An Ecosystem for Interactive Mixed-Reality Applications on the Web

Tutorial on Mixed Reality for the Web
Web3D ’14, Vancouver

August 10th 2014
Tutorial Outline

Today’s Topics:

1. The Future Internet Program
2. Declarative 3D for the Web: XML3D and XML3D Assets
3. Sharing one World: Multi Client Applications with XML3D
4. Mixing the Real with the Virtual: Augmented Reality and the Reality Mixer
5. Real Virtual Interaction
Tutorial Outline

Speakers:

- Kenny Mitchell (Disney Research Zürich)
- Marcel Lancellle (ETH Zürich)
- Fabio Zünd (ETH Zürich)
- Torsten Spieldenner (DFKI Saarbrücken)
Future Internet Program

The Future Internet Program of the EU (FI-PPP)

- Large Integration Activity of the EU (500M Eur.)
  - Move from TCP/IP to service-oriented architecture
  - Create comprehensive and consistent set of services
- 5-year duration (2011 - 2016)
  - Provide Core Technology in FI-Ware *Generic Enablers*
  - Create use-case scenarios in FI-Content (*Specific Enablers*)
- Build a business ecosystem around the technology
  - New approach: Include SMEs and Web Entrepreneurs
How can YOU use this 3D-Internet Technology?

- Check out FI-WARE Generic Enabler
  - XML3D source is already freely available on GitHub
    (http://github.com/xml3d/xml3d.js)
  - Other GEs will be available on FI-LAB
    (http://lab.fi-ware.org)

- Check out FI-Content Specific Enablers
  - Will be freely available at http://mediafi.org
  - SEs will be freely accessible on FI-LAB
Declarative 3D: XML3D

Declarative 3D for the Web:

- Extension to HTML5 for 3D Content
- Entirely based on Web technologies: DOM, CSS, HTML Events etc.
- Generic data model that allows data compositing and external references
- Xflow: Efficient declarative dataflow processing
  - Animations, image processing, AR, ...
- Provided as polyfill implementations
Declarative 3D: XML3D

Some more cool features:

- **Instancing mechanism** for externally described assets
- Efficient binary transmission format: **BLAST**
- **shade.js**: Portable and adaptable material description in JavaScript
- Integration of many external services:
  - **DFKI**: Scene editing, virtual characters, motion synthesis, server-based rendering, ...
  - **FI-PPP**: Synchronization, Augmented Reality, Real Virtual Interaction

→ Huge eco system for compelling 3D Web Applications
Declarative 3D: XML3D

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### Instancing XML3D Geometry

**Instancing assets in XML3D**

```xml
<asset id="myasset" transform="#baseTransform">
  <assetmesh shader="shaders.xml#tex" src="cube.json" />
  <assetmesh shader="shaders.xml#tex2" src="part_2.json" />
</asset>
```

Instantiate assets with just one node:

```xml
<model id="instance_1" src="resources.xml#myasset"/>
<model id="instance_2" src="resources.xml#myasset"/>
```

**Assets also provide:**

- Configurable parameters, e.g. for individual animations and poses
- *Can be defined externally!*
Instancing XML3D Geometry
XML3D Asset Servers

XML3D - Repo

- Fusion of XML3D and 3D-Repo
- Provides REST Interface to request versioned 3D models
- Uses BLAST for transmission of large structured data

See also Web3D paper talk
XML3D Asset Servers

ATLAS

*Advanced Three-dimensional Large-scale Asset Server*

Provides assets for different front-ends:

- Upload asset in supported format (e.g. **COLLADA**)
- Server stores asset in *internal interchange format*
- Front-end requests asset in specific format via URL
- Server converts asset and delivers it to front-end
Next:

- *Shared interactive 3D worlds based on XML3D*