Balancing Process and Content; Understanding Architecting in relation with Other Processes

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Abstract...
The automotive domain is quite demanding. Trucks and Cars have to be highly dependable (e.g. safe and reliable), and to operate in wildly varying conditions (from harsh environments such as deserts up to extreme winter weather). The lifetime of the vehicles is decade(s). The production volume demands mass production and well tuned supply chains to operate in a competitive environment. More and faster market and technology changes come on top of all these demands.

Partial solution to this demanding environment is an intricate set of processes. Good processes are crucial. Unfortunately, processes can also hamper the business, for instance by focusing so much on form that content gets lost.

Architecting is an activity that delivers content (needs analysis, requirements, design concepts, design decisions). Architecting can benefits a lot from good process interaction, reversely it can suffer tremendously from lack of process or overkill of process.
architecting in business context

What is a process?

How much process is needed?

performance of supporting processes

solutions to common problems

workshops, time-boxes and iteration

summary
Simplified process view

- **customer**
  - **supplying business**
    - **strategy**
      - process
    - **customer oriented** (sales, service, production) process
    - **product creation**
      - process
    - **people, process and technology**
      - management process
Tension between processes

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RSPprocessDecompositionAnnotated
Platform strategy adds one layer

Supplying business strategy

- Customer oriented
- People, process and technology

Value

- Short term; cashflow!
- Mid term; cashflow next year!
- Long term assets
- Long term know how (soft) assets

Component or platform creation

Product creation

- Strategy

Customer

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RSPprocessDecompositionPlusAnnotated
System Architecture Process in Business Context

Customer-Oriented Process

Systems Architecting Process

People, Process, and Technology Management Process

Context, Vision

Needs and Feedback

Stakeholder Interaction

Material

Presales, Sales, Logistics, Production, Service

Support

Information

Order

Product

Budget

Product Roadmap

Technology, Process, and People Roadmaps

Business Drivers

Customer Roadmap

Policy and Planning Process

Reality Check

Systems Architecting Process

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SAPprocessSimplified
What is a process?

- architecting in business context
- How much process is needed?
- performance of supporting processes
- solutions to common problems
- workshops, time-boxes and iteration
- summary
Process Attributes

**Purpose** What is to be achieved and why

**Structure** How will the goal be achieved

**Rationale** What is the reasoning behind this process

**Roles** What roles are present, what responsibilities are associated, what incentives are present, what are the criteria for these roles

**Ordering** What phasing or sequence is applied
Definition of a Process

"A process is an activity which takes place over time and which has a precise aim regarding the result to be achieved. The concept of a process is hierarchical which means that a process may consist of a partially ordered set of subprocesses."

"Method Integration: Concepts and Case Studies" by Klaus Kronlöf
A process within an abstraction hierarchy

principle → drives → process → elaborated in → procedure → supported by → tool
template

formalism

abstract

specific and executable

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SAPabstractionHierarchy
model architecting in business context
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How much process is needed?

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BPCAlogoHowMuch
Effectiveness (Flexibility, Manageability)

Flexibility
- Evolution
- Responsiveness
- Market change
- Technology change

Manageability
- Supply chain
- Mass production
- Long life times
- Dependability

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BPCAeffectivenessCurves
Effectiveness in Defense, Aerospace, Automotive

Effectiveness = \text{Flexibility} \cdot \text{Manageability}

\begin{align*}
\text{Effectiveness} &= W_F \cdot W_M \\
W_F &= 0.1 \\
W_M &= 0.9
\end{align*}
If Balance Shifts

Effectiveness = Flexibility $W_F \times$ Manageability $W_M$

Effectiveness $W_F=0.3 \quad W_M=0.7$
Typical Situation in Defense

Effectiveness

<table>
<thead>
<tr>
<th>process weight</th>
<th>very low</th>
<th>low</th>
<th>medium</th>
<th>high</th>
</tr>
</thead>
<tbody>
<tr>
<td>desired weight</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>actual weight</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>effectiveness</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>loss</td>
<td>-</td>
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</tbody>
</table>

Flexibility

Manageability

Effectiveness
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Supporting Processes for Architecting

people, process and technology managers
intend to support
systems architecting
by
processes, tool,
et cetera

product creation
process

phase gate
process
documentation
process
reviewing
process
engineering
process
meeting
structure
templates
check lists
repositories
tools

people, process and technology
management process

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BPCAsupportingProcesses
How effective are these Processes?

- How many hours per week do you sit in meetings?
- How many hours per week does the system architect spend on writing documentation?
- How satisfied are the consumers of documentation?
  - How easy can information be found?
  - How up-to-date is the information?
  - How timely is documentation available?
- What is the quality of the review process?
- Does the system architect feel supported by the processes at all times?
Common Problems

Large monolithic documents

- late, not up-to-date, time consuming to review and update

System architects spending 70%+ of time in meetings

Ineffective reviews

- too many reviewers, lack of ownership, too little time and attention, form rather than content

Noise generation due to too much prescribing templates or frameworks

- information overload, essentials are hidden

Poorly searchable repositories

- data and information cannot be found
Balance Form and Content

de facto activities
form
meetings
reading
writing
traveling
thinking
analyzing
testing
walking & listening

core competences
content
understanding
customer needs
specifications
requirements
key performance parameters
hands-on
analyzing and making
trade-offs
understanding
technologies and options

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BPCAtimeArchitect
architecting in business context

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Design Modular Documentation

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DGcompoundDocument
Recursive as "Normal" Designs

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Documenting with A3’s

A3 Architecture Overviews Focusing architectural knowledge to support evolution of complex systems
by: Daniel Borches and Maarten Bonnema, INCOSE 2010

Legend

Functional View

Visual aid

Constraints Choices

Quantification of key parameters

Physical View
Light-weight Distributed Reviews

- wide group of people, with an active concern or an expected contribution;
  - many iterations
  - multiple media:
    + meetings,
    + on paper
    + informal et cetera

specification specific Change Control Board
4 peoples/roles:
  1 producer
  1 consumer
  1 context
  1 independent

criteria for reviewers:
  + know how
  + critical
  + sufficient time

change request

by "lowest" operational manager:
project leader, subsystem PL, ...
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architecting in business context
The “CAFCR” model

What does Customer need in Product and Why?

Customer What drives, justifies, needs

Customer How

Product What enables, supports

Product How

Customer objectives

Application

Functional

Conceptual

Realization
CAFCR can be applied recursively

System (producer) Drives Customer Business Drives Enables Customer's Customer Business Drives Enables Consumer Drives Enables Value Chain

larger scope has smaller influence on architecture
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BCAFCRplusLifeCycle

CAFCR+ model; Life Cycle View

Customer objectives
Application
Functional
Conceptual
Realization

operations
maintenance
upgrades

Life cycle
development
manufacturing
installation

sales, service, logistics, production, R&D
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Time-boxes and Iteration

bottom-up   top down  second iteration  story -> use case

shared overview  improved overview  depth insight  1st big picture

day 1  day 2
Workshop timeline

- **prerequisite**
- **goal**
- **owner**
- **leader**
- **facilitator**
- **participants**
- **consolidation and follow-up: consolidation and follow-up**
- **workshop**

1. **conception**
   - **start**
   - **date reservations**
   - **preliminary program and invitation**
   - **definite date**
   - **venue**

2. **preparation**
   - **participants**
   - **allocate roles**
   - **anticipate problems**

3. **workshop**
   - **(optional) distribute presentations**

4. **consolidation and follow-up**
   - **program workshop format**
   - **invitation**

**Time**: ca 10 weeks
Sequence of Workshops

ratio of effort/time

1 : 4 : 1

Problem understanding

Analysis

Decision

ca 2 weeks

individual digesting and processing

individual digesting and processing

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Most Subject Progress Outside Workshop

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Problem understanding

Analysis

individual digesting and processing

subject progress

shared vision

time

progress

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WHTprogress
Venue Requirements

- open seating formation
- sufficient walking space
- ask for a room for 2* #participants
- plenary area
- break-out rooms

*plenary area*
Secret Workshop Success Factors

- Active: >70% of the time active
  - short intro, short broadcasts

- Focused: clear scope and goal
  - format
  - timely invitation
  - seed presentations
  - seed questions

- Well-Prepared: full-time present
  - no cellphone
  - no e-mail

- Involved participants:
architecting in business context

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solutions to common problems
documentation needs modular design
distributed review

different time scales

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BPCAsummary