

THE LONG-TERM PRESERVATION AND MANAGEMENT OF HUNGARY'S BUILT HERITAGE THROUGH THE APPLICATION OF HERITAGE BIM METHODOLOGIES

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ABSTRACT

Hungary's rich historical background has resulted in a diverse and significant built heritage. In addition to protecting cultural heritage, the preservation of the built environment also plays a critical role. Heritage conservation has been a part of Hungarian legislation since the 19th century. Although these legal frameworks have undergone considerable changes over time, the education and practice of heritage preservation remain a priority in the field of architecture.

With the digitization of the construction industry, an increasing number of new technologies, tools, and methodologies have emerged, offering novel opportunities for stakeholders in the sector. Today, Building Information Modeling (BIM) has become an integral part of numerous construction projects. Consequently, it is no surprise that in recent decades, BIM principles have also been adapted to the field of heritage conservation under the term Heritage BIM.

The aim of this paper is to explore, review, and analyze current international Heritage BIM methodologies and assess their potential implementation within Hungary's heritage preservation environment.

KEYWORDS _ *Heritage BIM, Built Heritage, Preservation, Digitization*

INTRODUCTION

The digitalization process of the construction industry has been ongoing for decades, and by now, it has proven its legitimacy and future necessity in several areas. In addition to the wealth of research, the construction market itself has demonstrated the benefits of applying BIM (Building Information Modeling), whether in terms of increasing efficiency, supporting sustainability, decision-making, or collaboration.

Recognizing these advantages, Hungary has also decided to regulate the mandatory application of BIM methodologies at the legislative level. However, due to the immense scale of the task, this cannot be achieved overnight. Therefore, lawmakers have prepared a phased, multi-year implementation plan. According to this plan, the use of BIM will initially be mandated only for certain project types (e.g., state-funded investments), which will then gradually be extended to private sector projects as well. Accordingly, both investors and authorities in the Hungarian construction industry will be given sufficient time to transition gradually to a BIM framework, while lawmakers can continuously work on shaping and developing the national BIM framework.

Since the goal is to establish a unified national BIM framework over the coming years that covers the entire built environment of Hungary, monuments cannot be excluded. In relation to these, heritage protection laws and regulations outline special requirements and objectives beyond those expected for general buildings. This paper presents the current state of heritage protection in Hungary, explores the potential uses of Heritage BIM, and examines the possibilities for methodologically developing a new BIM-based framework for heritage conservation—one that can reliably and sustainably fulfill Hungary's heritage protection goals.

METHODOLOGY

Numerous international scientific studies in the field of Heritage BIM offer valuable examples that can support the digitalization of Hungary's heritage protection system. To examine the possibilities for implementing these examples, the current institutional and legal framework for heritage protection in Hungary is first mapped out, as it defines the goals and responsibilities of heritage and monument conservation. Following this, it is necessary to review the existing Hungarian digital construction framework—particularly the segment related to heritage-protected buildings—and to identify its advantages, disadvantages, and challenges from the perspectives of regulatory authorities, investors, and asset managers. For each of the problems identified, solution proposals are developed with the help of best practices from international examples. These solutions can be implemented in parallel with legislative changes in the construction sector and the introduction of a national BIM framework, in a phased and long-term manner, considering these ongoing developments.

THE CURRENT LEGAL AND ADMINISTRATIVE FRAMEWORK OF HERITAGE PROTECTION IN HUNGARY

Heritage protection is a complex task that relies on one hand, on a robust legal regulatory background, and on the other hand, on a nationwide institutional system established to implement the heritage protection objectives defined in the legislation. Therefore, to explore the potential applications of Heritage BIM, it is essential to map out the legal and institutional background of heritage protection in Hungary.

The current legal framework of heritage protection in Hungary

The protection of cultural heritage and the built environment has long been present not only in Hungary, but globally. Modern heritage conservation defines universal principles through international charters

(e.g., The Athens Charter for the Restoration of Historic Monuments, 1931), enabling individual countries—such as Hungary—to establish their own legal heritage policies based on these guidelines.

In Hungary, the concept of heritage protection was officially introduced in 1881, when a law first defined the term monument, laid out the responsibilities of care and maintenance, and established a committee responsible for the oversight and management of monuments (Wolters Kluwer Hungary Kft 1881). Currently, heritage protection in Hungary is regulated by acts of law and government decrees. Until 2025, the primary legal instrument governing heritage sites, their protection goals, and related responsibilities was Act LXIV of 2001 on the Protection of Cultural Heritage (Hungarian Parliament 2025c). Since 2025, as part of the process of establishing a new national BIM framework, these provisions have been replaced by the Act C of 2023 on Hungarian Architecture (Hungarian Parliament 2024b).

In addition to the act itself, government decrees also play a significant role. These decrees cover expert activities related to heritage protection, specific data management and documentation requirements for heritage properties, and procurement regulations concerning state-owned heritage assets.

Based on the above, any legal assessment of the possibilities for Heritage BIM development in Hungary must consider the following regulations:

- Act C of 2023 on Hungarian Architecture (Hungarian Parliament 2024c)
- Government Decree No. 68/2018 (IV. 9.) on the rules related to the protection of cultural heritage (Hungarian Parliament 2024b)
- Government Decree No. 439/2013 (XI. 20.) on expert activities related to archaeological heritage and monument values (Hungarian Parliament 2025b)
- Government Decree No. 31/2024 (VIII. 22.) of the Ministry of Construction and Transport (ÉKM) on the regulatory framework for Building Information Modeling (BIM)-based design and technical implementation (Hungarian Parliament 2024a)
- Government Decree No. 313/2012 (XI. 8.) on the Construction Documentation and Information Centre and the National Construction Register (Hungarian Parliament 2025a)

The role, relevance and context of the above-mentioned regulations in the implementation of Heritage BIM are illustrated in Figure 1.

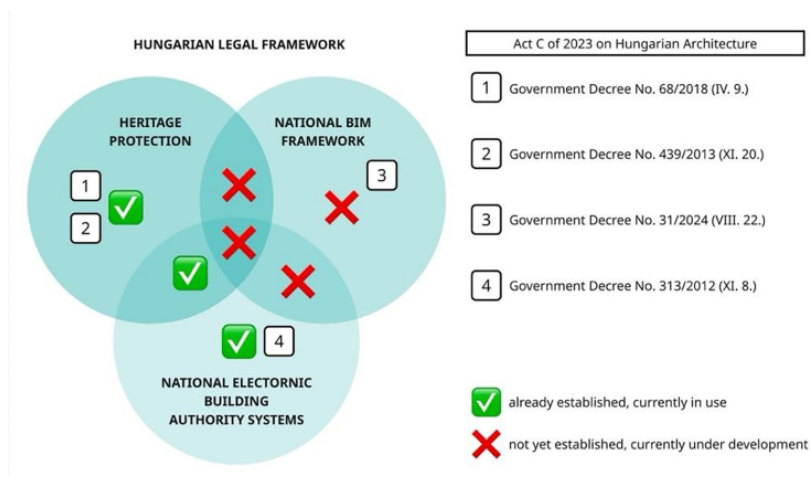


Figure 1: Current legal framework involving heritage protection, the new national BIN framework and the existing national electronic building authority systems in Hungary

As Figure 1 illustrates, the development and implementation of the new national BIM framework must consider existing national heritage protection laws and the currently operational electronic building authority systems. Furthermore, the introduction of the BIM framework may necessitate amendments to existing legislation or the creation of new laws to address newly emerging requirements.

The current heritage protection authority system in Hungary

In Hungary, the institutional and regulatory system of heritage protection has followed a similarly turbulent path as the monuments themselves. During the historical and political upheavals of the 20th century, all national heritage protection responsibilities were centralized in a single institution. However, this changed in the early 1990s, when the institutional and administrative structures of heritage protection underwent continuous reform. Currently, heritage protection falls under the Deputy State Secretariat for Heritage Protection within the Ministry of Construction and Transport (Ministry of Construction and Transport 2025d).

Today, construction administration in Hungary operates within the e-construction (in Hungarian: e-építés) framework, a government-supported digital platform that facilitates the digitalization of the construction industry (Ministry of Construction and Transport 2025a). This framework is divided into multiple subsystems, each supporting different aspects of the construction sector. For instance, administrative procedures related to construction and heritage protection take place in a different subsystem than those concerning utility planning or residential services.

Within Hungary's digital construction system, the use of several subsystems is required for the protection of cultural heritage. One such system is the Electronic Documentation System Supporting Construction and Heritage Authority Procedures (abbreviated as ÉTDR in Hungarian), which provides the platform for electronic submission of applications and plans, as well as case management (Ministry of Construction and Transport 2025c). It serves as the communication and documentation channel between the construction authorities, the relevant specialized authorities, and the applicants (investors, operators, citizens) for all types of construction projects—including those involving heritage buildings.

Another subsystem is the e-heritage platform (in Hungarian: e-örökség), recently launched on March 25, 2025, which contains a searchable database of Hungary's monuments, including key information and geographic representations (Ministry of Construction and Transport 2025b). Additionally, the platform provides interactive 3D models—generated from point clouds—of over 240 prominent monuments. The concept of the e-heritage system exemplifies a forward-thinking approach in heritage management in Hungary. This platform can have the capacity not only to support the execution of national heritage conservation tasks, but to also potentially meeting the requirements outlined in the forthcoming national BIM framework.

SHORTCOMINGS OF THE CURRENT HERITAGE PROTECTION SYSTEM IN HUNGARY

The recent launch of the e-heritage platform has addressed many previous shortcomings in the digitalization of heritage protection in Hungary. On one hand, it has established an official, nationwide central database that is accessible to the public and contains basic information on heritage properties. However, for initiating a design task involving a heritage-protected property, far more detailed information is required—especially when preparing for a construction project involving a monument.

In Hungary, heritage protection is assigned to specific sites. The current construction framework does not provide spatial visualization of heritage areas on a map; instead, it lists the individual properties assigned to protection. This is inadequate for large-scale projects—such as those affecting entire heritage-protected city districts—where spatial data visualization is essential.

This system also causes problems when entire sites are assigned heritage-protection, even if only one building on the site is actually listed as a monument. This can create a lot of problems, when for example, there is a site with over 30 buildings, but not all of them are protected—yet the entire property is treated as a heritage site under current regulation.

Zooming in further, issues also arise when only a part of a building is protected. There can be different wings of a building, and it is possible, that some extensions are under heritage protection, while others are not, yet this distinction is not apparent in the current system. This is illustrated in Figure 2.

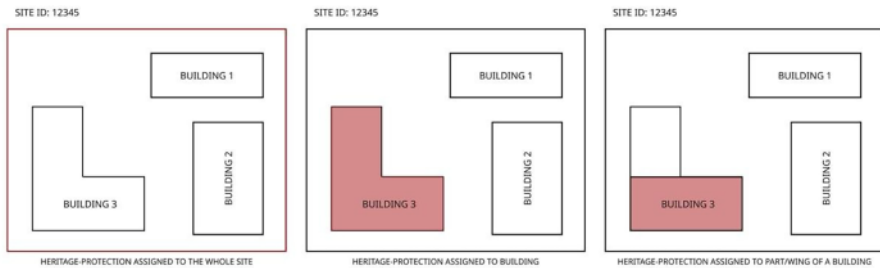


Figure 2: The different cases, when heritage protection is applied to the entire site, to individual buildings, or to parts of a building

On an even more granular level, Hungarian heritage protection laws strictly regulate what additional requirements must be fulfilled for construction activities affecting heritage properties—beyond those required for general construction projects. Perhaps the most important of these is the Heritage Value Inventory (HVI). The purpose of this inventory is to identify, document, and register heritage values at both the building level and the element level. It ensures that every heritage element—whether part of the building structure or a piece of furniture—is identified, catalogued, and documented with heritage data. This creates a snapshot of the monument’s condition at a given point in time, which is crucial for tracking its lifecycle.

Although the HVI is essential for the preparation of any project involving heritage properties, it is currently not available within any subsystem of the national construction framework. As a result, investigating a monument’s lifecycle requires additional research and effort.

POSSIBILITIES FOR IMPLEMENTING HERITAGE BIM

When developing the national BIM framework, the implementation of the ISO 19650 standard must be given particular emphasis. The ISO 19650 standard defines the fundamental principles of an ideal BIM lifecycle for general facilities. However, since ISO 19650 is an international standard, its principles must be adapted and specified in accordance with the legal and regulatory context of the given country—in this case, Hungary’s construction and heritage protection laws.

The Hungarian Heritage BIM lifecycle

Compared to general buildings, the lifecycle of heritage buildings must be extended with several elements specific to heritage protection, based on the legal construction environment of the country. Therefore, it is essential to complement the general BIM lifecycle with the special requirements defined by law in the case of heritage buildings. Embedded in the Hungarian legal framework, the ideal lifecycle of a heritage building is illustrated in Figure 3.

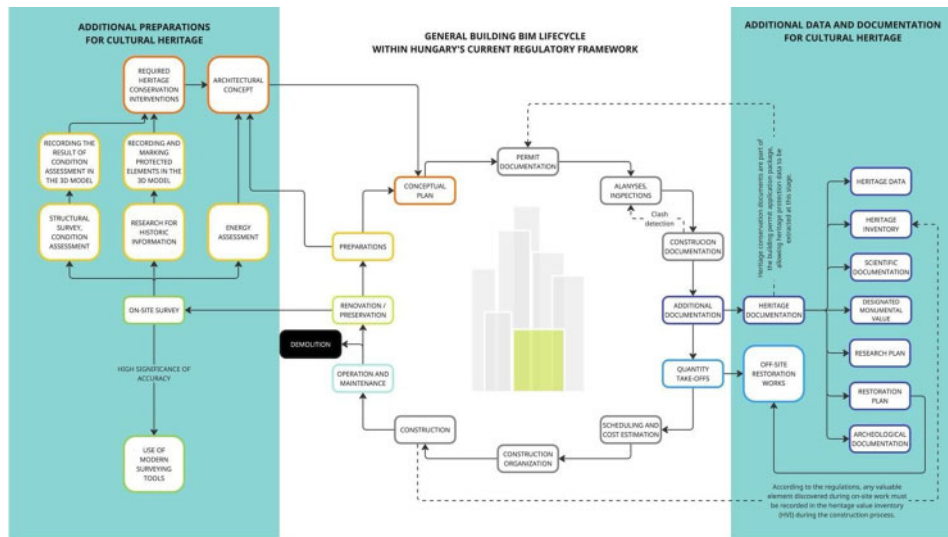


Figure 3: BIM lifecycle of a heritage-protected building within Hungary's current regulatory framework

As seen in Figure 3, additional considerations must be taken into account in Hungary when preparing projects and generating mandatory documentation for heritage buildings. Beyond this, it is also important to highlight that due to the special nature of heritage data, the involvement of additional expert roles is necessary in heritage construction processes, beyond those typically involved in standard building projects. Such roles include heritage consultants, art historians, and restoration specialists. Because of the complexity of heritage protection, producing mandatory heritage documentation for a specific monument often requires the collaborative work of multiple experts. For instance, in the preparation of a the HVI, a heritage consultant, an art historian, and a restoration specialist may all take part.

Development opportunities for Hungary's heritage protection systems

The spatial representation of heritage-protected areas could be implemented in a geographic information system (GIS) where the spatiality of a site's listing is visualized using polygons. The problem of managing heritage protection data at the site level could be resolved by further developing this GIS so that heritage protection is not linked to the site as a whole but rather assigned to the contour of a specific building or building part. This would make it possible to visualize which buildings or building parts are heritage-protected within a multi-building property and which are not. A great example of a solution to this challenge is the Historic England Open Data Hub, an online platform where heritage data can be managed in GIS format (Historic England 2025).

Element-level heritage data are much smaller in scale, so their management should not be spatial (GIS-based), but rather handled at the model element level. In the Hungarian legal context, element-level documentation is provided by the HVI, which—according to regulations—must be compiled in a tabular format with textual and photographic documentation. Making the HVI model-based with the help of a national heritage classification system could be a first step in the nationwide implementation of Heritage BIM practises. Another proposed development is making the HVI document accessible through one of the existing administrative subsystems. This would significantly support heritage-related construction projects, and would enable the continuous updating of the HVI. This would allow for the tracking of heritage elements, their cultural heritage value, their condition, and their specific maintenance needs. A good example for integrating heritage-specific aspects into the development

of a national BIM framework is the Arches system, which is an opensource data management platform for the heritage field, and is capable of handling both spatial-level and model-level heritage data (Arches Project 2015).

CONCLUSIONS

The new national BIM framework offers an opportunity to address long-standing issues in heritage protection using modern digital tools, while also enabling the further optimization of established heritage-related building processes. Beyond the proposed developments in the heritage-related administrative systems and the opportunities provided by the new national BIM framework, future efforts must address and resolve several additional challenges. These include the integration of specialized heritage professionals—such as art historians and restoration specialists—into Heritage BIM workflows; the documentation and data management of other types of heritage assets beyond protected buildings, such as statues, sculptures, and historic gardens; and the long-term storage and management of heritage data within 3D models instead of traditional 2D documentation formats.

It is also important to emphasize that due to the recent legislative reforms in the Hungarian construction sector, numerous legal changes have also affected heritage protection. As the new national BIM framework is established and continuously developed, it is expected that heritage-related regulations and electronic platforms will also require transformation to be fully integrated into this new national digital ecosystem.

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