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	3. Museum of Natural History, Vienna, Austria (AT)
	4. Nicolas Copernicus University, Department for Archaeology, Torun, Poland (PL)
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	6. Autonomous Province of Trento, Cultural Heritage Department, Trento, Italy (IT)
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Regional Strategies – pilot site Utín (CZ)

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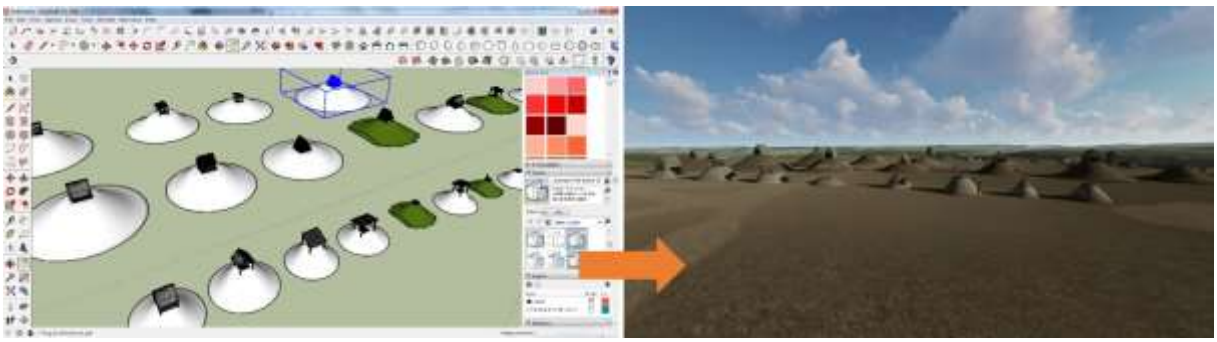
1. DESCRIPTION OF THE PILOT SITE AND ANALYSIS OF THE SITUATION

The area of interest is situated on a flat and well-accessible large hillock at Utín. The agglomeration arose shortly before the middle of the 13th century and existed till around the middle of the 14th century. Its essential function was the extraction of polymetallic ores and the production of silver and other non-ferrous metals (copper, lead). On the site is possible to analyse whole infrastructure consisting of subsequent workshops (ore mill, stamping mill, furnaces…). The mining and metallurgical settlement was extensively developed at the time of its boom. Besides the miner´s houses and workshops there was as well hospice and a filial chapel. The site is linked to the local name of the Poperek, which considered to be a word of the original Buchberg in German language, which corresponds to the naming of the local mining operations in the document from 1258 AD.

2. AIM AND RESULTS ACHIEVED THROUGH VISUALIZATION

The aim of the visualization activity has been to unveil regional archaeological heritage located underground, namely the heritage of the mining site Utín, for wide range of stakeholders. It has been focused on the practical application of innovative and trendsetting visualisation tools in the field of virtual and augmented reality. The IT specialists, archaeologists and students of the Masaryk University in Brno and the Archaeological Institute of the CAS in Prague, developed on the basis of the excavation and prospecting results on site, as well as comparable excavations and iconographic sources from all over Central Europe the virtual 3D model of a medieval mining center. It was once surrounded by forests in the mountainous area near Utin in the center of the Czech Republic and was called Buchberg 700 years ago.

Using data from airborne laser scanning (LIDAR) and data from Google Maps for creation of digital terrain model of size 10x10 km with detailed area of the mine 2x4 km.



Example of building 3D computer reconstructions on the models of mining shafts.

Implementation of archaeological data to 3D reconstruction model.

Final 3D computer visualisation of the pilot site.

Mobile application was developed for OS Android and was divided into 2 main parts – the Game and the Encyclopaedia. Both parts were complemented by 360 ° panoramic views, interactive 3D models of artefacts and augmented reality approach. With the aim to involve the general public even more, a virtual thriller game was developed for the application. It is called Ďáblova štola (Devil's shaft) and begins in year 1269.

The game mediates for tourists, students or residents in attractive, lively and authentic way the previously reached archaeological and historical state of research on the medieval life and silver mining on the Buchberg. The field of virtual games is undoubtedly a very good alternative teaching and educational method, which offers new ways of interaction between archaeologists and the public.

Testing the mobile application directly on pilot site Utín.

Printscreen from application (left – intro page, right – main graphic layout of the application).

3. INVOLVEMENT OF THE STAKEHOLDERS

Range of the addressed stakeholders was very wide. We were able to call people from different scientific and professional areas as well as from wide public, tourists and students of the Archaeology. We addressed regional, national and foreign groups of people. Category of age was very wide from students to retired people. All of them were very trilled to have a pleasure to try out virtual reality. Our activities targeted eminent persons, who have right to make decisions and support activities like that.

As the first group of stakeholders we considered very important to call regional professionals from the region Vysočina where the pilot site is situated. Very similar target group of scientists and professionals, specifically representatives of the Academy of Sciences of the Czech Republic and representatives of regions was involved in second round. Workshop of Virtual Archaeology in Panská Lhota was opened primarily for PhD students of Archaeology and secondly for employees of regional heritage institutions. It was a big honour that Archaeological Institute of CAS, Prague together with the State Office of Archaeology Saxony had opportunity to target very wide public group of people and tourists not only from the Czech Republic but from abroad too on the occasion on German embassy. First testing the application in the field, directly on the pilot site Utín was realised for the participants of scientific conference, Silver Jihlava 2019. At the end of project, we involved the natives from Utín and the inhabitants and pupils of the town Přibyslav. Smaller exhibition of archaeological findings from the pilot site was installed in the city museum of Přibyslav.

Wide range of stakeholders from scientists to public.

4. EXISTING COMMUNICATION STRATEGIES

The pilot site is currently presented via electronic media (website, Facebook). An information panel with links to a mobile application is installed directly on site, which is widely used for on-site use. Part of the presentation is also the exhibition "Po stopách středověkého stříbra/In the Footsteps of Medieval Silver" in the museum of the town Přibyslav. During the summer months, the tourist activities are supported with guided tours within the Archaeological Summer project. The cooperation with the local media is important, which helps to contribute to the promotion of the locality.

Links to pilot site presentations:

https://www.arup.cas.cz/buchberg-mobilni-aplikace-a-hra-dablova-stola-vas-povedou-po-stopach-stredovekeho-stribra/

https://www.facebook.com/events/572015636805493/

https://www.facebook.com/3datelierUAM/posts/3419458508065114/

https://www.pribyslav.cz/komentovane-prohlidky-buchberg-utin/a-3094

https://www.kzmpribyslav.cz/muzeum/kalendar-akci/komentovane-prohlidky-buchberg-utin

https://play.google.com/store/apps/details?id=cz.mathesio.buchberg

https://www.idnes.cz/jihlava/zpravy/historie-stredovek-tezba-ruda-buchberg-pribyslav-vysocina-archeolog-virtualni-realita-aplikace.A200629_556448_jihlava-zpravy_mv

Presentation of the site within the program of Archaeological Summer

5. NEW STRATEGIES FOCUSING ON USING VIRTUAL REALITY AND AUGMENTED REALITY FOR A BETTER COMMUNICATION OF THE HIDDEN HERITAGE

During the implementation of the project, we tried to test various procedures and methods of presenting the archaeological heritage through virtual reality. We currently have a set of technical procedures for their use, which we have verified in public presentations, museum exhibitions and mobile applications created directly at archaeological sites.

The basic tools include 360 ° panoramic views, interactive 3D models of artefacts and an augmented reality approach. These visualizations can also be supported by game elements. Within the museum expositions, it is possible to use the environment of virtual reality, which will make accessible places that are currently inaccessible by land or under the water.

Procedures for the presentation of archaeological heritage in the environment of augmented and virtual reality, which were created during the implementation of the VirtualArch project, are already currently used in a number of important archaeological sites and in exhibitions. An example is the site of the Celtic oppidum Závist, where findings from the Early and Middle Iron Ages are presented. The project will be completed in the second half of 2020. Another example of the early medieval fortified settlement in Libice nad Cidlinou, where the now defunct churches, fortifications and fortifications are presented.

The basic principle of the presentation of the archaeological site created for the pilot site Utín was used as a concept for the program *Archaeological Summer* (www.archeologickeleto.cz). The aim of the project is to acquaint visitors to archaeological sites with better or worse preserved terrain relics under the guidance of an experienced archaeologist. The program takes place throughout the Czech Republic in the summer months of this year. As part of the Archaeological Summer, guided tours take place at a total of 70 archaeological sites in the Czech Republic. Currently, more than 2,500 visitors completed the tours. The pilot site Utín is, of course, part of the Archaeological Summer.

6. ACTION PLAN 2020-2025

Post-project activities in the medium term (2020-2025) will be divided into two main areas.

The first will focus on the presentation of the pilot site and the maximum use of the created infrastructure for the local population and for the support of tourism. We consider the city of Přibyslav and its information center to be a key partner. The staff of the information center will be instructed in the control and presentation of the created mobile applications. During the year, primary and secondary school pupils will be introduced to regional history (especially the pilot site) and other aspects of cultural heritage protection in the form of guided tours. Within the Vysočina region, we expect continued cooperation with regional museums in Jihlava and Halvlíčkův Brod.

From the point of view of further development of tourism, we consider it crucial that the pilot site gets on the route of the marked tourist route. Currently, only the cycle route passes through the site. Two backbone hiking trails pass about 3 km from the pilot site. Their connection has already been pre-consulted with the Czech Tourists Club, which ensures the marking of touristic routes throughout the Czech Republic.

From the point of view of long-term care for the pilot site, it will be necessary to maintain functional contacts with its owners and farmers. Currently, the site is completely deforested due to the bark beetle calamity.

The second group of planned activities concerns the application of procedures for the presentation of archaeological heritage in the environment of augmented and virtual reality, which were created during the implementation of the VirtualArch project. These procedures are already currently used in a number of important archaeological sites and in the creation of exhibitions.

In the field of education, seminars are planned for workers in the field of monument care focused on the use of a database of virtual models (Home Kit) and the general use of virtual and augmented reality resources in the field of archaeological heritage protection.

Opening of the exhibition “In the Footsteps of Medieval Silver” in Přibyslav.

7. VISUALIZATION APPROACHES TO BE USED IN THE FUTURE BOTH FOR CONFLICT MANAGEMENT AND FOR TOURISM DEVELOPMENT

There are more than 30,000 archaeological sites in the Czech Republic. Only a small part of them has the status of special protection such as a cultural monument (1480), a national cultural monument (25), an archaeological monument reserve. Most archaeological sites do not enjoy specific protections. The current legislation only stipulates the obligation to carry out rescue archaeological research in cases where the site is endangered by construction or other destructive activities. Actually, no processes have been put in place to avoid interference with the archaeological heritage. The only possibility of preventive protection are land use plans, which define the extent of the archaeological site in the municipality. Cases where the authors of land use plans are actively interested in the occurrence of archaeological finds are completely unique.

Easier access to the visualization of archaeological heritage can be used when discussing land use plans at the level of regional and local government. The advantage in this respect is the integration of a virtual home kit into the structure of the Archaeological Information System of the Czech Republic, which is also used as one of the information sources for the creation of land use plans.

In the longer term, it can be expected that virtual reality will be important especially for the development of tourism and education. Raising awareness of the existence and importance of cultural heritage at the local level is the strongest tool for the protection of cultural heritage in the Czech Republic. Visualization in a virtual environment can be considered a powerful communication tool, especially for younger users. As part of educational programs, we consider it necessary to use game elements in addition to standard visualization procedures.

With the increasing availability of 3D documentation and visualization tools, it is necessary to take into account that these technologies can become part of teaching in primary and secondary schools, where they can favourably highlight the interest in cultural heritage and indirectly contribute to its protection. In this respect, we consider a key tool to be a database of virtual models (3D Home Kit) created on the basis of specific archaeological finds and professionally performed reconstructions.