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

Product Creation Process

Policy and Planning Process

Customer Roadmap

Business Drivers

Product roadmap

Budget, plan

Product Needs and feedback

Needs and Feedback

People, Technology, and Process roadmaps

Budgets

Technology, Process, and People roadmaps

Customer Needs and feedback

Technical Product Documentation

Product-related processes

Product roadmap

Support

Presales sales logistics production service

Information

Order

Product

Needs and Feedback

Product-related processes

Product roadmaps

Needs and Feedback

Technology, Process, and People roadmaps

Support

Product Creation Process

Policy and Planning Process

Customer-Oriented Process

People, Process, and Technology Management Process

Product Needs and feedback

Needs and Feedback

People Technology Process

Information

Order

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Product Needs and feedback

Needs and Feedback

People Technology Process

Information

Order

Product

Support

Product Needs and feedback

Needs and Feedback

People Technology Process

Information

Order

Product

Support
Financial Characterization of Decomposition

Process Decomposition of a Business
Gerrit Muller

version: 1.1
April 5, 2021
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
Decomposition of the Customer Oriented Process

Order Acquisition

Material

Order Realization

Order

Service Support

Product

Support

Information

Order

Product

$$

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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

- Customer
- Technology, Process, and People roadmaps
- Budgets

Business, Operations, and Technology elements

- Needs and feedback
- Technical Product Documentation
- Product-related processes
- Support

- Customer
- Order
- Product
- Service

- Presales
- Sales
- Logistics
- Production

- Information
- Material
- Processes

- Budget
- Business
- Drivers
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 → Budget, plan → Requirements and feedback → Product roadmap → Technology, Process and People roadmaps → Budgets

Product Requirements and feedback → Customer Oriented Process

Presales, sales, logistics, production, service → Product

Support → People Technology Process

Information → Order → Product

Requirements and feedback → Technical Product Documentation

Product related processes

Order → Budget

Technical Product Documentation → People Technology Process

People Technology Process → Technology, Process and People roadmaps

Technology, Process and People roadmaps → People and Technology Management Process

Material → Product
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**
- **full under development**
- **preparing or updating work**

The Product Creation Process

12 Gerrit Muller

version: 2.2
April 5, 2021
PCPdesignPhases
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

- **0. feasibility**: needs
- **1. definition**: design
- **2. system design**: verification
- **3. engineering**: specification
- **4. integration & test**: feasibility
- **5. field monitoring**: definition

- **iteration**
- **phase transitions check points**
- **large impact decisions**
- **order long-lead items**
- **order high-cost items**
- **announcement**

The Product Creation Process
Gerrit Muller

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April 5, 2021
PCPcharacteristics
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

- test and evaluate
- requirements specification
- build
- design

2% of budget (EVO)
2 weeks (XP)
up to 2 months per cyclus
Decomposition of the Product Creation Process

Operational Management
- specification
- budget
- time
  - planning
  - progress control
  - resource management
  - risk management
  - project log

Design Control
- technical
  - needs
    - what is needed
  - specification
    - what will be realized
  - design
    - how to realize
  - verification
    - meeting specs
    - following design
  - engineering
    - how to produce
    - and to maintain

Marketing
- profitability
  - saleability
    - customer input
    - customer expectations
    - commercial structure
    - product pricing
    - market introduction
    - introduction at customer
    - feedback
Operational Organization of the PCP

- Operational
  - Portfolio Operational Manager
- Technical
  - Family Architect
- Commercial
  - Family Marketing Manager

1. Entire Portfolio
   - Portfolio Operational Manager
2. Product Family
   - Family Operational Manager
   - Family Architect
   - Family Marketing Manager
3. Single Product
   - (Single Product) Project Leader
   - Product Architect
   - Product Manager
4. Subsystem
   - Subsystem Project Leader
   - Subsystem Architect
5. Module
   - Developers
Prime Responsibilities of the Operational Leader

The Product Creation Process

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April 5, 2021
PCPOperationalTriangle
The Rules of the Operational Game

business management

| define project |
| update project |

project leader

| assess risks |
| determine feasibility |

specification, resources, time

accept or reject

accept

execute project within normal quality rules
Operational Teams

- Operational Leader (project leader)
- Operational Support (project manager)
- Marketing or Product Manager
- Application Manager
- Requirements Analyst
- Test Engineer
- Architect
- Technology-Specific Architects
- Subsystem Architects
- Development support
- Quality Assurance
- Logistics
- Manufacturing
- Sales Manager
- Service

The Product Creation Process

version: 2.2
April 5, 2021
PCPconcentricTeams
The System Architecture Process

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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.

Distribution

This article or presentation is written as part of the Gaudí project. The Gaudí project philosophy is to improve by obtaining frequent feedback. Frequent feedback is pursued by an open creation process. This document is published as intermediate or nearly mature version to get feedback. Further distribution is allowed as long as the document remains complete and unchanged.

April 5, 2021
status: concept
version: 2.3
Map of System Architecting Process and Neighborhood

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

The System Architecture Process
24  Gerrit Muller
version: 2.3
April 5, 2021
SAPprocessMap
The System Architecture Process
25 Gerrit Muller

Version: 2.3
April 5, 2021
SAPcouplingPPPtoPCP

System Architecting Relation between PPP and PCP

Policy and Planning Process

Context: Product Portfolio, Time

Vision, Policy, Intention

Practical Knowledge

Feedback from Reality

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
- functionality
- qualities
- synergy
- specific solution
Make a map with names of individuals in the operational organization of one project and its context

Identify the relationships of the project core team:
- geographical
- organizational
- psychological
Process Decomposition of a Business

Importance in Financial terms

Value Chain and Feedback Flow

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Product Creation Process

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

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<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>
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**Phased Process**

**Needs**

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

**Legend**

- Core information in draft
- 10% most information available in concept
- Information is stable enough to use heavier change control

**Incremental Development**

- Test and evaluate
- Requirements specification
- Build
- Design

- 2% of budget (EVO)
- 2 weeks (XP)
- Up to 2 months per cycle

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PCP Decomposition and Operational Management

PCP decomposition

Product Creation Process

Operational Management
- specification
- budget
- time

Design Control
- technical

Marketing
- profitability
- sellability

Architecture at all levels; From portfolio to subsystem

Operational Commitment
- Specification
- Quality
- Resources
- Time

Core: Operational + Technical + Commercial

Exercise Product Creation Process
version: 2.3
April 5, 2021
System Architecture Process

In Business Context

Key Issues

5 Views

What does Customer need in Product and Why?

Customer
What

Customer
How

Product
What

Product
How

Customer
objectives

Application

Functional

Conceptual

Realization

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