

# Design Decisions (DD)

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Subgroup report

# Goals (a research agenda?)

- Why are we looking into this (motivation)?
  - Reuse of sets of design decisions (architectural knowledge transfer)
  - Explanation of the design (DD as rationale)
  - Advice for decision makers about taking decision
  - Improve quality of the decision making process (measure)
  - provide the right context for the developer to make the right local decisions
  - Awareness of the importance of capturing design decisions and rationale

# Definitions of DD

A DD is...

- a selection among possible choices against some criteria
- narrowing the set of possibilities
- committing some resource, under a set of constraints
- a set of (considered) alternatives, to achieve a certain set of goals, and a choice among them
- ... that is reflected, directly or indirectly through some other decision, in some ways in the product. (??)
- Notes:
  - the choices or possibilities may not be known, enumerated, explored.
  - This definition is probably too wide and encompasses more than just design

# Reuse of design decisions subsets from one system to another

- Carrying experience across projects
- Avoid having to return to the original designers
- Reduce cost, maybe, and more certainly risk
- Need to 'scrub' the decisions, because the context may have changed: more alternatives, different options, costs, etc.

# Improve decision process

- Satisfice, not optimize
- Decision under duress:  
time or resource constraint
- Use of prototypes to support the decision making process
  - throw away versus evolutionary prototypes

# DD Attributes & Classification

- Attributes
  - hard or easy to change
  - scope
  - cost, risk
- Incompleteness, inconsistency, risk
  - A decision management tool (or process) must allow for inconsistencies and reorganizations (“refactoring”) of decisions and sets of decisions

# Automated capture

- automation is key to make the approach successful
- no or little added burden on the designer/architect
- assisted capture  $\neq$  automatic reasoning
  - the former is high leverage
  - the latter is far more technically challenging
    - useful for safety, security and other hard ilities

# Issues (in no special order)

- How do design decisions relate to the design?
  - what design artifacts?
- Classification of design decisions
- Model of design decisions
- What are the useful relationships between design decisions that we are likely to exploit in queries
- How to trace back design decisions (change impact)?
- Cross-view relationships relative to design decisions

# Issues (cont.)

- Presentation/viewpoint/filter on design decision, with respect to the individual developer
- What is important: cost, risk, amount of dependencies between DD and other artifacts
  - Analytic approach
  - Operational approach (decisions that must be taken now)
- How to postpone a design decision to run-time
- What types of decisions are postponable?

# Issues (cont.)

- How can we distinguish important decisions from less important ones, based on what depend on them
- What are the design decisions worth keeping around?
- Alternatives: important to keep them around for later re-consideration
- DD & Alternatives and variability

# Useful pointers

- DRL, QOC, IBIS, InfoRat, Redux, Remap
- Codeeds, Lincoln U., Cornelia Boldyreff
- Archium, Anton Jansen, [www.archium.net](http://www.archium.net)
- VU, Hans van Vliet
- architectural tradeoff stuff at SEI (CBAM, ATAM,...)??
- Lee, Jintae, and Kum-Yew Lai. "What's in Design Rationale." In *Design Rationale Concepts, Techniques, and Use*, edited by Thomas P. Moran and John M. Carroll, 21-51. Mahwah, NJ: Lawrence Erlbaum Associates, 1996.
- Lee, Jintae. "Design Rationale Systems: Understanding the Issues." *IEEE Expert* 12, no. 3 (1997): 78-85.