IIIF 3D:
Complementing IIIF 2D & AV standards with 3D interoperability and sustainability

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EuroMed 2020 – 2-5 November

3D Community Group

International Image Interoperability Framework (IIIF)

- The IIIF 3D Community Group meets monthly
  - focus on knowledge sharing & discussion - *complexities, quality*
- Broad range of attendees:
  - Smithsonian
  - Metropolitan Museum of Art
  - Google
  - Mozilla
  - Web3D Consortium
  - Art Institute of Chicago
  - many institutional and independent participants

3D Community Group

Co-Chairs:

- Ed Silverton - https://twitter.com/edsilv
  (Mnemoscene, Universal Viewer)
- Tom Flynn - https://sketchfab.com/nebulousflynn
  (Cultural Heritage Lead, Sketchfab)
- Ronald Haynes - rsh27@cam.ac.uk
  (Computer Officer, University of Cambridge)

What itch are we scratching with the 3D group?

Scratching the 3D itch

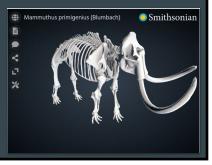
Connecting large & small institutional audiences

- Smithsonian's 3D Program
- Royal Pavilion & Museums

Scratching the 3D itch

Smithsonian's 3D Program

- Explore and reuse millions of digital items from the Smithsonian's collections (2.8 million at February 2020 launch)
- CC0 (waives copyright, do not need to ask permission to use)
- Images (jpg/IIIF)
- 3D (glTF, glb, obj, voyager scenes)
- Metadata (txt, IIIF json, Figshare)



Scratching the 3D itch

Royal Pavilion & Museums

- Managed by Brighton and Hove City Council
- Manages multiple locations
- Commissioned a new collections API using open source CMS and UV to enable sharing
- Close Look wordpress blog 400% increase
- Very economical to run AWS + Heroku
- Serverless-IIIF Lambda function for image tiling
- Google 3D model-viewer UV extension for glb files
- Metadata for 3D models, embedding/sharing, mostly CC0 open access download

Scratching the 3D itch

Varied 3D Production Workflows

- Production Methods
  - Photogrammetry
  - Laser Scanning
  - Structured Light
  - X-ray CT
  - 3D modelling
- Output formats
  - Mesh
  - Pointclouds
  - Volumetric
- Post production
  - Yes or no?
  - Optimisation?
  - Animation?
- Metadata
- Which axis is up?
- What are the scale units?
- Where is the pivot?
- Open Access
  - Copyright
  - Licensing

Scratching the 3D itch

Parallel Investigation - *working with related, natural partner groups, e.g.:*

- CS3DP - Community Standards for 3D Data Preservation
- Digital Preservation Coalition - considerations for data sustainability
- Europeana Task Force on 3D Content
  - final report, review article
- Developing project work between IIIF and Europeana partners
  - to improve integration, interoperability of 3D content
    - *see*: EuropeanaTech Insight magazine - Issue 14: 3D

Scratching the 3D itch

3D Viewers & File Formats

- 3DHop, X3D, Sketchfab, Smithsonian Voyager, Aleph, Google Model-Viewer/Poly, Universal Viewer (model-viewer, Aleph)
- OBJ, PLY, STL, GLTF/GLB, USDZ, X3D, DICOM, NXS
- Everyone is 'rolling their own' but community has a need to avoid 'lock in' + create alliances, consensus
- Multiresolution (NXS, GLTF LOD)
- Annotation interoperability (model-viewer/Aleph, Voyager, others?)
- No agreed IIIF json manifest format yet

tinyurl.com/IIIF3Dworkflows

Scratching the 3D itch

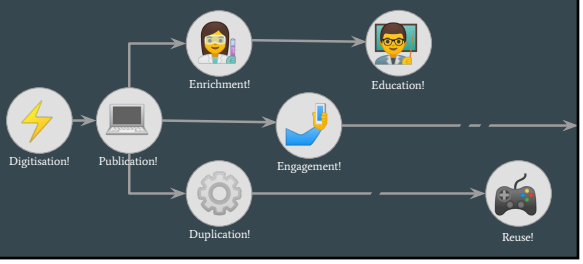
Note on W3C browser standards

- Web3D and X3D
  - extensible 3D (X3D), for interactive 3D models on the Web
  - royalty-free open standard for publishing, viewing, printing, archiving
  - ISO standard, 3rd-generation, direct superset of VRML

- WebXR
  - W3C Immersive Web Working Group - bringing 'high-performance Virtual Reality (VR) and Augmented Reality (AR) (collectively ... XR) to the open Web via APIs to interact with XR devices and sensors in browsers'
  - WebXR Device API - support for accessing [XR] devices, including sensors and head-mounted displays, on the Web

WebXR

A Vision of Interoperability



The current state of IIIF 3D

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The Charter: "A IIIF 3D Community Group provides an opportunity for institutions interested in interoperability to coordinate strategies and facilitate conversations about open standards that support 3D use cases."

- Genesis of the project - IIIF Conference Rome (2017)
- Formed in 2018 - Stu Snydman (Stanford) & Ed Silverton (Mnemoscene)
- Monthly community calls, group meetings / breakouts at IIIF conferences - Washington DC (2018), Göttingen (2019), Online 2020

The current state of IIIF 3D

2Culture Associates
Archaeology Data Service, UK
Art Institute of Chicago
Asian Art Museum of San Francisco
Bavarian State Library
Bowdoin College Museum of Art
British Library
Brown University
Cambridge University
Cambridge University Library
Canadiana Project (Ottawa)
carare.eu
Corning Museum of Glass
Cultural Heritage Imaging
Digirati
Direct Dimensions
eCampusOntario
Finnish National Library
Folger Shakespeare Library
Frame Factory GmbH
Fraunhofer IGD
German National Library of Science and Technology
Google
Harvard Library / Imaging Services
Historic Environment Scotland
Holocaust Museum
i2CAT Foundation
iDigBio
Image Science Associates
Indiana University
Indiana University Purdue University Indianapolis
Intranda GmbH
Istituto di Scienza e Tecnologie dell'Informazione
J. Paul Getty Trust
JPMorgan
KShell Analysis
LCE architects
Library of Congress
Los Angeles County Museum of Art
Merge Labs
Metropolitan Museum of Art
Minneapolis Institute of Art
Mnemoscene
MorphoSource
Mozilla Hubs
NASA Goddard Library / Goddard Space Flight Center
National Gallery of Art, US
Obama Foundation
Osher Map Library
Pennsylvania State University
Performant Software Solutions
Philadelphia Museum of Art
Princeton University Library
ResCarta Foundation
Science Museum Group
Simmons University
Sketchfab
Smithsonian Institution
Stanford
StoryFutures Academy
Storythings
Texas A&M University
Texas Tech University
The Arc/k Project
The New York Public Library
The Walt Disney Archives
Thermo Fisher Scientific
University of Virginia Institute for Advanced Technology in the Humanities
University of California, Los Angeles
University of California, Santa Cruz
University of Connecticut
University of Edinburgh
University of Ferrara
University of Illinois Urbana Champaign
University of Iowa
University of Kentucky
University of Oklahoma Library
University of the Pacific
University of Virginia
University of Virginia Library
Vatican Museums
Victoria & Albert Museum
Washington University in St. Louis
Web3D Consortium
Yale Center of British Art
Yale University Library

IIIF 3D - Complexities & Challenges

Some themes, functionalities identified in the group so far ...

- **Can I show 3D objects via IIIF today?**
  - ... with interoperable annotations?
  - ... with IIIF 2D shown together with 3D objects?
- **Which units and resolutions, scaling and orientation options are needed?**
- **What options are best for painting, lighting, and navigation?**
  - ... are special rendering, LOD (level of detail) options required?
- **File formats - how many types, features are needed?**
  - ... for individual models, composite scenes, LOD (linked open data)?
  - ... which are optimal for open web, interoperability, preservation?
  - ... which are best for VR, AR, WebXR (extended reality)?
- **What metadata are needed for an object - any emerging examples?**
- **What could a 3D manifest look like?**

A way forward: User Stories

A way forward: User Stories

User Stories

- "Simplest possible expression of a piece of functionality"
  - Ed, e.g. 'A preferred view.'
- User stories are system requirements often expressed as "persona + need + purpose." - tinyurl.com/AtlassianUserStories

A way forward: User Stories

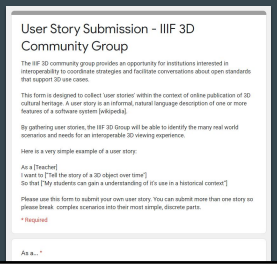
Submit your user stories using this handy form!

tinyurl.com/IIIF3Dstories

Only 3 questions!

- "As a..."
- "I want to...."
- "So that..."

... update in future 3D Group calls


User Story Submission - IIIF 3D Community Group

The IIIF 3D community group provides an opportunity for institutions interested in interoperability to coordinate strategies and facilitate conversations about open standards that support 3D use cases.

This form is designed to collect 'user stories' within the context of online publication of 3D cultural heritage. A user story is an informal, natural language description of one or more features of a software system [wikipedia].

By gathering user stories, the IIIF 3D Group will be able to identify the many real world scenarios and needs for an interoperable 3D viewing experience.

Here is a very simple example of a user story:

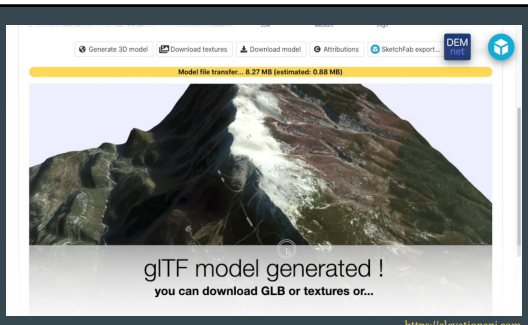
As a [Teacher]
I want to ["tell the story of a 3D object over time"]
So that ["My students can gain a understanding of it's use in a historical context"]

Please use this form to submit your own user story. You can submit more than one story so please break complex scenarios into their most simple, discrete parts.

* Required

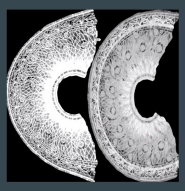
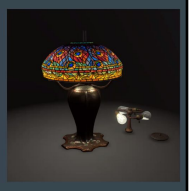
As a... *

Gallery - sample presentations



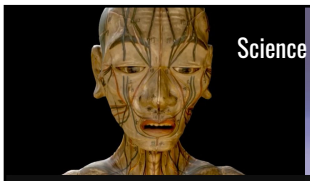
https://elevationapi.com

Cleveland Museum of Art - *Tiffany Lamp*

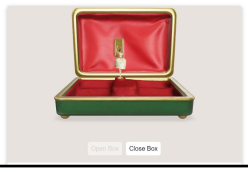



https://skfb.ly/6RoVI

Science Museum

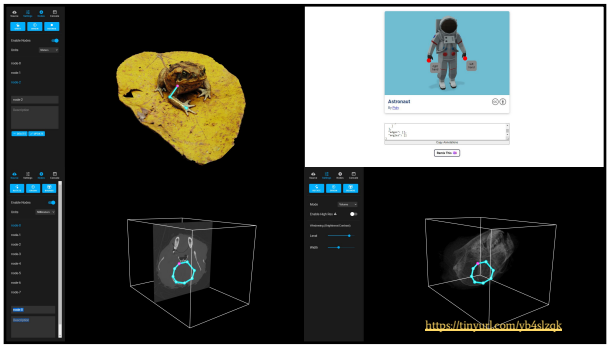


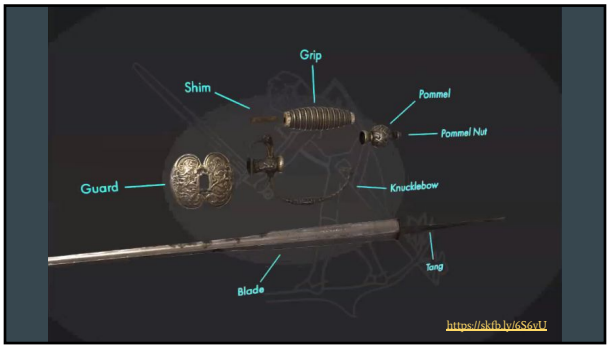
Animated Models

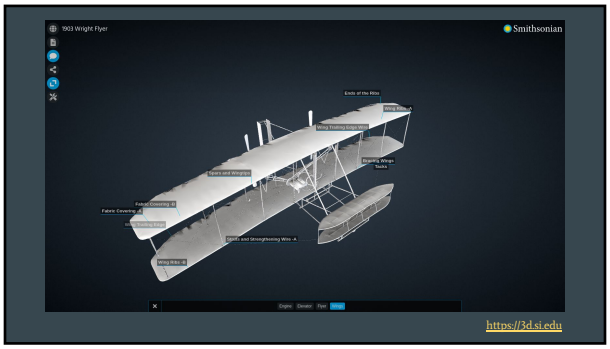


http://musicbox3d.glitch.me/

Annotation & Interaction

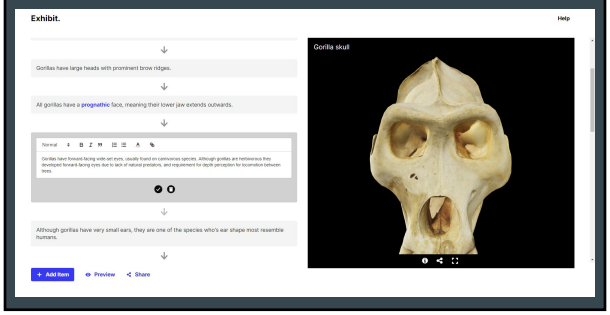






https://3d.si.edu

Exhibit.so



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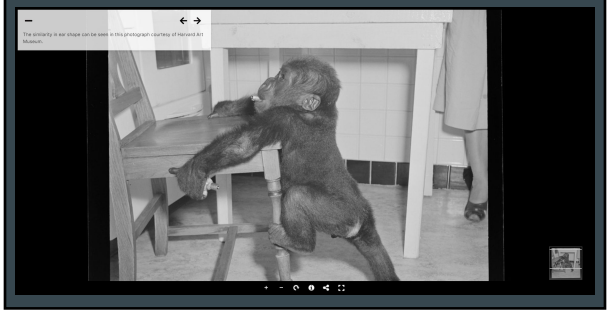

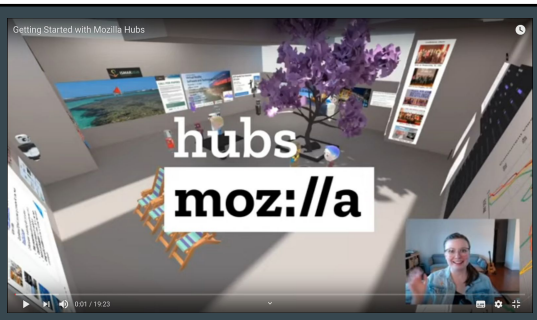

https://youtu.be/5OnOxywcbEQ & https://hubs.mozilla.com

2D images & video, 3D models – Viewer interactions!

Creating a WebXR Exhibition using Mozilla Hubs - Sophie Dixon, Mnemoscene

https://medium.com/mnemoscene/creating-a-webxr-exhibition-for-games-designers-students-85c457dabcf8

Actions & Invitations

Wikimedia Commons & IIIF Discussions

Discussions with Wikimedia Foundation, IIIF, partners – potential for:

- Wikimedia Commons – embeddable media viewer, free IIIF hosting?
  - https://www.mediawiki.org/wiki/Talk:Core_Platform_Team/Initiatives/IIIF_API
- Related open source IIIF & Wikimedia project – National Library of Wales
  - An introduction to the Madoc Platform – Stephen, digirati-ch https://medium.com/digirati-ch/an-introduction-to-the-madoc-platform-af516a67e0

Further Questions - *about viewing 3D …*

- **Do we need to view 3D objects inside other models (e.g. model nesting)?**
  - *Will viewers permit interaction among models placed within larger models (rooms, buildings)?*
- **Will viewers enable model viewing across repositories/platforms?**
  - *What annotations, metadata will be needed to migrate models between repositories?*
- **What set of Persistent IDs (PIDs) can track components & whole models?**
  - *How will we tag variations of models, or combine parts to form larger models?*

… factors for future interoperability, sustainability for models & collections

IIIF 3D Viewer Comparison Project

Viewing Complexity & Quality – *review of online 3D viewers:*

- Initially gathering basics - how 3D files are stored, delivered, displayed
- 3D file to be displayed - noting result, how it is achieved in each viewer
- 3D viewer representatives - shared sample model, shown in their viewer, summarising process to display

Following feedback, discussion, planning to look at specific features (e.g. camera position, annotations, interoperability, etc.).

3D Community – Invitations

- 3D User Stories — tinyurl.com/IIIF3Dstories
- 3D Workflows — tinyurl.com/IIIF3Dworkflows
- 3D Viewer Comparison — *… updates in due course*

Join the group! – *iiif.io/community/groups/3d*