Abstract
Philips Research is looking for ways to improve the software productivity. The business rationale for this research are the needs of semiconductor customers, the creators of consumer appliances. Technological developments, such as miniaturization and convergence have a strong impact on the form, function and content of consumer appliances. The appliance makers are struggling with the consequences, especially with the exponential increasing SW effort.

The customer and the semiconductor viewpoint are shown. Strategic questions for semiconductors are identified and discussed, such as the need for architecture, legacy and scoping.
Software productivity and components research goals

define vary create integrate test maintain
to create products faster with less effort

and/or by means of methods tools integration technology component technology... SW technology standardization partnering strategy?
to achieve better faster more functional more reliable safer ...
products...

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Customer viewpoint
Convergence -> Integration and Diversity

from PSAVAT 2001; "Light Weight Architectures; The way of the future? "

Semiconductor Software Strategy
Gerrit Muller

version: 0
March 6, 2013
SSSIntegrationAndDiversity
Exploring problem space and solution ingredients

**Problem space**

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<thead>
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**Solution ingredients**

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

**Family of products**

**Composable Architecture**

**Technologies**

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from PSAVAT 2001; "Light Weight Architectures; The way of the future? "

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SSSfromStakeholderToQualities
Dominant customer concerns

- time to market
- effort
- digital TV
- infrastructure
- application

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SSScustomerProblem
Trends in hardware and software

**direct product costs**: mostly determined by **hardware**

how about **software** license costs?

**development costs**: **software** becomes more expensive than **hardware**

**time to market**: **software** is limiting factor

**software** often synonymous with **integration**

**product value**: mostly determined by **software**

SW is integrating technology
SW implements functional behavior
Semiconductor viewpoint
Changes in semiconductor country in the last decade

- Analog → Digital
- Single function → Multiple functions
- $\text{mm}^2 \text{ Si}$ → "System" solution
- Small team → Large team
- Separate markets → Convergence markets

Deverticalization
Software ?!
Strategic questions for Semiconductor company

How to protect customers SW investments?

How to enable SW application reuse across domain boundaries?

Which software architecture? which hardware architecture

Which software to make? which hardware IP
How and with whom to partner?

How to do all of this fast enough? Thomson, TI, Intel, Samsung, ...
Which architecture?

How to protect customers software investments?

How to enable application reuse across domain boundaries?
Simplistic Architecting: Digital TV

analog TV  Set top box  Digital TV

Digital Video Platform SW

Digital Video Platform SW
Available Code Assets

Digital TV UI

<table>
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<th>TV applications</th>
<th>TV computing Infrastructure</th>
<th>3rd party stack(s)</th>
<th>Set Top Box functions</th>
<th>MHP</th>
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"Legacy" code > 500 Myr
Merge problems

Architectural mismatch:
wrappers, translators, conflicting controls

additional code
and complexity,
no added value

Poor performance;
additional resource usage

Problems Architecture Reuse non problem

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ARmergeProblems
Existing SW stacks

- STB
- TV
- MHP
- VCR
- DVD
- GSM
- 1394
- wireless LAN
- bluetooth
- 3G
- DVP

- Customer specific
- Domain specific applications
- Domain specific infrastructure
- Generic infrastructure
But there are much more domains and stacks
Ideal homogeneous situation?

long term dream

Reference Architecture +
Sample implementation
of Framework and
Components

Computing Infrastructure
Domain Infrastructure
Services
Applications
Framework
Reference Architecture +
Sample implementation
of Framework and Components
Today’s reality?

huge amount of glue
Achievable solution?

internal efficiency: fine grain components

Enable components "in the large" nuggets

framework specialization guidelines for integrating concept reference decomposition/allocation interface, format, protocol standards prototyping, development environments
Which software to make?
Core, key or base technology?

- **Core**
- **Key**
- **Base**

Technology life cycle:
- **Own value IP**
- **Critical for final performance**
- **Commodity**

Decisions:
- **make**
- **outsource**
- **buy**
- **refer customer to 3rd party**

Partnership:
- **Partnering**
Streaming: one of Philips’ core strengths

Software size

"control"

number crunching
operations/sec

streaming
Our territory?

customer specific

domain specific applications

domain specific infrastructure

generic infrastructure

year x

year x+2

year x+4

consolidation standardization

enabling, supporting
Summary

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SSSsummary