

THEORETICAL ASPECTS OF DEVELOPING A UNIFIED PLATFORM FOR STORING AND DISPLAYING MATERIAL CULTURAL HERITAGE IN 3D

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Material cultural heritage is an invaluable asset of humanity, reflecting the history, traditions, and achievements of various epochs and civilizations. Its preservation, research, and popularization are pressing tasks, in addressing which modern information technologies, particularly 3D scanning and modeling methods, play a significant role. However, to date, efforts in the digital representation of cultural objects are often fragmented, hindering data exchange and limiting access to digital collections.

This paper examines the theoretical aspects of developing a unified platform for storing and displaying material cultural heritage in 3D. The aim of the study is to define the key theoretical principles for constructing such a system, which will provide a centralized repository, standardized cataloging, effective research tools, and broad opportunities for the virtual presentation of cultural values.

An analysis of existing approaches to storing and displaying 3D models of cultural heritage was conducted, including digital archives of museums (e.g., [1]), commercial platforms for 3D content (e.g., [2]), and research initiatives. The analysis revealed the absence of a comprehensive platform that would combine centralized storage, flexible research tools, and a focus on the specific needs of the cultural heritage domain.

To conceptualize the future platform, a Business Model Canvas was developed (see Fig. 1).

<https://next.canvanizer.com/canvas/rcAHtp1DwaYb>

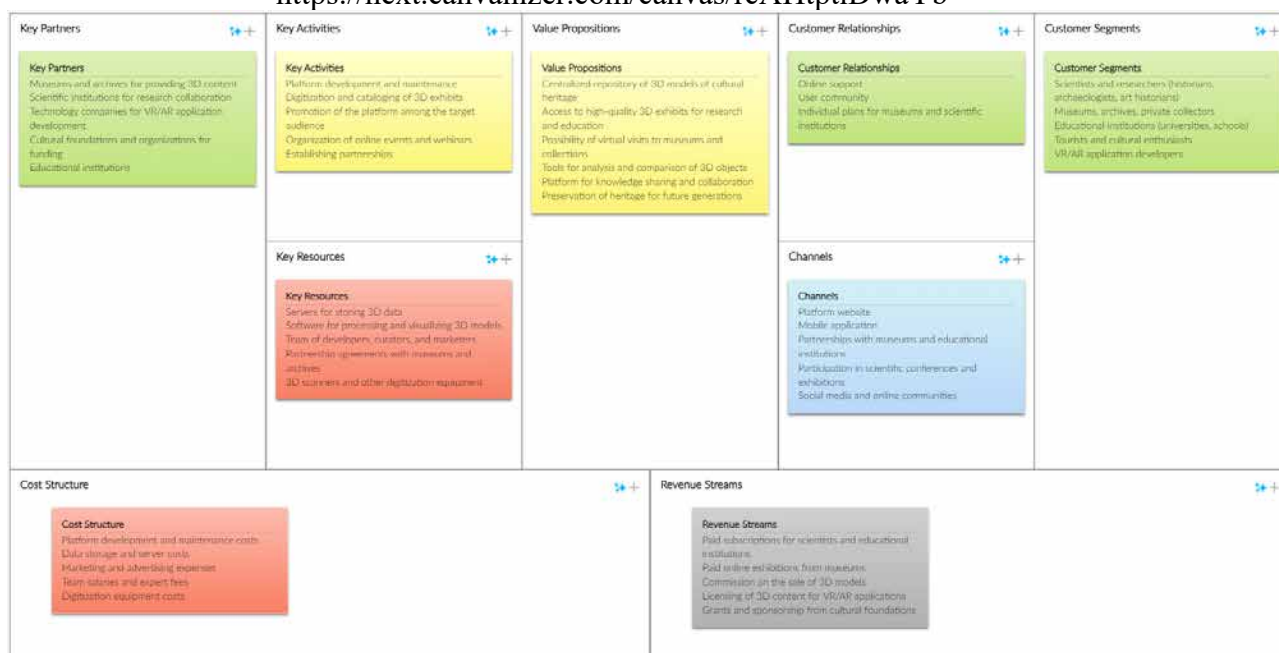


Fig. 1. Business Model Canvas of the platform for storing and displaying 3D materials of cultural heritage.

The developed business model defines key customer segments (scientists, museums, visitors), value propositions (centralized storage, analysis tools), distribution channels, and revenue streams.

Based on the analysis of user needs and existing approaches, a number of key functional requirements for the platform were identified, presented in the form of user stories (see Table 1).

Table 1. Examples of User Story

	Cataloging Metadata	and	3D Visualization	Analytical Tools
As	a scientist		a museum visitor	a researcher
I want	to be able to add detailed metadata to 3D models		to be able to interactively view 3D models in a web browser	to have tools for measuring and comparing 3D models
So that	I can easily find and analyze the necessary objects		I can get a complete understanding of the exhibits	I can conduct scientific research

User stories provide a user-centered approach to requirements elicitation, ensuring that the developed platform directly addresses the needs and goals of its intended users. By framing requirements in terms of user roles, actions, and motivations, user stories facilitate communication between developers and stakeholders, leading to a more intuitive and effective system. The user stories defined in Table 1 served as a foundation for the development of detailed use cases, which further specify the interactions between users and the platform.

To detail user interaction with the system, use cases were developed. One of the key business processes is the "3D Model Upload and Cataloging" process, the model of which in BPMN notation is shown in Figure 2.

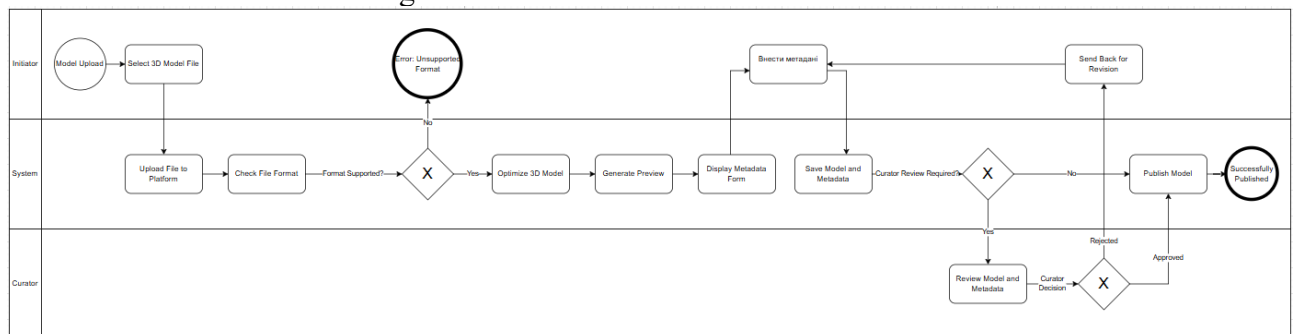


Fig. 2. Business process model '3D Model Upload and Cataloging' (fragment).

The developed concept of a unified platform has significant potential to improve the processes of preserving, researching, and popularizing material cultural heritage by centralizing data, providing specialized tools, and expanding access opportunities.

LIST OF REFERENCES

1. Europeana. [Electronic resource]. URL: <https://www.europeana.eu/en> (accessed: 18.04.2025).
2. Sketchfab. [Electronic resource]. URL: <https://sketchfab.com/> (accessed: 18.04.2025).

**НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ БІОРЕСУРСІВ І
ПРИРОДОКОРИСТУВАННЯ УКРАЇНИ
ФАКУЛЬТЕТ ІНФОРМАЦІЙНИХ ТЕХНОЛОГІЙ**



ТЕОРЕТИЧНІ ТА ПРИКЛАДНІ АСПЕКТИ РОЗРОБКИ КОМП'ЮТЕРНИХ СИСТЕМ

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