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Εκπαίδευση, Δια Βίου Μάθηση, Έρευνα και Τεχνολογική Ανάπτυξη, Καινοτομία και Οικονομία

Τόμ. 3 (2024)

Πρακτικά του 3ου Διεθνούς Επιστημονικού Συνεδρίου "Ελλάδα – Ευρώπη 2030: Εκπαίδευση, Έρευνα, Καινοτομία, Νέες Τεχνολογίες, Θεσμοί και Βιώσιμη Ανάπτυξη"

Sustainability through digital transition: the case of small cultural stakeholders

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doi: 10.12681/elrie.7138

Sustainability through digital transition: the case of small cultural stakeholders

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Περίληψη

Τα μικρά πολιτιστικά ιδρύματα διαδραματίζουν ζωτικό ρόλο στη διατήρηση και την προώθηση της πολιτιστικής κληρονομιάς. Για να διασφαλιστεί η μακροπρόθεσμη βιωσιμότητα και ανάπτυξή τους, αυτά τα ιδρύματα πρέπει να αναβαθμιστούν μέσω της ψηφιακής μετάβασής τους. Ωστόσο, συχνά αντιμετωπίζουν σημαντικές προκλήσεις λόγω περιορισμένων πόρων και τεχνικής εξειδίκευσης. Η παρούσα εργασία εμβαθύνει στον κρίσιμο ρόλο των ψηφιακών εργαλείων και υπηρεσιών στην υποστήριξη των μικρών πολιτιστικών ιδρυμάτων. Εντάσσεται στο έργο «Θάλεια», το οποίο υιοθετεί αυτή την προσέγγιση μέσω ενός ολοκληρωμένου πλαισίου που συνδυάζει τη σύγχρονη διαχείριση περιουσιακών στοιχείων και καινοτόμες στρατηγικές μάρκετινγκ με τεχνολογία αιχμής. Αξιοποιεί το μοντέλο δεδομένων CIDOC-CRM και μια κοινή δομή ιστού για να παρέχει ασφαλή διαχείριση περιουσιακών στοιχείων, εικονικές εκθέσεις, εφαρμογές ξεναγήσεων και διασύνδεση με πύλες crowdfunding. Επιπλέον, ένα συνεργατικό εργαλείο επαυξημένης πραγματικότητας προάγει περαιτέρω τη συνεργασία των εμπλεκόμενων ιδρυμάτων.

Λέξεις κλειδιά: Πολιτιστική Βιωσιμότητα, Ψηφιακή Μετάβαση, Μικρά Πολιτιστικά Ιδρύματα, Έργο Θάλεια

Abstract

Small cultural institutions play a vital role in preserving and promoting cultural heritage. To ensure their long-term viability and growth, these institutions must undergo a digital transformation. However, they often face significant challenges due to limited resources and a lack of technical expertise. This paper delves into the crucial role of digital tools and services in supporting these small cultural stakeholders. The presentation focuses on project “Thalia”, which embraces this concept through a comprehensive framework that combines modern asset management and innovative marketing strategies with cutting-edge technology. It leverages the CIDOC-CRM data model and a shared web structure to provide secure asset management, virtual exhibitions, digital tours, and connections with

crowdfunding portals. Furthermore, a collaborative augmented reality tool fosters stakeholder engagement.

Keywords: Cultural Sustainability, Digital Transformation, Small Cultural Institutions, Project Thalia

1. Introduction

Cultural institutions must leverage modern technologies, adopt sustainable practices, and employ contemporary business management models to effectively meet their objectives. These objectives encompass various facets, including the analysis, documentation, preservation, restoration, and presentation of their collections, as well as fostering creative engagement with their audiences (Anderson, 2009; Jankowska & Marcum, 2010; Loach et al., 2017; Stylianou-Lambert et al., 2014).

The *Hellenic Museum* (as legally defined) serves as a prime example of an organization tasked with managing cultural assets, hosting events, and combining both functions. Within Greece, the growing number of public and private museums, typically smaller in scale, face a substantial array of management demands. These demands include securing financial support for expansion and maintenance, orchestrating internal asset management, and effectively showcasing their collections to fulfill their core objectives and ensure long-term sustainability. Securing private capital and promoting these museums is typically based on the implementation of strategic communication and public relations policies. Such policies necessitate two critical components: (a) the development of a viable long-term, medium-term, and short-term communication program; this program takes into account the current state of affairs, target audiences, specific strategies, and tactics tailored to their objectives; (b) the subsequent guidance of the program's execution and the continuous assessment of its effectiveness. In today's dynamic landscape, museums face the challenge of managing a diverse array of activities. On one hand, they engage their audiences with educational programs, periodic exhibitions, and other traditional methods. Simultaneously, they embrace digital services, such as virtual tours and exhibitions. The convergence of these elements has significantly increased the complexity of internal management. However, *smaller museums and related cultural institutions find themselves in a challenging position, struggling to meet the heightened demands* due to their nature, limited staffing, the sheer volume of tasks, and the specialized expertise required. This multifaceted challenge not only complicates their operations but also

jeopardizes their long-term sustainability. To address this, smaller museums must adopt *sustainable models and strategies* that optimize the utilization of their resources and activities, facilitating not only their survival but also their growth and development.

While the inclusion of culture in the United Nations' sustainable development agenda has gained prominence, the issue of museum sustainability has not received systematic attention (UNESCO, 2023b, 2023a). The Museum Association has taken notable steps by organizing collection assessment training programs and issuing guides, practical rules, good practices, and sustainability checklists for museums (Museums Association, 2010, 2023a). They have also established key principles for sustainable museums and drafted sustainability principles (Museums Association, 2023b) with a focus on various aspects, such as striving for excellence, nurturing the museum-visitor relationship, optimizing resource utilization, adapting to evolving social and cultural landscapes, and fostering connections with other cultural institutions. However, it is important to note that many of these initiatives, along with the limited scientific publications on museum sustainability models, primarily concentrate on aspects of "green" development. For instance, Stylianou-Lambert et al. (2014) outlined a theoretical model of sustainable development with a focus on sustainability support policies rather than the museums themselves. They identified four key pillars - Culture, Environment, Society, and Economy - and proposed five steps for designing sustainability policies. Drawing on the experiences of businesses and organizations, it is evident that asset management models prove highly effective in monitoring and overseeing both tangible (such as buildings) and intangible (e.g., human capital, intellectual property) assets. Modern asset management models seamlessly incorporate the pillars of sustainable development. Moreover, digital asset management platforms offer several advantages, including enabling (a) rapid responses to changes in the external environment and facilitating the integration of data for long-term planning; (b) resource-efficiency and are particularly beneficial for small organizations with limited staffing; (c) guidelines and support decision-making processes.

Nevertheless, it is essential to recognize that museums have a distinct mission that sets them apart from other forms of organizations. This mission necessitates the development of specialized digital tools, specifically designed for computer-assisted museum asset management (Campolmi, 2013).

On the other side, within the domain of modern technologies, there exists robust and widespread support for digitization and the development of cutting-edge digital services for the cultural sector, both at the national and international levels. This support extends across various phases of the cultural asset life cycle and the associated tasks, including:

- The generation of high-value-added content through advanced 3D digitization techniques, see for example (Athena Research Center, 2014, 2016f, 2016g, 2016a, 2023c, 2023d, 2023b).
- Implementation of documentation technologies featuring standardized data formats and metadata, see for example (Athena Research Center, 2013).
- Cultural asset management solutions aimed at enhancing efficiency. Employment of controlled vocabularies and repositories for structured data management, see for example (CARARE, 2023a).
- Utilization of virtual exhibitions and museum technologies to expand cultural access, see for example (Athena Research Center, 2020, 2023e, 2023g).
- Application of scientific visualization tools and technologies tailored for domain specialists, see for example (Athena Research Center, 2016h, 2016i, 2016j, 2016b, 2023a).
- Deployment of digital guides to enhance the visitor experience, see for example (Athena Research Center, 2015; Omega Technology, 2023).
- Incorporation of narration and storytelling technologies to engage and educate audiences, see for example (CHESS - Cultural Heritage Experiences through Socio-personal interactions and Storytelling, 2023).
- Integration of virtual reality, augmented reality, and mixed reality applications for immersive experiences, see for example (CARARE, 2023b; Stories of Tomorrow, 2023).
- Utilization of geoinformatics applications for spatial analysis and presentation, see for example (Athena Research Center, 2016d, 2016e).
- Deployment of gamification and educational applications to foster interactive learning experiences, see for example (Athena Research Center, 2016c, 2016k, 2023f).

Moreover, the integration of these technologies has been showcased extensively, leading to their maturity and substantial improvement. Many of these tools are readily accessible and, in numerous instances, openly available.

In light of the aforementioned considerations, this paper embraces a comprehensive framework that revolves around the interaction of *Culture-Technology-Economy*. It proposes the development of an advanced methodology and digital platform, specifically tailored to support and analyze cultural organizations in optimizing the management of their collections and activities. The immediate objective is to seamlessly integrate state-of-the-art technologies with a primary focus on enhancing the sustainability of the cultural sector, ultimately safeguarding the rich cultural heritage of Greece. This framework for promoting sustainability and development is underpinned by modern technology and is adaptable to the unique requirements and attributes of each cultural organization. It offers a well-rounded approach, encompassing a structured methodology, best practices, and an array of digital services.

2. Methodology

The work in project Thalia endeavors to foster substantial connectivity between cultural organizations, with a particular focus on small museums, and the economy, supported by technology. This emphasis aligns with the core principles of the Culture-Technology-Economy triad within the overarching context of sustainable development. The overarching objectives encompass the thorough analysis and promotion of the cultural wealth harbored within cultural organizations, as well as the protection of Greece's cultural heritage. In the pursuit of long-term sustainability and the facilitation of development, custom-tailored to the specific landscape of Greece, this work guides and supports the following pivotal functions:

- The facilitation of decision-making in the cultural management of both primary and supplementary elements within each museum, encapsulated under the banner of cultural asset management.
- The rigorous evaluation of alternative pathways for development, expansion, and modernization.
- The meticulous planning, monitoring, and control of action implementation.
- The strategic presentation of the organization's image to the general public and distinct interest groups, including potential funders.

- The establishment and reinforcement of sound management practices and promotional strategies.
- The ensuring of accessibility and seamless integration of high-value-added digital technologies.
- The promoting of networking opportunities and collaborations.
- The comprehensive analysis and assessment of sustainability and development strategies.

The methodology is supported by two distinct sections:

- Theoretical Framework
- Digital Toolset

In the subsequent paragraphs, these two sections are described in more detail.

2.1. Theoretical framework for sustainable development

A fundamental pillar in project Thalia centers on the creation of a theoretical guide, and subsequently, a digital tool, aimed at enhancing asset management and marketing and communication strategy within small cultural organizations. This framework constitutes a pivotal stride towards the long-term sustainable development of museums, driven by two principal considerations. Firstly, it provides the indispensable theoretical underpinning for the full spectrum of internal and external operations, furnishing guiding principles and pragmatic solutions for individuals entrusted with organizational responsibilities. Secondly, it assumes the role of a potent educational instrument, benefitting all stakeholders engaged in the organization's activities and decision-making processes. The theoretical framework is rooted in two foundational approaches.

- The first revolves around the field of cultural asset management, as described in the relevant literature within the domain of cultural management (Lord & Lord, 2009), underscoring the necessity for cultural organizations to make informed decisions concerning both their cultural assets, such as collections, and their activities, including events.
- The second encompasses the realm of strategic communication planning for cultural organizations, focusing on the development of marketing and communication programs designed to underpin sustainability. This multifaceted approach not only ensures effective

internal management but also fosters meaningful connections with the public and society at large (Kotler et al., 2008).

For instance, the goal of audience development necessitates museums to not only expand but also deepen their relationships with their target audience (Ambrose & Paine, 2012). This holistic perspective, encompassing both the internal and external dimensions of a museum's operational environment, has assumed paramount significance in contemporary times. The sustainability of smaller cultural organizations is intrinsically tied to their capacity to effectively adapt to the ever-evolving environmental conditions (Morris, 2017). It is worth noting that the notion of adaptation to the environment has recently garnered substantial interest in research literature, drawing inspiration from natural processes and systems (Baltas et al., 2013). In the context of this work, the pertinent literature (which is evidently lacking) has been scrutinized, alongside the exploration of methods and systems for asset management and communication strategy that have demonstrated success in related or diverse economic sectors (Frictionless, 2023; Gallery Systems, 2023; Palo Alto Software — Business Planning and Management Software, 2023). Collaboration with museums will ensure the analysis of key variables and parameters within the economic environment, including asset valuation, partnerships, competition, and the objectives of a cultural organization. The theoretical model is implemented in two digital applications included in the digital toolset.

2.2. Digital toolset

Tools and methodologies have been integrated to ensure small cultural organizations gain access to a high-value platform. The digital toolset encompasses components like asset management software, marketing planning software, and supporting digital clustering software, including digital museums, electronic guides, networking systems, unified activities planning and special collaborative digital infrastructures. In the subsequent sections, the individual components of the digital toolset will be examined in greater detail.

2.2.1. Asset management

The museum asset management and valuation software in project Thalia represents a comprehensive solution for the internal management of all elements within the museum, encompassing both tangible and intangible assets. It effectively addresses primary components, such as permanent

exhibitions, as well as secondary elements, including educational programs, lectures, events, recreational areas, and gift shops, among others. The software introduces a range of indispensable tools and capabilities, including:

- Valuation of the museum's assets, spanning both tangible and intangible resources. This feature holds particular significance in the context of soliciting donations and capital while facilitating prudent economic and cultural resource management.
- Ongoing monitoring of the museum's multifaceted contributions, spanning the national, social, economic, cultural, and environmental domains. This capability not only enhances the museum's reputation among the public but also bolsters its standing with specific groups, such as donors and investors.
- The ability to identify the overall resource requirements, encompassing both fixed and variable elements, and their collective contribution to the museum's financial sustenance.
- A robust financial evaluation framework for appraising alternative investments, development initiatives, and outreach strategies.

In the context of integrating asset management and valuation into a comprehensive system designed for evaluating the value of cultural heritage artifacts and assets, a robust and efficient technological stack was employed. MySQL was chosen as the database management system to store and manage crucial asset information, aligning with the CIDOC standard for seamless data integration. To facilitate communication and interaction with the database, Flask was utilized to create a flexible API, ensuring smooth data retrieval and updates. The Object-Relational Mapping (ORM) framework further streamlined database operations, enhancing the overall system's performance. For the user interface, Vue.js was adopted, offering a dynamic and responsive frontend to interact with the asset management system. To ensure a seamless transition from development to production environments, Docker containerization was implemented, guaranteeing consistency and reliability throughout the deployment process. This comprehensive technological approach forms the foundation of a robust and effective asset management solution for the preservation and evaluation of cultural heritage artifacts and assets. Figure 1 shows example screenshots of the asset management/valuation system (in Greek) where the museum manager is called to use user-friendly forms and evaluate factors and variables connecting with value of objects or collections. The final result of the valuation is based on weighted summations of those values with variable

weights that the museum managers can select according to the scenarios they are testing. It should be emphasized that the formal economics principles underlying this system do not fall within the scope of this paper, since here the basic technological framework is being showcased.

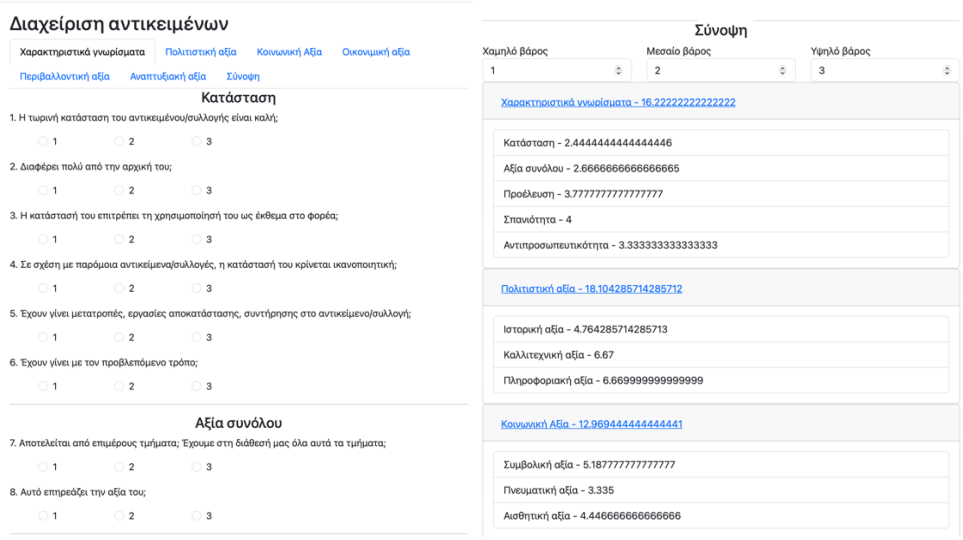

Figure 1. Screenshots from the online system for the artefacts and collections valuation

2.2.2. Marketing planning

An indispensable facet of modern museum sustainability is based on its capacity to attract visitors and cultivate relationships with influential groups, funders, and investors. In the contemporary economic and technological landscape, both on a global and local scale, strategic communication planning and public relations management assume a position of paramount significance. The capabilities embedded within this tool are designed to guide small cultural organizations in a range of critical activities, including:

- Identifying and comprehensively describing their status, encompassing both internal and external environmental factors.
- Strategically targeting their communication efforts to maximize impact.
- Crafting a well-structured communication strategy, accompanied by specific tactics that align with organizational objectives.

- Skillfully implementing and consistently monitoring the chosen strategies, while also facilitating automated and efficient management of relationships with specific interest groups, such as media outlets, funders, investors, and supporters.

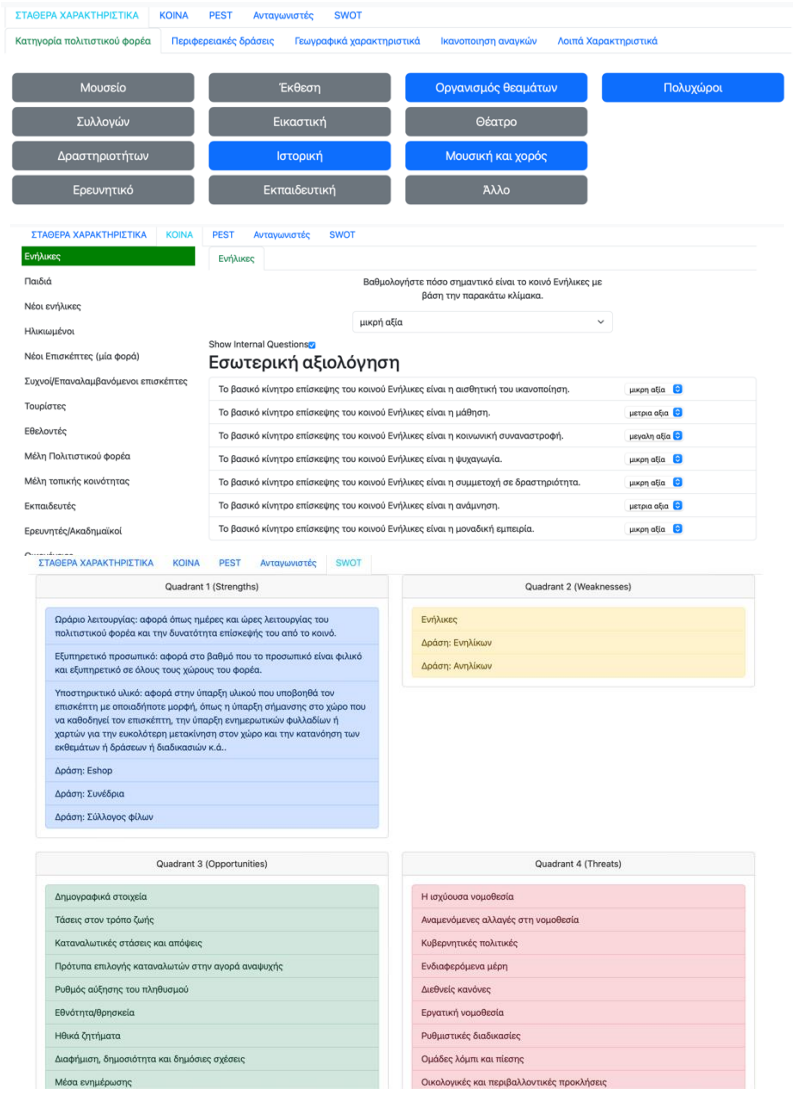

Figure 2. Screenshots from the marketing plan system

The market planning system follows the same technological approach and shares the same backend system with the asset management and valuation

system and this its description is identical. Figure 2 shows example screenshots of the system (in Greek) where the museum manager is called to use a user-friendly wizard app to define the crucial parameters of the museum, step-by-step reach a SWOT analysis and conclude in designing custom marketing plans It should be emphasized that the formal economics principles underlying this system do not fall within the scope of this paper, since here the basic technological framework is being showcased.

2.2.3. Digital clustering

A pivotal component of this endeavor is the creation of a *virtual museum framework* designed to interactively showcase and provide detailed descriptions of exhibits from one or more collections. This innovative tool is based on technologies that have a proven track record of implementing a diverse range of virtual exhibition and museum systems. Specifically, the application amalgamates and adapts the technology of Project *Synthesis* (Athena Research Center, 2023g), system *Dynamus* (Kiourt et al., 2016), and project *GameIt* (Athena Research Center, 2023f). Within this system, every cultural organization gains the autonomy to independently craft its virtual exhibitions.

Figure 3. Screenshot during a virtual exhibition creation by a museum curator

These exhibitions are seamlessly integrated into a unified virtual environment, ensuring a coherent and user-friendly experience for visitors, as shown in Figure 3 and Figure 4. The former figure shows a screenshot of the

administration interface where a museum curator creates a virtual museum and exhibition in the virtual world (inside the virtual building of the museum), whereas the latter, shows a screenshot of the interface with multiple visitors roaming the virtual world in front of the building of a museum (view of the world). The implementation of this virtual museum framework was based on cutting edge game engine technology (Unity game engine) and a modern intuitive interface both for the museum curators to create their exhibitions and the visitors to engage into a full cultural experience.

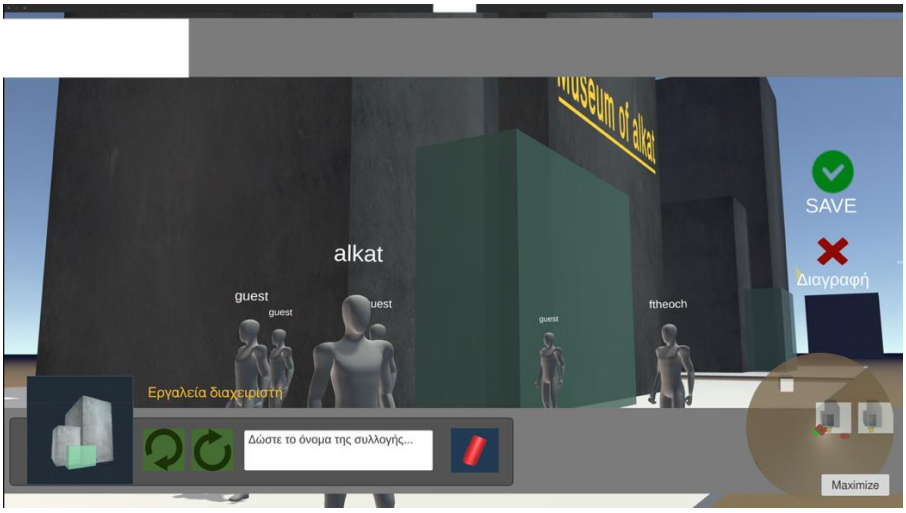

Figure 4. A screenshot of the virtual world, in which multiple users experience the virtual museums

A meticulously crafted *electronic guide* offers comprehensive guided tours of the cultural organization's premises, exhibits, exhibitions, and various activities. This sophisticated tool draws its foundation from the cutting-edge technologies with particular emphasis on the *3dguides* (Omega Technology, 2023) system and techniques derived from *iGuide* (Athena Research Center, 2015). It further incorporates mechanisms for personalized visit planning and active event participation, taking inspiration from the previous innovative projects, or drawing insights from current and pertinent research. In sum, this application furnishes a cultural organization with a holistic and user-friendly digital environment, empowering them to create digital tours and seamlessly link them to the physical space of the organization. Designed to operate seamlessly on smart mobile devices, this application strives to propel the digital tour experience beyond the current technological boundaries.

The *networking of cultural organizations is* a pivotal aspect of this initiative, entailing a suite of micro-applications for facilitating online interactions among cultural organizations that become part of the platform. This comprehensive network is designed to encompass forums where experts can exchange opinions, establish connections with e-commerce platforms for exhibitions, events, and educational programs, and forge links with platforms that support collaborative communication activities and crowdfunding initiatives. This innovative approach represents a dynamic integration of various elements within the cultural landscape.

It should be noted that all the technological solutions in project Thalia are based on a unified platform, encompassing a comprehensive *content management system (CMS)* backend tailored to the unique needs of cultural organizations. It not only delivers a unified view to visitors but also incorporates fundamental social networking and promotional functionalities. Beyond its presentation capabilities, this backend system stands as a central hub that effectively integrates all the applications and services within a shared management and presentation environment. It serves as the primary gateway for both organizations and visitors, streamlining access to a wealth of content and features. The overarching integration model, illustrating the synergy of all digital tools and services, is visually depicted in Figure 5. Within the backend, there resides a content repository housing the collective contributions of participating cultural organizations.

Figure 5. Architecture of technologies in project Thalia

Last but not least, project Thalia proposes an innovative collaborative augmented reality-based framework (named *SustainLab*) as a significant

contribution towards a next-generation networking tool. It operates on the same theoretical model and core digital services backend as the primary system, providing a collaborative environment equipped with remote interaction capabilities for designing cross-institution events and exhibitions and valuation functionalities, by using state-of-the-art augmented reality technologies, enhancing the collaborative experience. Figure 6-Figure 8 offer illustrative representations of how multiple individuals collaborate within the proposed augmented reality environment to co-create virtual exhibitions.

Figure 6. Screenshot of SustainLab during the co-creation of an exhibition: showcasing the placement and manipulation of 3D objects

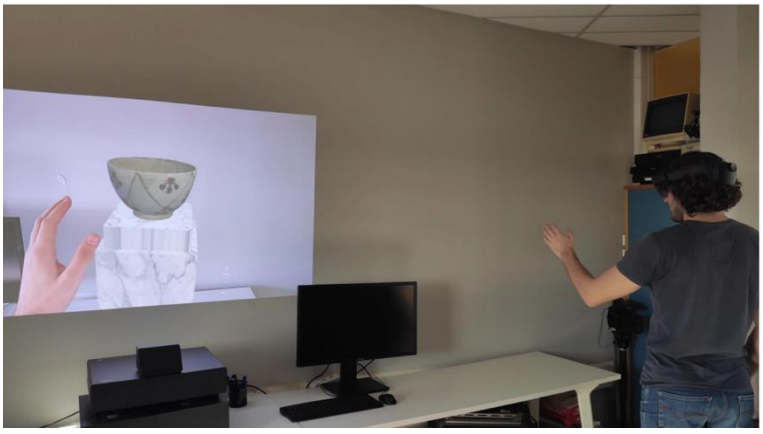

Figure 7. Photo of a SustainLab user during the placement and manipulation of 3D objects in the virtual exhibition space

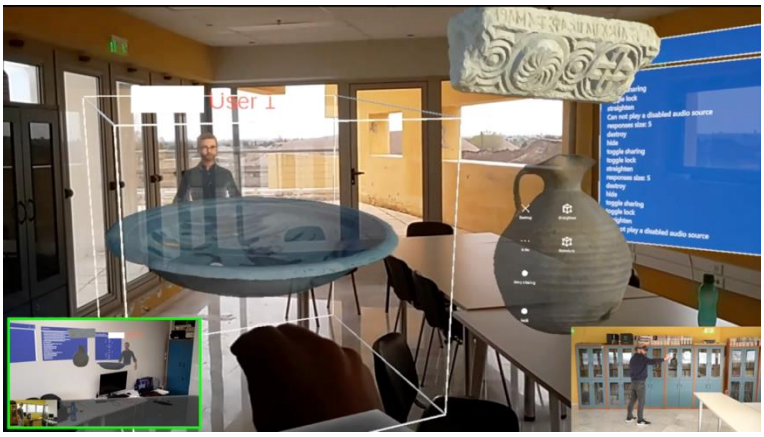

Figure 8: Screenshot of SustainLab during an augmented reality collaborative exhibition design session between two parties

3. Conclusion

In conclusion, this paper has delved into the essential necessity for small cultural stakeholders to embrace a digital transition for the preservation and promotion of cultural heritage. Project Thalia has exemplified the transformative power of digital tools and services, underpinned by a robust theoretical framework and an innovative digital toolset, in safeguarding cultural heritage and ensuring the sustainability of small cultural organizations. Through a strategic focus on asset management, marketing strategies, and cutting-edge technology, this work aims to create a sustainable economic model that generates revenue, fosters economic development, and upholds the preservation of cultural collections for future generations. This is a work still in progress and there are still no evaluation results apart from a typical user-interface assessment, which only targets half of the challenge. Nevertheless, as this project includes cultural stakeholders in its development and there is a constant feedback loop, the results are expected not only to bolster the economic viability of cultural institutions but also to make significant contributions to broader goals towards the digital transition of the cultural organizations. In addition, new paths are being opened for the preservation of vulnerable cultural resources while respecting the autonomy and independence of each cultural entity. The goals of project Thalia demonstrate the enormous potential for leveraging digital technology to support cultural institutions, drive economic growth, and ensure the preservation of our shared cultural treasures. As we move forward, further research and expansion of such initiatives will continue to unlock new

possibilities and advance the collective mission to protect and celebrate our cultural heritage.

4. Acknowledgment

This research has been co-financed by the European Regional Development Fund of the European Union and Greek national funds through the Operational Program Competitiveness, Entrepreneurship, and Innovation, under the call RESEARCH – CREATE – INNOVATE (project code: T2EDK-1018).

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