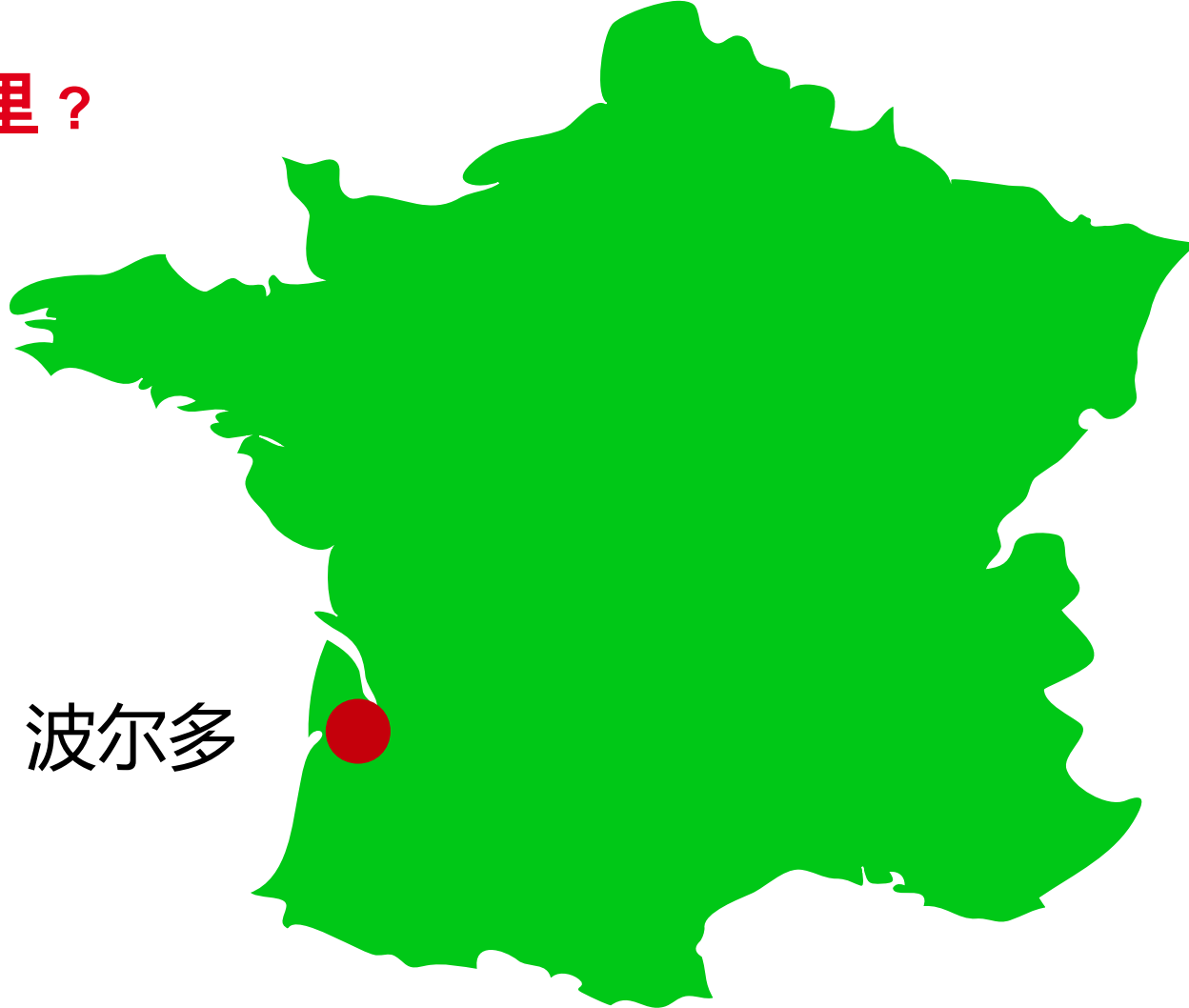


# 3D as a Service for Cultural Heritage

xavier.granier@institutoptique.fr

我们在哪里？



波尔多

法国

# Scientific Context

- Optic
  - Professor @ IOGS
  - Member of LP2N
  - Since 2012
- Computer Graphics
  - Head of MANAO team
  - 2011 – 2018
- Archeology
  - Archeovision
    - Scientific Director
  - 3D Constortium
    - Coordinator
  - Since 2017

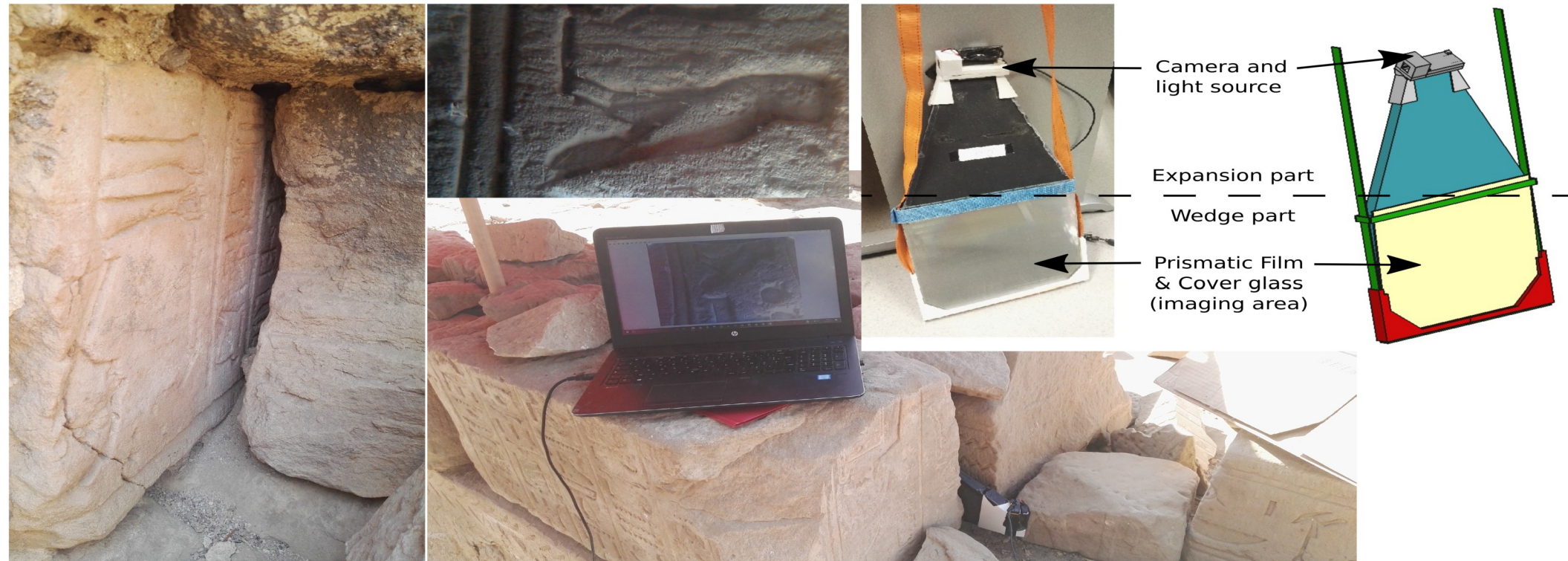
# 3D for Cultural Heritage

- How to acquire
  - Still some progresses for geometry
  - Challenges for Appearance
- How to analyze
  - Extract important structures
- How and What to visualize
  - Rendering styles
  - Tools for archaeologist
  - Tools for museum
- How and What to archive

# 1

## Acquire

# Unpublished – New device for acquisition



With IFAO – Imaging in cervices – Medamoud temple – Egypt

# En cours – acquisition d'apparence

- Very Large collection
  - Clothes from Asia
  - XIX<sup>th</sup> century
- Difficulty to expose them
  - Too fragile
- Goal of the collaboration
  - Create an exhibition
  - Original or actual state



Robe - Fish skin - painted et sewn

# Vietnam – Woman Cloth



MEB | MUSÉE D'ETHNOGRAPHIE  
DE L'UNIVERSITÉ DE BORDEAUX

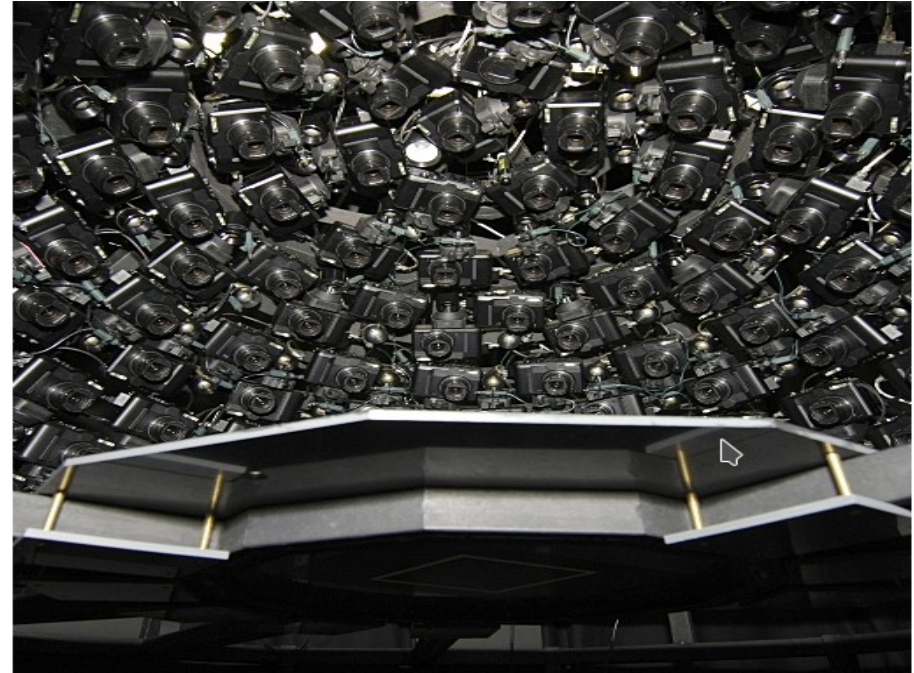




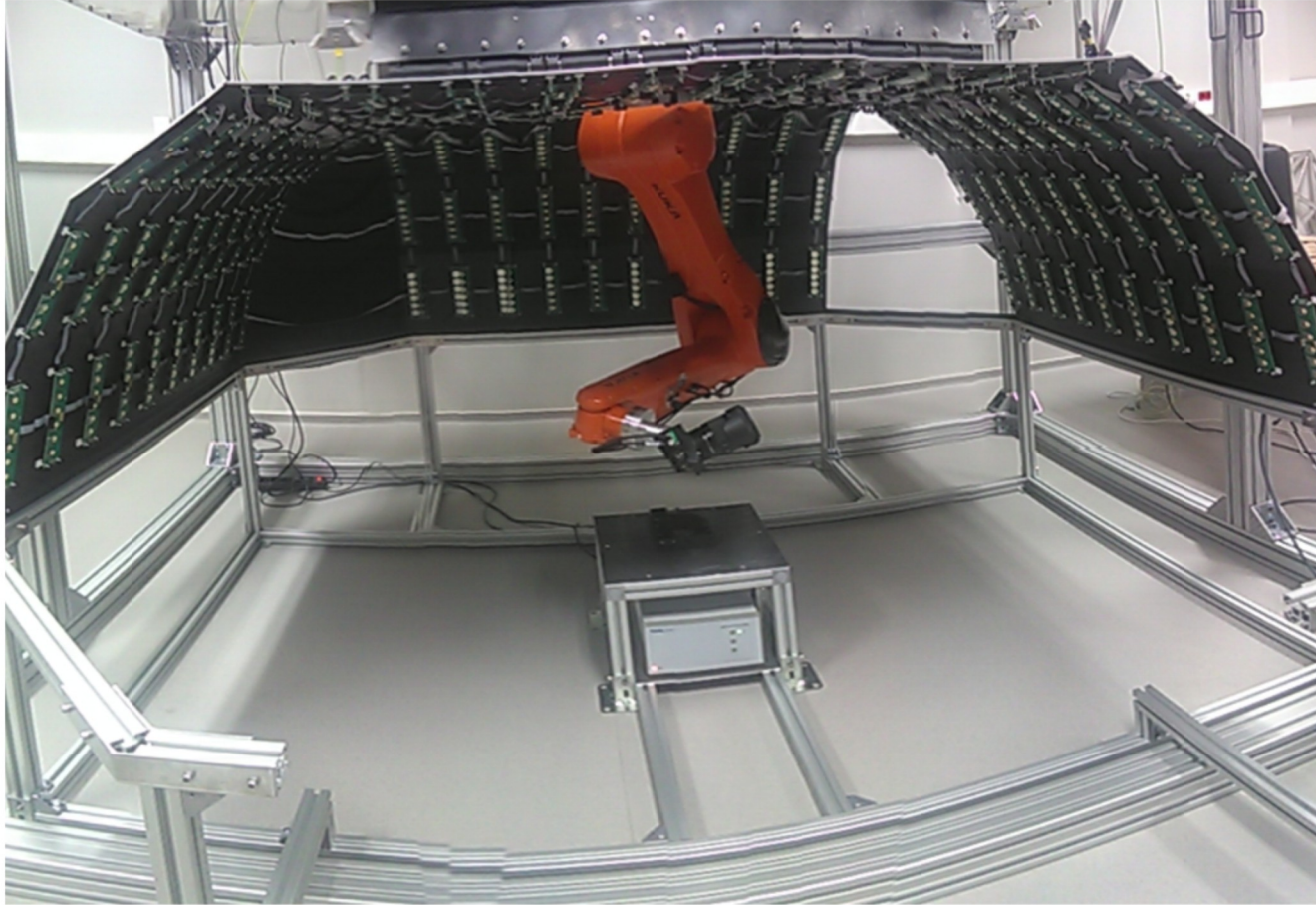
# New acquisition platform

- Prev. : *Integrated High-Quality Acquisition of Geometry and Appearance for Cultural Heritage*
  - Schwartz, Weinmann, Ruiters, and Klein
  - VAST 2011
- Scan whole clothes
  - > 1000 LEDS
  - 3D Scanner
  - Robot arm

<http://btf.cs.uni-bonn.de/viewer/>



## Current status



# 2

## Analyze

# Illustrative Shading



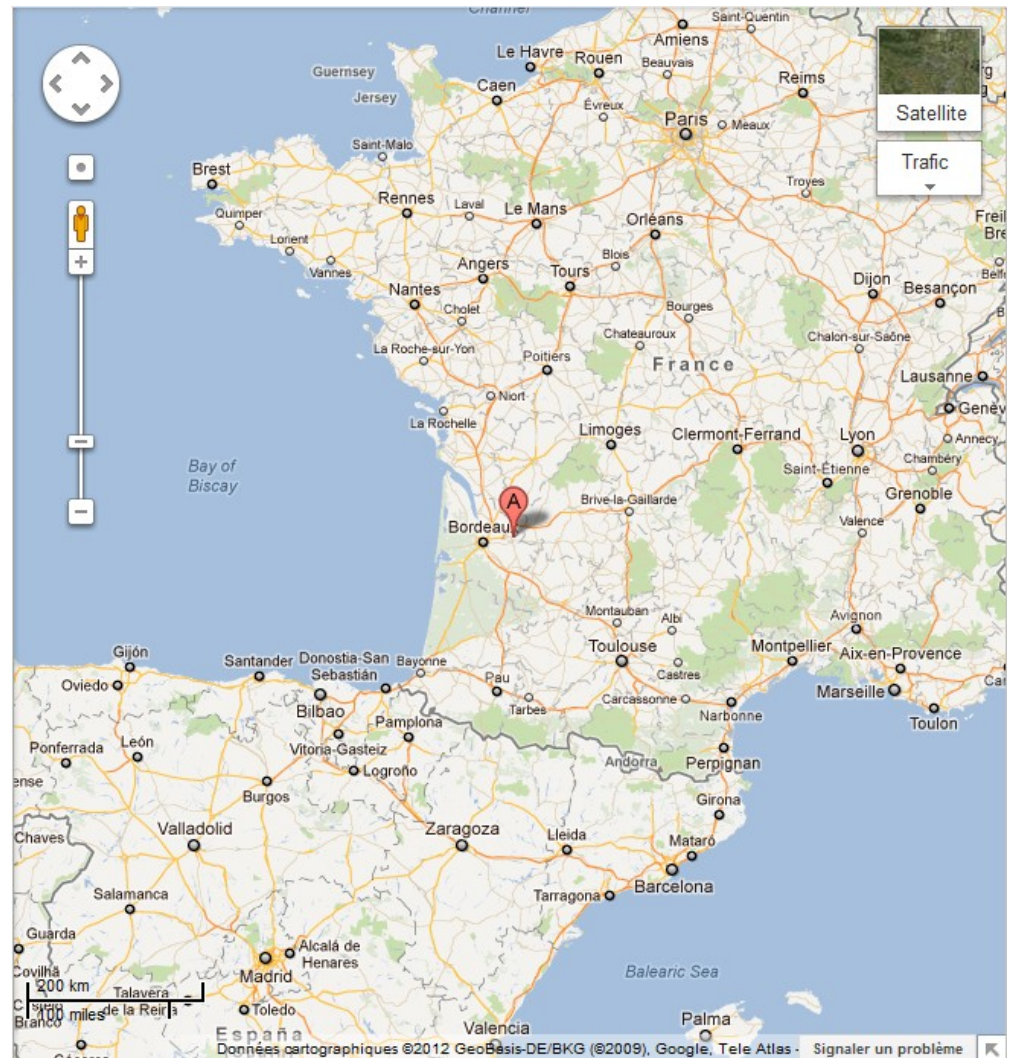
Classical Phong Shading



Illustrative Material

3D model of d'Isis (d'Alexandria Lighthouse)  
Acquired by **CEAlex** & **Archéovision**

# Epitaph of St. Emilion



# Epitaph of St. Emilion

- Discovered between 1934 and 1951
- Oldest written trace of St Emilion relics ?



Frédéric Boutouille (Univ. Bordeaux, CNRS)  
Pascal Mora (Archéovision, Univ. Bordeaux, CNRS)  
Romain Vergne (Inria, Univ. Bordeaux)

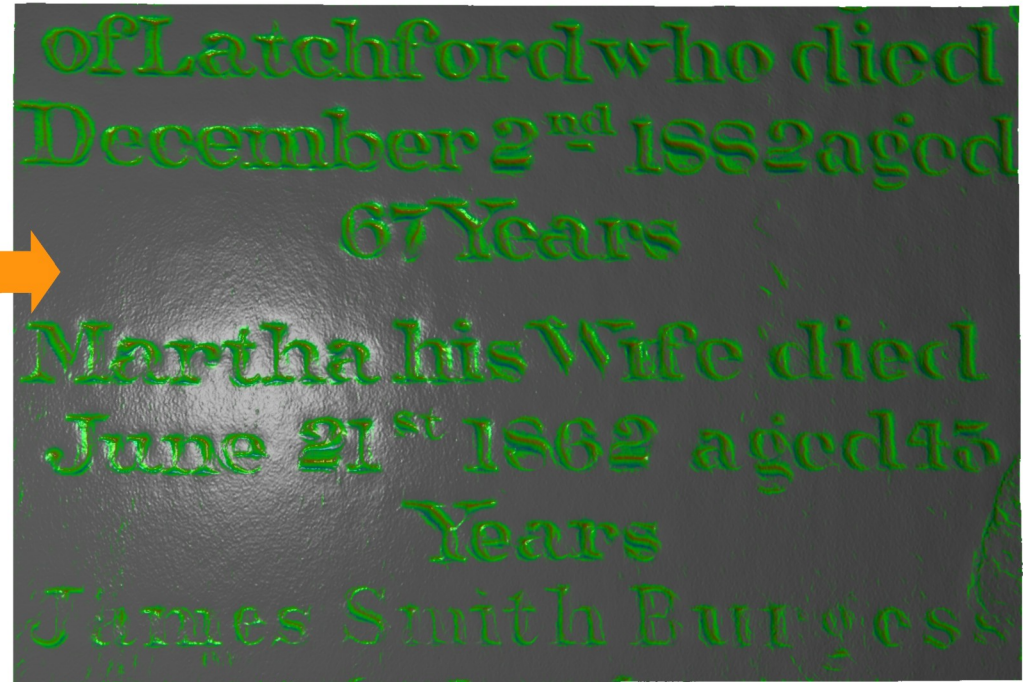
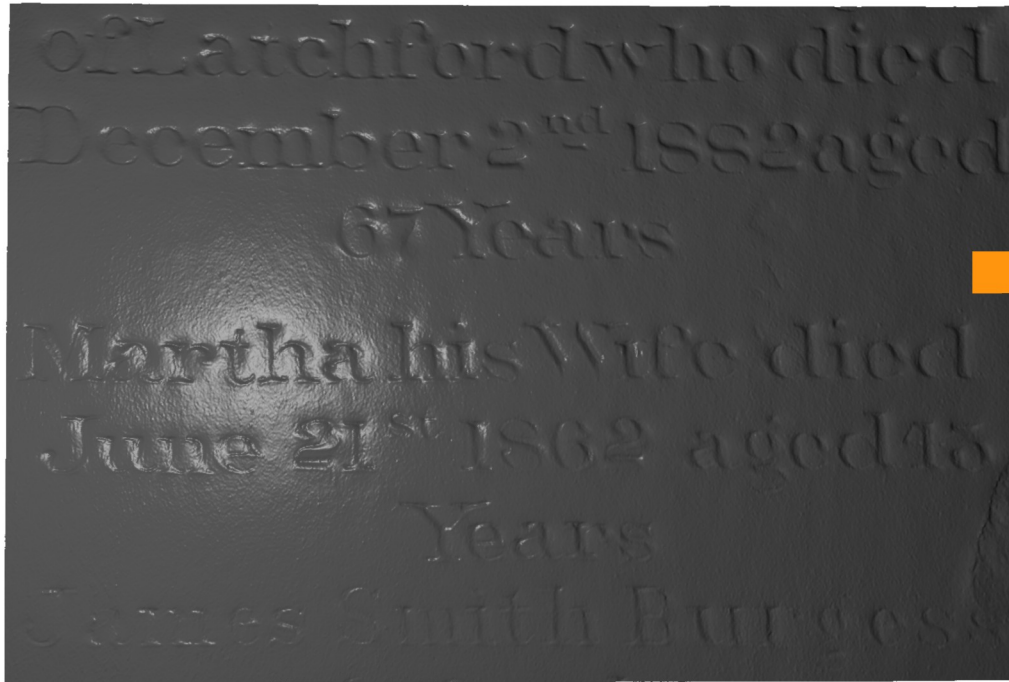


# Epitaph of St. Emilion



## Taking into account scale + filtering

### For Digital Squeeze





# Taking into account scale + filtering

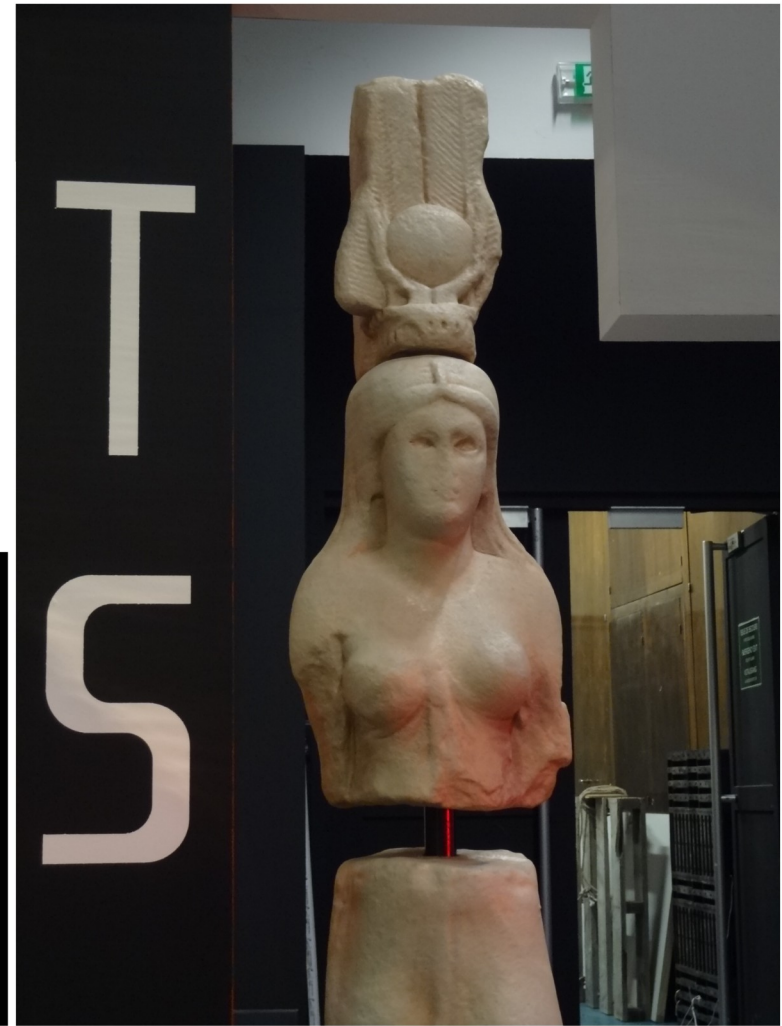
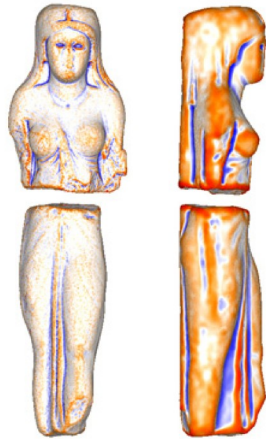
L. Amman, P. Barla, G. Guennebaud, X. Granier & P. Reuter  
*CGF 2012*



# 3

## Visualize

## Ex : Maritime museum (Paris)



# Spatial Augmented Reality

- From Prototype to museum
  - Real world as display support



# Spatial Augmented Reality

- From Prototype to museum
  - Real world as display support

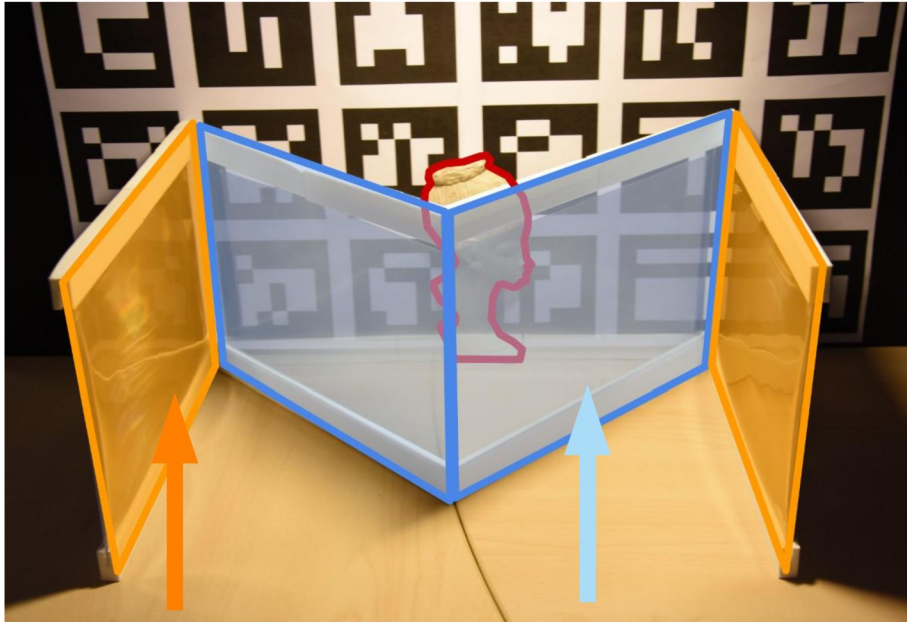


**Mercati di Traiano  
Museo dei Fori Imperiali**



ACM JOCCH 2014

# EgoSAR : Spatial Augmented Reality for Multiple Users

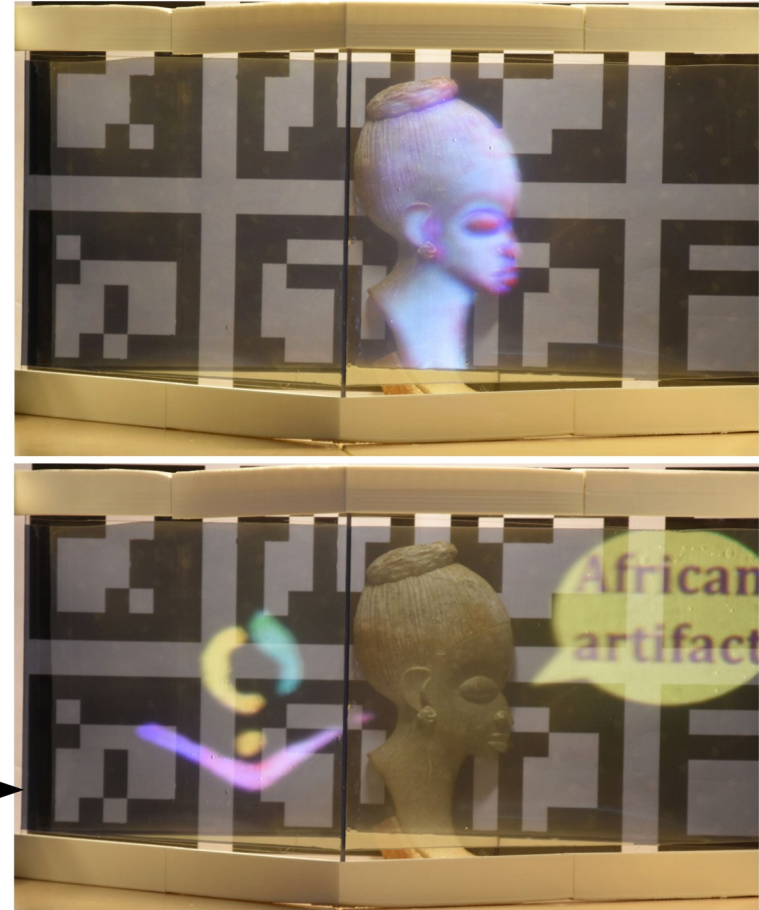


Retroreflection

Beam splitter

Personalized & view-  
dependant augmentation

IEEE ISMAR 2016



# 4

## Archiving



archéovision



Archeo**transfert**



UMS SHS-3D 3657

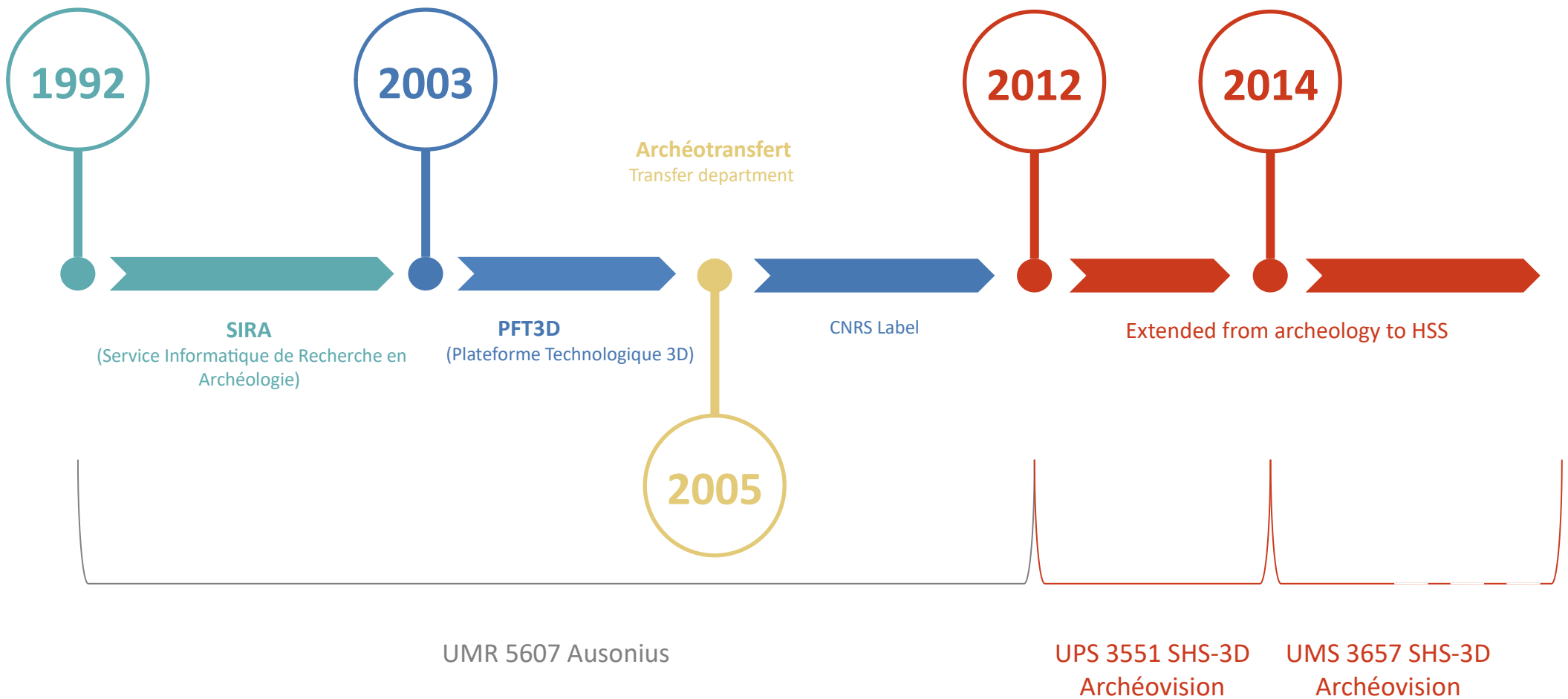
Cellule de transfert d'Archéovision



université  
de **BORDEAUX**



# 25 years of experience



# Archeogrid : more than 15 years of data organization

- Organize data from the team
- Data management
- Metadata enrichment
- Collaborative work with partners

The screenshot shows the Archeogrid website interface. At the top, there is a search bar and the Archeogrid logo. Below the logo is a navigation menu with icons for various categories. The main content area displays a list of projects under the heading 'Projets PFT3D'. The list includes various archaeological sites and projects, such as 'AKHENATON\_PERSONNAGE', 'ALESSA\_REMPARTS', 'ALEXANDRIE\_PHARE', 'AMARNA', 'AMARNA\_PLANTES', 'AUTUN', 'BARBEZIEUX', 'BARZAN\_ENTREPOTS', 'BARZAN\_HABITATIONS', 'BARZAN\_MACHINERIE', 'BARZAN\_THERMES', 'BERUGES\_REMPARTS', 'BORDEAUX\_GALLIEN', 'BORDEAUX\_GRAND\_HOTEL', 'BORDEAUX\_SAINTE ANDRE', 'BORDEAUX\_ST MICHEL', 'BRUNIQUEL', 'CASTELCULIER', 'CHAZAL', 'CONSTANTINE\_SANCTUAIRE', 'CONSTANTINOPLE', 'COPTOS', 'CUSSAC', 'DIAZ\_BASILIQUE', 'DELPHES', 'DELPHES\_SPHINK', 'DIE\_COMMARQUE', 'DOUGGA', 'ERCOLANO\_HERCULANUM', 'ERMANT', 'FONTENILLE\_GROSSE\_PEROITE', 'FONTENILLE\_MOTTE\_DE\_LA\_JACQUILLE', 'FONTENILLE\_PETITE\_PEROITE', 'FOURQUES\_SUR\_GARONNE', 'GAUZAC\_LATRINES', 'HYPOGEE\_DES\_DUNES', 'IDRIS', 'KARNAK', 'KHORSABAD', 'LANGOSRAN\_DONJON', 'LA\_RICHE\_ST\_COSME', 'LA\_SAUVE\_MAJEURE', and 'LEVALLOIS\_PERRIT\_CLEMENT\_BAYARD'. To the right of the list, there is a preview window for the 'Rite d'adoration par AKHENATON' project. The preview shows two 3D models of an Akhenaton statue, one in a naturalistic style and one in a more stylized, blue and gold style. Below the preview, there is a detailed description of the project, including its objectives, dates, financing, and complementary actions.

**ARCHEOGRID**

Projets PFT3D

- 2C30\_AUDREX (1703)
- AKHENATON\_LOUVRE
- AKHENATON\_PERSONNAGE**
- ALESSA\_REMPARTS (11)
- ALEXANDRIE\_PHARE (197)
- AMARNA (1374)
- AMARNA\_PLANTES (29)
- AUTUN
- BARBEZIEUX (705)
- BARZAN\_ENTREPOTS (622)
- BARZAN\_HABITATIONS (88)
- BARZAN\_MACHINERIE (1898)
- BARZAN\_THERMES
- BERUGES\_REMPARTS (26)
- BORDEAUX\_GALLIEN (103)
- BORDEAUX\_GRAND\_HOTEL
- BORDEAUX\_SAINTE ANDRE (3616)
- BORDEAUX\_ST MICHEL (4)
- BRUNIQUEL
- CASTELCULIER (101)
- CHAZAL (255)
- CONSTANTINE\_SANCTUAIRE (203)
- CONSTANTINOPLE (152)
- COPTOS (941)
- CUSSAC
- DIAZ\_BASILIQUE (18)
- DELPHES (30)
- DELPHES\_SPHINK (32)
- DIE\_COMMARQUE (65)
- DOUGGA (1818)
- ERCOLANO\_HERCULANUM
- ERMANT (26)
- FONTENILLE\_GROSSE\_PEROITE
- FONTENILLE\_MOTTE\_DE\_LA\_JACQUILLE
- FONTENILLE\_PETITE\_PEROITE
- FOURQUES\_SUR\_GARONNE (36)
- GAUZAC\_LATRINES
- HYPOGEE\_DES\_DUNES (17)
- IDRIS (55)
- KARNAK (1122)
- KHORSABAD (193)
- LANGOSRAN\_DONJON (522)
- LA\_RICHE\_ST\_COSME (268)
- LA\_SAUVE\_MAJEURE (35)
- LEVALLOIS\_PERRIT\_CLEMENT\_BAYARD (461)

Rite color 3D - 2015-2016

Projet : Rite d'adoration par AKHENATON

Objectifs scientifiques : Louvre : restitution des volumes et peintures d'un buste "Personnage" : restitution du SN-TA, site d'adoration sous les rayons solaires par Amenhotep IV et Nefertiti Animation 3D pour l'exposition "Atou-Num"

Date de début du projet : 2011

Date de fin du projet : EN COURS

Financement : ANR

Actions complémentaires : Revealing Flash Light

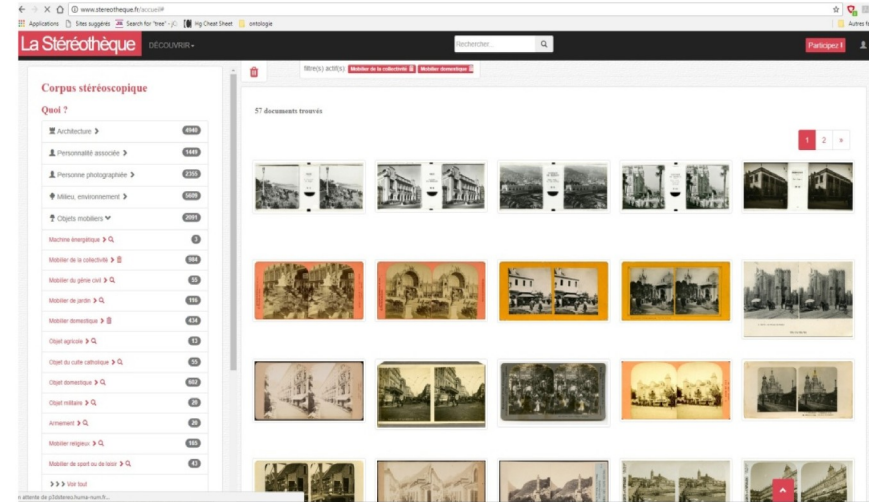
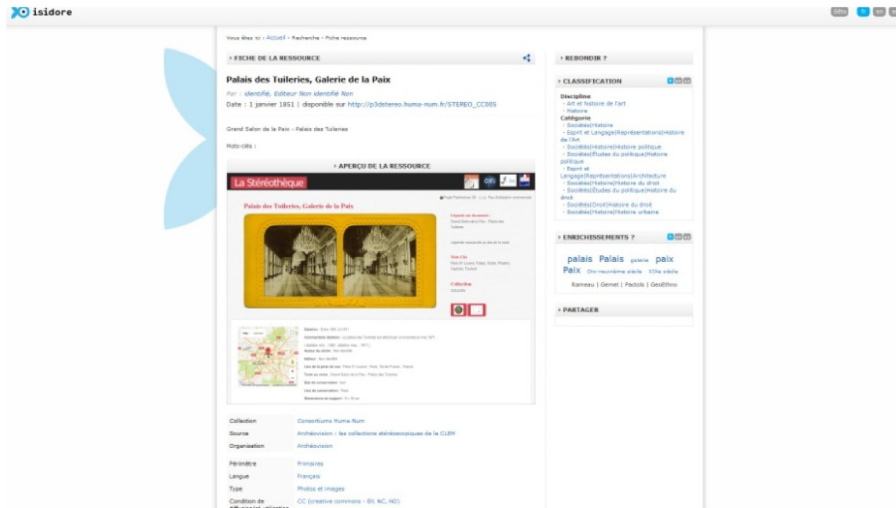
Etude sur le couleur du buste d'akhenaton, projection des couleurs sur le buste en 3D -> projet région Retrocolor 3D (2015-2016)

Restitution : oui

Acquisition : non

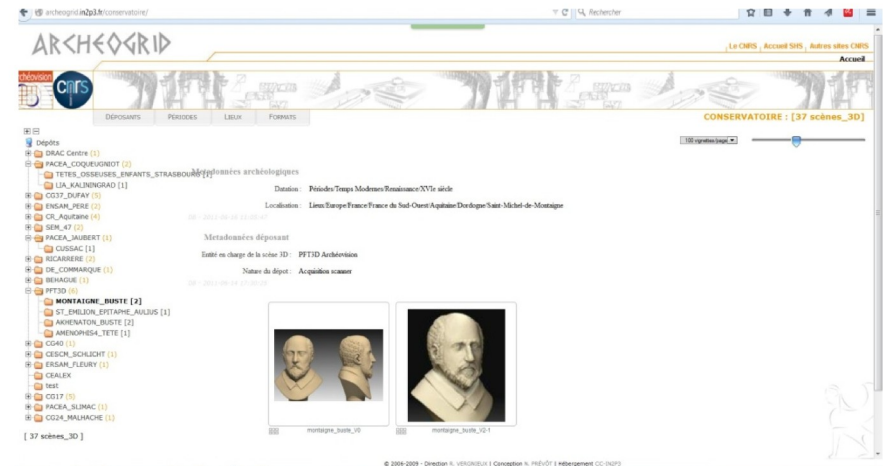
# Archeogrid: 3D data diffusion

- Publication of Corpus for research and other public with the Stereotheque
- Gathering and managing metadata



# Archeogrid: Data archiving

- Saving into Conservatory of 3D data for HSS, preparation to final archiving to CINES
- Servers from TGIR Huma-Num
  - National Digital Infrastructure for HSS



# 3D Consortium for Human & Social Sciences

*3D for all HSS*



Equipes membres du consortium 3D



<https://shs3d.hypotheses.org/>

# Goals

## Development & good use of 3D tools for HSS

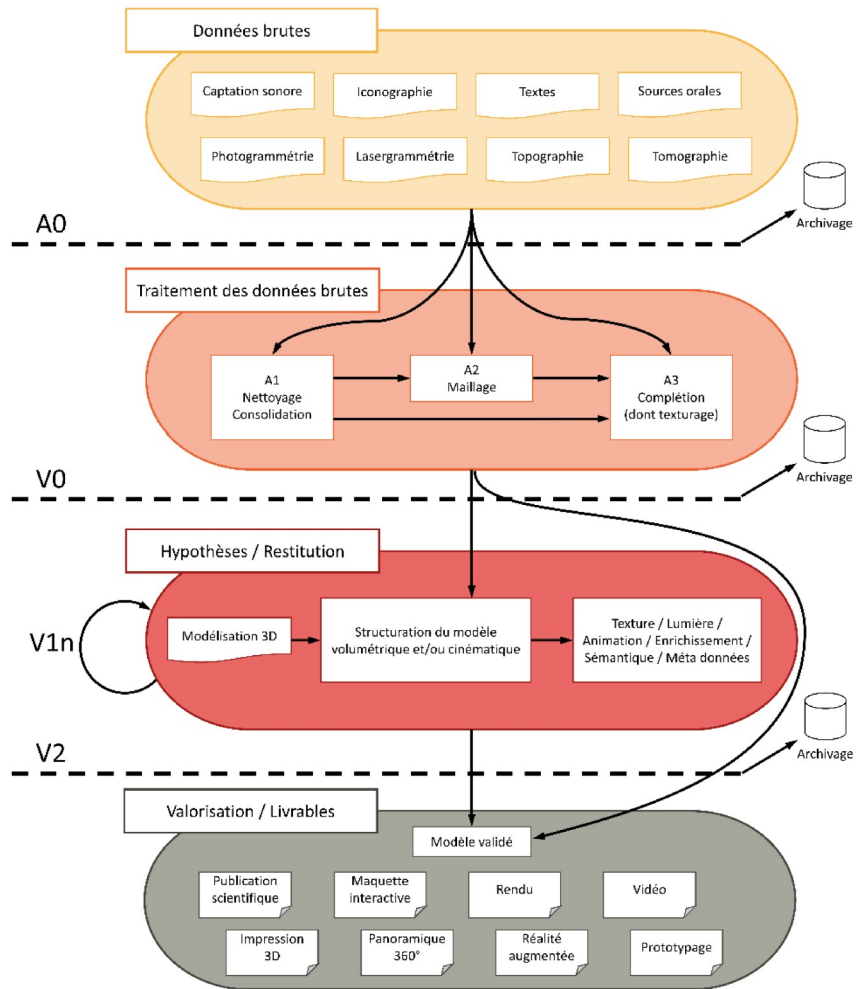
- 4 axes
  1. Technological review
  2. Elaboration and Transmission of Knowledge
  3. Life cycle, interoperability & archiving
  4. HSS meetings: exchanges of uses, communication & formation

[consortium3d-coordination@services.cnrs.fr](mailto:consortium3d-coordination@services.cnrs.fr)

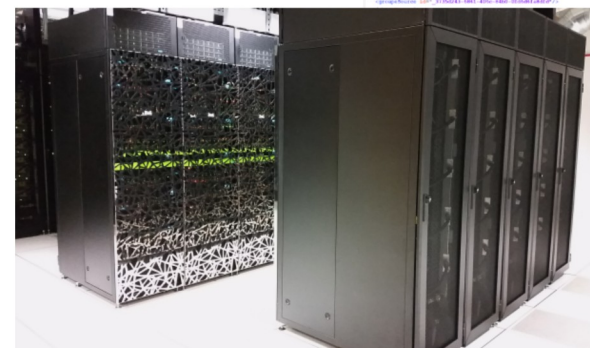
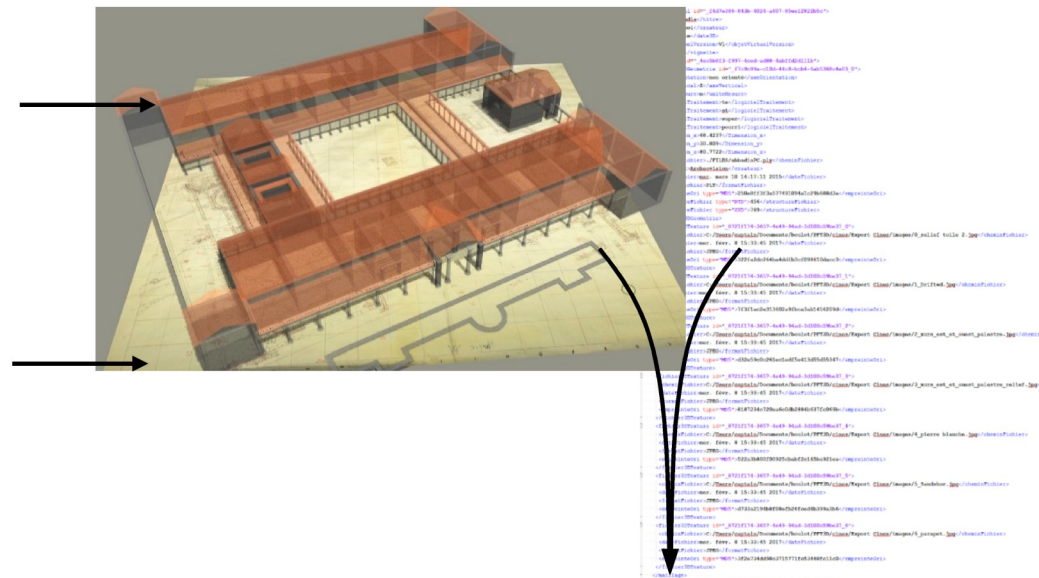




# Graphe séquentiel de la production de données 3D



# Archiving 3D data



# 3D Repository for HSS

- aLTAG 3D
  - Archiving software
  - Easy to create metadata
  - Packet creation
- Archiving @ CINES
  - Format ply / dae (COLLADA)
  - Currently in the process of finalisation



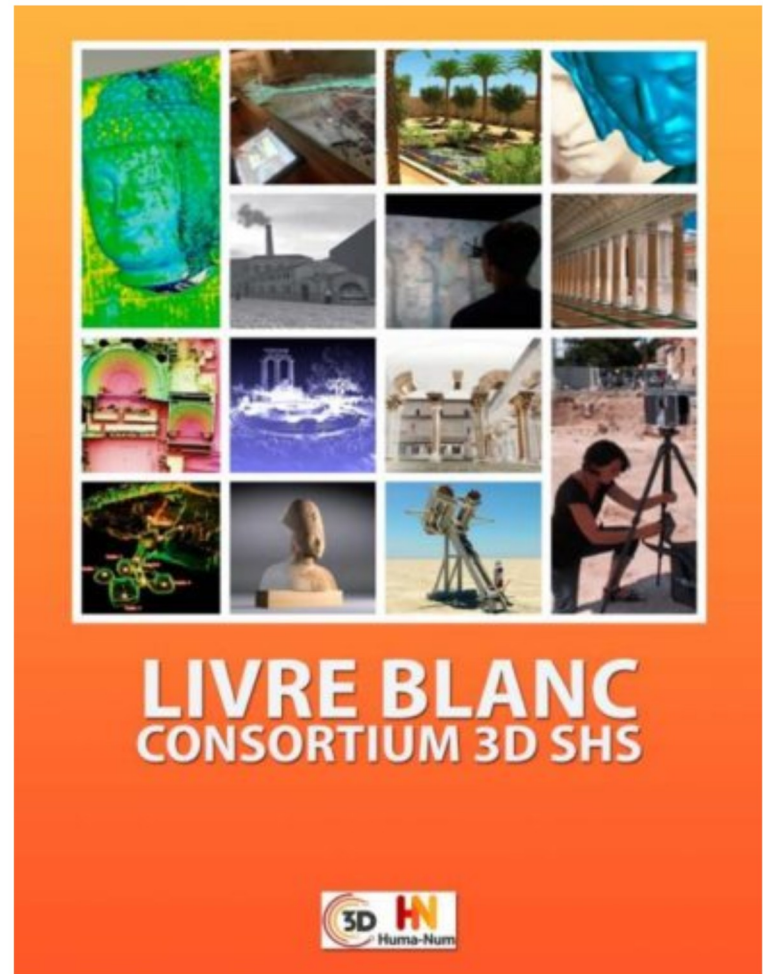
[consortium3d-coordination@services.cnrs.fr](mailto:consortium3d-coordination@services.cnrs.fr)



# White Paper

- Tools &
- Good Practices

<https://hal.archives-ouvertes.fr/hal-01683842/>



# 5

## Open to Collaborate

## We are open to collaborate

- Spreading the use of 3D for HSS
  - More international
  - What about a Chinese white paper ?
- Appearance Acquisition
  - New challenges
  - Development of tools for on-site acquisitions
- Visualization
  - New display systems
  - New HCI
- Archiving
  - Challenge: development of tools to explore the archived data
    - Semi-Automatic classification
    - Matching
    - ....

# 谢谢

<http://xgranier.free.fr>

