DIGITIZATION OF CULTURAL HERITAGE OF SLOVAK REPUBLIC

J. Brehovská, P. Brunčák, L. Dedík, I. Kravjanská, A. Sučiková


STUDIO 727, Bratislava, Slovak Republic - laico@727.sk

Digital monuments fund
The Slovak national project Digital Monuments Fund (ZMSF) benefits from the Operational Programme Information Society (OPIS) funded between 2012 and 2015. This project concerns The Monuments Board of the Slovak Republic (MBSR) and is an instance of Priority Axis 3 Development of repository institutions and modernization of their national infrastructures. The aim of this project is to improve the system of acquisition and processing of data about the cultural heritage of the Slovak Republic (SR) and the subsequent use of digital content for the purpose of protecting the cultural heritage values of SR. The process of digitizing the cultural heritage of the SR was realized in 2 ways - by external suppliers and by internal component of the MBSR. The task of both components together was digitization of 1,855 selected objects of the cultural heritage.

The internal digitalization
The internal component MBSR - Department of digitization and graphic documentation (DDGD) is a specialized institution, which was created for the needs of the project, based on an existing Department of Graphic documentation. Thanks to the project, the department purchased modern surveying equipment, there was set up a new server room with a large repository and end - computing workplace. DDGD mostly used 3 modern surveying methods: terrestrial laser scanning (TLS), digital photogrammetry (DP) and aerial 3D scanning.

The task of DDGD was the measuring of 400 historical objects. They consist of very various types and sizes. The largest group of digitized objects represented:
1. Small objects - churches, tombs, altars, icons, baptismal fonts
2. Folk and burghers houses - knocker, wooden and stone houses
3. Technical objects - bridges, windmills

Among other things there were measured also various archaeological sites, areas of cemeteries and small movable objects.

The external digitalization
External digitalization of historic buildings and urban conservation was secured by the company STUDIO 727 in cooperation with other contractors.

Their task was the measuring of 31 large heritage groups (these groups include 1,455 historical objects). They can be divided into the main categories:
1. Small objects - these were mostly small churches, castle ruins or simple memorials
2. Movable objects - here were bigger castles and manor houses
3. Large objects - historical town areas

External partner of the digitalization mostly used following modern surveying methods: photogrammetry, laser scanning and combination of these methods in a new software Reality Capture created during the project of digitalization. The main reason for the use of the combination of technologies was an effort to use benefits of each method and to eliminate major weaknesses. This approach is unique, because after a comprehensive analysis of existing commercial products, it was found there is no optimal software solution that addressed these issues. During the project there was established cooperation with Capturing Reality software company. This company is dedicated to the development of photogrammetric software. They created a unique software that allows a combination of automated processing photogrammetry and scanned data and can work with huge number of data. An example of use of the software Reality Capture is illustrated in object Sala Terrena situated at the castle Červený Kameň. Sala Terrena is a ground floor room with archi-baroque decoration (Figure 1-2).

During the project there were taken more than 2,000,000 pictures from the land, more than 100,000 elevation pictures (mainly from the drone and helicopter) and more than 18,000 survey points. Overall the unique feature of used method is the fact that this increases in the rate of detail in (depending on the input) very significant. The final model created in the photos is up to half the resolution of the real image, the texture information may be maintained practically in the ratio 1:1.

Example of internal digitalization
From measured data of 400 objects were postprocessed diverse outputs like pointcloud (hosted or with intensity); 3D polygonal models, vector models, orthoimages, panoramas and completed technical documentation of the objects (situation, contour plan, facade views, ground plan section, cross-section view, longitudinal section view ...). All of them can be used by architects, historians, restorers, for educational and presentation purposes. Examples of outputs are shown on following figures (Figures a-i).