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# The French National 3D Data Repository for Humanities: Features, Feedback and Open Questions

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We introduce the French National 3D Data Repository for Humanities, designed for the conservation and the publication of 3D research data in the field of Humanities and Social Sciences. We present the choices made for the data organization, metadata, standards and infrastructure towards a FAIR service. With 419 references at the time of the writing, we have feedback on some challenges to develop such a service and to make it widely used. This leads to open questions and future developments.

## Context

Research in the field of Humanities and Social Sciences (HSS) are integrating the use of 3D data in their scientific practice. With the democratization of 3D technologies, the increasing number of 3D models raises several questions [3] around a major one: how to ensure data transmission for future research? The resulting questions concern the archiving, conservation or publication processes, and thus the data format, the standard metadata and the infrastructure.

Archiving digital data is an issue for research and Cultural Heritage institutes [1]. In 2014, with the support of French national digital infrastructure for HSS (Huma-num), a consortium "3D for Humanities" has been created as a scientific network of 3D models producers and users in the field of archaeology and Cultural Heritage. It led to the deployment in 2018 of the National 3D Data Repository (CND3D) for the conservation and publication of 3D data, with all related documents and well-defined metadata scheme, within the goal of a FAIR service.

## Features

The CND3D is organized around the two notions [2] of

1. Virtual object: a 3D digital instance of a coherent entity, from a Cultural Heritage point of view: that has been digitized and/or resti-

tuted. Each virtual object includes not only the final model, but also to all the documents (from digital scans, images, ... to texts) that have been used.

2. Deposit: a collection of coherent virtual objects.

All the documents, the virtual object, and the deposit are associated with corresponding metadata.

**Findable and Accessible:** Publishing data means making them available to the scientific community. It is therefore necessary to ensure that documentation and metadata complies with interoperable standards. We use Dublin Core with an ongoing alignment with the CIDOC-CRM to integrate the European ARIADNE portal. While keeping the possibility of defining its own referential, the CND3D is aligned with PeriodO, Geonames and the PACTOLS thesauri.

The metadata can be filled on-line, or off-line with a specific open source software named aL-TAG3D (a Long Term Archive Generator for 3D). This software allows us to construct the package, object-by-object by attaching the sources to it and by filling in, at all levels the requested metadata. It was designed to simplify the tedious task of metadata filling for such complex data.

**Interoperable and Reusability:** A DOI is assigned at deposit and virtual object levels. This DOI allows publications in the open archive HAL

to point the referenced 3D. Reciprocally, the related publications in HAL are referenced by their unique identifier.

The ultimate goal of FAIR is to optimize the reuse of data. Standard 3D formats (PLY and DAE) and non-standard formats are allowed (later ones without archiving possibility). By using standards formats, data and metadata can be pushed to a long term archiving facility (CINES - National Computer Center for Higher Education).

**Storage:** We use a national networked distributed, long-term and secured storage facilities provided by Huma-Num. To preserve the accessing right on sensitive data, authentication and right management are included.

## Feedback

Creating new deposits and references to virtual objects requires the same amount of work than adding a classical publication on an open archive, despite a few more dedicated metadata for HSS referencement.

However, the time spent to actually deposit each object can be quite large, according to the data complexity since it contains not only 3D files, but also all the related documents. The quantity, as well as the variety of metadata is increasing with the different files, which can considerably increase the time required for a data record. Despite that aLTAG3D simplifies the process and is a real asset thanks to its easy handling and architecture, we have to develop more tools which ease data deposit, including plug-ins to automatically retrieve already existing metadata.

## Open Questions

Our tools will be evolving according to technology, but also to the needs of users, such as

the integration of a 3D viewer. Among existing technologies [1], we are experimenting 3DHOP for meshes and Potree.org for point clouds. But the main challenge is the creation of a perennial services while minimizing the required to be increased storage cost that has an economical and ecological impact that we can not neglect for such data sizes.

Other questions concern the possibility to define a standard and perennial use of the 3D model as a support of external references in the spirit of annotations or SIG. This comes together with the always increasing possible interconnections with other repositories by the use or newly defined or new metadata standards and will increase the visibility of the indexed objects.

The main challenge for the wide acceptance remains to ease the filling process of metadata for such complex data. It illustrates even more that any digitization project needs to integrate data management, and define the just amount of pertinent data to create, with a reduced but well documented number of files.

## References

- [1] Champion, E. and Rahaman H. "Survey of 3D Digital Heritage Repositories and Platforms." *Virtual Archaeology Review* 11, no. 23 (8 July 2020): 1-15.
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- [3] Münster, S. et al. (Eds.). (2016). *3D research challenges in Cultural Heritage II: How to manage data and knowledge related to interpretative digital 3D reconstructions of Cultural Heritage*. Springer.