Preserving the Past in the Digital Future: User Centric Approach

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Abstract: This paper describes a methodology and plan for promoting the tangible and intangible cultural heritage to digital users. The example in the article is related to Glozhene village, Teteven Municipality, Lovech District, Bulgaria. The primary goals are to digitize local landmarks and artifacts and create a virtual platform for showcasing and sharing the rich heritage of the Glozhene region. The study also seeks to determine the best methodology for presenting and socializing cultural heritage in an innovative way that meets the technological expectations of modern society and adheres to established user experience standards. This digital transformation aids in the preservation and promotion of cultural heritage.

Keywords: Digitization, Augmented Reality, Virtual Reality, 3D, Cultural Heritage, User Experience, Artificial Intelligence.

1 Introduction

Museums curate and contextualize cultural artifacts and histories (Song & Evans, 2024). Modern technologies enhance the sharing and experience of cultural and historical heritage. Research indicates ICTs have shifted tourist information needs (efficiency, engagement, aesthetics, social recognition), aligning with UX standards (Mieli & Zillinger, 2020). Current technologies enable virtual museum walks, object visualization, and detailed 3D models.

Digitalization deepens heritage engagement, understanding, and dissemination (Lian & Xie, 2024), while preserving artifact integrity (Muchanova, 2024). Surveys show high user interest in VR/AR. Digitalization bridges historical heritage with the 21st century (Lian & Xie, 2024). Immersive 3D/virtual tours and interactive AR enhance user experience. Method selection should suit the heritage and audience. Projects like Iwalk (Ignatov, n.d.) and "Innovative Presentation of Bulgarian Writers" (Muchanova et al., 2019) exemplify technological potential. This report aims to present the benefits of im-

proving user experience in showcasing sites around Glozhene village through innovative digital technologies for both on-site and virtual visitors, focusing on digitizing and promoting local landmarks.

This report aims to present the benefits of improving user experience when presenting the sights and sites around Glozhene village. This will be achieved through innovative digital technologies and modern virtualization, catering to both on-site visitors and virtual researchers. The focus is on showcasing various solutions that utilize interactive information technologies to digitize and promote landmarks within the village area.

2 Research Methodology

The methodology for this research draws inspiration from Don Norman's 1988 book *The Design of Everyday Things* (Norman, 2013), which provides a comprehensive guide to cognitive engineering principles applied to the design, construction, and use of machines. The core of this methodology lies in understanding the user's cognitive processes and how they interact with a system, emphasizing the importance of designing systems that are intuitive, easy to use, and enjoyable. This methodology is further explored and refined in (Muchanova, 2024), where the author analyzes user experience criteria and the methodology for developing user-centered software solutions related to the presentation of cultural and historical heritage (Fig.1). The study details technical requirements and standards for applying technologies to enhance the presentation of objects through 3D modeling, AR, VR, and virtual tours.

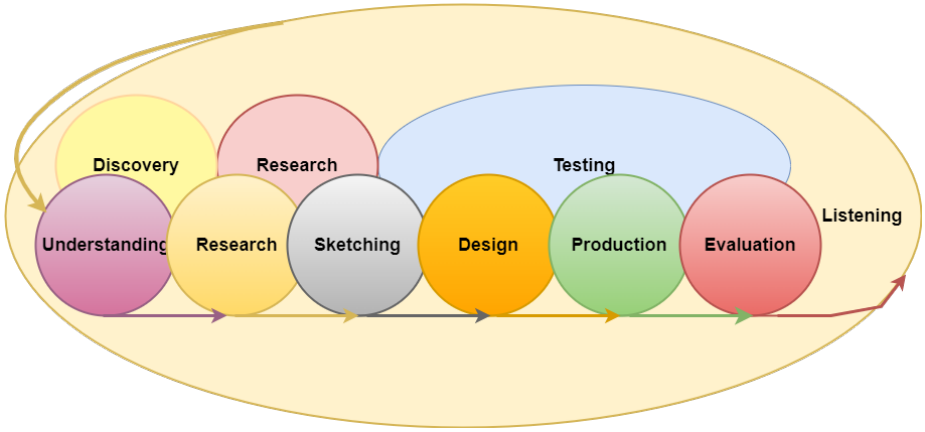

Fig. 1. Implementation of User-centered design in the software product development life cycle.

Digitalization methodology involves iterative analysis, design, development, and rigorous UX evaluation of the virtual platform. This ensures a technically sound, user-friendly product effective in cultural heritage promotion and preservation. The digitalization process utilizes methodologies like 3D modeling, virtual tours, and AR to create appealing digital access for modern tourists. Platform design should adhere to UX principles, such as ISO 9241 (ISO, 2019), ensuring intuitive navigation, clear information,

and an engaging interface accessible to diverse users. Prioritizing UX in design and development ensures effective promotion and preservation of the Glozhene region's cultural heritage while providing a meaningful user experience.

3 Analysis of Landmarks in the Glozhene Area

The research involves an initial exploration of the sites around Glozhene village and how they are presented to the public, both digitally and on-site. This helps determine the right approaches for making innovative improvements. Cultural heritage is generally categorized into tangible and intangible forms, with tangible heritage including architecture, sculpture, paintings, and artificial landscapes. (Lian & Xie, 2024) Available online information about these landmarks includes their creation era, interesting facts, geographical location, and routes, often utilizing photos and videos from both professionals and amateurs. The key determinants of international tourist flow include a range of economic, personal, and supply-side factors. (Nazare et al., 2024) The main attractions are cultural monuments of national importance: the Glozhene Monastery, founded in the 12th century, and the Morovitsa cave, inhabited since antiquity. The area also features a Roman road with partially preserved authentic pavement, and evidence of historical light signaling techniques can be observed in the mountains (Fig. 2).

Fig. 2. Landmarks of Glozhene area.

Within Glozhene village itself, there are two cultural monuments of local importance: a Revival church built around 1812, currently in poor condition after an earthquake in the early 20th century, and a 19th-century stone bridge over the Vit River (Fig. 3).

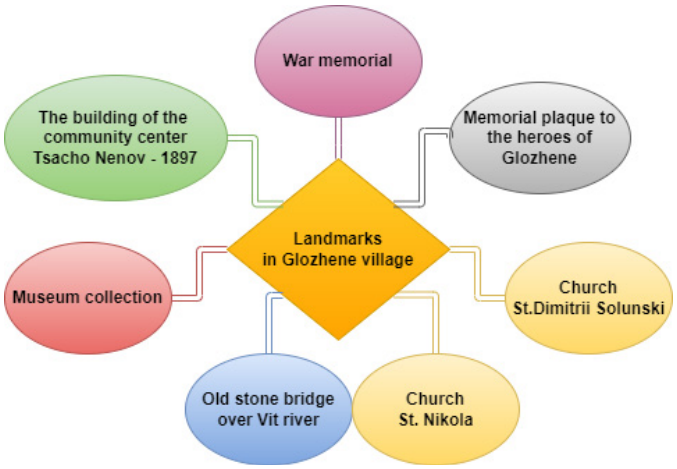

Fig. 3. Landmarks of Glozhene.

Analysis of these landmarks requires a comprehensive approach, considering factors that influence tourist flow, including economic considerations like income levels and transportation costs, personal preferences, and supply-side factors like accessibility, attractions, and service quality. For example, the analysis could examine the income levels of tourists who typically visit the Glozhene region and the available transportation options. It could also explore the types of attractions that appeal to these tourists and the quality of services offered in the region.

Additionally, the analysis should delve deeper into the cultural and historical significance of each landmark. For religious sites like the Glozhene Monastery and the Revival church, this includes gathering information about their founding, architectural styles, notable religious figures associated with them, and any unique rituals or traditions practiced there. For natural sites like the Morovitsa cave, the analysis should explore its geological formations, any archaeological discoveries made there, and the biodiversity it supports. This in-depth analysis will inform the design of the virtual platform and ensure that it accurately and comprehensively represents the rich cultural heritage of the Glozhene region.

4 Design of the Proposed Solution

The system will employ AI-powered chatbots to provide instant support, answer visitor queries, and offer personalized recommendations based on user preferences and real-time data. The possible integration with local businesses will be a key feature, allowing users to access information on nearby restaurants, accommodations, and services, thus promoting the local economy.

Proposed improvements include:

- Audio recorded guides - Recorded audio files with detailed information for the artifact;
- AR reconstructions visualize object-related information

- 360-degree virtual tours - High-resolution 3D models of the artifacts will be created, allowing users to manipulate and examine them digitally from all angles;
- 3D virtual models of artifacts - give the option to take a closer look at the artifacts from a 360-degree point of view;
- 3D prototypes - a scale model of a given landmark, which can be bought for memory;
- Lidar scan of the buildings of the church “St. Dimitrii Solunski” and community center (Raykovska et al., 2024) (Fig. 4) - A Lidar scan will create a precise 3D point cloud of the church and community center;

Fig. 4. Options for digitalization of cultural heritage.

The design of the proposed solution should incorporate gamification and social media interactions to enhance user engagement. For example, the virtual platform could include interactive games or quizzes that educate users about the cultural heritage of the Glozhene region. It could also integrate social media features that allow users to share their experiences and connect with others who are interested in the region.

5 Evaluation

A design, no matter how technologically advanced, is only successful if it meets user needs and expectations while fulfilling technical and legal requirements. To achieve this, several questions must be addressed:

RQ1: Who uses the product? The digital presentation of cultural heritage should aim to reach a broad audience, with special attention to young people, those over 60, and people with disabilities. This can be achieved through tailored applications that cater to specific needs.

RQ2: How is the product used? This involves considering the practical application of the product, including the required devices, place of use, time commitment, and other relevant factors.

RQ3: Why is the product used? Understanding the user's motivation, whether it's for leisure, education, or necessity, is crucial for designing an effective product.

RQ4: What do consumers expect from the product? Users expect detailed, engaging, and informative content that is presented in a modern and technologically appealing way (Fig. 5).

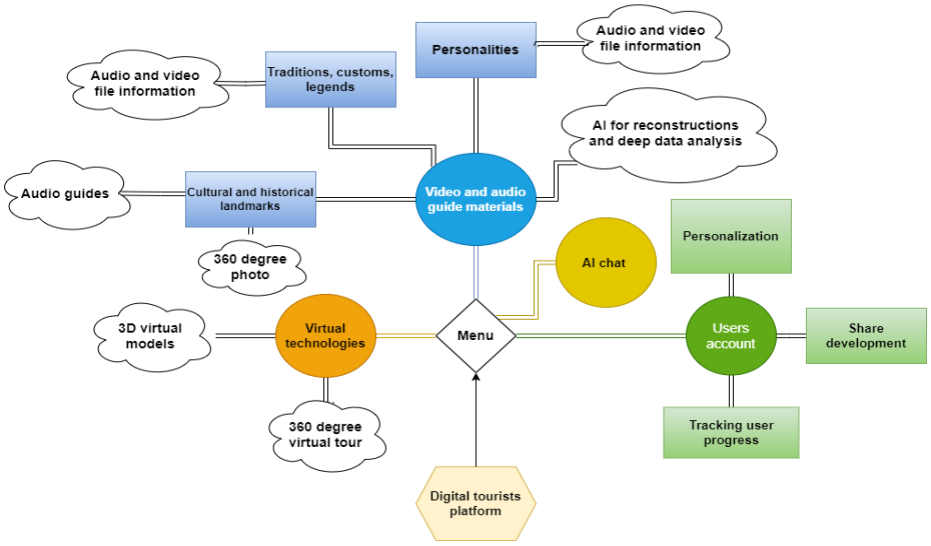

Fig. 5. Platform for digital tourists.

This digital platform holds the potential to significantly transform how we engage with and safeguard our cultural heritage. It is designed to present cultural and historical landmarks in full compliance with criteria for a superior user experience, ensuring intuitive navigation where all functionalities are accessible within a maximum of three clicks. This minimizes user effort and maximizes efficiency. Furthermore, a user profile section with built-in personalization allows individuals to tailor their experience to specific interests, thereby enhancing engagement and relevance.

Through virtual walks and three-dimensional virtual models, digital tourists can explore landmarks from anywhere globally, potentially inspiring future physical visits. These immersive experiences offer a unique perspective and level of detail often unavailable via traditional media, fostering a deeper connection with the sites.

To provide a richer user experience, the platform embeds high-quality audio and video materials. These present compelling narratives about the past, offering deeper insights into the cultural and historical significance of the landmarks and bringing their stories to life in an engaging and memorable way, catering to diverse learning styles.

Artificial Intelligence (AI) is employed to analyze the extensive metadata associated with cultural heritage items for research. This advanced analysis can uncover previously unknown connections and patterns within the data and aid in detecting new information related to significant Bulgarian personalities and their contributions.

By making this information readily accessible and presenting it engagingly, especially for younger generations, we can ensure our history is appreciated, understood, and valued for years to come. The platform aims to cultivate a sense of cultural ownership and encourage lifelong learning.

The evaluation of this proposed solution will consider the concept of "presence"—the feeling of being physically present in a virtual environment—a key factor in user engagement. This will be measured through direct user feedback (surveys, qualitative studies) and analysis of behavioral data like time spent on the platform and interaction levels. The internationally recognized standard ISO 9241, which outlines a robust design model for interactive systems prioritizing end-user needs, will also be a benchmark.

Artificial Intelligence will be further integrated to continuously analyze user behavior patterns and preferences. This provides valuable insights for ongoing user experience analysis and iterative platform optimization, allowing for continuous improvements to its design, content delivery, and overall usability.

This platform's innovations build upon the foundational work of Don Norman, who coined "user experience" and emphasized user-centered design, and Peter Morville, who defined the seven key facets of UX. These facets were enhanced in the research of (Muchanova, 2024) with the significant additions of personalization and rich visualization, reflecting their growing importance.

The technical architecture ensures scalability, sustainability, robust security for data protection, and universal accessibility for an inclusive experience.

6 Performance

Furthermore, this platform utilizes the detailed metadata approach in Table 1, categorizing artifacts into spirituality and faith, lifestyle and culture, and natural, with rich descriptions including traditions, materials, era, and more.

Table 1. Metadata from a digital platform.

Category	Field	Description	Example
Identification	Name	Official name of the landmark	Glozhene Monastery
	Location	Geographic coordinates	42.9757° N, 24.1696° E
	Type	Category of the landmark	Religious, Architectural
	Status	Legal protection status	National Significance
	Ownership	Owner of the landmark	Bulgarian Orthodox Church
	Accessibility	Public access restrictions	Open to visitors
Description	History	Historical background and significance	Founded in the12th century
	Era	Period of creation/relevance	Medieval
	Condition	Current state of preservation	Well-maintained
	Material	Construction materials	Stone, wood
	Dimensions	Physical measurements	20m x 15m
	Techniques	Traditional methods used	Fresco painting
	Distribution	Geographic spread	Local
Media	Photos	Visual documentation	Professional, amateur
	Videos	Audio-visual recordings	Documentary, promotional
	Sound Recordings	Audio recordings	Chants, bells
	3D Models	Digital representations	Interactive, textured
	Virtual Tours	Immersive experiences	360° panoramas
	Augmented Reality	Interactive overlays	Historical reconstructions
	AI Restorations	Digitally enhanced versions	Reconstructed frescoes
Connections	Related Objects/People	Associated artifacts or figures	Icon of St. George
	Sources of Information	References and links	Historical archives, websites
	Routes	Accessible paths	Hiking trails

The “digital platform for tourists” and innovations, such as virtual tours and 3D models, build upon the idea to improve the user experience according to Don Norman, and Peter Morville, who defined the seven criteria of UX. These criteria were further enhanced in (Muchanova, 2024) by adding personalization and visualization. The platform adheres to these improved criteria and meets all requirements for creating digital files and materials.

7 Conclusion

This paper describes the landmarks around Glozhene village. Based on a study of innovative models for presenting landmarks, museums, and artifacts, the study provides recommendations for applying emerging technologies like AR and VR, virtual tours, and 3D modeling. The proposed changes aim to meet the expectations of modern tourists and virtual users. This modernized presentation is expected to increase interest in the area, contributing to the social and economic well-being of the local population.

The conclusion should emphasize the potential of virtual tourism platforms to promote sustainable tourism by redirecting tourist traffic to lesser-known destinations and enhancing user engagement. The virtual platform, with its intuitive design and interactive features, serves as a successful example of how virtual tourist platforms can contribute to the growth and resilience of the tourism industry.

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