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]
The Janus face of technology

Technology push

Influence

Today’s Society Background Norms & Values

Or unconscious? Passive

Conscious Active

Tomorrow’s Artifacts

Human pull Creation

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

Technological and economical drivers → IT characteristics → Consequences → Psychological damage

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

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ItpushFreeProduction
Virtuality or reality?

Wood
Position
Size
Trees
Shrubs

Tree
Trunk
Branches

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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
Ethical and legislative blurring

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
• 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

E
Environment
Analysts

H
Organizations
Humans
Managers

P
Processes
Consultants

T
IT Technology
Engineers

User Interfaces

Procedures

Models
Characteristics of subsystems in the environment

- Plannability
- Speed of Change
- Adaptivity
- Effort of Change
- Technology
- Processes
- Organizations
- People
- Culture

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ITpushSubsystemCharacteristics
Roles and Responsibilities

Environment

Analysts

Organizations

Humans

Managers

System Architect

IT Technology

Engineers

Processes

Consultants

Project Leaders

schedules and resources

Marketing and Sales Managers

commercial

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System Architect integrates 5 viewpoints

Customer
What
Customer
How
Product
What
Product
How
What does Customer need in Product and Why?
drives, justifies, needs
enables, supports

Customer objectives
Application
Functional
Conceptual
Realization

Product How

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Deliverables of a System Architect

- Report
- Design
- Spec

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RSAdeliverables
Responsibilities of a System Architect

- Balance
- Consistency
- Decomposition
- Integration
- Overview
- Quality
- Function
- modules
- satisfied stakeholders
- system
- context

KISS
- Elegance
- Simple
- Integrity
- Fitting

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RSA responsibilities
Bottom-up elicitation of system characteristics

<table>
<thead>
<tr>
<th>consolidation in deliverables</th>
<th>Quantity per year (order-of-magnitude)</th>
<th>architect time per item</th>
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<tr>
<td>meetings</td>
<td>10</td>
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<tr>
<td>informal contacts</td>
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<tr>
<td>sampling scanning</td>
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<td>$10^7 - 10^{10}$</td>
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<td></td>
<td>real-world facts</td>
<td>infinite</td>
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</tbody>
</table>

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Architects must increase customer side contribution

- Current Architects
- Required Architects

customer objectives application functional conceptual realisation

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Conclusion

- 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
Working group "Human Values & IT"

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