

X3DOM

Status and Future Development

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Outline

- X3DOM – Basic Concepts
- X3DOM 1.x: Latest Developments
- X3DOM 1.x: Standardization
- X3DOM 2.0: First Steps
- X3DOM 2.0: Call For HTML Profile Refinement

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

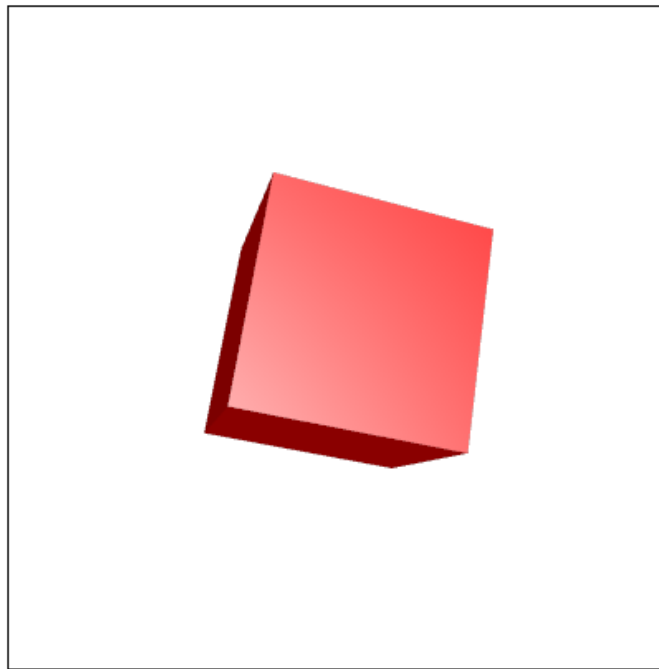
```
<!DOCTYPE html >
<html >
  <head>
    <link rel='stylesheet' type='text/css' href='http://www.khronos.org/webgl/resources/css/x3d-layout.css' />
    <script type='text/javascript' src='http://www.x3dom.org/x3dom/release/x3dom.js'></script>
  </head>
  <body>
    <h1>Hello X3DOM World</h1>
    <x3d 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

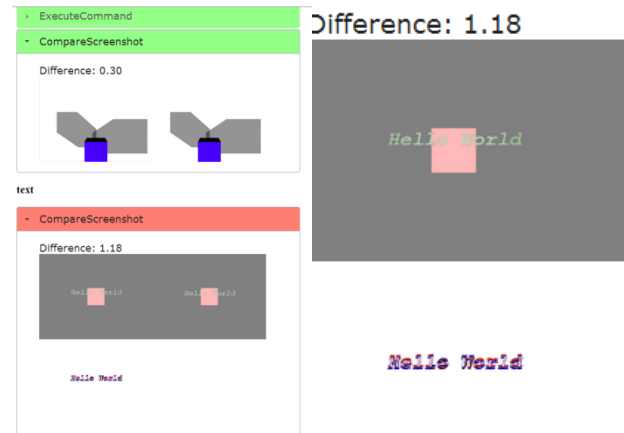
- Latest stable release: 1.6.1
- Originally an experiment by Fraunhofer IGD, now an open source project hosted on GitHub
- Communication over mailing lists, GitHub

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

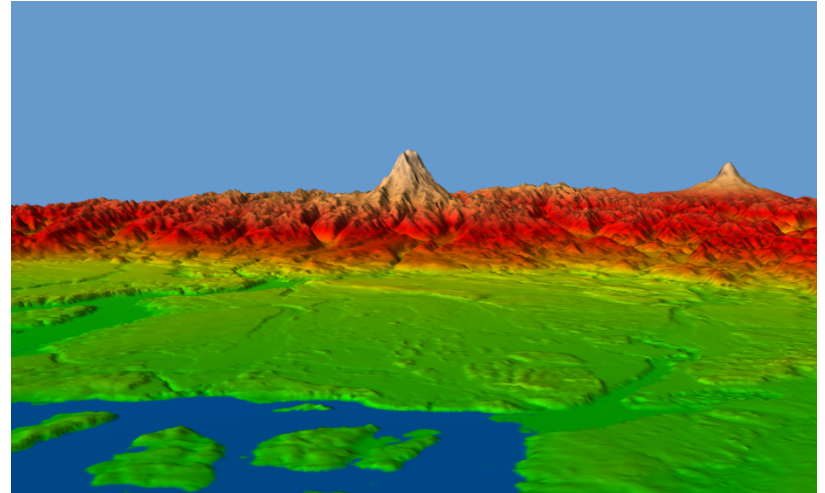
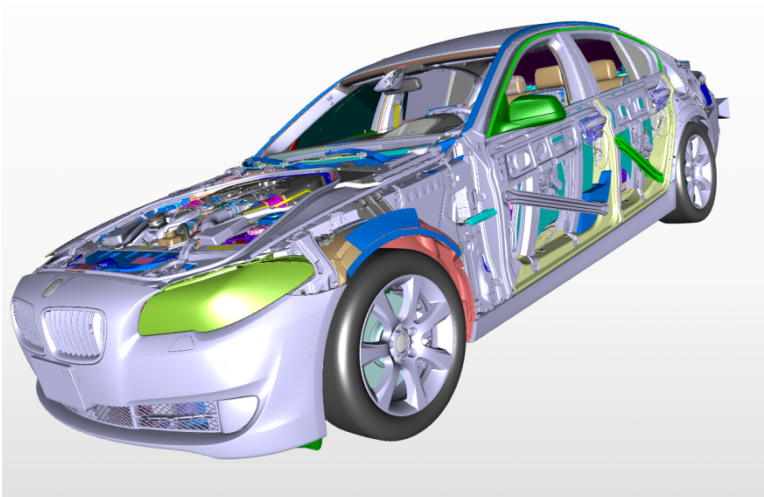
X3DOM 1.x: Latest Developments

- Central Web portal for examples
- Node API Documentation, Beginner's Guide, Tutorials
- Automated Testing Suite



X3DOM 1.x: Latest Developments

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



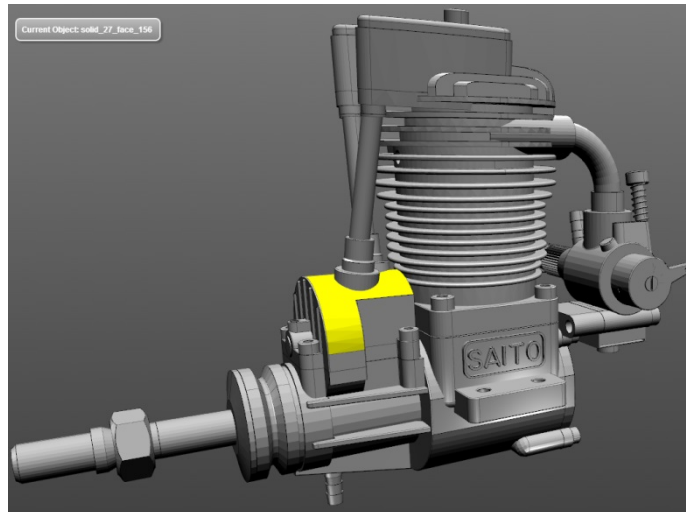
X3DOM 1.x: Latest Developments

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



X3DOM 1.x: Latest Developments

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



X3DOM 1.x: 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)

X3DOM 1.x: 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

X3DOM 1.x: Standardization

- 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)

X3DOM 2.0: First Steps

- X3DOM 1.x: Goal: (X)3D in DOM
Started as small experiment, rapid development, at the cost of general stability and extensibility
- X3DOM 2.0: Goal: Scalability, Long-term
Stable and extensible, TypeScript, quality assurance, rendering separated from X3D-related code

X3DOM 2.0: First Steps

- Pluggable Rendering Environment (PRE)
 - High-performance rendering of large data sets
 - Different culling, rendering and compositing components can be combined
 - Basic user interaction API (navigation, picking, ...)
 - Developed along with X3DOM 2.0, but separated

X3DOM 2.0: First Steps

- X3D layer very small, almost no functionality
 - No DOM manipulation possible
 - Clean implementation of basic ROUTE, Event, ... mechanisms still needs some time
 - Nodes: *Transform, Viewpoint, Shape, Appearance, Material, Box, ExternalShape, StaticGroup*
 - HTML profile needs to be updated

X3DOM 2.0:

Call For HTML Profile Refinement

- X3DOM HTML Profile from 2009
 - Some nodes questionable
 - Some (new) nodes probably missing
- Aims:
 - Expressive set of core features / nodes
 - X3DOM 2.0 implements refined HTML Profile