**Jenny’s group**

**a. What important discovery functions do you need? In what ways do 3D/VR products need to be searchable and retrievable for you, your institution, or others? Who do you expect will be searching and how will they be searching.**

-Look at past metadata as the building blocks to building one for 3D/VR---Who do we want to expand it to? How do we query future stakeholders?

-Controlled vocabulary-if you can search on expanded metadata you can pull from all sources

-Annotations-Embedding vs side-car- put in as much as is practical “basics”-can be related back forever, technical metadata

VR experiences have to be searchable/K-12 lesson plans

**b. What metadata schemas and tools are required in 3D/VR production workflows?**

-Document the history of how the mesh was derived--3D validation tool-looked at the value of vertices of the mesh

-workflow tool for production-Version Control

**c. What core metadata fields are necessary for your work?**

Looking at existing framework and do a gap analysis—CIDOC terms—Web3D constortium -searches across multiple collections

Granularity issue-

-Product specific info file (session file)

**d. How can 3D/VR production processes  
integrate metadata from existing sources?**

-Command history,scanner tools, post-processing

Cult Lab 3D<http://www.cultlab3d.de/>

**e. How do we enable search and discovery across multiple collections?**

Use CIDOC to guide and build our core metadata fields-National Museum of Netherlands<http://www.cidoc-crm.org/>

Search by shape <http://shape.cs.princeton.edu/search.html>

**f. Compared with current search tools  
for 3D/VR products, where do we need to be in 5 years?**

-Interoperability-NIH print exchange 3dprint.nih.gov

-Can I even run the proprietary VR experiences/ stuff in 5 years? Most likely not-

Network-Advocacy-“best practice”

ISOX3D

Natural language search…. Ontologies?

<http://3d-coform.eu/>

**Nathan’s Group**

* 1. **What important discovery functions do you need? In what ways do 3D/VR products need to be searchable and retrievable for you, your institution, or others? Who do you expect will be searching and how will they be searching.**

For non-profit, users are academia, researchers, educators. Data are crowd-sourced, plus professionally developed. So there are lots of missing data fields. Looking for solution to visual-based search where you can see components.

*Want a Gradient for how trustworthy data is based on source and quality of documentation.*

For scientific specimens, using scientific taxonomies of plant specimens, or extinct animals is great for scientists, but limits usability of collections for non-scientists. Or being able to show how bone fragments fit into similar animal’s skeleton

Characterizations of the deposit. - need to be able to describe the context of the site. A lot of this would be applied in linked data.

Rich experience and description and accessibility is important for public, which ultimately funds all this.

FAIR - findable, accessible, interoperable, reusable

* 1. **What metadata schemas and tools are required in 3D/VR production workflows?**

*“3D / VR lots of specialized metadata, but how much of that specialized metadata actually needs to be indexed? You need the transparency, but for average user, they might want to find 3D model, but don’t care about modality, unless they’re a researcher”*

Start with Dublin Core and work way out from there.

Darwin Core, Audubon Core, paleo core

-CIDOC CRM for cultural heritage(?)

<http://jennriley.com/metadatamap/seeingstandards.pdf>

Metadata examples:

ImageName

Yresolution

LightSource

ResolutionUnit

Compression

Sharpness

ExposureMode

Flash

SceneCaptureType

DateTime

BrightnessValue

PhotometricInterpretation

YcbCrPositioning

Xresolution

LensSpecification

ImageUniqueID

ExposureBiasValue

Saturation

RelatedImageWidth

ExposureProgram

FocalLengthIn35mmFilm

ShutterSpeedValue

ColorSpace

Contrast

ExifImageWidth

SpatialFrequencyResponse

DateTimeDigitized

ApertureValue

ImageWidth

ProcessingSoftware

LensModel

FocalPlaneYResolution

SubjectDistanceRange

WhiteBalance

CompressedBitsPerPixel

ReferenceBlackWhite

SensingMethod

Fnumber

DateTimeOriginal

Artist

FocalLength|

SubsecTimeOriginal

BitsPerSample

FocalPlaneXResolution

Software

ExifImageHeight

ImageLength

SubjectDistance

SubsecTimeDigitized

ISOSpeedRatings

Model

GPSInfo

MaxApertureValue

ExposureTime

FocalPlaneResolutionUnit

SubsecTime

Orientation

RelatedImageLength

ExifInteroperabilityOffset

Make

PrintImageMatching

FlashPixVersion

SamplesPerPixel

XPAuthor

ExposureIndex

GainControl

MeteringMode

DigitalZoomRatio

SubjectLocation

ExifVersion

Copyright

HostComputer

UserComment

BodySerialNumber

ImageDescription

ExifOffset

CFAPattern

MakerNote

FileSource

SceneType

CustomRendered

ComponentsConfiguration

JpegIFOffset

JpegIFByteCount

* 1. **What core metadata fields are necessary for your work?**

Rightsstatement.org

* 1. **How can 3D/VR production processes integrate metadata from existing sources?**
  2. **How do we enable search and discovery across multiple collections?**

Aggregator, SHARE project, OAI-PMH

Biodiversity community has tool Integrated Publishing Toolkit. Similar to PMH, pushes out a feed.

* 1. **Compared with current search tools for 3D/VR products, where do we need to be in 5 years?**

“Standards are like toothbrushes. Everyone thinks they’re a good idea, but no one wants to use anyone else’s”

Adoption of standards by 3D data creators,

**Robert-Group on Metadata Questions -**

**Day 2 March 2, 2018 - 9:30-10:30 - Metadata QUestions**

Group Members: JArrod (Creaform) - Kristy (UCSB) - Doug (Duke) - Ed (Duke) - Benjamin (VTRC) - Robert

* 1. What important discovery functions do you need? In what ways do 3D/VR products need to be searchable and retrievable for you, your institution, or others? Who do you expect will be searching and how will they be searching.

Discussed how Creaform scanning so that he would add to sketchfab and be searchable -

In Morphosource must show scanner make and model and scanning lab

Ghostscan is analagous to RTech Spider -

Items to search on

1. Scanner Make Model and Manufacturere
2. Scan Facility
3. Resolution (Morphsource)
4. Modality (structured light or photogrammetry)
5. Location (object held) - linked open data location name
   1. Where it was scanned
   2. Where is it held
   3. Where is origination
6. Software version
7. Resolution
8. Need real locations for map GPS Measurement or other
9. TIme period context

Example - know that archeological dig happened and want to find all 3D scans from that dig -

Defining a standard here that is not created yet - need to see how this lays out with a current 3D model -

* 1. What metadata schemas and tools are required in 3D/VR production workflows?

What types of metadata are needed for use in archeological site?

* Important metadata fields describing physical objects from archeological dig - trench no and other arch specific metadata
* Doug - Is the model the right size campared to the physical object - a bounding box with a measurement would be a good calibration tool for 3D models
* Loading same file into geomagic, avizo (CT),
  1. What core metadata fields are necessary for your work?
  2. How can 3D/VR production processes integrate metadata from existing sources?
  3. How do we enable search and discovery across multiple collections?
  4. Compared with current search tools for 3D/VR products, where do we need to be in 5 years?

Search across multiple collections - pull these into single browser and have collections that are usable across systems -

Metadata aggregators

**Zack’s Group**

Question A and E. How do we enable search and discovery across multiple collections?

Liz: Need some sort of search across databases/systems.

Carla: Searchability: Too 3D-centric perspective. Searching on a topic, restrict search to types of material.

Liz: Depends on the research needs.

Carla: A user wants to find information about the thing they’re interested in, not necessarily a specific format.

Jon: What is the existing infrastructure, and how to integrate 3D into that? What would those platforms be?

Zack: how about DPLA?

Carla: Closest thing, conceptually, Europeana aggregates in that way. 3D-ICONS project metadata is aggregated in Europeana and links back to 3D-ICONS content. Need to link 3D objects with their real world objects.

Jon: Look for discipline-specific aggregators, like iDigBio.

A.Who do you expect will be searching?

Jon: Develop a persona/use-case in order to design around particular.

Angel: LC only has 3D printing as a subject heading.

Jon: One of the archiving institutions is archiving printouts of 3D data.

Questions B&E:

Carla: International Council of Museums, and IFLA, are now backing Cidoc conceptual model, looking at aggregating; more uptake in European context.

Tools: Carla: CRM-dig > RDF, CHI tools.

Mellon-funded Research Space

Getty-funded arches project: Arches:  (CRM is under the hood) <http://www.getty.edu/conservation/our_projects/field_projects/arches/>

FRBROO conforming to IFLA, ICM; ISO standard. Mapping old stuff.

<https://www.ifla.org/publications/node/11240>

Collections may need to support heritage, science...etc.

Europeana didn’t fully implement this…

How do we contribute?

-be aware of where we are.

-CRM-dig: metadata digital provenance; very clear taxonomy for relating digital to real world objects. Event based model.

-Let’s not reinvent wheel.

Arguments against:

-CRM is too complicated (wrong! The average user shouldn’t have to deal with CRM directly).

-Can’t do what I need. (wrong! You can have them add it to the spec; e.g., developing object/digitalObject distinction; and digitization processes, and added ).

Jon: Production workflow metadata. Developing scan to web pipeline, which uses metadata model to document that pipeline. How applicable to others’ workflows. Flat, basic attribute-value pairs. Evolving. Not using linked data yet. Different needs for different processes. Scanner specs, dates of scanning, link it back to the system that scanned it. Possibly link point clouds with resulting derivatives (web version, low-res, high-res), all have to be linked together as the same digital object.

Carla: That’s where unique identifiers come in. Linking together different kinds of information about the same thing/subject/entity.

Jon: Each dataset and final model gets an ARK, which are linked together in the metadata.

Carla: each image has a uuid, but each set also has its own uuid. Very image set focused.

Jon: In terms of workflow: Born digital and scanned workflows each have special needs, but both produce 3D digital objects.

Carla: Visualizations and reconstructions. Our work is focused on representing things in the real world.

Public Library Context:

Liz: A subset are concerned about how accurate models are.

Educate users on copyright, but haven’t gotten to 3D models yet (3D printer has notice for public to accept).

Important to know what you can use the 3D material for:

DPLA, Europeana, CC:

Rightsstatements.org

URIs

Angel: Where can people go to find digital projects? No common DH directory of digital projects. Where will people want to get access? Through the project, the model,

How to restrict access to information:

Need to hide some metadata in some cases.

**Summary / Takeaways:**

**Discoverability**: Are we taking too much of a 3D-centric perspective? Integrate into existing search systems (user may be searching on topic, rather than format); need to develop personas/use-cases to develop user needs.

-discipline specific aggregators?

-public library context

-Look to work that is being done in European context.

-CIDOC - CRM

**Need to draw on other areas that have dealt with these questions** (e.g., photographs).

Need to think about which part of this problem is a 3D problem, and draw from solutions that already exist out there, model the work based on other community groups.

**Other issues:**

How to properly support culturally-sensitive material?

Tool making is one job / building collections another.