X3D Specification Activities

... fasten your seat belts!

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Web3D Consortium
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First...

Many thanks to Korea Chapter of Web3D Consortium for
• Many sustained and stellar technical efforts
• Collegial and constructive efforts
• Organization and coordination
• Foresight and Vision
X3D Graphics Standards: Specification Relationships

Reference Standards
- Computer Graphics Reference Model (CGRM) 11072
- VRML97 with EAI 14772
- HTML5 and Document Object Model (DOM)
- GL Transmission Format (gITF) 2.0
- 3D Printing Scanning ISO JTC 1
- Mixed Augmented Reality (MAR) Reference Model ISO/IEC 18039
- WebVR OpenXR etc.

Web3D Functional Specifications
- Humanoid Animation (H-Anim) 19774
  - Part 1: Architecture, hands, feet
  - Part 2: Motion animation
  - Part 3: Facial model animation
- X3D Graphics v3.3 Architecture 19775-1
- v4.0 HTML DOM
- v4.1 MAR WebVR
- X3D Scene Access Interface (SAI) 19775-2

File Encodings and Interfaces
- Medical content and metadata for health records
  - DICOM HL7
- Fast Inforset (FI) Compression ISO 24824-1
- XML Security: Authentication, Encryption, etc.
- Efficient XML Interchange (EXI) Compression
- JSON specifications: IETF RFC/schema, 22275:2018 etc.
- 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

Examples
- HTML pages containing X3D
- X3D scenes, model files
- Compressed gITF shapes
- X3D scripts, applications
- SAI libraries

Legend
- ISO/IEC Web3D Standard
- ISO/IEC Standard
- W3C Recommendation
- Khronos Standard
- Other specifications

Planned, Proposed
28 September 2018
Standards progress and plans

• H-Anim 2 Architecture and Motion Capture
  • implementation efforts for X3D: schema is now published
  • Issue: rename to HAnim: simplify search, unify document/program representations
  • Issue: review, address ISO editor

• X3D Scene Access Interface (SAI)
  • Current status is up to date, small errata being encountered
  • Some changes may be desirable based on new language additions

• X3D C, C++, C#: NWIP approved, work in progress.
  • Sharable soon, we hope?

• X3D Java SAI: implementation mature, specification review/update
  • automatically updating X3DJSAIL codebase with X3D v4 changes

• X3D Python SAI: implementation in tandem with Java
  • ISO NWIP and initial-draft specification document by SIGGRAPH
Standards progress and plans

- **X3D JSON Encoding**: implementation mature, JSON schema evolution, first-draft specification, NWIP needed

- **X3D 4.0** for HTML5/DOM/CSS, *development in progress*
  - Many components proposed, increasing participation
  - Two open-source JavaScript implementations guarantee successful execution
  - Three additional open-source implementations (C++, Pascal, Java) also active
  - Will begin listing assets online

- **X3D 4.1** Mixed/AR/VR/XR, progressing in tandem
  - Will build on W3C WebXR Immersive Web working group (meeting next week)

- **Strategies to Improve X3D v4 Sound Component** renewed activity
  - Dependency, partnership on W3C Audio
Standards progress and plans

• Data-centric security: applying implementations
  • XML Encryption for privacy
  • XML Authentication for authentication

• Metadata and Annotations
  • Printing and Scanning
  • Medical
  • Computer Aided Design (CAD)
  • Cultural and Natural Heritage

• X3D Unified Object Model (X3DUOM) is mature – specify within X3D v4?
• X3D Semantic Web Working Group is now approved and has begun, building X3D Ontology, portions likely autogeneratable using X3DUOM
X3D Unified Object Model (X3DUOM) Creation

- **Existing X3D Specifications**
- **Specification prose defining new X3D nodes, fields, types and 3D semantics**
- **X3D file encoding standards updated .x3d .x3dv .x3db etc.**
- **X3D unified object model (X3DUOM)**
  - Autogenerate X3D specification annexes
    - File encodings
    - Language bindings
  - X3D Scene Access Interface (SAI)
  - Open-source code autogeneration
    - Java X3DJSAI
    - JavaScript X3DJSONLD
    - C++/C#/C
    - Python

- **X3D XML Schema (annotated)**
  - X3D XML DTD, X3D Schematron, X3D Tooltips
  - X3D JSON Schema
    - X3D unified object model (X3DUOM)
    - .xsd
    - .xml .json
    - .xs1t
    - .dtd .sch .xml
    - .json
Projective Texture Mapping (PTM) Component

• Initial draft added to Github X3D Specifications
  • First edit to occur this week. Several iterations for continuous improvement.

• Next: add to XML Schema
  • Then X3DUOM, X3DJSAI, DTD, X3D Tooltips
  • February X3D Working Group Review, confirm it is a separate component. Add as component.
  • X3D Schematron validation heuristics (if any) as diagnostics for X3D Validator.

• Implementations
  • Existing: FreeWrl has implemented, X3DOM (proposed)
  • Recommended: X3DOM, X_ITE (either means both) for broad deployability as X3Dv4
  • Suggested: Castle Game Engine

• Examples Provided, Need to be Published
  • X3D Basic Examples Archive (most likely)

• Review, finalize, submit paper. Take care to ensure that no legal problems occur.
Discussion: legal considerations useful

• All prose, content submitted for ISO Specifications must be under Web3D Consortium Intellectual Property Rights (IPR) Policy.
  • Members also have “safe haven” private review if desired, but with prior agreement that all accepted technology is royalty free (RF) for any use.

• Authors can also publish papers either before a specification (reporting on graphics advances and experimentation) or afterwards
  • ... and retain copyright ownership rights for such documents throughout

• Authors benefit from broad, rigorous implementation and evaluation
• Public and industry benefit from royalty-free standards that can last.
• Win-win-win situation built on proven track record of broad success.
Catalysts

• Coherent functionality among all file encodings, language bindings
• Github version control for Web3D member access to draft specifications
• Steadily increasing validation capabilities ensure high quality models
  • also facilitates rapid software development
• Increased availability of X3D codebases to support export and import
• Insistence on example scenes for all new components enables
  • better sharing and mutual testing
  • demonstrated adoption of other standards
• Events: Web3D and SIGGRAPH Conferences, regular ISO meetings, etc.
• Web3D process, community, archival mailing lists, and Mantis issue tracker
Gating factors and challenges

Giant understatement:  A Lot of Work is Going On!

• Communication  Communication  Communication  !!!

• Coordinated efforts on design, documents and implementations

• Continuing growth into many areas needing 3D portrayal on the Web
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