WebVR and Beyond: Web3D Futures BOF

X3D: Open royalty-free interoperable standard for enterprise 3D

15 August 2018

Web3D Consortium

www.web3d.org

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Presenters:

Nicholas Polys - Virginia Tech

Anita Havele - Web3D Consortium

Johannes Behr - Fraunhofer IGD

Mitch Williams - Samsung

Discussion

Who are we

An International, non-profit, member funded, standards development organization

Developing the ISO specification X3D for interactive 3D graphics on the Web

Our members span from academia, research, industry, government, and professionals

A community of technologists, artists and enterprise

web3D CONSORTIUM

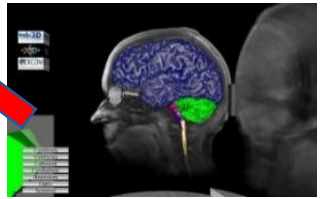
WWW.Web3D.org

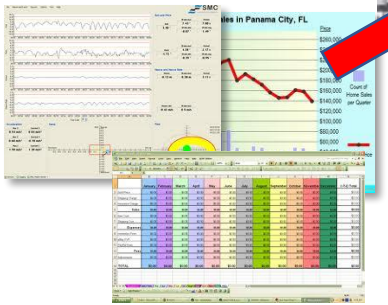
Data from different domains have to Coexist
Mash up 3D data across domains

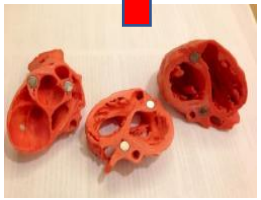
Design

Geo

Medical







3D Printing

X3D: Create once - Run Anywhere

The Web is the platform

All browsers
All platforms

Making 3D an ordinary media by publishing 3D to the Web

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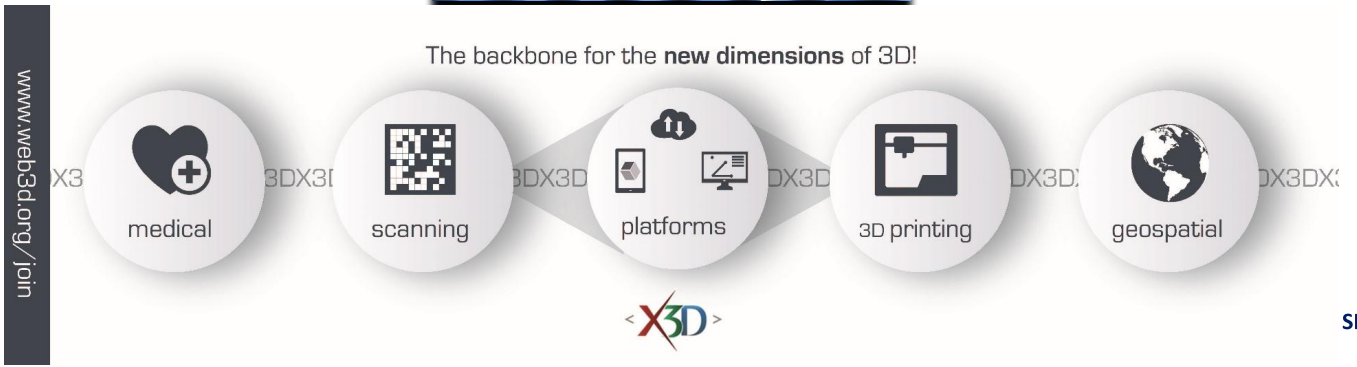
We are laying the foundation

Geospatial
Medical
Design
3D Printing
&Scanning

Simulation
Humanoid Animation
VR Technologies
Augmented Reality



X3D: Your backbone for new dimensions of 3D

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Industry Standards unify communities

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ISO

OGC
Open Geospatial Consortium, Inc.

W3C WORLD WIDE WEB consortium

KHRONOS GROUP

DICOM
Digital Imaging and Communications in Medicine

HL7 INTERNATIONAL

What is X3D (Extensible) 3D

- Originated from VRML, X3D is an ISO standardized specification for interactive 3D graphics.
- A File Format and Runtime API (Javascript, Java, …)
- Multiple encodings (file formats): XML, VRML, JSON, based on the same abstract scengraph model
- Includes shaders, animation, interaction, geometry, texturing, lighting, camera
- Extensible - Capabilities added through scripting and node prototyping.

What is X3D (Extensible) 3D

- Large set of nodes for 3D modeling
- Profile and Component structure promotes interoperability
- Implementations on multiple platforms: desktop, mobile, Web
- Domain components - Design, 3D Printing, Medical, Geospatial, Humanoid Animation, AR and VR
- Multiple open source implementations (X3DOM and X-ite)

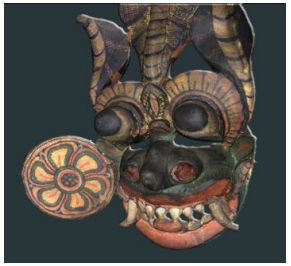
www.web3d.org/what-x3d

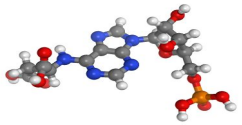
x3dom
Instant 3D the HTML way!

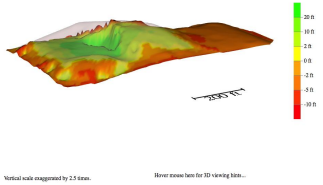
X-ite

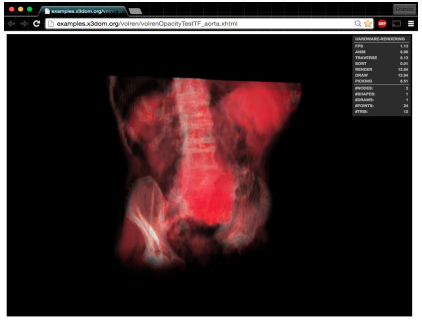
Key Factors of durable X3D

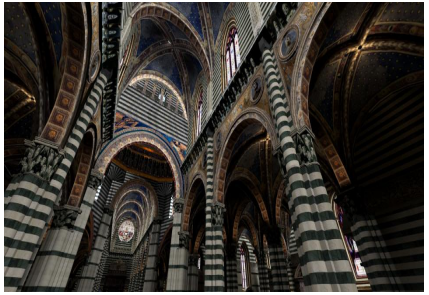
- Long Term Stability
- Visualization
- Performance
- Integration
- Data Management
- Real-time Interactivity
- Security
- Ease of Use











Strengths of X3D

An international ISO royalty-free open standard

Robust open source implementations

Hardware and Software agnostic

Bring data from different sources and publish on different platforms

A layer above webGL/OpenGL

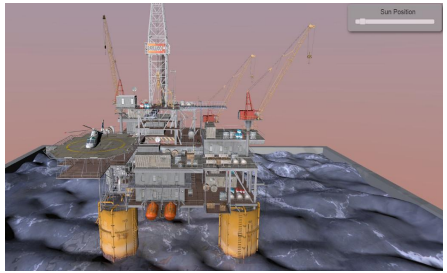
Web Authors vs Graphics Programmers

Enterprise solutions

A welcoming open community (x3d-public@web3d.org)

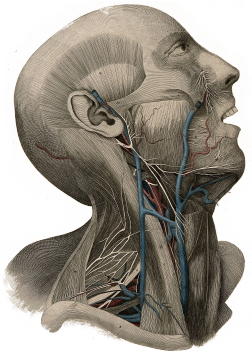
X3D Capabilities

Drilling Rig
Animation, interaction, shadows, details

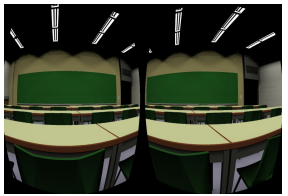


High Poly, Progressive Loading
Happy Buddha

Volume Rendering



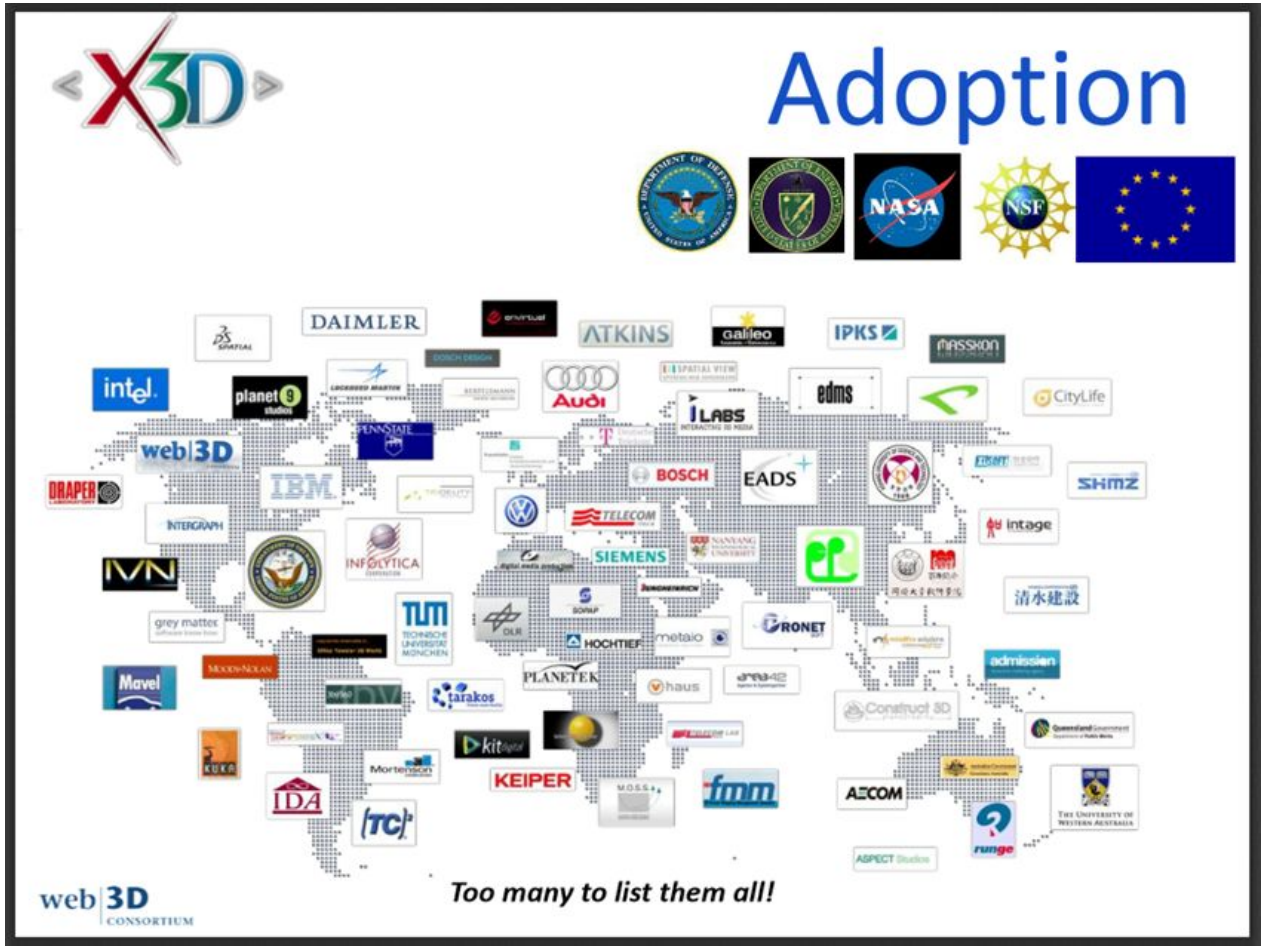
Oculus Support
Classroom



3D Printing

NIH 3D PRINT EXCHANGE

Web3D members are making this happen


Adoption
DAIMLER
ATKINS
IPKS
intel
planet 9 studios
Audi
edms
CityLife
web3D
IBM
BOSCH
EADS
SHMZ
INTERGRAPH
TELECOM
intage
IVN
INFOLYTICA
SIEMENS
清水建設
grey matter
TUM
TECHNISCHE UNIVERSITÄT MÜNCHEN
DLR
HOCHTIEF
metaio
admission
Mavel
PLANETEK
tarakos
haus
Construct 3D
KUKA
kitdigital
Mortenson
KEIPER
fmm
AECOM
IDA
TC
runge
ASPECT Studios
Too many to list them all!
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Mission

Interoperability: Converge standards

Portability: Industry Support

Durability: stands the test of time

Web3D… VR++

… Online Evolution …

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Nicholas Polys
Johannes Behr
MitchWilliams
Anita Havele

2017-2018 News

- X_ITE library updated
- Deployed in X3D examples archive
- X3DOM support for Gltf and WebVR
- New Castle3D X3D Game Engine release
- H-ANIM 2.0 under ISO-IEC ballot
- 3D Print Exchange (NIH, Navy) upgrades to Drupal 8
- New Scanning initiatives and vendor support

3D on the Web

Engines access access worlds by url

- Stand-alone Plug-ins in Web browsers
- Native WebGL in mobile browsers
  - X3DOM
  - X_ITE
  - GearVR
- Gltf 2.0 support (PBR)

All HMD platforms!

- WebVR
- X3DOM
- GearVR

VR on the Web

Engines access worlds by url

- All HMD platforms!
- WebVR
- X3DOM
- GearVR

WebVR

With X3DOM Javascript library

- Photospheres
- Videospheres
- Volumes
- Heritage
- 3D city models
- ...

X3DOM

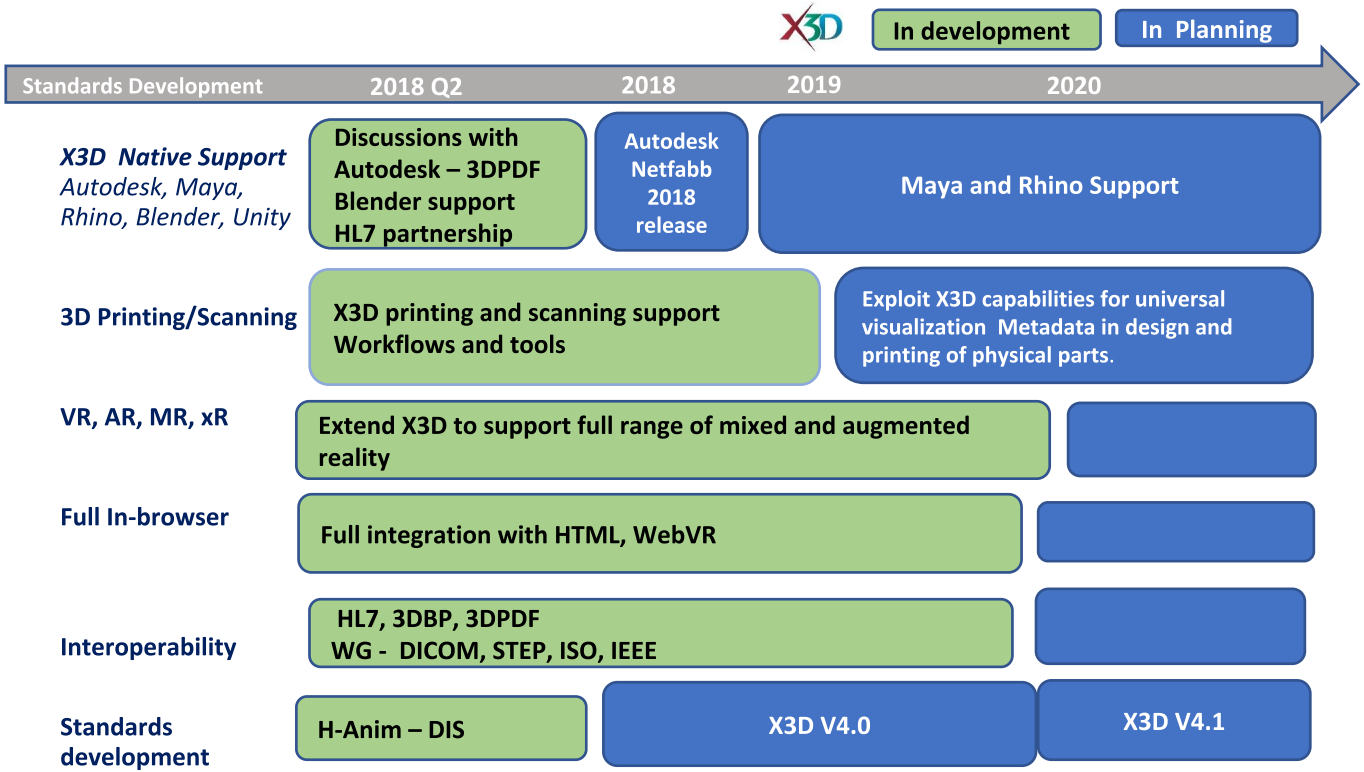
Johannes Behr, Timo Sturm

Fraunhofer IGD

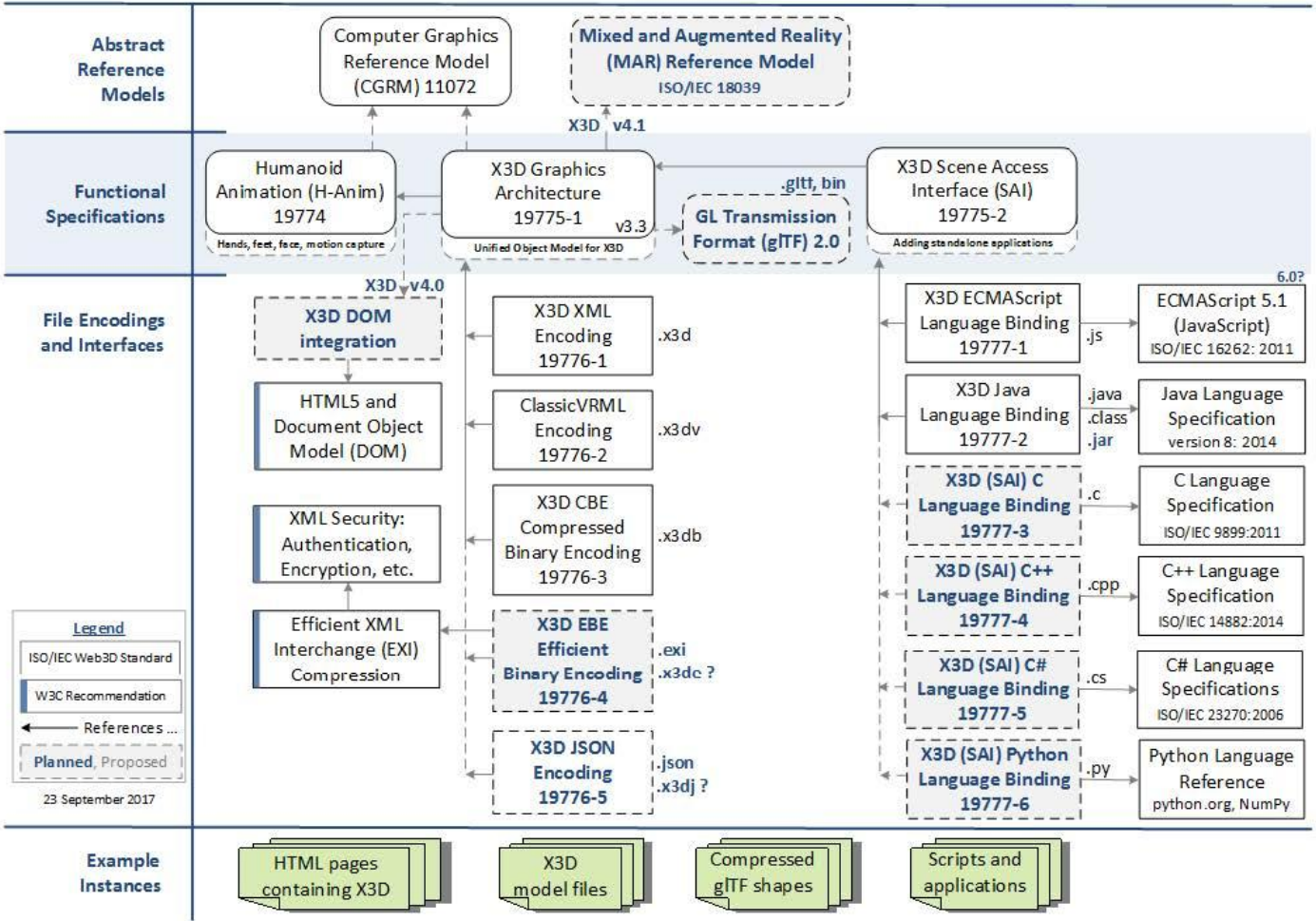
GearVR

Mitch Williams, Samsung

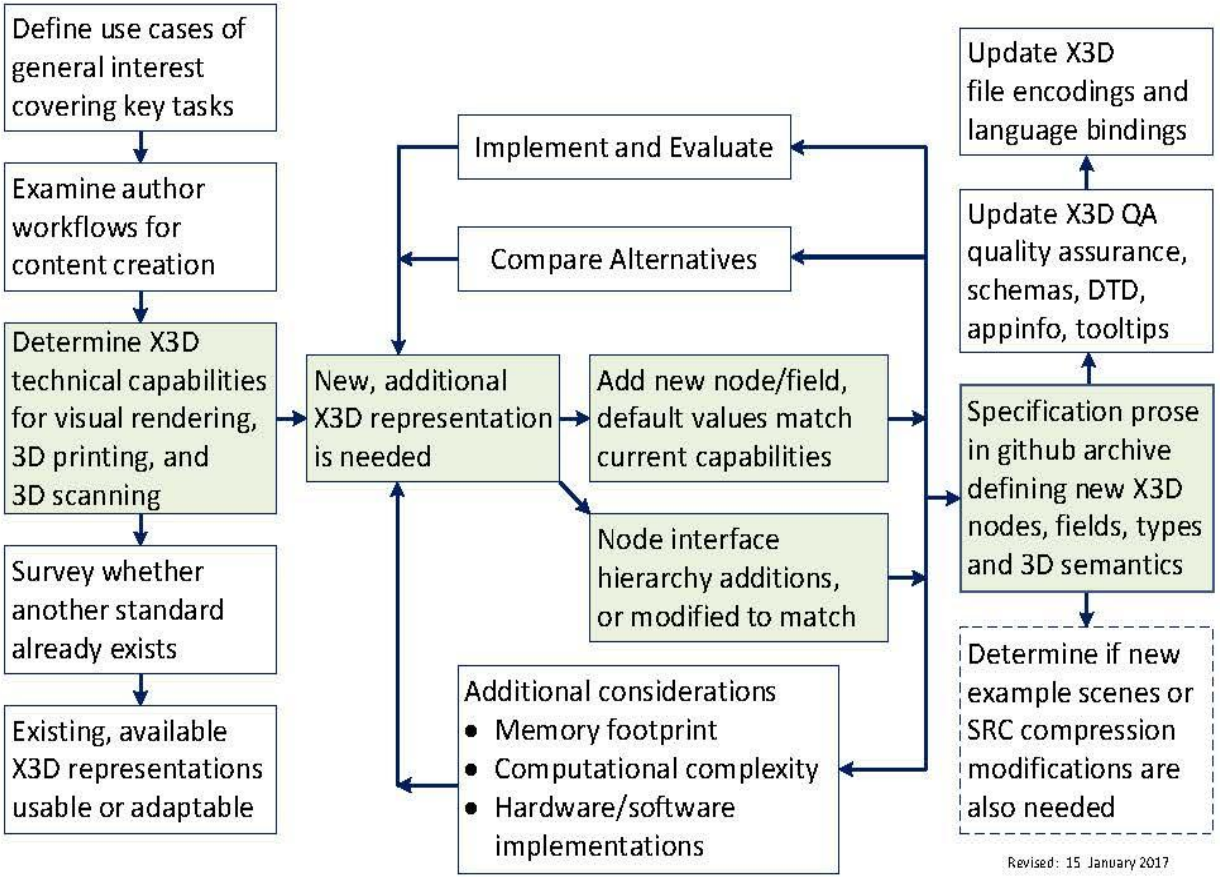
Web3D Standards Roadmap



X3D Graphics Standards: Specification Relationships



Specification design process for new capabilities



HTML5 Open Web Arch

• 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 (MOST)

Some aspects are standardization, others simply aligning best practices.

X3D version 4, HTML5/DOM

- Inline, ExternalShape: glTFmodel
- Physically Based Materials: glTF
- Advanced lighting model
- Shadows and reflections
- Cloud-based, offline rendering

X3D version 4.1, VR/AR/MAR

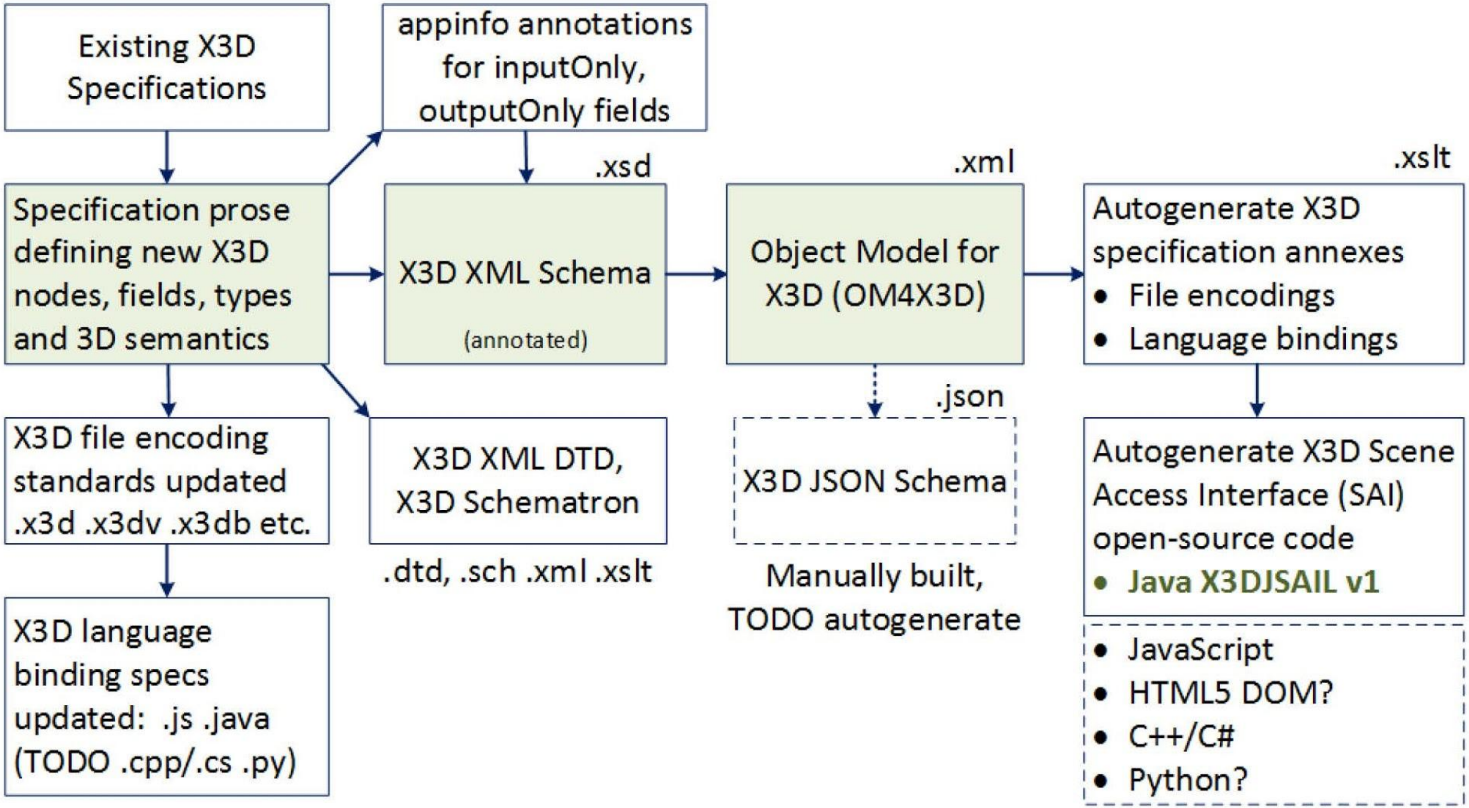
- Co-develop 3.1 to immediately follow completion of X3D v4.0
- WebVR as baseline capability set
- Composing see-through/360 video, high-definition, green screen, etc.
- Push “settled issues” to X3D v4.0, defer final WebVR support to v4.1

X3D xR

Augmented & Mixed Reality

- Web3D Members develop ISO-IEC reference model (jointly with MPEG)
- Web3D Consortium Special Interest group
  - German and Korean members
  - Specified nodes for optical and video see-through AR
- X3D nodes proposed:
  - CalibratedBackground, TrackedObject,...

Object Model for X3D: Creation, Autogeneration



X3D Unified Object Model (X3DUOM)

Audio

White paper: Strategies for Improved Sound Support in X3D

W3C Audio Working Group

- Web Audio, Web Midi, Web Audio Processing: Use Cases and Requirements
- MediaStream Processing API

Audio shaders/scripts in combination with configurable pipeline? Use of audio in annotations

Humanoid Animation (HAnim) + Medical

New HanimDraft International Standards (DIS) available online! • HanimArchitecture (skeleton, skin, hands and feet, precise naming) • HanimMotion Animation (e.g. mocap, BVH conversion) • Tool updates expected by SIGGRAPH Vancouver, August 2018

Medical Working Group also meets regularly • Liaisons with DICOM imaging, Health Level 7 (HL7), etc. • Diverse applications and uses

• Shared strategy: suitable for archival Electronic Health Records (EHR) • Metadata and annotations, security, compression, ontologies, standards

New Opportunities @ Web3D Consortium

- X3D v4 for HTML5/DOM and family of Web Standards.
- X3D v4.1 for Mixed Augmented Reality (MAR).
- JSON Encoding.
- C#, C++, C language bindings.
- Python language binding.

- Inlining formats and referencing fragments: glTF and Physically Based Materials
- Advanced lighting and rendering techniques, shadows, projective texture mapping, etc.
- Advanced audio.
- Semantic 3D using Semantic Web Standards.
- Digital Publishing and EPUB standard.

- HAnim Motion Animation and working towards Medical Records support.
- Cultural and Natural Heritage.
- 3D Printing
- 3D Scanning
- Demonstration videos
- Import/export support.

- X3D Wish List items
- VR Hackathons.
- Web3D Conferences

Join Us!

- Many opportunities for professional development and recognition.
- Great community to share and learn with.
- Stable process that lets good content stay relevant indefinitely.
- Bringing 3D into enterprise business models and everyday website design.
- Unlocking 3D graphics everywhere.

Discussion

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X3D Anywhere

www.web3d.org/join

Join us to Build the Future of 3D

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