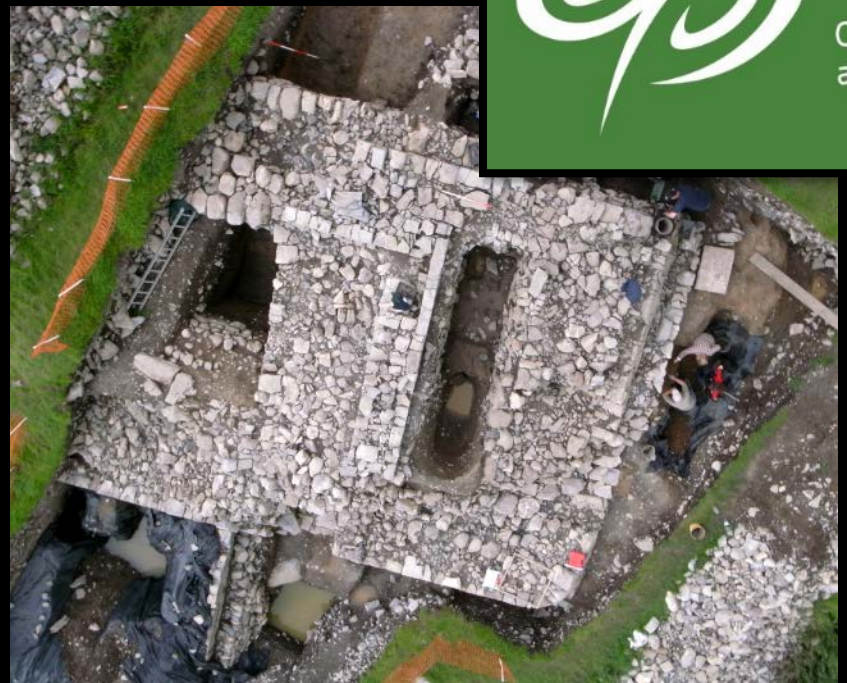
3D-ICONS: ARCHIVING & REUSE

Anthony Corns (Technology Manager)

The Discovery Programme
Centre for Archaeology and Innovation Ireland

The Discovery Programme

Centre for Archaeology and Innovation Ireland



WHY?

Our Cultural Heritage is Finite

CAPTURE

3D-ICONS

3 Years

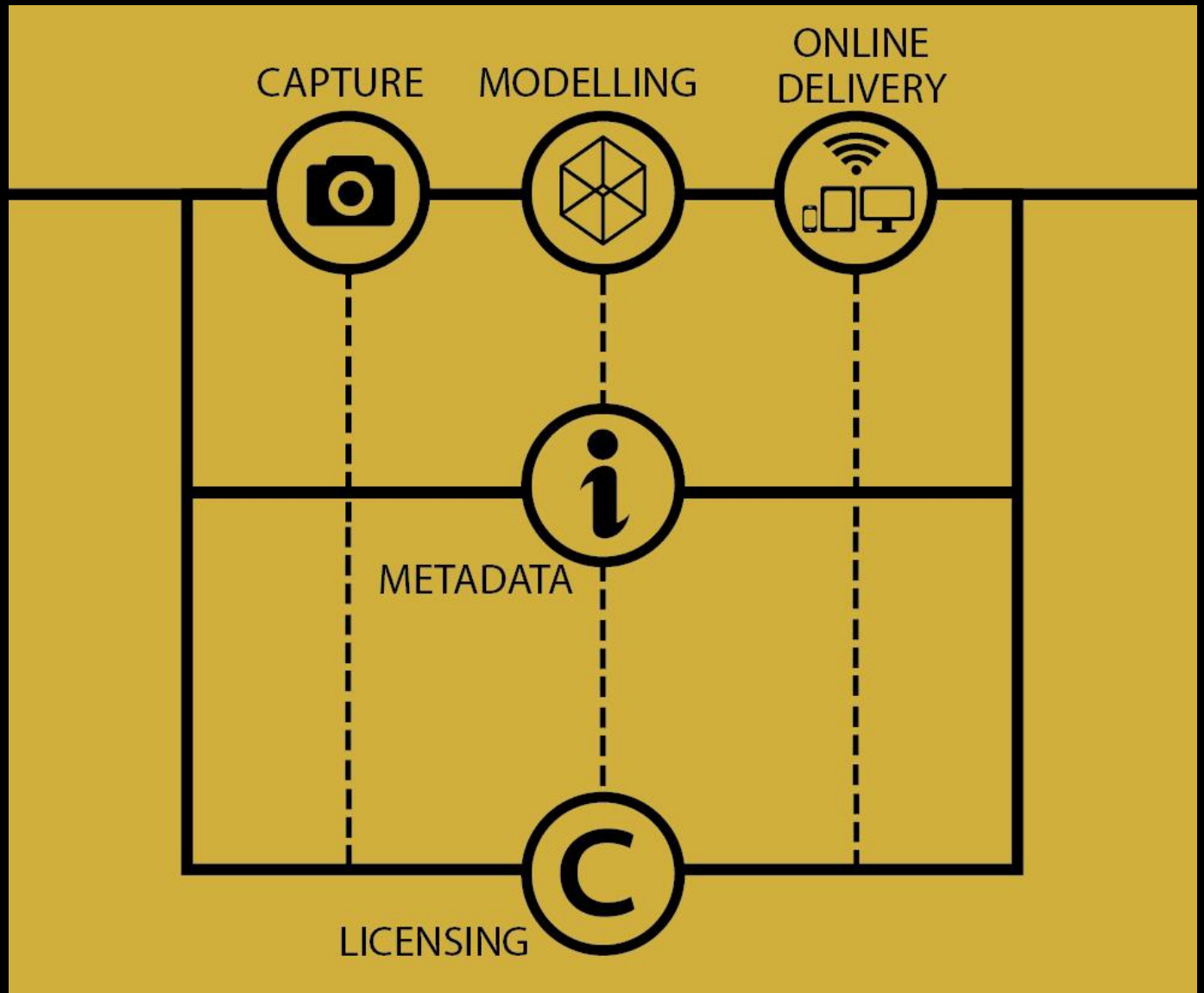
16 Partners

€5 million

4000

objects

Pipeline Development



Capture

Landscape	Structures	Detail
Accuracy 5cm	Accuracy 2mm	Accuracy 0.1mm
Resolution 12cm	Resolution 10mm	Resolution 0.5mm

Capture

Landscape	Structures	Detail
Accuracy 5cm	Accuracy 2mm	Accuracy 0.1mm
Resolution 12cm	Resolution 10mm	Resolution 0.5mm

Capture

Capture

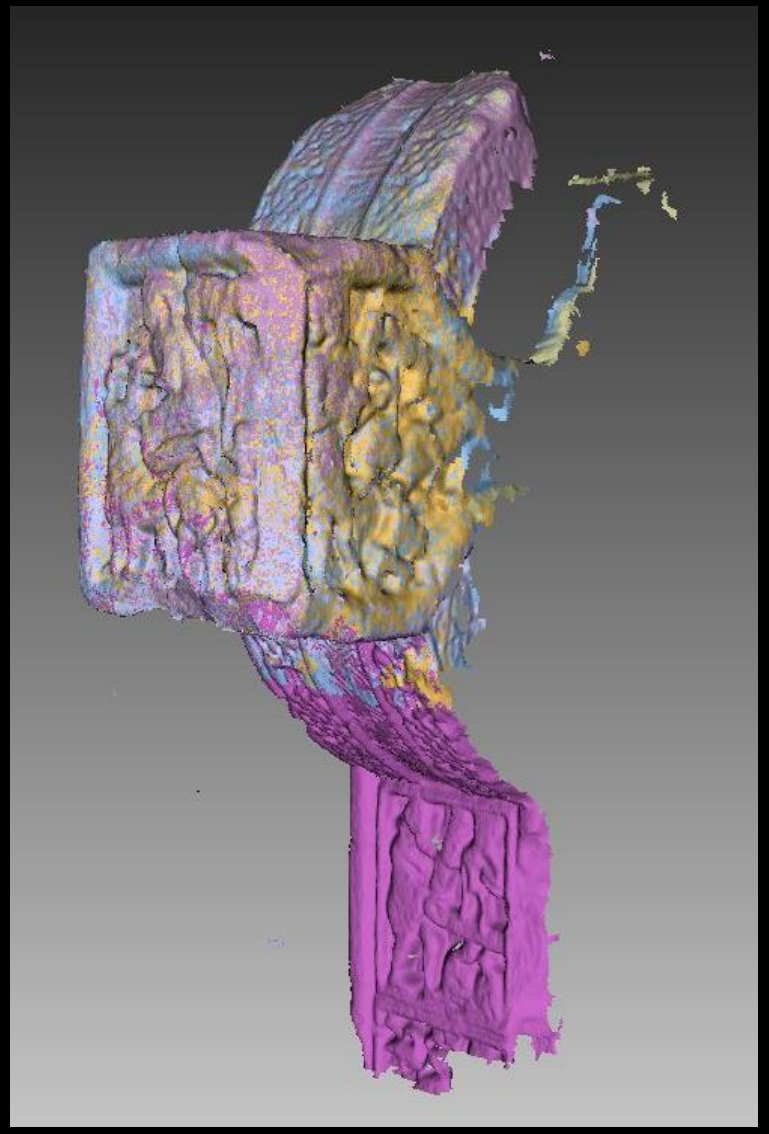
Skellig Michael

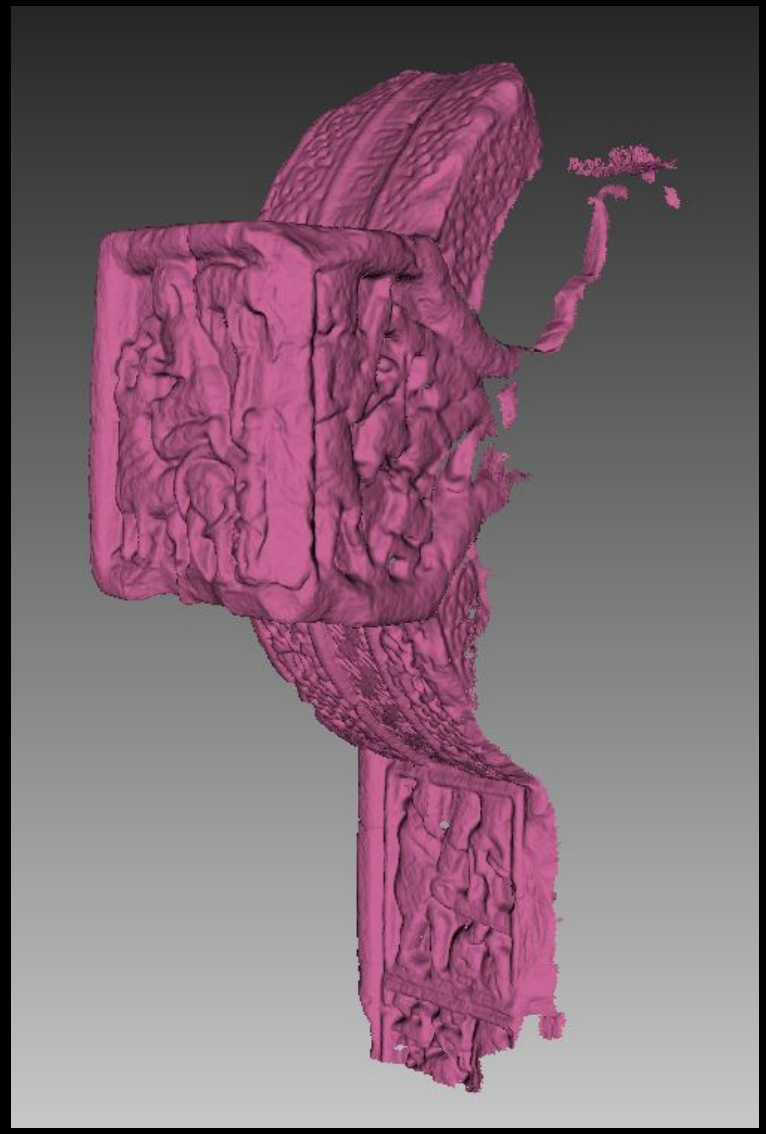
Derry's Walls

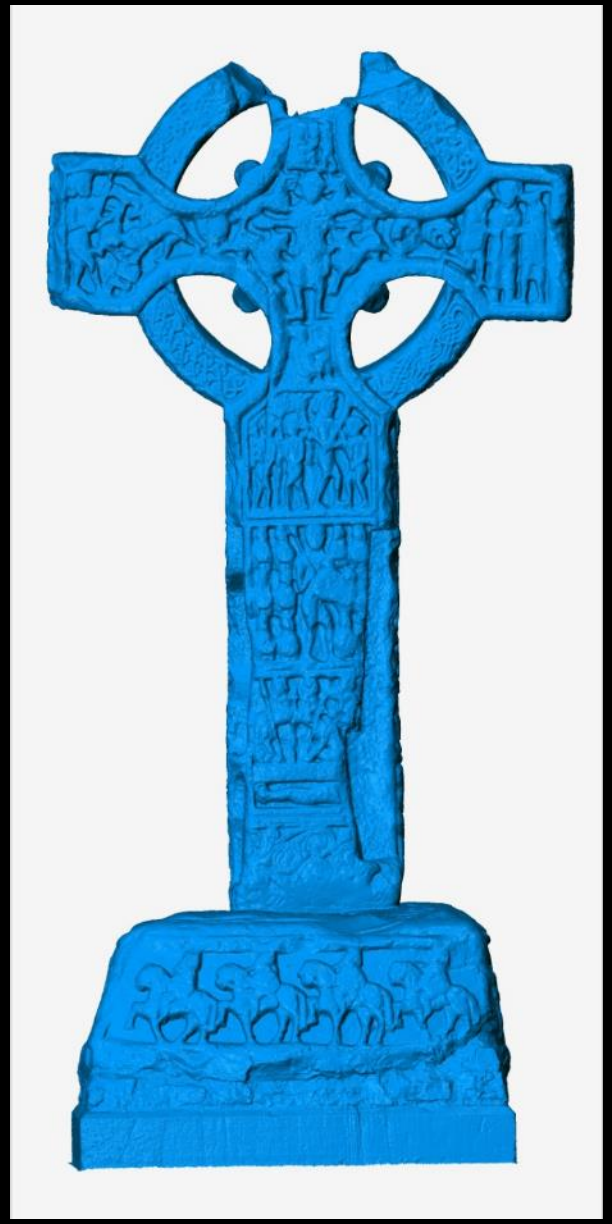
Point Cloud Archiving

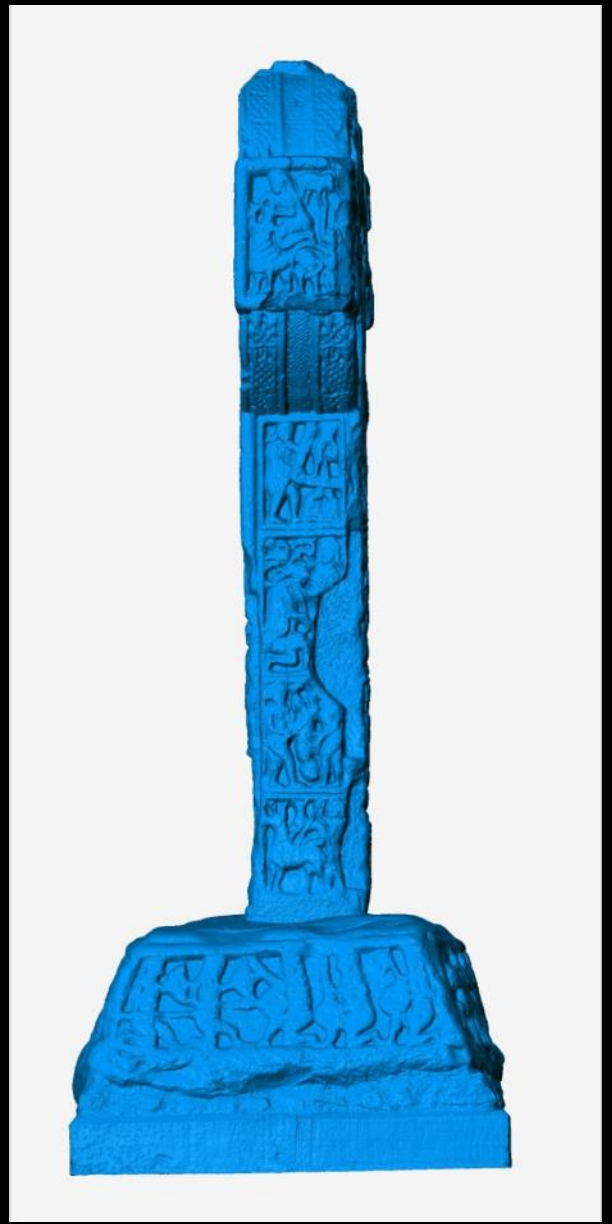
RAW – EACH STATION
REGISTERED
GEOREGISTSERED
CLEANED

NATIVE FORMAT
ASCII (XYZ,RGB,I)





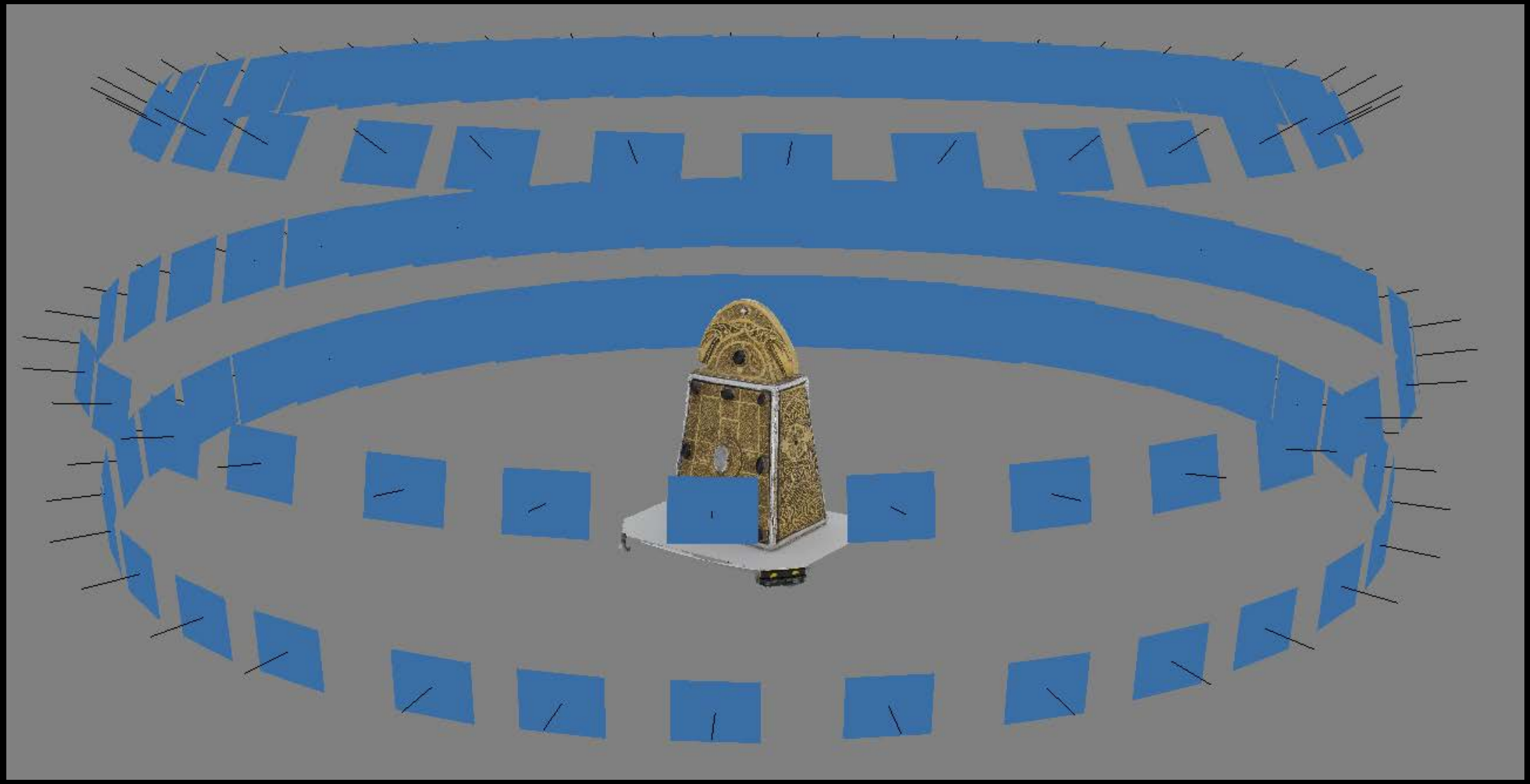




Close Range Data Archiving

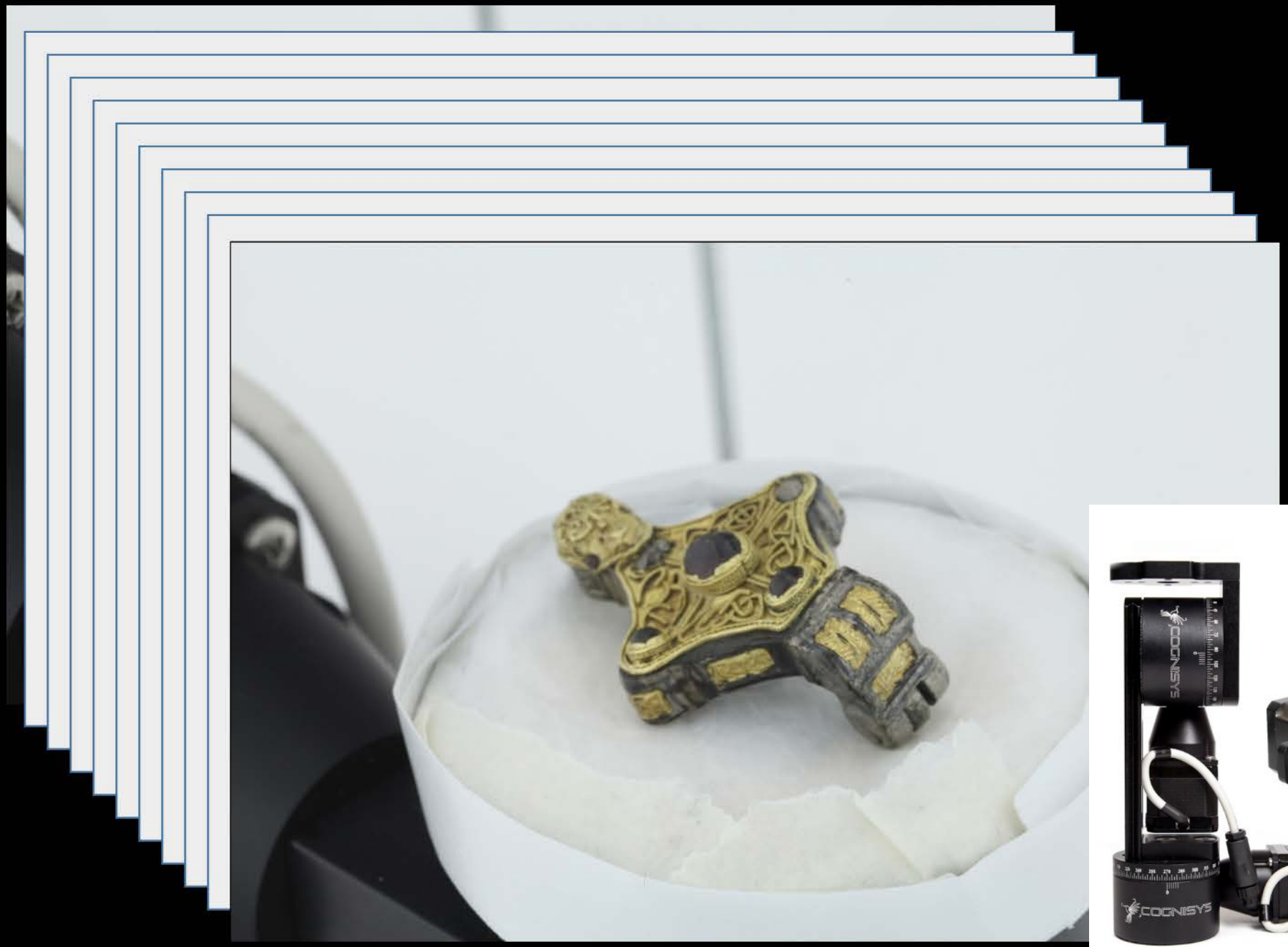
RAW – EACH FRAME
REGISTERED
CLEANED

NATIVE FORMAT
PLY



RTI Image Files

48 Locations per side



COGNISYS
StackShot
CAUTION
PINCH POINT
STACKSHOT 3X
COGNISYS

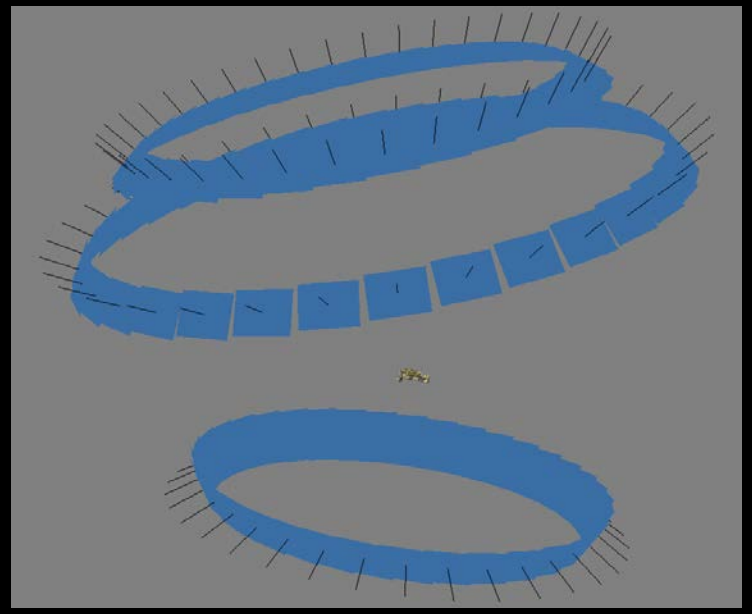


Image Files
108 Locations
10 Shots per Location

MODELLING

Original Faro Focus laser scan survey

Number of points: 212,000,000
Faro format data: 1.48 GB
XYZ export file: 7.5 GB

1 Pointcloud decimated to 1cm resolution

Number of points: 8,600,000
Percent of original < 5%
XYZ export file: 330 MB

2 Meshed in Geomagic Wrap

OBJ export: 17,600,000 polygons
File size 1.34 GB

3 Retopologised low resolution mesh

OBJ export: 200,000 polygons
File size 10.4 MB

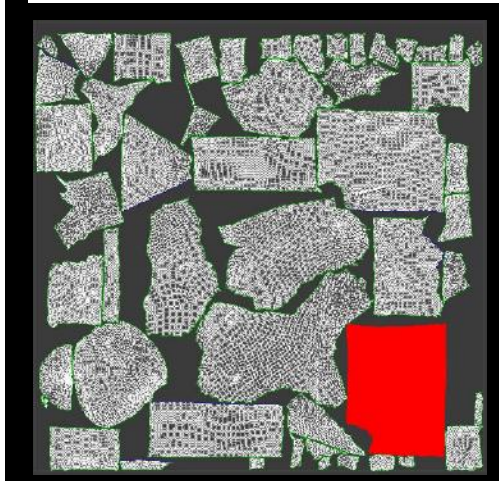
4 UV unwrapping

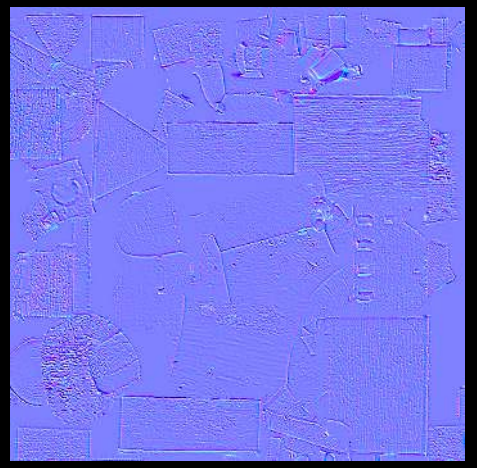
5 UV Normal map

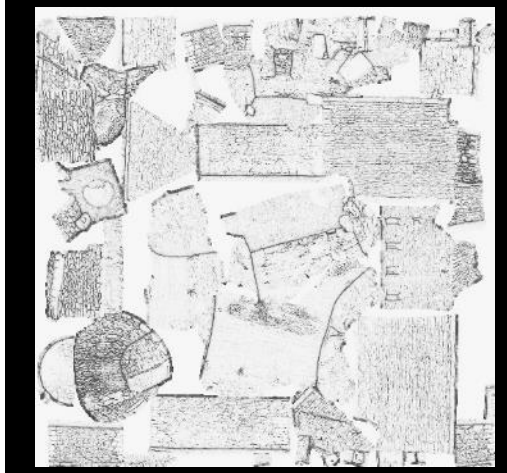
6 UV Global ambiant occlusion (AO) map

7 Texture from MARI 3D

FINAL MODEL - blended texture & AO
20 MB - 0.24% of original







SAVE VIEW

Discovery
ramme
or Irish
logical Research

SAVE VIEW

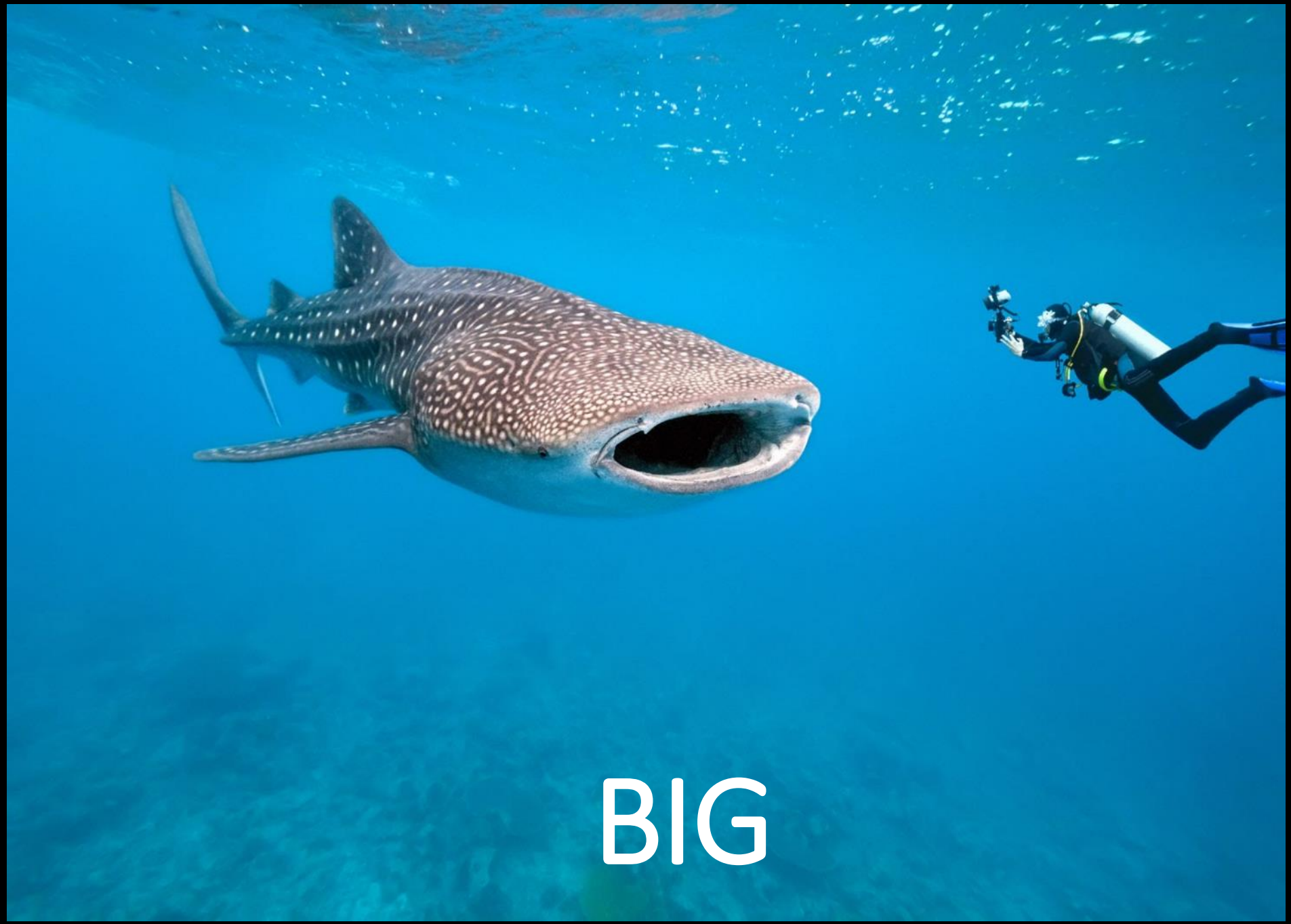
SAVE VIEW

Figure 3

Figure is standing and holding bell and crozier, symbols of abbot's or bishop's authority, perhaps an actual churchman, or Christ as 'Abbot of the World'.

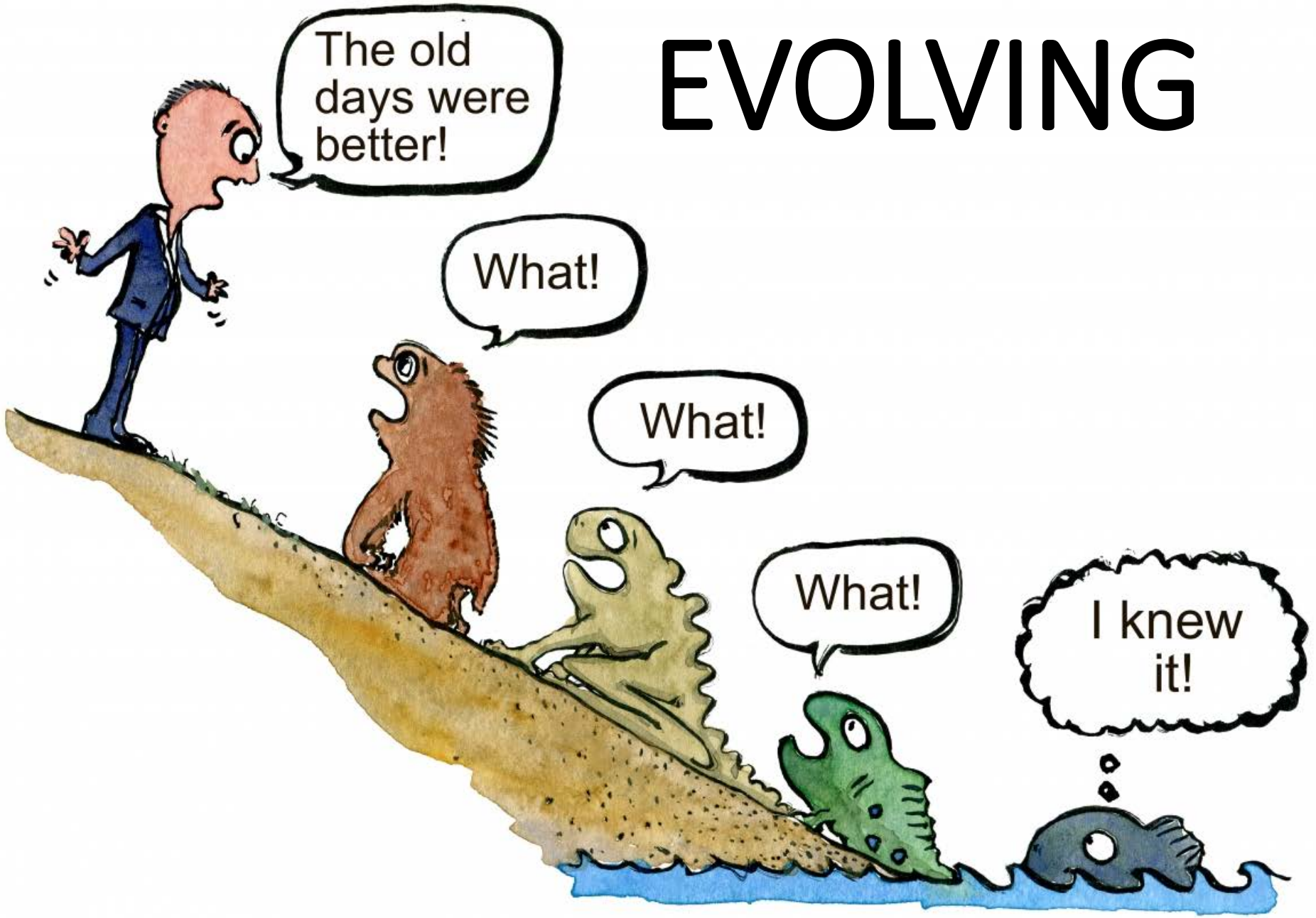
skfb.ly/Cp9t

CHALLANGES


BIG

VARIETY

EVOLVING



By Frits Ahlefeldt

SOFTWARE STACK

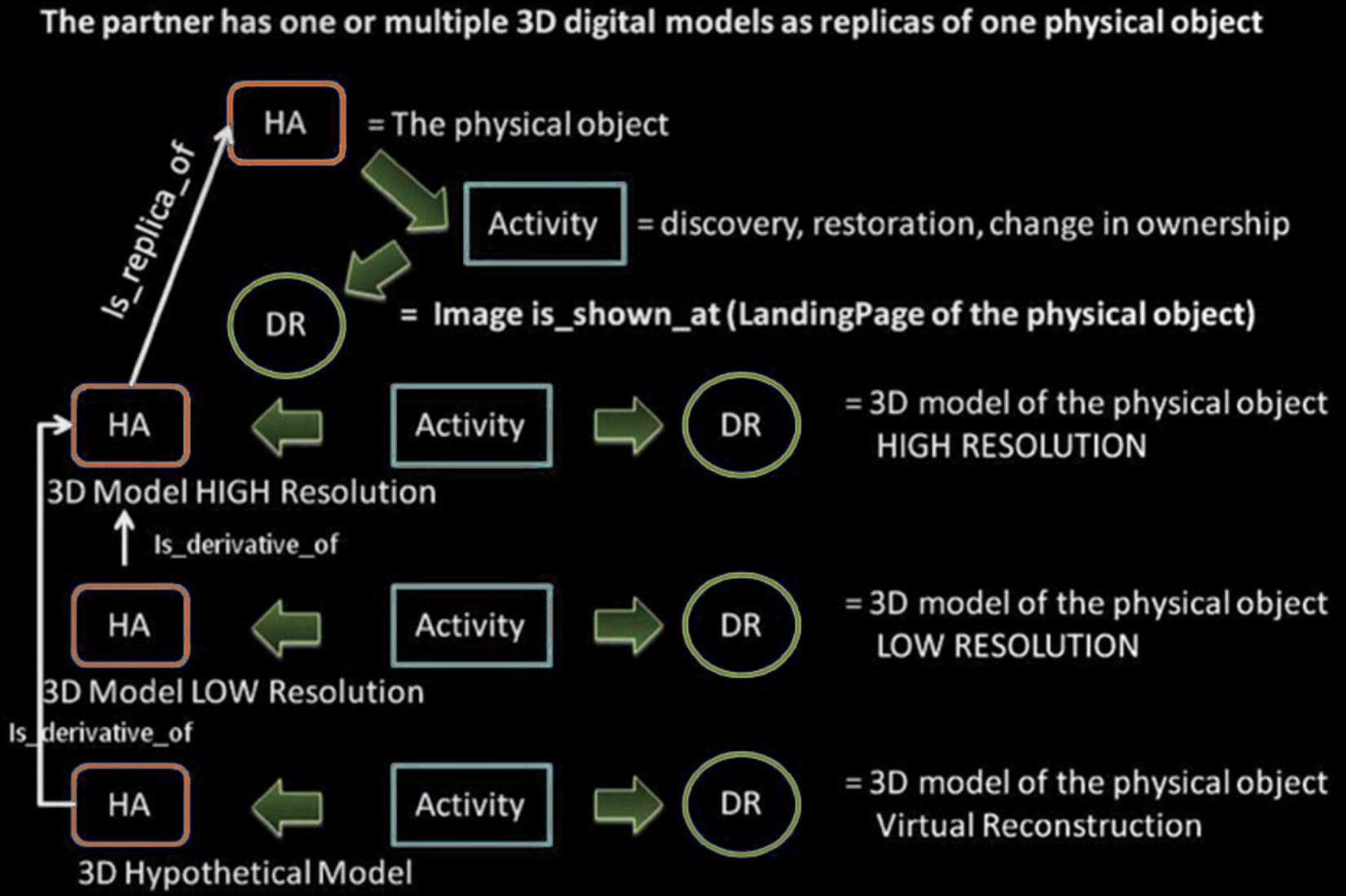
METADATA & IPR

Metadata - CARARE

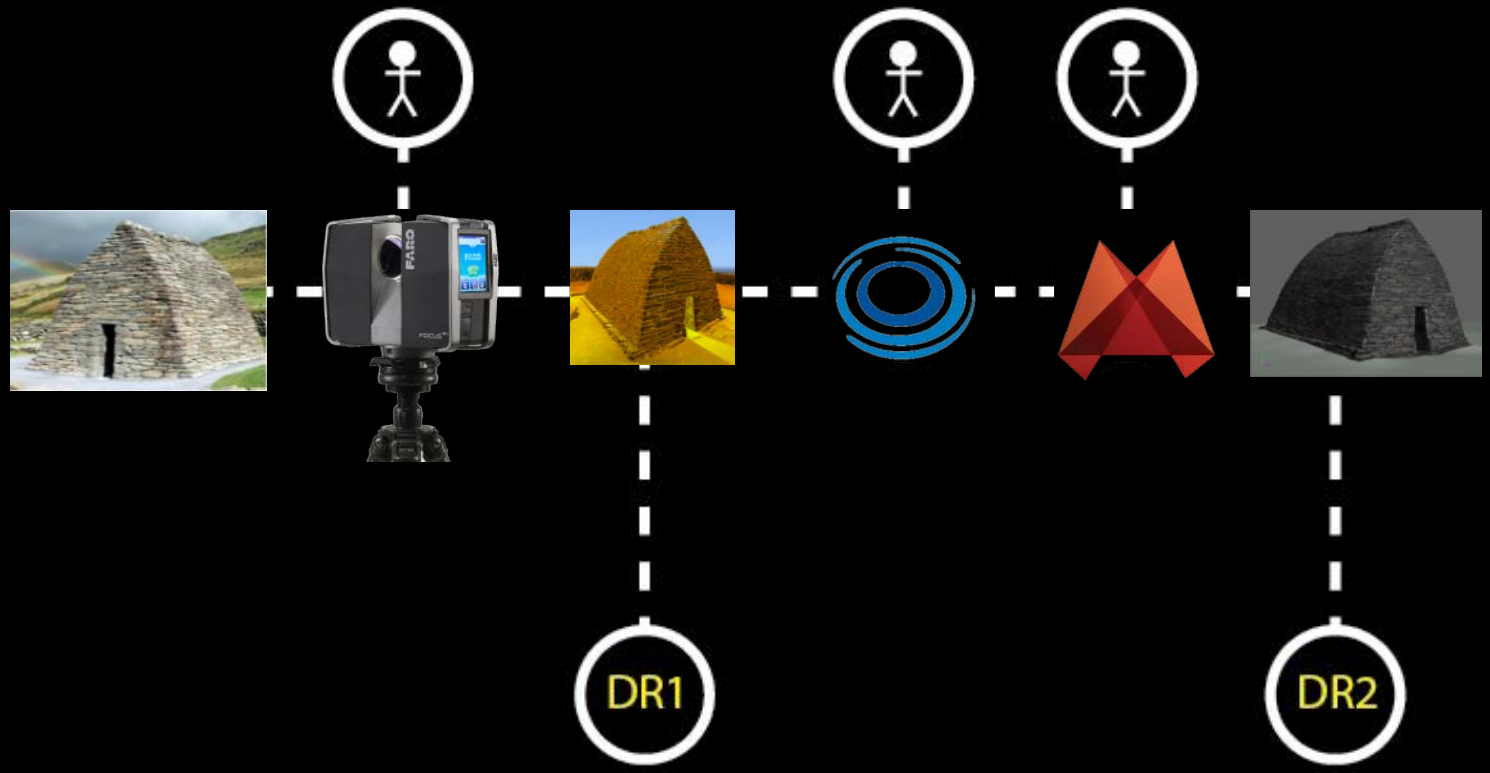
Connecting ARchaeology and ARchitecture in Europeana

1. It describes in detail the artefact or monument which is being modelled in 3D and its provenance
2. It describes in detail the digital representation of artefact or monument and its online location
3. It provides technical information and quality insurance on the processes and methods utilised in the digitisation and modelling of heritage objects
4. It provides information on the access, licensing and reuse of the created 3D models and any associated digital content
5. It enables the search, discovery and reuse of content through the mapping of metadata to aggregators e.g. Europeana Data Model (EDM)

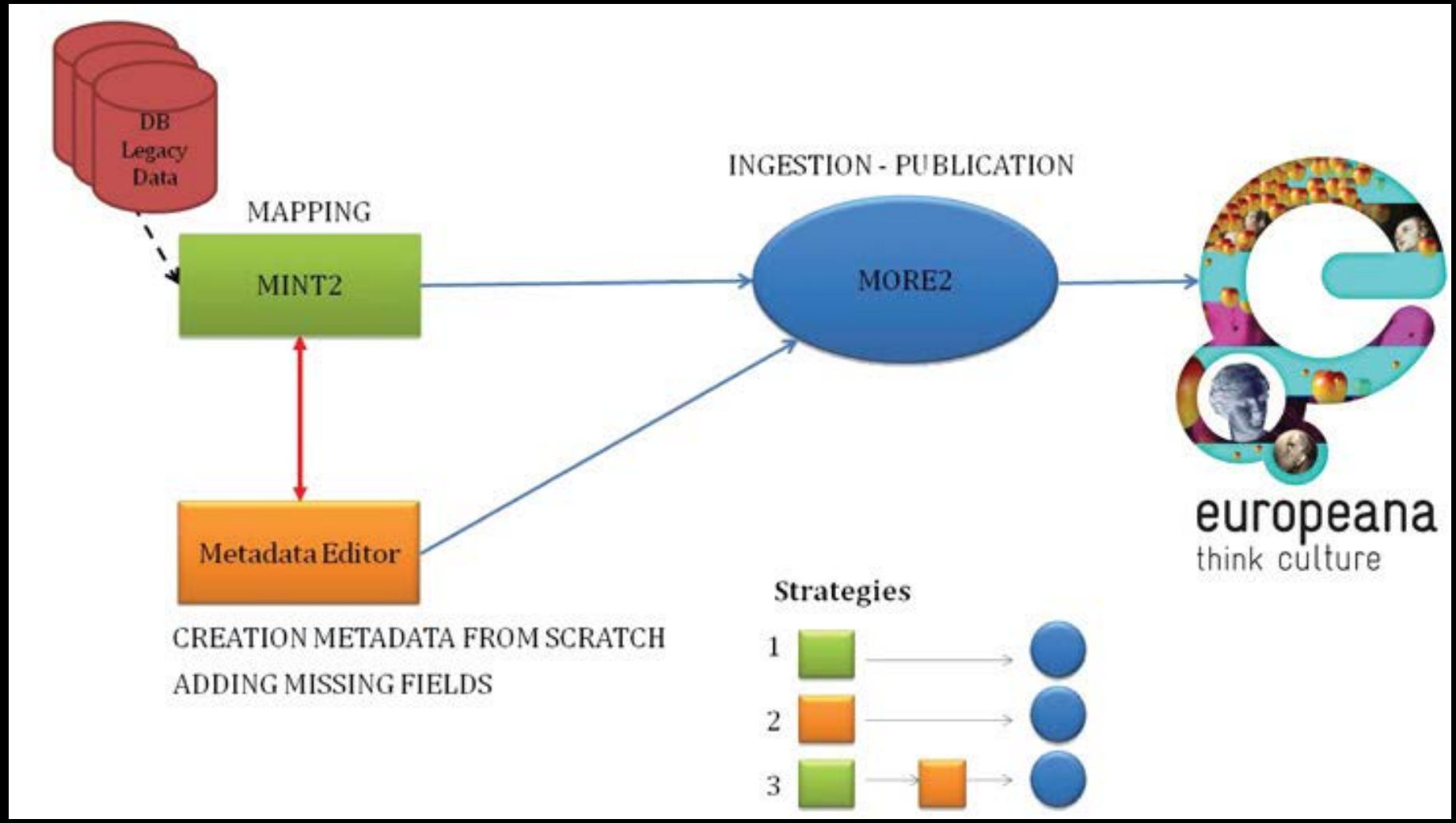
Metadata - CARARE



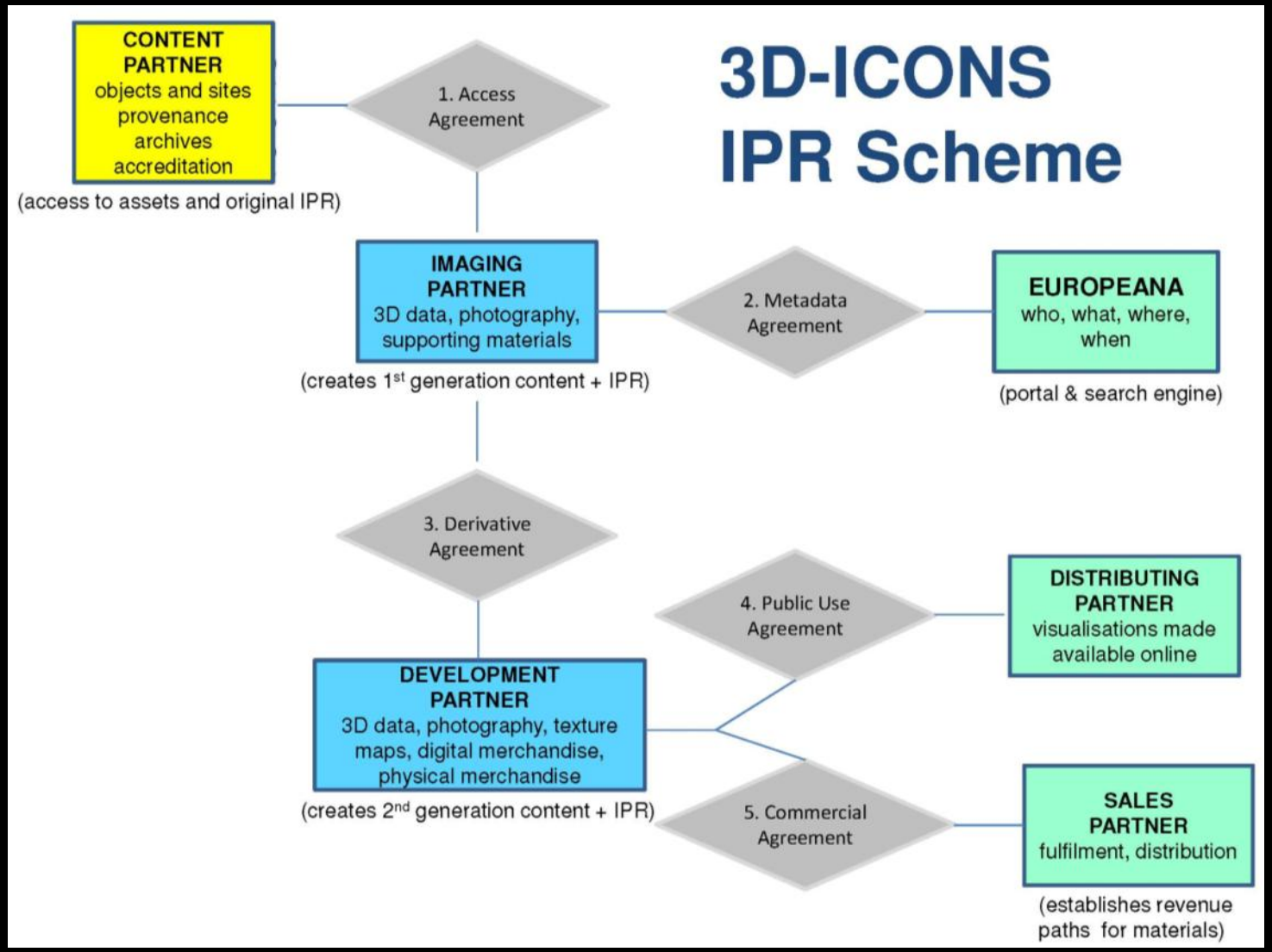
Metadata - CARARE



Metadata - CARARE



Reuse & IPR


3D-ICONS
IPR Scheme
CONTENT PARTNER
objects and sites
provenance
archives
accreditation
(access to assets and original IPR)
1. Access Agreement
IMAGING PARTNER
3D data, photography, supporting materials
(creates 1st generation content + IPR)
2. Metadata Agreement
EUROPEANA
who, what, where, when
(portal & search engine)
3. Derivative Agreement
DEVELOPMENT PARTNER
3D data, photography, texture maps, digital merchandise, physical merchandise
(creates 2nd generation content + IPR)
4. Public Use Agreement
DISTRIBUTING PARTNER
visualisations made available online
5. Commercial Agreement
SALES PARTNER
fulfilment, distribution
(establishes revenue paths for materials)

Activity Chain

1. Selection

INPUT:
A site of significant cultural and heritage interest is proposed.

PROCESS:
Chosen site is organised in to one or more *Entities* representing major areas of interest. Minor features known as *Details* are identified by the Institute*. Off-site *Details* are also reviewed for possible inclusion.
Working in collaboration with the scanning teams, curatorial staff prepare a list of *Entities* and *Details*.

WHO:
Institute.
Scanning Group.

OUTPUT:
List of items chosen for digitization.

2. Assessment

INPUT:
List of *Entities* and *Details*.

PROCESS:
Each *Entity* is assessed by the curator noting condition and any special requirement.
Scanning technicians review the site and recommend an imaging process.
Alternative methods of acquiring *Details* are investigated.

WHO:
Curators.
Imaging Technician.

OUTPUT:
For each *Entity* and *Detail* a program of capture is documented and submitted to the Institute for approval.

3. Acquisition

INPUT:
Approved programs.
Imaging and access schedules.

PROCESS:
Each item is imaged, this may include one or more of:
Photography,
3D Laser Scanning,
3D Projection Scanning.
Researchers compile supporting materials relating to the object and its group.
Each process follows established protocols to guarantee fidelity and is approved by the relevant supervisor.

WHO:
Curators.
Researchers.
Imaging Technicians.
Photographers.

OUTPUT:
Raw 3D data files.
Unprocessed images.
Rough draft supporting materials.

4. Processing

INPUT:
Raw 3D data files.
Unprocessed images.
Rough draft supporting materials.

PROCESS:
Photography is colour balanced.
3D data is processed based on technology.
Supporting material is edited.
Each process follows established protocols to guarantee fidelity and is approved by the relevant supervisor.

WHO:
Curators.
Researchers.
Photographers.
3D Technicians.

OUTPUT:
Approved 3D models with minimal human intervention.
Quality 2D images.
Approved supporting materials.

5. Post-processing

INPUT:
Approved 3D models with minimal human intervention.
Quality 2D images.
Approved supporting materials.
End-user request.

PROCESS:
The approved data is modified depending on the desired purpose of the model.
This may include:
3D post-processing,
2D image adjustment,
Content editing,
Development of interfaces and format.

WHO:
3D Developers.
Software Developers.
Editors.

OUTPUT:
Various outputs, ranging from digital exhibitions, interactive software applications, 3D printing etc. set by the specific end-user request.

7. Commercialization

INPUT:
Market driven request for digital materials.
Digital assets from library.
Budget plan.

PROCESS:
Revenue opportunity identified by sales team.
Library assets utilised to produce commercially viable materials such as merchandising or software applications.

WHO:
Sales and Marketing.
3D Developers.
Software Developers.
Editors.
Product Developers.
Manufacturers.

OUTPUT:
Various outputs, ranging from digital exhibitions, interactive software applications, 3D printing etc.

6. Data Management & IPR

INPUT:
Digital material from each set of the process chain; raw scan data, photography, supporting information, object metadata, process metadata, process logs, etc.

Request for access and subsequent use of data based on suitable CC license. Document outlining the terms relating to access and ownership of the artefact and any derivative materials.

PROCESS:
Secure online document & project management software hosts and tracks all data as it moves between locations.

Agreement established between Institute, Scanning Group and/or Processing Group. Arrangement either as contracted parties or joint venture.

WHO:
Access to the data is open to everyone involved in the pipeline, with read and write restrictions limited by their respective requirements.

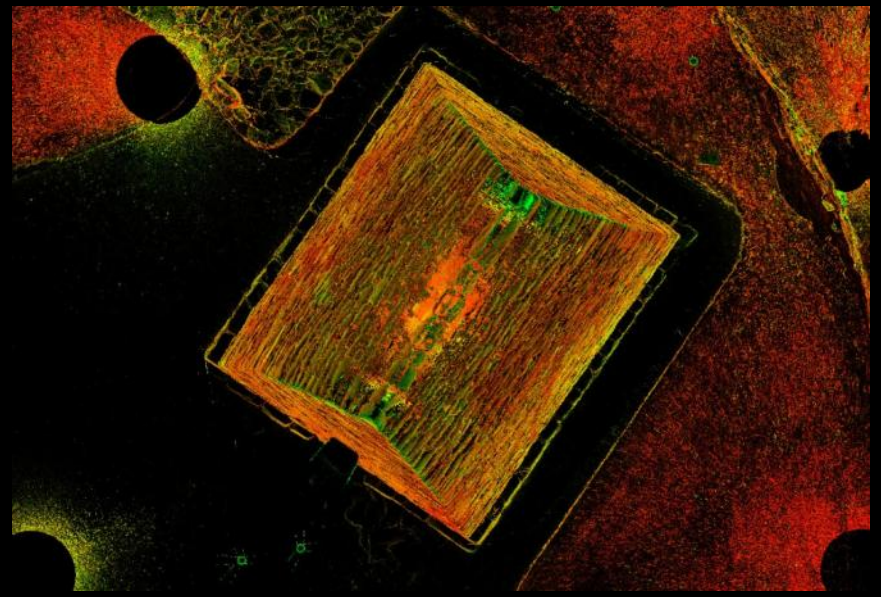
Institute, Scanning Group, Processing Group, Europeana, Other libraries, End Users and Public.

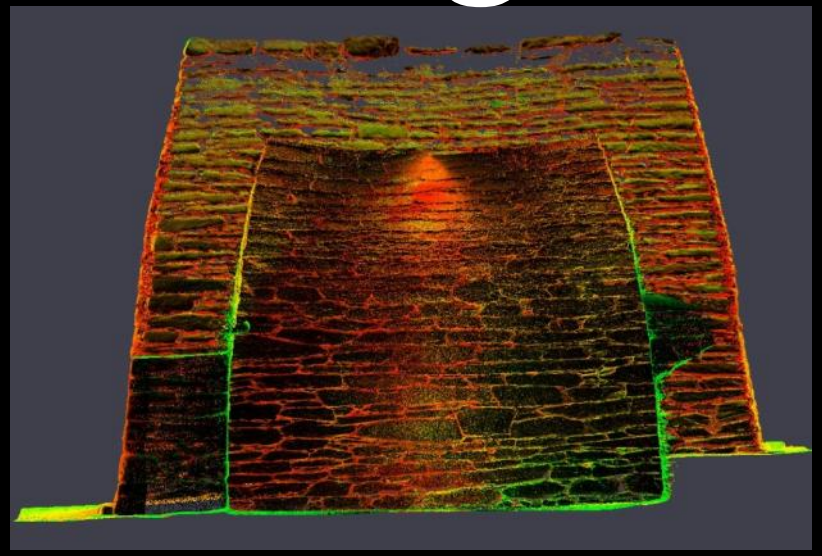
OUTPUT:
Resource management tools for managers, cost and budget plans for finance and efficient version control of all digital assets

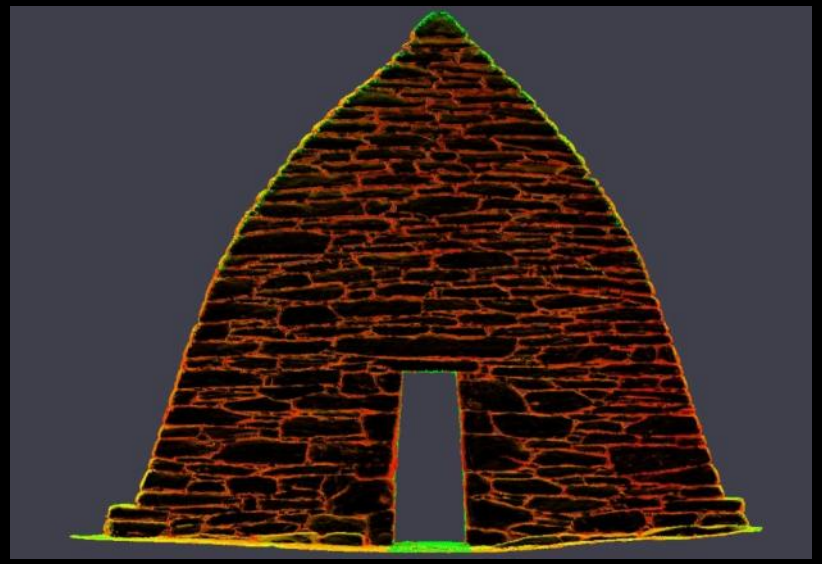
Clear statement of ownership of all levels of derivatives including percentages with regarded to shared royalties citing CC or similar structures. Notes detailing any specific provisions or exceptions.

REUSE

Reuse: Monitoring



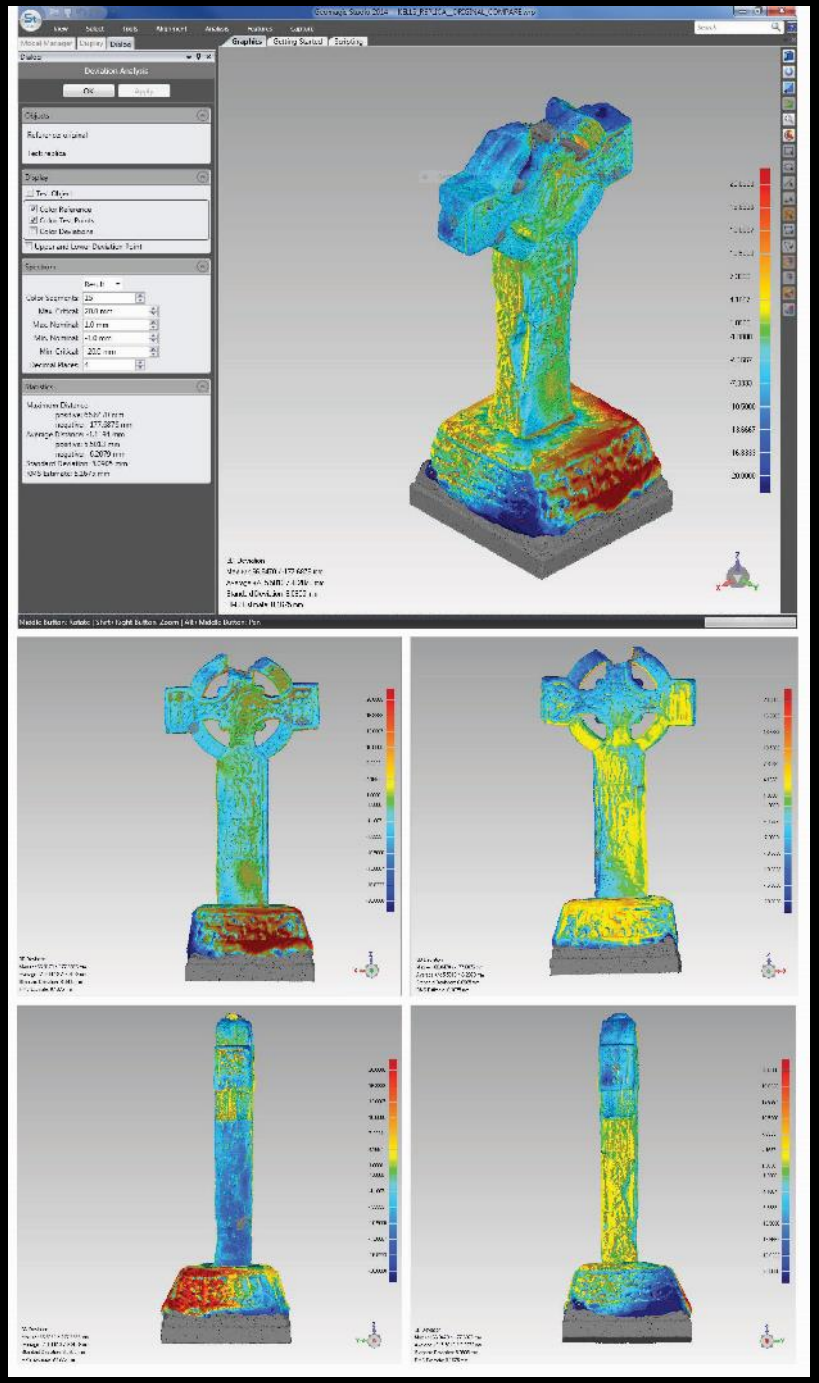


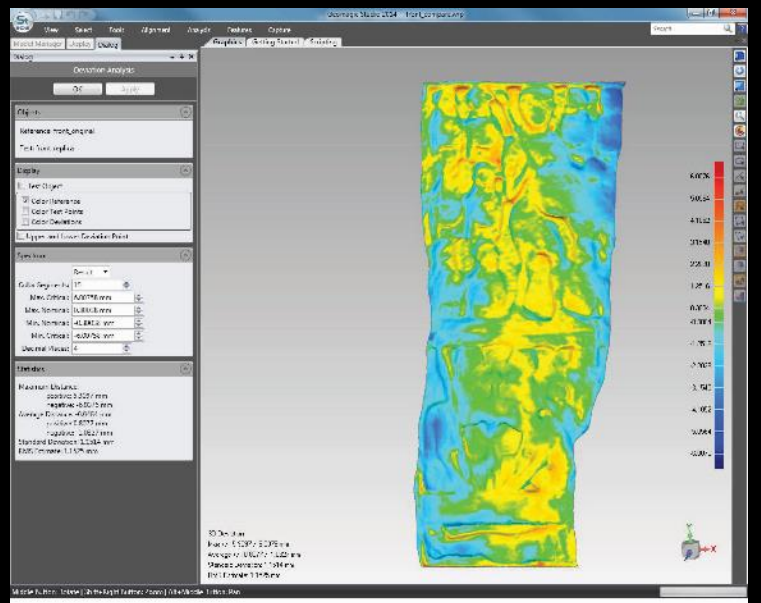


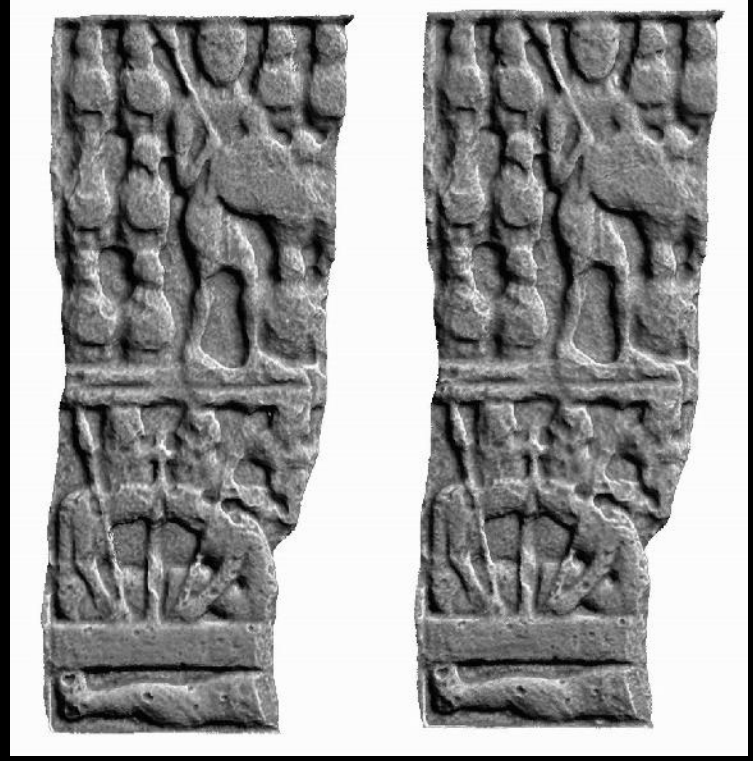
Original

Market Cross, Kells, from original

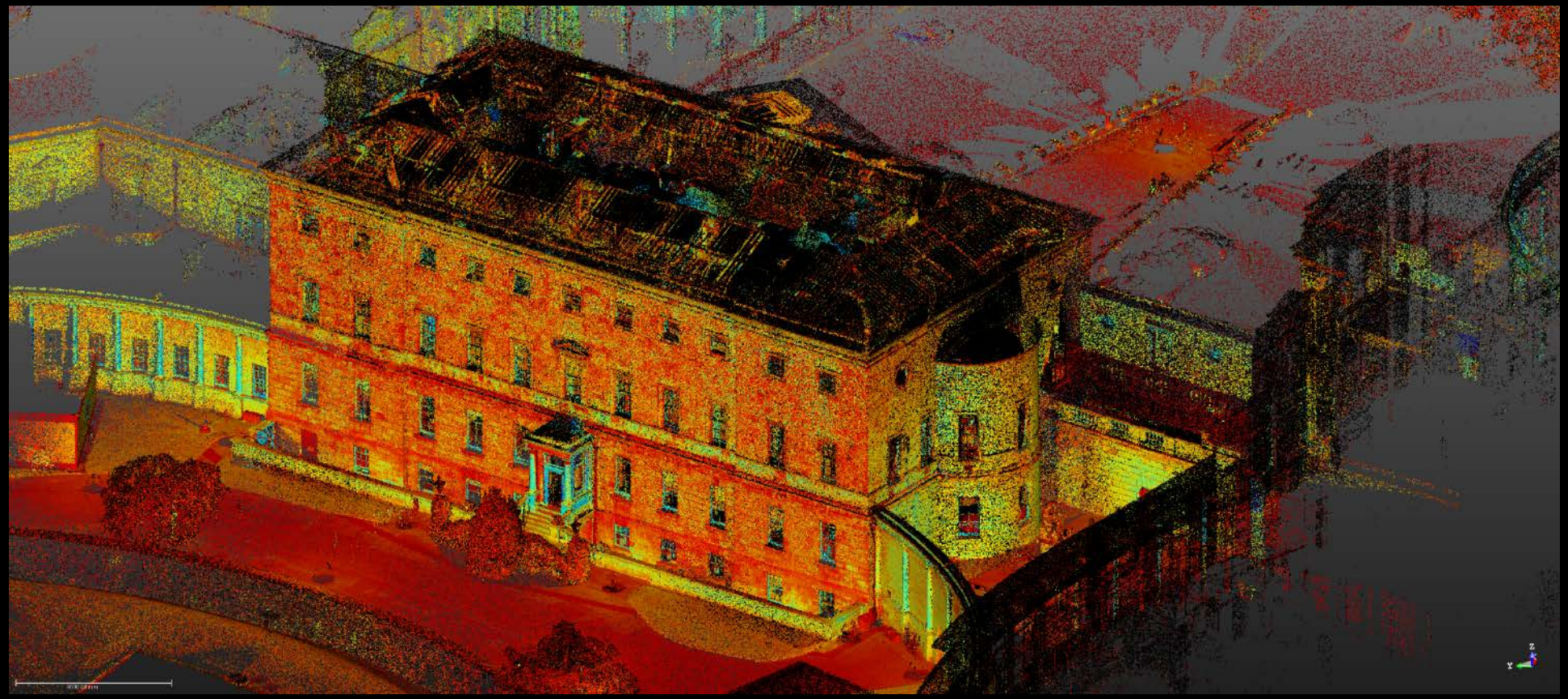
Poured Concrete Replica


Deviation Analysis
OK
Apply
Objects
Display
Statistics


Deviation Analysis
OK
Apply
Objects
Display
Statistics

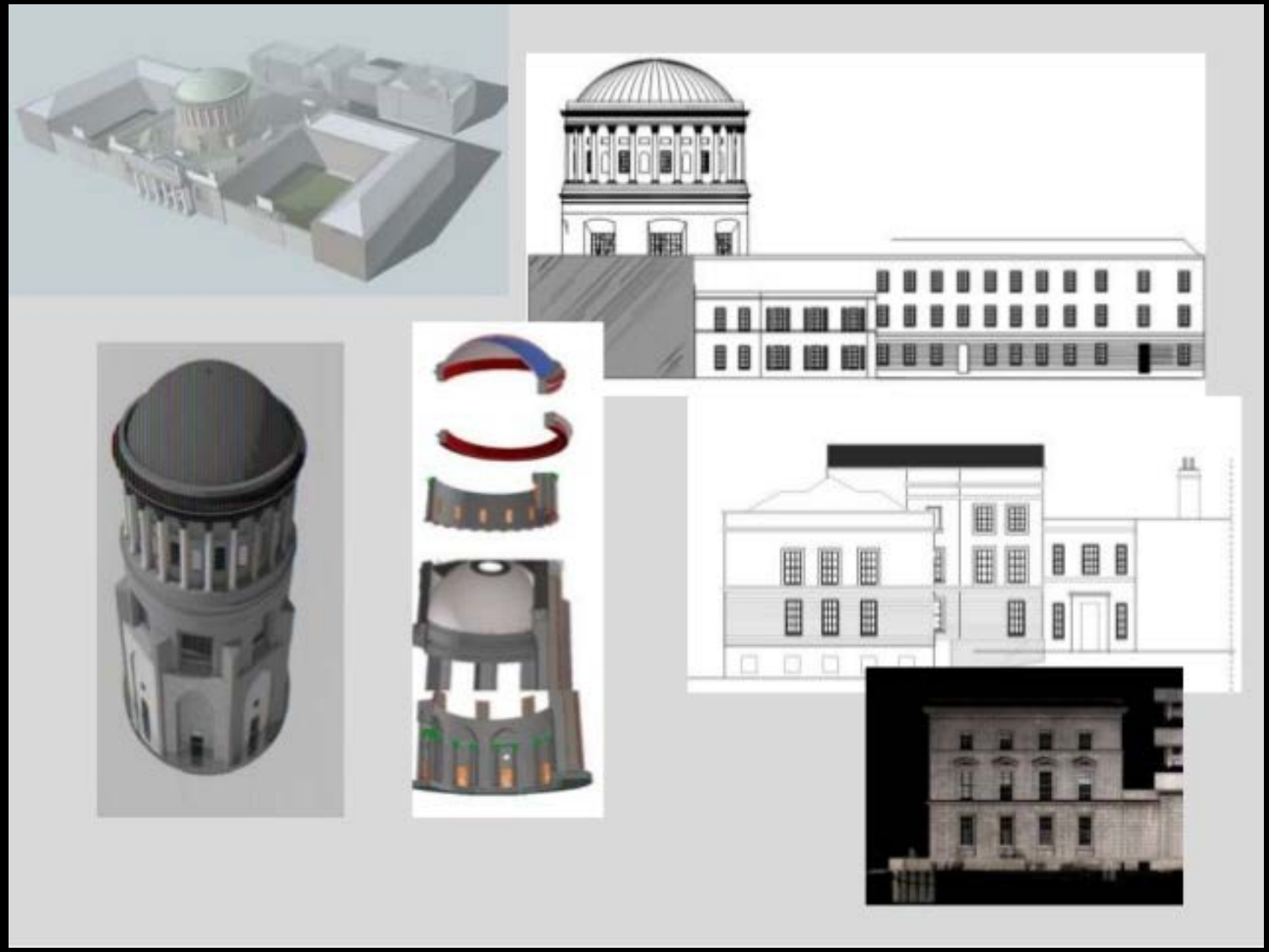


Kuka Robotics Canada



BIM (Building Information Model)

HBIM (Historic Building Information Model)



(Maurice Murphy, DIT)

HBIM Interoperability Challenges

Development of shared interoperable historical buildings object libraries enabling efficient future HBIM construction

http://aecconnect.blogspot.ie/

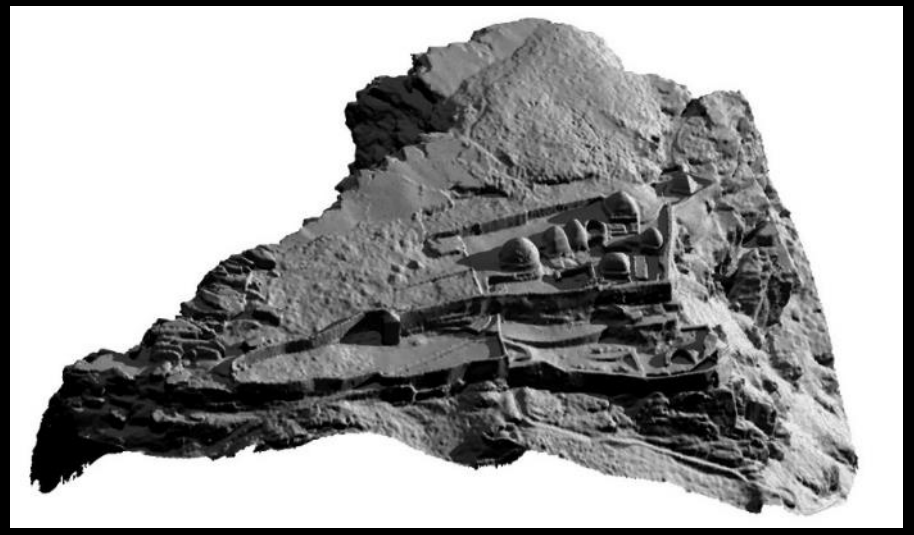
IRELAND'S
ANCIENT EAST

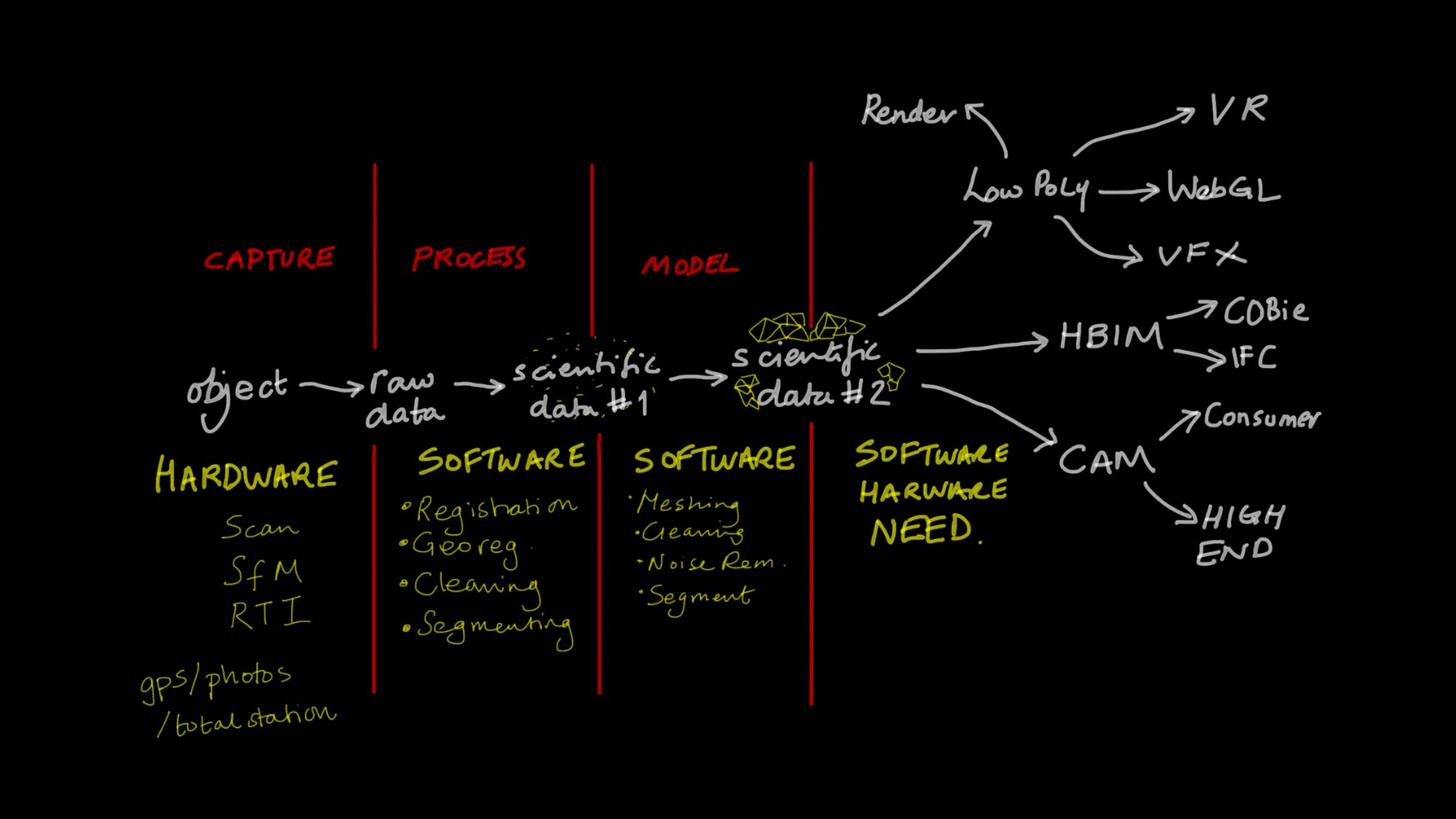
Cavan Burren Park
Loughcrew Cairns
Newgrange Dowth and Knowth
Hill of Uisneach
Lough Gur
Brownshill Dolmen

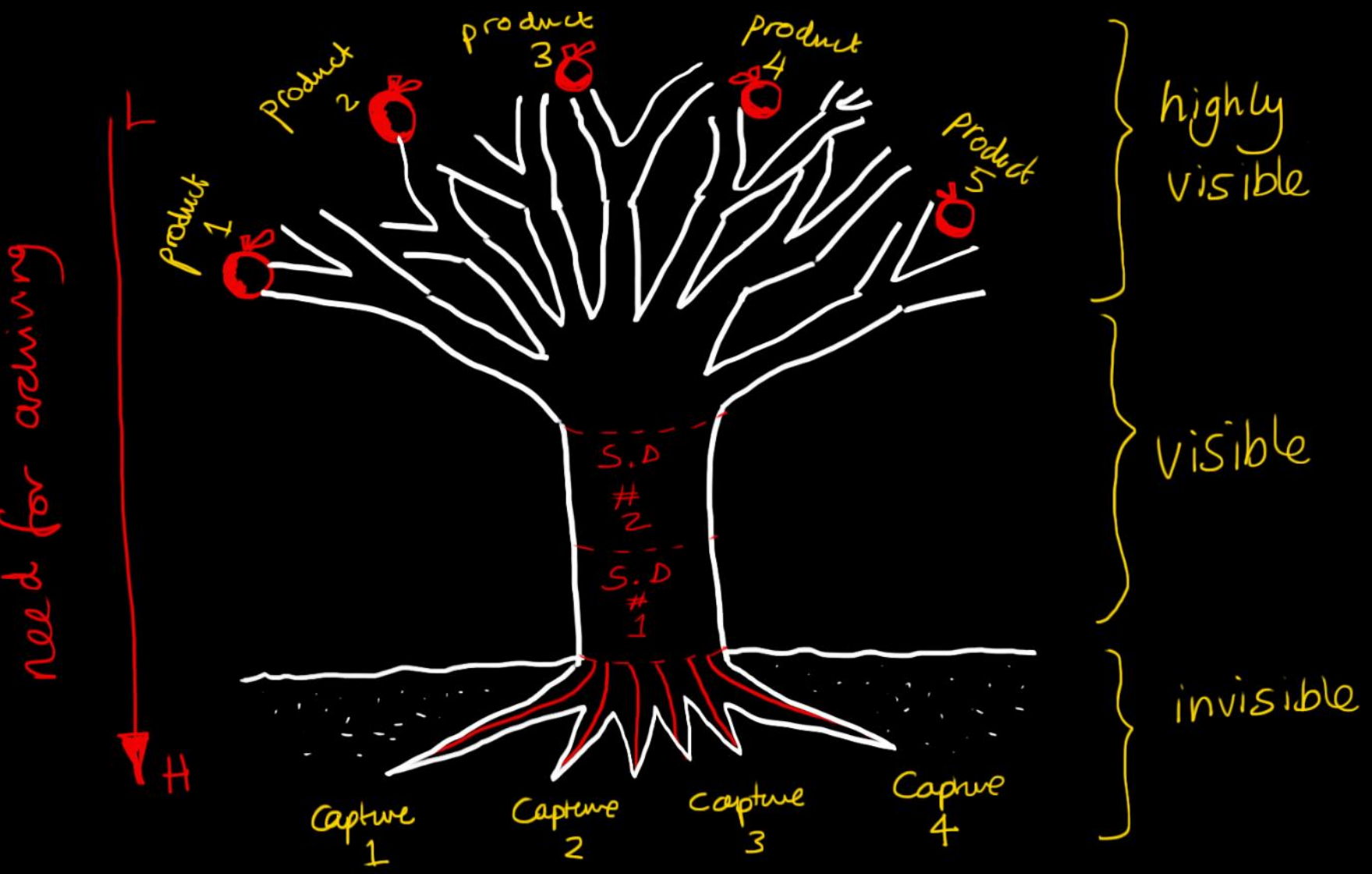
Dublin Airport introduction of 51st & Green - TravelMedia.ie Soiree Networking Event 2016
Inspired by Newgrange
5:20 / 7:42

Irish Film Board

- Met with film commissioner of Irish Film Board
- Use 3D content as an enticement to production companies looking to film in Ireland:
  - Pre-production planning
  - Post production VFX
- Could money raised go towards scanning more heritage sites which the film board could market?




CAPTURE
PROCESS
MODEL
object
raw data
scientific data #1
scientific data #2
Render
VR
Low Poly
WebGL
VFX
HBIM
COBie
IFC
CAM
Consumer
HIGH END
HARDWARE
Scan
SfM
RTI
gps/photos
/total station
SOFTWARE
• Registration
• Georeg
• Cleaning
• Segmenting
SOFTWARE
• Meshing
• Cleaning
• Noise Rem.
• Segment
SOFTWARE
HARWARE
NEED.



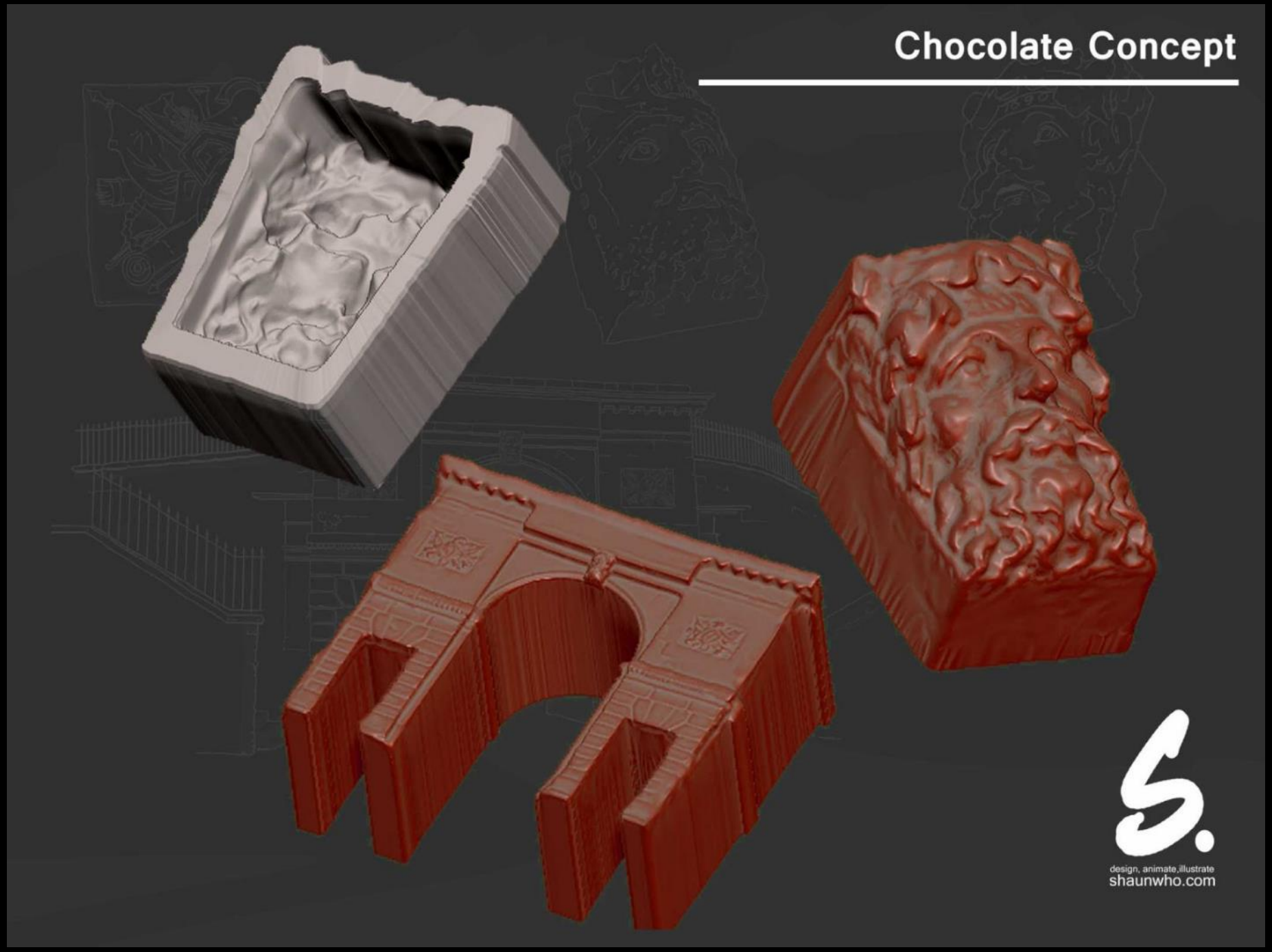
product 1
product 2
product 3
product 4
product 5
L
H
need for archiving
S.D # 2
S.D # 1
Capture 1
Capture 2
Capture 3
Capture 4
highly visible
visible
invisible

Activate Windows
Go to Settings to activate Windows.

Roisin Fitzpatrick

Sean Doran

Chocolate Concept



design, animate,illustrate
shaunwho.com

Appropriate Use

turbosquid.com

Acknowledgements

Surveyors: Gary Devlin & Robert Shaw
3D Modelling: Aaron Deevy & Patrick Griffin

www.3dicons.ie

Sketchfab

https://sketchfab.com/discoveryprogramme

www.discoveryprogramme.ie

@DiscProg

www.CARARE.eu