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Scanning Authenticity: On the Limits of 3D Representation in Museums

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Abstract

The integration of 3D technologies into museum digitization practices offers new ways to visualize and explore cultural heritage objects. However, translating physical artefacts into digital models raises critical questions about what is captured, how, and why. This paper investigates how features associated with authenticity—such as traces of use, damage, and material ageing—are identified and represented in 3D digitization workflows. Drawing on case studies from Culture Heritage Institutions, the analysis focuses on the tension between what is technically possible during data acquisition (e.g., geometry, colour, surface detail) and what museums define as authenticity-relevant features. It also considers the extent to which these decisions lie in the domain of technical data versus interpretation and documentation. The paper argues that authenticity is not a static property of the object, but a relational concept shaped by institutional priorities, available technologies, and curatorial intent. A typology of representational strategies is discussed, along with reflections on the limitations and performance of digital reproduction. Ultimately, the paper calls for greater transparency and critical reflection in the production of 3D models, particularly when they serve as scholarly or public proxies for original artefacts. Using the example of the Greek funerary reliefs in the Collection of Classical Antiquities of the Berlin State Museums, we will discuss in detail the implications of these observations for the negotiation process between museum and data producer and user.

1. Introduction

The digitization of museum objects has been an integral part of museum practice for a considerable period. Three-dimensional digitization facilitates not only the technical reproduction of geometries, textures and colours, but also the emergence of new forms of mediation, research, and the culture of remembrance. Nevertheless, the quality of a digital twin is not solely determined by the precision of the data; rather, the question of how the authenticity characteristics of an object can be represented digitally is paramount. The crux of the issue is not the extent to which the digital copy formally resembles the original, but rather the question whether and to what extent central characteristics, such as materiality, traces of use, or historical contextualization, can be digitally transferred and documented.

This paper explores the strategic potential of Cultural Heritage Institutions (CHIs) in influencing the realm of 3D reproductions. Through a meticulous examination of targeted planning methodologies and the conceptualization of a digital authenticity profile, this study seeks to elucidate the manner in which CHIs can wield influence over the 3D reproduction landscape. The focus of this study is the intersection between technical feasibility and curatorial relevance: The following questions must be addressed: which features should be transferred, which ones can be transferred, and how can the difference between these two groups be made transparent?

The study is structured into five interrelated sections. It begins by establishing a conceptual framework through an examination of the notion of authenticity in the museum context. Building upon this foundation, the second section investigates the role of digital twins as information-based surrogates and reflects on their potential to convey object-related knowledge. This discussion naturally leads into the third section, which outlines the technical and conceptual requirements for generating, organizing, and documenting 3D data in a manner that preserves its interpretative value. The fourth section deepens the inquiry by focusing on the digital representation of authenticity attributes, addressing both their formal articulation and their epistemological implications. These considerations set the stage for the fifth section, which turns to questions of reliability, provenance, and the conditions necessary for sustainable reuse of 3D data within and beyond institutional contexts. Finally, the theoretical and methodological issues explored throughout the study are brought together in a case study on the digital documentation of Greek tomb reliefs from the Collection of the Antikensammlung at the Staatliche Museen zu Berlin, illustrating how authenticity can be meaningfully represented in digital form.

2. Defining the conceptual context

The concept of 'aura' (Benjamin, [1936] 1991), which is deeply rooted in the Benjaminian tradition, has been a central theme in discussions on authenticity in museum practice for decades. This concept has been a recurring subject in the literature on the reproducibility of original objects in CHIs and in heritage management. The examination of this topic has a long-standing tradition. According to Benjamin ([1936] 1991), an “auratic object” is closely interconnected with its presence in time and space—its “here and now of the artwork”. Its presence is invariably unique, intricately interwoven with the specific geographical location in which it is situated. It is a witness to time. In the object's “physical structure” (Benjamin, [1936] 1991), temporal traces and material changes manifest themselves, as well as its interweaving with cultural and historical lines of tradition (Benjamin [1936] 1991; Stopka, 2022).

The accession of an object to a museum is subject to a series of defined protocols and authenticity mechanisms (Stopka, 2022), which are based on the examination of authenticity, identity, and preventive conservation measures. This process encompasses not only the investigation of an object's legal and historical biographies, such as through provenance research and the establishment of ownership, but also the execution of technological analyses of the artefact. A thorough analysis is conducted on the materials, chemical compositions (for instance,

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of pigments) and other properties. Even works that are born digital are subject to forensic methods for the storage of data integrity, for example through the use of checksums.
The process of registration and inventorying objects within a museum facilitates the establishment of their new identity, thereby integrating them into existing collection contexts. The implementation of conservation and security measures is adapted to the specific object in question, with consideration given to its fragility and materiality. These processes add new layers to the object's biography—an idea central to Benjamin's concept of the original's aura.
Museums function as authorized sites of authenticity (Smith, 2006; Stopka, 2022). In a variety of presentation formats and exhibition scenarios, they demonstrate the performative power of authenticity and facilitate the experience of the Benjaminian concept of the "here and now" (Benjamin, [1936] 1991) of auratic objects.

At the same time, this institutional practice of authenticity repeatedly necessitates the production of reproductions (Zuanni, 2023)—for research, exhibitions, documentation, or merchandising. In this context, reproductions serve to mediate and preserve the authenticity of the original (Stopka, 2022). Standardized technical reproduction—especially through digitization—plays a central role in this process. In the fields of 2D and 3D digitization, internationally established guidelines already exist for acquisition, data processing, documentation, and multimedia visualization. These include, for example, the FADGI (2023) standards and the *Metamorfoze* preservation guidelines (2024) from the Netherlands. Such frameworks help ensure that the material properties of an object—such as colour accuracy, texture, surface structure, geometric precision, lighting effects, and depth—are faithfully reproduced. They provide methodological and technical orientation but do not constitute formal quality standards or automated validation processes.

Although both *The London Charter* (2009) and *The Seville Principles* (2011) outline essential methodological and scientific principles for the acquisition and visualization of 3D data, they remain at the level of general recommendations. They do not define binding standards for practical implementation (Vico Lopez, 2018). As a result, central questions of "intellectual transparency" (Baker, 2025; Hermon and Niccolucci, 2018) in 3D paradata production remain "unresolved" (Huvila, 2025).

Ensuring the highest technical quality in digital reproductions is not merely a technical objective—it directly impacts public perception and trust in digital representations. A compelling example is the so-called "Yellow Milkmaid Syndrome" (Verwayen et al., 2011): The mass circulation of over 10,000 low-quality digital images of Vermeer's *The Milkmaid* online created a distorted visual impression, misrepresenting the work's original colour spectrum and detail. As a result, many visitors to the Rijksmuseum questioned the quality of even the institution's high-end reproductions, such as those printed on museum postcards. This phenomenon prompted the museum to develop new business models focused on the production, quality assurance, dissemination, and licensing of museum data (Verwayen et al., 2011).

Museums therefore act not only as guardians of an object's authenticity, but also as contributors to the "quality of our collective memory" (Verwayen et al., 2011). Operating at the interface of material heritage and digital representation, CHIs assume a mediating and responsible role by producing and providing high-quality, trustworthy digital representations (Verwayen et al., 2011).

This paper does not aim to settle whether digital reproductions of cultural objects inevitably lead to a loss of aura. Rather, it emphasizes that digital reproductions have become a central part of authentication mechanisms within CHIs. It is crucial not to view digital replication as merely a technical step in an object's lifecycle (Smith, 2006). Their significance lies in their performative capacity: they open new spaces of meaning in relation to the original and enable new forms of perception, engagement (Jones et al., 2018), and experience with cultural heritage.

These digital twins realize their potential through multimodal dissemination and active interaction—even beyond authorized sites. Nevertheless, their impact and trustworthiness remain linked to their provenance and to the data quality guaranteed by CHIs. This underscores the need to understand and design digital reproductions strategically—as tools for access, mediation, and active cultural memory—not in contradiction to, but in dialogue with, the material authenticity of the original. In this sense, the question of an object's authenticity remains central to heritage practice in CHIs, as does the question of how authenticity is handled in the digital practice of cultural heritage (Di Giuseppantonio Di Franco et al., 2018).

One of the aims of this text is therefore to demonstrate how a strategic, practice-oriented, and implementable collaboration between different stakeholder groups—primarily between 3D technology experts and CHIs—can successfully produce high-quality digital reproductions.

Although digitization has become a routine part of museum operations, 3D digitization remains a technically and resource-intensive endeavour. Planning, execution, data curation, publication, and long-term accessibility of 3D data are not yet governed by broadly established standards (Manz et al., 2023). Despite the widespread availability of 3D data acquisition technologies recently, their application often remains limited to specialized professionals, particularly due to the complex and labour-intensive nature of post-processing and data evaluation (Hernández-Muñoz, 2023). For CHIs, this represents a significant financial and operational burden.

These challenges are further compounded by the high-quality expectations placed on 3D data production. As outlined earlier, digital reproductions are more than mere facsimiles—they serve as vessels of collective memory. Central to this discussion is the question of how mechanisms of authenticity can serve as the foundation for defining quality criteria in the creation of high-fidelity digital twins. This paper does not focus on the advanced position of Latour and Lowe (2011) concerning the migration of the aura into digital objects per se. Rather, in the spirit of their work, it engages with the question: What constitutes a good reproduction—particularly in the context of object conservation, where the original is constantly being reproduced (Latour and Lowe, 2011)?

The approach of using authenticity as a basis for defining quality criteria in the creation of digital surrogates is not intended to position CHIs exclusively as authorized custodians of the authentic. Instead, the aim is to recognize the specific expertise of CHIs in dealing with authenticity within heritage practice and to transfer this expertise into the domain of digital heritage. The goal is not to define the concept of authenticity itself—that would go beyond the scope of this paper—but to examine how understandings of authenticity can be strategically integrated into digital reproduction processes.

In planning and implementing 3D reproductions, the focus should not be on the dichotomy between materiality and digitality as opposing poles (Di Giuseppantonio Di Franco et al., 2018). Rather, the central question is: What characteristics render a cultural object authentic—and how can these characteristics be translated into digital form using current technologies? The emphasis, then, is not on the binary distinction between original and copy, but on the performative capacity of high-quality 3D data: its ability to enable new scenarios of democratization, the emergence of alternative narratives, and expanded access to cultural heritage (Di Giuseppantonio Di Franco et al., 2018; Jones et al., 2018).

3. The Aura of the Aura – That's Just a Copy

The question whether a digital surrogate or a digital twin has an aura is not the focus of this article. This debate has been comprehensively explored by numerous scholars (e.g. Jeffrey, 2015; Jeffrey et al., 2020; Jones et al., 2018; Latour and Lowe, 2011). Instead, the focus here is on the genesis of digital twins and the function and effect of these copies in relation to museum authenticity mechanisms. The emphasis is not on the performative power of their potential authenticity, which is comparable to their physical counterparts, but on the fundamental understanding of their function and the potential that good digital reproductions offer in a museum context. This understanding enables a well-founded and strategically embedded approach to the conception, production, dissemination and long-term archiving of such digital objects in everyday museum life. Furthermore, these provisions enable the utilization of the objects by external parties, such as academic institutions or educational facilities. Consequently, these entities are able to incorporate the objects into their instructional practices, irrespective of geographical location or scheduling.

Zuanni (2023) posits that real and digital objects are fundamentally different entities. Digital twins are created as products of a specific reproduction process. These models are not merely representations of physical forms; they have evolved to encompass a broader functionality. As Huvila (2025) notes, they have become "functional replicas that replicate entire systems", thereby enabling simulations, interactions and dynamic analyses that extend far beyond mere representation. This development marks the commencement of their own biography as digital objects (Zuanni, 2023). The documentary function, embedded in contexts such as research, analysis and mediation, is an integral part of museum authenticity practice. As posited by Jones et al. (2018), such processes facilitate the attribution of authenticity or forgery within authorized sites, such as museums.

In this regard, the digital reproduction process is intricately linked to the following question: The present study seeks to address the fundamental question of authenticity in the digital age. In this regard, it is crucial to ascertain the extent to which authenticity can be reproduced digitally and to what degree it can be replicated through technological means. (Di Giuseppantonio Di Franco et al., 2018).

The definition of authenticity cannot and should not be understood monolithically; rather, it must be negotiated collectively by CHIs, academics, practitioners, and communities of origin. As stated in the section entitled 'Values and Authenticity' of *The Nara Document on Authenticity* (1994), authenticity is assessed based on various sources of information, including form, materiality, substance, function, context, technique and traditional contexts (Lemaire and Stovel, 1994).

Should the real existing object be comprehended as a meaningful source of information, it is possible to deduce which information is central and thus determine which aspects should be integrated into a digital reproduction process. The subsequent stage of the research is to ascertain the extent to which authenticity, understood as information content, can be represented digitally. In the contemporary era of technological advancement, the frontiers of technical capabilities, data acquisition, processing, and visualization are perpetually being redefined. The rapid evolution of recording and processing tools necessitates a constant re-evaluation and adaptation to prevailing developments in the field.

Contemplating the extent to which authenticity can be digitally reproduced raises questions that extend beyond mere technical or philosophical considerations. This issue directly influences content-related decisions and the practical implementation in museum settings. Depending on the objective – be it for research, mediation, restoration, archiving or public relations – the requirements for digital reproduction vary considerably. In the context of museum practice, the pertinent questions are not only 'How exactly?' but also 'What for?': In order to fulfil their function, it is essential to ascertain the specific information that must be digitally available in terms of its quality, depth, and form. It is evident that the optimal scenario would involve the capture of objects at the highest possible resolution. This approach would ensure the efficiency of the digitization process, thereby facilitating the derivation of all derivatives from a single model. However, given the current technical capabilities, this would necessitate an effort that is difficult to justify. Consequently, a compromise must be made between an efficient recording and processing process and the highest attainable quality. This compromise is continually renegotiated against the backdrop of technological evolution.

In this context, it is imperative to emphasize that technical decisions pertaining to digitization, encompassing both two-dimensional (2D) and three-dimensional (3D) modalities, are profoundly contingent on the technological capabilities available at the time of data collection. It is evident that the primary objective is to attain the utmost image quality, characterized by resolution, colour fidelity, accuracy, and the intricacy of the details. However, an exclusive focus on technical criteria, such as hardware, software, and image processing, would impose significant limitations on the performative potential of the digital copy, particularly in relation to future usage scenarios, given the rapid pace of technological change (Chapman and Kenney, 1996).

Notwithstanding these technological dependencies, decision-making processes for digital reproduction should not be confined to technical aspects alone, but rather guided by the different levels of information that the original brings with it (Chapman and Kenney, 1996). These content-related qualities, including material, contextual and symbolic meanings, should be given primacy and reflected upon at the moment of recording. Digital representation, where possible, is also recommended. It is important to note that this is particularly evident in the context of rapidly changing technology, where original works remain relatively static and are subject to the effects of ageing. However, as has been increasingly observed recently, original works are also susceptible to threats from political, military, and climatic influences.

From a strategic perspective, this signifies that authenticity criteria should not merely be applied retrospectively to the digital replica, but rather should be integrated into the planning process of 3D digitization at an early stage as a design element. The evaluation of museum collections should be informed by a range

of criteria, including the complexity of the material, its conservation relevance, the object's biography, and its representativeness. These criteria should already play a central role in the process of selecting objects for display. In the course of data collection, curatorial assessments can be linked to technical parameters. Such parameters may include resolution, scanning methods and texture capture.

An integrative approach would help to ensure that technical reproductions are not created in isolation from the museum's logic, but rather continue it. The objective is to develop a digital authenticity profile, defined as a documented set of information that facilitates comprehension of the aspects of material authenticity and object biographical contexts that have been deliberately transferred to the digital reproduction, as opposed to those aspects that have not been transferred. To illustrate this point, one may consider the potential for the digital visualization or annotation of traces of ageing, restoration work, or material properties. It is evident that the latter step is not a trivial one. It is important to note that conventional recording methods are only capable of transferring the geometry and colour of an object into a model. Other optical properties of the material, such as reflections or transparency, can only be transferred from the physical object to its virtual copy through visual comparison. This step has been largely neglected to date, yet it is crucial for authenticity and the use of the model as a representative of the original.

The implementation of such a digital authenticity profile plays an essential role in subsequent decision-making processes during data collection and further modelling work, especially if these strongly intervene in interpretative areas of visualization (Baker, 2025). In the present context, it is imperative to acknowledge the pivotal role of a predefined and meticulously documented authenticity profile. This profile serves as a pivotal instrument in the context of the storage of scientific traceability and the limitation of implicit manipulations, particularly in phases where 3D data can be modelled, supplemented or transformed (Di Giuseppantonio, Di Franco et al., 2018).

4. The Aura of the Aura – That's Only Data

The issue of authenticity in the context of digital twins extends beyond the extent to which a digital reproduction can accurately represent the original, as conceptualized by Latour and Lowe (2011), to the quality of the data generated during the digitization process itself. This is necessary to ensure the comprehensibility of technical and intellectual decisions (Ioannides et al., 2025a).

Numerous publications, conference reports and technical guidelines, including the 2022 *Study on quality in 3D digitisation of tangible cultural heritage*, have contributed significantly to the establishment of quality features in data collection and the creation of 3D models in the field of cultural heritage over the past decades. Nevertheless, these focus strongly on the technical capabilities of the hardware and software used. This phenomenon has been termed "technological authority" by Garstki (2018). The individual who has access to the original object and is responsible for carrying out the digital reproduction process, known as the *data producer*, determines the use of specific technologies, the data collection process, post-processing, and possible digital interventions.

This proximity to the object endows the *data producer* with a certain epistemic authority, enabling them to emphatically claim, "I was there and this is what the artefact looks like" (Garstki, 2018). However, this is precisely where a fundamental area of tension becomes apparent: the data generated by the *data producer* is implicitly attributed authenticity – not because it is the original, but because it is considered to be the most accurate digital representation possible. However, this assumption is based on a complex interplay of technical decisions that are rarely documented transparently.

In order to resolve the tension between the authority of the *data producer* and the authenticity of the generated data, it is suggested that CHIs, in particular, be permitted to exert targeted influence through the strategic development of a digital authenticity profile. The definition of specific characteristics or properties of an object, such as materiality, scale, signs of ageing or other contextual meanings, as particularly worthy of protection or representation, has the active effect of steering technical decisions in the digitization process. This approach facilitates the systematic documentation of these prioritized authenticity features in the paradata. Consequently, it is possible to trace which aspects were represented in the digital twin and which were not. Such an approach fosters transparency and enhances the interconnectedness of digital representations in scientific, museum and participatory contexts.

In this context, approaches such as the concept of "memory twins" (Ioannides et al., 2025b) are gaining in importance, as they have the capacity to holistically document not only the object, but also its digitization and the narrative layers together with it. Despite the emphasis of the present contribution on the genesis of such digital and memory twins, it employs innovative approaches that extend beyond purely technical mapping. As Smith (2006) contends, cultural institutions possess an institutional authority that empowers them to define and integrate authenticity features of material objects into digitization processes.

5. Digitizing authenticity

As part of the development of a digital teaching platform on Greek archaeology at the University of Bonn, an extensive inventory of plaster casts of Greek sculptures and reliefs in the university collections of Bonn, Bochum and Tübingen was recorded using various 3D methods. To enhance the immersive nature of the teaching environment, it seemed appropriate to augment the 3D models of plaster copies with those of marble originals, so that not only the shape of the objects but also their overall materiality could be visualized. As very few university collections hold such originals, a collaboration was established with the Collection of Classical Antiquities of the Berlin State Museums to record their extensive collection of Greek tomb reliefs and make them available for teaching purposes under clear, defined licences.

In this context, the idea of a digital authenticity profile was used and evaluated for the first time during a scanning project. A complex negotiation process was necessary to address the requirements of the museum on the one hand and those of the *data producers* and *data users* on the other. The first step was to agree on an efficient and suitable recording technique that would guarantee fast and reliable recording on the one hand and accurate and authentic data on the other.

Due to the extensive experience available in Bonn in recording plaster casts, we decided to use a handheld Artec Leo Structured Light Scanner (Williams et al., 2024), which achieves a spatial resolution of 0.1 mm and thus captures the details necessary for a comprehensive understanding of the objects. The Artec Leo (Artec group, 2025) is a device that functions autonomously, thus negating the necessity for a cable connection to a computer. Consequently, it can be utilized in an open exhibition without posing a hazard to objects, visitors, or staff due to cables or tripods. Due to the necessity of preserving the objects, as well as their considerable size and weight, it was not possible to transport them to a laboratory to record the reliefs with alternative methods that would have produced models with an even higher resolution.

Due to the positioning of the objects in the collection close to the wall, it was only possible to capture the entire back of a few reliefs (Figure 1).

Figure 1. Placement of objects in front of the wall in the exhibition

Although these do not feature any images, they often provide interesting insight into the manufacturing process. Even though it would have been interesting for scientific reasons to capture the objects completely from all sides, this was not justifiable from a conservational and practical point of view. In addition to the backs, it was also not possible to fully record the heavily undercut folds of the garments. Although it is possible to close the holes and remodel larger imperfections without any problems, such heavily modified models are unlikely to be considered an authentic copy. The colour texture produced by the scanner was also found to be problematic, as the saturation and hue of the colours differed quite significantly from the original. While such deviations were not problematic in the case of the previously recorded plaster casts, they are unacceptable for the precise representation of the material properties of marble. Whilst it would be feasible to adjust the texture during the post-processing stage by visually comparing it with the original, this step would also be contradictory to the objective of creating a model that is as authentic as possible. Consequently, we have chosen to employ high-resolution and colour-calibrated images in conjunction with the scans, which can be integrated within the Artec Studio 19 software. It is thus asserted that the models are capable of reproducing the colour of the tomb reliefs authentically.

Except for the cropping of the object, no manual intervention was employed in the process. The results were subsequently exported in OBJ format, accompanied by a 16K colour texture in PNG format, ensuring sustainable utilization of the models in any 3D software environment (Figure 2).

Figure 2. Rendering of the objects in Blender

6. Error 404: Broken Links, Reliable Data and Visualization

The pivotal question pertains to the methodology for data storage, with the objective of ensuring the sustainability commitments made. These considerations frequently result in the data being made available on visualization platforms such as Sketchfab, or in environments specifically developed for scientific purposes, including 3DHOP (Visual Computing Laboratory, 2020) or Kompakkt (Kompakkt development team, 2025). It is evident that all viewers are constrained in their ability to display the models in their entirety, resulting in a significant portion of the original information being compromised. Sketchfab is one of the few options that allows for the enhancement of reduced models with Physically Based Rendering (PBR) methods, thereby ensuring an authentic representation. However, other viewers lack this capability, resulting in the display of only a reduced geometry with a simple colour texture. This limitation renders them entirely unsuitable for storing and accessing complex 3D data. Furthermore, there is a complete absence of clarity for all viewers regarding the maintenance and future development of the platforms and underlying software environments. For example, the last update from 3DHOP dates back to 2020, so further development and maintenance are unlikely. We believe that making models available exclusively through a web-based viewer is a misconception that will inevitably lead to the loss of many elaborately produced models.

We are convinced that only institutionalized, permanently funded research data repositories are suitable for guaranteeing the long-term usability of the data in its entirety. We have decided to store the data in the Bonndata research data repository at the University of Bonn to guarantee the permanent availability of all data, metadata and paradata under a clearly defined licence under a fixed DOI.

In addition to a textured, high-resolution, unprocessed model, each archive contains colour-calibrated images that form the basis of the texturing, as well as a low-resolution model with a normal and ambient occlusion map to enable efficient visualization of the models in web applications and game engines. The models will also be made available through Sketchfab for use in university teaching and museum outreach (Sketchfab, 2025). The comprehensive and careful metadata description and the availability in standardized data formats allow the models to be easily transferred to other use scenarios in the future, without being dependent on a visualization platform with an unclear perspective.

So far, three reliefs have been completely processed and are permanently stored in the research data repository (Figure 3). The remaining objects are currently being processed and will be made available in the same way.

- Female fragment of the tomb of Nikarete (SK 740) https://doi.org/10.60507/FK2/MHT0HM
- Funerary Stele of the Girl Silenis (SK 1492)

https://doi.org/10.60507/FK2/2IZ4WS

- Funerary relief of Sosias and Kephisodoros (SK 1708) https://doi.org/10.60507/FK2/5UYAVJ

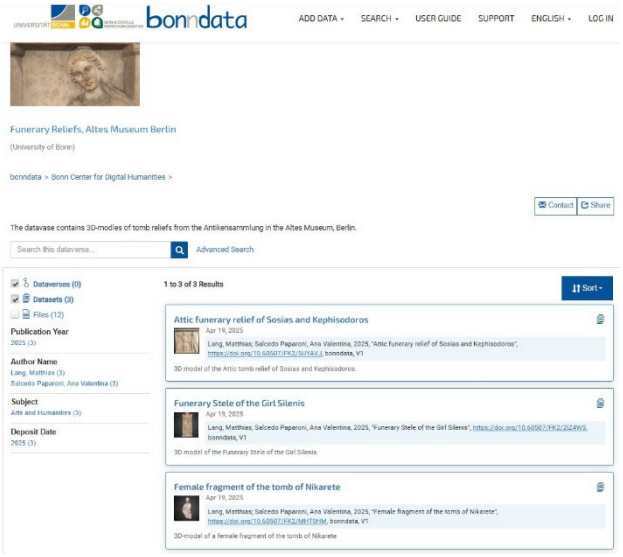

Figure 3. The models in the Bonndata research data repository

7. Conclusions

Cultural Heritage Institutions (CHIs) play a central and evolving role in defining how authenticity is interpreted and represented in the digital sphere. Their responsibilities extend far beyond the care of physical artefacts. Museums must now also determine which qualities of an object are essential to preserve and communicate when it is translated into a digital format. Authenticity, in this context, is not an inherent characteristic but a concept that is shaped by curatorial judgment, institutional values, technical decisions, and user expectations.

It is no longer sufficient to consider digital reproductions as simple visual representations based on technical accuracy. The true challenge lies in capturing and conveying information that is materially, historically, and contextually significant. Questions such as whether traces of use, alterations, or signs of ageing should be included in the digital version, and if so, how they should be interpreted and presented, are of increasing importance. Museums must adopt a comprehensive approach that brings together curatorial expertise, technical knowledge, and thoughtful planning to ensure that digital representations support meaningful engagement with cultural heritage.

To meet this challenge, the digital authenticity profile has emerged as a useful and forward-thinking concept. It allows institutions to identify which features of an object are to be digitally recorded and which are accepted as beyond the reach of current technology or outside the goals of the reproduction. This profile documents the criteria used in planning and executing digitization, thereby allowing others to understand the decisions that shaped the final outcome. It makes the reproduction process transparent and helps build trust in the integrity and reliability of digital models across research, education, and public communication.

Beyond this, the profile serves as a detailed record of each phase of the digitization process. It captures the methods used, the limitations encountered, and the interpretive choices made during data acquisition and postproduction. This record supports scientific traceability and provides a foundation for responsible data reuse. It also helps establish institutional standards for how authenticity is addressed in digital heritage practices and allows future users to assess the model's relevance and limitations.

The practical benefits of this approach are clearly demonstrated in the example of the Greek funerary reliefs from the collection of the Antikensammlung at the Staatliche Museen zu Berlin. The collaborative development of a digital authenticity profile enabled curators and technical teams to define what needed to be preserved in the digital versions of these objects. This included tool marks, subtle surface textures, and other features that offer insight into the objects' history. At the same time, the profile acknowledged limitations related to physical access and the capacities of the scanning equipment. Rather than being viewed as flaws, these constraints were documented as part of an informed and transparent process. This case illustrates how institutions can work across disciplines to ensure that digitization does not simply reproduce surfaces, but also communicates meaning and significance.

Museums and CHIs are uniquely positioned to lead the development of thoughtful and responsible approaches to digital authenticity. Their role includes not only defining what counts as authentic in the digital context, but also ensuring that the methods, decisions, and results are clearly documented and preserved. To achieve this, they must commit to open and carefully described data, ensure long-term access through trusted repositories, and provide clear licences that support both academic and public use. Through these actions, digital reproductions can become reliable and meaningful sources of knowledge, extending the presence of cultural heritage into new spaces of engagement and understanding.

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