PHILIPS

OSGi in the consumer entertainment environment

“My devices work together for me”

Paul Bristow
Philips Softworks
paul.bristow@philips.com

Leo Rozendaal
Philips Research
leo.rozendaal@philips.com
Contents

• Vision
• Networked consumer devices: step by step
  – connectivity
  – device interoperability
  – reconfigurability and downloading new applications
• Exploiting networked consumer devices
• Another use of OSGi in (consumer) devices

note: this presentation is about consumer electronics in general, not particularly about Philips’ CE division
Vision:

• Seamless Connectivity

• Ambient Intelligence
  – electronic environments that are sensitive and responsive to the presence of people

“My devices work together for me”
“My devices work together for me”

- videocommunication
- “TV”
- camera
- multiple remote controls
- light
- robot/toy

source:
“Don’t miss your favourite show when you are interrupted”

• While watching your favourite programme on TV...
• Interruption: the doorbell rings
• **Automagically,**
  – the VCR/PVR starts recording the programme you were watching
  – picture from front door camera appears on tv screen
• (Handle visitor)
• Afterwards, you can resume the programme at the point of interruption
“Adapt to the ever-changing web without changing every device”

- Collecting EPG information from the web:
  - need to adapt to changes in formatting, location, etc. of the information
  - solve by using an updateable application
  - this application gets updated *automagically* whenever needed
  - it forwards the gathered info in a non-changing format to other home devices
  - these other home devices do not need to be adapted

- Not just EPGs, e.g. also other content navigation
What do we need to accomplish such scenarios?

• A number of connected devices
• Devices need to be able and willing to communicate with one another
• Ways for an application to monitor/control tv, vcr, doorbell, camera, etc.
• Someone to create, supply and maintain the application
In the ideal world...

- All consumer home devices
- would use the same network technology
- would use the same interoperability layer
- would be bought from a single vendor (at one time)
- ...

“My devices work together for me”
However...

- Home Networking is not a user’s goal
  - “I’d like to buy a home network, please”
- Devices and networks evolve slowly
- You and I are not the typical target buyer and user for such systems
- Home Networking typically starts with the second PC, and not in the entertainment domain
Why consumer electronics devices are different from PCs…

• Limitations in memory, processing capabilities, power consumption (no fan)
• No (or little) configuration options or extensions
• Long life cycle expected (by consumer)
• Support of legacy
• Reliability, predictability
• …
Why the *usage* of consumer electronics devices is different from PCs…

- The user does not (want to) understand all the details of what is happening
- Installation and maintenance should be straightforward
- Using should be straightforward
- Offering additional functionality/ features/ applications should be done in a way which appeals to the user’s view of the world, and his/her state of mind
- …

“the armchair experience”
Networking consumer devices: Step by step

Being gentle with our customers
Step 1: Connectivity

- Analogue content transfer (cinch, SCART)
- Digital content transfer (SPDIF, digital video camera)
- Simple control (SCART pin 8, AV-link; camera control)
- Connection to the PC cluster for
  - sharing the Internet connection
  - content transfer to and from PC
    - video editing; listening to streaming audio
    - later also watching streaming video
  - new interconnected devices
    - e.g. networked audio/video storage, PVR
- Evolutionary growth!
Example: Streamium MC-i 200

www.streamium.com
Step 2: Interoperability

• A middleware (software) layer above networking technology

• Devices expose their functionality in a standard way

• Devices can discover functionality offered by other devices and use such functionality

• Examples: UPnP for IP, HAVi for IEEE 1394
Towards step 3: Reconfigurability and downloading new applications

• Devices are connected and can ‘see’ and ‘use’ other’s functionality

• But the end user functionality is still fixed, i.e. what the manufacturer thought was appropriate at design time for that device

• Large variations between devices and networks in different homes

⇒ We need a flexible environment for adding functionality (applications) after shipping
Networked consumer devices: 
Exploiting the networking

- Adding functionality after shipping
- Downloadable (new-purpose) applications
Various types of downloaded applications

- Code updates, and additional device applications (extensions, goodies)
  - manufacturer
- Applications associated with streaming content. e.g. a TV programme
  - content owner, broadcaster
- Applications using multiple networked devices (“multi-device applications”)
  - manufacturer, service bundler, any 3rd party
Enabling technologies

- Download and remote management of applications over a (broadband) network
- Abstraction from networking technology and middleware
- Now addressing entertainment related functionality
- Next challenge: User Interface matters

- Broadcast managed download of applications
- Built around the requirements of a tv broadcaster
- Now considering additions for networked functionality, PVR, etcetera
Enabling technologies

- Download and remote management of applications over a (broadband) network
- Abstraction from networking technology and middleware
- Now addressing entertainment related functionality
- Next challenge: User Interface matters
- Broadcast managed download of applications
- Built around the requirements of a tv broadcaster
- Now considering additions for networked functionality, PVR, etcetera

A great opportunity for a complementary fit rather than a clash
Features needed for entertainment related applications

- Usually about audio/video content
  - downloaded application needs:
    - localization of content sources
    - content browsing
    - localization of rendering device(s)
    - control audio/video rendering
    - user interface presentation, including
      - concurrency of applications
      - supporting different device capabilities
        - e.g. big tv, small tv, audio set, voice control only
      - uniform way of behaviour
Current activities in this context

• These topics are being addressed in the OSGi “Entertainment” group
• Discussions between OSGi and DVB-MHP
• Also one of the work items in a European (ITEA) collaboration project “HomeNet2Run”
  → http://www.extra.research.philips.com/euprojects/hn2r/

• If accomplished successfully, this could make OSGi a potential solution for consumer entertainment products
Challenges (technical) ...

- Inclusion of sufficient functionality in at least some of the new devices, so that the additional multi-device functionality (first step on the way towards ambient intelligence) can be added at an appropriate moment

- Piggybacking on the devices’ main purpose

- Limiting and justifying extra price tag
Challenges (more) …

• Managing the installation and registration of networked devices

• Explaining the concepts of networking and networked functionality to the user

• Creating and delivering compelling applications
Another use of OSGi in (consumer) devices

An interesting abstraction layer for product code
Inside a typical product (1): using a **proprietary** API for built-in appl’s

<table>
<thead>
<tr>
<th>appl. # 1</th>
<th>appl. # 2</th>
<th>appl. # 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>middleware</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>drivers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>hardware</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**proprietary API** (per platform)
Inside a typical product (2): using a **standard** API for built-in appl’s

advantage: portability of applications
Conclusions

• Home Networking is an incremental and evolutionary process
• The OSGi framework is a natural location for downloading applications fitting multi-device functionality to realize that “my devices work together for me”
• Probably some extensions needed for entertainment related scenarios
• The OSGi framework can also be used as an abstraction layer for the “internal” applications in a product
“My devices work together for me”