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

Well-kept secret of proprietary 3D technologies
Rarely interoperable

Single vendor solutions are almost always limited
Building blocks for stable 3D solutions

- Stability
- Extensibility
- Interoperability
- Stable Development
- Leverage Existing Skills

Is your technology stable?
Is your technology extensible?

- Stability
- Extensibility

Is your technology Interoperable?

Market Dominance
Biggest competitor wins?

- Companies hope to “own” 3D
- Success short lived
- Close technologies
- Single vendor solutions
- No Interoperability
**Business case for open standards**

ISO study showing the benefits of open standards

1. Address open standard in your planning
2. Build a process of understanding how open standards can improve or impact your business
3. Evaluate available open standard options and organizations
   - Membership benefits
   - working group structure
   - Outreach opportunities
   - IPR Policies
4. Focus on long-term goals
   you might be surprised how easy it is to make a business case for open standards?

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**X3D: Extensible 3D**

Interactive Real-time 3D Open Standard for the Web
Is your 3D solutions providing these building blocks?

<table>
<thead>
<tr>
<th>Building Blocks</th>
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<td>Stability</td>
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<td>Leverage Existing Skills</td>
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**X3D**
- Durable - 1997
- X3D V4.0 extending to HTML5
- Between systems and platforms
- Vendor Neutral/Consensus
- VRML, X3DOM

**Benefits of open standards: X3D**
Increasing the value of your existing and future investments

**ROI**
Open standards drive more competitive solutions
- Encourage open source software solutions
  (X3D has 11 Open Source, 12 Commercial implementations)
- Stable versioning of specifications (X3D V3.3 now)
- Reliable, fixed terms of availability of standards
- Provides greater software re-usability (backward compatibility since 1997)
- Enables greater data portability (Several conversion tools)
- INTEROPERABLE and CONVERGING standards (OGC, W3C, Khronos, DICOM)
What is X3D?
Second Generation VRML
A complete solution for 3D on the Web

File Formats:
XML, ClassicVRML, Binary

Run-Time Engine (player)
1 open source and 9 players

Real-Time • Web-based • Interactive • Animation • Extensible • Scriptable
Meshes • lights • materials • textures • shaders
Interaction • Animation • Audio/Video

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

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

www.web3d.org
Who is developing X3D?
Web3D Consortium founded in 1997 to support and advance the VRML specification now called X3D

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

Our members span business, academia, government and the military

Scene graph for real-time interactive 3D
Delivery of virtual environments over the web

Multiple ISO-ratified encodings
• XML (.x3d)
• Classic VRML (.x3dv)
• Compressed Binary (.x3db)

• Multiple APIs
• ECMAScript (JavaScript)
• Java
Web3D Showcase 25 March 2014

X3D Profiles


General Goal:
- A 3D visualization component for any runtime environments
- Reduced complexity and implementation effort

A lightweight X3D
- Lightweight runtime essentials
- A stripped down X3D Scene Graph Rendering System
- Complimentary to other external runtime systems (HTML5, Mobile, OGC, W3C…)

Eliminate
- X3D-Script
- Protos
- High-Level Sensors

Use
- Mobile applications
- Lightweight HTML web pages
- Augmented Reality Applications

X3D Specifications

X3D File Encodings
- .x3d XML Encoding
  DTD, Schema
  ISO 19776-1
- .x3d Abstract, API
  Specifications
  ISO 19775-1, 2
- .x3dv ClassicVRML
  Encoding
  ISO 19776-2
- .xdb Binary
  Encoding
  ISO 19776-3
- .wrl, .wrz
  VRML 97
  Specification
  ISO 14772-2

X3D Programs

DOM
- Document
  Object Model
  Recommendations
  W3C

Scene Access Interface (SAI)
- Java
  ISO 19777-2

Programming Language Bindings

© 2007, Daly Realism & Don Brutzman

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X3D Resources

- **Open Source Players**
  - Xj3D – stand-alone player
  - FreeWRL – (Mac, PC, Linux), stand-alone and plug-in

- **Open Source Authoring Tools**
  - X3D-Edit

- **X3D Resources**
  - Conversion Tools
  - Example/Models

- **X3D Book/Course Videos**

Geospatial 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

- Integrate Earth with X3D scenes

**X3D Earth** - Generation of local regions or full-scale globes using any data

- Without license restrictions, openly scalable
**X3D- Earth**
Open Standards based visualization infrastructure for geo referenced simulation

Geo data is delivered as scenes graphs of highly synthesized X3D display elements, optimized for efficient real time rendering at high frame rates.

- 3D Map Server - 3D Globe
- 3D Street Views
- 3D Virtual Globes
- Extensibility and interoperability between 3D City Models
- Open interface to exchange servers and clients

X3D Streaming allows effective fly-throughs for web applications and datasets that are too big for being stored in single files.

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**X3D Geospatial Nodes**

- GeoCoordinate
- GeoElevationGrid
- GeoLocation
- GeoLOD
- GeoMetadata
- GeoOrigin
- GeoPositionInterpolator
- GeoProximitySensor
- GeoTouchSensor
- GeoTransform
- GeoViewpoint
Next Generation X3D

X3D 4.0: Complete HTML Integration no plugins

• X3D models in your native browser
• X3DOM Developed by Fraunhofer (Web3DC Member)
• No plug-in required
• Available NOW with Firefox, Chrome, and Safari
• Open source JavaScript X3D player
• WebGL and Flash support

www.x3dom.org

http://www.x3dom.org/x3dom/example/x3dom_carousel.xhtml
X3DOM Oil Rig Demo

X3DOM Benefits

**Development costs:** Web developer vs. Graphics expert

**Adaptability:** Declarative material abstraction allows shading adoption per client hardware (e.g. GLSL, ray-tracing...)

**Efficiency:** UI events, culling, rendering can be implemented in native code, thus utilizes battery resources efficiently

**Accessibility:** High level navigation and interaction styles allow very late adaptations for specific use cases

**Metadata:** Allow indexing and searching content

**Mash-ups:** Asset reuse in new context

**Security:** No plugins or even direct GPU calls necessary

**ExternalMesh Compression:** Compressing geometry representation of a scene achieving significant performance improvement.

**Powerful Abstraction for Web Applications**
The X3D specifications are online at: http://www.web3d.org/x3d/specifications

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

Web3D and W3C have similar policies.

X3D Convergence

And supported by these relationships.
Web3D Liaison Relationships

ISO

SC24

SC29

Web3D Consortium

WG 6
X3D & others

WG 9
ARC

IPR
RF
RAND
 patents

IPR
RF
RAND

OGC

W3C

Khronos

IPR
Member protection only
open door to individuals

World Wide Adoption
Why do our members use X3D

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

Upcoming Web3D Events

Siggraph 2014 and Web3d Conference
Vancouver, Canada

• Co-sponsored by Web3D Consortium, ACM SIGGRAPH and Eurographics
• Conference 8-10 August 2014
• Siggraph 11-15 August 2014
• Highlights current Capabilities and trends in interactive 3D graphics.
• Several Workshops (Geospatial, AR, Compression) and Tutorials
• Looking forward to participation from the OGC Community

www.web3d2014.org
Join the Web3D Evolution!

web3D consortiun
Visit us at: www.web3d.org
To Join: www.web3d.org/join

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