# VIRTUAL REALITY TECHNOLOGY IN ARCHITECTURAL HERITAGE AND ITS IMPACT ON MONUMENT CONSERVATION APPROACH

Today's digital technologies offer new opportunities to 'bring to life' historical places, and objects through digital reconstruction. This makes it possible to indirectly supplement physical objects with intangible educational resources. The problem, as with tangible reconstructions, is the question of the 'authenticity' of the restored world. Virtual reality, however, does not have such a disruptive effect on the authenticity of monuments; instead, it allows for the visualisation of various aspects such as history, transformation, layering and even the reintegration of monuments and their elements utilizing virtual reality technology. Presenting various forms of monument preservation resulting from historical and field research, while keeping the original substance intact, reopens the question of the scope of reconstruction in conservation theory.

The main idea of the project is based on the implementation of the results of field research and their visualisation - indicating the four-dimensional building history of the object: the variability of space over time. Digital visualisation technology also gives us the possibility to educate ourselves historically as well as architecturally, but also to 'experience' it as a stimulation of the senses, an immersion in the digital world of history. The greatest advantage of this technology is the possibility to perceive two worlds simultaneously: the real world and the digital world; this makes it possible to complete the knowledge of an object without the need for a material reconstruction. Virtual reconstruction, even if it is non-invasive and intangible, can still be dangerous from a conservation point of view. Nowadays, the provisions of the Venice Charter, while remaining a cornerstone of conservation doctrine, are increasingly not treated dogmatically. This results in an increasing number of not only reconstructions but also activities leading to the 'Disneylandisation' of historic spaces. Therefore, a homogeneous group of historic buildings - Dominican churches in Gdansk, Tallinn and Pavia, related to the research team's scientific activities - was selected as the object of study. This makes it possible to use the results of many years of field research documenting their transformations and, at the same time, to study various aspects of the influence of virtual reality on conservation issues (modelling of the aforementioned transformations, reconstruction of objects, valorisation of proposed actions in space). The knowledge of the structure of the objects will also allow us to conduct a critique of the conservation solutions proposed in the past (and partly implemented); from the point of view of protecting the authenticity of the objects (e.g. reversing the effects of reconstructions, demolitions, romantic and stylistic restorations).

The main focus of the project is to use the 3D environment to digitally reconstruct historic buildings, to achieve this it is crucial to start with an accurate architectural inventory to provide a solid foundation for the subsequent 3D modelling processes. The preferred method for this inventory is a combination of photogrammetry and laser scanning, where photogrammetry involves creating a 3D model by analysing multiple photographs and laser scanning provides accurate measurements and creates a detailed point cloud of the object. By having a high-quality inventory, it will be possible to move to the virtual reconstruction phase. Using 3D computer modelling techniques will make it possible to create a cross-sectional history by phase of the object, which may have been altered for various reasons, including destruction or transformation.
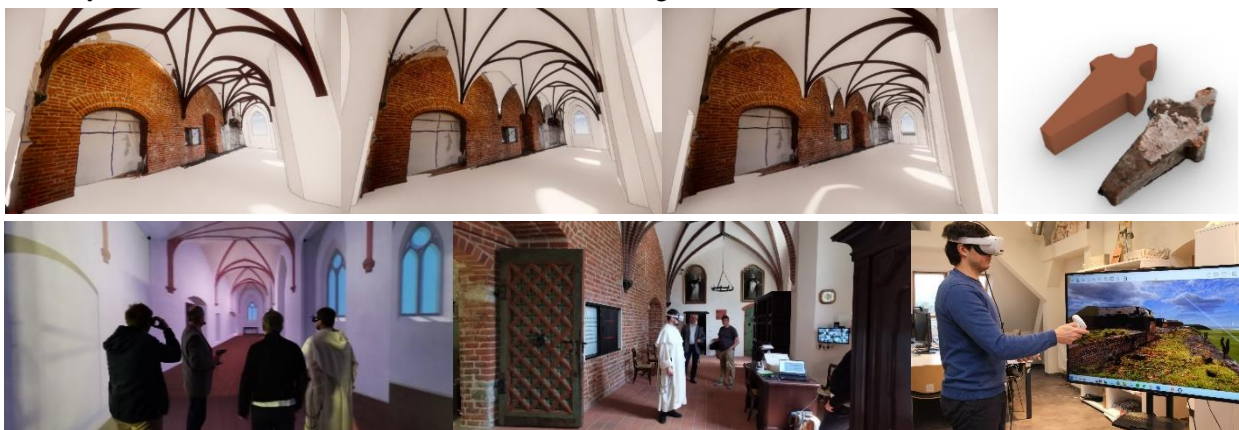
Sacristy of St. Nicholas Church and Dominican Monastery in Gdańsk. Digital reconstructions of vaults in virtual reality based on interdisciplinary architectural research.

In the course of the project, several research tasks will be undertaken, including historical and archival research, field research, computational research in combination with laboratory work, conceptual research and inference. These research activities will contribute to several scientific publications in the Open Access system and presentations at international scientific conferences dealing with the digitisation of architectural heritage.