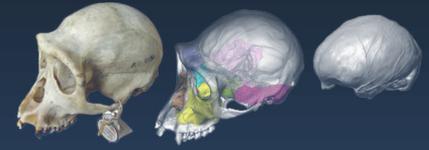


AGORA 3D

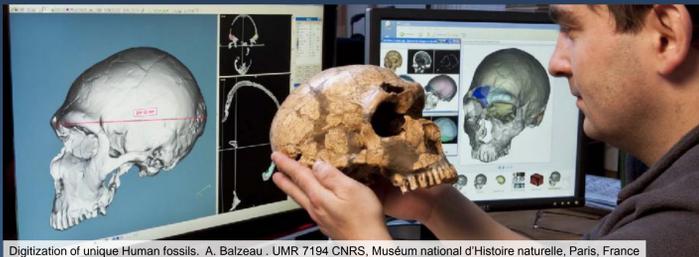
High resolution 3D digitization and scientific imagery of Natural History and Cultural Heritage collections.

J. Davy^{1,2}, J. Brecko³, S. Lemaitre³, A. Mathys¹, E. Gilissen¹, P. Mergen¹, C. Vastenhouw⁴, E. Buelinckx⁵, P. Semal³.

The Consortium of European Taxonomic Facilities (CETAF) which is the European network of Natural History Museums and Botanical Gardens is now including High Resolution 3D digitization in the future roadmap. More requests for destructive sampling for molecular analyses, isotope analyses or physio-chemical analyses require a "backup" of the collection specimen before its destruction. The creation of a virtual object with the highest possible resolution is then needed in order to preserve the original data of the specimen. The evolution of practices makes the new collected material not available for the increase of the physical collections of the institutions. After study, most of this material has to be repatriated to the country of origin. This is an issue for increasing the collections in terms of quantity and scientific value. The High Resolution digitization creates a virtual backup and allows scientists to continue to have access to the specimens for scientific studies even if the specimen is unavailable and to create in some cases physical reproductions for display in the Museums.



CT scanning of the "Pan paniscus" type. Collection RMCA. Image A. Balzeau, RMCA & MNHN, Paris.

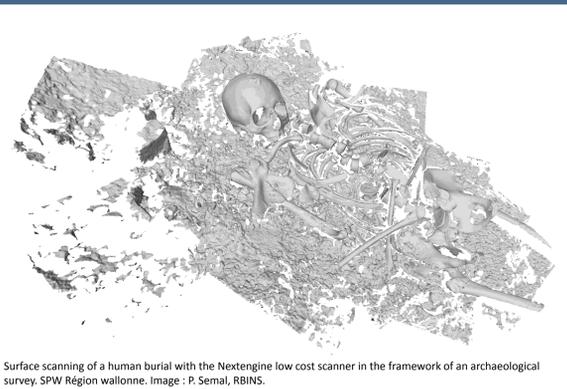


Digitization of unique Human fossils. A. Balzeau. UMR 7194 CNRS, Muséum national d'Histoire naturelle, Paris, France

Curators face a dilemma:

Preserving unique specimens while facilitating their scientific development whereas the repetitive use of collections may at times endanger the preservation of their integrity.

Recording archaeological structures



Surface scanning of a human burial with the Nextengine low cost scanner in the framework of an archaeological survey. SPW Région wallonne. Image : P. Semal, RBINS.

Large Variety of technologies:



Digitization equipment. Images, J. Davys, RMCA.

AGORA 3D

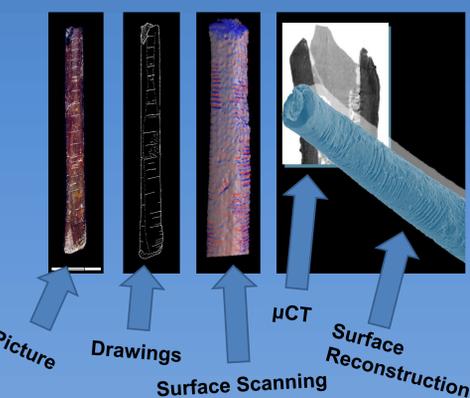
- Analyzes different non-destructive technologies
- 3D high resolution digitization of the Natural History and Cultural Heritage federal collections for scientific study.
- Bring together equipment and methods
- Endeavor to develop a common set of protocols and recommendations.
- Development of new technology is **not** the focus. It is making the best and most efficient use of the available technology.
- Evaluate the different 3D applications available on the market with special interest for Open Source technologies.

The activities developed in the framework of this project follow the international standards defined by the Biodiversity Information Standards (TDWG) such as BioCASE and GeoCASE as well as the Europeana standards such EDM (EUROPEANA Data Model) and ESE.

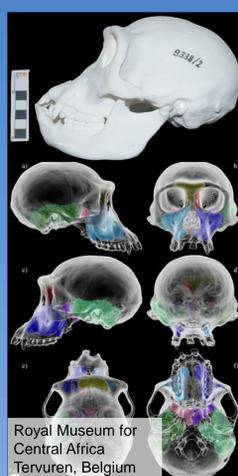
The AGORA 3D consortium is composed of 4 Belgian federal scientific institutions of the "Nature Pole" and the "Art Pole". The institutions involve in the project are :

- The Royal Belgian Institute of Natural Sciences ;
- The Royal Museum of Central Africa ;
- The Royal Museums of Art and History ;
- The Royal Institute for Cultural Heritage.

The goal is to maximize the collections represented. The partners in this project are already involved in several scientific programs using High Resolution digitization for scientific purposes. It is necessary to develop these technologies because they are used in many new fields of research in taxonomy, biomechanics, material science, archaeology and history of art. Universities, often developers of these techniques do not have a role as partner in the consortium, but could be considered as suppliers of technology.

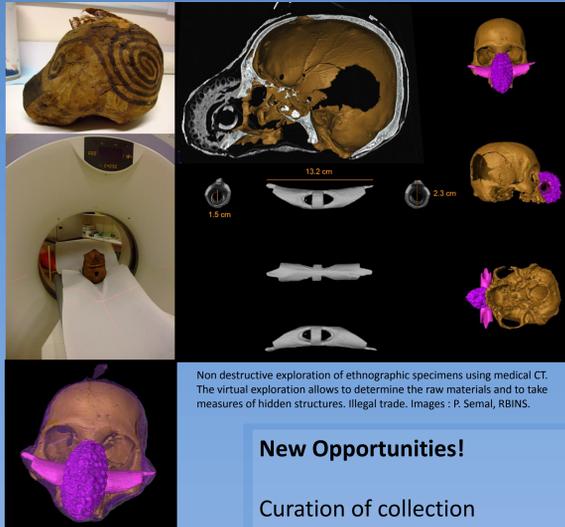


Digitization of the Ishango rod. Examples of the multiple techniques and potential information of each model. Collection RBINS. Images : P. Semal, RBINS.



Royal Museum for Central Africa Tervuren, Belgium

CT



Non destructive exploration of ethnographic specimens using medical CT. The virtual exploration allows to determine the raw materials and to take measures of hidden structures. Illegal trade. Images : P. Semal, RBINS.

New Opportunities!

- Curator of collection
- Virtual Backup (crash disaster)
- Non destructive technologies
- Sharing data with community
- Non-intrusive restoration aid

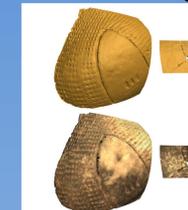
Scientific Research

- Access to hidden structures
- Morphometry
- Virtual histology

Dissemination

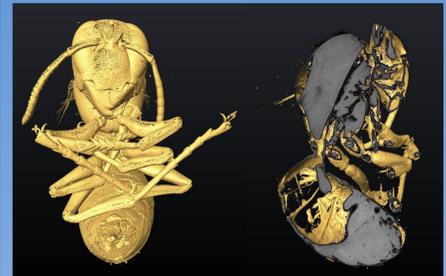
- Virtual Museum
- New displays in Museum

Surface scanning:



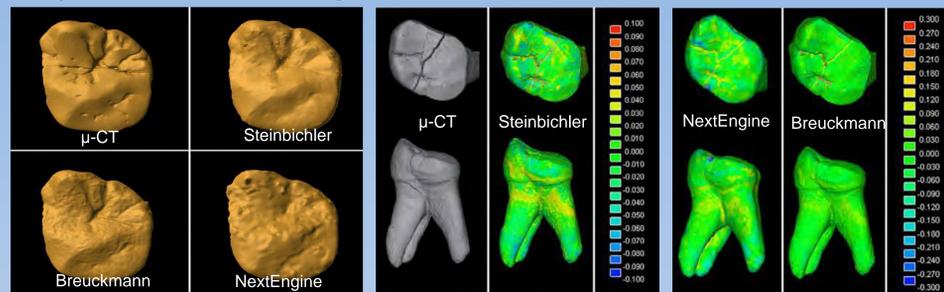
Rendering of a Neolithic pottery fragment scanned with DEIOS prototype surface scanner. Collection RBINS. Image : P. Semal, RBINS.

Internal structures

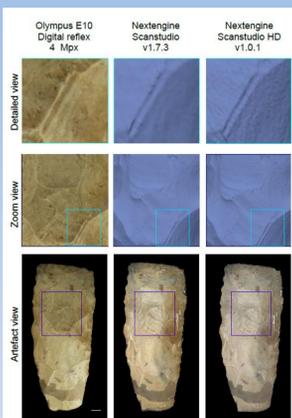


µ-CT and surface rendering of an insect. Image P. Semal, RBINS.

Comparison between technologies

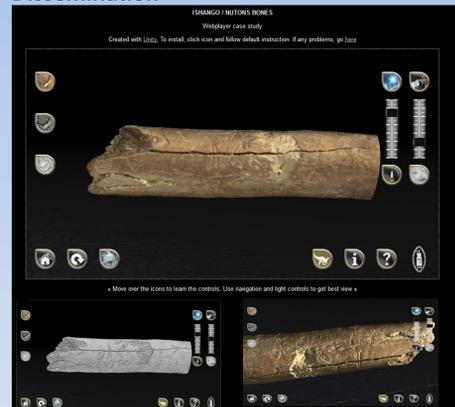


Visual and metric comparison between surface rendering of a Neanderthal tooth of Spy Cave digitized with µ-CT, high-end and low cost surface scanners. Collection RBINS. Images : P. Semal, RBINS; A. Slizewsky, Neanderthal Museum & M. Friess, MNHN, Paris.

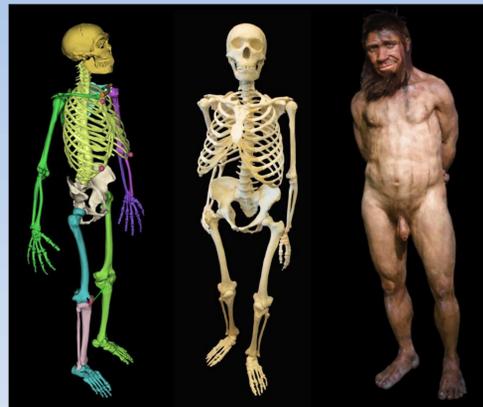


Surface and texture rendering comparison between digital picture and the Nextengine low cost laser scanner. Collection RBINS. Images : P. Semal, RBINS.

Dissemination



KU Visualization with real-time 3D rendering Web application (Unity 3D) a Paleolithic mobile art object digitized by photogrammetry (minidome). Collection RBINS. Image : M. Proesman, KULeuven, Belgium



Virtual reconstruction of the Spy II Neanderthal skeleton using LhpFusionBox developed by LABO, ULB. 3D printing of the bones and hyper-realistic reconstruction by A. & A. Kennis. Images T. Chapman, ULB, P. Semal, RBINS and T. Hubin, RBINS.

Can be applied to:

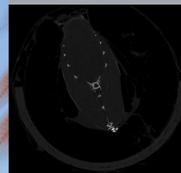
- Botany
- Geology
- Paleontology
- Zoology
- Archeology
- Anthropology
- Etc...

Needs:

- 3D Visualization
- Accuracy
- Texture on models
- Internal Structures
- "Landmarks" and Measures
- Traceability
- USER FRIENDLY!!!



Digitization of a specimen in alcohol.



µ-CT slice and internal structure reconstruction. Images : P. Semal, RBINS.

- Royal Museum for Central Africa (RMCA), Belgium
- Royal Botanical Garden of Belgium (RBGB), Belgium
- Royal Belgian Institute of Natural Sciences (RBINS), Belgium
- Royal Museums of Art and History (KMG-MRAH), Belgium
- Royal Institute for Cultural Heritage (KIK-IRPA), Belgium

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