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A Digital Platform for Heritage Data Sharing: The Ecclesiastical Repository for Ecclesiastical Treasures in the NARRATE Project

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Abstract

Cultural Heritage (CH) is a shared legacy, and its preservation reflects a collective responsibility to safeguard our common history. The ERASMUS+ project NARRATE – Needs for Digital Recording and Documentation of Ecclesiastical Cultural Treasures in Monasteries and Temples, funded by the European Union, aimed to preserve both tangible and intangible ecclesiastical heritage through the creation of a digital repository. NARRATE focused on the structured documentation of ecclesiastical CH and the management of a digital archive tailored to the needs of the clergy, many of whom are unfamiliar with digital tools. Through user-centered surveys, the project integrated the clergy's perspectives to ensure the tools developed were accessible and relevant. The repository comprises two components: i) the Interactive Dashboard, allowing users to manage ecclesiastical artifacts and access educational materials, and ii) the NARRATE Server, which comprises a Web application that enables end-users and third-party services to interact with it and exchange data, ensuring interoperability through CIDOC-based semantic metadata. Alongside, NARRATE offers multilingual educational resources, including videos and guides, designed for both clergy and the wider public. This fosters engagement in cataloguing, metadata annotation, and digital storytelling. NARRATE provides an inclusive platform for clergy, scholars, and the public to explore, preserve, and appreciate under-documented ecclesiastical treasures, contributing in this way to a cross-cultural understanding and sustainable heritage preservation.

1. Introduction

Cultural Heritage (CH) represents a collective inheritance passed down from previous generations as a legacy to those who follow. Its preservation is a responsibility and a profound commitment to safeguarding our shared humanity. NARRATE – Needs for Digital Recording and Documentation of Ecclesiastical Cultural Treasures in Monasteries and Temples, is an ERASMUS+ project funded by the European Union, focused on this commitment; to preserve both tangible and intangible ecclesiastical heritage by creating a digital repository for ecclesiastical treasures.

Specifically, this project focused on the proper, organized, and planned recording of ecclesiastical CH artifacts, as well as on the organization and management of the resulting digital archive. NARRATE's key focus was to address the needs of the clergy community, a target group that may not be familiar with digitizing tools and often shows hesitancy in using digital platforms. The project made it a priority to directly engage this community by incorporating their insights through user-centered surveys that were designed to capture their unique needs. By including them in the decision-making process, NARRATE ensured that the tools developed were directly aligned with their expectations, making them more likely to adopt and utilize the technology.

The ecclesiastical valuables in this study, refer to the broad range of sacred objects, furnishings, and liturgical items associated with the religious and cultural life of Christian churches. These include both movable items, such as vestments, chalices, crosses, censers, relics, and embroidered textiles, as well as immovable elements, like iconostases, frescoes, altars, and architectural features integral to the church structure. The concept also encompasses intangible treasures, including rituals, and craftsmanship traditions passed down through generations. These valuables are not only functional in liturgical practice but also carry significant historical, artistic, and spiritual value, reflecting the devotional heritage and identity of local religious communities across Greece, Bulgaria, and Turkey.

To enable the systematic digital archiving of the aforementioned ecclesiastical valuables, the NARRATE repository was developed with two main components: the NARRATE Interactive Dashboard and the NARRATE Server. The Interactive Dashboard serves as the primary interface for users to manage their accounts and ecclesiastical treasures, as well as explore educational materials. The NARRATE Server is a web application that exposes Application Programming Interfaces

(APIs) to enable interaction and data exchange between users and third-party services. The creation of a new data model and reference ontologies was designed for the description of ecclesiastical cultural treasures, ensuring compatibility with cultural heritage data integration standards. These semantic metadata-based tools enable the cataloguing, discovery, and sharing of relevant datasets, and offer interoperability across different systems and users within the ecclesiastical domain.

In addition, the NARRATE repository has the advantage of providing educational content. Recognizing the need for accessible and engaging learning materials, the NARRATE team developed a diverse set of training resources, including instructional videos, presentations, and downloadable PDFs. These materials serve as essential tools for individuals and institutions involved in the preservation, study, and appreciation of ecclesiastical heritage. The educational content is designed to support various audiences addressing both clergy and non-clergy community, offering them insights into best practices for cataloguing, metadata annotation, and digital storytelling related to ecclesiastical treasures.

1.1 Current practices in digital documentation

Current practices in digital documentation of religious cultural heritage adopt interdisciplinary approaches that blend technology with historical, architectural, and artistic knowledge to preserve both tangible and intangible heritage (Beck, 2013). Techniques such as 3D scanning, photogrammetry, and laser scanning are increasingly used to create detailed digital models of religious artifacts and sites, enabling virtual reconstructions and preservation even in cases of damage or destruction (Llerena-Izquierdo & Cedeño-Gonzabay, 2020; Rüther et al., 2012; Schaich, 2007). These methods not only maintain physical accuracy, capturing measurements, textures, and colours, but also offer immersive experiences through platforms like Virtual Reality. While 3D photogrammetry dominates in documenting structures, intangible heritage, such as rituals or oral traditions, is more effectively preserved through digital storytelling, which engages audiences and enriches cultural narratives (Petousi et al., 2022).

The concept of heritage itself however, is evolving alongside technological advancements. In addition to technical innovations, recent research emphasizes the theoretical and social dimensions of digital heritage practices. Researchers are more and more engaging new modes of collection, representation, and audience interaction. These practices are increasingly shaped by social media and virtual communities, which contribute to heritage interpretation and dissemination(Giaccardi, 2012). Scholars also highlight the urgency of digital preservation in the face of urban expansion, conflict, and neglect, asserting the value of digital heritage as a safeguard against cultural loss (Kalay, Y.; Kvan, T.; Affleck, J., 2007).

While numerous studies have explored the preservation and documentation of cultural heritage, there is a notable gap in research specifically addressing the systematic documentation of ecclesiastical CH, particularly the movable and immovable assets of the Orthodox Church. The region of interest for this research is Thrace, encompassing areas of Greece, Turkey, and Bulgaria. In this context, the effort was directed toward the systematic documentation of ecclesiastical treasures, with the objective of identifying and codifying the specific recording needs through a comprehensive assessment of user requirements. Thrace has rich repository of post-Byzantine icons, manuscripts, and artifacts, and at the same time presents a cross-border cultural and religious diversity. Due to Thrace’s historical exposure to political instability, the region presents a unique context that requires coordinated documentation efforts and international cooperation. This project, through stakeholder engagement, metadata collection, and the design of a practical, user-friendly digital archive, aims to support the digital transformation of ecclesiastical CH management while preserving traditional knowledge and enabling remote access to such vulnerable heritage sites.

In the present paper, we present the development of the NARRATE project's ecclesiastical treasure repository, built upon a thorough needs analysis that provided input on the actual requirements of the users’ needs for documenting ecclesiastical assets. The adapted model provides a standardized approach to record religious artifacts, ensuring consistency through structured metadata, shared taxonomies and ontologies, and seamless multimedia integration in a cohesive digital format. In this way, the resulted repository provides a platform not only to record and thereby to protect these artifacts, but also fosters collaboration among re-searchers, academics, professionals, and the local community interested in the ecclesiastical-historical heritage.

2. Materials and Methods

2.1 Defining documentation and cataloguing priorities

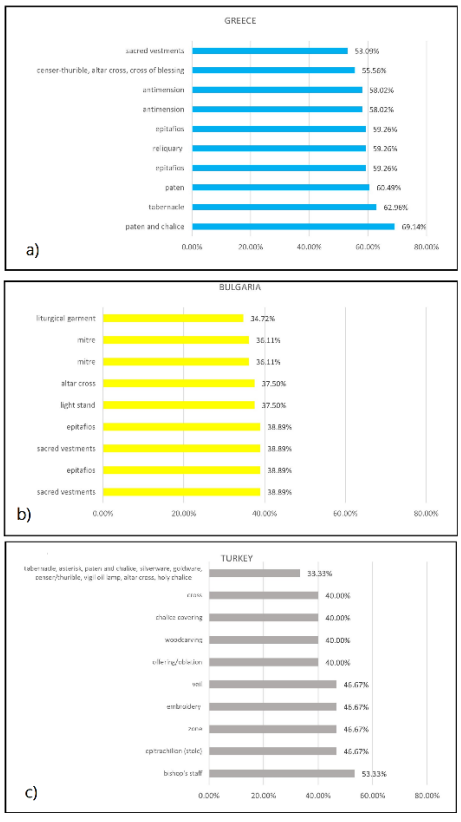


Figure 1. Survey results across the three participating countries, highlighting the 10 most popular movable church valuables that the clergy community in: a) Greece, b) Bulgaria, and c) Turkey

A structured methodology was applied for designing the ecclesiastical treasure repository (Stamou et al., 2025). The initial focus was on identifying the specific documentation and recording needs for these unique artifacts. This involved

identifying the specific documentation and recording needs of ecclesiastical artifacts, structures, and liturgical items through a review of current practices and detection of metadata and cataloguing gaps. Input from various stakeholders, such as clergy, conservators, theologians, and archivists, was essential in defining the key data elements for comprehensive records. Moreover, locating the individuals and institutions that possess these artifacts helped refine the model's focus on its target groups.

Figure 1 presents a selection of the results, illustrating clergy responses from Greece, Bulgaria, and Turkey concerning the most popular movable church valuables. These results form part of a wider dataset that also includes input from non-clergy participants, as well as information on immovable objects and both tangible and intangible ecclesiastical treasures. (*Narrate*, 2025).

In Greece, the leading valuable to be documented is the paten and chalice, with 69.14% of participants indicating its importance. This is followed by the tabernacle (62.96%), and a cluster of items scoring just below 60%, including paten (60.49%), epitaphios, and reliquary (each at 59.26%). The antimension, a consecrated cloth used during the Divine Liturgy, also appears prominently with 58.02%. Items such as the censer-thurible, altar cross, and cross of blessing (55.56%) and sacred vestments (53.09%) are also included in the top ten responses. Overall, the data reflect a strong emphasis on Eucharistic vessels, sacred fabrics, and ritual implements in Greek liturgical tradition.

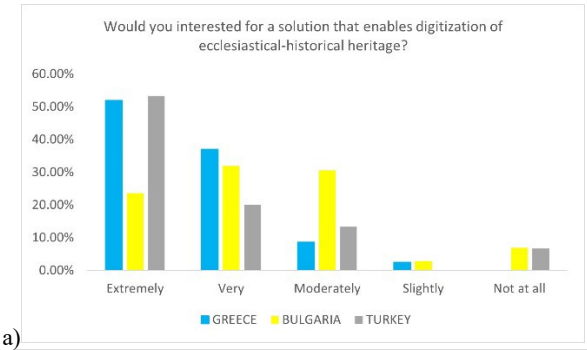
In Bulgaria, the highest-ranked items, each with 38.89%, are epitaphios and sacred vestments, suggesting a strong emphasis on liturgical textiles and ceremonial attire. These are followed closely by the altar cross and light stand (both at 37.50%), and the mitre (36.11%), which reflects the symbolic importance of hierarchical and ceremonial elements in Bulgarian ecclesiastical practice. The liturgical garment ranks slightly lower at 34.72%. Overall, the results indicate a consistent valuation of items related to worship rituals and clerical vesture.

Finally, in Turkey the most frequently mentioned item is the bishop's staff, with 53.33% of respondents recognizing its importance, suggesting its strong symbolic significance in ecclesiastical hierarchy. This is followed by a group of items, including the epitrachelion (stole), zone, embroidery, and veil, each selected by 46.67% of participants, indicating a shared appreciation for liturgical vestments and decorative elements. Several other items such as the cross, chalice covering, woodcarving, and offering/oblation vessels each received 40.00%, while a broader group comprising sacred vessels like the tabernacle, asterisk, paten and chalice, silverware, goldware, and other implements (e.g., censer/thurible, vigil oil lamp, altar cross, holy chalice) were noted by 33.33% of respondents. Overall, the Turkish results highlight a balanced emphasis on both ceremonial objects and vestments, reflecting the functional and symbolic roles these items play in religious practice.

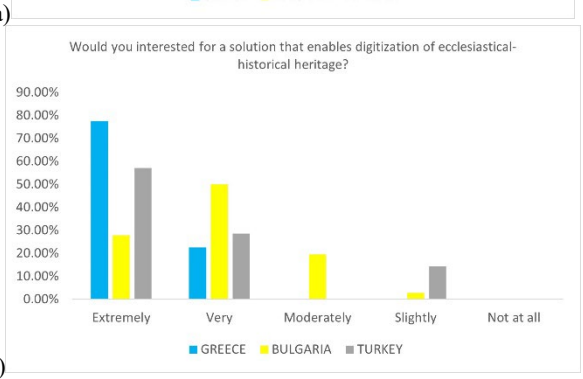
2.2 User needs assessment and codification of documentation standards

The next step was the comprehensive user needs assessment to ensure that the digital archive would be practical and accessible for its intended audience. This included categorizing users and conducting surveys and interviews to gather insights into their expectations and preferences. Most responses were collected through face-to-face interactions, which also encouraged participants to share personal stories, offering deeper qualitative insights into their relationships with ecclesiastical heritage. Based on this feedback, the model established documentation standards, such as consistent metadata structures and multimedia integration.

The analysis of the survey provided valuable insights that have informed the development of codification and documentation standards for the ecclesiastical repository. First of all, the results highlighted that both clergy and non-clergy communities share a strong interest in the historical and cultural significance of their region's ecclesiastical heritage and acknowledge the need to preserve it. Figure 2 presents the survey results gathered from both clergy and non-clergy communities across the three participating countries, highlighting their interest in the digitization of ecclesiastical treasures.



a)



b)

Figure 2. Survey results across the three participating countries, highlighting their interest in the digitization of ecclesiastical treasures: a) clergy and b) non-clergy community

While many respondents reported limited technological familiarity, there was a clear preference across all three countries for digital formats to showcase these artifacts, whether through cultural institutions' websites, open-access platforms, or a combination of both. Participants in the surveys most frequently favoured formats such as albums, catalogues, and detailed photographic documentation for representing ecclesiastical and historical treasures. Notably, interviewees in all three countries expressed a willingness to use a digital platform dedicated to recording ecclesiastical artifacts as a means of promoting and presenting their own church's heritage.

The digitized ecclesiastical-historical heritage should be exhibited in:	Greece	Bulgaria	Turkey
In an electronic environment/website of cultural institutions	38.24%	24.71%	50.00%

In an electronic environment with open access	33.33%	24.71%	35.00%
On paper	15.69%	18.82%	10.00%
Hybrid form	10.78%	28.24%	0.00%
Other, please suggest	0.98%	1.18%	0.00%
I cannot say	0.98%	2.35%	5.00%

Table 1. Survey results of the clergy community across the three participating countries identifying the most popular digital formats for documentation

The digitized ecclesiastical-historical heritage should be exhibited in:	Greece	Bulgaria	Turkey
In an electronic environment/website of cultural institutions	55.00%	55.56%	71.43%
In an electronic environment with open access	57.50%	61.11%	28.57%
On paper	20.00%	22.22%	0.00%
Hybrid form	22.50%	22.22%	42.86%
Other, please suggest	2.50%	2.78%	28.57%
I cannot say	2.50%	2.78%	0.00%

Table 2. Survey results of the non-clergy community across the three participating countries, identifying the most popular digital formats for documentation

A more detailed description of the survey results can be found on the project's official website (*Narrate*, 2025).

Subsequently, the codification of documentation standards followed, in order to ensure consistency and interoperability. This was achieved through the use of structured metadata, unified taxonomies and ontologies, and the integration of multimedia elements, such as high-resolution images and detailed textual descriptions, into a cohesive digital environment. By applying these standards, the NARRATE repository is designed to ensure that the documentation process remains both technically robust and accessible, while also being meaningful to a wide range of stakeholders.

The NARRATE repository was developed as a secure and well-structured platform dedicated to the preservation and long-term protection of ecclesiastical artifacts. At the same time, it was conceived as a collaborative hub designed to bring together researchers, scholars, conservation professionals, and members of the local community. By enabling knowledge sharing, the contribution of records, and active engagement with ecclesiastical-historical heritage, the repository aims to foster greater appreciation and deeper understanding of the cultural and spiritual significance of these treasures.

2.3 Design of the NARRATE Repository

2.3.1 Data models and reference ontologies

A core element of the NARRATE repository was the adoption of a semantic-based data model, where semantics refer to data with well-defined meaning (Stuckenschmidt & Harmelen, 2005). This was essential for enabling the NARRATE data discovery service, which supported users in locating, accessing, and analyzing relevant data(Czerwinski et al., 1999). The approach involved creating semantic metadata descriptions using standardized vocabularies and ontologies to define explicit meanings and relationships between terms (Duval et al., 2002) thereby guiding the design of database schemas that describe ecclesiastical cultural heritage. Following a review of established data models, the CIDOC Conceptual Reference Model (CRM) was selected as the foundation. CIDOC CRM is a formal ontology widely used in cultural heritage for integrating and mediating heterogeneous data (*CIDOC CRM*, 2025). It supports semantic interoperability, allowing disparate data sources to be unified under a shared conceptual repository. The core CIDOC CRM entities selected for the NARRATE database are illustrated in blue rectangles with yellow letters in Figure 3.

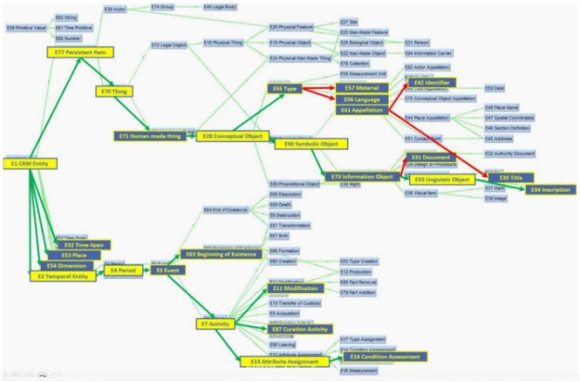


Figure 3. Selected entities of CIDOC-CRM model

The outcome was effectively a subset of the CIDOC CRM. However, since CIDOC CRM is a high-level conceptual model, its conversion into a low-level relational database structure was not straightforward. This transformation followed specific design principles aimed at ensuring future interoperability with other CIDOC CRM-compliant projects.

2.3.2 Architectural design and technology stack

At a high-level, the NARRATE Repository consists of two main components: *i)* the NARRATE Interactive Dashboard; and *ii)* the NARRATE Server, as illustrated in Figure 4.

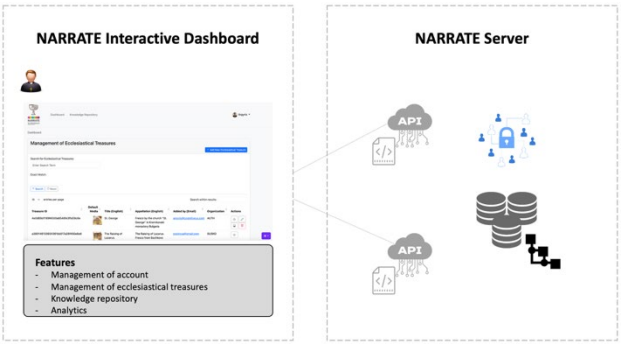


Figure 4. Overview of NARRATE Repository components

The NARRATE Interactive Dashboard serves as the primary user interface, enabling the management of both user’s accounts and ecclesiastical treasures, as well as allowing access to educational and dissemination material regarding the digital recording and documentation of ecclesiastical treasures. The NARRATE Server comprises a Web application that exposes APIs for data interaction and exchange with users and third-party services.

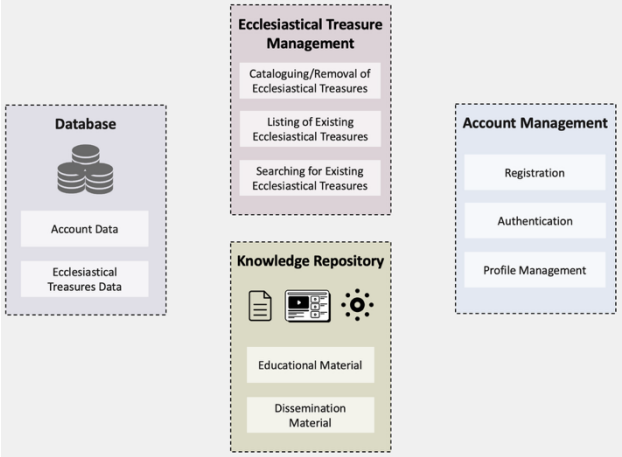


Figure 5. Conceptual design of NARRATE Repository

The realized solution was based on the conceptual design (Figure 5) that consists of the following four modules:

1. Database: Sores user account data, such as, email, password, name, organization, and role, as well as data related to ecclesiastical treasures, such as, images, videos, and descriptive text. The text data is structured using data models and reference ontologies based on the CIDOC CRM, which guided the database schema design;

2. Ecclesiastical treasure management: Handles operations related to cataloguing, removal, listing, and searching ecclesiastical treasures. Users can add new entries by providing structured information (e.g., description, documentation, media), remove existing ones, view all catalogued items, and filter search results based on specific criteria;

3. Account management: Responsible for operations related to user accounts, including registration, login with authentication and authorization, and profile management. Users can sign up, access platform features, update personal information, manage passwords, and set profile pictures;

4. Knowledge repository: Provides educational and dissemination resources on the digital recording and documentation of ecclesiastical treasures. It includes course and training materials, recorded webinars, demonstration videos, and content for promoting collaboration and knowledge sharing.

The NARRATE Server was developed in Python 3.10.8 using the Django REST Repository (Figure 6). It is deployed via NGINX as the Web server and Gunicorn as the Web Server Gateway Interface. Additionally, we use Celery for handling time-consuming tasks (e.g., sending verification emails), combined with RabbitMQ as the message broker. Data is stored in a PostgreSQL database, structured based on the CIDOC CRM to support cultural heritage integration. The entire setup is containerized using Docker for portability and ease of deployment.

The NARRATE Interactive Dashboard front-end was built using Django’s template language, which employs variables and tags to render Hypertext Mark-up Language (HTML) dynamically. It uses HTML5 for structuring content, Cascading Style Sheets for modern styling, and JavaScript to manage user interactions and asynchronous communication with the server without page reloads.

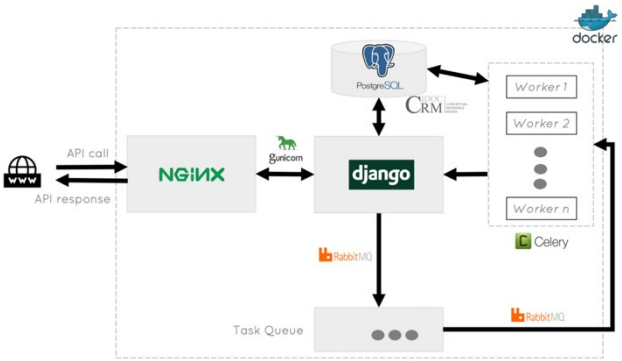


Figure 6. Architecture design of NARRATE Repository

3. Results and Discussion

This section presents the implementation of the NARRATE Interactive Dashboard, illustrated in Figure 7.

First, we implemented a comprehensive account management system, incorporating modern authentication and user profile features, as follows:

i) User registration and account activation: Users sign up with basic details and activate accounts via email using a verification code;

ii) Authentication: Users login with their credentials to access the platform’s features, including management of ecclesiastical treasures and access to the knowledge repository;

iii) Password management: Includes password reset via email and in-session password updates;

iv) Profile management: Logged-in users can update personal details and upload profile pictures;

v) Session control: Users can terminate their logged-in session and sign out of the system via the dashboard interface.

All features are accessed through intuitive Web forms and provide user feedback on success or failure.

Second, we provide a set of features for managing ecclesiastical treasures, accessible through the NARRATE Interactive Dashboard, as follows:

- View ecclesiastical treasures: After logging in, users can view all catalogued ecclesiastical treasures in a tabular format;

- Access control: All ecclesiastical treasures are visible to users, but only the creator has permission to modify or delete their own entries and media;

- Add ecclesiastical treasures: Users can catalogue new ecclesiastical treasures by completing structured forms grouped at higher levels of abstraction, such as, “Name and Description”, “Characteristics”, “Documentation and Conservation”, “Objects and Collection”, and “Content, Photos, and Videos”.

- Edit ecclesiastical treasures and media: Users can update both the descriptive information and associated media (images, videos, text) of ecclesiastical treasures. Media management includes options to view, add, update, or delete files;

- Delete ecclesiastical treasures: Users can permanently remove their own ecclesiastical treasures and associated media after confirmation;

- Advanced search: The system supports flexible searching, including free-text and exact-match options across all ecclesiastical treasures metadata.

Third, we implemented a knowledge repository that provides centralized access to educational and dissemination resources on the digital documentation of ecclesiastical treasures. Available materials include curated course content, structured training guides, recorded webinars, demonstration videos, and dissemination assets. These resources aim to support learning, promote tool adoption, and encourage collaboration. Users can view or download all available materials.

Last but not least, we implemented the system analytics feature, which logs certain actions that occur within the platform, such as, user account actions (e.g., sign up, login, profile updates, sign out), management of ecclesiastical treasures (e.g., view, add, edit, delete, search), and system errors. It is implemented as an API endpoint and is accessible only to administrators. A dedicated script is provided for setting up administrator accounts.

A more detailed description of the implemented features and the realization of the NARRATE Repository can be found on the project's official website (*Narrate*, 2025).

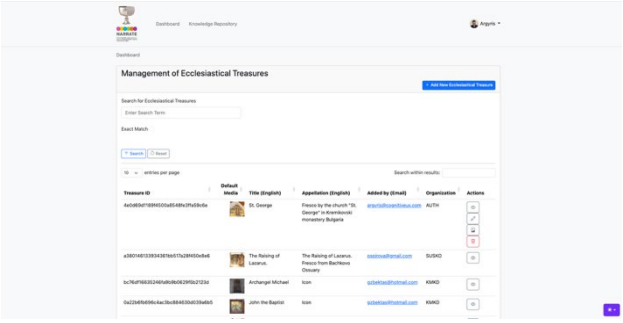


Figure 7. The landing page after login, which displays all the catalogued ecclesiastical treasures, along with certain actions allowed to the logged in user. Additionally, the page allows individuals to explore the knowledge repository

4. Conclusion

The developed repository played a crucial role in achieving the broader objectives of the NARRATE project. Through an iterative, User-Centered Design approach, we ensured that both the repository and its discovery tools were intuitive, efficient, and aligned with users' needs. The integration of open-source technologies further supported transparency, flexibility, and the potential for future enhancements and adaptations.

Analysing the perspectives of clergy and non-clergy community, the creation of consistent taxonomies and ontologies for data entry proved vital to the initiative’s success. To ensure the repository's long-term sustainability, we implemented well-defined data governance frameworks outlining permissions for editing, updating, and accessing content. Moreover, interoperability with existing cultural heritage systems was prioritized to allow integration with broader ecclesiastical and historical databases, increasing the repository’s impact and utility.

As a result, the repository stands as a valuable and inclusive resource for all stakeholders interested in the documentation and sharing of ecclesiastical heritage. It combines methodological rigor with practical usability, tailored to meet the real-world needs identified through stakeholder engagement. With multilingual support and user-friendly navigation, the platform encourages cross-cultural understanding and academic inquiry. At the same time, it enables the documentation of a wide range of ecclesiastical artifacts, many of which had been previously under-documented or at risk of being forgotten.

Acknowledgements

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References

Beck, L. S. (2013). Digital Documentation In The Conservation Of Cultural Heritage: Finding The Practical In Best Practice. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, *XL-5/W2*, 85–90. https://doi.org/10.5194/isprsarchives-XL-5-W2-85-2013

CIDOC CRM. (2025. https://cidoc-crm.org/. (Accessed on 11/06/2025)

Czerwinski, S. E., Zhao, B. Y., Hodes, T. D., Joseph, A. D., & Katz, R. H. (1999). An architecture for a secure service discovery service. *Proceedings of the 5th Annual ACM/IEEE International Conference on Mobile Computing and Networking*, 24–35. https://doi.org/10.1145/313451.313462

Duval, E., Hodgins, W., Sutton, S., & Weibel, S. L. (2002). Metadata Principles and Practicalities. *D-Lib Magazine*, *8*(4). https://doi.org/10.1045/april2002-weibel

Giaccardi, E. (2012). *Heritage and social media: Understanding heritage in a participatory culture*. Routledge, Taylor and Francis Group. file:///C:/Users/Dell/Downloads/10.4324_9780203112984_previewpdf.pdf

Kalay, Y.; Kvan, T.; Affleck, J. (2007). *New Heritage: New Media and Cultural Heritage* (1st ed.). Routledge, Taylor and Francis Group. https://doi.org/10.4324/9780203937884

Llerena-Izquierdo, J., & Cedeño-Gonzabay, L. (2020). Photogrammetry and Augmented Reality to Promote the Religious Cultural Heritage of San Pedro Cathedral in Guayaquil, Ecuador. In M. Botto-Tobar, M. Zambrano Vizuete, P. Torres-

Carrión, S. Montes León, G. Pizarro Vásquez, & B. Durakovic (Eds.), *Applied Technologies* (pp. 593–606). Springer International Publishing.

Narrate. (2025, June 10). https://narrateproject.eu/results. (Accessed on 11/06/2025)

Petousi, D., Katifori, A., Servi, K., Roussou, M., & Ioannidis, Y. (2022). Interactive Digital Storytelling in Cultural Heritage: The Transformative Role of Agency. In M. Vosmeer & L. Holloway-Attaway (Eds.), *Interactive Storytelling* (pp. 48–67). Springer International Publishing.

Rüther, H., Bhurtha, R., Held, C., Schröder, R., & Wessels, S. (2012). Laser Scanning in Heritage Documentation. *Photogrammetric Engineering & Remote Sensing*, *78*(4), 309–316. https://doi.org/10.14358/PERS.78.4.309

Schaich, M. (2007). From 3D Scanning to Analytical Heritage Documentation. In J. Nimmrichter, W. Kautek, & M. Schreiner (Eds.), *Lasers in the Conservation of Artworks* (pp. 463–471). Springer Berlin Heidelberg.

Stamou, A., Nassis, F. C., Chrysafi, E., Sylaiou, S., Kaya, G., Sarlak, E., Ribolov, S., Karavaltchev, V., Constantinides, A., Belk, M., & Stylianidis, E. (2025). Preserving Ecclesiastical Cultural Heritage of Thrace: A Needs Analysis for Digital Recording in Monasteries and Temples. *Heritage*, *8*(2). https://doi.org/10.3390/heritage8020066

Stuckenschmidt, H., & Harmelen, F. (2005). Information Sharing on the Semantic Web. In *Advanced Information and Knowledge Processing* (p. XIX, 276). Springer Berlin, Heidelberg. https://doi.org/10.1007/b138282