Architecture and Design Intent: An Experience Report

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Introduction

What is Design Intent?
- Set of decision-making factors
  - Rationale
  - Best-Practices
  - Patterns, Styles, Idioms
  - Naturalistic Decision-making
  - Situational Analysis

Graduate Topics Course on Design Intent
- Teach theory, history, and current practices of AK and DI
- Goal: Use the project as a prototype study on DI modeling
  - Gain preliminary results for hypothesis forming
  - Improve methods for future studies
Overview of the Project

➔ Project overview:
   ➤ Add features to an existing software project
      ➢ Evolutionary design

➔ Project Phases:
   1. Infer DI/AK from unstructured documentation
   2. Perform decision modeling without decision process
   3. Perform decision modeling with decision process

➔ Problem Domain:
   ➤ Document management system
   ➤ Extensive documentation covering all aspects of the system
      ➢ Executive summaries and white papers
      ➢ Informal architecture documentation
      ➢ User manuals
      ➢ Wikis / mailing list archives
      ➢ Source code (open-source)
   ➤ Mature, suitably complex
   ➤ Easy to understand domain
Phase 1 – Using Existing Knowledge

➔ Read documentation and answer specific questions

♀ Where can certain knowledge be found?
   ➢ Functional requirements
   ➢ Architectural design
   ➢ Architectural rationale

♀ How was rationale explicitly and implicitly represented?

➔ Results:

♀ Docs were suitably thorough to find basic functional and architectural design
   ➢ Relevant information was spread throughout multiple sources
   ➢ Subject to interpretation
   ➢ Difficult to terminate search without exhaustive reading

♀ Rationale present, but subtle coding
   ➢ Students used content analysis

♀ Searches were disorganized
   ➢ Reflected immaturity of architects
   ➢ Lack of structure in documents
Phase 2 - Decision Modeling w/out process

- Treat requirements structuring as a design activity
- Use QOC to:
  - formalize requirements (questions, constraints) and
  - consider early design alternatives (options)
- Students felt that the process helped them discover alternatives and hidden assumptions
  - But they couldn't identify anything specific
- Students felt that it helped coordinate their group
  - More or less than other collaborative systems?
Phase 3 – Decision modeling with Process

➔ Use CBSP to structure requirements and map to arch elements
  ➔ Treats requirement structuring as a design activity
  ➔ Distinct steps with input and output artifacts
  ➔ Other architecture design processes not suitable for evolutionary design
  ➔ Other arch+rationale systems do not provide a design method

➔ Students found CBSP difficult to use
  ➔ Steps were incompletely defined or too vague
  ➔ Categories and classifications were too ambiguous
  ➔ Lack of tool support and method guidance
Analysis of Problem Domain

⇒ DSpace was a good domain choice
  ⇨ Can be used for repeatable, controlled experiments
  ⇨ Half- to full-day observation studies with individuals or teams
  ⇨ Question: How do experienced architects approach existing documentation for evolving domains?
  ⇨ We can “fake” AK or DI for DSpace to perform specific tests
Analysis of Method

➔ Decision-Support is useful
  ➔ AK as process by-product
  ➔ Many decision support processes are for initial design
  ➔ CBSP or Preskriptor (e.g.) not suitable for evolving designs

➔ General rationale modeling for architectural design is not that useful
  ➔ General rationale systems have been studied more thoroughly and better in the past
  ➔ We should be focusing on systems of integrating arch. design with AK

➔ Missed Opportunity – Round Trip
  ➔ Integrate semiformal DI/AK into unstructured documentation as a comparison for the next iteration