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<td>Carnegie Mellon University, Software Engineering</td>
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Architecture-Centric Engineering (ACE) Design and Analysis – with TSP
What Drives Architectural Need?

There are no definitive studies or guidelines, probably because the answer is context dependent.

- More than 2 people
- More than 6 months effort
- More than 25-30 KLOC (thousands of lines of code; a VERY high number for 2 people over 6 months)
- Critical non-functional attributes (performance, safety, security, etc.)
- *No pre-existing architecture!* (…especially if someone other than the developer is attempting to maintain or enhance it)
Why is Architecture Needed?

Represents *earliest* design decisions

- hardest to change
- most critical to get right
- communication vehicle among stakeholders

*First* design artifact addressing

Quality attributes (i.e., performance, security, usability)

Key to systematic *reuse*

- transferable, reusable abstraction

What do I need to know?
Citizen calls 911 → Emergency Management Organization → Local govt → First Responders

Emergency Alerting System → Social media

Carriers’ Gateway
“As-Is” Standalone Implementation

Acme Purchasing System (APS)

Interfaces to supporting systems

Legend:
- Part of APS
- Outside APS

Reviewer client

User client (Using approved desktop, laptop, mobile device)

APS admin client

Vendor Portal

Vendors

Internet

Internet (SSL)

Reviewer Portal

Part of APS

Outside APS
“To-be” Hosting view
APS Decomposition View

Interfaces to supporting systems

Vendors

Internet

Internet (SSL)

Reviewer client

User client (Using approved desktop, laptop, mobile device)

APS admin client

Reviewer Portal

Acme Purchasing System (APS)

Legend:

Part of APS

Outside APS

Legend:

Reviewer Portal

Requisition System

Purchase Order System

Product Receipt System

Payment System

Enterprise Service Bus

Internet

Internet

Internet

Internet
Architecture Guidelines & Principles Document

Table of Contents

• Timeline
• Quality Attributes
• Guidelines
• Strategies
• Constraints
• Design/Coding Guidance
• Architecture Evolution
• Decisions
Conceptual Flow of the MTW

SoS Drivers and Capabilities → Mission Threads and Vignettes → SoS Quality Attributes → Legacy Systems → Quality Attribute Augmentation (with stakeholders)

Views - operational development sustainment

SoS Architecture Plan

SoS Challenges → Architecture Issues → Engineering Issues → Capability Issues → Qualitative Analysis of Augmented Mission Threads (w/o stakeholders)

SoS Quality Attributes

Mission Threads Augmented with Quality Attribute, Capability, Engineering Considerations

Mission Threads

SoS Drivers and Capabilities

Quality Attribute Augmentation (with stakeholders)

Impacts

distilled into

Software Engineering Institute

Carnegie Mellon University

Architecture Best Practices for Project and Technical Leaders
Bachmann, McHale, Morrow, 11/5/14
© 2014 Carnegie Mellon University
Conceptual Flow of the QAW

Quality Attribute Scenario elicitation, prioritization, refinement (with stakeholders)

Prioritized Quality Attribute Scenarios

Refined QA Scenarios
(subset of scenarios, in priority order)

Qualitative Analysis of Refined Scenarios
(w/o stakeholders)

Architecture Challenges

Business Drivers

Software Architecture Plans

Quality Attributes

impact
distilled into
System Engineering Timeline

- System Design Review
- Preliminary Design Review
- Critical Design Review
- Production Readiness Review
- In-Service Review
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