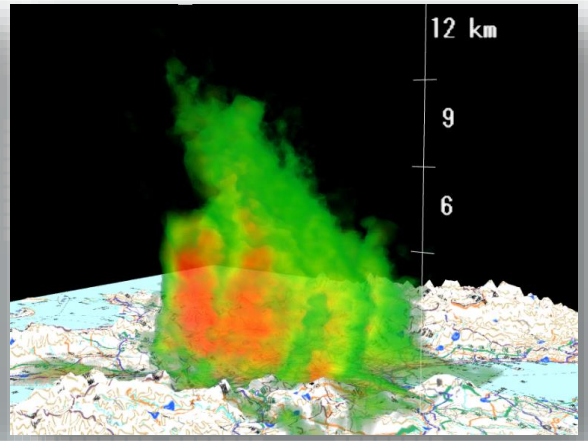
Web3D.org

X3D: An Open 3D Digital World



Web3D and X3D Overview

One World Terrain Standards Meeting - Arlington, Virginia

March 25, 2015

Web3D Consortium – Anita Havele, Executive Director

Anita.havele@web3d.org

Market Needs

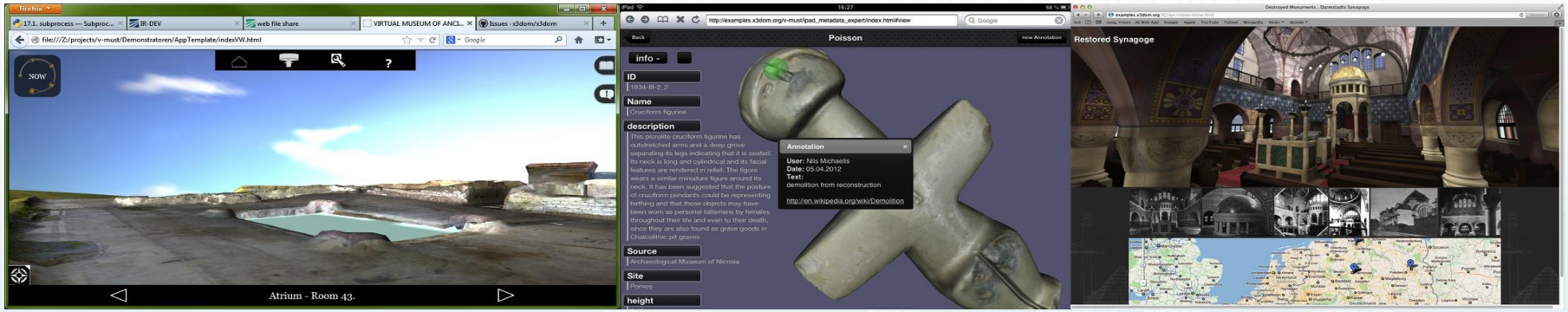
Highly integrated interactive 3D worlds

Cities - Weather - building - Engineering - scientific

Web as the delivery method

Next-Generation 3D Web Applications

Immersive 3D inside your Web browser



Enhancing user experience with sophisticated visualizations

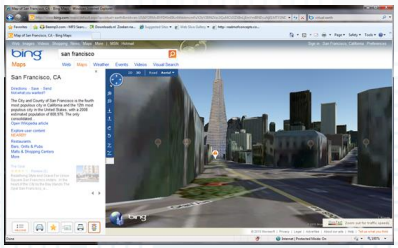
Yesterday: website with videos

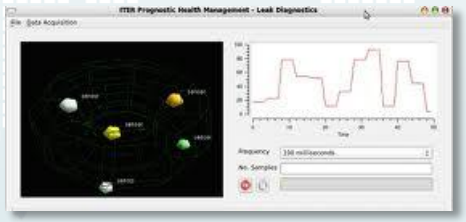
Today: Immersive 3D inside your Web Browser

Diverse Data Sources

Increased Interest in 3D Web applications

- Geospatial data
  - Terrain
  - Imagery
  - Buildings
  - Simulation/design



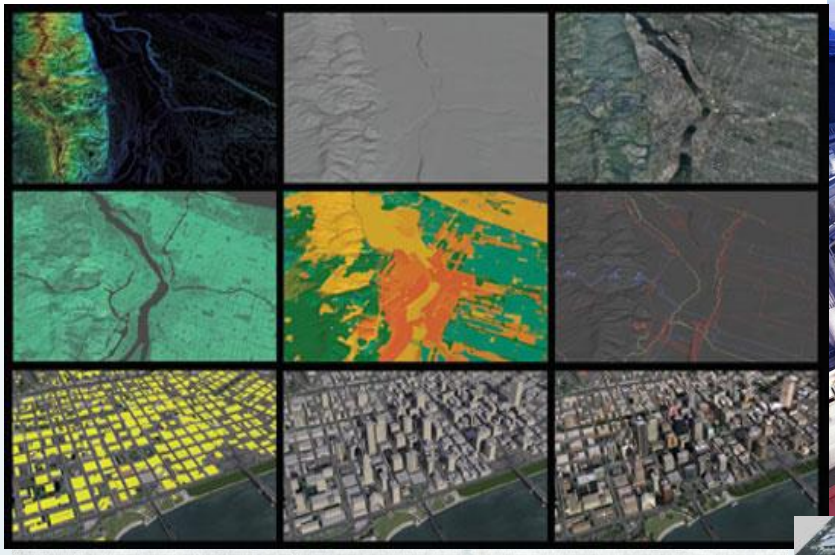


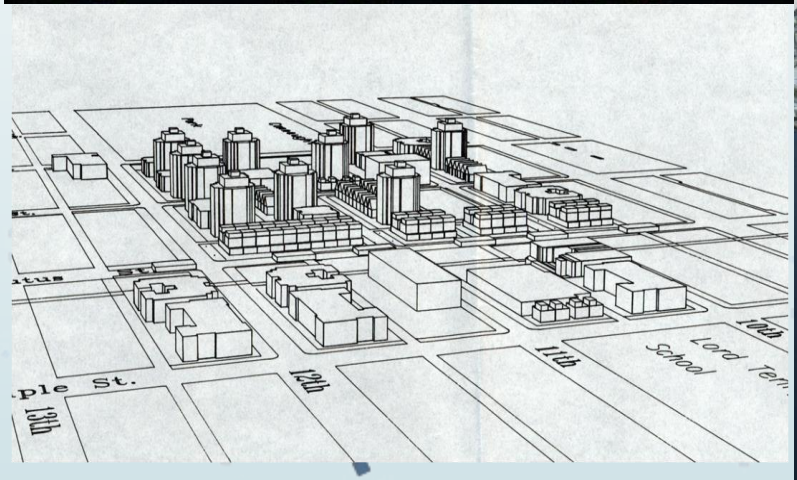
- Visualization of abstract information
- Experiencing Cultural Heritage data in 3D
- Virtual Engineering

3D Cities on Digital Globes

This is Amsterdam in 3D.

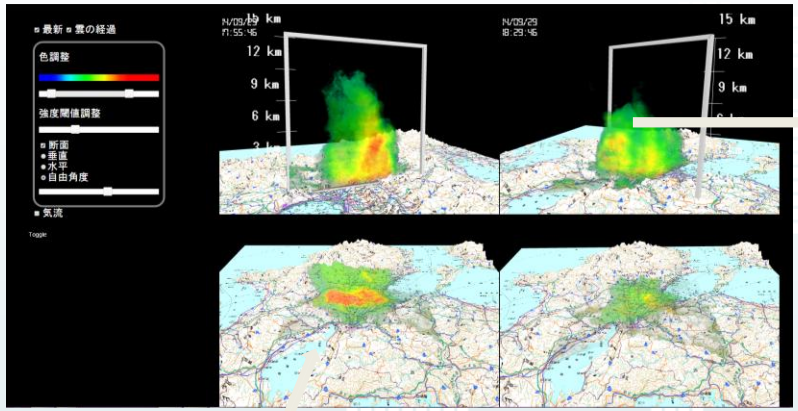
3D Smart Cities

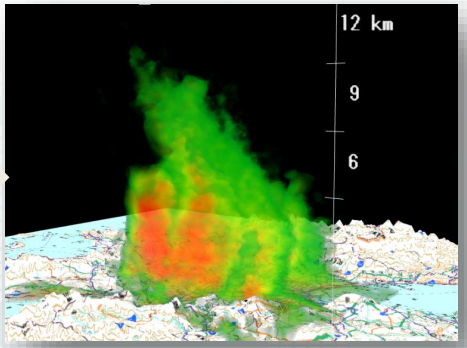


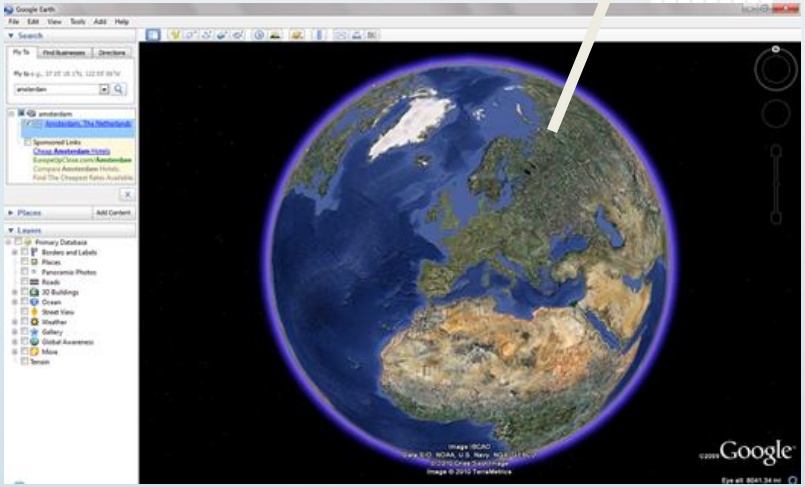


City functions and informed planning decisions

Volumetric 3D weather data on Digital Globes



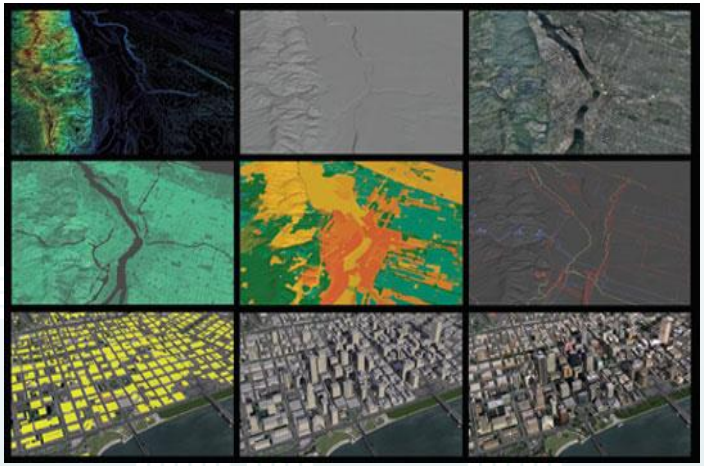




3D Maps with volumetric cloud data.

Agriculture & Development

- Crop suitability
- Land use
- Water
- Weather / climate
- Terrain
- Local scans
- …



What's the future for your 3D technology?

Market Dominance - Propriety Solutions - Biggest competitor

- Companies hope to "own" 3D
- Success is short lived, many companies die
- Poor open standards support
- Single vendor solutions & lock-in (closed or patented technologies)

Leading to NO Portability, Interoperability, Extensibility and Durability

Why Are Open Standards Important for 3D?

Creating quality 3D content is expensive:

Both in time and software costs

Something just as expensive is recreating 3D content:

When the underlying technology no longer works

Proprietary 3D technologies:

Rarely interoperable

How do we develop Open Systems?

- International Collaboration
- Convergence of standards & policies
- Market adoption

Standards are proven and evolving

They can converge

X3D

CityGML

HTML5

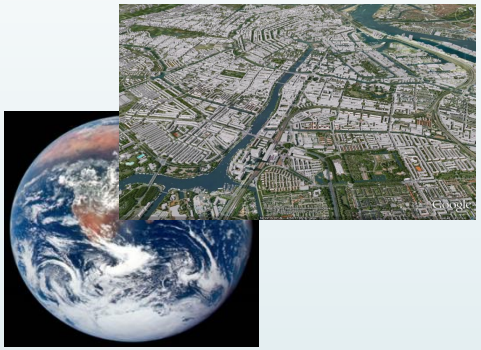
WebGL

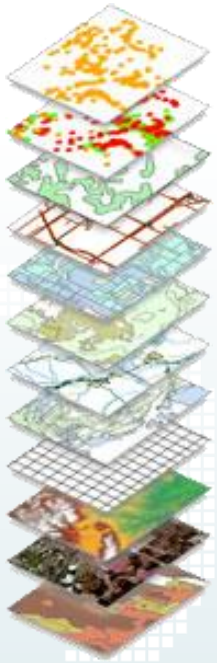
Market Adoption
Web Browser Support

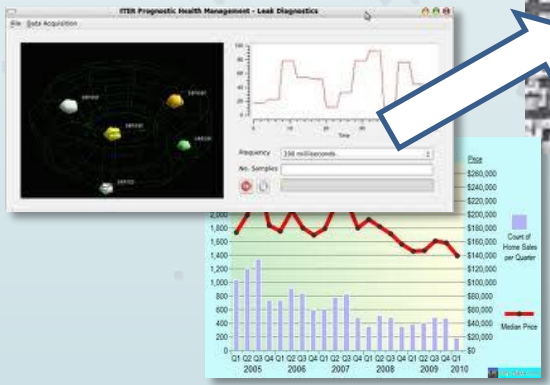
WebGL

Data must Coexist

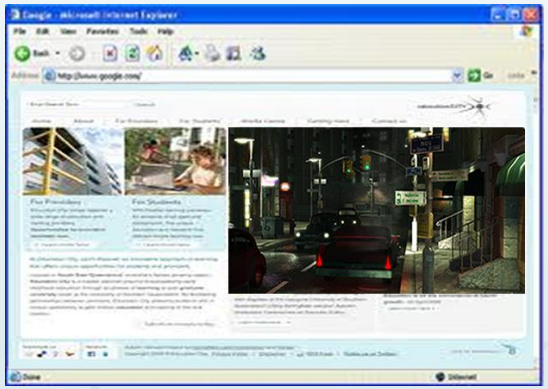
3D Visualization requires mashing diverse data

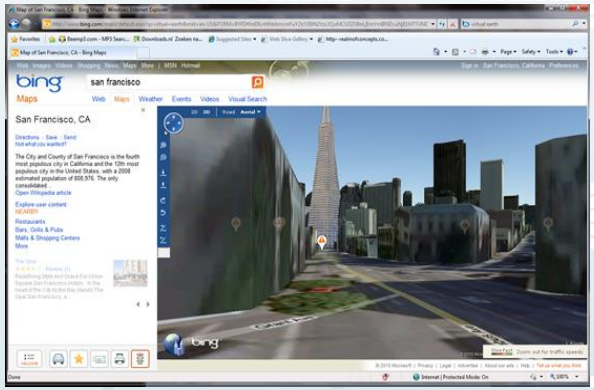






Web3D Consortium is making this happen with X3D technology





Ensure an open digital framework to help designers, engineers and industries deliver interactive 3D on the Web.

X3D - Interactive Real-time 3D standard for the Web

- Open ISO Standard
- Royalty-Free
- Evolutionary - 1997
- Durable
- Interoperable
- Multi Platform

www.web3d.org

Who is developing X3D?

Web3D Consortium founded in 1997

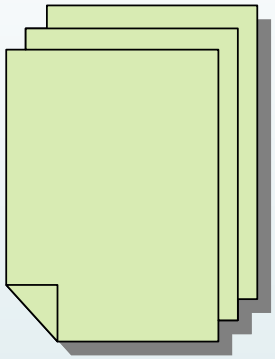
- International
- Non-profit
- Member-funded
- Industry group

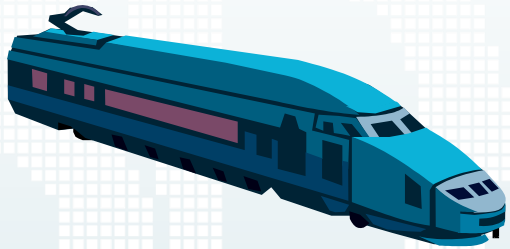
www.web3d.org

Our members: Business, Academia, Government and Professionals

What is X3D?

X(Extensible)3D- A complete solution for 3D on the Web





File Formats:
XML, ClassicVRML, Binary

Event Model
open source and commercial engines

Meshes • Lights • Materials • Textures • Shaders
Interaction • Animation • Audio/Video

Real-Time • Web-based • Interactive • Animation • Extensible • Scriptable

Scene graph for real-time interactive 3D

Delivery of virtual environments over the web

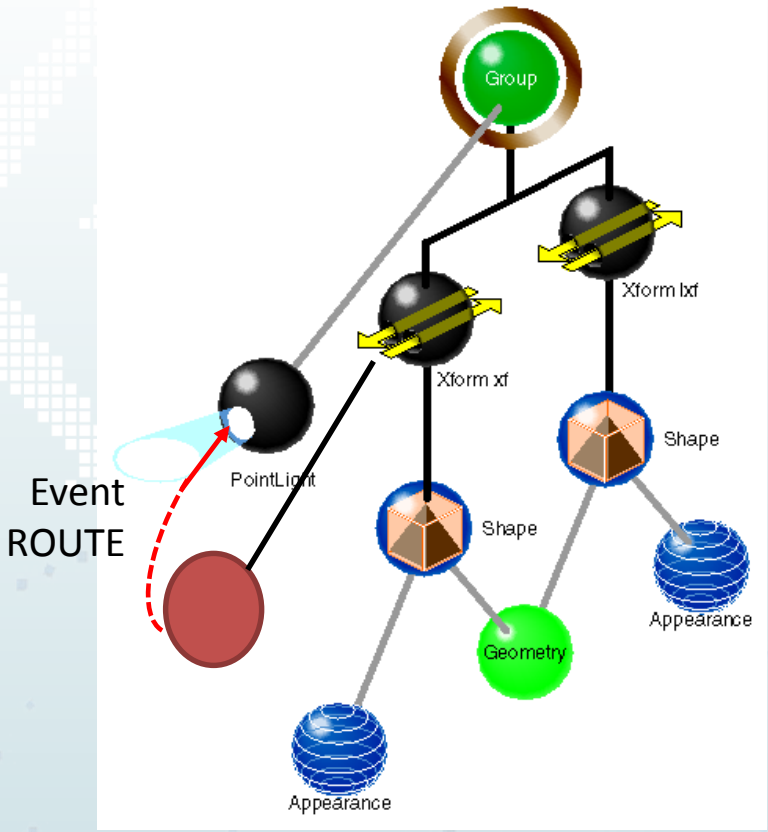
The next-generation VRML

Multiple ISO-ratified encodings

- XML (.x3d)
- Classic VRML (.x3dv)
- Compressed Binary (.x3db)
- JSON

Multiple APIs

- ECMAScript (JavaScript)
- Java
- Python

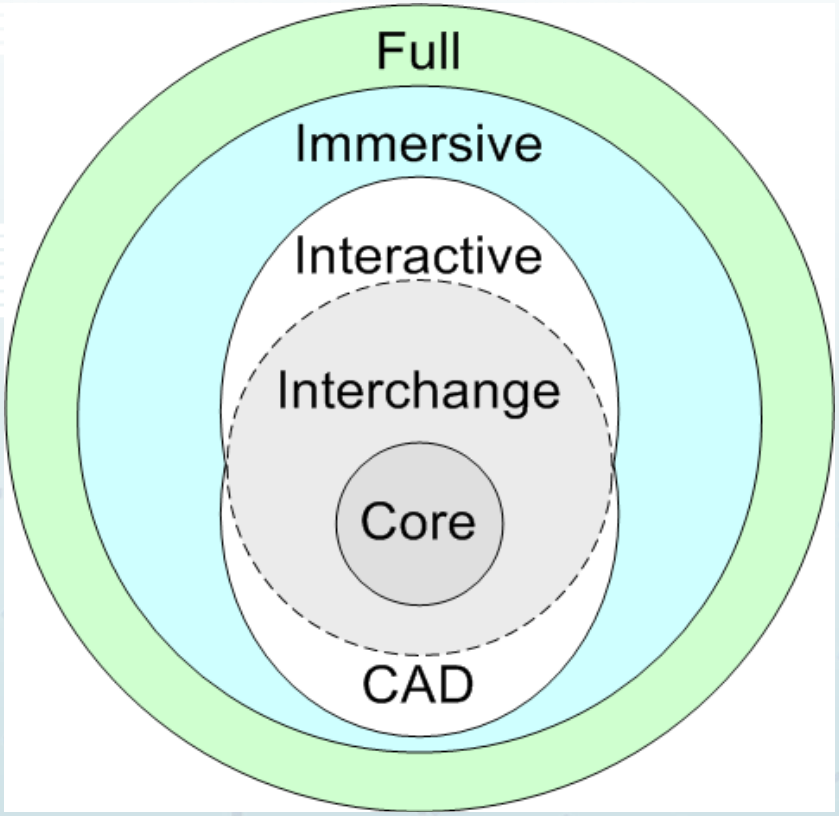


X3D Components and Profiles

Goal:
- Modular 3D visualization components
- Reduced complexity and implementation effort

A light-weight X3D
- light-weight runtime essentials
- A stripped-down X3D Scene Graph
- Complimentary to other platforms and data services
  (HTML5, Mobile, OGC, W3C, DICOM, …)

Uses
- Mobile applications
- Vertical Markets (Geo, Medical)
- Augmented Reality Applications
- Virtual Reality



Geospatial Component of X3D

Geospatial scenes have requirements beyond ordinary 3D scenes

- **Double-precision accuracy** on floating-point displays
- Diverse yet **coherent spatial reference** systems

11 X3D Geospatial nodes add Geo functionality to X3D

- Integrates the globe with X3D scenes

Generation of local regions or full-scale globes using any data

Spatial data creation
Spatial representation/analysis and
Spatial 3D Presentations

Real-time sharing and Interactive/Immersive 3D visualization

Without license restrictions, openly scalable

OGC/Web3D Convergence

Provide improved location enabled 3D web services for Geo data

OGC Vision: Achieve the full societal, economic and scientific benefits of integrating **location resources** into commercial and institutional processes worldwide

Web3D Consortium Vision: Provide a forum for the creation of open standards for **3D Visualization**, and to integrate these standards and resources into commercial and institutional processes worldwide

.

X3D OGC standards Interoperability

- **GML**
- **CityGML**
- **KML Encoding Standard**

Correlating approaches with OGC formats and tools

- 3D Portrayal Interoperability Experiment (3DPIE)
- 3DIM DWG
- 3D Portrayal SWG – X3D as an Annex

OGC 3DPIE and X3D

- X3D aligns with OGC 3D visualization goals
- 3D Portrayal Interoperability Experiment
- 3D Portrayal SWG participation

- **Web3D Member Contributions**
  - Virginia Tech – 3D Blacksburg Project
  - Bitmanagement – BS Contact Geo Browser
  - Fraunhofer – Instant Reality Browser/X3dom
  - MBARI – Sensor data underwater visualization
  - NPS – X3D Earth Project

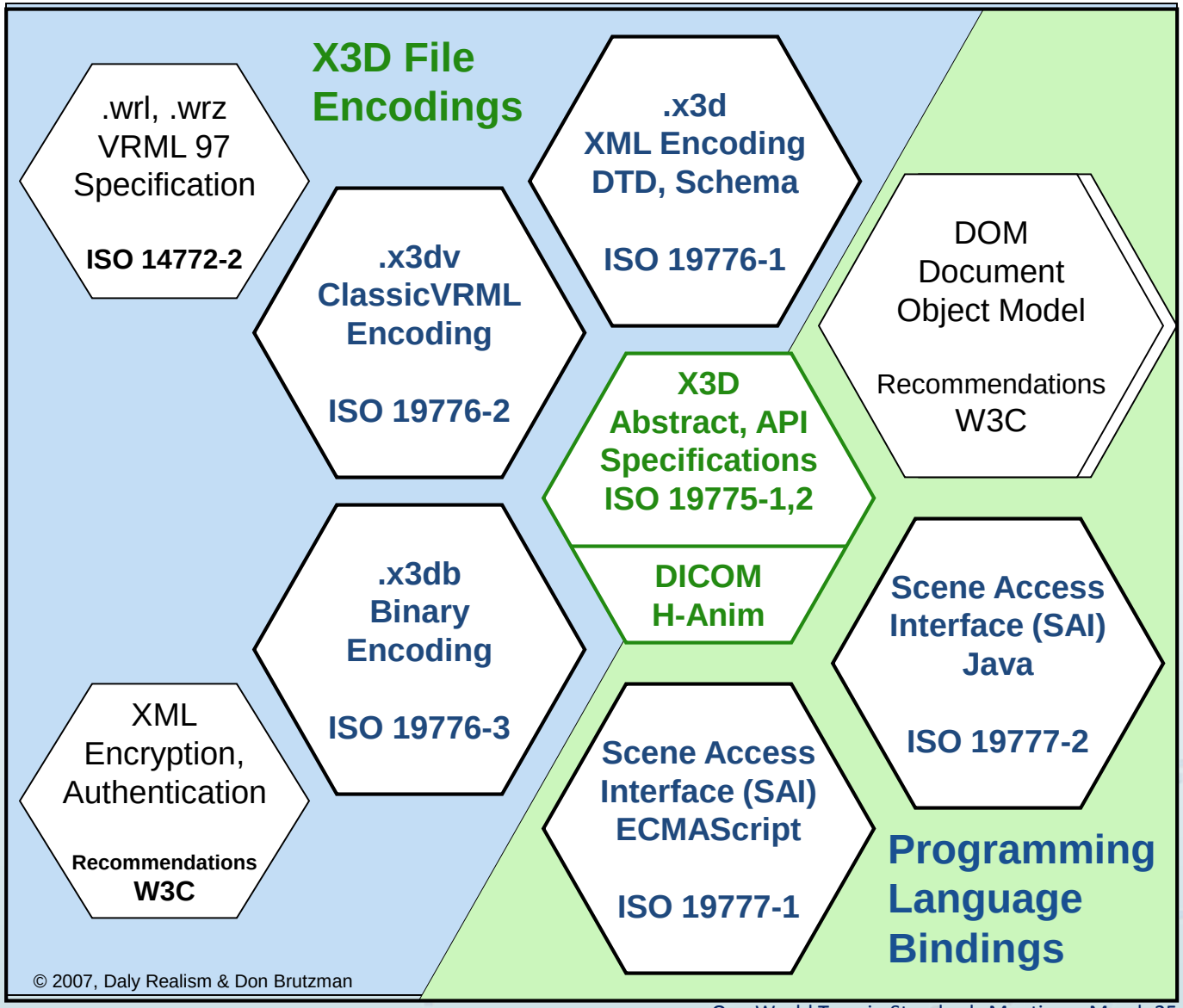
X3D Standardization Process

The X3D specifications are online at:
http://www.web3d.org/x3d/specifications

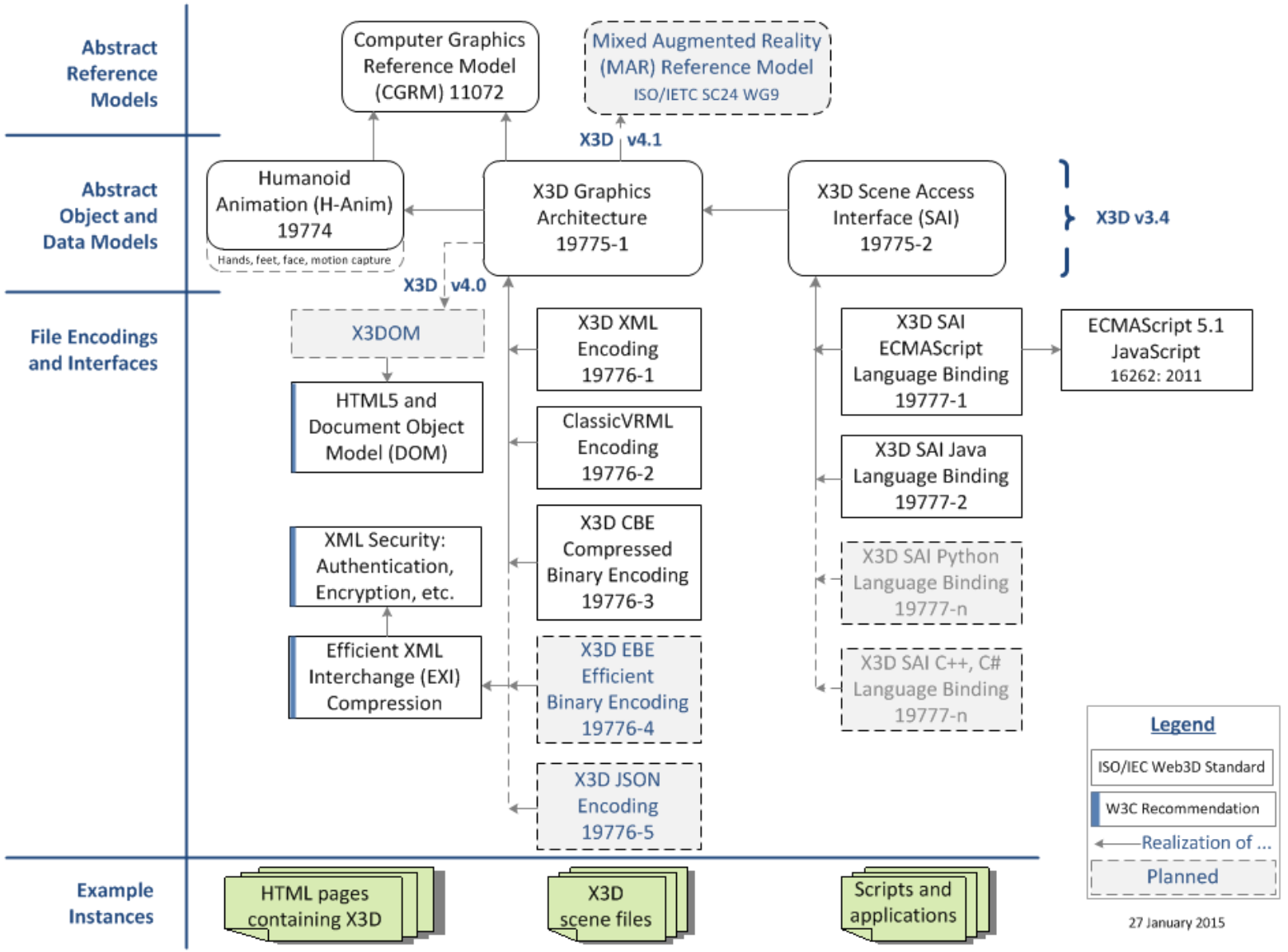
Web3D and W3C have similar policies

X3D graphics is defined by a set of specifications
These "specs" are developed by working-groups as part of the Web3D Consortium

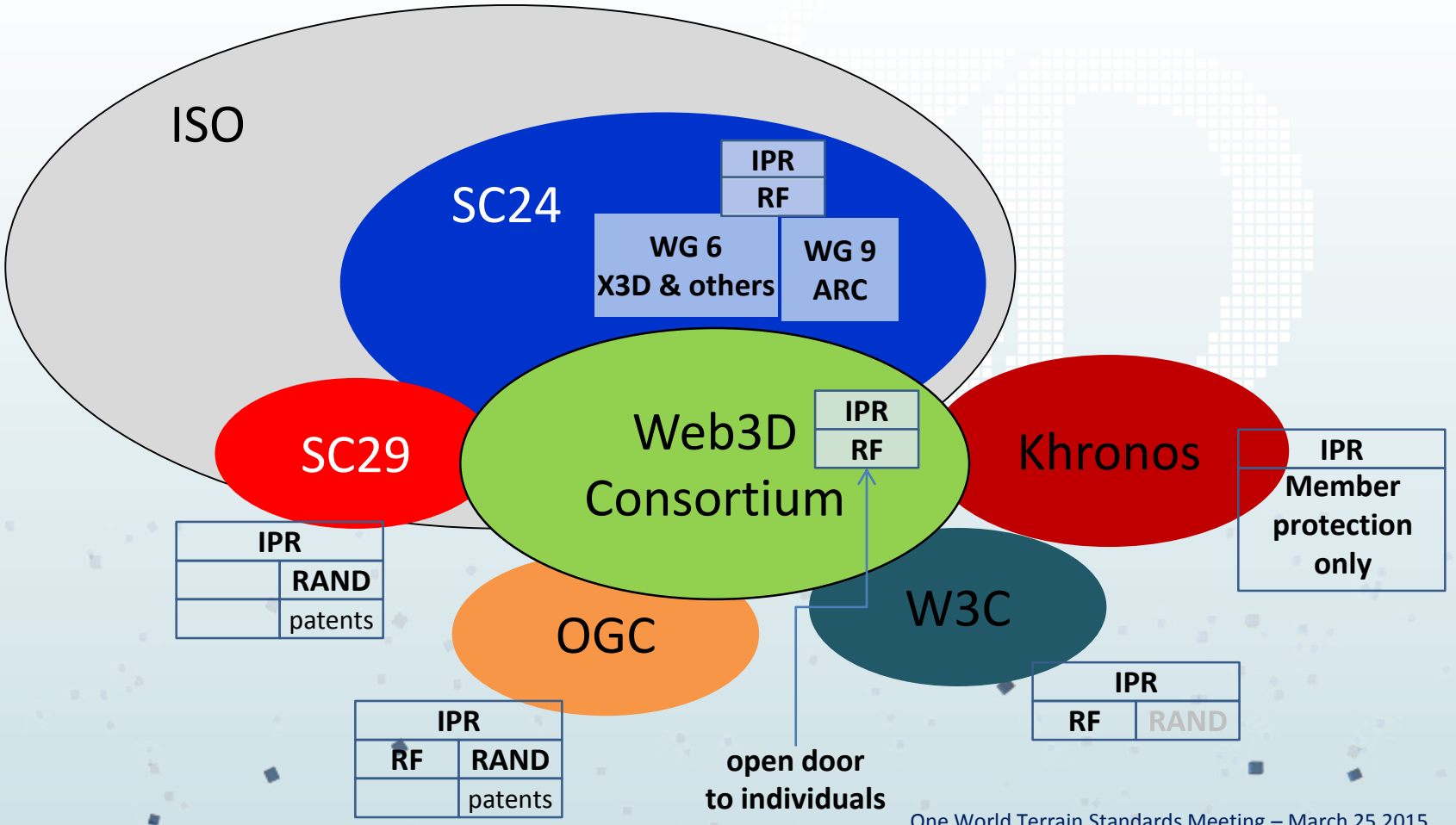
X3D Specifications



X3D Graphics Standards: Specification Relationships



Web3D Liaison Relationships



Requirements for Standards Contributions

- Clear definitions
- Specification prose
- Compatibility/evolution plan
- Two independent implementations
- Example X3D scenes
- Intellectual property rights (IPR) commitment

X3D Resources

- **Open Source Players**
  - Xj3D – stand-alone player
  - FreeWRL – (Mac, PC, Linux), stand-alone and plug-in
- **Open Source Authoring Tools**
  - X3D-Edit
- **Open Source Models and Converters**
- **Commercial Players, Authoring tools and Converters**
  - **X3D Resources**
  - **X3D Book/Course Videos**

X3D: High-Fidelity Graphics

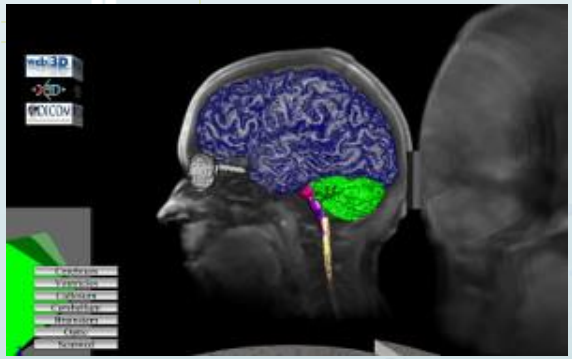
X3D: Foundation for All Markets

Cultural Heritage

Geospatial

Augmented Reality

Medical



X3D: Large-Model Compression
Streaming, Shadows, Animation

What are we working on now?

X3D version 3.4. Evolution of Capabilities tracks steady improvements across all 3D graphics for the Web.

X3D version 4.0. HTML5 support using X3DOM as a prototype and Open Web Platform (OWP) Integration for deployment in any Web page. www.x3dom.org

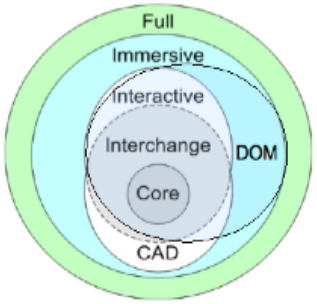
X3D version 4.1. Mixed and Augmented Reality (MAR) for emerging VR-AR devices and user interfaces.

Humanoid Animation. H-Anim models that include hands, feet, face and motion capture (mocap), also suitable for medical use.

X3D Efficient Binary Encoding. Smaller file sizes, faster decompression, and streamable deployment of animation.

X3D JSON. Complete JavaScript Object Notation encoding for Javascript programmers.

What is X3DOM?

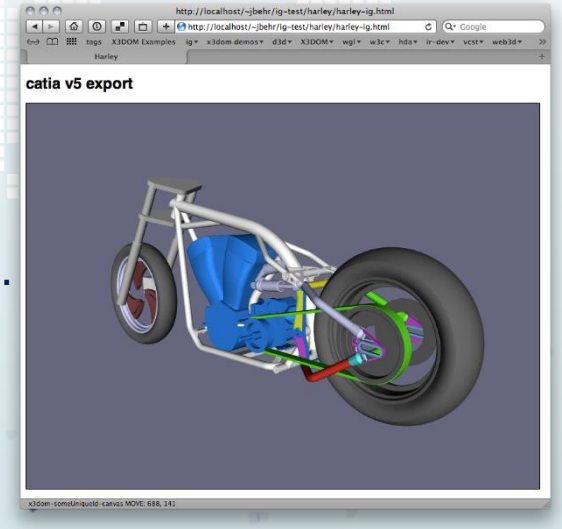


X3DOM is a new approach and integration architecture, making declarative 3D as simple as text, video, and Sound on a web.

The model supports the integration of X3D content directly into the HTML DOM tree.

The architecture utilizes existing standards(WebGL) and web technologies from the existing browser architecture.

It allows web developers to build dynamic 3D content using DHTML, AJAX and existing JS-libs like jQuery.



X3D 4.0/X3DOM – 3D in HTML5

X3D models in IE 11, Firefox, Chrome, and Safari

www.X3DOM.org

- X3DOM Developed by Fraunhofer IGD (We3D Member)
- Open source JavaScript X3D player
- Dom - A language-independent convention for representing and interacting with objects in HTML
- HTML- Events provide the ability to let events trigger actions in a web browser
- CSS - A style-sheet language used to describe the presentation semantics
- JavaScript -A client-side scripting language standard used in web environment

http://www.x3dom.org/x3dom/example/x3dom_carousel.xhtml

Next Generation X3D - Declarative (X)3D in HTML

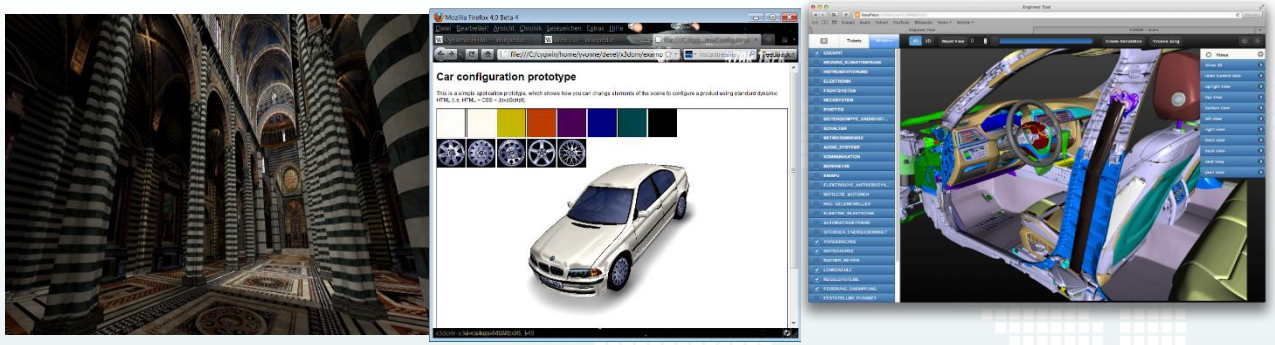
	2D (Final HTML5 spec)	3D (No W3C spec yet)
Declarative Scenegraph Part of HTML-document DOM Integration CSS/ Events		
Imperative Procedural API Drawing context Flexible		

X3D: Run Anywhere

All browsers
All platforms

Why use X3D?

Open, Durable, Portable and Extendable

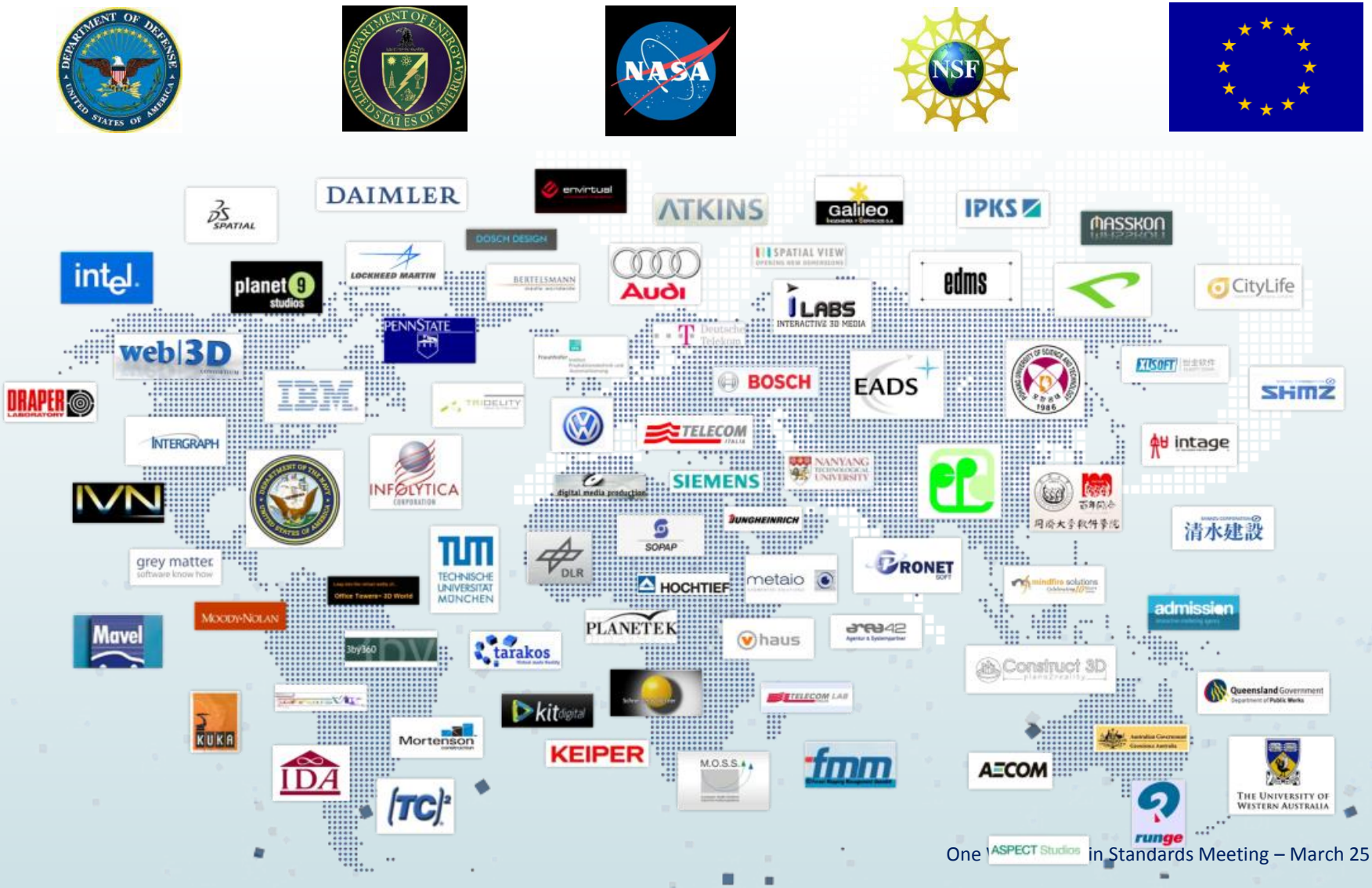


- Open source, free, and royalty-fee ISO standard
- Provides an Interactive and immersive 3D experience
- Runs on many platforms from mobile to caves
- Efficient compressed binary encodings for high performance
- Compatible with other Standards
- **Archival stability that stand the test of time**

Why do our members use X3D?

- Build 3D products based on a stable open 3D standard
- Avoid proprietary lock-in
- International, Conformant/ISO Standard
- Their customers are asking for open standards based technology
- Vendor neutral environment
- Consensus based participation from both end-users and software developers
- Access to a community of world-wide 3D experts
- Converge with other open standards

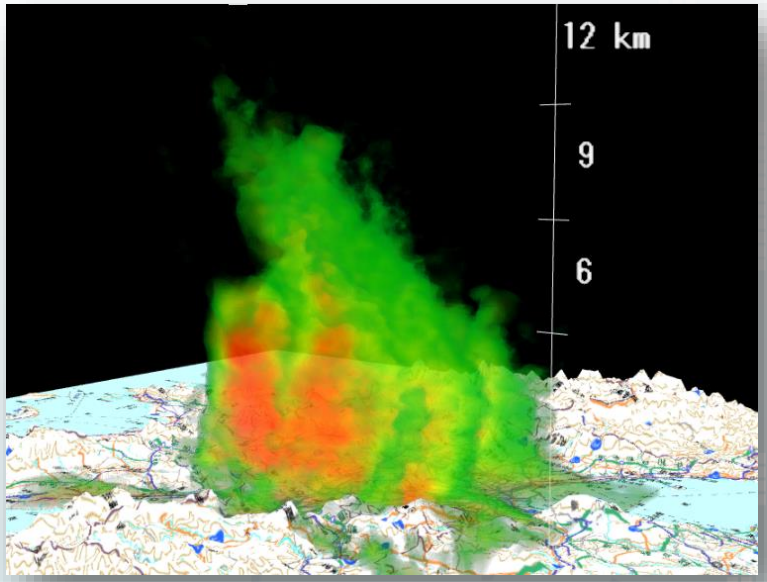
Who else is using these web3D standards?



The National Institutes of Health joins Web3D Consortium

X3D standards for model archive and 3D printing

The Toshiba joins Web3D Consortium



X3D standards for Volumetric Data

Upcoming Web3D Events

2015 Web3D Conference – June 18-21, 2015

20th Anniversary

Heraklion, Crete, Greece

VR Hackathon - San Francisco, California

May 2015

SIGGRAPH 2015 - Los Angeles, California

Aug 2015

An Open 3D Digital World

Join us to Build the Future of 3D

Visit us at: www.web3d.org

To Join: www.web3d.org/join

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