Digital Signage & Digital TV Out Of Home (DOOH)
1. Digital Signage: Market and use case

2. About Innes

3. Technologies and Standards
Market access

3 large segments

Broadcast

Institutional

Mass Market

3 main sectors:

• Point of wait,
• Point of sale,
• Point of transit,
The primary contact for point-of-wait projects is often the system integrator or value-added resellers that bring together the different skills to meet the needs of the customer.
External communication projects where the goal is a recognized ROI are generally controlled by advertising agencies or screen network operators.
The “transportation” projects are often supported by the system integrator in connection with the public service delegator transport operator. The main difficulties of the sector is the need to conform to many standards (EN50155, …). Unlike the previously described sectors, the equipment onboard, such as media players or display must endure a high temperature range (for instance -25°C/+70°C) and to be anti-vibration.
About Innes

- **Main player in the digital signage in France**
  - 75 % point of wait (corporate, museography)
  - 20 % point of sale
  - 5 % point of transit

- **Creation of the company in 2005**

- **Strong R&D (multimedia, linux/windows, TI omap, Intel Atom, …)**

- **AV Hardware manufacturer and Software author**

- **Sales activity begins in 2013 Europe**
Innes: Manufacturer of Richmedia players and encoders
Solution 1: Peer to peer usage

Mono – user

Composer + Scheduler (Screen Composer)

Player (Playzilla)
Solution 2: Server use (many people use the system)
TECHNOLOGIES AND STANDARDS
Digital Signage: Architecture of a «open» player

User Application

Rich Media Engine
AV Framework + Web Framework (Gecko, Webkit, ...)

Direct X  Kronos API (OpenGL, Open VG, OpenMAX, ...)

Linux X86
X11/ Wayland / Android

Linux ARM/Cortex A8
X11/ Wayland / Android

Intel 9xx  Intel Poulso  Nvidia  Davinci ARM9 + DSP C64  OMAP CortexA8 + DSP

SMIL+, JavaScript, CSS3, HTML5, XPath, XSPF, XMP, iCal, Device API...

WS-*

SOAP  DPWS  WS-Management

Popai Play-log

X86  Windows

WS-*
The power of a declarative language (easy for authoring software)
- The power of a style language like CSS3 (layout, animation, …)
- The power of a script language known for a large public (web designer) and a collection of APIs (device, canvas, webgl, …)
- Synchronized Multimedia Integration Language
- XML language
- Open specification
- Temporal synchronization
  - Sequences
  - Exclusive time containers
  - Events
- Supported by leading digital signage systems: Advantech, IAdEA, Innes, Scala, Spinetix, Stinova, …
- Ideal candidate for interoperability

http://www.w3.org/AudioVideo/
http://www.a-smil.org/
- Region
  - Place: top, left, width, height
  - Css Regions (http://labs.adobe.com/technologies/cssregions/)
  - Shape: border-radius, clip, ...
  - Background: background-color, opacity, ...
  - Media behaviour: object-fit (fill, contain, cover), object-position
- Transitions
  - transition-property
  - transition-duration
- Audio volume
- Media queries
  - Media features
    - @media all and (orientation: portrait){…}
    - @media all and (aspect-ratio : 16/9){…}
    - *:-moz-system-metric(touch-enabled){…}
  - Media types
    - @media tv {...}
<smil>
  <head>
    <style type="text/css">
      [region="mainRegion"]{
        transition-duration:1000ms;
        transition-property:opacity;
        opacity:0;
        left:0px;left:0px;width:1920px;height:1080px;
        ...
      }
      [region="mainRegion"]:smil-active{
        opacity:1;
      }
    </style>
  </head>
  <body repeatCount="indefinite">
    <video region="mainRegion" src="video1.mp4" duration="media"/>
    <video region="mainRegion" src="video2.mp4" duration="media"/>
  </body>
</smil>
SMIL Medias elements and interactivity

- SMIL Medias elements must have a close semantic HTML5
- Notion of inheritance -> suitable control (play/stop, next page, etc.)
- New elements in SMIL:
  - iframe (browsing context, seamless, …)
  - book (paged media)
  - vector vs animation ?
  - svg ?
• Have notions that are not presents in wallclack
  • Events with begin and end: can be notified even if device was off at the beginning
  • Exceptions
  • Alarms: 10 minutes before end, ...
• Interoperability with existing calendars softwares
• Use of calendar API (html5)

Example:
BEGIN:VCALENDAR
BEGIN:VEVENT
DTSTAMP:20120531T102355Z
UID:507f6235-694f-42fb-a10c-0a4a38ac027e
LAST-MODIFIED:20120531T102355Z
CREATED:20120531T102355Z
DTSTART:20120519T080000
DTEND:20120519T120000
RRULE:FREQ=WEEKLY;INTERVAL=1;BYDAY=MO,TU,TH,FR
EXDATE;VALUE=DATE:20120615
END:VEVENT
END:VCALENDAR
<smil>
  <head>
    <style type="text/css" src="style.css"/>
    <link type="text/calendar" href="calendar.ics"/>
  </head>
  <body>
    <par repeatCount="indefinite">
      <video region="mainRegion" src="video.mp4" duration="media"
        begin="UID507f6235_694f_42fb_a10c_0a4a38ac027e.begin"
        end="UID507f6235_694f_42fb_a10c_0a4a38ac027e.end"/>
    </par>
  </body>
</smil>
SMIL + scripts

• Issues:
  • Everything can’t be done by declarative: clients have very different needs
• Introduction of scripts

Example:
<smil>
  <head>
    <script type="text/javascript">
      ...
      function loadFunction(event){…}
    </script>
  </head>
  <body onload="loadFunction(event)" repeatCount="indefinite">
    <script type="text/javascript">…</script>
    <video region="mainRegion" src="video.mp4" duration="media"/>
  </body>
</smil>
Issues:

• SMIL States are poor (data model, ...)
• Need to have declarative State Chart to animate interactivity

Proposal:

• **SCXML W3C**
Device API

- Battery status
- **Media Capture** (camera, microphone)
- **Messaging** (SMS, MMS, emails)
- **Sensor API**
- **Calendar** (iCalendar, ISO-8601)
- **Permissions for Device API Access**
- **Systems info and events** (CPU, network, etc.)
- **Touch Events**
- .....
Player - Monitor: AV Signal Transport, Monitoring and commands

- Proprietary protocol like Samsung MDC RS232, Ethernet
- VESA Monitor Command Control Set (MCCS) and DDC/CI I2C on DVI, VGA, HDMI, Display Port, HDBaseT
- Signal transport TCP/IP oriented (SMPTE 2022 FEC)
POPAI Digital Signage Standards committee has released a reference system and a glossary on common terminologies that are available for download from POPAI site or following hypertext.

- **Content Standards**
- **Screen-Media Formats**
- **RFI Working Template**
- **POPAI Digital Signage Device RS-232 Standards**
- **POPAI Digital Signage Playlog Standards V 1.1**
- **Digital Control Commands**
- **Industry Standards of Digital Signage Terms**
- **Work-in-Progress: Server-Player API Standard**
Server-Player API Standard

- Object Media downloader
- Player language downloader
- Software downloader

**Some tracks:**
- REST HTTP,
- HTTP cache API like Manifest HTML5,
- XACML (Access control): example: no download during the day for files bigger than 1Mio,
- SOAP,
- FUMO FOTA (Firmware Over the Air) ([Open Mobile Alliance](https://www.openmobilealliance.org/))
Unambiguously object media definition

What are the formats that can be played by the player?

- POPAI Screen-Media Formats

- RFC4281: The Codecs Parameter for "Bucket" Media Types
“Popai Playlog is a collection of record or information created from the digital signage system reflecting the content played, the system performance and other data. (Synonyms: billing log, performance log, audit log, proof-of-play report)”
Two candidates:

- SNMP (set, get, trap primitives commands)
- WS-Management (object model)

**Pro of the second solution:**
WS-Management is available with Microsoft PowerShell architecture
Use HTTP/HTTPS
Easy to integrate with a DPWS (Device Profile for Web Service) stack