

Feb 5th, 1:45 PM - 5:00 PM

## Presentation Panel on Metadata Standards

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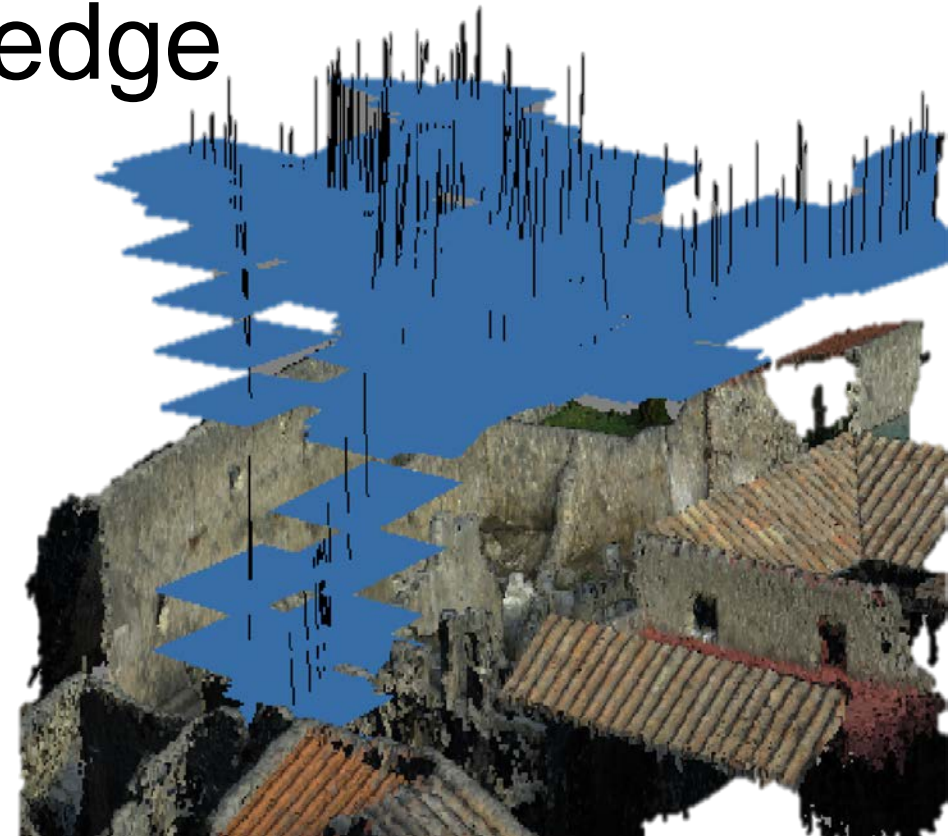


community standards  
for **3D data** preservation

Forum 1  
5 – 7 February 2018



# 3D Models for Cultural Heritage: from Survey to shared Knowledge

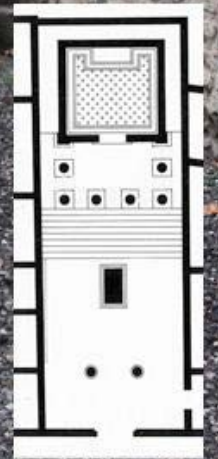
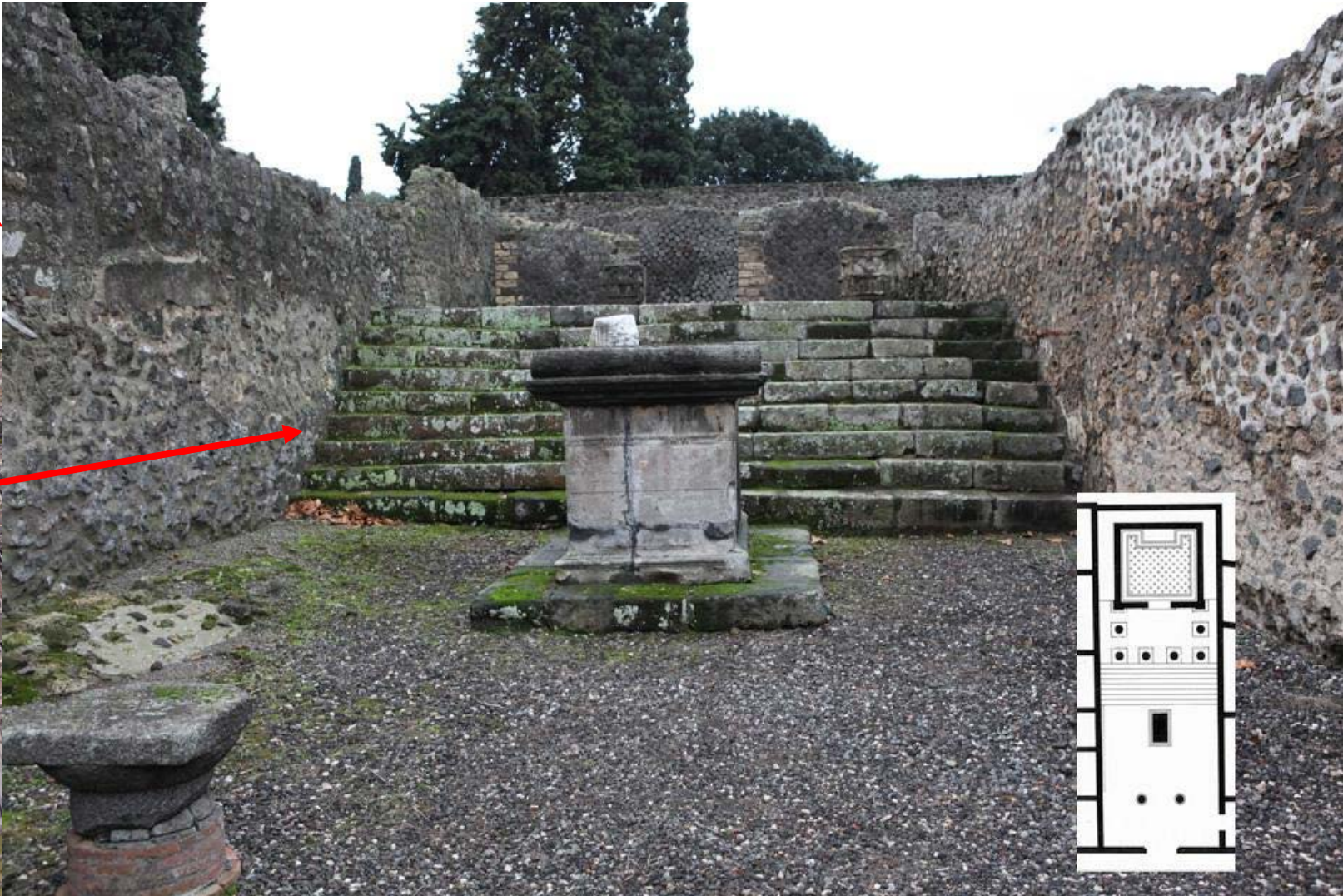
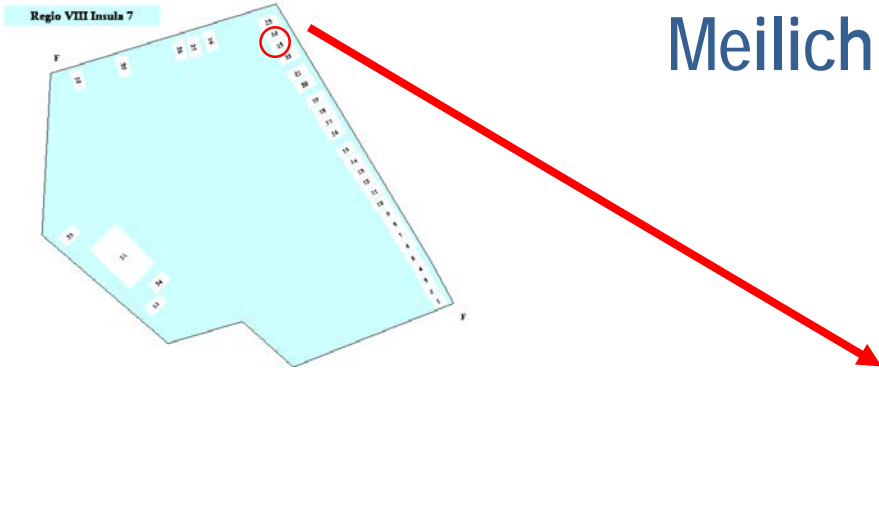


ANDREA D'ANDREA

Centro Interdipartimentale di Servizi di Archeologia  
Università degli Studi di Napoli L'Orientale



# The curious (but paradigmatic) case of the Temple of Zeus Meilichios or Esculapio at Pompeii (VIII.7.25)





# An online model (for sale!)

## Tempio di Esculapio (Giove Meilichio)

Home / Tempio

28th July 2015 | Permalink | By Eric



Currently the site is off.  
The project has been acquired  
probably by another company  
involved in Augmented Reality

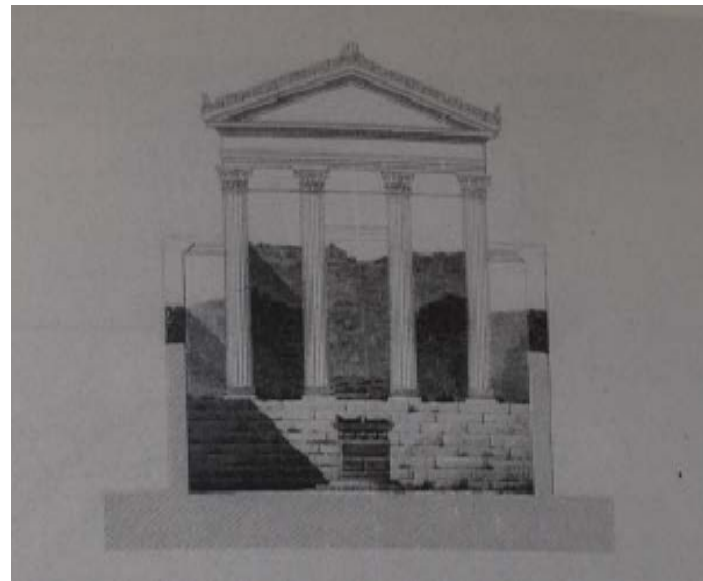
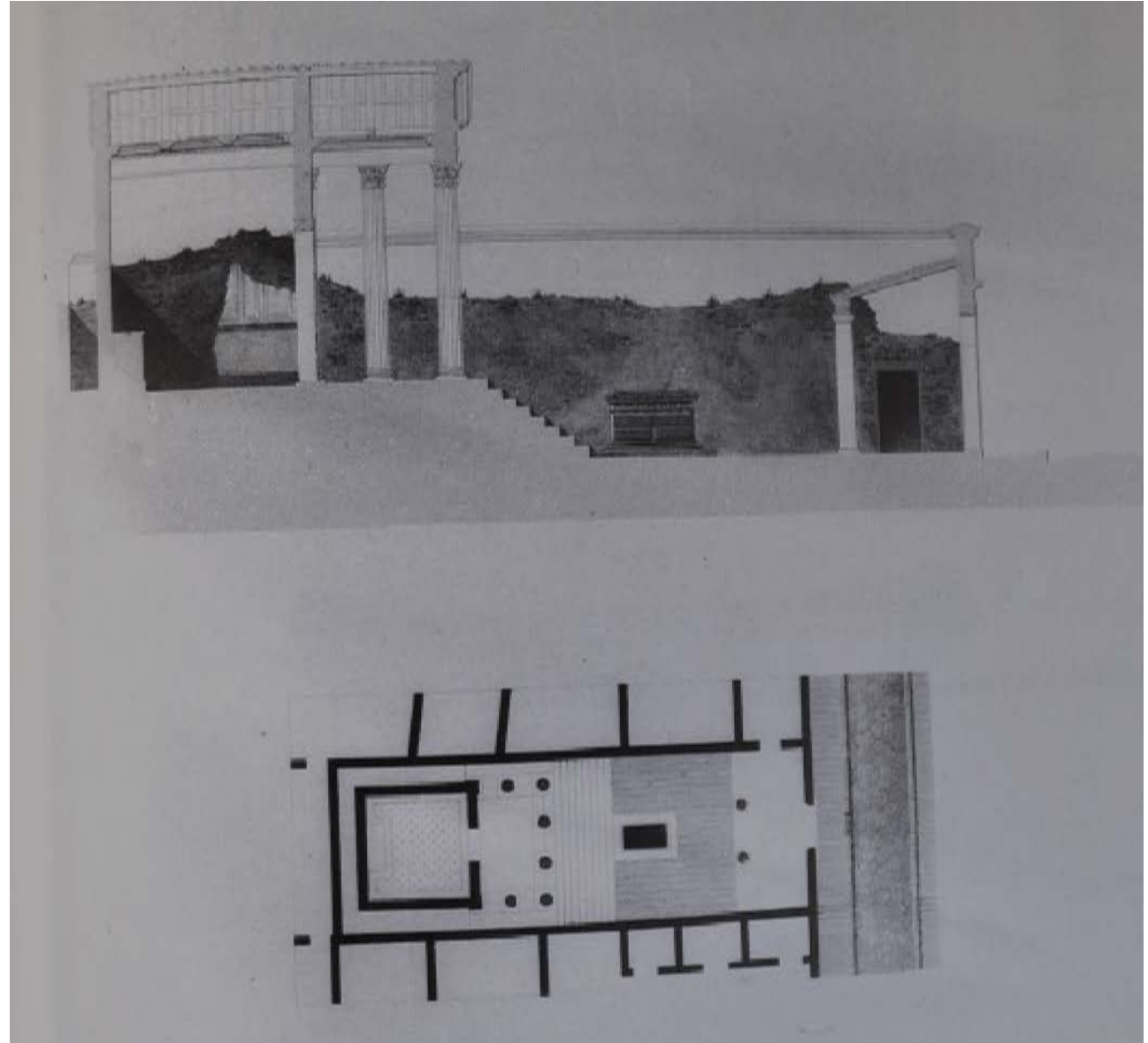
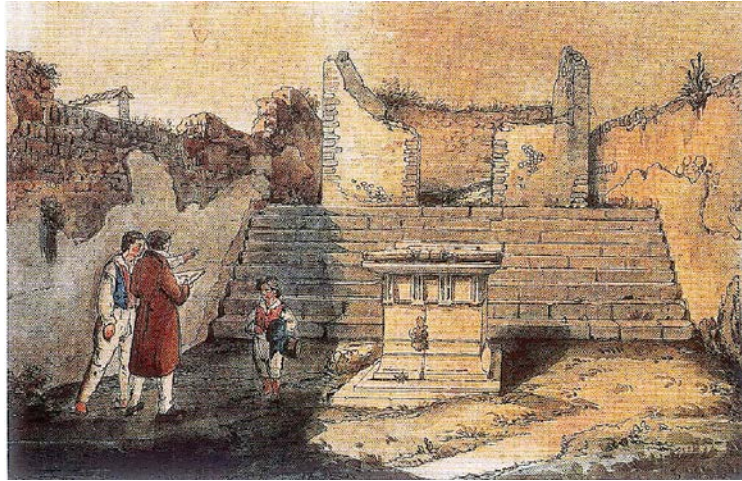


The original temple



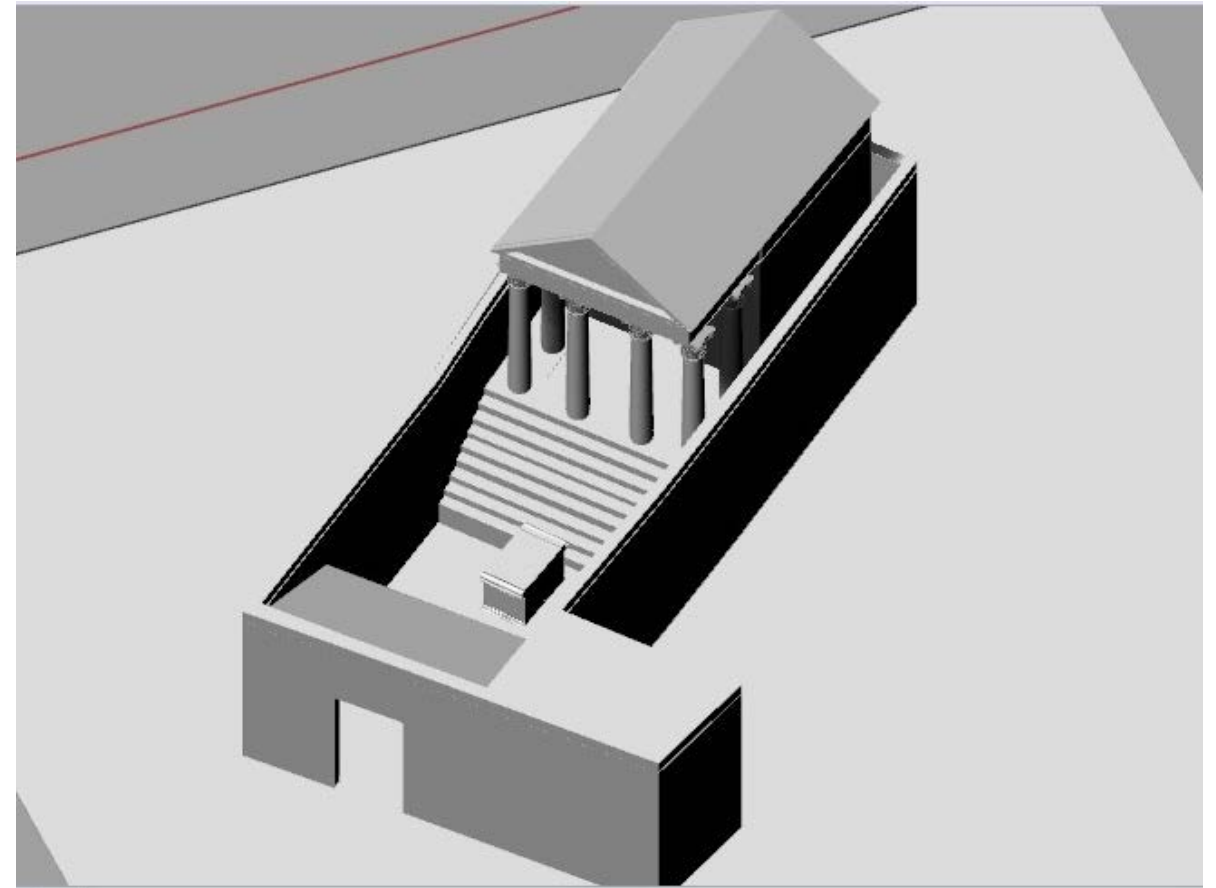
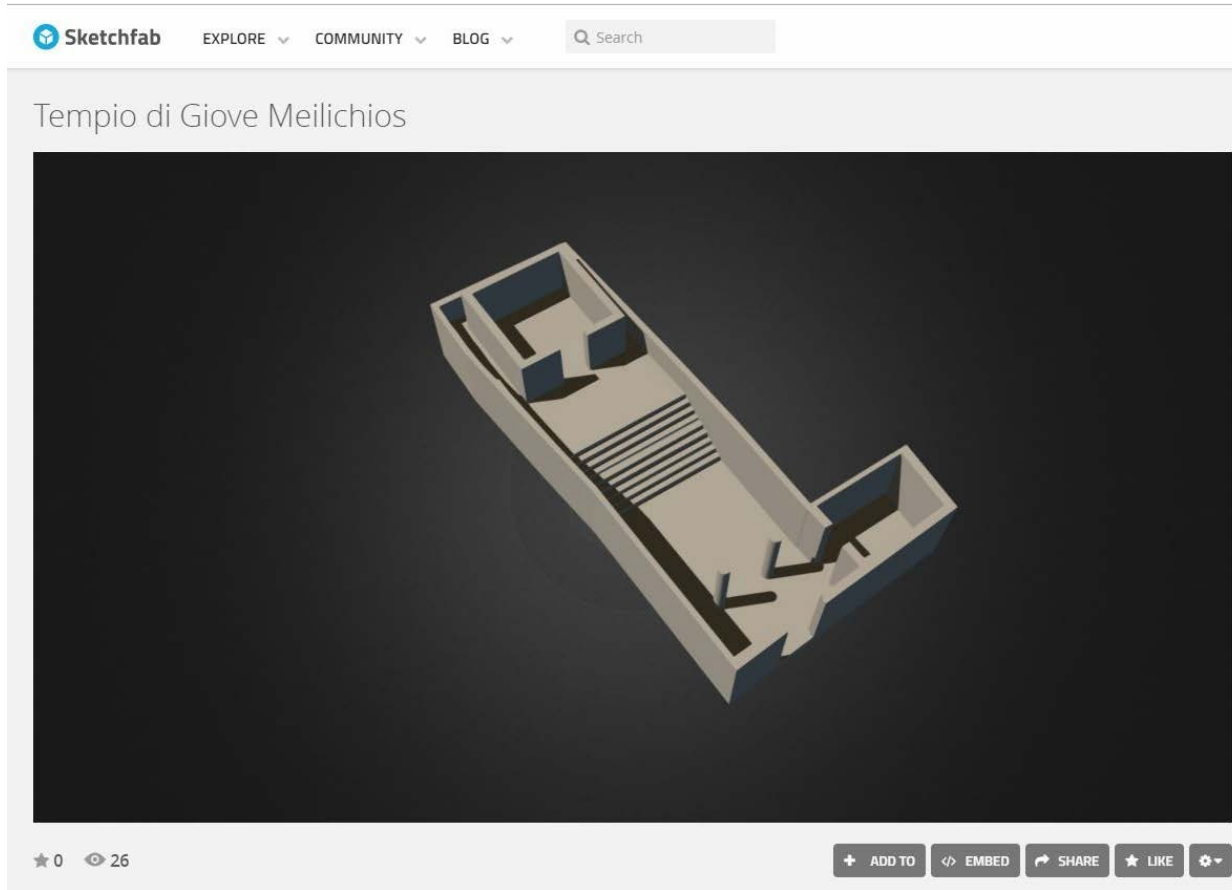
I am text block. Click edit button to change this text. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut elit tellus, luctus nec ullamcorper mattis, pulvinar dapibus leo.

# The graphical documentation and a filological reconstruction of the sacred building



F. Mazois, *Les Ruines De Pompéi*, 1838. Paris  
D. Russo, *Il Tempio di Zeus Meilichio a Pompei*, Napoli 1991

# Our 3D reconstruction on sketchfab



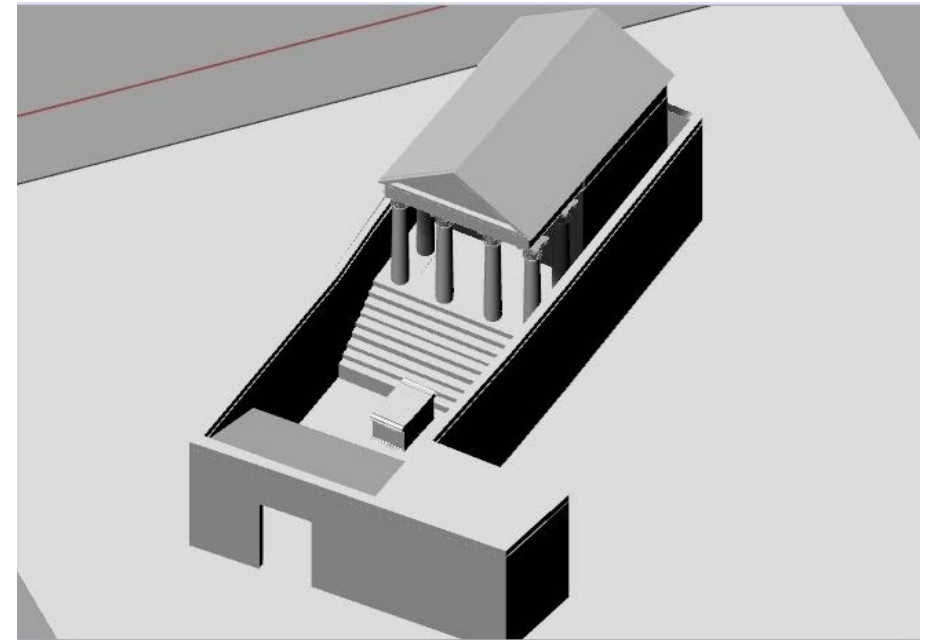
Description **Model information**

Size	22kB	Vertices	684
Source format	.obj	Rigged	No

Metadata



# Which is the model scientifically correct?



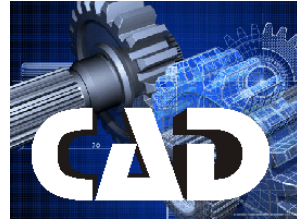
We need good metadata!

# A digital resource/asset/record: a terminological and conceptual clarification



Material object

+



=



Digital surrogate

Digital Replica/Copy/Reproduction  
Digital Reconstruction



The physical object



Digitization



The digital object



# Key principles of good metadata for 3D assets

## The London Charter (2008) (<http://www.londoncharter.org>)

- *Numerous 3D initiatives underlined* the importance of ensuring both that computer-based visualisation methods are applied with scholarly rigour, and that the outcomes of research that include computer-based visualisation should accurately convey to users the status of the knowledge that they represent, such as distinctions between evidence and hypothesis, and between different levels of probability.
- the Charter aims to enhance the rigour with which computer-based visualisation methods and outcomes are used and evaluated in heritage contexts, thereby promoting understanding and recognition of such methods and outcomes. **The Charter defines principles for the use of computer-based visualisation methods in relation to intellectual integrity, reliability, documentation, sustainability and access.**

### Principle 4: Documentation

Sufficient information should be documented and disseminated to allow computer-based visualisation methods and outcomes to be understood and evaluated in relation to the contexts and purposes for which they are deployed.

#### Documentation of Process (Paradata)

4.6 Documentation of the evaluative, analytical, deductive, interpretative and creative decisions made in the course of computer-based visualisation should be disseminated in such a way that the relationship between research sources, implicit knowledge, explicit reasoning, and visualisation-based outcomes can be understood.

# Key principles of good metadata for 3D assets



Sevilla Principles (2011) (<http://www.sevilleprinciples.com/>)

The Sevilla Principles aims at increasing the conditions of applicability of the London Charter in order to improve its implementation specifically in the field of archaeological heritage, including industrial archaeological heritage, simplifying and organising its bases sequentially, while at the same time offering new recommendations taking into account the specific nature of archaeological heritage in relation to cultural heritage.

## Principle 7: Scientific transparency

*All computer-based visualisation must be essentially transparent, i.e. testable by other researchers or professionals, since the validity, and therefore the scope, of the conclusions produced by such visualisation will depend largely on the ability of others to confirm or refute the results obtained.*

**7.3 The incorporation of metadata and paradata is crucial to ensure scientific transparency of any virtual archaeology project.** Paradata and metadata should be clear, concise and easily available. In addition, it should provide as much information as possible. The scientific community should contribute with international standardization of metadata and paradata.





# Key principles of good metadata for 3D assets

## Provenance

In 3D digitisation of cultural heritage objects **provenance covers the technical processes:**

- Equipment chosen and the instrument settings
- Light sources
- Any obstacles to digitisation or sources of noise/reflections
- Software choices and settings
- Techniques chosen for meshing, textures, decimation, simplification, alignment etc.

Technical Process

## Paradata

**Paradata provides information about the human processes** of understanding and interpreting:

- The evidence used to interpret an object and to create a reconstruction
- The methodology used in a research project

**Paradata enables**

- Alternative interpretations or hypothesis to be presented and linked to the supporting factual evidence

Human Process

# 3D Models online (for sale)

← → ↻ Sicuro | <https://www.turbosquid.com/3d-model/archaeology> ☆ hp 2
















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Architecture > Archaeology > Related Categories (10) ▾

Archaeology 3D Models  
900 Results: Page 1

Compatibility ▾ Formats ▾ Price ▾ Quality Level ▾ Poly Count ▾ Sort: Best Match ▾ ⚙

3D Models ▾ More ▾

 <p>\$199 max max obj 3ds ma c4d</p>	 <p>\$149 ma 3ds max obj c4d</p>	 <p>\$349 max stl fbx obj max</p>	 <p>\$49 ma 3ds max obj c4d</p>	 <p>\$249 max fbx obj</p>
 <p>\$199 max fbx obj</p>	 <p>\$49 max 3ds fbx obj max c4d</p>	 <p>\$139 max obj fbx</p>	 <p>\$259 ma 3ds max obj c4d</p>	 <p>\$139 max obj fbx</p>
				



# 3D models online (for sale)

**Roman Colosseum**  
by hauritz3d

**\$199** [Add to Cart](#)

Royalty Free License - All Extended Uses

**Included Formats**

- CheckMate Pro Certified Sep 21, 2011
- Native:**
  - 3ds Max 2010
  - mental ray 2010
- Exchange:**
  - Autodesk FBX
  - OBJ

Don't see the file format you need?  
[Free File Format Conversion](#)

Have questions? Chat with us now.  
[Live Chat Now 24/7](#)

**3D Model Specifications**

Product ID:	508279
Published:	Jan 7, 2010
Geometry:	Polygonal Quads/Tris
Polygons:	538,917
Vertices:	507,471
Textures:	Yes
Materials:	Yes
Rigged:	No
Animated:	No

Metadati  
Resolution  
IPR  
format



# 3D human being online

**HUMAN ALLOY**  
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Home > Product > Pre Posed Basic > Basics Free 3D Model

## Basics Free 3D Model

**New Price €0.00**

Our Basics free model. Try out one of our lightweight 3D people.

Package includes:

Human Alloy Basic Models
Most of the times 3D people need to blend seamlessly into the background of your visualizations.
Human Alloy 'Basics' 3D people do just that. They are lightweight, easy to drop in your 3D scene and won't clog-up your computer and at a appropriate price at that.
Software
3Ds Max 2014 + Vray (Simple shader)
SketchUp (Simple shader)
Wavefront .OBJ (Simple shader)
Autodesk .FBX (Simple shader)
Resolution
40K Polygons





# Key principles of good metadata for 3D assets

Scientific data cannot be used correctly without information about what they mean, how they were created and in which conditions.

Relevant to 3D asset are:

- The instruments, methods and techniques used in both data capture and data processing (Provenance)
- The motivations and rationales behind the 3D record (Paradata)

**Metadata store** information about the life cycle of a 3D object

- **Field:** keeps track of instrument settings, the condition of the physical object being scanned and the objectives of the project
- **Lab:** keeps track of post processing of the data and provides a record of how evidence has been interpreted
- **Access:** supports discovery and use of the objects for education, tourism, research
- **Preservation:** supports long term preservation and allows for re-use of the data

**Metadata assure** Authenticity, Historical Rigour, Scientific (Intellectual) Transparency, Training, IPR



# 3D-ICONS project: the Metadata Schema (CARARE 2)



3D-ICONS content includes:

- Heritage assets (monuments, buildings, landscapes and other real world objects) described in textual metadata with relations to places, events, thumbnails and other digital objects.
- Real world cultural objects (such as historic drawings and photographs, publications, archive materials) which provide sources of information about the heritage asset.
- Born-digital resources related to these objects, such as 3D models.
- Based on previous Metadata Standard (Carare) and Ontology (CIDOC-CRM, CIDOC-CRMdig)

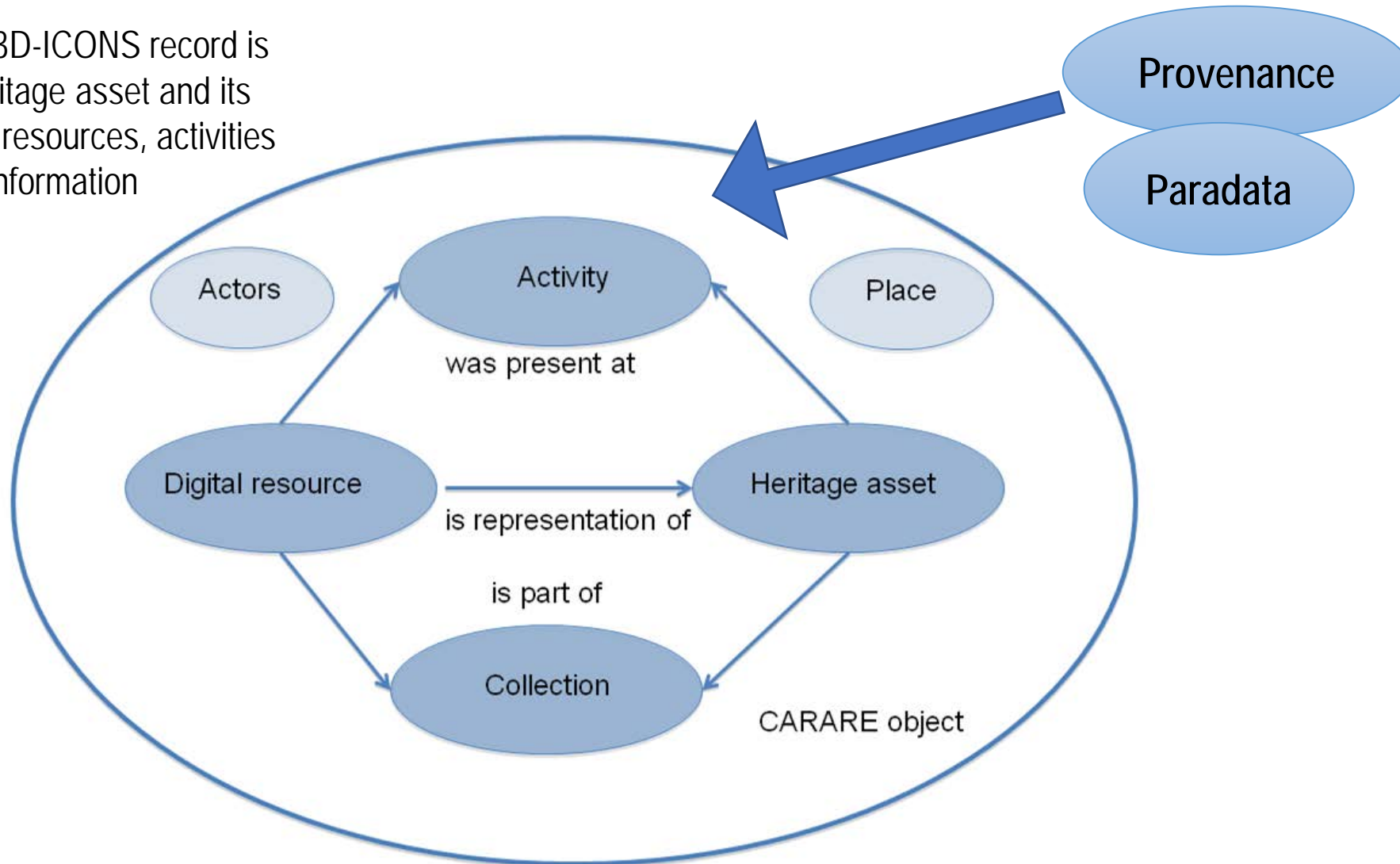
The 3D-ICONS schema is an update of the previous CARARE. You can find it as CARARE 2





# 3D-ICONS project: the Metadata Schema

Conceptually the 3D-ICONS record is focussed on a heritage asset and its relations to digital resources, activities and to collection information



Metadata Editor for metadata from scratch

# 3D-ICONS project: the Metadata Schema



**Activity** describes events or activities that the monument has taken part in:

**Methods** : the methods used in this specific activity, e.g. open area excavation, sample survey, augering, boring, stratigraphic, restoration, conservation, re-pointing, photogrammetric survey etc. Use of a controlled vocabulary is recommended. **(PROVENANCE)**

**Event type**: general classification of the type of event or activity which took place, e.g. survey, archaeological excavation, digitization, rebuilding. Use of a controlled vocabulary is recommended. **(PROVENANCE)**



# 3D-ICONS project: the Metadata Schema



To define the digitization process adopted to create the 3D final model we added **some relations** explaining the relations between the Heritage Asset, Digital Resource and the Activity.

The properties reuse those from CIDOC-CRM and in particular from CRMdig

**L1B.was\_digitized\_by** – associates a Heritage Asset with an Activity. It is a sub-property of Was Present At.

**L20F.has\_created** – associates an Activity to an Digital Resource. It is a sub-property of Was Present At.

**L22F.created\_derivative** – defines the reuse of a Digital Resource, created by a digitization process, through multiple different processing phases. It is a sub-property of Is Derivative Of.





# 3D-ICONS project: the Metadata Schema

THE PARTNER HAS ONE OR MULTIPLE 3D DIGITAL MODELS AS REPLICAS OF ONE PHYSICAL OBJECT

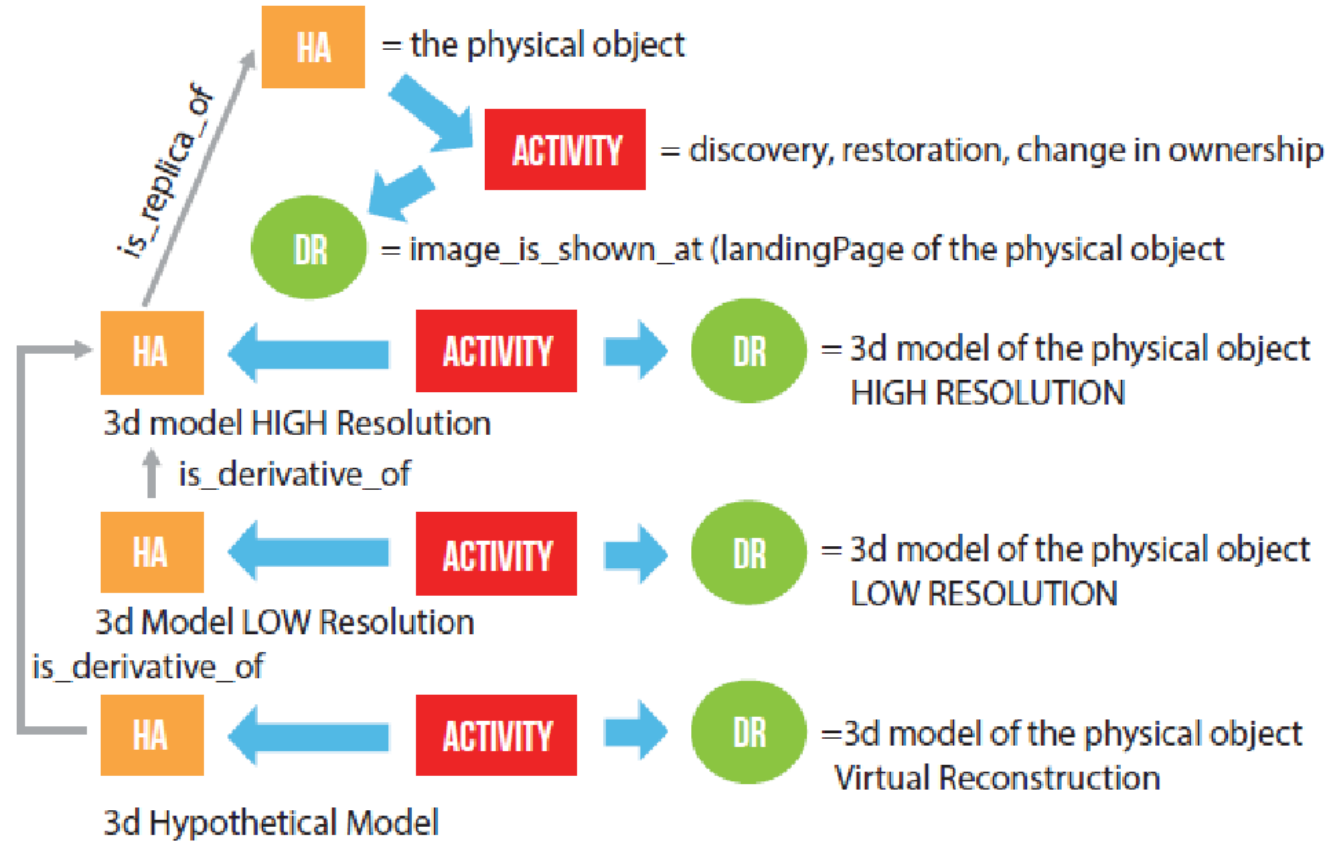


DIAGRAM ILLUSTRATING APPROACH TO METADATA CREATION FOR MULTIPLE DERIVATIVES FROM A SINGLE CULTURAL HERITAGE OBJECT

# 3D-ICONS project: the Metadata Schema



## *Activity ... (from raw data to final rendering)*

**Consists of:** this is a repeating group of elements which allows the specific activity (or activities) that took place during the overall **Event** to be described.

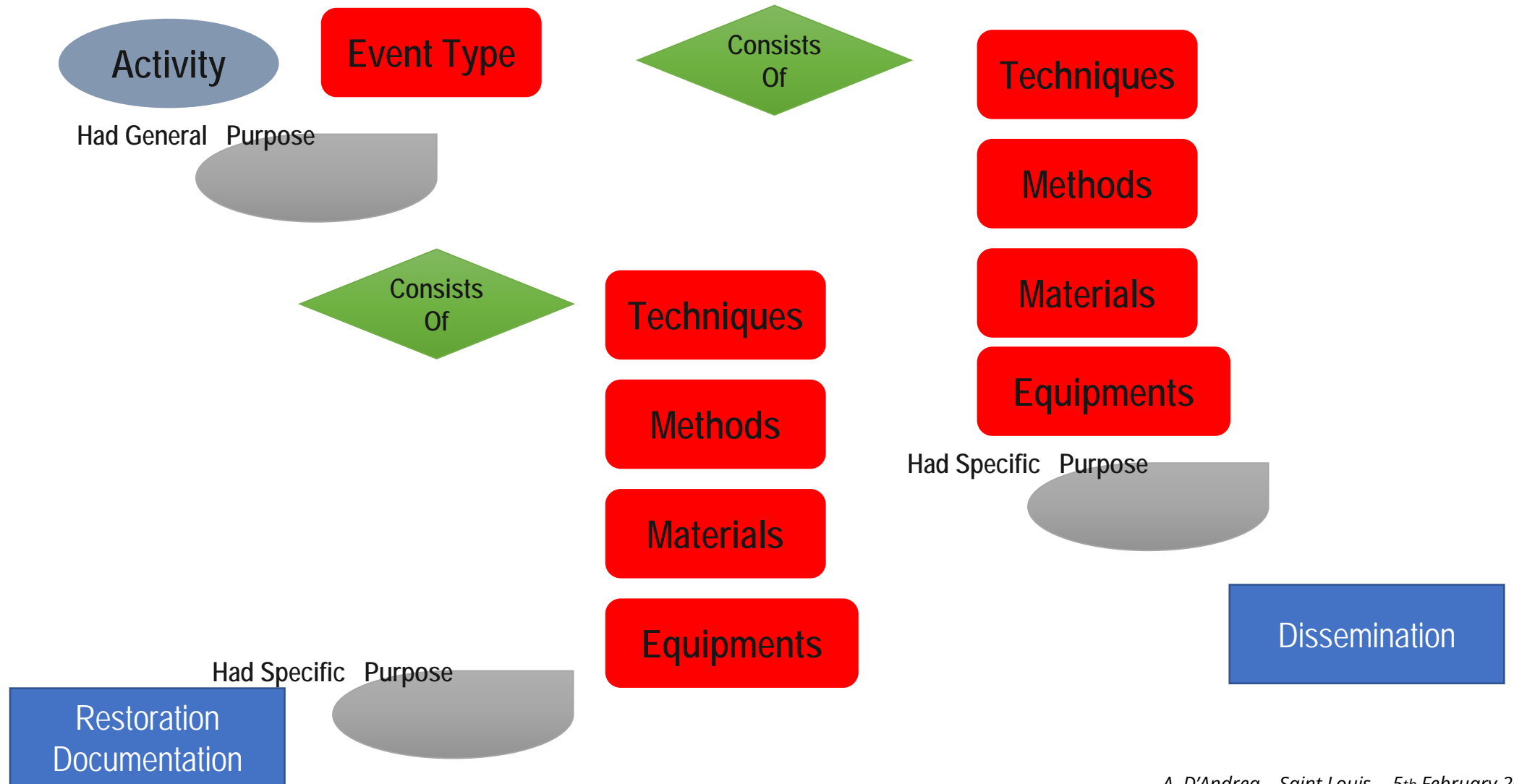
**Had General Purpose:** this is a free text description of the general goal or purpose of an Activity. For example this could include practicing, preparing, monitoring, researching, designing, testing etc. **(PARADATA)**

**Had Specific Purpose :** a free text note describing the specific goal or purpose of this activity. For example, carrying out 3D data acquisition, restoration of a part of a building, completing a survey, constructing a building, etc. **(PARADATA)**



# 3D-ICONS project: the Metadata Schema

## CARARE 2.0 Schema

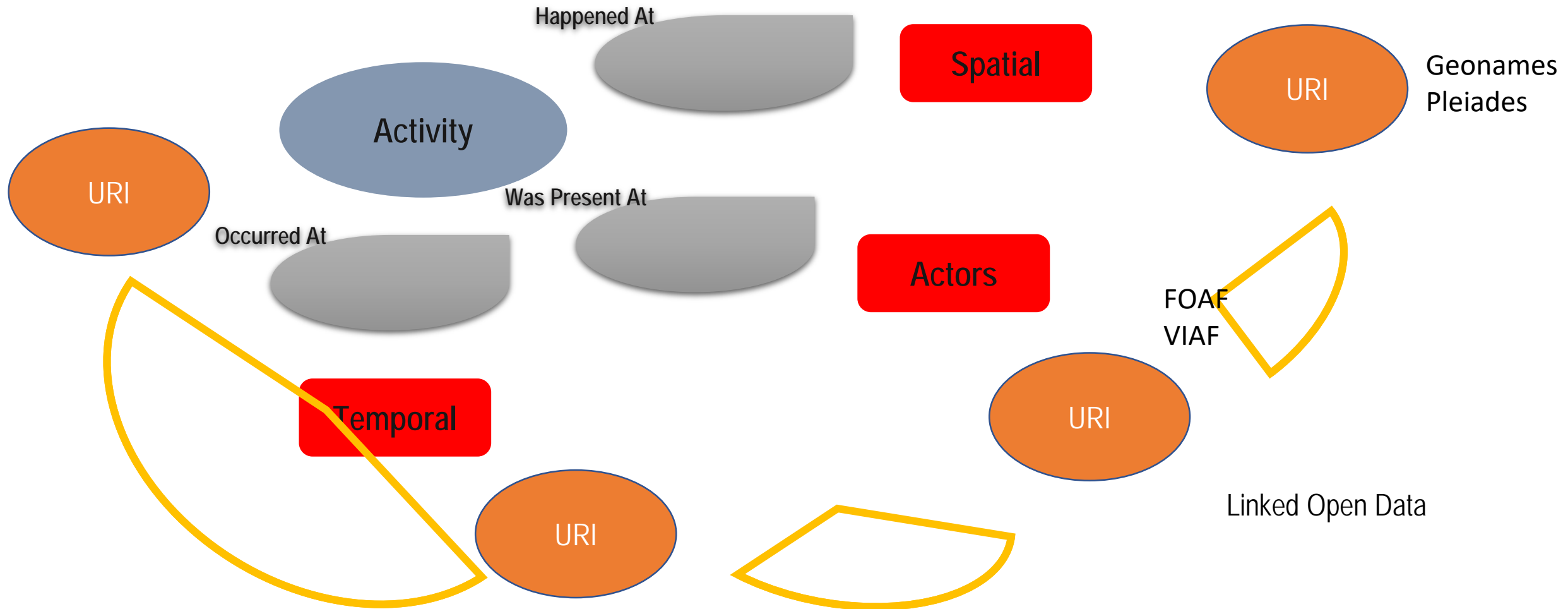




# 3D-ICONS project: the Metadata Schema



## CARARE 2.0 Schema





# 3D-ICONS project: 3D models published on CISA repository



## Statue of Claudio seduto



### Heritage Asset

*Source:* CISA, Centro Interdipartimentale di Servizi per Archeologia, Italy

*Metadata Rights:*  
The Creative Commons CC0 1.0 Universal Public Domain Dedication (CC0)

*Asset Description:*  
Modello 3D della statua di Claudio Seduto (MANN, inv.6056) trovata ad Ercolano. Doveva esser parte dell'Augusteum (cd. Basilica), inserita a destra, nell'edera rettangolare del lato di fondo. La statua di Claudio Seduto faceva pendant con l'altra colossale statua di Augusto (MANN 6040, cat.23) della quale ripropone lo stesso schema iconografico di Giove in trono, seppure con lievi differenze. L'iconografia dell'imperatore assimilata a Zeus, ben si confaceva all'immagine del potere imperiale, supremo e universale, così come sintetizzato dal simbolismo della Gemma Augustea, in cui Augusto in persona è raffigurato nei panni di Giove e con il lituus degli auguri in mano, segno del potere militare.

*Provenance:* 3D Icons Project

*Type:*  
STATUE  
JULIO-CLAUDIAN  
<http://vocab.getty.edu/aat/300020545>  
<http://vocab.getty.edu/aat/300047600>

*Data Range:* 2014 - 2014

*Period:* <http://pleiades.stoa.org/vocabularies/time-periods/roman>

*Date:* Julio-Claudius Age

*Materials:* Marble

*Dimension:* width and height 80 x 222 centimetres

*Location:*  
National Archaeological Museum  
<http://www.geonames.org/7303972/naples-national-archaeological-museum.html>

*Publication Statement:*

### Digital Resources

*Type:* 3D ~ *Format:* .pdf

*Link:*  
<http://vast-lab.org/3dicons/data/96>

*Copyright:* Copyright CISA and SopArchNapoli

*Access Rights:* Restricted Access

AA

T

Pleiades

Geonames

LOD



# 3D-ICONS project: 3D models published on CISA repository



## Digital Provenance

### Acquisition

*Description:*

An amount of photos have been shot from different points of view by Nikon D90 Camera with 18-55mm lens, using an auto focus; average distance camera from the object is 1.50-2 mt with 2 reference distances of 3.5 cm.

*Consists Of:*

carrying out 3D data acquisition

*Methods:*

metric survey

*Techniques:*

structure from motion

*Equipment:*

Manfrotto tripod

### Post-processing

*Description:*

*Consists Of:*  
3D pdf production  
mesh decimation  
photo rendering

*Methods:*

the textured 3D model is exported to 3D pdf format  
snapshot  
Decimate command

*Techniques:*

Export command  
Reduction mode is triangle count  
image capture and export in jpg format

*Equipment:*

AgiSoft Photoscan Professional Edition 1.0.4  
Geomagic Studio 2013  
Geomagic Studio 2013  
Meshlab 1.3.2

### Processing

*Description:*

the photos alignment has been performed by AgiSoft Photoscan Professional Edition in order to produce a dense points cloud ant to build a textured dense surface model.

*Consists Of:*

texturing  
mesh noise removal  
dense surface reconstruction  
photos alignment

*Methods:*

points triangulation  
Scale-invariant feature transform approach  
texture mapping

*Techniques:*

Feature matching across the photos and solving camera orientation parameters  
Poisson Surface Reconstruction  
generic mapping mode and mosaic blending mode  
Mesh is cleaned up using the Relax and Remove Spikes command. The remaining errors are fixed through the Mesh Doctor function. The mesh has been exported as an obj file .

*Materials:*

*Equipment:*

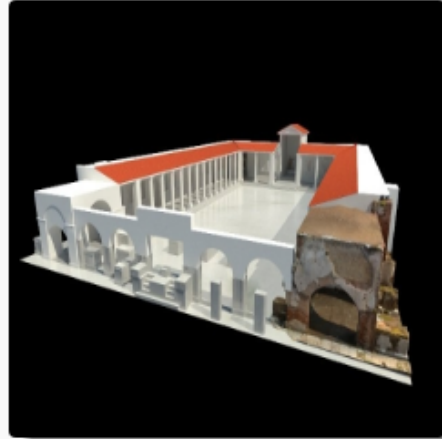
Meshlab 1.3.2  
AgiSoft PhotoscanProfessional Edition 1.0.4  
AgiSoft PhotoscanProfessional Edition 1.0.4  
Geomagic Studio 2013  
AgiSoft PhotoscanProfessional Edition 1.0.4






# 3D-ICONS: the project repository

## 3D model of Augusteum at Herculaneum with Quadrifrontal Arch

Back



Metadata	Information
Appellation	3D model of Augusteum at Herculaneum with Quadrifrontal Arch
Address	Ercolano, Ercolano, Italy
Coordinates (Lat, Lon)	<a href="#">(40.80569 , 14.34799)</a> <a href="#">Click to view it on Google Maps</a>
See it on Europeana	
Link	
Landing Page	

Heritage Asset

Digital Resources

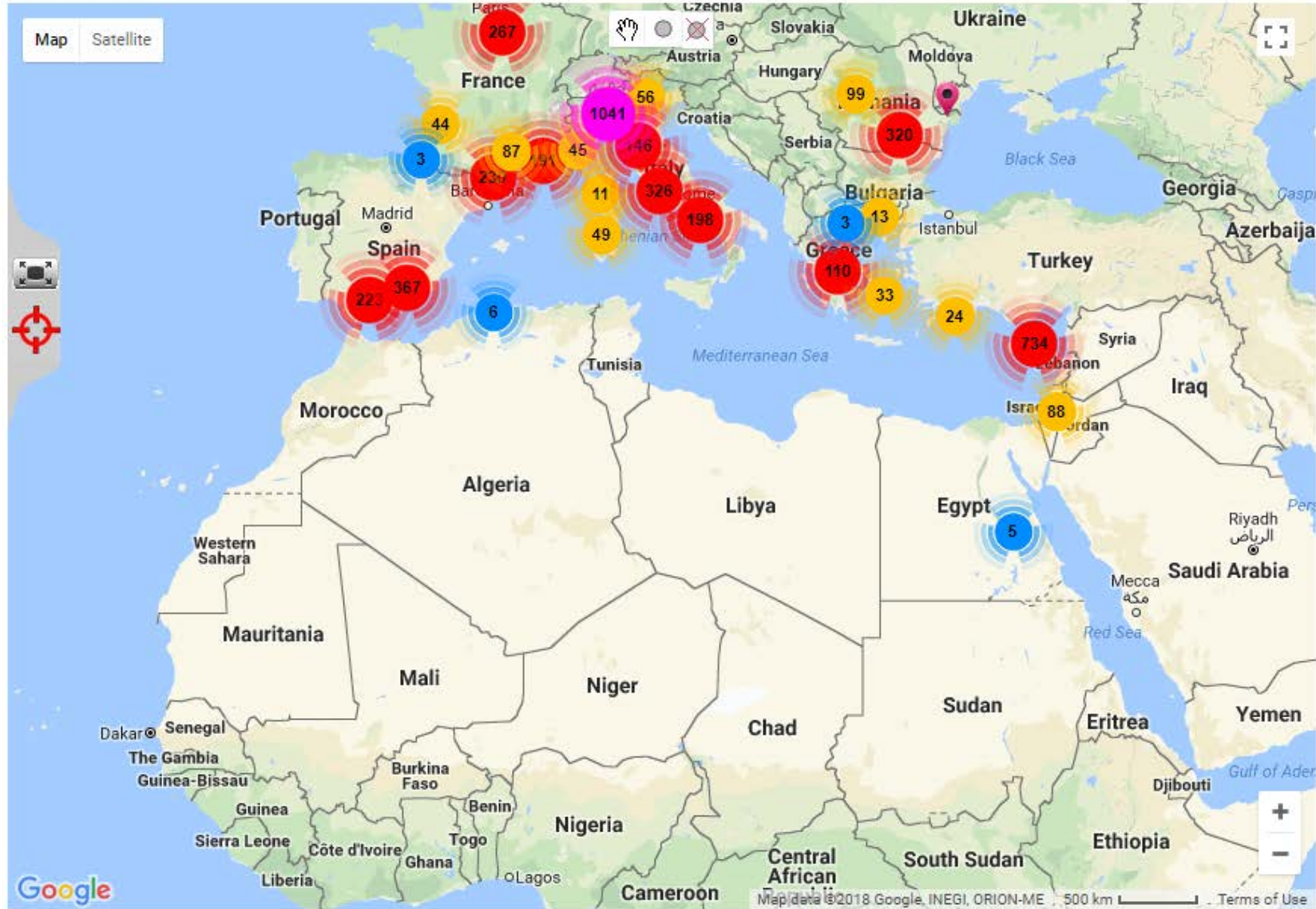
Paradata

Activity1

Activity2

Activity3

Metadata	Information
Name	Acquisition_4
Description	CAD format data of archaeological plans, profiles and sections of the excavation areas and survey provided by publications and reports.
Purpose	documentation
Equipment	Rhinoceros 5
Actor	Angela Bosco, person, researcher
Actor	Marco Barbarino, person, researcher



Search by keywords

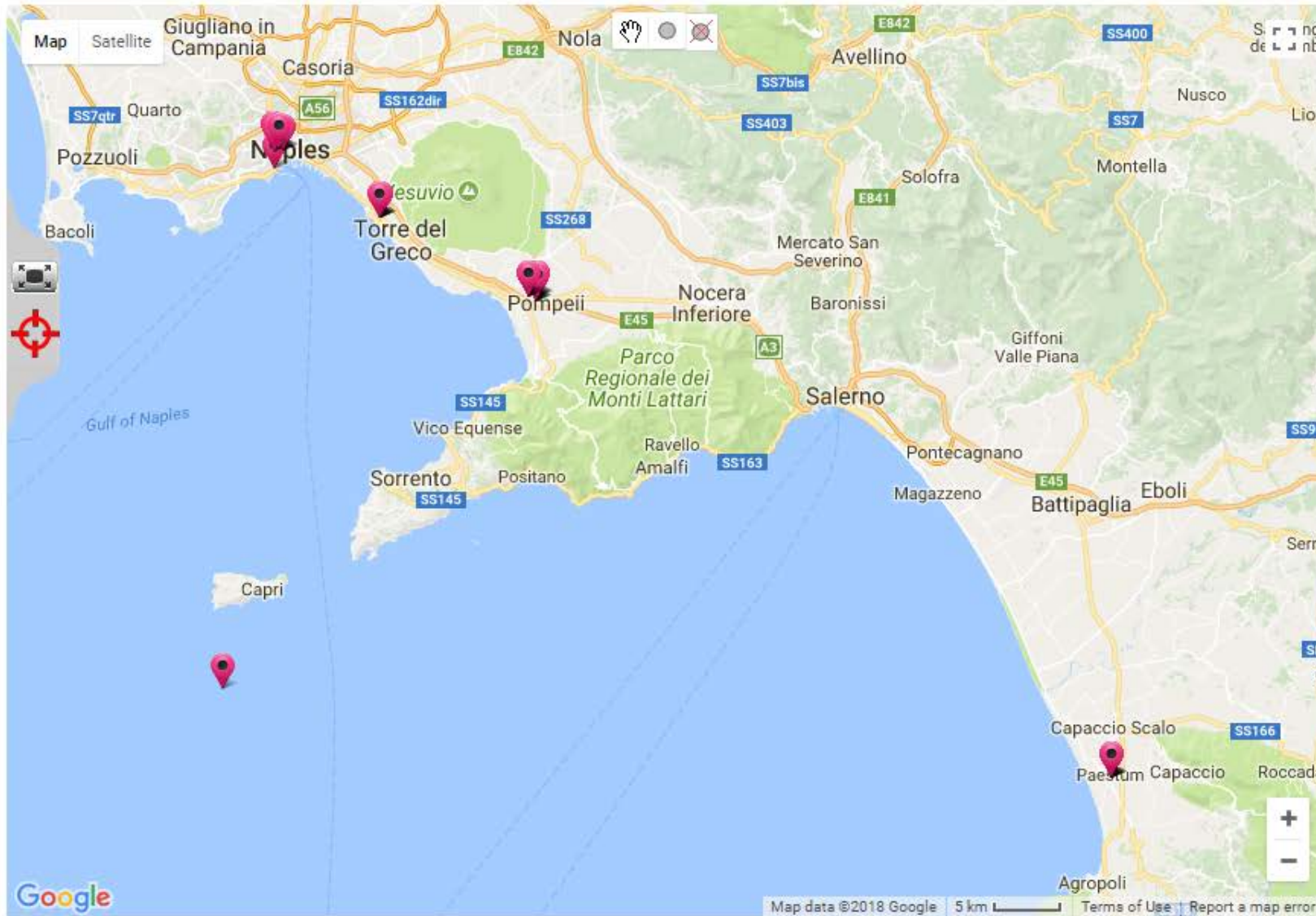
Country  
-All- ▼

- Type
- Organisation
- Size
- Date

<http://3dicons.ceti.gr/index.php>







Search by keywords

Country

-All-

- Type
- Organisation
- Size
- Date

Search

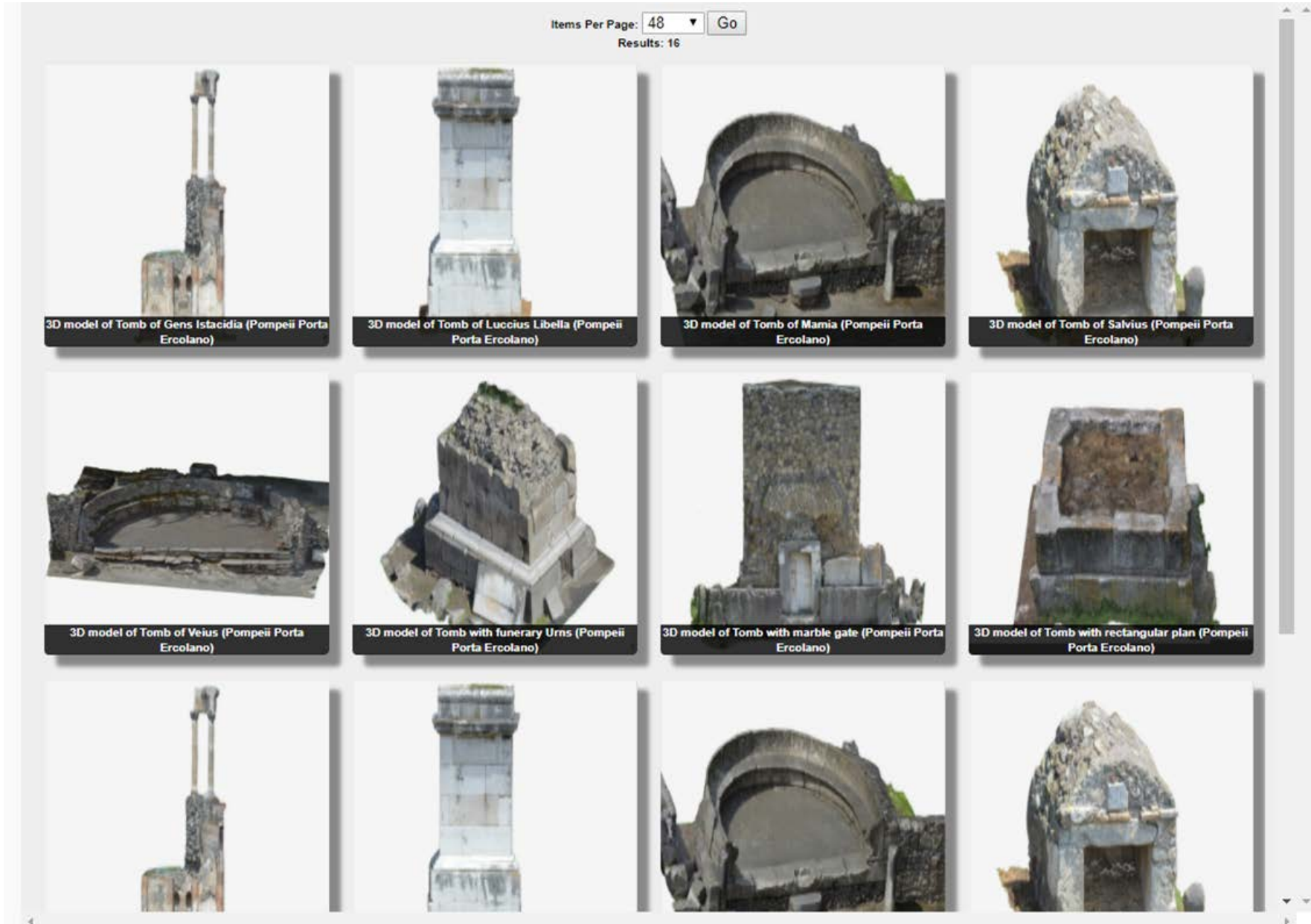
Reset search

















# 3D-ICONS: the project repository


Items Per Page: 48 Go  
Results: 16






 <p>3D model of Tomb of Gens Istacidia (Pompeii Porta Ercolano)</p>	 <p>3D model of Tomb of Luccius Libella (Pompeii Porta Ercolano)</p>	 <p>3D model of Tomb of Mamia (Pompeii Porta Ercolano)</p>	 <p>3D model of Tomb of Salvius (Pompeii Porta Ercolano)</p>
 <p>3D model of Tomb of Veius (Pompeii Porta Ercolano)</p>	 <p>3D model of Tomb with funerary Urns (Pompeii Porta Ercolano)</p>	 <p>3D model of Tomb with marble gate (Pompeii Porta Ercolano)</p>	 <p>3D model of Tomb with rectangular plan (Pompeii Porta Ercolano)</p>
 <p>3D model of Tomb of Gens Istacidia (Pompeii Porta Ercolano)</p>	 <p>3D model of Tomb of Luccius Libella (Pompeii Porta Ercolano)</p>	 <p>3D model of Tomb of Mamia (Pompeii Porta Ercolano)</p>	 <p>3D model of Tomb of Salvius (Pompeii Porta Ercolano)</p>

# 3D-ICONS: the project repository


3D model of Tomb of Mamia (Pompeii Porta Ercolano) Back



Metadata	Information
Appellation	3D model of Tomb of Mamia (Pompeii Porta Ercolano)
Address	Villa Delle Tombe, Pompei, Italy
Coordinates (Lat, Lon)	<a href="#">(40.75187, 14.48084)</a> <a href="#">Click to view it on Google Maps</a>
See it on Europeana	
Link	
Landing Page	

[Heritage Asset](#)   [Digital Resources](#)   [Paradata](#)

DR1

Metadata	Information
Thumbnail	
Name	Digital Resource of 3D model Tomb of Mamia
Type	3D
Format	pdf
Contacts	Andrea D_Andrea Coordinator CISA Palazzina B 8 Vico Santa Maria d_Agnone Naples 80139 Italy Italy +39081293501 cisa@unior.it Centro Interdipartimentale di Servizi per l'Archeologia



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