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What Makes a Good Software Architect?

SEI Webinar

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DM-0003417
What Makes a Good Software Architect?

Software Engineering Institute
Carnegie Mellon University
Pittsburgh, PA 15213

John Klein and Andrew Kotov
Hosted by Will Hayes
Polling Question

What is your relationship to software architects?

- I am a software architect
- I want to become a software architect
- I manage software architects
- I work on projects with software architects
- Other
The Life of a Software Architect

- Development organization’s management stakeholder: Low cost, keeping people employed, leveraging existing corporate assets!
- Marketing stakeholder: Neat features, short time to market, low cost, parity with competing products!
- End-user stakeholder: Behavior, performance, security, reliability, usability!
- Maintenance organization stakeholder: Modifiability!
- Customer stakeholder: Low cost, timely delivery, not changed very often!

Architect: How can I make sure the system has all that?
What do architects do?
Architect’s Skill Sets

Core Skill Sets
- Design - create and evolve
- Analysis - will the design provide the needed functions and qualities?
- Models and representations - “documentation”
- Evaluation - are we satisfying stakeholders?
- Communication – with technical and business teams
- Technical Leadership
Polling Question

Do architects in your organization do:

- Architecture design
- Development
- Architecture analysis
- Modeling or other documentation
- Architecture evaluation
- Communicate architecture
- Provide technical leadership
- Provide coaching and mentoring
Architect Skills in the System Lifecycle

- Clean-sheet
- Create Abstractions
- Conceptual Integrity
- Develop-ability

Initial Designer

- Minimize change
- Position in new environments

Sustainer

Extender

- As-built
- Integration
- Tradeoffs that take on debt
Polling Question

Does your organization offer or require specific professional development for architect (e.g., classes, apprenticeships, certificates)?

• Yes
• No
• Not sure
Architect’s Design Trade-off Toolbox: Balancing Agility and Technical Debt

Software Engineering Institute
Carnegie Mellon University
Pittsburgh, PA 15213

Ipek Ozkaya, SEI
Michael Keeling, IBM
What is Technical Debt?*

- Exists in an **executable system artifact**, such as code, build scripts, automated test suites;

- Is traced to **several locations** in the system, implying ripple effects of impact of change;

- Has a **quantifiable** effect on system attributes of interest to developers, such as increasing number of defects, negative change in maintainability and code quality indicators are symptoms of technical debt.

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Polling question

Managing technical debt is a critical technical skill that software architects should have.

• I agree

• I disagree
Software Architecture Biggest Contributor

- Bad architectural choices rated as the top contributor to technical debt among over 1800 developers we surveyed.
- 56% of the respondents ranked architecture among top 3 pain points.

A Field Study of Technical Debt [https://insights.sei.cmu.edu/sei_blog/2015/07/a-field-study-of-technical-debt.html](https://insights.sei.cmu.edu/sei_blog/2015/07/a-field-study-of-technical-debt.html)
Polling question

In which of these areas do you observe technical debt the most?

- Code; our code has become very hard to maintain because of clones, cycles, and random bug fixes.
- Architecture; we have made suboptimal architectural decisions that we need to rearchitect soon.
- We have skipped practices such as reviews, necessary testing, and documentation that we are now paying for with low system quality.
- All of the above
- None of the above
Technical Debt is Not Simply Bad Quality

Original interpretations of technical debt led us to think it is bad code quality.

- Low internal code quality is a problem, but claiming it as technical debt should not and does not legitimize it!

“we have the source code static analysis tools, but this is to assure proper quality of source code. But how architectural changes are impacting I don’t know.”
Essential Software Development Artifacts

<table>
<thead>
<tr>
<th>Visible</th>
<th>Invisible</th>
</tr>
</thead>
<tbody>
<tr>
<td>New features and added functionality</td>
<td>Architectural, structural features</td>
</tr>
<tr>
<td>Positive Value</td>
<td></td>
</tr>
<tr>
<td>Negative Value</td>
<td>Defects</td>
</tr>
<tr>
<td>Technical Debt</td>
<td></td>
</tr>
</tbody>
</table>

Polling question

In our project technical debt management is currently owned by:

- The software architect
- The product owner
- The team
- All of the above
- No one
Who is Aware and Manages Technical Debt

Developers are most aware of technical debt.

While a joint responsibility, software architects are reported to own management of technical debt more often than other roles.

A Field Study of Technical Debt https://insights.sei.cmu.edu/sei_blog/2015/07/a-field-study-of-technical-debt.html