

# **X3D Version 4 Working Draft**

## **Online Release, Ready for Early Adoption!**

Web3D Consortium Webinar

3-6 August 2020

Don Brutzman

X3D Working Group

# Welcome Aboard!

- Web3D has published X3D4 working draft 2 for public review
- Full compatibility demonstrated for full X3D and VRML ecology
- Now is time for earlier adopters to improve codebases, test models
- We continue to implement and evaluate with excellent results
- Final version likely at [Web3D 2020 Conference](#) November 2020 when Web3D Consortium members decide on readiness for ISO ratification
- Your questions, comments and improvements are always welcome.
- Execution is a team sport – have fun with X3D4! 😊 😊 😊 😊

# X3D Highlights <https://www.web3d.org/x3dv4-highlights>

- Major: HTML5 integration allows X3D on any web page
- Major: multiple file formats and programming languages
- Major: glTF asset materials, lights, Physically Based Rendering (PBR)
- Major: integrate Web Audio API
- Major: no plugins required, multiple open-source implementations
- Major: backwards/forwards compatibility with X3D and VRML
- Numerous and growing set of converters, tools, models, support
- Active working groups and community steadily driving forward...
- Here we go!

# X3D4 Highlights: Benefits and Opportunities

- Benefits of International Standard with ISO review
- 3D Printing, 3D Scanning, CAD models
- Humanoid Animation (HAnim) upgraded
- Partnerships with other Standards Development Organizations (SDOs) including ISO, W3C Khronos, Open Geospatial Consortium (OGC)
- Semantic Web and structured metadata for querying 3D models
- Influential enabler for emerging new work: Medical representations, cultural and natural heritage, Web3D User Experience (Web3DUX)
- Shared pool of knowledge, forums for tackling tough challenges

# X3D Version 4 Strategy: Straight Ahead

2016-2020 Annual  
Milestones Follow

X3D<sup>®</sup> Version 4 is a major upgrade to the Extensible 3D (X3D) Graphics International Standard that aligns with the HTML5 Recommendation. This is major work in progress, expected to include several future versions. This effort is driven by the [X3D Graphics Working Group](#) with regular community outreach.

X3D is always evolving, and the [Web3D Consortium Standards Strategy](#) carefully guides all these improvements. X3D Version 4 enables authors to publish any interactive 3D content anywhere on the Web, without restrictions or plugins.

Next-generation evolution + revolution is combined with archival compatibility of existing legacy content.

- [X3D Implementations Status](#) and [X3D Version 4.0 Development](#) show specific details and planned evolutionary changes to the baseline X3D architecture.
- Next year: X3D Version 4.1 will add [Mixed Augmented Reality \(MAR\)](#) capabilities and consider improved geometric compression.

# W3C Workshop on Web and Virtual Reality

Samsung San Jose, October 19-20, 2016; San Jose, CA, USA

White paper: [X3D Capabilities for Declarative Virtual Reality](#)



# Web3D 2017, Brisbane Australia: Future of X3D

"**Future of X3D**" [presentation](#) and [detailed notes](#) from Web3D 2017 Conference, Brisbane Australia, 7 June 2017 ([photograph](#)).



# Web3D 2018, Poznan Poland: Future of X3Dv4

"**Future of X3D**" progress [presentation](#) from [Web3D 2018 Conference](#), Poznan Poland, 20-22 June 2018. Continued scrutiny and development.

**Web3D 2018**

The 23<sup>rd</sup> International ACM Conference on 3D Web Technology  
20-22 June 2018, Poznań, Poland  
Conference venue: building CEUE (4th floor), Towarowa 55  
Co-located with VR Hackathon: 17-20 June 2018

**EUROVR** **KHRONOS GROUP**  
CONNECTING SOFTWARE TO SILICON

**Speakers**

 Patrick Bourdot	 Dieter Fellner	 Mariano Alcañiz Raya	 Daniel Thalmann	 Neil Trevett
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Best papers  
to be published in  
**Graphical Models**  
journal



# Web3D 2019, Los Angeles: X3Dv4 Working Draft

First [X3Dv4 Working Draft Specification](#) release, numerous execution discussions in group meetings and technical sessions. Onward we go!

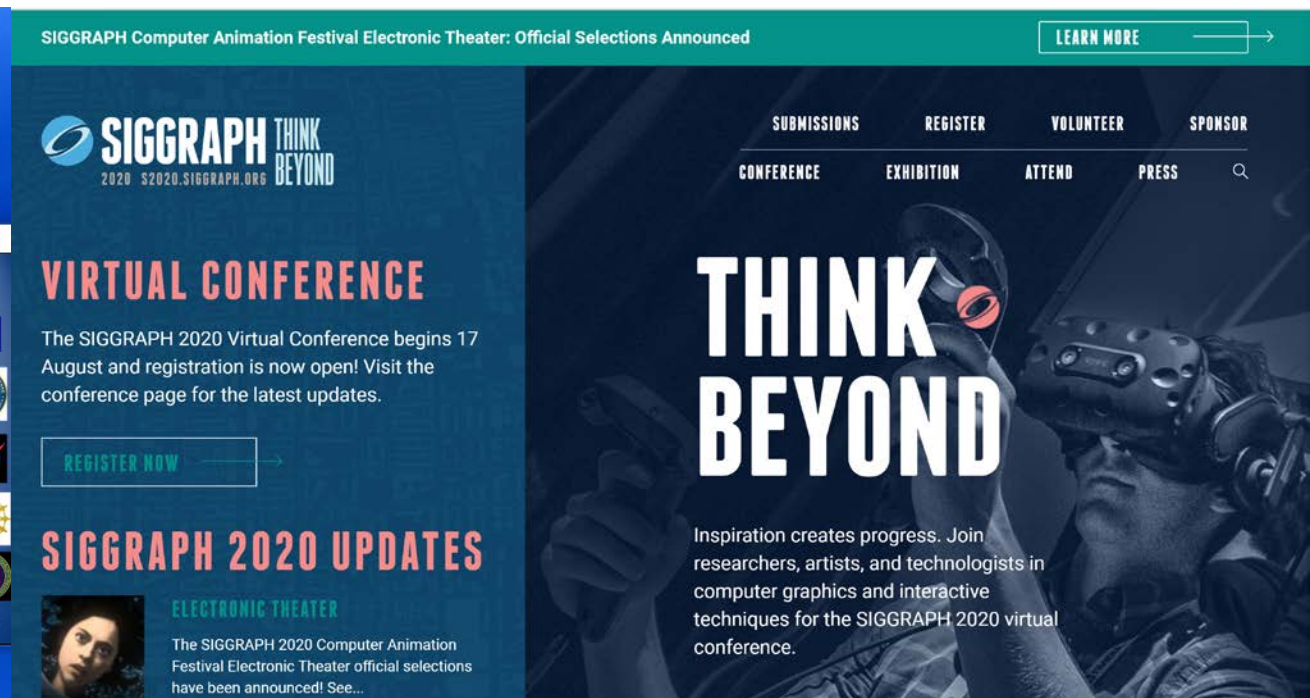
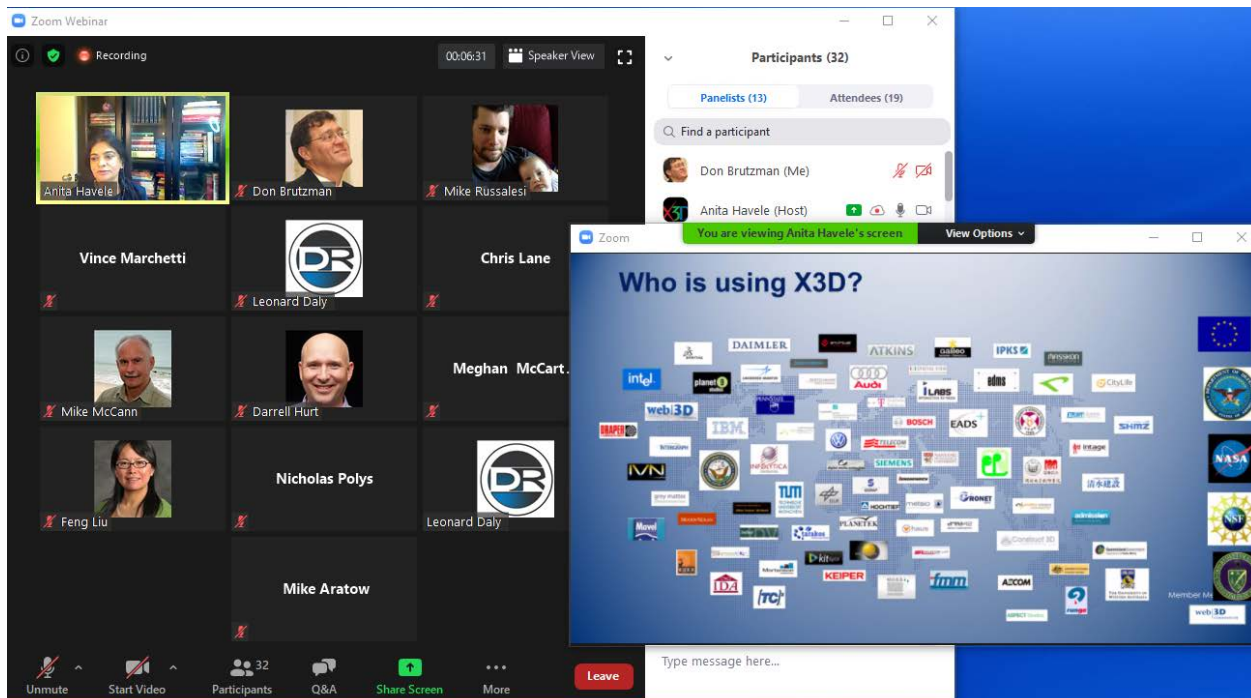


# SIGGRAPH 2020, Working Draft 2 Public Release

Second [X3Dv4 Working Draft Specification](#) released, now reviewing examples implementations and evaluations. Results matter!

[Web3D Webinars](#)  
3-6 August 2020

[SIGGRAPH](#)  
24-28 August 2020



# [Web3D 2020 Conference](https://2020.web3dconference.org) - Online Free November

Papers, Posters, Tutorials, Workshops and Industrial Use Cases will inform Web3D Consortium member vote for ISO Committee Draft submission

<https://2020.web3dconference.org>

[Web3D 2020](#) [SUBMISSIONS](#) [PROGRAM](#) [COMMITTEE](#) [VIRTUAL EVENT](#) [REGISTRATION](#)

**WEB3D 2020 – VIRTUAL CONFERENCE**  
**3D for a Hyperconnected World**  
**The 25th International Conference on 3D Web Technology**  
**09 – 13 November 2020**

Explore the latest innovations in 3D. Think VIRTUAL 3D with us in our new digital format

# Keeping track of what is happening

Strategy: X3D Version 4

- <https://www.web3d.org/x3d4>

[x3d-public mailing list](#) archives all discussion

- [https://www.web3d.org/mailman/listinfo/x3d-public\\_web3d.org](https://www.web3d.org/mailman/listinfo/x3d-public_web3d.org)

Twitter announcements

- [@Web3DConsortium](#)
- <https://twitter.com/Web3Dconsortium>

Web3D Standards

- <https://www.web3d.org/standards>
- <https://www.web3d.org/specifications>

**Weekly Videoconferences  
X3D Working Group**



# X3D4 Working Draft 2 Public Release, August 2020

- Ready for early adopters! X3D4 work is accelerating forward.

## X3Dv4 Public Working Draft

View

Edit

Revisions

<https://www.web3d.org/x3dv4-public-working-draft>

The Web3D Consortium is happy to release the second public [X3Dv4 Working Draft \(WD2\) Specification](#).

- Release reviewed satisfactorily by X3D Working Group, 31 July 2020
- Published at [web3d.org/specifications/X3Dv4Draft](https://www.web3d.org/specifications/X3Dv4Draft) and [X3Dv4WorkingDraft.zip](#) (also reviewers [.pdf](#))

Key references:

- [X3D4 Overview](#)
- [X3D4 Highlights](#)
- [X3D4 Strategy](#)
- [X3D4 Implementations Status](#)



Much X3D4 execution work is accelerating forward on implementation and evaluation of example models, to good effect. Have fun with X3Dv4!

# X3D Assets

- [X3D Tutorials](#)
- [X3D Draft Specification](#)
- [X3D Resources](#)
- [X3D Scene Authoring Hints](#)
- [X3D Tooltips](#)
- [X3D Example Archives](#): over 4000 models in regular regression testing
- [Humanoid Animation \(HAnim2\) Specification](#) and [Examples](#)
- [Twitter announcements](#) and [Web3D Videos](#)

# Web3D Consortium YouTube Channel

- Library
- History
- Your videos
- Watch later
- X3D version 4 Experi...
- Show more

- SUBSCRIPTIONS
- ACMSIGGRAPH
  - Bitmanagement
  - Castle Game Engine
  - Fraunhofer IGD
  - H3D API
  - igeedee
  - NIH 3D Print Exchange
  - Qntfi, Inc.
  - VT Visionarium
  - Web3D Conference
  - X3D for Web Authors
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## Web3D Consortium

198 subscribers

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### Created playlists

≡ SORT BY

 25 VIEW FULL PLAYLIST	 11 VIEW FULL PLAYLIST	 39 VIEW FULL PLAYLIST	 7 VIEW FULL PLAYLIST	 4 VIEW FULL PLAYLIST	 3 VIEW FULL PLAYLIST
<b>Tool Support for X3D and VRML</b>	<b>X3D version 4 Experimentation</b>	<b>#VRML Virtual Reality Modeling Language</b>	<b>Learn X3D! Integrate 3D content seamlessly into your webpage ...</b>	<b>Introduction to X3D</b>	<b>Interviews and Presentations</b>
 6 VIEW FULL PLAYLIST	 2 VIEW FULL PLAYLIST	 3 VIEW FULL PLAYLIST	 23 VIEW FULL PLAYLIST	 16 VIEW FULL PLAYLIST	 15 VIEW FULL PLAYLIST
<b>Mixed Augmented Reality (MAR)</b>	<b>Physics Engine</b>	<b>Liked videos</b>	<b>Business Applications</b>	<b>#HANIM Humanoid Animation</b>	<b>#HANIM X3D Animated Music Video Competition</b>
 49 VIEW FULL PLAYLIST	 3 VIEW FULL PLAYLIST	 18 VIEW FULL PLAYLIST	 22 VIEW FULL PLAYLIST	 10 VIEW FULL PLAYLIST	 5 VIEW FULL PLAYLIST
<b>X3D: Extensible 3D Graphics International Standard</b>	<b>3D Scanning</b>	<b>Computer-Aided Design (CAD)</b>	<b>Geospatial Applications</b>	<b>Medical Visualization</b>	<b>Virtual Reality (VR)</b>

# X3D4 Players and Authoring Tools

- [X ITE](#) open-source JavaScript for HTML pages
- [X3DOM](#) open-source JavaScript for HTML pages
- [Castle Game Engine: view3Dscene](#) open-source Object Pascal
- [FreeWrl](#) open-source C
  
- [Titania](#) authoring environment (Linux)
- Others in progress: [X3D-Edit](#) v4, [White Dune](#)
- [Blender](#) export improvements in progress



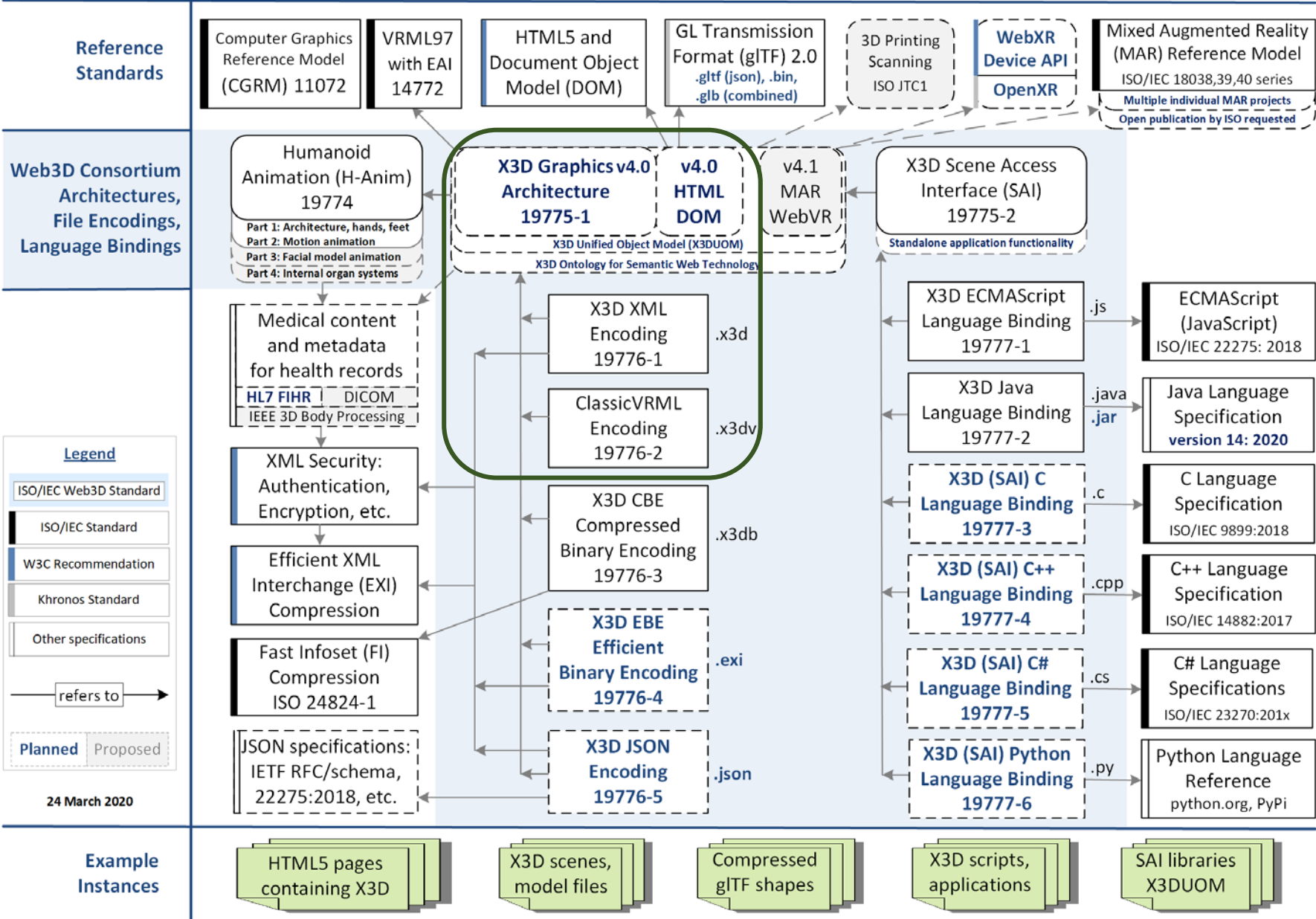
# X3D4 Code Libraries and Tools

- [X3DJSONLD](#): JavaScript, JSON, Node.js
- [X3DJSAIL](#): Java
- [X3DPSAIL](#): Python
- [X3D C++](#): proposed, under development
- [X3D Ontology for Semantic Web](#)
- [X3D JavaScript Object Notation \(JSON\) Encoding](#)
  
- [X3D Quality Assurance \(QA\)](#): schemas, doctypes, schematron
- [X3D Validator](#): battery of comprehensive tools as online test page, rebuild/redeployment for X3D4 in progress
- Vast suite of XML tools – all still work!

# X3D Graphics Standards Relationships

We are here!

Common basis for every kind of X3D model, confirmed by round-trip tests



# X3D 4 Summary #1

- First [X3Dv4 Public Working Draft](#) specification released for Web3D 2019! Scrutiny, feedback and engagement are welcome.
- Big detailed Big Picture: see [X3Dv4 Strategy](#) and [X3Dv4 Implementations Status](#).
- Following the path projected by Web3D 2017's Future of X3D session, building on steady progress at Web3D 2018, daily email posts and weekly meetings, multiple Web3D Consortium working groups and community participants continue to build on the architectural stability of the Extensible 3D (X3D) Graphics International Standard.
- Two open-source implementations ([X3DOM](#) and [X-ITE](#)) adapt X3D content for HTML5 integration, with excellent results showing compatible event models for user interaction and model animation.
- Considering a 3D Printing and 3D Scanning profile for hardware interoperability.
- Virtual, Augmented and Mixed Reality (VR/AR/MR) can all use X3D and continue being explored to good effect – X3Dv4.1 to follow. Strategic timing is valuable.

# X3Dv4 Strategy

X3D<sup>®</sup> Version 4 (X3Dv4) is a major upgrade to the Extensible 3D (X3D) Graphics International Standard that provides close support for the HTML5 Recommendation. This is major work in progress, expected to include several future versions. This effort is driven by the [X3D Graphics Working Group](#) with contributions from other working groups and regular community outreach.

- *Imminent.* [X3Dv4 Public Working Draft](#) specification release for Web3D 2019 and SIGGRAPH conferences
- *Current.* [X3Dv4 Implementations Status](#) provides summary links tracking active efforts,
- *Recent.* "**X3D Futures: what is happening, how to get involved!**" [presentation](#) from Web3D 2018 Conference, Poznan Poland, 22 June 2018.
- *Previous.* "**Future of X3D**" [presentation](#) and [detailed notes](#) from Web3D 2017 Conference, Brisbane Australia, 7 June 2017 ([photograph](#)).

X3D is always evolving, and the [Web3D Consortium Standards Strategy](#) carefully guides all these improvements. X3D Version 4 enables authors to publish interactive 3D content anywhere on the Web, without restrictions or plugins. Next-generation evolution + revolution is combined with archival compatibility of existing legacy content. Please see:

- [X3D Version 4.0 Technical Development](#) shows planned evolutionary changes to the baseline X3D architecture.
- X3D Version 4.1 will add [Mixed Augmented Reality \(MAR\)](#) capabilities for diverse virtual and augmented reality (VR, AR) devices.

Normalizing interaction (event model) semantics with HTML5 can further open up X3D for the vast majority of Web authors. The Web3D Consortium has identified [X3DOM](#) and [X\\_ITE](#) as prototypes for the next generation X3D Version 4.0 that support direct integration into HTML5 webpages without requiring the use of any browser plug-in. The Consortium and the X3D community are working closely with open-source exemplars to maintain and expand the X3D standard as it progresses and moves into full browser support. The Consortium also continues to support all existing X3D and VRML content.

Steady progress towards X3D Version 4 continues. We cordially invite you to [Join Web3D](#) as we continue to reliably build a stable foundation that establishes 3D graphics as a "first-class citizen" in the World Wide Web.

# X3Dv4 Implementations Status

X3Dv4 implementations are under way. [X3D™ Version 4 \(X3Dv4\)](#) is a major upgrade to the Extensible 3D (X3D) Graphics International Standard that provides close support for the HTML5 Recommendation.

The X3D Working Group is executing the Web3D [Web3D Standards Adoption Process](#) and meeting guidance by [Web3D Board of Directors](#), all to good effect. [Web3D Consortium membership](#) has value!

## Approach Summary

X3D activity includes over 20 years of progressive evolution that maintains durable stability and backwards compatibility. The best way to introduce new capabilities is to propose them on the [x3d-public mailing list](#) so that they can be considered in detail. Then we add an agenda item to the next X3D Working Group teleconference so that the proposed capability can be discussed. Then, away we go:

- **Specification Prose:** produce draft X3Dv4 Architecture Specification ([github](#)) aligning with [W3C HTML5/DOM Recommendations](#).
- **Implement Code:** open-source JavaScript [X\\_ITE](#) and [X3DOM](#) players (for HTML5) plus other X3D browsers.
- **Evaluate Examples:** using all available X3D implementations and ~3500 models in [X3D Example Archives](#).
- **Finalize and Review:** iteratively improve specification, implementations and examples until success thresholds are met.

[X3D Node and Statement Inventory Comparison](#) tracks progress of all known X3D players, authoring and validation tools.

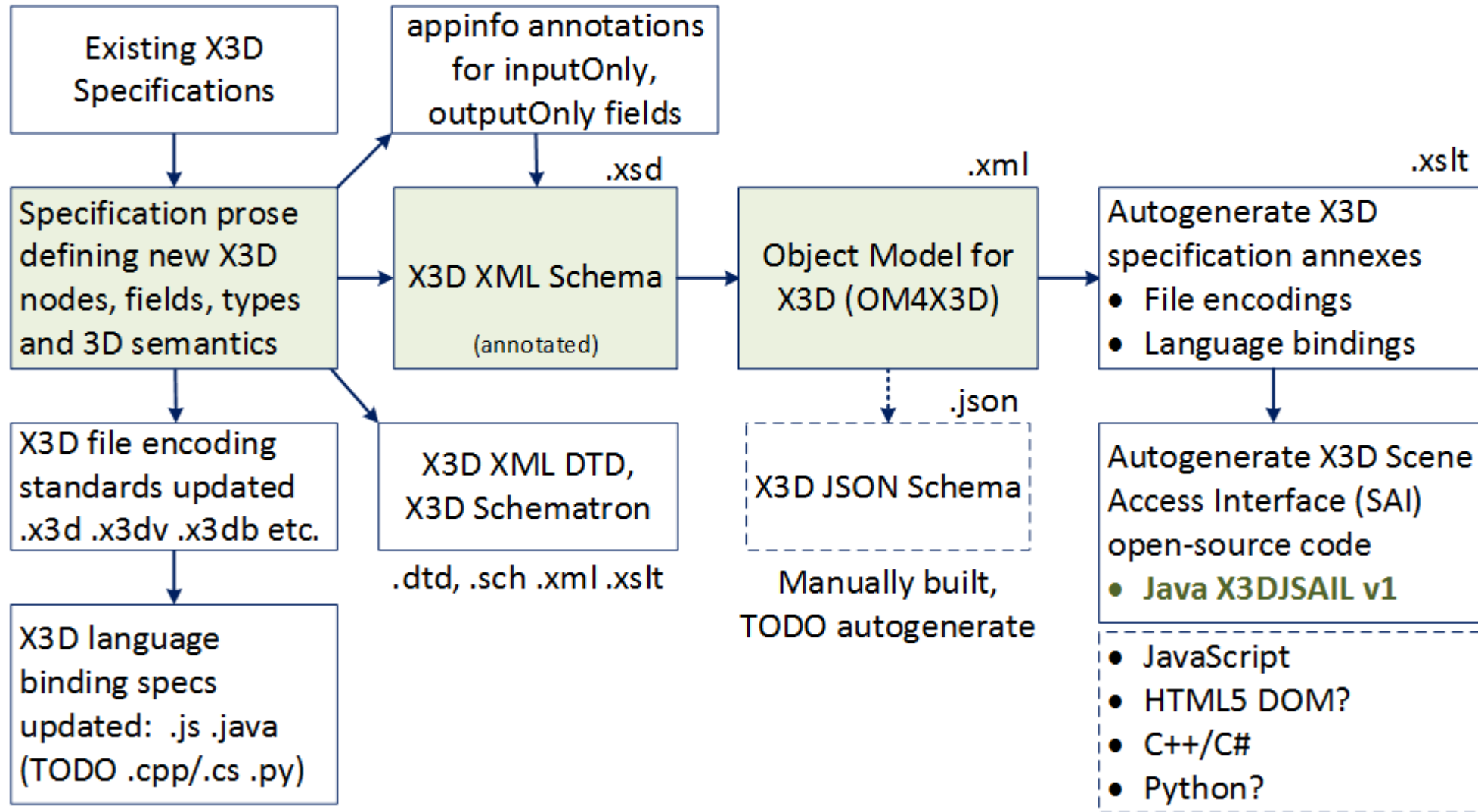
## Milestones

1. *26-31 July 2019.* Publish draft specification plus examples and implementation updates at [Web3D2019/SIGGRAPH 2019](#) conferences.
2. *16 December 2019.* Working group closes new-technology submissions, finalize all efforts. Prepare ISO NWIP document.
3. *First quarter 2020.* Working Draft submitted to X3D Community, Web3D Consortium members, Web3D Board and ISO.

# X3Dv4 Summary #2

- Central to these efforts is an [X3D Unified Object Model \(X3DUOM\)](#) that enables consistent implementation and presentation of content across multiple file encodings (XML, ClassicVRML, JSON, binary) as well as multiple programming language bindings (JavaScript, Java and planned adaptations to C/C++/C# and Python).
  - [X3D JSON Loader \(X3DJSONLD\)](#) and [X3D JSON Encoding](#)
  - [X3D Java Scene Access Interface Library \(X3DJSAIL\)](#)
  - Turning the corner: **X3D Python Package** alpha release!
- Second-generation Humanoid Animation (HAnim) has stabilized motion-capture (mocap) outputs for both general-purpose and human-specific (i.e. medical) usage. Medical mappings and deployment efforts continue.

# Object Model for X3D: Creation, Autogeneration



**X3D Unified Object Model (X3DUOM)**

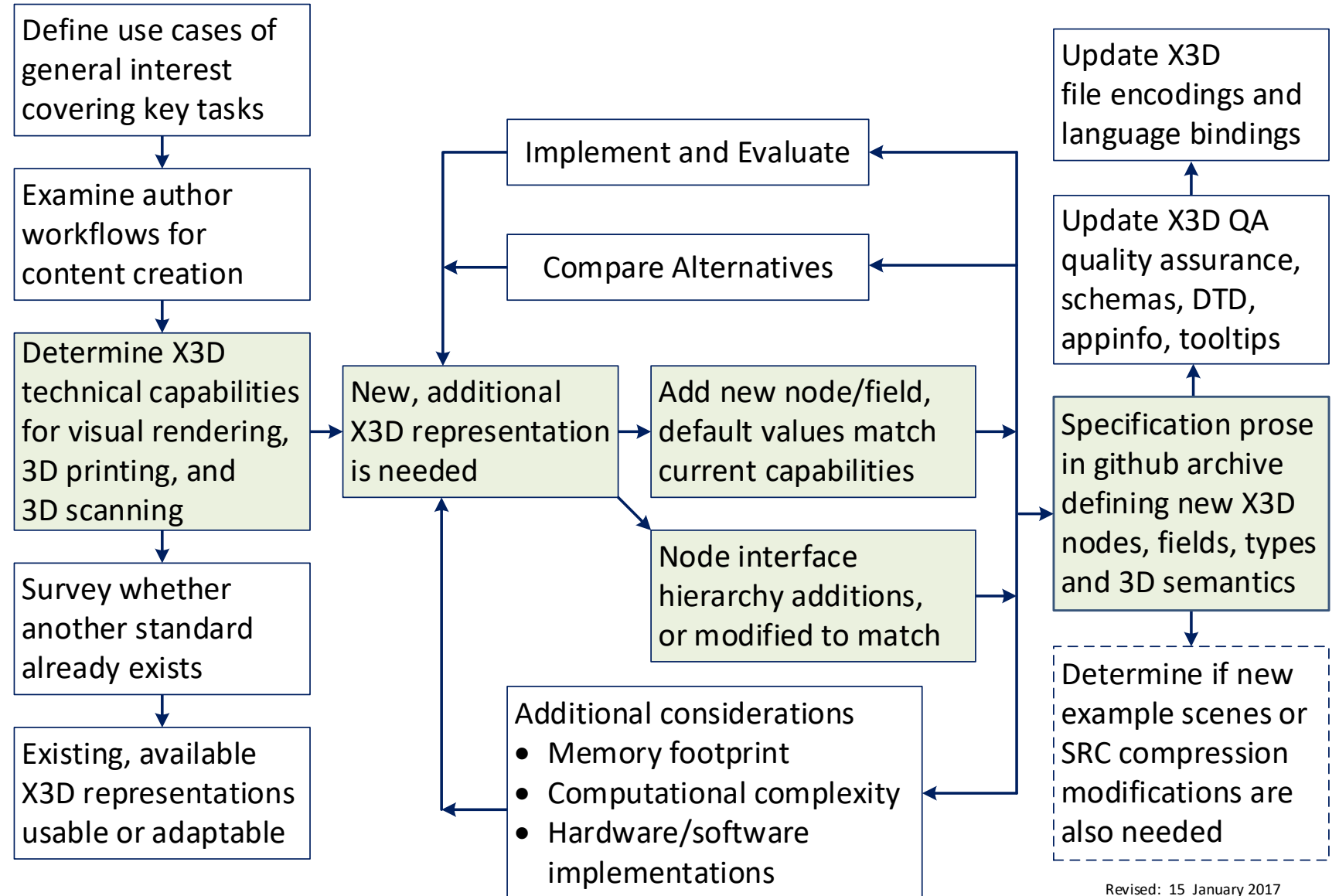
# X3D 4 Summary #3

- Over two decades of progress are steadily evolving to finally unlock full promise of Interactive 3D Graphics within the Web architecture.
- [X3D Resources](#), [X3D Scene Authoring Hints](#), [X3D Tooltips](#), import/export support, forwards/backwards version compatibility, [X3D Quality Assurance \(QA\)](#) validation tools, and a large corpus of open-source version-controlled [X3D examples](#) are together ensuring that consistent semantics are emerging for 3D on any platform.
- XML compression, encryption and authentication available already.
- This progress report outlines numerous parallel lines of effort, and also points out individual opportunities to utilize and extend X3D consistently across multiple domains.



# Specification design process for new capabilities

**Web3D process helps us work together to get a big job done!**



# HTML5 and Open Web Architecture

- Harmonization of ID linkages and event models, HTML DOM and X3D
- Composition with Cascading Style Sheets (CSS)
- Compatibility + usage of Scalable Vector Graphics (SVG)
- Accessibility, annotations, internationalization (I18N), etc.
- X3D as presentation layer compatible with Semantic Web
- Linkage of hybrid model data and information

Some aspects are standardization, others can simply align good design.

- [Now active](#). **Web3DUX User Experience Working Group** established to share, assess, and promote best practices for X3D + HTML usage.

# Rendering progress is significant

## X3D version 4, HTML5/DOM

- Inline
  - glTF model assets, JSON or binary
  - Optional support **STL, PLY**, others
- Physically Based Materials: glTF
- Advanced lighting model
- Shadows and reflections
- Cloud-based, offline rendering

*Next year*

## X3D version 4.1, VR/AR/MAR

- Co-develop 4.1 to immediately follow completion of X3D v4.0
- WebVR as baseline capability set
- Composing see-through/360 video, high-definition, green screen, etc.
- Push “settled issues” to X3D v4.0, defer final WebVR support to v4.1
- **Emerging:** health, safety, security

# 3D Printing and 3D scanning

- 3D Printing: bits into atoms
- 3D Scanning: atoms into bits

Uh, approximately everything?!

CAD Design Printing Scanning Working Group is building profiles

- Geometry requirements essentially complete
- **Metadata and annotations** getting close scrutiny, building exemplars
- Contributing to multi-standard ISO tech committee, Byoung Nam Lee
- Also STEP Visualization group, Soonhung Han, Christophe Mouton

Simple use case: scan, print, view any object archivally published to X3D

Share via [NIH 3D Print Exchange](#) and [NPS X3D Model Exchange](#)

# Audio

## [W3C Audio Working Group](#)

- Web Audio, Web Midi, Web Audio Processing: Use Cases and Requirements
- [Web Audio API](#) is now W3C Candidate Recommendation (CR) !

“High-level API or processing and synthesizing audio in Web applications”

High-fidelity audio processing chains, *AcousticProperties* for materials

Excellent support emerging in Web browsers plus additional codebases

Audio graphs, realistic audio rendering with configurable pipeline

Now matching online examples and refining design, more to follow!

White paper: [Strategies for Improved Sound Support in X3D](#)

# Humanoid Animation (HAnim) + Medical

New HAnim version 2 International Standard (IS) available [online!](#)

- HAnim Architecture (skeleton, skin, hands and feet, precise naming)
- HAnim Motion Animation (e.g. motion capture, BVH mocap conversion)
- HAnim tool, player, validation and [example](#) updates ongoing to match X3D4

Medical Working Group meets regularly with accelerating progress

- Liaisons with DICOM imaging, Health Level 7 (HL7), etc.
- Diverse applications and uses, demonstrate using test cases
- Shared strategy: suitable for archival Electronic Health Records (EHR)
  - Especially cooperative work with [HL7 FHIR](#) standard for health care data exchange
- **Metadata and annotations**, security, compression, ontologies, standards
  - Building all the way to [X3D Semantic Web](#) ontologies for all models and domains
  - Full package of necessary technical capabilities now available for proof of capability

Transparent and accountable: all specifications maintained in [github version control](https://github.com/Web3DConsortium) for members

The screenshot shows the GitHub profile page for the Web3D Consortium. The browser address bar displays `https://github.com/Web3DConsortium`. The page header includes the GitHub logo, a search bar, and navigation links for Pull requests, Issues, Marketplace, and Explore. The profile information for the Web3D Consortium is displayed, including its logo, a description: "Web3D Consortium builds international standards for 3D graphics. Consortium members can request access to contribute. Learn more and join at web3d.org", and contact information: "International", "https://www.web3d.org", and "brutzman@nps.edu". Below the profile information, there are tabs for Repositories (2), Packages, People (23), Teams, Projects, and Settings. A search bar for repositories is present, along with filters for Type and Language, and a "New" button. The main content area shows two repositories: "X3D" (Private) and "HAnim" (Private). The "X3D" repository is described as "Maintenance and development of all X3D specifications, i.e. ISO/IEC 19775, 19776 and 19777 series." and has 8 forks, 1 star, 1 issue, and 0 pull requests, updated 1 hour ago. The "HAnim" repository is described as "Maintenance and development of all Humanoid Animation specifications, i.e. ISO/IEC 19774 series." and has 0 forks, 0 stars, 0 issues, and 0 pull requests, updated on May 5. On the right side, there are sections for "Top languages" (HTML) and "People" (23 members).

# Member value: Mantis issue tracker is thorough

[https://www.web3d.org/member-only/mantis/view\\_all\\_bug\\_page.php](https://www.web3d.org/member-only/mantis/view_all_bug_page.php)



Logged in as: *brutzman* ( Don Brutzman - developer )

2020-08-01 12:17 PDT

Project: X3D

Main | My View | View Issues | Report Issue | Change Log | Roadmap | My Account | Logout

Search:  Apply Filter

Viewing Issues ( 1 - 17 / 17 ) [ Print Reports ] [ CSV Export ] [ Excel Export ]

	P	ID	Tags	#		Category	Severity	Status	Updated	Summary
<input type="checkbox"/>		<a href="#">0001268</a>	HTML5, V4.0	1		19775-1 (Abstract)	feature	<a href="#">assigned (brutzman)</a>	2020-06-26	allow height and width attributes for X3D scene?
<input type="checkbox"/>		<a href="#">0001271</a>	V4.0	11		19775-1 (Abstract)	major	<a href="#">resolved (brutzman)</a>	2020-06-19	add visible field to X3DBoundedObject
<input type="checkbox"/>		<a href="#">0001292</a>	V4.0	3		19775-1 (Abstract)	minor	<a href="#">assigned (npolys)</a>	2020-06-18	numbering of z order of layers in LayerSet
<input type="checkbox"/>		<a href="#">0001258</a>	V4.0	3		19775-1 (Abstract)	major	<a href="#">acknowledged (brutzman)</a>	2020-04-07	Layout component needs to be consistently implemented
<input type="checkbox"/>		<a href="#">0001218</a>	V4.0	8		19775-1 (Abstract)	minor	<a href="#">assigned (vmarchetti)</a>	2020-01-31	7.2.4 MetadataDate - New node type, or new data type
<input type="checkbox"/>		<a href="#">0001080</a>	V4.0	2		19775-1 (Abstract)	minor	<a href="#">acknowledged</a>	2019-11-01	8.4.1 TimeSensor - TimeSensor cycleInterval needs to be modifiable when running
<input type="checkbox"/>		<a href="#">0001238</a>	V4.0	20		19775-1 (Abstract)	minor	<a href="#">assigned (vmarchetti)</a>	2019-11-01	Clarify ambiguous functional specification for OrthoViewpoint
<input type="checkbox"/>		<a href="#">0000840</a>	V4.0	2		19775-1 (Abstract)	minor	<a href="#">confirmed (brutzman)</a>	2019-11-01	18.3.3 X3DTexture2DNode - Descriptive text for image textures
<input type="checkbox"/>		<a href="#">0001265</a>	V4.0	1	1	19775-1 (Abstract)	major	<a href="#">assigned (npolys)</a>	2019-10-24	Text size clarification, relative to baseline
<input type="checkbox"/>		<a href="#">0001260</a>	V4.0			19775-1 (Abstract)	major	<a href="#">assigned (andreasnlesch)</a>	2019-08-14	use of custom elements (x3d- prefix) for X3Dv4 in HTML5



## X3Dv4 Draft Specification Implementation Status

Components and Nodes	X3D Specification Paragraphs	Examples	Implementations	Tooltips, links to Validation	Notes
Annotation	<a href="#">42 Annotation component</a>	TODO	<a href="#">Xj3D</a> (partial)		Work in progress by <a href="#">Design Printing Scanning</a> and <a href="#">Medical Working Groups</a>
Event model alignment	Modifications to <a href="#">Concepts, 4.4.8 Event model</a>		<a href="#">X_ITE</a> (complete), <a href="#">X3DOM</a> (partial)		X3D Script/ROUTE events via DEF, HTML5/DOM events via id, browsers exchange event changes after render loops
Field name changes	Affects child SF/MFNode field naming for ~10 nodes		<a href="#">X3D-Tidy</a> conversion updates once resolved		See <a href="#">Potential future changes for improved consistency of field names</a>
glTF file loading	Multiple nodes for scene graph integration and advanced rendering		<a href="#">X3DOM</a> , others		glTF closely related to Lighting model, also provides geometric compression.
HAnim v2	<a href="#">26 Humanoid Animation (HAnim) component</a> , updating HAnimHumanoid and adding HAnimMotion node for BVH-style motion animation	TODO update <a href="#">Basic Archives: HAnim</a>	<a href="#">X3DJSAIL</a> Ready for update by other existing applications.	<a href="#">HAnimMotion</a> , <a href="#">HAnimHumanoid</a>	<a href="#">HAnim v2</a> is undergoing ISO Final Draft International Standard editors review, expected completion 7 August 2019.
Inline	<a href="#">9 Networking component</a> Allow loading other model types, security precautions	TODO	<a href="#">X3DOM</a>		<a href="#">Mantis 744</a> , <a href="#">Mantis 1151</a> , <a href="#">Mantis 1171</a> , <a href="#">Mantis 1257</a>  TODO support STL, PLY?
Lighting model	TODO add new capabilities while retaining optional backwards compatibility with X3Dv3  <a href="#">17 Lighting component</a>	TODO	TODO confirm: <a href="#">Castle Game Engine</a>  <a href="#">X3DOM</a>		Satisfactory review by X3D Working Group of <a href="#">Physically Based Rendering (PBR)</a> proposals by Michalis Kamburelis

Thanks for many contributions!!

... we continue tuning testing and deploying all of these great new capabilities

**Web3D  
membership  
has value!**

# Bottom lines all around

Our X3D + HTML future now arriving. Take advantage of new capabilities!

- An amazing amount of progress is available for early adopters, now.
- We have a formal path forward, proven process and good procedures.

Web3D membership has value!

- Can accelerate, focus attention, offer help, support for your project of interest
- Web3D needs you to [Join Our Team](#) as business, university, agency or individual

Community contributors adding major value too!

- Ask questions, review, contribute code and models

**Get involved,  
share benefits!**

# Contact

**Don Brutzman, Ph.D.**

[brutzman@nps.edu](mailto:brutzman@nps.edu)

<http://faculty.nps.edu/brutzman>

Code USW/Br, Naval Postgraduate School

Monterey California 93943-5000 USA

1.831.656.2149 work

1.831.402.4809 cell