

X3DOM

Status and Future Development

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Outline

- X3DOM – Basic Concepts
- Latest Developments
- Standardization
- Next Steps

X3DOM – Basic Concepts

- „X3D in HTML5“
- Project launched & Web3D paper in 2009
X3DOM: a DOM-based HTML5/X3D integration model
- Open Source Project (MIT / GPL)

X3DOM – Basic Concepts

- X3D declarations as part of HTML Web page
- Several rendering backends possible
 - Dedicated X3D (ActiveX) plugin
 - Flash plugin
 - **WebGL / JavaScript (no plugin)**

X3DOM – Basic Concepts

- **WebGL / JavaScript** is the usual way to do it

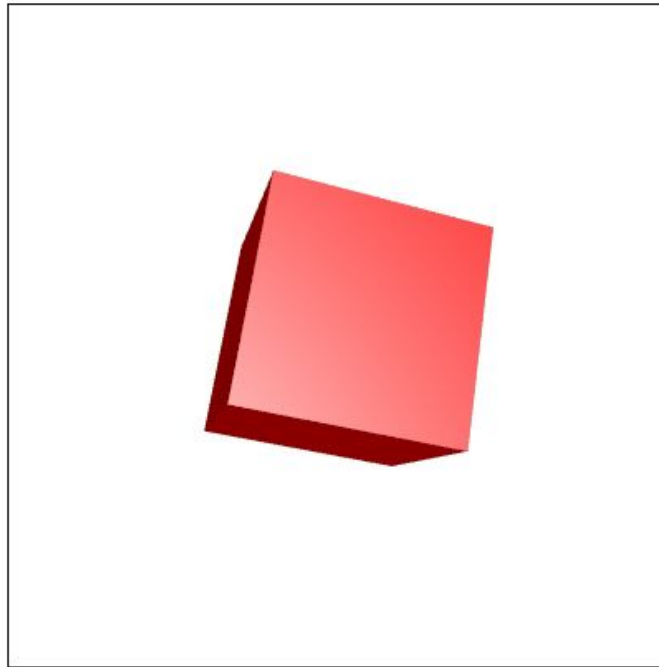
```
<!DOCTYPE html >
<html >
  <head>
    <link rel='stylesheet' type='text/css' href='http://www
    <script type='text/javascript' src='http://www.x3dom.org/x3dom/release/x3dom.js'></script>
  </head>
  <body>
    <h1>Hello X3DOM World</h1>
    <x3d width='400px' height='400px'>
      <scene>
        ...
      </scene>
    </x3d>
  </body>
</html>
```

Include X3DOM JavaScript Library
(*Polyfill*)

Definition of the X3D Scene in HTML
(No self-closing tags, unlike X3D in XML)

X3DOM – Basic Concepts

Hello X3DOM World



X3DOM – Basic Concepts

- DOM API as Interface to X3D content
 - X3D Node = DOM Element
 - X3D Field = DOM Attribute
 - DOM Manipulation (*appendChild*, *setAttribute*, ...)
 - HTML Events
 - (Experimental) CSS integration
- Easy to learn for Web developers

X3DOM – Basic Concepts

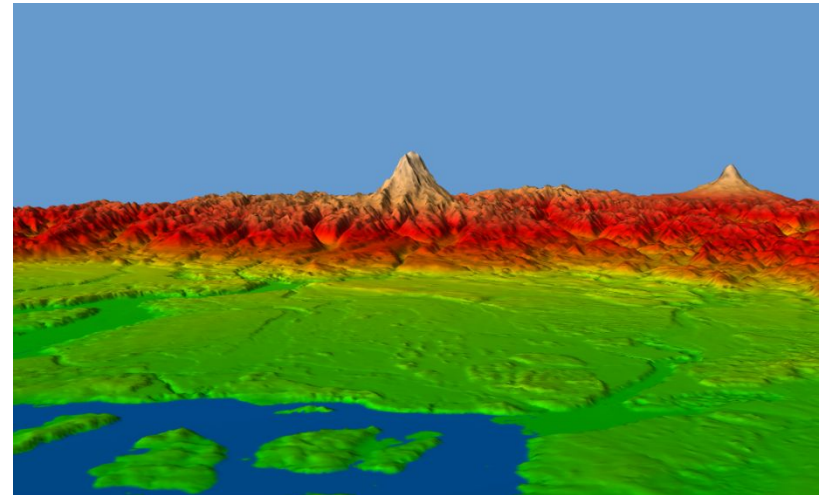
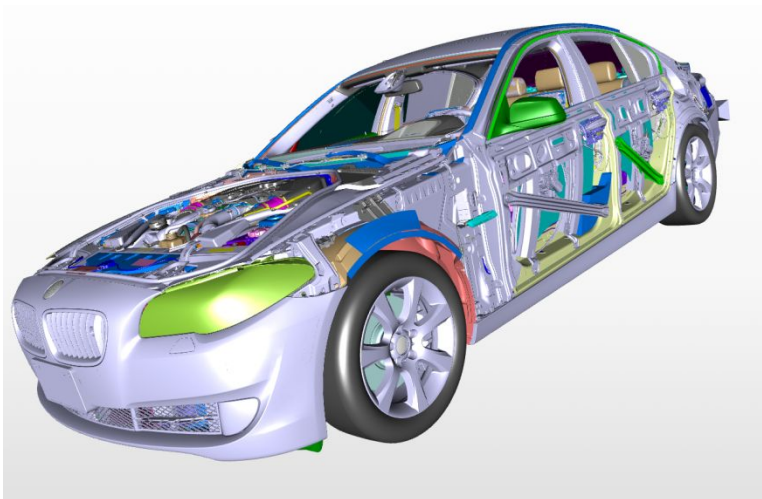
- Latest stable release: 1.7
- Originally an experiment by Fraunhofer IGD, now an open source project hosted on GitHub
- Many contributions by community
- Communication: Mailing lists, GitHub tracker

X3DOM – Basic Concepts

- Recent, ideal node contribution workflow:
 - Check similar concepts (in InstantReality, Xj3D, ...)
 - For self-cooked nodes: Submit proposal
 - Why do existing concepts not solve the problem?
 - Discussion on X3DOM mailing lists and GitHub
 - Development, guided by ongoing discussion
 - **Pull Request** on GitHub

Latest Developments

- Additions beyond X3D mostly driven by performance reasons (see next slides)



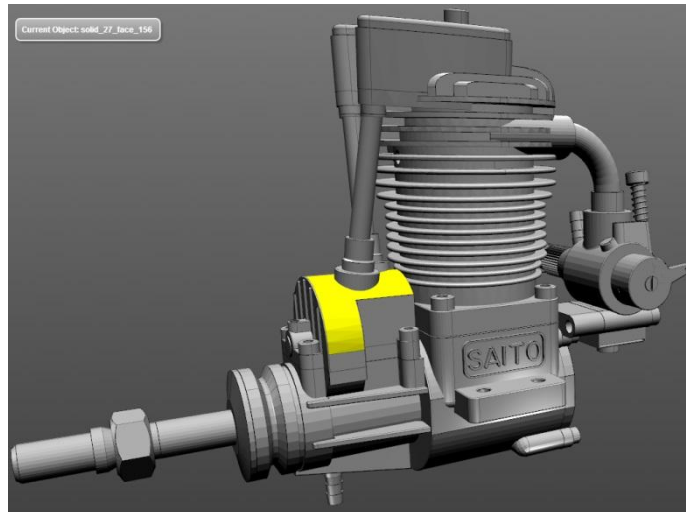
Latest Developments

- *ImageGeometry, BinaryGeometry, POPGeometry, **ExternalGeometry***
(How to efficiently stream binary mesh data)



Latest Developments

- *MultiPart* Node: Parts are not DOM objects
(*How to efficiently identify many small parts*)



Latest Developments

- JS Field Interface
(How to efficiently access large field values)
 - getFieldValue, setFieldValue
(uses JS objects / value types instead of strings)
 - requestFieldRef, releaseFieldRef
(returns / releases reference instead of copy)

Latest Developments

- Other non-standard X3D behavior:
 - Mouse Events as alternative for *TouchSensor*
 - *onoutputchange* event processes ROUTEable field value changes in a JS callback function

Latest Developments

- Fresh Page, including new Examples Portal

The screenshot shows the X3DOM website homepage. At the top, the logo "x3dom" is displayed with the tagline "Instant 3D the HTML way!". To the right of the logo is a navigation menu with links: "News", "See it" (highlighted in a blue box), "Get it", "User's Showcases", "Documentation", "Get involved", and "Support".

Below the navigation is a "Featured" section containing six small images representing different 3D scenes: a colorful landscape, a classical building interior, a 3D bar chart, a green airplane, a starry space scene, and a cardboard box with a smartphone.

Underneath the featured images is a search bar with the placeholder text "Example name, description, ...".

The main content area is divided into three columns of example categories:

- Examples**
 - Basics**
 - Lights**: You want your scenes to appear in a good light right? T...
 - Shadow Effects**: Learn how to create realistic shadows for your x3dom sc...
 - Using Images and Movies for Textures**: This tutorial shows what type of image and movie format...
 - Navigation modes**: X3DOM provides some generic interaction and navigation ...
 - Large Models + Binary Compression**
 - Terrain of Puget Sound**: BVH Refinement...
 - Restored Synagogue**
- Tech Demos**
 - HTML Integration**
 - HTML Hello World**: Basic X3DOM in HTML example
 - XHTML Hello World**: X3DOM in XHTML example
 - Background Opacity**: Background and object opacity
 - 3D object in front of text**: A 3D object in front of HTML text
 - Multi-View**: Multiple X3D scenes in a single XHTML document
 - id/USE**: Model with id/DEF names and USE/Route references
 - Simple DOM updates**: Model with DEF/USE references
 - jQuery Manipulations**
 - Simple Applications**
 - Virtual 3D Gallery**: Example which combines jquery lightBoxes with X3DOM to realize a virtual gallery of digitized 3D objects.
 - Car Product Configurator**: A simple car configurator.
 - Scientific Visualization and Data Picking**: Scientific visualization of turbulent flow with pickable temperature distribution.
 - Augmented Reality (FLARToolkit)**: An augmented reality demo using Flashes FLARToolkit for marker tracking.
 - Augmented Reality with WebRTC / JSARToolkit.js**: An augmented reality demo using WebRTC and JSARToolkit.js for marker tracking.
 - Solar System with Carousel Menu**: A solar system view, using a carousel menu and showing some information when clicking on a

Latest Developments

- CommonSurfaceShader now also supports object-space normal maps



Latest Developments

- Proposals for Integration into X3D:
 - Integration of DOM Events
 - *ExternalShape* and *ExternalGeometry* nodes
 - Popular non-standardized nodes
(for example, *MatrixTransform*)
 - *LineSensor* node (*PlaneSensor* not sufficient)
 - *CommonSurfaceShader*

X3DOM: Next Steps

- HTML Profile Refinement necessary
 - Process not defined yet
 - Should be discussed (also on mailing lists)

Thanks for your attention!

Questions?