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Valorisation of history and landscape for promoting the memory of WWI

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ABSTRACT

In recent years many activities were conducted to commemorate the 100th Anniversary of the First World War (WWI) outbreak. Among these, the valorisation of history and landscape (VAST) project (http://vast.fbk.eu) was part of the initiatives promoted by the Autonomous Province of Trento (Italy) as a tribute to WWI events in the region. The project was primarily aimed to document and promote, through 3D digitization approaches, ICT technologies and communication material, the memory of sites, theatre of the world conflict. The Trento's area was under the Austro-Hungarian Empire until the end of WWI and on the border with the Italian Kingdom. The area represented a crucial and bloody war front between the Austrian and Italian territories. It was thus constellated of military fortresses, trenches and tunnels, most of them now ruined and at risk to slowly disappear. 3D surveying and modelling techniques were exploited to produce 3D digital models of structures and objects, along with virtual tours, dissemination material and a WebGIS of the area. All the products are now used for restoration, valorisation, educational and communication purposes.

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1. Introduction and research aims

VAST (*valorizzazione storia e territorio/valorisation of history and landscape*) was an interdisciplinary project with the ambition of exploiting state-of-the-art 3D modelling and visualization technologies to reinforce and enrich with new significance heritage sites and monuments on the mountainous area in the North East of Italy related to the First War World (WWI). The area was part of the Austro-Hungarian Empire until the end of the WWI and represented one of the crucial border with the Italian Kingdom (Fig. 1a). Consequently, the territory was constellated of military fortresses (Fig. 1b), trenches and underground tunnels that represent a unique heritage patrimony, especially for the plateau of Luserna, Lavarone and Folgaria (Trento's province). This area is lived by an ethnic and linguistic minority (the *Cimbrians*) descending from Germans and speaking *Cimbrian*, a Bavarian dialect that has maintained characteristics of Middle High German [1]. The VAST project was strongly supported by members of the *Cimbrian* community, persuaded that new ICT technologies would have helped in the valorisation and preservation of their cultural heritage.

Most of the military WWI constructions are now ruined and risk to slowly disappear (Fig. 1c). Therefore, the primary goal of the VAST project was to enhance the conscience of what the war had represented for the local community, in particular for the young generations that do not have directly witnessed its cruelty. Military structures and artefacts were surveyed and modelled in 3D to produce new dissemination and communication materials (3D digital models, scientific and communicative articles, virtual tours, conferences, WebGIS platforms, etc.) now used both in museums and along the main routes running across the territory. The realized products comprise classic informative resources, mainly devoted for an adult audience, as well as virtual and interactive reconstructions of war buildings, objects and landscape, more appropriate for the young generations.

The project was run in collaboration with various partners and local stakeholders, with complementary expertise in cultural and technical research field. This allowed to reach the goal of digitizing and communicating WWI heritage and memory for the commemoration of the 100th Anniversary of the war outbreak.

The aim of the article is to showcase how ICT solutions, 3D surveying and modelling procedures could facilitate and improve the

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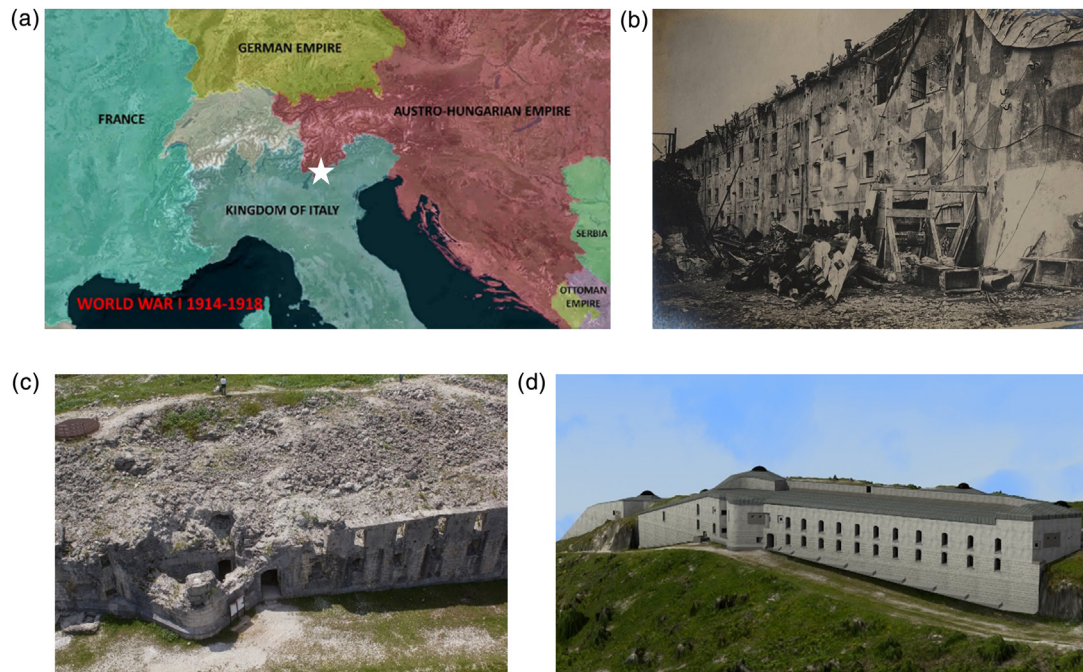 [1] Website: http://3dom.fbk.eu.

Fig. 1. (a) Borders of contending countries during WWI. The white star indicates the location of the area interested by the VAST project. (b) An historical picture of Luserna fort. (c) *Cherle* fort or *werk Sebastiano* as it appears today and (d) its virtual reconstruction.

dissemination of heritage information, enhancing valorization and attracting young generations to heritage places.

1.1. The Austro-Hungarian forts in the Trentino area

In the XIX century, the Trentino-Alto Adige region was the last Italian territory still belonging to the Austro-Hungarian Empire. Aiming at protecting it against the spread of the Italian unification movements, more than 50 military fortifications (*werk* in German) were built in the southern-east part of the region. In particular, a double set of fortifications organized in an internal and external ring were erected to protect the city of Trento, capital of the Trentino province [2]. From the 1830s to the WWI outbreak, four generations of forts, corresponding to six different construction phases, were designed and built, each of them at different heights on the mountains:

- the 1st generation (first three phases) comprises forts situated at the entrance of the valleys, as a natural bottlenecks and block of the main routes;
- the 2nd generation (beginning of 1880) features fortifications at higher altitude, characterized by a simple planning scheme known as 'Trentino style';
- the 3rd generation, called 'Vogl era', was built to complete the defense belt of the eastern Trentino front, and consist of armored forts, fitted with reinforced domes and shields for the artillery in the casemate;
- the 4th generation (1904–1914) was promoted by the Austro-Hungarian general Conrad von Hötzendorf and is characterized by fortresses made in concrete and steel located on the plateau and on the top of mountains.

The military fortresses considered in the VAST project and hereafter presented belong to the 4th generation. Each fortification, with casemate, rotating domes, corridors, underground passageways and reinforced blocks, was often realized with the main body completely carved into the rock in order to be camouflaged, so that only the façade was partly visible from outside.

1.2. State of the art in heritage documentation with multi-data sources

In the last years, digital 3D modelling and visualization techniques have been widely employed to document sites of cultural significance, as well as patrimony threatened by both human (war, mass tourism, pollution) and natural (flooding, sea water rising, earthquakes) influences. Digital reconstruction implies the representation of the artefact or monument to its original state [3] and requires the verification of the suggested reconstruction through additional information, such as historical documents, images, records, etc.

In Kinji et al. [4], for example, the approach to 3D modelling of buildings of the Citadel of Bam, a UNESCO world heritage site destroyed after an earthquake, is discussed. Complementary data, such as 2D maps, photos, maps, are used to provide a digital restoration of the site. Examples of multi-data source and multi-sensor approaches are discussed in Guidi et al. [5], Remondino et al. [6] and Torres-Martínez et al. [7]. Guidi et al. [8], Hanke et al. [9] and Rodríguez-Gonzálvez et al. [10] integrated 3D data with historical sources. Digital restoration of lost cultural heritage using photogrammetry and crowdsourced images is the aim of the Rekrei project (https://projectmosul.org) [11].

1.3. WWI commemoration projects

All around the World, the centenary commemoration of WWI (also called Great War) outbreak has been recognised as key moment, not only to honour who sacrificed their lives in the war, but also to understand the influences of those events on our society, and convey their memories to young generations.

Besides a number of national and local events, ceremonies, and exhibitions, also international organizations have promoted several initiatives. For example, *Europeana*, the European digital platform for cultural heritage, has sponsored three digital projects:

- the "Europeana Collections 1914–1918" (http://www.europeana-collections-1914-1918.eu): it is a digital collection of