Architecting User Value:

From technical Engineering to Value Engineering

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Abstract

Today’s IT development is extremely driven by technology instead of the needs of humans and organizations. We consider this to be a highly undesirable and even dangerous situation. Inspired by an analysis of the driving forces and the adverse effects of this situation, we propose an alternative way of thinking that could have the potential to change the current trend. In this approach, the system architect fulfills a crucial role by considering the needs of all stakeholders and integrating the aspects of the human/organizational, process and technology aspects of the total system. In our view, this integration must not only consider the business drivers, but also general human and organization values like human behavior and organization culture. This requires, however, system architects that have also insight in the non-technical parts of the game, in order to make product development more demand-driven and human-oriented.
Technology serves humans, not vice versa

Culture, Communities, Organizations

Humans
feeling, thinking and behaving,
with norms, values, preferences and objections

Business
drivers, strategies and processes

System
functionality and technology

drives determines [Gartner]

drives
serves

embedded in

serves

The Janus face of technology

Technology push
Influence
Today’s
Society Background
Norms & Values
Tomorrow’s
Artifacts
Human pull
Creation

Or unconscious?
Passive

Conscious
Active

Original: Dieter K. Hammer
Cause Analysis of today’s IT problems

Technological and economical drivers \rightarrow IT characteristics

Consequences

Economical damage

Psychological damage
IT characteristics

- Complexity
- Free Production
- Virtuality and Reality becomes indistinguishable
- Computers decisions are anonymous
- IT solutions are created by "Enginerds"
Complexity

User

Multi-Million line
Applications

Multi-Million line
middleware components

Multi-Million line
operating system

Multi-million
gate
processor
Multi-million
gate
I/O

black box
Free production

Multi-Million line
Applications

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Multi-million
gate
processor

Multi-million
gate
I/O

black box

User
Virtuality or reality?

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Consequences

- Malfunctioning software
- Abundant software of dubious quality
- Inbalance and instability of the total system
- Unforeseen side effects
- Ethical and legislative blurring
- Forcing of users
Malfunctioning software

Unit used in Error Metrics:

Number of errors per kilo lines of code

- Multi-Million line Applications
- Multi-Million line middleware components
- Multi-Million line operating system
Ethical and legislative blurring

... Cut the vessel ...

Liability:

+ follow the mandatory procedure

? who is responsible when cutting the vessel kills the patient?
Economical damage

- Pay for unused functions
- Security failures
- High project failure rate
- Support dependence
- Fuzzing
Denver Airport: Luggage handling

- The system was not ready when the new airport was finished -> opening was delayed for many months.
- Operational the system goofed many times, disturbing airport operation.
Psycho-social damage

- Playing with IT as an alibi for primary activities
- New forms of criminality
- Laziness and superficiality
- Fading ethics
- Restricted and abstract human interaction
Interacting subsystems of a total system
Characteristics of subsystems in the environment
Roles and Responsibilities

- System Architect
- Processes Consultants
- IT Technology Engineers
- Organizations
- Humans Managers
- Environment Analysts
- commercial Marketing and Sales Managers
- Project Leaders
- Schedules and resources

Diagram:

- System Architect
- Processes Consultants
- IT Technology Engineers
- Organizations
- Humans Managers
- Environment Analysts
- commercial Marketing and Sales Managers
- Project Leaders
- Schedules and resources
System Architect integrates 5 viewpoints

**What** does Customer need in Product and **Why**?

- Customer **What**
- Customer **How**
- Product **What**
- Product **How**

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- **C**ustomer objectives
- **A**pplication
- **F**unctional
- **C**onceptual
- **R**ealization

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drives, justifies, needs

enables, supports
Deliverables of a System Architect

[Diagram showing various book stacks labeled 'Report', 'Spec', 'Design']
Responsibilities of a System Architect

- Balance
- Consistency
- Decomposition
- Integration
- Overview

- Requirement
- Spec
- Design
- Realization

- module
- subsystem
- system

- KISS
- Elegance
- Simple
- Integrity
- Fitting

- satisfied stakeholders
- system
- context

- Architecting User Value: From technical Engineering to Value Engineering

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RSAresponsibilities
Bottom-up elicitation of system characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Quantity per year (order-of-magnitude)</th>
<th>architect time per item</th>
</tr>
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<tr>
<td>driving views</td>
<td>$10$</td>
<td>$100$ h</td>
</tr>
<tr>
<td>shared issues</td>
<td>$10^2$</td>
<td>$1$ h</td>
</tr>
<tr>
<td>touched details</td>
<td>$10^4$</td>
<td>$0.5 - 10$ min</td>
</tr>
<tr>
<td>seen details</td>
<td>$10^5 - 10^6$</td>
<td>$0.1 - 1$ sec</td>
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<tr>
<td>product details</td>
<td>$10^7 - 10^{10}$</td>
<td></td>
</tr>
<tr>
<td>real-world facts</td>
<td>infinite</td>
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</tr>
</tbody>
</table>

Consolidation in deliverables, meetings, informal contacts, sampling scanning.
Architects must increase customer side contribution

- Current Architects
- Required Architects

- customer objectives
- application
- functional
- conceptual
- realisation
• Present-day IT systems cause problems.

• The design must take **humans** and **processes** into account.

• The **system architect** is instrumental as **integrator**.

• The focus of the architect must be on **stakeholders** instead of technology.

• But also **users** have their own **responsibility** in the selection and use of technological means.

• Literature propagates **business drivers**, **strategies** and **processes** as driving force.
The most important driver...

The way humans feel, think and behave,

human norms, values, preferences and objections
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