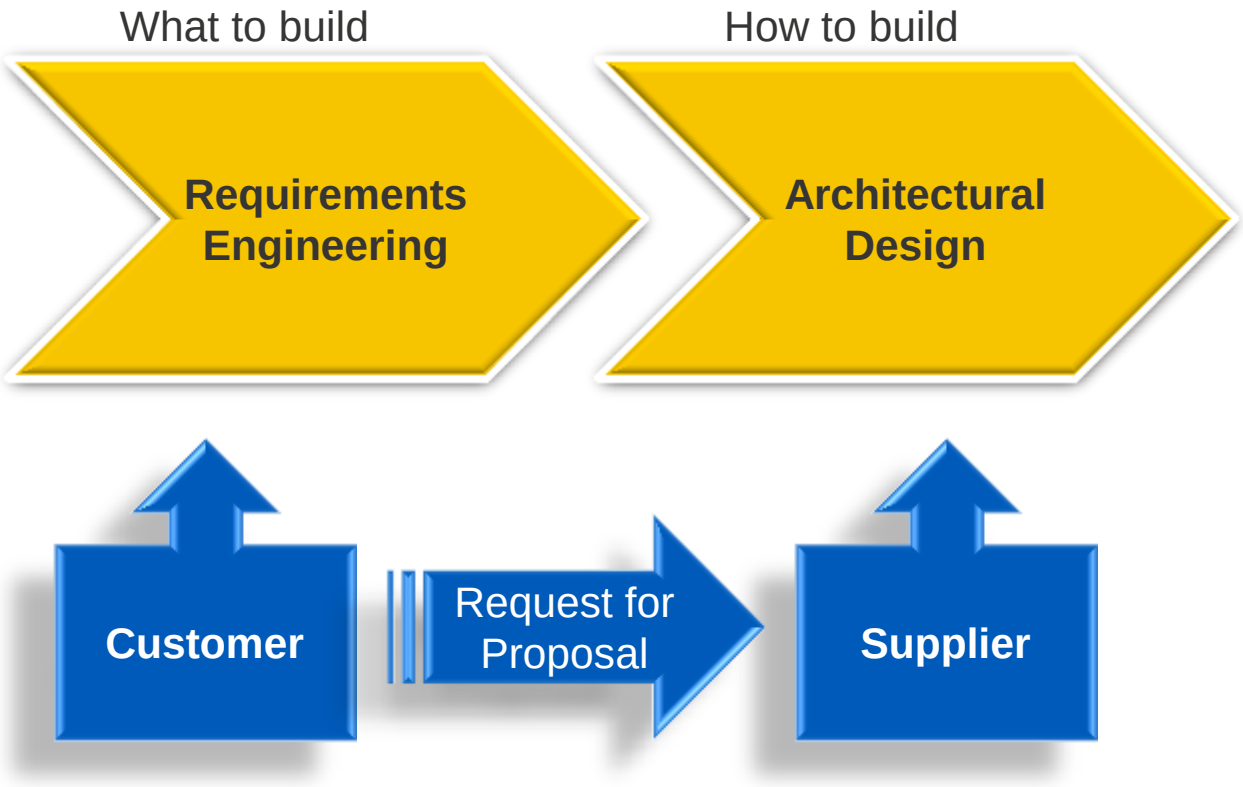
Engineering Paradigm on NFRs (1)
First the what, than the how

Traditional engineering: separating the *what* from the *how*. (e.g. Gilb)



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Engineering Paradigms on NFRs (2)
Integrated RE/AD

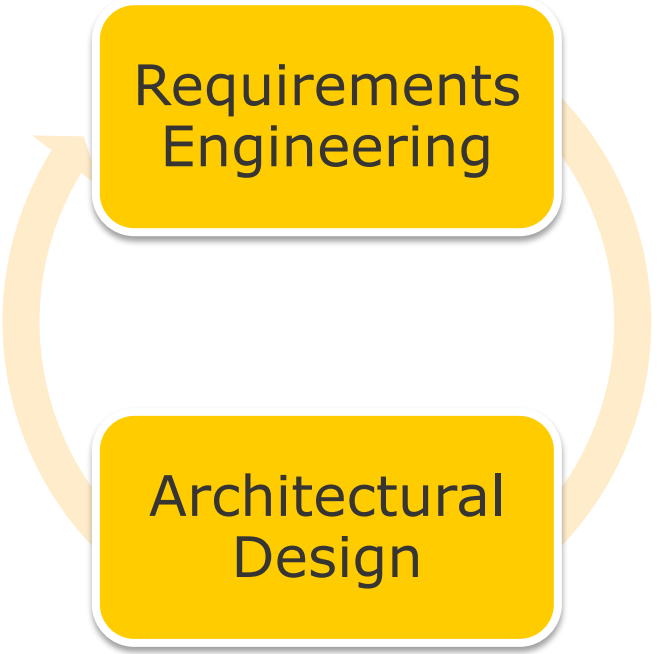
Architecture cannot be derived from requirements in one go.

[Boehm and Bose, 1994]

Functional Requirements, NFRs and Architecture should not be separated.

Requirements engineering can only be done properly if architecture developed at same time.

[Paech et al.,2002]



But: integrated approach impossible in fixed price tendering.

Strict separation of roles in tendering process mandated by law.

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NFR Dilemmas for Suppliers

Example 1: NFRs in RFP are hard-quantified, system to be designed

- How to deal with uncertainty in feasibility? No time for PoC…
  - Go along with requirement and take risk?
  - Offer non-compliant solution (risk losing the job…)?

Example 2: NFRs ignored in RFP

- Supplier is still responsible for useable system
- Suppliers who do not cost the "hidden" NFRs will win…

Lately in RFPs, we see:

- harder quantified NFRs
- penalties growing in severity
- more legaleering, less engineering

→ decline of trust between customers and suppliers

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NFR Dilemmas for Suppliers

Do tendering rules force customers to contract the supplier that has the lowest level of understanding of the NFRs?

Example from Dutch highway tunnel safety system:

> *"at the time of awarding the bid, it was known that the winning bidder scored quite badly on quality […], but the quality criterium weighed insufficiently to compensate for the low price. The winning party, when asked, confirmed that, in their opinion, they could realize the project."* [Gram and Keulen, 2010].

Result: project plagued by quality issues so severe that they caused years of delay.

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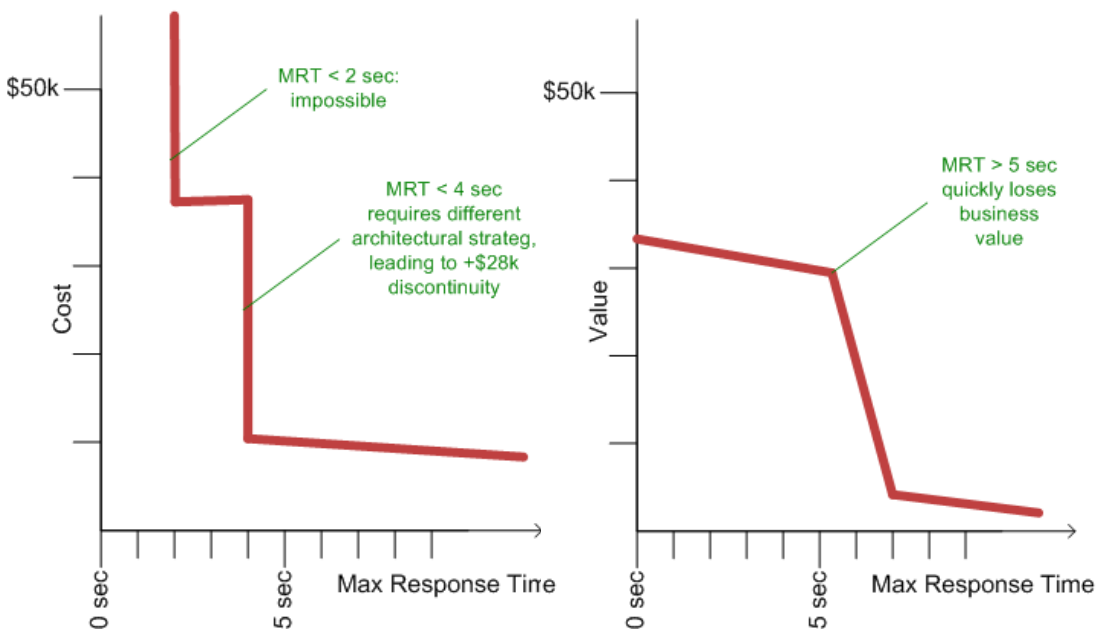
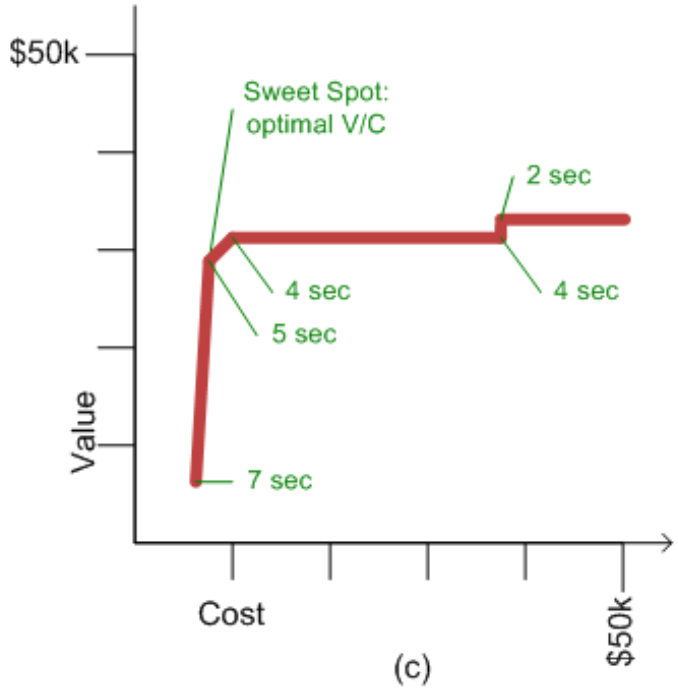
NFR Quantification as an Economic Problem

2002 Kazman et al., 2008 Regnell et al., 2009 Berntsson Svensson





Determining economic sweet spot requires:

- Supplier knowledge of NFR Cost function
- Costomer knowledge of NFR Value function
- Communication of this knowledge between customer and supplier

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NFR Quantification as a Negotiation Problem

NFRs highly risk- and cost-sensitive

→become subject of negotiation process

Negotiation tactics:

- risk avoidance
- divide and conquer
- good guy/bad guy
- salami nibbling and slicing

… on top of the technical difficulties of the engineering …

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When to quantify NFRs

Engineering & economic perspective: NFRs should not be quantified until cost/value knowledge and customer/supplier communication established

→usually well after contract signing

Commercial reality often demands quantified NFRs in contract.

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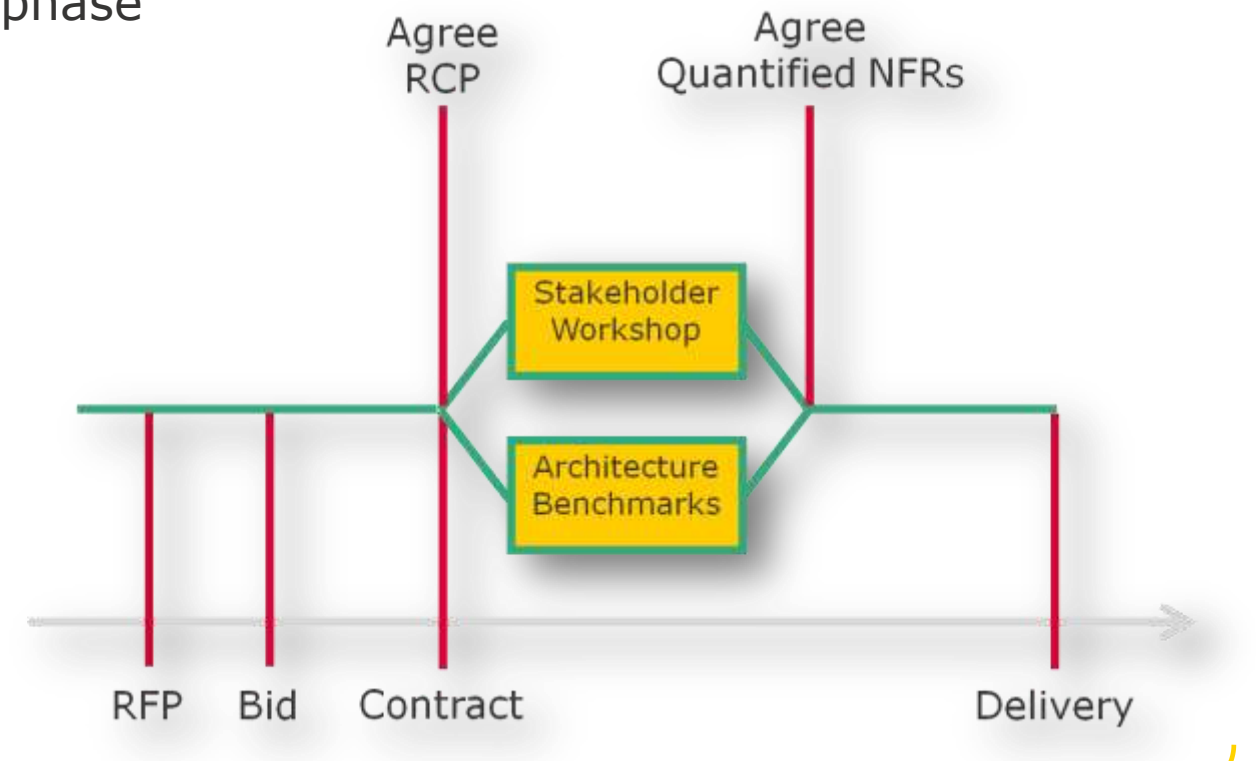
Towards Solutions (1)
Requirements Convergence Plan

Synchronise agreement with appropriate project milestone, e.g.:

- (Waterfall) Controlling specification
- (ASAP) Blueprint phase
- (RUP) Elaboration phase



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Towards solutions (2)
Competitive Dialog

"A procedure in which any economic operator may request to participate and whereby the contracting authority conducts a dialogue with the candidates admitted to that procedure, with the aim of developing one or more suitable alternatives capable of meeting its requirements, and on the basis of which the candidates chosen are invited to tender."

- Allows freer exchange of information between customer and suppliers.
- More suitable for integrated RE/AD approach.

In practice:

Use of competitive dialogue only 5% of IT tenders, but growing.

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Conclusions

- In most cases, it is impossible to find the optimal quantification for important NFRs at tender time.
- Competitive dialogue or requirements convergence plan may help.

IT industry could benefit from change in attitude that reflects this:

- Transparency between customers and suppliers about NFRs.
- Willingness to share the risk of unquantified NFRs.
- Trust is key requirement.

How can academia help?

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