Abstract

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 trends and the impact on consumer appliances are discussed. Then the software effort problem is analyzed and solution directions for the SW productivity problems are explored.
Value chain

Consumers

Providers

Retailers

System Integrators

Component and Platform Suppliers

Providers

Retailers

System Integrators

Component and Platform Suppliers

Consumers

Providers

Retailers

System Integrators

Component and Platform Suppliers
Integration and Diversity

GSM phone
firewall
dvd
audio microset
pda
watch
sailboat

surveillance camera
cable modem
set top box
headphone
pen
garment
car

camera
speech
mp3
television
Communicator
Ambient Intelligence
living room

car navigation
computer
games
flat display

Software Productivity for Consumer Appliances
version: 0
September 9, 2018
LWAIntegrationAndDiversity

Gerrit Muller
Uncertainty (Dot.Com effect)

source: BigChart.com
dd march 19, 2001

Software Productivity for Consumer Appliances
version: 0
September 9, 2018
LWAdotcom
Problem: increasing SW size, decreasing reliability?

![Graph showing the typical amount of errors per product from 1990 to 2005. The x-axis represents years (1990 to 2005), and the y-axis represents the typical amount of errors per product (10, 100, 1000, 10000). The graph indicates an upward trend, suggesting an increase in errors as the software size increases.]
Manage large PCP teams of > 1000 people

or

Significantly increase SW productivity

from: Ad Huijser
Philips Software Conference 2001

System Integrator size of workforce

required team size

1000

100

10

1

historic trend

2000

2005

2010

our challenge

1

10

100

1000

— SW productivity —

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Software Productivity for Consumer Appliances

version: 0
September 9, 2018
AHtheChallenge
Partial Solution: Configurable Component Platform

<table>
<thead>
<tr>
<th>Systems</th>
<th>MIPS</th>
<th>TriMedia</th>
<th>MPEG</th>
<th>Real</th>
<th>GSM</th>
<th>RF</th>
<th>amp</th>
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- ● required
- ○ optional
Exploring problem space and solution ingredients

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

Solution ingredients

Composable Architecture
Family of products
Configurability

Technologies

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Searchable keywords:
- Programmability
- Flexibility
- Increase supplier content
- Competitive Performance / cost / power
- Composable Architecture
- Family of products
- Configurability
The Holy Grail: Reuse


dollar sign

$\$\$

REUSE

Promise

Reality

time

Software Productivity for Consumer Appliances
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ARtheHolyGrail
"Guiding How" by providing rules for:

1. Functional Decomposition
2. Construction Decomposition
3. Allocation
4. Infrastructure
5. Choice of integrating concepts
Evolution of functionality

- Customer specific
- Domain specific applications
- Domain specific infrastructure
- Generic infrastructure

Year x
Year x+2
Year x+4

Enabling, supporting consolidation standardization
Existing SW stacks

- STB
- TV
- MHP
- VCR
- DVD
- GSM
- 1394
- wireless LAN
- bluetooth
- 3G
- DVP
- domain specific applications
- domain specific infrastructure
- generic infrastructure
- customer specific
But there are much more

- modem cable, ADSL, ...
- firewall
- residential gateway
- homeserver
- audio
- MP3, ...
- CD, SACD, DVD, ...
- radio
- jukebox, HD, ...
- security
- home control
- webcam
- videocam
- photocam
- games
- PDA
- webpad
- PC's
- modem cable, ADSL, ...
- firewall
- residential gateway
- homeserver
- mediascreen
Simplistic Architecting: Digital TV

analog TV

Set top box

Digital TV

Digital Video Platform SW

Digital Video Platform SW

Merge
Available Code Assets

Digital TV UI

- TV applications
- TV domain infrastructure

Set Top Box Platform

- 3rd party stack(s)
- Set Top Box functions

Digital Video Platform SW

- TV domain HW
- Set Top Box domain HW
- Computing HW

"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

Duplication
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

OS
FS
MP3
MPEG2

Computing Infrastructure
Domain Infrastructure

language
style

personalization
tune
theme

Configuration
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

Software Productivity for Consumer Appliances
Gerrit Muller
version: 0
September 9, 2018
Software productivity research goals

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 products better faster more functional more reliable safer ...
Coarse research plan

2001

learn
scope
hardware domain
application domain
customers
SW technologies
current solutions

2002

explore
solutions
build
analyze
measure
test

2003

roadmap, strategic choices

2004

transfer

identify
solutions

problem statement

Software Productivity for Consumer Appliances
version: 0
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SWPcoarseResearchPlan