An architecture for multi-device adaptation of HTML5 media apps

WWW2015
20th May 2015, Florence, Italy

Mikel Zorrilla
Vicomtech-IK4
mzorrilla@vicomtech.org
Outline

1. Motivation
2. Multi-device Adaptation
3. Adaptation Challenges
4. Architecture
5. Implementation / demos
6. Conclusions
Motivation

• A strong trend towards **Web-based apps**

• Users accessing services from **several devices simultaneously**
  – Loosely coupled: Backend or event-driven model

• Users would like to have a **single experience** through multiple devices at the same time

• **TV still the prominent device for media**
  – Combined with tablets, smartphones, laptops, etc.
  – Growing interest in second screen solutions within the Connected TV
Motivation

• Broadcasters and app developers need to implement, distribute and maintain a set of complex solutions
  – Specific target devices / platforms
  – Specific communication solutions

• For a second screen application with a TV
  – HbbTV + companion device
  – Ginga (Brazil). ITU-T H.761 for IPTV.

• Fragmented Connected TV market
Multi-device Adaptation

**FROM:**
Different apps for specific target devices, controlling one by one their functionality, visualisation and inter-device communication

**TO:**
Single app, where app developers describe the complete functionality, interface and the multi-device behaviour once

Multi-device adaptation: The seamless translation of a single app into a multi-device execution, providing a well fitted portion of app on each device
Adaptation Challenges

- **Multi-device adaptation (splitter)**
  - Decide which pieces of content are suitable to be presented on each device
- **User interface adaptation**
  - Show the pieces on each device in a responsive way
- **Inter-components communication**
  - The pieces should share a context and this must be distributed
## Design objectives

<table>
<thead>
<tr>
<th><strong>Autonomous behaviour</strong></th>
<th>Self-regulated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dynamically adaptable to changeable contexts</td>
</tr>
<tr>
<td><strong>Expressiveness</strong></td>
<td>Boost the development of this kind of apps</td>
</tr>
<tr>
<td></td>
<td>Avoid broadcasters / app developers to deal with complex solutions</td>
</tr>
<tr>
<td></td>
<td>Web technologies, re-usable</td>
</tr>
<tr>
<td><strong>Openness</strong></td>
<td>Open approach using and extending Web languages, with a potential to be standardised</td>
</tr>
<tr>
<td></td>
<td>Interoperability</td>
</tr>
</tbody>
</table>
Architecture

• Based on Web-Components
  – Application defined by logic modules: in pieces
  – Composability
  – Encapsulation
  – Reusability
Architecture

- It will act over the app-related Web Components
- It will have a global overview of the APP (Web Components & CSS properties)
- It will use other MediaScape resources to have a global overview of the context

```html
<html>
  <link rel="import" href="components/app-container/app-container.html">
  <body>
    <component-1/>
    ...
    <component-N/>
  </body>
</html>

<template>
  <style>
    component-1 {
      adaptation-engine-property: value;
      UI-engine-property: value;
    }
  </style>
</template>
```
Workflow

• Re-usable rules
• The rules will take into account
  – The App code: Multi-device behaviour
  – The context information (how many device, capabilities, etc.)
Implementation

• Adaptation Engine
  – adaptation-engine-needs e.g.: broadcast capabilities
  – adaptation-engine-best-fit e.g. biggestScreen, touchable
  – adaptation-engine-behaviour:
    • movable
    • duplicable
    • required
Implementation

• **User Interface Engine**
  
  – Responsive design: mechanisms for single device (media queries, etc.)
  
  • Usually CSS for each target device
  
  • App with 6 components: 64 different combinations
  
  • Template based approach over CSS Grid Layout
Demonstrator
Demonstrator
Conclusions

• We addressed the adaptation challenge for multi-device media applications

• In MediaScape we proposed an architecture based on Web Components

• The implementation validates the design objectives:
  – Autonomous behaviour
  – Expressiveness
  – Openness

• We are working to provide an open library to create multi-device application

• Still working on it: optimisation, new rules, etc. Ready by the end of the year in www.mediascapeproject.eu
Thank you!

An architecture for multi-device adaptation of HTML5 media apps