3D: Design, Print, Scan BOF

X3D: Open royalty-free interoperable standard

for enterprise 3D

15 August 2018

Web3D Consortium

www.web3d.org

Nicholas Polys Ph.D., President
npolys@vt.edu

Anita Havele, Executive Director
Anita.Havele@Web3D.org

Scope & Outline

- Web3D Community
- 3D Print Exchanges
- Workflows & Roundtrips
- Enterprise scale (Mmarc Petit, EDF)

- ***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

web 3D CONSORTIUM

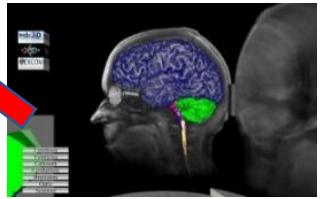
WWW.Web3D.org

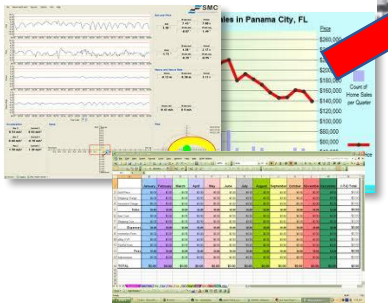
Data from different domains have to Coexist
Mash up 3D data across domains

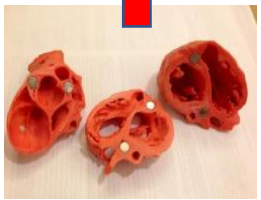
Design

Geo

Medical







3D Printing

web3D CONSORTIUM

SIGGRAPH 2018 | Vancouver

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

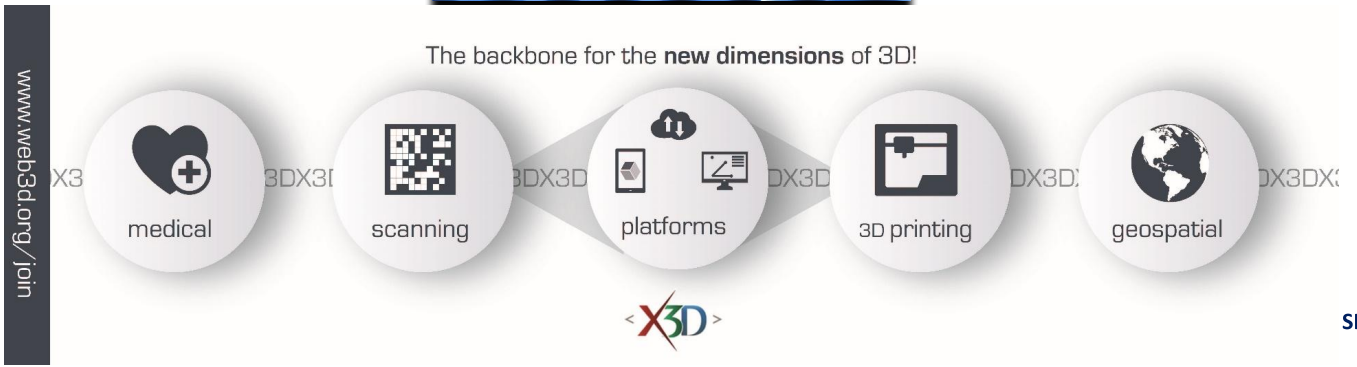
web3D CONSORTIUM

SIGGRAPH 2018 | Vancouver

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

SIGGRAPH 2018 | Vancouver

Industry Standards unify communities

web 3D CONSORTIUM

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)

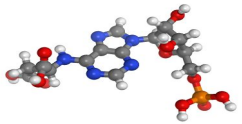
www.web3d.org/what-x3d

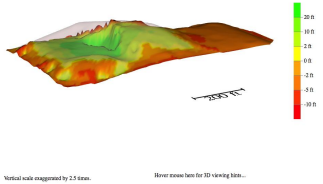
x3dom
Instant 3D the HTML way!

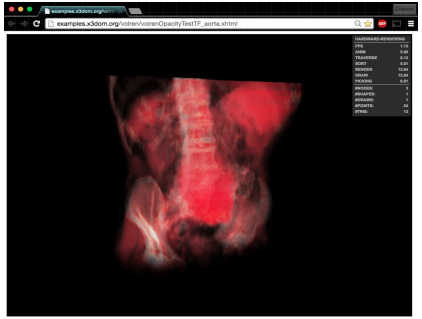
X-ite

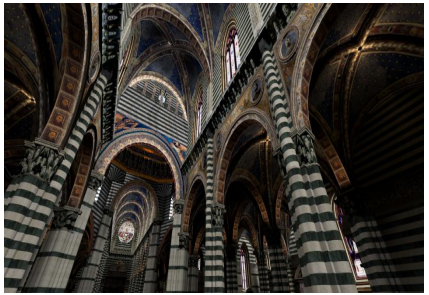
Key Factors of durable X3D

- 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

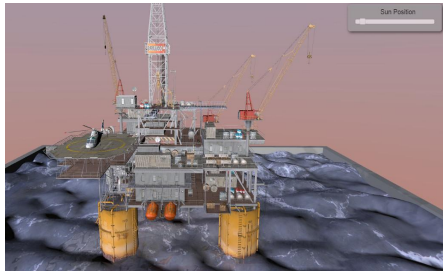
Web Authors vs Graphics Programmers

Enterprise solutions

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

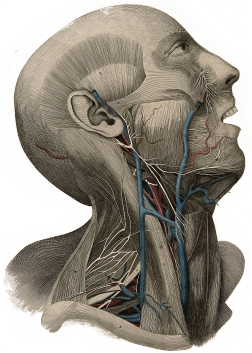
X3D Capabilities

Drilling Rig
Animation, interaction, shadows, details

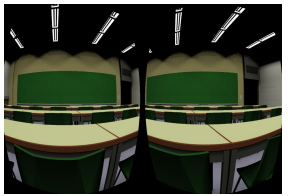


High Poly, Progressive Loading
Happy Buddha

Volume Rendering



Oculus Support
Classroom

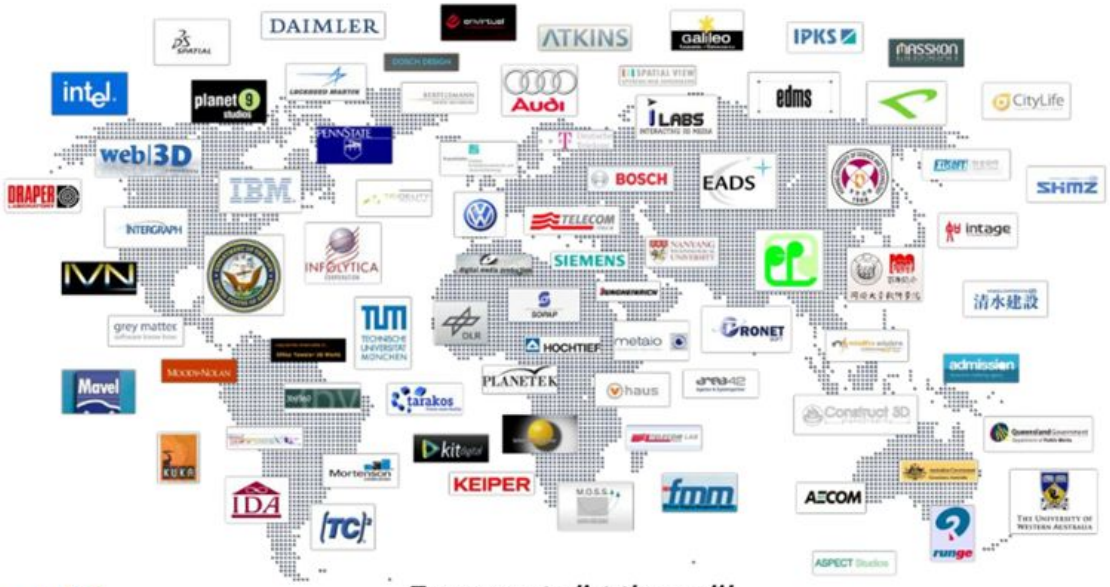


3D Printing

NIH 3D PRINT EXCHANGE

Web3D members are making this happen

Adoption



web3D CONSORTIUM

Mission

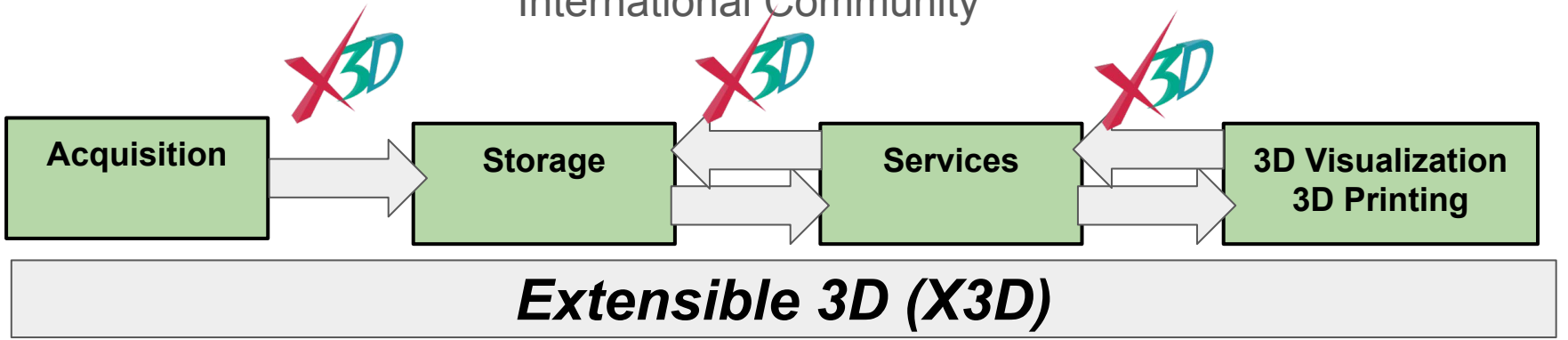
Interoperability: Converge standards

Portability: Industry Support

Durability: stands the test of time

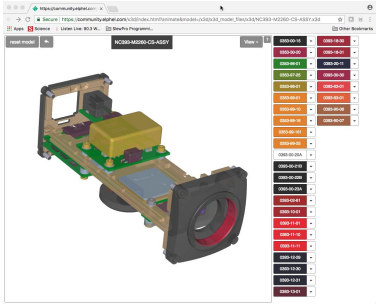
X3D: The Greatest Common Denominator

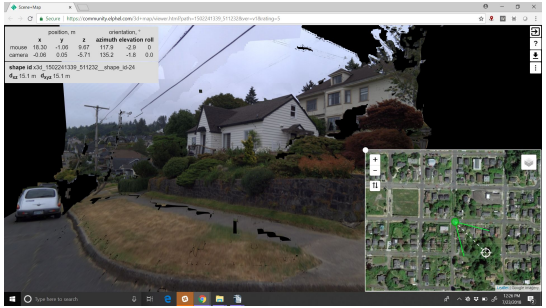
- ***Portability:*** multiple tools, workflows, and delivery platforms
- ***Interoperability:*** sharing & Accessibility
- ***Durability:*** ISO-IEC recognition, Standards harmonization
- ***Community:*** Web3D Consortium, International Community

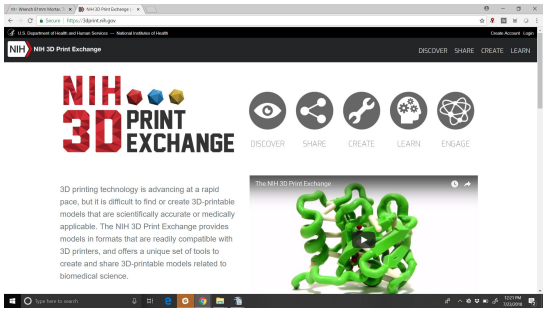


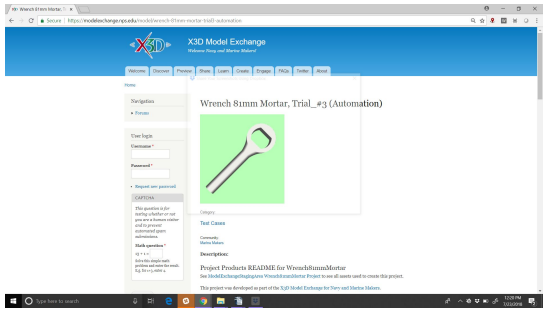
X3D Enterprise Case Studies

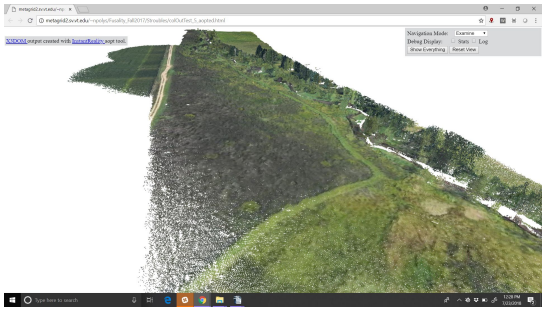
- ***CAD publishing***
  - Elphel - STEP to X3D pipeline
  - CADExchanger
- ***Presentation of Scanning Data***
  - Photogrammetry - Point Cloud to X3D pipeline
  - LIDAR - Las2X3D by Virginia Tech
- ***Print Exchanges***
  - NIH: 3dprint.nih.gov
  - NPS: ModelExchange.nps.edu
  - Native printer support: CURA, NetFabb, Shapeways



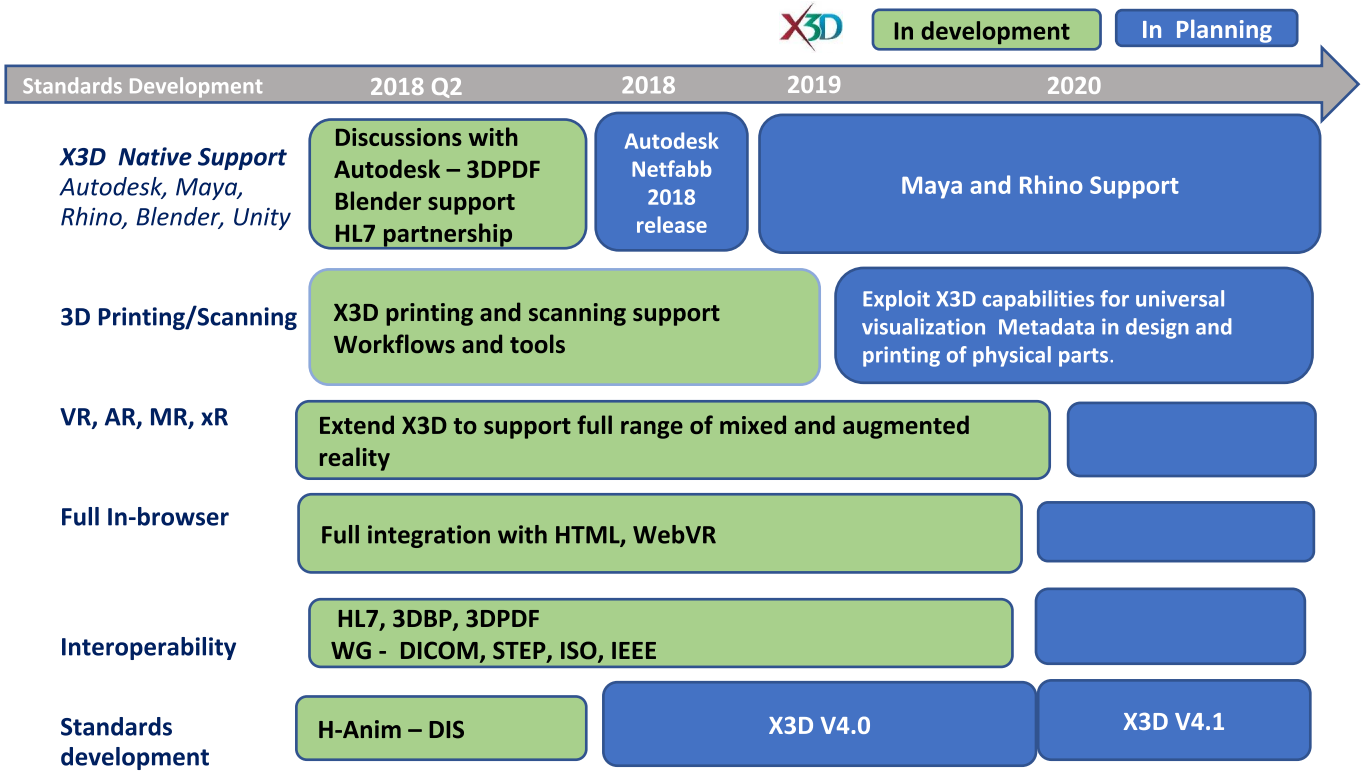




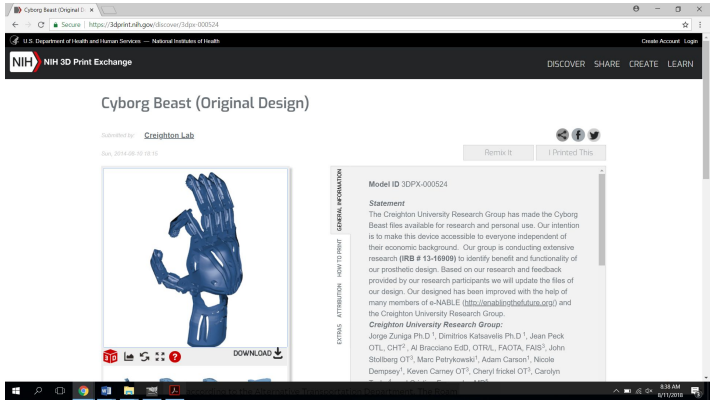




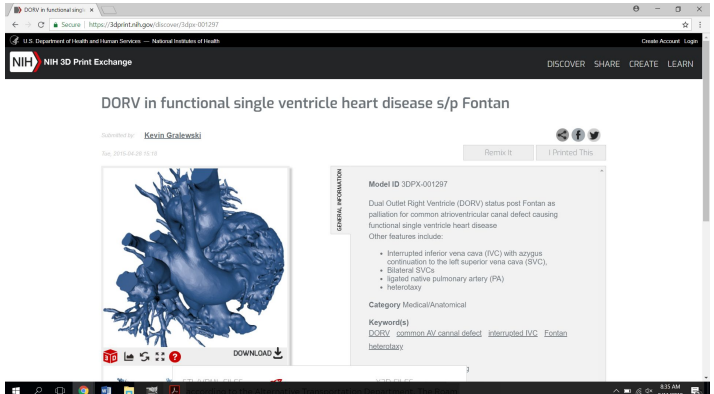
Web3D Standards Roadmap

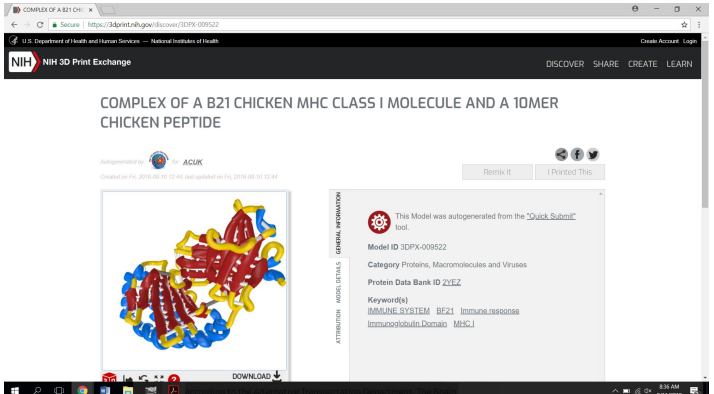


NIH 3D Printing / 3DMD scanning



NIH 3D PRINT EXCHANGE





web 3D CONSORTIUM

DOD Print Exchange

A 3D Print Exchange on Drupal 8 for DOD makers@!

X3D Design, Printing, and Scanning Working Group

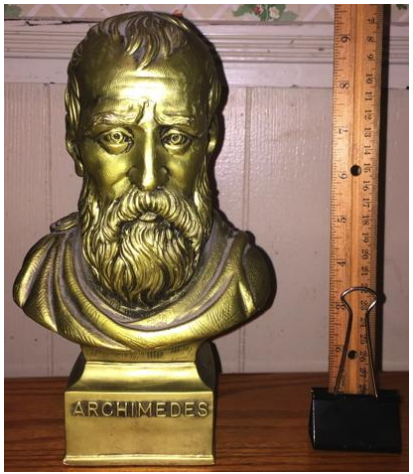
Vince Marchetti, KShell

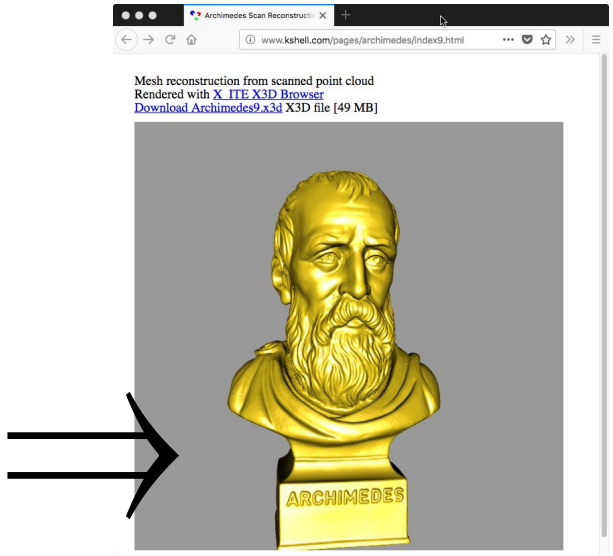
Co-Chair Web3D Consortium

3D Design, Printing, and Scanning (3DPS)

Working Group

3D Scanning : ουσία to X3D and the Web





http://www.kshell.com/pages/archimedes/index9.html

X3D Scanning, Visualization, and 3D Printing Workflow

Steinbichler Comet 5 optical scanner

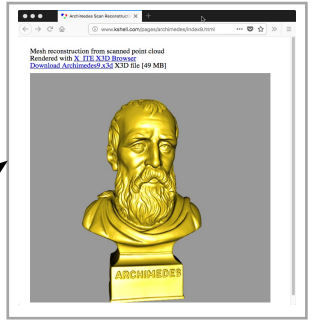
.XYZ Point cloud file

Meshlab

Open Source Software

X3D file

3D on the Web

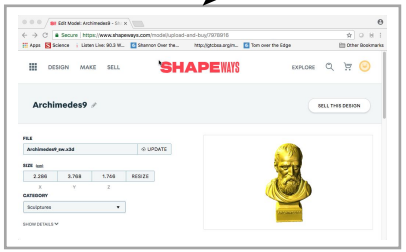


X_ITE browser

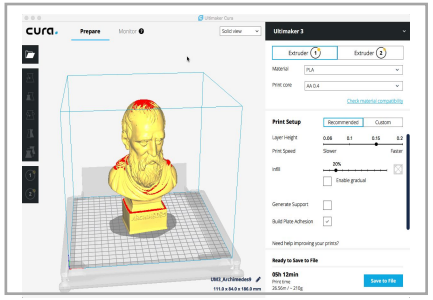
x3dom
Instant 3D the HTML way!

SHAPEWAYS

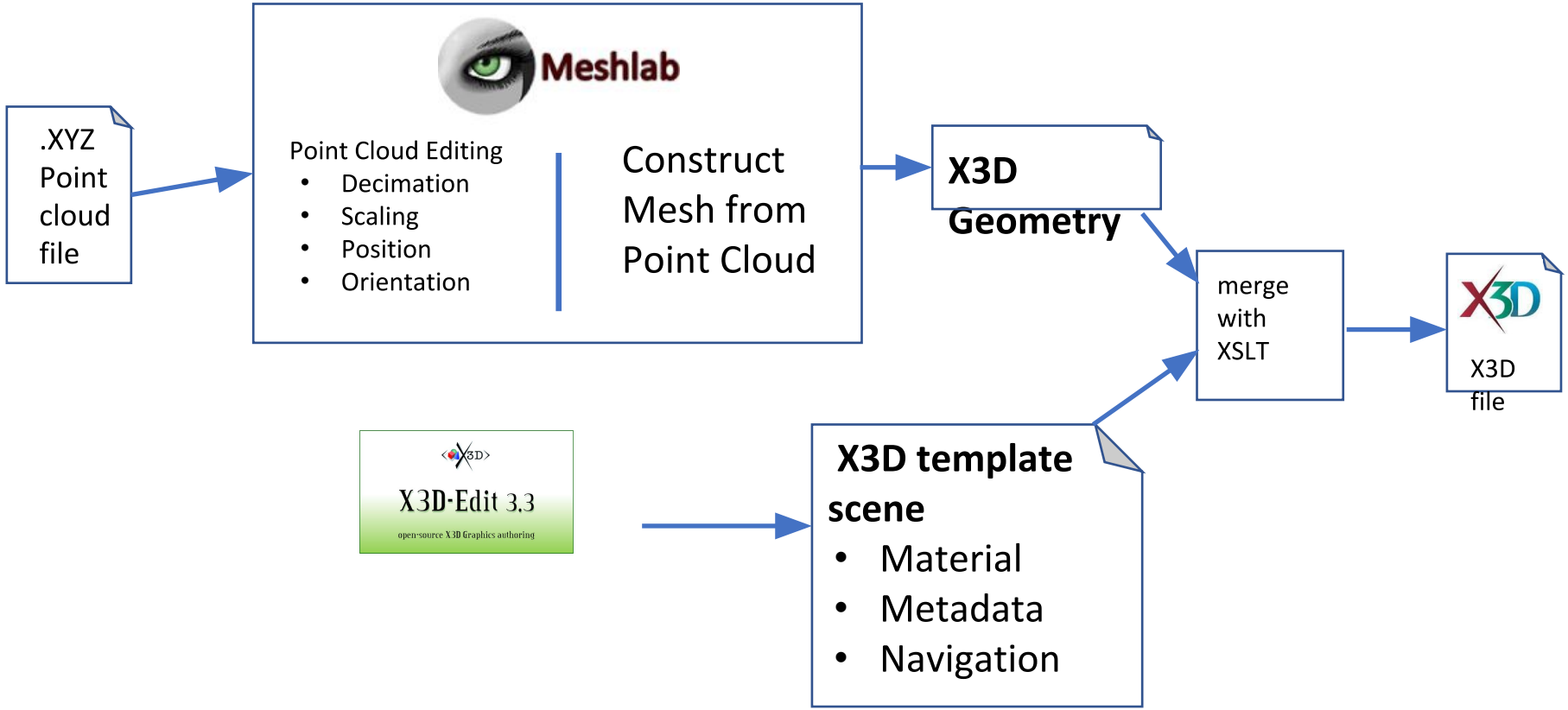
3D Printing Service



Cura software for desktop 3D printers



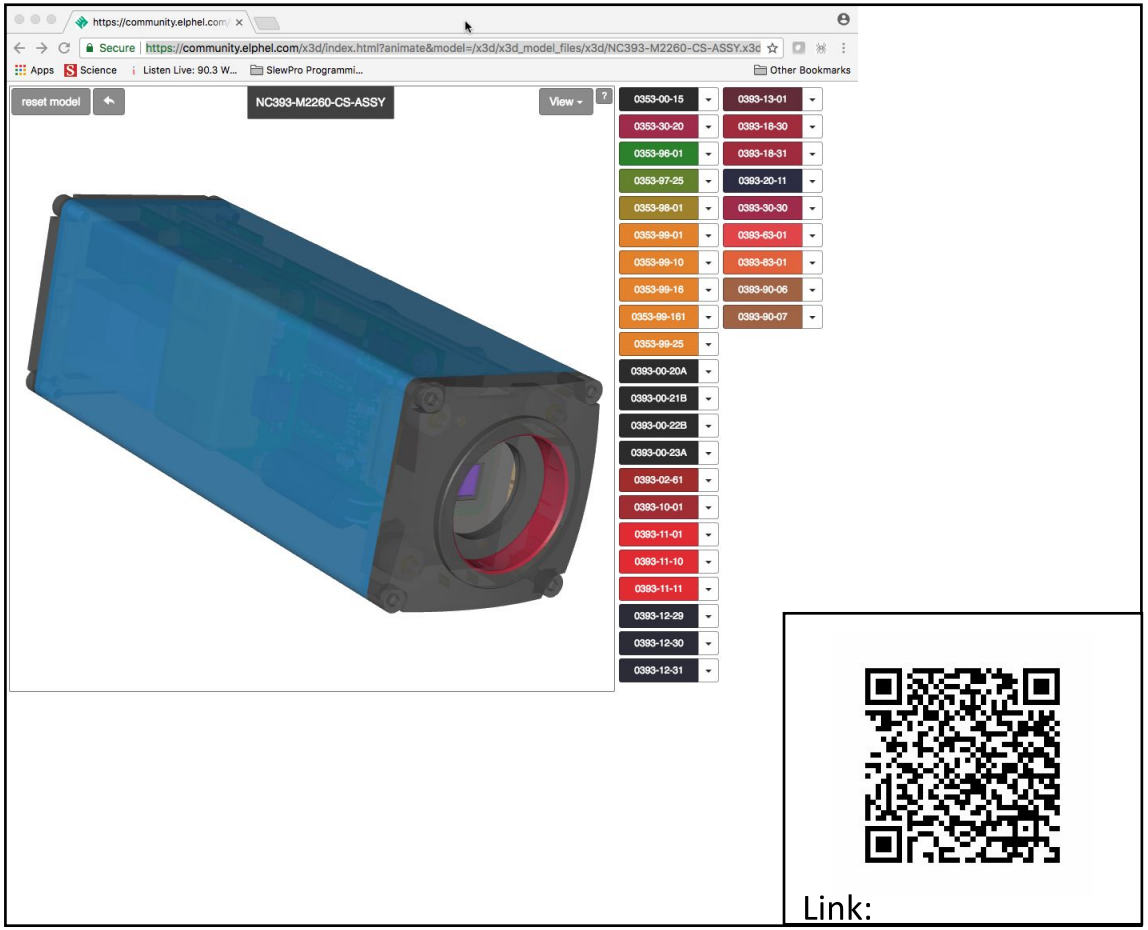
Workflow for X3D Scene creation from 3D Scan data



X3D Use Case: CAD Publishing

web3D CONSORTIUM

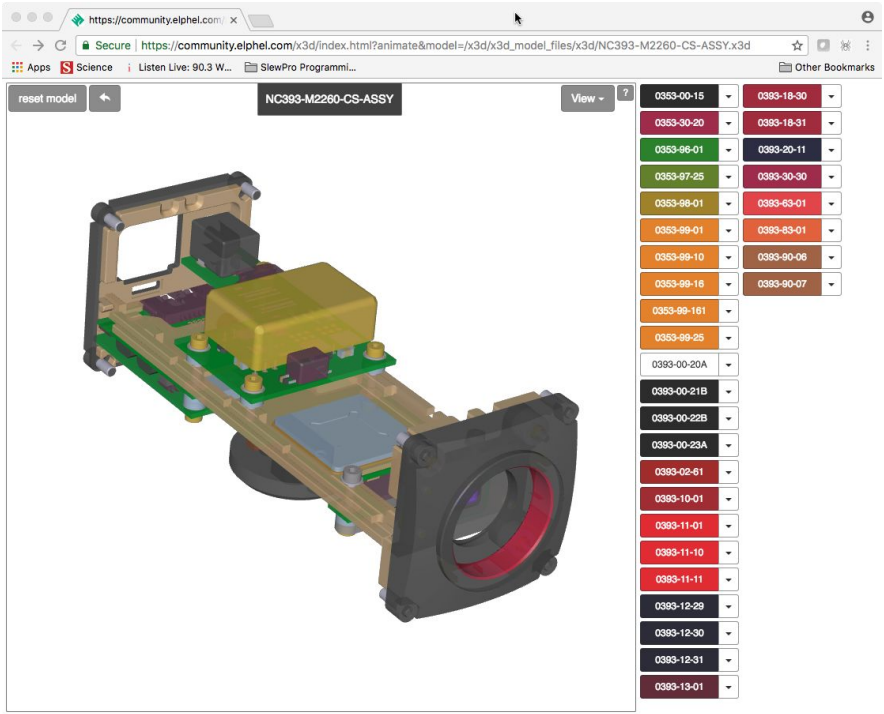
Publish CAD Data on Web for Customers and Suppliers



Link: [NC393-M2260-CS-ASSY]

Elphel Inc.
Salt Lake City, Utah, USA
https://www.elphel.com

Leverage open source software, X3D/X3DOM, and commercial CAD design application to publish CAD assembly models on any web browser.

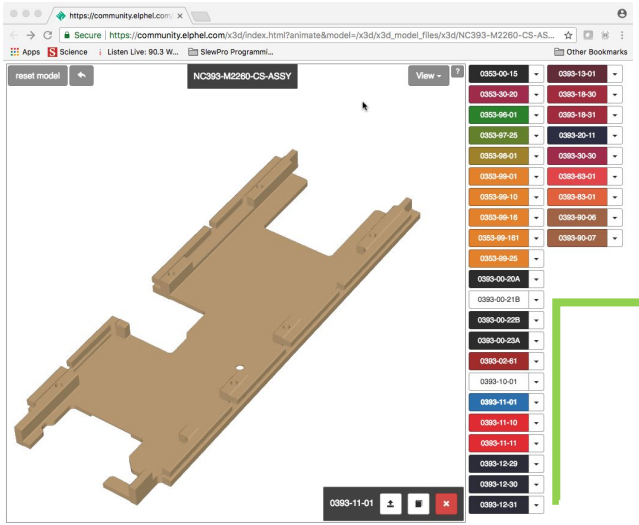


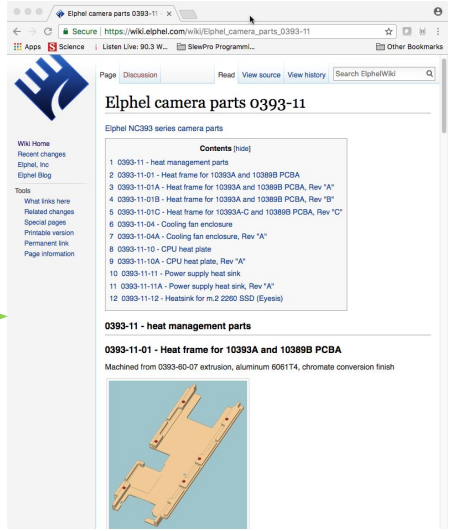
Bidirectional Javascript calls between 3D scene and HTML5 UI elements allows interactive inspection and viewing of assembly and internal parts.

Integration of X3D scenegraph and HTML5 DOM allows scripting with common web application frameworks.

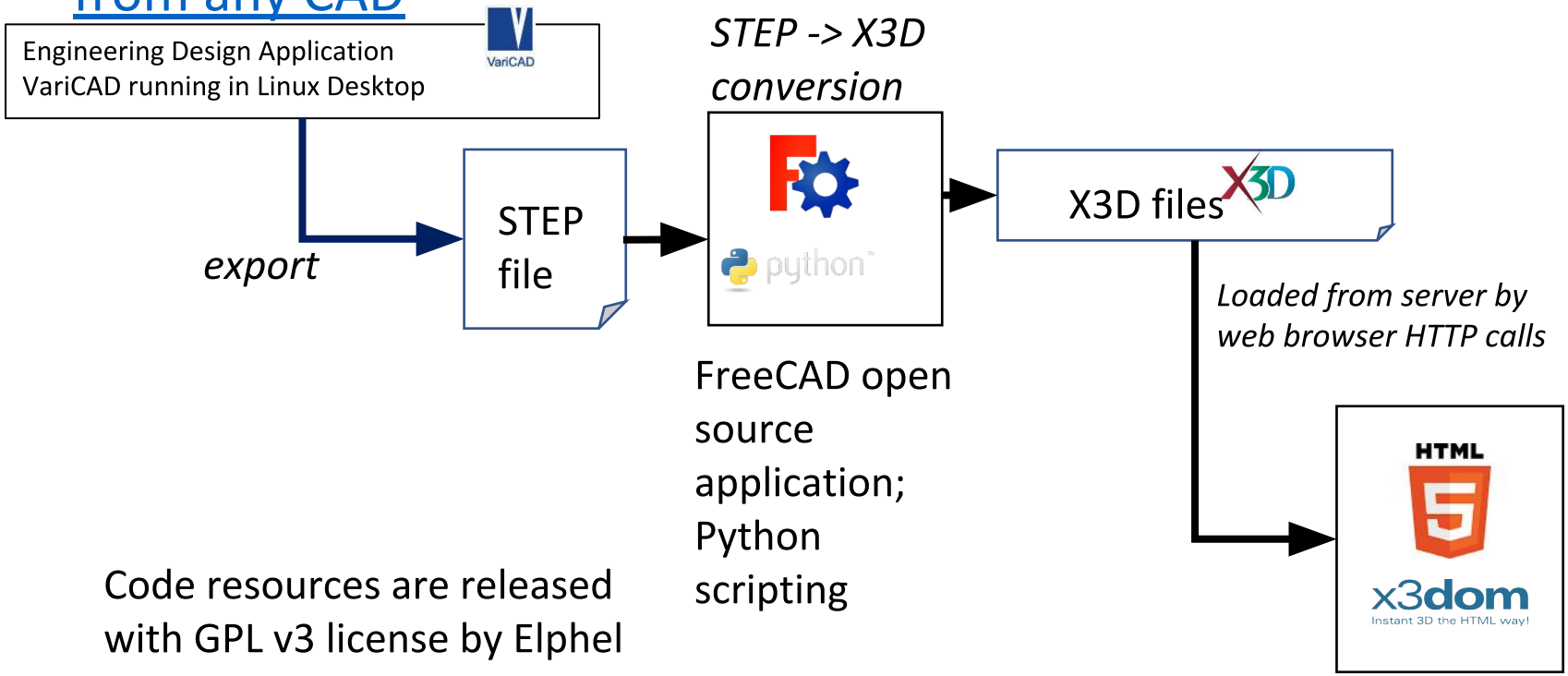
3Di --- ”intelligent 3D”

Touch sensitive 3D parts allow linking to descriptive Wiki pages.





Workflow: as detailed in Elphel Blog X3D assemblies from any CAD



FreeCAD open source application; Python scripting

Code resources are released with GPL v3 license by Elphel Inc.
Public Git Repository

HTML 5 web page
X3dom JavaScript library

X3D Use Case: CAD Assembly Animation

Vince Marchetti, KShell

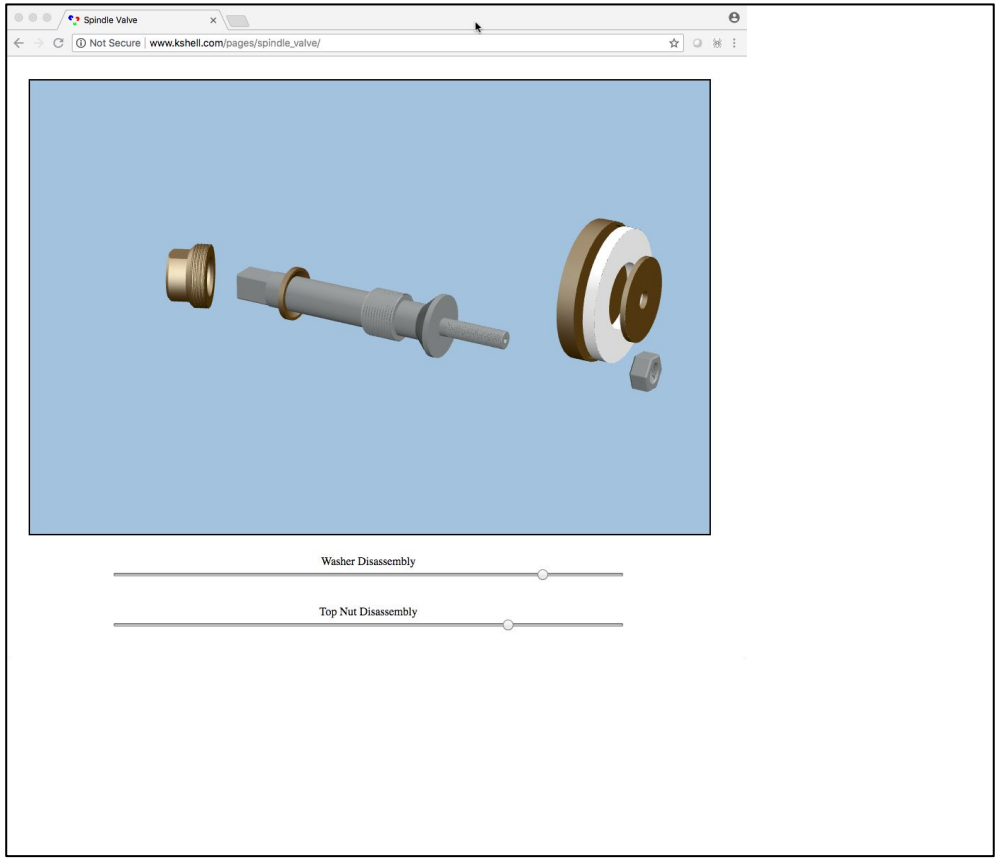
Co-Chair Web3D Consortium

3D Design, Printing, and Scanning (3DPS)

Working Group

web|3D CONSORTIUM

Animated Assembly & Disassembly with X3D & HTML 5

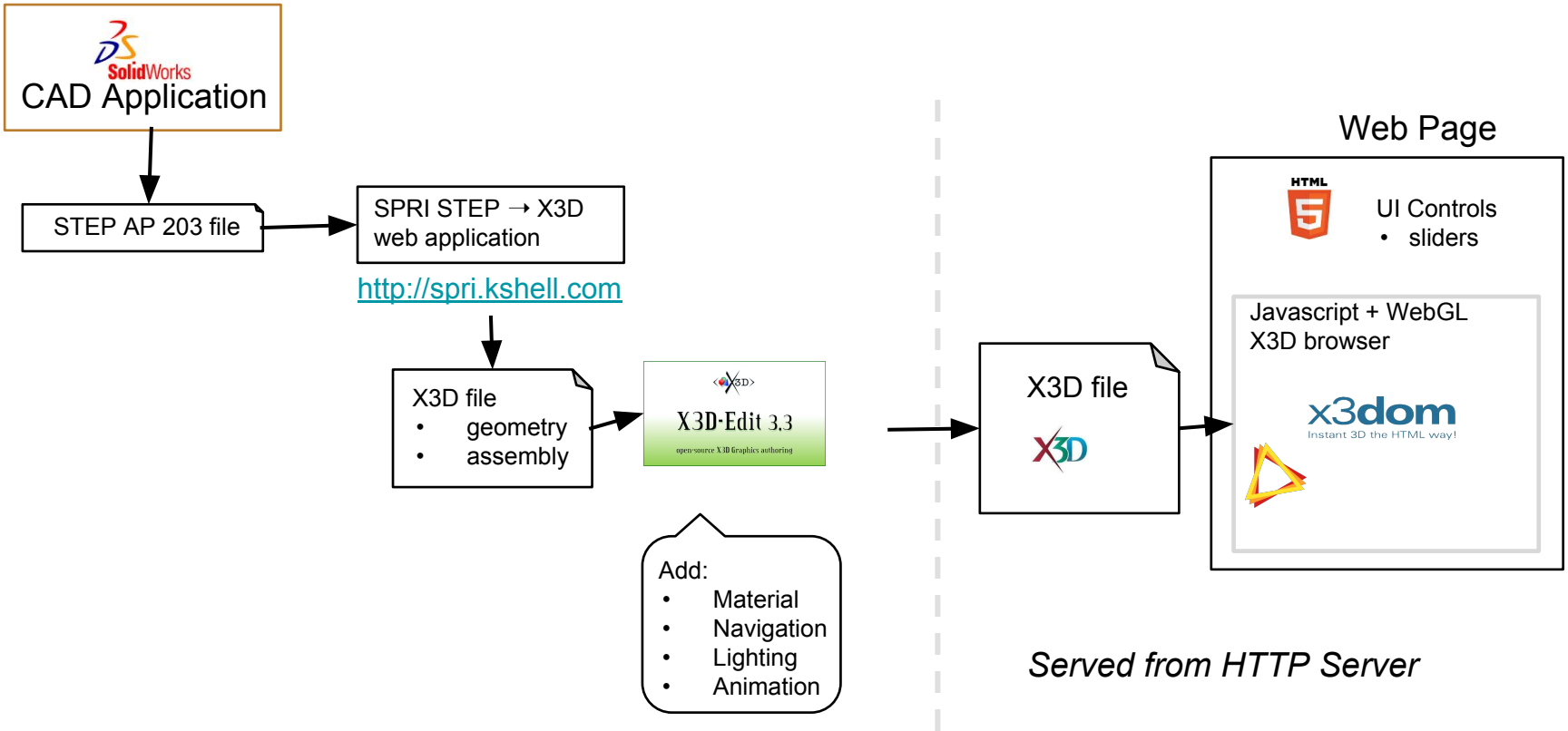


Combining:

- Detailed rendering of CAD assembly model
- Declarative X3D programming of assembly motion sequence.
- Integration with HTML5 UI Controls

http://www.kshell.com/pages/spindle_valve

Workflow and Data Flow for X3D Animated Assembly Model on web page



EDF - Marc Petit

Las 2 X3D

Virginia Tech: landscape scanning

https://vimeo.com/visionarium2018

X3D Anywhere

www.web3d.org/join

Join us to Build the Future of 3D

Contact:

Anita Havele, Executive Director

Email: Anita.Havele@web3d.org

Web3D Consortium
650 Castro Street Suite #120-490
Mountain View, CA 94041
Phone: +1 248 342 7662

Discussion

SIGGRAPH 2018 | Vancouver