Architectural Evaluation for Product Lines

GSAW 2000
Breakout Group 4
Summary

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Participants

- 26 people on sign-in list, others were there too
- Panelists: Mel Cutler (Aerospace), Marcio Dias (UCI), Mike Grier (Raytheon), Hoh In (Texas A&M), Carol LeDoux (Aerospace), Nikunj Mehta (USC), Linda Northrop (SEI), John Ohlinger (NRO), Jeff Shaw (Raytheon)
- Scribes: Patricia Mangan (Aerospace), Debbie Nerio (Aerospace)
- Stayed to finish binning the questions: Mel Cutler (Aerospace), Debbie Nerio (Aerospace), Tom Tufo (SAIC)
Breakout Group Approach

- Presentations by panelists
- Workshop
  - Identify and capture issues raised in panelist presentations and group brainstorming
  - Categorize and consolidate issues
  - Determine which issues have been solved, which are important to solve*
  - Make recommendations*

*We ran out of time before we got to these steps
Issue Categories

- Issues raised were put into categories, which we defined loosely as follows:
  - Features - Things that can be assessed
  - Assessment - What you do to evaluate features
  - Quality - Results of assessment
  - Process - Development process
  - Evolution
Features Questions: Architectures

- How do you represent an architecture so that you can better understand its characteristics (e.g., behavioral, performance, optimization, composition)?
  - What notations do you use to describe it?
  - What parameters of an architecture do you model?
- How do you know something is a product line?
- What (if any) are the interactions between the architecture of a product line and the architecture of any sub-product line?
Features Questions: Variation Points

- How do you specify, define, represent variation points?
  - So that you can better understand their behavioral, performance, optimization, composition, etc. characteristics

- What is the granularity of variation points (e.g., component level, subsystem level)?

- What is the nature of the variation (i.e., different implementations or different functionality)?
Features Questions: Components and Connectors

- How do you specify the behavior of a connector or component to capture all of the assumptions in a given architecture?
- What are the issues regarding domain independence and domain dependence both for components and for connectors?
Assessment Questions

How do you evaluate a product line architecture?
- What are the criteria for assessing goodness?
- How do assessment methods change when you evaluate PL architectures versus product architectures?

What forms of evaluations are there?
- Some examples: modeling, analysis, prototyping, questions, checklists, metrics, cost estimation
More Assessment Questions

- How do you determine whether your architecture can support a product line?
- How do you infer properties of a system from the combination of an architecture and a set of components (or from potential changes to the components)?
- How do you validate the results of different assessment approaches?
  - How do you fuse the results?
Quality Questions

- What is a good architecture (depends on context and perspective)?
- What are the criteria (standards) you use to determine whether the architecture is appropriate or not?
- How do you interpret evaluation results according to different stakeholders’ perspectives?
Development Process Questions

- What is the relationship between the PLA and how you intend to produce the products?
  - e.g., Generate, compose, instantiate, build, configure
- How would you use architectural evaluations as part of an iterative design process?
- What kind of tool support is there for developing PL architectures?
  - e.g., Tools for understanding the impact of variation points
- How do you manage variation points?
  - How many is too many, is there a right number?
Evolution Questions

- How do you manage evolution of an architecture and its components?
  - How do you accommodate new requirements and avoid architectural drift?
- How do you build in enhancements during sustainment, not just simple bug fixes?
- How do you track architectural conformance during development and evolution?
  - How important is it?
Conclusions

- There are still a lot of unknowns, but many organizations are making inroads, in academia, industry, and government
- There is a lot of consensus on some of the questions, others are more contentious
  - Some questions seem to have been resolved, at least in specific domains
- It would be useful to see what progress has been made by GSAW2001