



COLOUR & SPACE IN
CULTURAL HERITAGE



Case Study Proposal
Visualization of White Bastion fortress based on
3D Spatial Documentation of Material Cultural Heritage
And Interactive Digital Storytelling

Date of call: 15 May 2014

Deadline for the applications: 15 June 2014

The CS must be completed by 31 July 2016 Report due by 1st September 2016

1. **Title of the proposed case study:** Visualization of White Bastion fortress based on 3D Spatial Documentation of Material Cultural Heritage and Interactive Digital Storytelling

2. **Duration/dates:** Sep 2014 – jan 2016

3. **Purpose of the case study:**

Visualization of White Bastion's appearance from 3 time periods will be used for introducing the cultural heritage professionals and general public with this valuable object and its history. It will also show the power of digital technologies in preservation and presentation of cultural heritage.

4. **Contribution to the objectives of a particular COSCH Working Group, or Groups, and generally, to the COSCH Knowledge Representation schema:**

Contribution to WG5, proof of concept of interactive digital storytelling in historical visualization of cultural heritage, WG2, use of laser scanned data for 3D virtual presentations of CH (a detailed report on the reasons why this specific technique was chosen, if the expectations were delivered and which raw data needed to be provided for our special application), use case for COSCH KR

We propose to focus the further work in COSCH project in domains of WG5 around this and similar case studies. Based upon this and similar visualization projects we can perform evaluation, analysis and produce a set of guidelines for efficient and sustainable CH visualization at the end of the project.

5. **Target users and their needs:**

(Please name the user groups likely to benefit from the proposed case study and list likely research questions they may ask, e.g. Museum curators: can the proposed method support the authentication of the object under study?)

- Museum curators: learning how to introduce interactive digital storytelling methodology in museum exhibitions (interactive digital storytelling concepts are still under research, in order to find the best balance between interactivity and information conveyed by the story, our project would contribute to that research)
- Archaeologists: combining laser scanned data with 3D modelling and photogrammetry to obtain visualization of CH object's appearance in different time periods
- General public (museum visitors, internet users, students, schools): gaining knowledge about the cultural heritage site and its history

6. **Description/Rationale of central idea:**

The fortification known as „White Bastion“ is one of the most impressive and important historical sites in Sarajevo. It is located on the southeast outskirts of the City, with an overview on the city valley (Figure 1). During the history it had a very significant and strategic position. The fortification is a part of the dominant defence walls that were surrounding the old city of “Vratnik”.



Figure 1. Bijela tabija (White bastion) fortress, Sarajevo, Bosnia and Herzegovina

The value of the historical site presents the various strata, starting from medieval until the present time. During the archaeological excavations there were found the remains from medieval fortification from 14th century, Ottomans period (17th century) when the fortification was expanded and some new objects were built. During Austro-Hungarian rule the part of the fortification and the object inside the walls were demolished and destroyed and a new group of objects was built. During the early excavation (Figure 2), a significant number of artefacts was found (Figure 3), registered and conserved for the purpose of the exhibition hosted in Museum of Sarajevo.

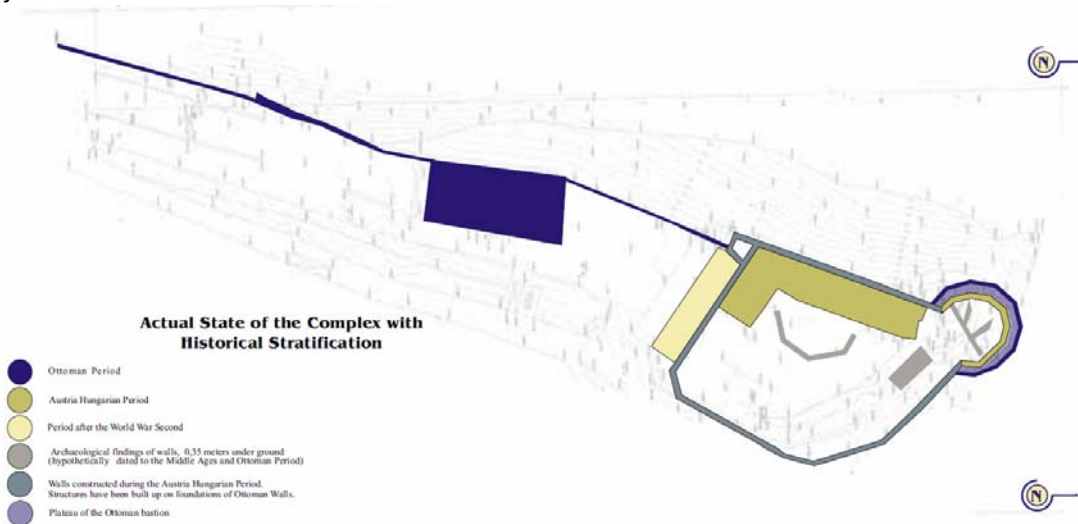


Figure 2. Actual state of the complex with historical stratification



Figure 3. Artefacts found on the site

We believe that the use of different modern surveying technologies will provide us more information about early stage of fortification. Using 3D-visualization we will be able to follow the “growth” of the fortification through history. Creating a 3D model where different historical stages of the object are overlapping, will fill the gaps in our understanding of the object’s history. Using remote sensing techniques, we will improve our excavation data and obtain a new direction in excavation process that will come in the future. Creating virtual reconstruction accompanied with 3D models of the artefacts that are found and interactive digital storytelling about the use of the fortification will bring closer heritage to habitant and to the next generations.

7. Proposer: (name, position, affiliation, contact details)

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8. Other collaborators: (names, positions, affiliations, contact details)

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9. Description and schedule of the work to be carried out: (what, where & how)

- Laser scanning the site and archaeological findings (ETF) October 2014
- Creating 3D models of the artefacts found on the site using photogrammetry (CETI) – STSM, October 2014
- 3D modelling of White bastion(ETF) November 2014 – March 2015
- Creating interactive digital stories (ETF) – March 2015-June 2015
- Design and development of the virtual presentation project (ETF) June 2015-September 2015
- User evaluation, (ETF, CETI, KCL, I3MAINZ, UCC) September 2015 – November 2015

- Organization of public presentation of the project and a workshop for CH professionals – October 2015
- testing and evaluation of COSCH KR functionality through this case study (ETF, CETI, KCL, I3MAINZ, UCC) September 2015 – January 2016

10. Description of the main results expected, explaining potential benefits for users and how their needs are likely to be attended and solved:

Results:

- implementation of selected concepts in historical visualization, obtained through evaluation of various projects and own experience, in the virtual presentation of White bastion fortress in Sarajevo
- proof of interactive digital storytelling methods use in successful representation of cultural heritage
- application of the visualization project elements for testing the COSCH KR
- analysis of user feedback and reactions to virtual cultural heritage applications

Benefits

- “Association of archaeologists 1894” will gain knowledge in the most advanced methods for virtual presentation of CH
- general public will finally be able to appreciate the White bastion in its significant historical context
- Museum curators will learn how to enrich their physical exhibitions with digital content
- Digital preservation of the archaeological site and findings

11. Relationship to earlier relevant research in the field and literature:

- representation of uncertainty (parts of the model which are based on assumptions are marked differently from physical remains. Every level of uncertainty is marked with different colour)
- new interactive digital storytelling concept
- 4D digitization
- use of laser scanning and photogrammetry in 3D modelling for CH

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12. Potential interdisciplinary value of research carried out and any other comments

This project joins experts from the following disciplines: archaeology, art history, literature, computer science and movie production.

Financial aspects

Funding of the proposed work will be covered by ETF Sarajevo. We propose an STSM for creating 3D models of artefacts from the site using photogrammetry, to be realized in Sarajevo through a visit from a CETI staff member to the ETF Sarajevo as host institution.

13. Response to reviewers' recommendations

This project is limited to only one monument but this case study could be extended to other monuments or similar case studies. The objectives defined are well stated but are limited. The aim is 3D reconstruction and 3D visualisation, but no detail is given about the methodologies that will be used to reach these objectives.

Methodology we plan to use in achieving the goals of the project includes advanced high fidelity 3D modelling of the Fortress object in all three time periods (see Section 6), converting the model into the interactive form presentable online using 3D web players such as Unity and combining the digital stories about the model with its geometry in a form of an interactive digital storytelling application. We are still developing interactive digital storytelling methods that will be most appropriate for virtual cultural heritage applications (see References) and this project will be a case study for one of these methods.

Experts in 3D reconstruction and 3D modeling are missing.

In the project team will be engaged experts for high fidelity 3D modelling (ETF Sarajevo), virtual reconstruction of objects from photos (CETI), chief archaeologist of the White Bastion excavation (AA) and other experts from storytelling and visual arts domains who usually collaborate on our projects.

This project fits partly COSCH's expectations. 1 STSM is requested (for creating 3D models) that seems too low in regards to the objectives defined (especially for the 3D reconstruction task).

There is no need for STSM for 3D reconstruction as it will be done by the proposer institution – ETF Sarajevo within our regular activities.

Availability of instruments (for laser scanning) on-site has to be given.

Instruments for laser scanning will be rented from a local company and the expense will be covered from different sources.

Similarly which instrument CETI will use for photogrammetry?

CETI will use the camera that will be brought by their representative during the STSM.

Connection between the 3D model of the bastion and the scanned artefacts is not clear.

Artifacts were found on the excavation site as mentioned in Section 6. There are coins, weapons, ceramics and objects of military purpose. Their 3D models will be located in the interactive virtual environment in places from where they originate.

Number and type of artefacts should be given. How many objects will be selected?

A selection will contain such number of objects that can be recorded and digitized during the planned STSM.

The mechanism of interaction with visitors is unclear. Is the internet platform created in the framework of this case study? If yes, some simple functionalities of this software should be provided.

It will be a Unity interactive application implemented on Internet. The users will be able to watch the digital stories, browse the virtual environments and examine the models of artifacts. They will be able to select one of the three time periods from the history of the Fortress. The aim of the project is to enable the users to travel to the past.

Expectation from COSCH seems to be the evaluation of the results. If yes, please indicate under which form (Taskforce meetings?).

The form depends on the definition of further COSCH activities. If the Taskforce meetings will continue, it will be a good opportunity for the project evaluation. Anyway, it will be performed through the WG5 activities.

The case study should result in a "Guide to good practice".

At the end of the project, the work methodology will be described in form of a guide.