Module System Architecture Context

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Abstract

The system architecture process is positioned in a wider context: First in the business context, then in the Product Creation Process context.
Abstract

This article positions the system architecture process in a wider business scope. This positioning is intended to help understanding the processes in which the system architect (or team of system architects) is involved. It focuses on an organization that creates and builds systems consisting of hardware and software. Although other product areas such as solution providers, services, courseware, et cetera also need system architects, the process structure will deviate from the structure as presented here.
Simplified Decomposition of the Business

Customer-Oriented Process

- Sales
- Logistics
- Production
- Service
- Presales

Policy and Planning Process

- Customer Roadmap
- Business Drivers

Product Creation Process

- Product Needs and Feedback
- Budget, Plan
- Product Roadmap

People, Process, and Technology Management Process

- Needs and Feedback
- Technology, Process, and People Roadmaps
- Budgets

Customer

- Information
- Order
- Product
- Support

Material

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version: 1.1
September 24, 2014

Embedded Systems Innovation

HBV
Financial Characterization of Decomposition

Customer Oriented Process

Product Creation Process
Policy and Planning Process
People and Technology Management Process

Management

Cashflow Generation

Tomorrow’s Cashflow

Customer Needs and Feedback
Product Needs and feedback
Material

Support

Order
Product
Product-related processes
Technical Product Documentation

Information
presales sales
logistics production\nrepair

Customer Roadmap
Business Drivers
Product roadmap
Budget, plan

Technology, Process, and People roadmaps
Budgets

People Technology Process

Assets

People and Technology Management Process

Tomorrow’s Cashflow Generation

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Embedded Systems Innovation

HBV

PDBprocessDecompositionByValue
Multiple Instances per Process

Customer Oriented Process: Depends on geography, customer base, and supply chain.

Product Creation Process: One per entity to be developed, where such an entity can be a product family, a product, or a subsystem.

People and Technology Management Process: One per “competence”, where a competence is a cohesive set of technologies and methods.

Policy and Planning Process: One per business. This is the pro-active integrating process.
The Value Chain and the Opposite Feedback Flow

Policy and Planning Process

Customer-Oriented Process

Product Creation Process

People, Process, and Technology Management Process

Policy and Planning Process

Customer-Oriented Process

Product Creation Process

People, Process, and Technology Management Process

- Customer Roadmap
- Business Drivers
- Budget, plan
- Product roadmap
- Product needs and feedback
- Information
- Technical product documentation
- Product
- Support
- $$$

Feedback

Value

- Customer
- Customer-orientated process
- Budget
- Technology, Process, and People roadmap
- People Technology Process
- Product Needs and feedback
- Support
- $$$
Decomposition of the Customer Oriented Process

Order Acquisition

Order Realization

Service Support

Material Order Product

Information Order Product Support

Customer-Oriented Process
Extended with Generic Developments

- Policy and Planning Process
- Customer-Oriented Process
- Product Creation Process
- Generic Developments Creation Process
- People, Process, and Technology Management Process
The Product Creation Process

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Abstract

The Product Creation Process is described in its context. A phased model for Product Creation is shown. Many organizations use a phased model as blueprint for the way of working. The operational organization of the product creation process is discussed, especially the role of the operational leader.
The Product Creation Process in Business Context

Customer

Policy and Planning Process

Customer Oriented Process

Product Creation Process

People and Technology Management Process

Customer Roadmap
Business Drivers

Material
Sales
Logistics
Production
Service
Presales

Product Requirements
and feedback

Information
Order
Product

Support

Product Requirements
and feedback

Requirements and
Feedback
Technical Product
Documentation
Product related
processes

Product roadmap
Budget, plan

People
Technology
Process

Technology, Process
and People roadmaps
Budgets
Phasing of the PCP at Business Level

0. feasibility
1. definition
2. system design
3. engineering
4. integration & test
5. field monitoring

sales
logistics
production
service
development & engineering: marketing, project management, design
Phasing the Design Control Process

Legend:
- [ ] core information in draft
- [ ] 50%
- [ ] most information available in concept
- [ ] information is stable enough to use heavier change control

0. feasibility
1. definition
2. system design
3. engineering
4. integration & test
5. field monitoring

needs
- [ ] full under development
- [ ] preparing or updating work

specification
- [ ] full under development
- [ ] preparing or updating work

design
- [ ] full under development
- [ ] preparing or updating work

verification
- [ ] full under development
- [ ] preparing or updating work

engineering
- [ ] full under development
- [ ] preparing or updating work
Advantages and Disadvantages of a Phased Process

**benefits**
- blueprint: how to work
- reuse of experience
- employees know *what* and *when*
- reference for management

**disadvantages**
- following blueprint blindly
- too bureaucratic
- transitions treated black and white
Characteristics of a Phase Model

The Product Creation Process

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PCPcharacteristics

large impact decisions

phase transitions check points

needs
design
verification
engineering
specification

0. feasibility
1. definition
2. system design
3. engineering
4. integration & test
5. field monitoring

order long-lead items
order high-cost items
order product announcement

iteration

concurrency

needs
specification
design
verification
engineering

large impact decisions

order long-lead items
order high-cost items
order product announcement
Define a minimal set of large-impact decisions.

Define the mandatory and supporting information required for the decision.

Schedule a decision after the appropriate phase transition.

Decide explicitly.

Communicate the decision clearly and widely.
Evolutionary PCP model

- Requirements specification
- Design
- Build
- Test and evaluate

2% of budget (EVO)
2 weeks (XP)
Up to 2 months per cycle
Operational Organization of the PCP

The Product Creation Process

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PCPOperationalOrganization
Prime Responsibilities of the Operational Leader

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PCPoperationalTriangle
The Rules of the Operational Game

- define project
- update project
- assess risks
- determine feasibility
- accept or reject
- specification, resources, time
- accept
- execute project within normal quality rules

business management

project leader
Abstract

The System Architecture Process is positioned in the business context. This process bridges the gap between the Policy and Planning Process and the Product Creation Process.

The purpose of the System Architecture Process is to provide the Integral Technical overview and consistency, and to maintain the integrity over time. Subjective characteristics as elegance and simplicity are key elements of a good architecture.

The scope of the system architecture process is illustrated by showing 5 views used in a reference architecture, ranging from Customer Business to Realization.
System Architecting Process in Business Context

The System Architecture Process

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SAPprocessSimplified
Map of System Architecting Process and Neighborhood

- Policy and Planning
- People and Technology
- Product Creation
- Marketing
- Project Management
- Design Control
- Systems Architecting
- Business

The System Architecture Process

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SAPprocessMap
System Architecting Relation between PPP and PCP

Context: Product Portfolio, Time

Vision, Policy, Intention

Practical Knowledge

Feedback from Reality

Policy and Planning Process

Product Creation Process
System Architecting Key Issues

**key words**
- balance
- consistency
- integrity
- simplicity
- elegance
- stakeholder satisfaction

**balancing acts**
- External ↔ internal requirements
- Short term needs ↔ long term interests
- Efforts ↔ risks from requirements to verification
- Mutual influence of detailed designs
- Value ↔ costs

**example trade-offs**
- performance
- synergy
- functionality
- specific solution
- qualities
1. Map operational organization.
2. Report on one flip the best case.
3. Identify the relationships of the core team: geographical, organizational, psychological, et cetera.
4. Report the result of 3 on one flip.
Process Decomposition of a Business

Importance in Financial terms

Value Chain and Feedback Flow

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PCP involves **all** disciplines, much more than D&E

<table>
<thead>
<tr>
<th>0. feasibility</th>
<th>1. definition</th>
<th>2. system design</th>
<th>3. engineering</th>
<th>4. integration &amp; test</th>
<th>5. field monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>sales</td>
<td>logistics</td>
<td>production</td>
<td>service</td>
<td>development &amp; engineering: marketing, project management, design</td>
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</tbody>
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**Phased Process**

**Incremental Development**

- test and evaluate
- requirements specification
- build
- design

2% of budget (EVO)
2 weeks (XP)
up to 2 months per cyclus
Exercise Product Creation Process
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PCP Decomposition and Operational Management

PCP decomposition

- Product Creation Process
- Design Control
- Marketing
  - technical
  - profitability
  - sellability

Operational Management
- specification
- budget
- time

Operational Commitment

- Specification
- Quality
- Resources
- Time

Architecture at all levels; From portfolio to subsystem

- entire portfolio
  - operational
  - technical
  - commercial
- product family
  - portfolio operational manager
  - portfolio architect
  - portfolio marketing manager
- single product
  - family operational manager
  - family architect
  - family marketing manager
- subsystem
  - subsystem project leader
  - subsystem architect
- module
  - developers

Core: Operational + Technical + Commercial
System Architecture Process

In Business Context

Key Issues

5 Views

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