Abstract

The question: "What is an architecture" is addressed. Trends in the customer world and in the technology are used to obtain an outline of the product requirements. The customer world itself is a value chain consisting of quite heterogeneous stakeholders.

To satisfy the needs of these customers an integral approach is required. Architectures play a key role in such an integral approach.

Architecture lessons from practice are given to illustrate criteria for a good architecture are discussed. The concept of architecture-weight is introduced.
What is Architecture?

Understanding Why
Describing What
Guiding How

Do the right things
Do the things right
1A. Do the right things; The Dynamic Market

1B. Do the things right; Lessons from Practice

2. The Weight of an Architecture; Architectural Chaos or Bureaucratic Control?
Part 1A:
Do the right things;
The Dynamic Market
Value chain

Consumers

Retailers

Providers

System Integrators

Component and Platform Suppliers

Providers

UPC Canal+ AOL

AT&T

Retailers

Fry's Dixon

Consumers

Boonstra Peper Kok Chirac Blair Pietersen Smith Jones Jansen Muller Kleisterlee Clinton

Providers

AT&T

AOL

UPC

Canal+

Sony Philips CE-TV

Loewe

Nokia Philips CE-DN

Philips CE-PCC

Intel Microsoft

Micron Philips Semiconductors

Liberate Samsung ST LG TI

System Integrators

Philips Components

Component and Platform Suppliers

Light Weight Architecture: the way of the future?

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September 9, 2018
LWAvalueChain

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Integration and Diversity

GSM phone
firewall
dvd
audio microset
pda
watch
sailboat
surveillance camera
cable modem
set top box
headphone
garment
car navigation
car
car
computer
mp3
television
games
flat display
Communicator
Ambient Intelligence living room

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LWAIntegrationAndDiversity
Uncertainty (Dot.Com effect)

AOL
Amazon.com

source: BigChart.com
dd march 19, 2001

Light Weight Architecture: the way of the future?
Moore's law

From COPA tutorial, Rob van Ommering

1965: 1 kB
1979: 64 kB
2000: 2 MB
1990: 64 kB
System Integrator Problem Space - Business

Light Weight Architecture: the way of the future?

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Light Weight Architecture: the way of the future?

Gerrit Muller
System profile

Problem space

- Light Weight Architecture: the way of the future?
- Gerrit Muller
- version: 2.3
- September 9, 2018
- LWAsystemProfile
### Technologies

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- ● required
- ○ optional

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**Light Weight Architecture: the way of the future?**

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September 9, 2018

LWAsystemTechnologyMap
Exploring problem space and solution ingredients

Problem space

Programmability, flexibility
Increase supplier content
Competitive Performance / cost / power

Solution ingredients

Configurability
Family of products

Composable Architecture

Technologies

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- required
- optional

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LWAfromStakeholderToQualities
Architecture only works if the complementary viewpoints are addressed consistently
Conclusions Part 1A

Understanding Why
Dynamic Market Convergence Integration Diversity

Describing What
Configurable Component Platform
Portfolio and Family architecture

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Part 1B:
Do the things right;
Lessons from Practice
"Guiding How” by providing rules for:

1. Functional Decomposition
2. Construction Decomposition
3. Allocation
4. Infrastructure
5. Choice of integrating concepts
The Art of Architecting

Stakeholders

Expectations

Architecting

Facts

Architecture(s)

problems, legacy

Facts, Expectations and Intuition may be false
Integration requires a critical mindset that is alert for unknowns

Architect(s)

Intuition, assumptions, beliefs, bias

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LWAarchitecting
Architecting is much more than Decomposition

Decomposition is "easy"

Integration is difficult
Myth: Platforms are Stable

How **stable** is a platform or an architecture?

**Dynamic Market**

**Fast changing Technology**

**Architecture**

**Components**

**Platform**

Light Weight Architecture: the way of the future?

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The first time right?

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Feedback

- stepsizes: 3 months
- elapsed time: 25 months

Start, Target

Light Weight Architecture: the way of the future?
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Feedback (2)

stepszie: elapsed time

3 months 25 months 2 months 12 months

Start Start Target Target

Light Weight Architecture: the way of the future?
Small feedback cycles result in Faster Time to Market
3rd generation components are mature, active maintenance needed.

Growth and change continues, some "old" components become obsolete.

Light Weight Architecture: the way of the future?

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LWAplatformEvolution
Part 2:
The Weight of an Architecture;
Architectural Chaos or Bureaucratic Control?
weight(architecture) = \sum_{\text{all rules}} \text{weight}(\text{rule})

weight (\text{rule}) = f (\text{level of enforcement}, \text{scope (impact)}, \text{size}, \text{level of coupling or number of dependencies})
Scope and Impact

Business or Portfolio
  \[ n \]
  \[ m \]
Product Family
  \[ n \]
  \[ m \]
Product
  \[ n \]
  \[ m \]
Subsystem
  \[ n \]
  \[ m \]
Component
  \[ n \]
  \[ m \]

Heavy-weight
  High impact
  Large scope

Light-weight
  Small scope
  Low impact
  Light-weight

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Criteria for an Architecture

Customer
being informed
functionality
performance
timely available
acceptable cost

Open

implementation
decoupling
solution freedom

Suppliers

Feedback
Responsiveness

Business
manager
bottomline
future growth

Evolution

guidance
understandability
accessibility
product feasibility

Engineers

Solution Freedom
Communicable

Architecture
Effectiveness for dynamic markets and fast changing technologies

Flexibility
- Evolution
- Responsiveness
- Maintenance

Manageability
- Integration
- Interoperability
- Providing control

Light Weight Architecture: the way of the future?

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LWAeffectivenessCurves
Conclusion Part 2

Overall effectiveness = Flexibility * Manageability

For dynamic markets and fast changing technologies:

- Very low
- Low
- Medium
- High

Light Weight Architecture: the way of the future?

LWAeffectiveness

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LWAeffectiveness
Light Weight How -To

weight(architecture) = \sum_{\text{all rules}} weight(rule)

1. Reduce the rule set to the \text{(business)} essential

Understand
- your customer
- your customer's customer
- etcetera

2. Minimize the weight per rule
Minimize Rule Weight

weight(rule) =

\[ f \left( \text{level of enforcement}, \text{scope (impact)}, \text{size}, \text{level of coupling or number of dependencies} \right) \]

- minimize number of mandatory rules
- empower, delegate
- minimize implementation details
- focus on essential concepts
- Apply design principles on architecture
- Multi-view architecting
1A. Dynamic Market: Understand Your Customer

1B. Architecting in Practice: Change is normal, Stability is the exception

2. Optimal architecture: Light weight!
Acknowledgements

This presentation has been enabled by the inspiring and critical comments of:

- Jürgen Müller
- Peter van den Hamer
- Lex Heerink