Web3D Consortium and X3D Graphics International Standards

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www.web3d.org
Next-Generation 3D Web Applications
Open Immersive 3D worlds in your browser – Web your platform

Enhancing user experience with sophisticated visualizations
• Yesterday: Flash-based site with videos
• Today: Immersive 3D inside your native Browsers

Increase Interest in 3D Web applications - The Web is your platform
• Geospatial
• Product presentation
• Visualization of abstract information
• Experiencing Natural and Cultural Heritage data in 3D
• Virtual Engineering
Industry is looking at building highly synthetic 3D worlds on the Web. Cities, Weather, building, Engineering, scientific and the Web is their delivery method of choice.
Mission:
Convergence of standards
International Collaboration
Industry Support
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
Is your technology stable and long term?

Where are these tools now?

Single vendor proprietary solutions are almost always limited
Is your technology extensible?
Does it converge with open standards?

Market Dominance: Biggest competitor wins?

• Companies hope to “own” 3D
• Success short lived
• Close technologies
• No open standards
• Single vendor solutions

Therefore NO Interoperability and extensibility
Is your technology Interoperable?

All browsers
All platforms
Building blocks for stable 3D solutions

- Stability
- Extensibility
- Interoperability
- Stable Development
- Leverage Existing Skills
Web3D Consortium and X3D Graphics Standards

Data Can Coexist

Open Standards Supported Framework
Standards are already in place to be used
Industry Support
Web Browser Support

WebGL
Graphics Stack

X3D Application

X3DOM

HTML Browser

WebGL

DirectX/OpenGL

X3D Browser (Standalone, Plug-in)

Operating System

Hardware

X3D Declarative: For Web Authors Vs 3D graphics application programmers

X3DOM
A layer above WebGL
Your Web3D world is here...

Extensible 3D (X3D) Graphics International Standards

X3D technology ensures an open 3D framework that is open, interoperable and extensible
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
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
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
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
• Complementary 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 Graphics Standards: Specification Relationships

Abstract Reference Models
- Computer Graphics Reference Model (CGRM) 11072
- Humanoid Animation (H-Anim) 19774
- Mixed Augmented Reality (MAR) Reference Model
  ISO/IEC SC24 WG9

Abstract Object and Data Models
- X3D v4.1
- X3D v4.0

File Encodings and Interfaces
- X3D v3.4
- X3D v3.0
- X3DOM
- HTML5 and Document Object Model (DOM)
- XML Security: Authentication, Encryption, etc.
- Efficient XML Interchange (EXI) Compression
- X3D XML Encoding 19776-1
- ClassicVRML Encoding 19776-2
- X3D CBE Compressed Binary Encoding 19776-3
- X3D EBE Efficient Binary Encoding 19776-4
- X3D JSON Encoding 19776-5

Example Instances
- HTML pages containing X3D
- X3D scene files
- Scripts and applications

Legend
- ISO/IEC Web3D Standard
- W3C Recommendation
- Realization of...
- Planned
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.
Proposal Requirements for Standards Contributions

Clear definitions are needed, what is the technology being proposed?

Specification text will eventually be needed that formally describes these capabilities.

Compatibility/evolution plan for integration with existing X3D/H-Anim standards, if needed.

Two independent implementations to show feasibility, at least one in open source.

Example X3D scenes that demonstrate common use cases for authors who want to utilize the technology.

Intellectual property rights (IPR) commitment that, if accepted, the technology is Royalty Free (RF) for any use.
Adoption Process

1. Identify Standard or Extension to existing standards
   - Study Market Trends/Requirements
   - Identify Consortium Members' Interest
   - Identify if this requirement falls under an existing working group charter
   - Form a new working group if this does not fall under an existing working group charter

2. Form a Working Group
   - Identify Working Group Leadership
   - Identify Working Group Members (open to all Web3D Consortium members)
   - Create Working Group Charter, Goals and Milestones
   - Plan Meeting frequency and schedules
   - Allow Invited Experts if needed
3. Identify Previous Work
   • Identify any related Member activities'
   • Identify output from related SIG (Special Interest Group)
   • Identify Open Source contributions available for adoption and submission

4. Identify Requirements
   Create Use Cases
   Create specification requirements from these use cases
   Create Proof of Concept/Interoperability experiments
   Explore partnership with other organizations as needed
Adoption Process

5. Create Standard or Extension
   • Follow Consortium's IP Policy
   • Ensure Open and Consensus based solution
   • Identify at least two independent and interoperable
   • Create conformance testing suites
   • Announce member/public review of 30 days
   • Review comments and incorporate or discard with cause.
   • Complete standard or extension for submission

6. Submit Standard or Extension for Board approval and Member vote
   • Web3D Consortium Board of Directors review
   • Board determines if a Web3D Members vote is necessary
   • Tabulate Member vote results
   • Start ISO certification process after final Board approval

7. ISO Certification - Follows ISO policy for all standards
X3D Convergence

And supported by these relationships.
Standards are already in place to be used
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
- 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 Web, and to integrate these standards and resources into commercial markets and user education programs.
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
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
Web3D Liaison Relationships

Web3D Consortium and X3D Graphics Standards

ISO

SC24

WG 6
X3D & others

WG 9
ARC

Sc29

Web3D Consortium

Khronos

OGC

W3C

IPR
RF
RAND
patents

IPR
RF
RAND
patents

open door
to individuals

Web3D Consortium and X3D Graphics Standards
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
Open Standards - X3D
Deliver New Dimensions on the Web
X3D: Foundation for All Markets

- Cultural Heritage
- Geospatial
- Augmented Reality
- Medical
X3D: Run Anywhere

All browsers
All platforms
X3D: Archival Open Standards for Natural and Cultural Heritage
X3D: Training & Maintenance
Mixed Augmented Reality
X3D: Geospatial - From Space to Ocean
X3D: Medical Imaging - Volume Rendering
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.

**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.
The conference highlights capabilities and trends in interactive 3D graphics across a wide range of applications and supports research from mobile devices up to high-end immersive environments.

Explore methods of using, new 3D Web technologies such X3DOM, WebGL and HTML5, Flash/Stage 3D, X3D, COLLADA, and the MPEG family.

www.web3D2015.org

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Co-sponsors: Web3D Consortium and Eurographics

Join us to celebrate our 20th anniversary
The National Institutes of Health joins Web3D Consortium

X3D standards for model archive and 3D printing
The Toshiba joins Web3D Consortium

Weather data 3D visualization for observing the complete lifecycle of torrential rain

X3D standards for Volumetric Data
Why use X3D?

• Open source, free, and royalty-fee ISO standard
• Build highly detailed synthetic spaces
• Combines 3D geometry and animation
• Provides an Interactive and immersive 3D experience
• Scenes can run on many platforms from mobile to caves

• Archival stability that stands the test of time
• Efficient compressed binary encodings for high performance
• Converges with other open Standards
Join us to Build the Future of 3D

Visit us at: www.web3d.org
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