Working Session: Software Architecture Competence

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Improving Software Architecture Competence

Most of the work in architecture to date has been technical

- Design and creation
- Evaluation and analysis of architectures
- Styles and patterns
- Architectural reuse and software product lines
- Architectures for particular domains
- Architectural re-engineering and recovery

But architectures are created by *architects*…

- How can we help them do their best work?
- What does it mean for an architect to be competent?
- How can an architect improve his/her competence?

…working in *organizations*.

- How can we help an organization help their architects do their best work?
- What does it mean for an organization that produces architectures to be competent?
- How can an organization improve its competence in architecture?

Participants

Len Bass — SEI

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Ortho-Clinical Diagnostics

Dave Curry — Navar

Hong-Mei Chen — 4H at marra

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Steve Livengood
Samsung Electronics

G. Todd Kaiser — Raytheon

Alejandro Bianchi — Liveware IS

Robert Schwenk — US Army

Greg Such — SEI

Kalyan Jakka — CMU

Raghu Sangwan — PSU

Carl Snyder — Argon

Nancy Ridenow — ITT

Anthony Tsakiris — Ford Motor

Elias Fallon
Cadence Design Systems

Opening discussion questions - 1

1. **Can you given an exemplary example of competence, or a pathological example of competence?   How would you have measured or predicted these?**

   - Architect needs to understand roles, understand the scope of work. Ultimately, they need to understand the organization.

   - Be a good communicator. Frequency of communication is a measure.

   - Experience and knowledge in the domain, having built similar systems.

   - Embracing the most recent innovations in the field is not necessarily a good thing.

   - The architect should be aware of the skill set available in the team.

   - Specialized skills (e.g., security, performance).

   - What processes has the architect used? What was his role then?

   - Is the architect able to answer the hard questions about the design? Did the code ended up like the original architecture?

   - If the architecture withstood the test of time, it's a sign that the architect did a good job. If the architecture did not withstand the test of time, we can't hold it against the architect because other factors may have affected the end result.

   - There's the competence on the acquirers side and the providers side.

Opening discussion questions - 2

2. What do you think is the value of architecture to an organization? For each, how might you measure the value?

- Decrease the amount of verification and validation of the product. The organization wants to move the cost of V&V on the product to the V&V of the architecture.

- Is there recognition of the architect in the organization? Definition of the role 'architect'?

- Are there groups within the organization where architects can share experiences?

- Having dedicated architects is a function of the size of the company.

- Does the software process in use prescribe architecture-related activities (e.g., producing a SAD)? Are there standard architecture artifacts as outputs?

- Are there experts in different quality attributes available to help in the software architecture of the systems.

- How does the organization staff development teams?

- Pathological: some organizations don't do better in architecture saying they don't have time/money for that and already know what to do.

- Can the managers speak the language of architecture?

Other questions

How can we convince an organization that architecture is important?

- It's difficult. You have to engage technical people that have a say within top management. These champions of architecture work need to be able to describe the benefits and artifacts that architecture-centric work would generate.
- Sacrifice training budget to send management to SEI or Zachman courses
- Training can be informal like brown bag lunches.
- You can incentivize people to create good architectures.
- You can incentivize developers not to ignore the architecture.
- You can create career path for architects.
- You can certificate architects.
- Organizations that do these things are more architecturally competent.
- To stimulate people to participate in QAW, we tell them it's their interest to be there.

Other questions

How can we convince a manager that architecture is important?

- Discuss the impact of not finding problems early in the design phase.
- If the customers ask for it, manager will do it.
- If we can tell managers how much money will be saved with architecture, they will buy it.

How can we measure the ROI of architecture?

- Tell executive that the way business is done can change dramatically in a short period of time and architecture is a mechanism for gaining control of these changes.

Possible value of architecture

Predictability in cost and schedule and quality

- Measure: Variance between predictions and actual
- Hypothesis: Architecture practices lead to lower variances

Ability to achieve system that meets its requirements (which presumably reflect business goals)

- Measure: Does it or doesn't it?   What percentage of requirements are met? What percentage of high-priority requirements are met?
- Hypothesis: Architecture practices lead to higher achievement

Architectural duties: How can we measure value?

Architecting	• Overall
	• Creating the architecture
	• Architecture evaluation and analysis
	• Documentation
	• Existing system and transformation
Life cycle phases other than architecture	• Requirements
	• Testing
	• Coding and development
Technology related	• Future technologies
	• Tools and technology selection
Interacting with stakeholders	• Overall
	• Clients
	• Developers
Management	• Project management
	• People management
	• Support for project management
Organization and business related	• Organization
	• Business
Leadership and team building	• Technical Leadership
	• Team Building