"EMOUNDERGROUNDS" - "Project N° 905"
"EMOtional technologies for the cultural heritage valorization within transnational UNDERGROUNDS"

Adriatic-Ionian Programme INTERREG V-B 2014-2020 - 2nd call

O.T2.1: Small scale investments as pilot applications of technological/multimedia/interactive installations to manage/enjoy/enhance 10 cultural sites

Municipality of Nardo' (LP) and All Project Partners

Project Details:

Programme: **Adriatic-Ionian INTERREG V-B 2014-2020**

Programme Priority: **2) Sustainable Region.**

Programme priority specific objective: **Promote the sustainable valorisation and preservation of natural and cultural heritage as growth assets in the Adriatic-Ionian area**

Project Title: **EMOtional technologies for the cultural heritage valorisation within transnational UNDERGROUNDS**

Project Acronym: **EMOUNDERGROUNDS**

Reference No: **501**

Lead Beneficiary: **Municipality of Nardò**

Total Budget: **2.599.994,86 €**

Time Frame: **01/01/2020 – 31/12/2022**

Output Details

WP: **T2 - *Design and development of emotional innovative joint paths across transnational cultural undergrounds***

Output Title: ***Small scale investments as pilot applications of technological/multimedia/interactive installations to manage/enjoy/enhance 10 cultural sites***

Programme indicator to which the project main outputs contribute: **OI_6c.1_3 Number of small-scale investments and demonstration projects**

Involved Beneficiaries: **All Partners**

Output Description: *10 small scale investments as pilot applications of technological/multimedia/interactive installations to manage/enjoy/enhance 10 cultural sites, in each project area: Nardò, Carpi, Andravida-Killini, Rijeka, Šibenik, Koper, Ivančna Gorica, Kukes, Bar, Trebinje*

Date of delivery: **31 December 2021**

Project Main Output Quantification Target: No **10**

Place of delivery: **Nardò (IT) Carpi (IT), Andravida- Killini (GR), Rijeka (HR), Šibenik (HR), Koper (SI), Ivančna Gorica (SI), Kukes (AL), Bar (MO), Trebinje (B&H)**.

Contents

Abstract

The main achievement of the project "EMOUNDERGROUNDS" - "*EMOtional technologies for the cultural heritage valorization within transnational UNDERGROUNDS*" funded by INTERREG V-B Adriatic-Ionian (ADRION) Programme 2014-2020, consists in the delivery of ten cultural attractors requalified, enhanced and promoted, thanks to small-scale investments consisting in pilot applications implemented along the whole project lifetime with technological, multimedia and interactive installations for the better management, enjoyment and valorization of the selected cultural sites (*castles, fortresses, other cultural buildings, cities with tunnels and undergrounds*).

Pilot actions were implemented across the Adrion-Ionian regions of Italy, Greece, Croatia, Slovenia, Albania, Montenegro and Bosnia-Herzegovina in the project areas of Nardò, Carpi, Andravida-Killini, Rijeka, Šibenik, Štanjel (municipality of Komen), Ivančna Gorica, Kukes, Bar, Trebinje. These provided new diversified emotional-cultural exhibits had a demonstrative character as they were able to go beyond the experiential cultural tourism practices and technics used at local level, thanks to the application to the involved territories and to the specific thematic field of cultural heritage enhancement, of advanced multimedia technologies such as virtual reality rooms, smart mobile applications, holographic demonstrations, interactive projections capable to bring to life, historical or legendary characters and contents linked to those cultural attractors.

This achieved project Output of ten small scale investments as pilot applications of technological, multimedia and interactive installations, was specifically provided in the following identified cultural attractors:

- Acquaviva Castle in Nardò - (Italy);
- Pio's Palace in Carpi - (Italy);
- Chlemoutsi medieval castle in Andravida-Killini – (Greece);
- Castle of Gradina in Rijeka – (Croatia);
- St. Michael's Fortress in Šibenik– (Croatia);
- Castel of Štanjel in Koper – (Slovenia);
- Podsmrek Castle in Ivančna Gorica – (Slovenia);
- Undergrounds and tunnels of the City of Kukes in Kukes – (Albania);
- Fortresses of the Old town of Bar – (Montenegro);

- Fortress of Trebinje in Trebinje – (Bosnia and Herzegovina).

The activities conducted to achieve this project Output, have been of managerial, scientific and technological type. All these activities were functionally and logically connected, jointly oriented to achieve this final project result of ten technological, multimedia and interactive installations to better manage, enjoy and enhance the identified cultural sites. The used approach is specifically schematized as follows, and each Partner, under the coordination of the Lead Partner, carried out the planned activites for each cultural site:

- Cultural attractors studies and literature analysis to catalogue each site with tourist route;
- Purchasing of furniture and fittings and IT hardware and software for equipping each identified cultural asset;
- Survey, 3D relief, photogrammetric and photographic campaigns, one for each site;
- Virtual, digital and multimedia contents productions, one for each site;
- Design and development of multimedia, interactive, accessible, indoor or outdoor installations, one for each project site;
- Wireless Monitoring Systems tools implemented within each site.

Each Partners implemented the above mentioned activites in its site under the coordination of the Municipality of Nardò, cooperating with all the other Partners. They promoted their new exhibits for tourist and cultural experiences by dedicated inauguration Ceremonies of the new emotional paths, which took place within the requalified cultural attractors attracting a number of users (participants and viewers) equal to 18.231.

The achieved results are described in the following pages.

Introduction

The main interactive project Output of EMOUNDERGROUNDS project is represented by these new, diversified emotional-cultural exhibits implemented and promoted in project sites. Partners implemented and promoted their pilot applications working synergically, under the leading coordination of the Municipality of Nardò (Lead Partner of EMOUNDERGROUNDS project), to boost the attractiveness and the competitiveness of their participating tourist destinations, developing, by the use of new multimedia interactive technologies, a transnational cultural-creative tourist product based on the emotional visiting experience of the underground heritage.

In the project territories, it was agreed that a better cooperation at local and macro-regional levels was an effective tool for strengthening the competitive tourist positioning of the involved territories with a long-term perspective. These pilot actions have a clear transnational relevance being jointly strived for and developed by the partnership, showing likewise a clear potential to be transferred to other institutions and/or territories beyond the project, also thanks to the implemented capitalization activites within the ADRION thematic Sub-Cluster focused on Cultural and Creative Industries coordinated by the LP of EMOUNDERGROUNDS project.

Technological, multimedia and interactive installations were implemented in each project site for the better management, enjoyment and valorization of the selected cultural sites.

The attractiveness of such cultural sites was further enhanced by the aura of mystery that experiential paths based on the most advanced multimedia technologies can provide, guiding visitors and users from all over the world in an emotional and evocative way through the history and legend of the undergrounds, cultural attractions of the project. Visitors have the opportunity to live a unique and fascinating experience through time, never experienced before. Specifically, these experiences includes in the various project sites: virtual reality rooms, intelligent mobile applications, holographic demos, interactive screens and projections able to bring to life real or imaginary characters and cultural contents linked to those places.

1. OVERALL AND SPECIFIC GOALS THAT SUGGESTED THE CONCEIVING AND IMPLEMENTATION OF PILOT ACTIONS AT PROJECT LEVEL AND AT PARTNER LEVEL

1.1 Overall goal of small-scale investments at project level

The overall goal of EMOUDNERGROUNDS small-scale investments, was to exploit the project areas' potential, improving knowledge, technics and practices of local operators (policy makers and bodies governing cultural attractors) for a better preservation, management, valorisation, enjoiment and promotion of the identified cultural assets, strengthening, at the same time, the already existing tourism services by promoting lesser-known destinations.

Project Partners had the opportunity to develop and promote innovative solutions able to remove the tangible obstacles (especially in a complex historical period such as that lived for the COVID-19 pandemic crises that was full of restrictions for people mobility), for enjoying in an emotional way cultural heritage by using advanced multimedia technologies, increasing the accessibility and visibility of the targeted heritage sites by a wider audience of visitors with new digital tourism services provided at local and transnational level.

This general goal has been reached by promoting a continuous process of quality improvement in culture heritage and tourism management, differentiating deseasonalizing and delocalizing the local tourist offers. Richness has been enhanced even more by those new solutions connoted by a mystery wing that solely the experiential paths based on the most advanced multimedia technologies could assure, guiding visitors/users in a suggestive way along the history and legend of the identified accessible cultural sites.

Specifically, this general goal enabled the promotion of an integrated offer of cultural tourist services in the project areas across the Adriatic-Ionian regions, through the possibility of enjoying diversified cultural contents made available through the study of historical, philological and literary sources, emotional physical and virtual creative itineraries, and dissemination events that revitalised the local communities involved, promoting the cultural resources of the places in each project area: Nardò, Carpi, Andravida-Killini, Rijeka, Šibenik, Štanjel (Municipality of Komen), Ivančna Gorica, Kukes, Bar, Trebinje.

Definitively, Partners were able to provide a new transnational creative-cultural-tourism product in Adriatic-Ionian project Regions for the benefits of a wide audience.

1.2 Specific goals of small-scale investments at project level and per each partner

The specific goal of this output at project level was to promote a new transnational creative-cultural tourist product based on innovative methodologies and advanced emotional technologies, capable to provide new forms of cultural experience to strengthen the greener, digital and resilient growth of the whole area.

LP – Municipality of Nardò:

The specific goal of the small-scale investment implemented in Nardò Municipality has been to design, develop and promote a cultural emotional and evocative path between history and legend for residents and foreign visitors, through multimedia technological exhibits settled in the undergrounds and on the terraces of the "Acquaviva d'Aragona" Castle in Nardò. The areas hosting the equipment and technological systems, aimed at entertaining users and multi-target people, such as: tourists, families and schools. These visitors can jump into the past, finding themselves virtually face to face with dukes and barons or prisoners locked in the prisons, thanks to audio-guides, panels, augmented reality, simulations, intelligent mobile applications, hologram and interactive projections. Multimedia contents are mainly focused on on "Giangirolamo II Acquaviva d'Aragona", Count of Conversano and Duke of Nardò, known as the "Guercio", on prisoners locked in the dungeons as well as on the discovery, through audiovisual content, of the rich history of the Castle and, in part, of the town of Nardò.

PP2 - Municipality of Carpi:

The specific goal of the small-scale investment implemented in the Pio's Palace of Carpi has been to design, develop and promote a multifaceted path of emotional knowledge of the Palazzo dei Pio which through AR and VR immerses visitors (residents, Italian and foreign tourists, school groups) in history, right from the entrance to the Palace, then in the tourist office and in the basement of the Palace, where the great Warrior

"guards the door". Architectural context, historical evolution and relationship with the present are at the center of the new attractions that branch off from the Sala delle Poste to the other rooms of the Palazzo dei Pio, offering a new idea of usability of the site, an increasingly point of access to the system of sites cultural (and not only) of the city.

PP3 - Municipality of Andravida-Killini:

The specific goal of the small-scale investment implemented in Municipality of Andravida-Killini has been to design, develop and promote a cultural emotional and imposing path between history and present for residents and foreign visitors, through multimedia exhibits settled in the Warehouse ASO. The area hosting the equipment and technological systems, aimed at entertaining users and multi-target people, such as: tourists, families and schools. These visitors can take a Virtual Tour of the Castle alternative in the sense of serious game for a "Walkthrough" in the outer Castle area and an aerial navigation Castle site (Fly-by). Also, through a 3D animation video produced from 3D models and 3D environment of older historical periods (Medieval period of Clermont Castle) the cultural emotional path's experience could be an autonomous tourist product for the region.

PP4 - Rijeka Tourist Board:

The specific goal of small-scale investment in Trsat Castle is to enhance the cultural and touristic offer in Trsat Castle and to evoke its history. The Trsat castle was built over centuries and was ruled and managed by many different cultures. That is why its very rich and complex history is perfect for deeper exploration and interpretation. Every ruler left the piece of himself in the castle which is shown in its unique look intertwined with various cultural influences. Small scale investment in the cript, or the undergrounds of the castle enables the visitor to explore the scarcely known historical facts about the castle in a unique and innovative way. The exhibit space in the underground has a natural cave that lends itself well to the interpretive story because of its historical and cultural importance because it connected the Castle with the coastal area of Rijeka in the past. The main character of the exhibit is the Castle's last owner and resident, count Laval Nugent. He was responsible for the final and the greatest restauration of the Castle which gave the castle its present appearance. The exhibit is made in a innovative way with the help of digital technology and multimedia giving the visitors opportunity

to explore the exhibit by watching the video or exploring the castle horougout the history on interactive screen. The digital kiosk placed at the entrance to Trsat castle enables visitors, especially those with reduced mobility (there are many stairs at Trsat castle), to take a virtual walk through Trsat castle. In addition to the real version, it is possible to walk around the Trsat castle in all stages of construction, through the 3D model of the Trsat castle. As part of the mentioned exhibition, there is also the first point of the virtual self-guided tour of Trsat castle. The mobile application serves as an independent tourist guide that guides the visitor through 12 points around the Trsat castle and sends information to the mobile device via beacon technology. In addition to textual information, it is possible to listen to the information in audio form, in Croatian and English.

PP5 - Public Cultural Institution Fortress of Culture Šibenik:

The specific objective of Fortress of Culture's activities within WP2 is to enrich and enhance cultural offer of its fortresses and city of Šibenik (in general) with new, interactive and immersive experiences.

With that in mind, Fortress of Culture made studies and detailed photogrammetric recording of all the interior and exterior walls of St. Michael's Fortress which was an important step in developing four VR scenarios (installed on VR equipment procured within the project) as a part of pilot actions within the WP2. That being said, one of the objectives was to ensure safe, educative and easy access to Šibenik's fortresses for its visitors – thus Fortress of Culture mobile application was created with the aim of providing timely and accurate information before, during and after visiting Šibenik's fortresses. On the other hand, it enables a better insight into the needs of visitors, which gives the Fortress of Culture guidelines for further development and improvement of contents and programmes for its visitors.

PP6 - Regional Development Centre Koper:

One of the specific goals in terms of increasing the competitiveness of the municipality in the Slovenian and cross-border area is also the 'Development of tourism with focusing also on cultural, educational, sustainable tourism programmes on the basis of the rich natural and cultural assets of the heritage'. A special place in the development of

tourism in the area Komen Municipality is Štanjel, which is a nationally recognised settlement heritage and symbolically represents Karst and Slovenia in the wider area. The specific goal of this investment is to further enrich Štanjel's tourist and educational offer. A new info panel welcomes tourists in the renovated reception centre, monitors and computers provide a wider range of programmes for visitors, including also educational purposes, and an app-guided tour system helps guides to present information in a more interesting way.

PP7 - Municipality of Ivančna Gorica:

The main goal of the investment implemented in the Municipality of Ivančna Gorica has been to bring the history of Podsmreka City closer to the general public and tourists. This will contribute to the preservation of cultural heritage, even though using advanced information and communication technologies to different target groups. Enriched and upgraded the existing tourist offer, which will be more attractive for visitors. One of the goals has been to gain experience from the participating Partners in the project and improve the visibility of Slovenia and Ivančna Gorica in the program area. The project improved the level of accessibility of cultural sites, especially using new interactive and innovative presentations of the castle and other solutions.

PP8 - Municipality of Kukes:

The specific goal of the small-scale investment implemented in Kukes municipality has been to design, develop and promote a cultural emotional and evocative path across the underground city of Kukes for the benefits of residents and foreign visitors, through multimedia technological exhibits settled in the Ethnographic Museum in Kukës. PP8 achieved the specific objectives of its pilot action implementing all the planned activities, such as: a study of the tunnels' cultural attractor in Kukës with also a geological and literature analysis; - the purchase of functional equipment; - a photographic and 3D campaign of the tunnels museums in Kukës both with a Map of the cultural attractors and undergrounds tunnels of Kukës; - the design and development of multimedia contents and virtual tour of the rebuild tunnels; - the physical setups in the Ethnographic museum in Kukës; the Wireless Monitoring System with the audio system for the enjoiment of the developed multimedia contents.

The installed equipments are functional to welcome different visitors who are interested in getting to know the underground tunnels and the opportunities that the tunnels offer for the development of cultural and historical tourism in the region.

PP9 - Tourism Organisation of Municipality of Bar:

The specific goal of the small-scale investment implemented in Old town of Bar has been to design, develop and promote a cultural emotional and evocative path between history and legend for residents and foreign visitors, through multimedia technological exhibits settled in the centre for visitors and cultural path connecting five attractions in the old town. The areas hosting the equipment and technological systems, aimed at entertaining users and multi-target people, such as: tourists, families and schools. Digital displays, 3D animations, 360-degree shots, descriptions of locations designed by historians and tourist guides are included in an interactive mobile application. In addition to the new digital content, the area of the fortress of the Old town is covered by a wi-fi signal for the first time, which enables both domestic population and foreign tourists to use smart devices at the same locations.

PP10 - Trebinje Development Agency:

The specific goal of the small-scale investment implemented in Trebinje was to revive the legacy from Austro-Hungarian period when whole city could be perceived as fortification. Fortification Trebinje (Festung Trebinje) was actually system consisted of more than 30 fortifications of different type, and together with supporting infrastructure there were almost 100 objects of military purposes, divided in two circles of defense. One was inner, with objects in the center of the city and the other was outer – on hills arround Trebinje.

The idea of creating multimedia installation including procurement of appropriate equipment and digital contents production was derived from project's intention to develop joint cultural project to be valorised in tourism of whole project area and from local stories and legends.

Former command post of Austro-Hungarian army in Trebinje, now building of Herzegovina Museum which dominate the Old town, was the central spot of all Trebinje fortifications and its preserved dovecot tower (only on saved in BiH) was used as main communication point with other fortified buildings from the Austro-Hungarian Monarchy. Virtual tour through the most important fortifications, placing the visitor to the past and in the role of carrier pigeon or fortification staff operating the objects, characterize the digital interactive installation presenting "Trebinje as fortification" and the biggest Austro-Hungarian fortification in this part of Europe - "Strač", with its immense undergrounds. Interesting artefacts from Austro-Hungarian period, in digital form and

nicely integrated into the presentation, just fulfill the experience of this virtual adventure.
Whole installation includes also touch platforms, wall projections, wireless monitoring system, audio assistant etc., while previously performed study of cultural attractors as well as relief & photo campaign, had set the basis for development of the contents later translated into digital form in post-production.
Exhibition is placed in one of museum depots with still unexplored locations in its close surrounding, fitting the ambient to full experience for visitors and combining new technologies and old architecture.

2. DESCRIPTION OF THE SUPPORTING METHODOLOGICAL APPROACH AND NOVELTIES ELEMENTS

The preservation, conservation, enhancement, fruition of cultural assets as well as the sustainable and inclusive tourism are closely interlinked. The supporting methodological approach used to provide this final project Output, has been defined strategically taking into account this premise. The adoption in the project of technological and sustainable innovation initiatives have favored the adoption of a project approach of systemic and multidisciplinary nature, especially for the implementation of the activites that have been instrumental for the provision of this project Output in the framework of the WPT2, since the processes of innovation, qualification and development, useful for the achievement of such Output, required the identification of solutions capable of solving all the inevitable "contradictions" that, genetically, arise from a complex action/intervention, as an innovation action/intervention is, implying the need to keep under control, monitor and manage aspects related to the environmental sustainability, digital transformation, accessibility. Therefore, the methodology implemented entailed the adoption of a holistic, integrated and multidisciplinary approach that accompanied the implementation of all the phases/activities that were necessary to deliver this project Output, focused on the multimedia and technological exhibits for the better valorization of the identified cultural assets.

Based on this approach, each activity carried out by the Partners, was found to be closely coordinated and correlated with: - the emerged territorial innovation needs of each project site, including the degree of digital maturity and background features of the specific territories; - the overall project goal and each specific instrumental technical activity for its full achievement; - the overall and specific goals of this specific project Output; - the compliance with the applicable regulatory framework at Programme and project level and at project territories levels.

Basically, the project supporting approach used to deliver this Output, followed six main phases, strictly interdependent and temporally and logically sequential, that conducted Partners in their work along the project lifetime, with the unique goal to make available new forms of cultural experiences able to valorize and further promote the chosen cultural heritage. These six main activities phases, have been:

1. Cultural attractors studies and literature analysis to catalogue each site with tourist route;

2. Installations on-sites of furniture and fittings and IT hardware and software for equipping the identified cultural assets;
3. Survey, 3D relief, photogrammetric and photographic campaigns, one for each site;
4. Virtual, digital and multimedia contents productions, one for each site;
5. Design and development of multimedia, interactive, accessible, indoor or outdoor installations, one for each project site;
6. Wireless Monitoring Systems tools implemented, within each for each site.

All these activites carried out by each Partner in its site, allowed to deliver No ten cultural attractors requalified, enhanced and promoted, thanks to the settled-up of pilot applications of technological, multimedia and interactive installations for the better management, enjoyment and enhancement of each selected cultural site. These installations included: - No twelve cultural attractors studies and analysis developed, also with details on the undergrounds of the chosen sites (the PP3 carried put two further researches in its cultural assests); - No ten survey campaigns of cultural attractors performed, that included also surveys on the undergrounds of the chosen cultural sites; - No ten multimedia interactive installations designed and developed in equipped cultural sites, with the aid of equipment including wireless monitoring systems and tools (furnitures and fittings and hardware and software).

Thanks to the cooperation experiences had by Partners at both project and cluster level, in the activites implementation phase, it was possible to use interactive methodologies of mutual involvement through interactive spaces, shared Jamboards, open brainstorming sessions, web-conferences, meetings on site, to jointly construct and share this project Output goals and tools for the better preservation of cultural heritage and the valorisation of the cultural and creative industries, widely involved in project territories, also with a long-term perspective of tourism and culture development strategy for the period after the project-end.

The project's activities were essential not only for the public authorities and cultural and creative industries involved directly in the project, but also to promote a responsible participation of people to a constant monitoring and safeguarding of artworks, with the final goal to enhance the sustainable tourism in the targeted ADRION regions.

Finally, the development of a new methodology integrating different IT techniques and know-how on international marketing for new forms of cultural experiences, proved to be a valuable tool which could be employed furthermore by local authorities and bodies

governing cultural attractors, to drive public policies of sustainable valorisation of cultural assets that, for their nature, are destined to remain active even after the end of the project.

The project in fact involved however the owners and/or the managers of the identified sites so, the achieved project Output will be maintained active and functional also beyond the project-end, allowing them to continue in the medium-long term period to promoting and managing the revitalized cultural attractors and their resources, with the continue management and animation as well, of this produced Exhibits in each project area and beyond the same. Moreover, the adopted methodology enabled the development of a new tourist-creative-cultural product with a transnational dimension, that is able to integrate the latest IT techniques (3d models, virtual reality, holographic projection), with environmentally friendly and inclusiveness measures, that made the provided technological installations a very attractive feature for cultural sites of this project, contributing to be sustainable and increasing also for the future, the number of visitors with a diversification of target groups and tourist offers.

Regarding the *novelties elements* of this project Output, it should be highlighted that the project made possible the realization of interventions for the design, development, setting-up and promotion of new models of cultural experience based on innovative digital distribution formats: technological, multimedia and interactive installations for the enhancement of the selected cultural sites, including virtual reality rooms, intelligent mobile applications, holographic demonstrations, screens and interactive projections capable of bringing to life, in a real or imaginary way, historical or legendary characters linked to the sites involved.

The adopted digital solutions were connotated by elements of novelties as they were able, on the one hand, to go beyond the experiential cultural tourism practices/technics already used in the project territories, having a demonstrative effect of the application of existing solutions to the involved territories/cultural sites, which very often have been not adequately valorized or have been abandoned and forgotten (especially for the undergrounds spaces), and on the other hand, they were able to fully grasp the potential of the used technologies as they proved to be able of reaching wider and diverse target groups even in a delicate historical period such as the one lived starting from the 2020, that was characterised by the global socio-economic crisis caused by the COVID19 pandemic; crisis that has highlighted how the digitization of services is a growing necessity for companies and institutions in order to ensure their sustainability over time,

thus imposing a rethinking of relations with the public, cultural distribution formats and related business models.

More specifically, the digital technologies present an enormous growth potential for tourism development and cultural and creative industries sector not only as a response to COVID19, but also as a guarantee for their medium-long-term sustainability.

The specific project goal is to promote a new transnational creative-cultural tourist product based on innovative methodologies and advanced emotional technologies, for new forms of cultural enjoiment to strengthen the greener, digital and resilient growth of the whole area. This project Output gave an enormous contribution to the achievement of this EMOUNDERGROUNDS project goal.

Thanks to this project Output, EMOUNDERGROUNDS project is demonstrating how, digital technologies, including emerging technologies, such as virtual and augmented reality and other multimedia technologies, can play a crucial role for the sustainability of the entire sector creating new business opportunities, industrial innovation, access to new markets and audiences.

3. HOW THE PILOT ACTIONS HAVE BEEN IMPLEMENTED AND THEIR RESULTS, INCLUDING THE ENVIRONMENTAL IMPACTS AND SOCIAL INCLUSION

The following pages describe how the pilot actions were implemented by all Partners and the results achieved by each Partner.

3.1 How the pilot actions have been implemented including their environmental impacts and social inclusion

Under the coordination of the Lead Partner, Partners started the implementation of the activites finalized to the achievement of this project Output consisting in new multimedia, technological and interactive exhibits for new forms of culture experiences across the Adriatic-Ionian Regions.

In close cooperation with each other, the project Partners have produced ten digitized cultural assets with the aid of advanced multimedia technologies for an innovative and emotional cultural experience. The attractiveness of these cultural sites is further enhanced by the aura of mystery that experiential paths based on the most advanced virtual and augmented reality technologies can ensure, guiding visitors and users from all over the world in an emotional and evocative way along the history and legend of the underground passages of the project's cultural attractions.

The implementation of the activites instrumental for the achievement of this project Output, has followed the process with the consequential steps strictly and functionally interconnected, as described below:

1. Cultural attractors studies and literature analysis to catalogue each site with tourist route;

2. Purchasing of furniture and fittings and IT hardware and software for equipping the identified cultural assets;

3. Survey, 3D relief, photogrammetric and photographic campaigns, one for each site;

4. Virtual, digital and multimedia contents productions, one for each site;

5. Design and development of multimedia, interactive, accessible, indoor or outdoor installations, one for each project site;

6. Wireless Monitoring Systems tools implemented, within each project site.

After the identification of the cultural attractors in each project site, Partners started the project activites by the study and analysis of the identified cultural assets on which all the project digital interventions have been focused. The cultural sites covered by the project are the following:

1. Acquaviva d'Aragona Castle in Nardò, chosen by the Lead Partner (*Municipality of Nardò*);
2. Palazzo dei Pio in Carpi, chosen by the Partner No2 (*Municipality of Carpi*);
3. Chlemoutsi Castle in Andravida-Killini, chosen by the Partner No3 (*Municipality of Andravida Killini*);
4. Trsat Castle in Rijeka, chosen by the Partner No4 (*Rijeka Tourist Board*);
5. St. Michael Fortress in Šibenik, chosen by the Partner No5 (*Public Cultural Institution Fortress of Culture Šibenik*);
6. Štanjel Castle in Koper, chosen by the Partner No6 (*Regional Development Centre Koper*);
7. Podsmreka Castle in Ivančna Gorica, chosen by the Partner No7 (*Municipality of Ivančna Gorica*);
8. Old Underground Town of Kukes, chosen by the Partner No8 (*Municipality of Kukes*);
9. Old Town and Fortresses of the Municipality of Bar, chosen by the Partner No9 (*Tourism Organisation of Municipality of Bar*);
10. Underground Fortress in Trebinje, chosen by the Partner No10 (*Trebinje Development Agency*).

Partners carried out the study and analysis of the identified assets, with scientific research of historical and legendary sources to reconstruct the origins and evolution of the identified sites. The conducted analyses included a scientific study and literature analysis to catalogue the assets in each site both with an historical analysis of the cultural attractors and their undergrounds. In summary, the studies conducted have shown the following main features per each Partner and site:

***Acquaviva d'Aragona Castle in Nardò*:**

The date of construction and the designer of the "Acquaviva" Castle in Nardò are not known, although local historians usually attribute the commission to the powerful Acquaviva d'Aragona family in the period included in the second half of the fifteenth century or, at most, at the beginning of the sixteenth. The layout of the Castle has a trapezoidal plan with four towers at the corners, of which three are cylindrical and the fourth one almond shaped. The castle sits on a pre-existing fortress that, in turn, had replaced the Norman-Swabian Castle around the 1270. The present building was constructed around the 1497 according to the design of the military architect Giulio Antonio Acquaviva. It looks like a typical Aragonese fortress, with a quadrangular plan, enclosed by the four circular towers. Urbanistically, it is located on the edge of the old city and represents the reconnection point between the old city walls and the new buildings. The building was converted into a noble residence in the early 20th century and has been restored several times. The more than 50 rooms present have all been completely renovated. The building is subject to urban planning, cultural-landscape and environmental constraints. It currently houses part of the municipal offices, including the representative offices, the Mayor room, the "Sala Giunta", the Council Hall, other "multi-purpose" spaces on the ground and first floors for exhibitions, events and cultural associations. The EMOUNDERGROUNDS interventions to promote, enhance and improve this cultural heritage asset by new media and emotional technologies, have been carried out in the undergrounds and on two terraces of the Castle. The Castle's undergrounds are made up of a first large room (room n.1), barrel-vaulted, used as the "Welcome Area", and by adjacent consecutive spaces (rooms no. 2,3,4), also barrel-vaulted, where, through technological and multimedia aids (multi-projection and holographic videos), visitors can take a leap into the past and find themselves virtually

Figure 1 - Acquaviva d'Aragona Castle in Nardò

"face to face" with the holograms of the illustrious characters of the territor: Giangirolamo II Acquaviva d'Aragona (the "Guercio di Puglia") or with the prisoners locked in the dungeons, and discover through audiovisual content the rich history of the castle and, in part, of the town of Nardò.

Palazzo dei Pio in Carpi:

Carpi is located in the centre of the Po Valley, at the hub of the main road system of northern Italy. The city has always managed to combine a strong-impact historical-cultural heritage with lively creativeness and versatile business skills. Carpi is also renowned for its culinary specialties, traditional produce and the excellence of the local cuisine.

Figure 2 – Palazzo dei Pio in Carpi

The Palazzo dei Pio di Savoia complex is made up of a group of buildings dating from the Middle Ages to the 18th century. Founded as a fortified castle, it was remodelled over the centuries with the construction of fortresses, towers and turrets that were joined together in the early 1500s, when it was transformed into a princely residence by Alberto Pio III.

It is now home to the Museums, Municipal Historical Archive and Kiddie castle.

The complex's highlights include the Great Courtyard, Renaissance frescoes and internal visit route.

With The EMOUNDERGROUNDS interventions in the renovated tourist office of InCarpi, the first place of reception for tourists intent on accessing the network of monumental, museum and naturalistic sites of the city and the territory, the multimedia installations concerning the relationship between the evolution of the Palazzo and the city of Carpi are strategically placed. The experiential journey continues in the undergrounds of the Guerrieto and in the interior of the historic building, where the story moves on to the decorations in the main rooms, the Chapel, the ancient Sala della Dama, the Sala of the Petrarchian Triumphs. Also involved are the two squares dei Martiri and Re Astolfo in

relation to the Palazzo: through an APP and QR code, visitors will be able to interact with the surrounding spaces, capturing the historical evolution that goes from the Middle Ages to the present day.

Chlemoutsi Castle in Andravida-Killini:

The castle Chlemoutsi was built between the years 1220 – 1223 by the Frankish prince of Peloponnese (Morea) Godfrey Villehardouin which had previously occupied the peninsula in 1205 and had founded the Frankish Principality of Achaia.

Figure 3 - Chlemoutsi Castle in Andravida-Killini

It was the best Frankish construction in the Peloponnese, built from the start according to a strict architectural plan, of purely western character, which was not significantly altered later by the Turks.

Its original French name was: "Clermont". It was built on a strategic position, on the summit of a hill on the westernmost promontory of the Peloponnese, dominating the surrounding plains and offering an extensive view of the Ionian Sea. In that way, the castle secured control over the most important area of the Principality of Achaea, which included its capital Andravida, as well as its major port and commercial centre in Glarentza. Clermont functioned as a residence of the Prince and as a symbol of the authority and power of the Villehardouins.

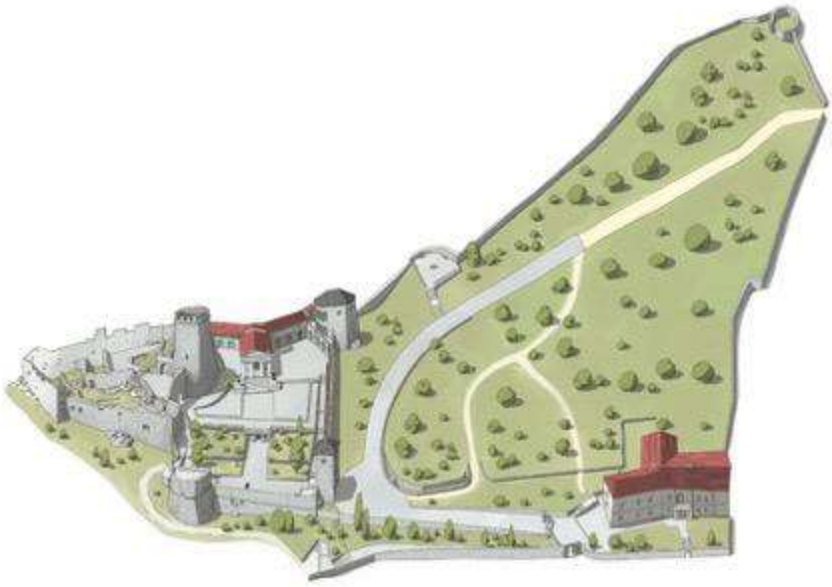
The Chlemoutsi Castle followed the fate of the Villeardhouin dynasty, after that the adventures of the Latin authority and changed hands among other conquerors who followed the Franks. The construction of the Castle was linked to a great dispute between Godfrey Villeardhouin and the latin clergy of Achaia. Since the prince, in order to find the money for his ambitious plan confiscated the revenues of the clergy and as

a consequence Pope Honorius III excommunicated him. After the completion of the castle though their relations were reestablished as the Pope was convinced about the necessity of the castle.

The EMOUNDERGROUNDS interventions to promote, enhance and improve this cultural heritage asset by new media and emotional technologies, have been carried out in the undergrounds, in the warehouse ASO. In this large room of warehouse visitors can take a leap into the past using audiovisual material and 3D animation of the Chlemoutsi castle in different historic period. All information based on photogrammetric mapping, architectural drawings, plans, sections and appropriate historical documentation sources provided by the Ephorate of Antiquities of Ilia, 3D models and 3D environment of older historical periods (e.g. the Medieval period of Clermont Castle) were produced to be rendered in 3D animation video.

Trsat Castle in Rijeka:

Trsat Castle is located on a hill above the Rječina canyon. At first glance, one is enchanted by the strong impression of the romance of this place, which within the old, gray stone towers, overgrown with ancient ivy, in dead silence, through which penetrate the whispers of many centuries. Tarsatica is the name of an ancient settlement located on the right bank of the Rječina. The name comes from the local population and means an ethnic group living by the river (Tarsa / Tarsus). It is assumed that a Roman observatory or fort was located at that place, and one of the towers in Trsat is called Roman. The foundation of the settlement dates back to 799, when the Frankish Margrave Erich was killed, after which the army of Charlemagne destroyed the city, forcing the inhabitants to flee to the hill above Rječina. The first mention of Trsat dates back to 1288, when it is mentioned in the Vinodol law which states that the place is part of the Vinodol manor, which is ruled by the princes of Krk, Frankopani.



Current appearance of the Trsat castle was created through five construction phases. The (1) medieval phase of construction lasts from 1225 to 1479, (2) the Frankopan phase begins in the 15th century with Nicholas IV. Frankopan, and (3) The transitional phase extends from 1530, taken as the end of the Frankopan phase, to 1824, when the management of Trsat and its renovation was led by the famous Count Laval Nugent. In (4) the Nugent phase, from 1824, the castle gets the basis for the foundation of the museum, and, finally, (5) the 20th and 21st century phase marks the appeal for the restoration and preservation of Trsat castle.

Figure 4 - Trsat Castle in Rijeka

Trsat castle has been one of the most visited cultural attractions in Rijeka and its surroundings for years. The local population uses it as a place to meet and socialize. Apart from the interpretation center The Routes of the Frankopans, which covers only one historical era of Trsat Castle, there was no interpretation at Trsat castle and visitors did not have the opportunity to learn more about the history of the castle. Rijeka Tourist Board, as the manager of the Trsat Castle, has been investing in the maintenance of the castle and the improvement of its offer for many years in order to improve the experience of visitors and to popularize the object itself and thus contribute to the attractiveness of the entire destination. Participation in the EMOUNDERGROUNDS project enabled the Rijeka Tourist Board to use innovative technologies to provide visitors with an improved experience of the Trsat castle and to experience it in a different way, previously impossible. In the space where there is a natural cave, which once upon a time connected Trsat with the Rječina (river), a new interactive exhibition was designed and installed.

St. Michael Fortress in Šibenik:

St. Michael's Fortress is the oldest historical monument in Šibenik. It was protected as a national cultural asset in 1964 and underwent a series of archaeological campaigns (1972-77; 1990-96; 2017-20), as well as many conservation projects since 1980's. New features were added on the fortress with the completion of revitalization project in 2014, the main one being an open-air summer stage. Archaeological findings showed the continuing occupation of this location throughout the last 3000 years. Considering the tendance in the last half a century or so, it is somewhat peculiar that the comprehensive documentation campaign which would mark the exact state of every stone on the fortress was never carried out. The aim of the initial study analysis (A.T.2.1) and documentation-making process (A.T.2.3) was to cover the gaps in PP5's knowledge about St. Michael's Fortress. PP5 requested the making of detailed plans of all inner and outer walls. Hundreds of photos have been shot with drones. The collected data was then converted into digital photogrammetric 3D model which was used for generating the raster images of horizontal or vertical projections. The resulted images were then analysed in CAD or GIS programmes. This detailed documentation gives the complete existing condition of St. Michael's Fortress in 2020 and will be used for years and perhaps decades to come. Additionally, one can find many suggestions about the

developmental phases of the fortress by carefully examining the structure, material and height of walled segments.

Figure 5 - St Michaels' Fortress

One of the more important parts of initial study is a chemical analysis of mortar and carbon fragments found in the interior of the walls. This is still an experimental, but very developing scientific method, and samples were taken from just one part of the wall considered to be the oldest. The results of the study offered a new perspective on many of the reconstructions and additions to the fortress and supplemented the existing literature: The carbon fragments were dated ~ 881 to 978AD, century or two before the first historical mention of Šibenik. The further confirmation of this date would lay a groundwork for the case of earlier urban formation of the city (or the suburbium below the fortress), which has been speculated about for several years. The digital photogrammetric 3D model and other documentation made within aforementioned activities was an important foundation for VR scenario development and virtual production and post-production services. The goal of the VR scenarios is to inform and educate visitors to Šibenik's fortresses in a fun and interactive way about the history of the city of Šibenik, with special emphasis on the development of the Šibenik fortification system and its use over the centuries. Additional goals are the application of new technology in heritage interpretation; as well as the presentation of hitherto lesser-known historical events, professions or characters, i.e. the diversification of traditional historical narratives. The four interactive games are intended for people over ten years old and can be played by anyone who wants to try their hand at using old weapons virtually, defending Šibenik and its fortresses, escaping from a dungeon or racing through the old city centre, with an incredible feeling of how

realistic it all looks once visitors put on their VR headset. New (VR) content was presented to general public in VR Snow Fort, i.e. Šibenik Technological Experience event, placed in city centre in December 2022 as a part of Advent festivities. The organization of aforementioned event was easy since VR equipment and furniture procured within the project was envisioned as modular, mobile VR stations that are easy to assemble and disassemble: it consists of VR headsets with all of necessary add-ons and VR stands. As St Michaels' fortress hasn't got much space inside of it and most of it is multifunctional, PP5 is able to remove and put back the equipment from the fortress in order to implement PP5s usual programmes which require a lot of space. The equipment, i.e. VR content can be used on all of Šibenik's fortresses and locations under the Fortress of Cultures' management as needed – mostly on St. Michael's Fortress, but sometimes on St. John's and Barone Fortress, House of Arts Arsen and on other locations (such as The VR Dome which was rented within Šibenik Technological Experience event) – as all parts of the VR equipment are mobile.

The last, but not any less important is the Fortress of Culture mobile application. The mobile application provides all useful information about fortresses and Fortress of Culture's programmes on its fortresses but also in House of Arts Arsen (all locations under Fortress of Culture's management), all in one place. The Fortress of Culture mobile application was created with the aim of providing timely and accurate information before, during and after visiting Šibenik's fortresses. On the other hand, it enables a better insight into the needs of visitors, which gives the Fortress of Culture guidelines for further development and improvement of contents and programmes for visitors.

Additionally, two additional researches were conducted within activity A.T.2.1 Cultural attractors undergrounds studies and analysis: Topographical measurement of fortification sites around Šibenik with 3D laser imaging (LIDAR) - this research/report includes a brief historical overview of the locality and the recording of positions with LiDAR technology (the results of the obtained analysis will serve for a better understanding of the historical context of the creation and use of the aforementioned fortifications, while precise recording established the dimensions of the site, the current state of preservation, and other archaeological traces in the immediate vicinity) and Mortar dating and composition analysis from the fortifications in and around Šibenik - this research was carried out for the purpose of better understanding the time frame of the creation of certain structures, and the obtained results are going to serve for the

planning of future archaeological research as well as for the scientific valorization of the locality Gradina in Goriš, Zvonik hill in Mirlović Zagora and several other locations in the wider area of the city of Šibenik. These scientific researches will result in better understanding, interpretation and valorisation of fortification sites in and around Šibenik.

Štanjel Castle in Koper:

For centuries Štanjel's Castle has been the centre of Štanjel, a picturesque settlement on the border between the Karst and the Vipava Valley. It stands on the south-western part of the Štanjel hill, where it is sheltered from the storm, well-shaded and has always offered a good view of the surrounding area. The castle consists of the so-called lower palace, which today houses the restaurant, the tourist information centre, the Knights' Hall, the Lojze Spacal Gallery and the Štanjel Museum, and the higher upper palace. Both parts are connected by a castle courtyard with a richly designed Baroque stone staircase. The castle as we know it today is the successor of more modest medieval castle buildings. Its origins date back to the early 16th century, but the castle reached the peak of its splendour at the end of the 17th century under the family of the Counts of Cobenzel. The castle was built in several phases. The older upper palace was built by converting several stone houses leaning against the old walls. The younger lower palace began to grow around 1580 as part of the new Štanjel fortification structures and by 1700 had already assumed its present size. In recent years, the local authorities have invested a lot of funds and effort in renovating the castle and raising

Figure 6 - Štanjel hill

Figure 7 - Štanjel Castle in Koper

awareness among the local population, in order to bring the otherwise remote area, closer to tourist flows. The activities of the EMOUNDERGRONDS project have made it possible to bring additional content to the site, and it has been particularly interesting to introduce new ways of presenting the rich heritage using advanced IT technologies. The first investment was in a new interactive info panel that greets visitors in the reception center. On the screen information about the project are available and all the new are regularly updated by the tourist centre officers. On the way from the castle to the Kobdilj's Tower, "trigger points" were placed along the clustered medieval streets through which the AVIKO app can be used to find out a series of interesting historical facts given by the avatar in shape of a medieval boy. In the undergrounds of the Kobdilj's Tower, a hall has been equipped in which various presentations or workshops for tourist and educational purposes can be held via a wall monitor and a powerful computer and two laptops. At the entrance in the tower there is an info monitor with all the information about the project, Štanjel and pictures of the upper floors of the tower, which is inaccessible to people with mobility problems due to the steep stairs, so they can see everything in the entrance hall.

Podsmreka Castle in Ivančna Gorica:

The history of Podsmreka Castle is linked to the families who owned it and significantly shaped not only Southeast Slovenia but also the wider Slovenian and even European cultural, economic and political space. The castle has changed many owners who have rebuilt and renovated the building according to their tastes and the preferences of the times. Podsmreka Castle was built at the end of the 16th century by the Galli family, and its present-day appearance was finalized in early 19th century. Historical sources first mention the place "Smreckh" in a document from 1504 in connection to an estate in Stična, but the manor of Smreck (Smrekha) itself was documented first by Valvasor in his 1689 anthology *The Glory of the Duchy of Carniola* with several lengthy lines of text and graphic representation. Emil Rothschütz and his family moved to Podsmreka Castle in 1866 when his wife, Countess Antonia Cecilia Lichtenberg, inherited it.

Figure 8 - Podsmreka Castle in Ivančna Gorica

He founded the Carniolan Commercial Apiary in 1868 and began trading in beekeeping equipment and Carniolan honey bees. This marked the start of an intensive bee export period that continued in Slovenia until the first half of the 20th century and had a key influence on the spread of the Carniolan honey bee in Europe and worldwide. Podsmreka Castle became the central beekeeping centre in Carniola, while the area of today's Slovenia became famous for what is now second most widespread honey bee species in the world. The company has won prestigious awards, including a silver medal at the Paris World Exposition. Emil Rothschütz is also credited with the scientific naming of the Carpathian honey bee; he worked with Dr Pollman, who helped get the bee recognised as a distinct subspecies and entered in the bee systematics as Apis mellifera carnica. In 1909, the castle was bought by Peter Majdič, a Slovenian industrialist and businessman from Celje, who continued the beekeeping business until its collapse after WWI. He then sold it to the Ljubljana merchant Franco Fortuna, who later sold it in 1934 to Peter Klarwill, a Viennese entrepreneur. He was forced to leave Europe in 1938 because of his Jewish ancestry, and he sold the estate to Anton Verovšek, a merchant from Ljubljana who managed it wisely until 1948, when the place was nationalized. Several institutions, courses and schools were established there, including an educational

institution for young women, which soon moved to a larger building in Višnja Gora. After that, the castle was managed by the Stična agricultural cooperative, which organized professional courses, followed by the Medex company. In 1969, the Slovene Ethnographic Museum in Ljubljana took over and set up a permanent exhibition of pottery crafts in Slovenia. The museum closed shortly afterwards and the castle remained deserted.

With the EMOUNDERGROUNDS project the municipality got an opportunity to develop smart tourism and new tourism products. With the project's support, the local public and tourists can learn more about the history of Podsmreka Castle. New interactive and innovative tools were used to present the castle in the context of the House of the Carniolan Honey Bee in Višnja Gora, with a comprehensive presentation of the history of one of the most widespread honey bee species in the world that originated here. Through a unique virtual reality experience, using smartphone apps, holographic presentations and interactive projections, the Municipality of Ivančna Gorica has created a tourism offer model based on utilizing and innovating cultural heritage, increasing the attractiveness and accessibility of the local environment, and creating additional tourism offers linked to the heritage of Podsmreka Castle.

Old Underground Town of Kukes:

Figure 9 – Tunnels in Kukes

The political developments of Albania in the years 1945-1990 caused Kukësi to assume the role of a military zone. This is due to the geographical position on the border with the former Yugoslavia. The policies of the state of the period 1945-1990, where its focus was on protecting it from the imaginary enemy, led to the construction of the underground city in parallel with the construction of the new city of Kukës.

The underground city (Tunnels) is witness to a difficult period for the population of Albania and the municipality of Kukës in particular, as a border region. The tunnels clearly express the illusion of the time, where the people had to protect themselves from the imaginary enemy. Underground tunnels with a surface

area of 1000 meters are built under the city of New Kukës. It was built in the early1980s and has a 1.5-meter-thick cement ceiling. The underground tunnel of Kukës met all the needs of the population. There the population could receive all services such as water supply, which was provided through a well inside the shelter, which had been tested for drinking water.
Ventilation system, which still works today. Electricity was provided through a generator. The health service, as there was also a hospital with all the equipment of the time. The phone line would ease the isolation inside the tunnel as long as they stayed there. The interior minister had a hotline connected to the senior leadership.

In the inability to install the equipment in the tunnels, because access to them requires large financial interventions for the rehabilitation of the infrastructure of the underground city, the equipment was installed near the Ethnographic Museum. Situated in the city center, the museum is located inside a modest structure. It is inside it, however, that you will find the comprehensive ethnographic and cultural history of this region. Because the area's nature and landscape are its most significant attractions, there is plenty of information about its flora and fauna. The museum is divided into three pavilions: Biodiversity, Archaeology, and Ethnography. The equipment is installed in the basement of the museum and is accessible to different visitors.

Figure 10 - Studies and Analysis of Kukes

Figure 11 - Survey, 3D relief, photogrammetric and photographic campaigns

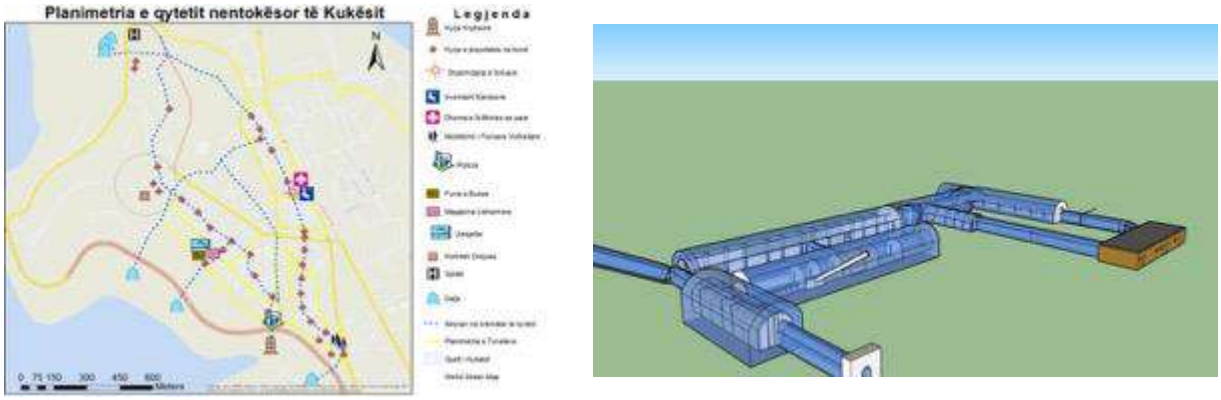


Figure 12 - Virtual, digital and multimedia contents productions

Figure 13 - Kukes Underground museum

Old Town and Fortresses of the Municipality of Bar:

The Old Town of Bar is the largest and the most important medieval archaeological site in the Balkans. It covers the area of 4.5 hectares, where the remains of around 600 public and private edifices are the proof of the existence of various construction phases present in different epochs of the Mediterranean history.

The visual identity of the Old Town of Bar is formed by the ramparts, bastions, towers, a citadel, numerous squares and churches. On the western and northern side, in the immediate surroundings of the ramparts of the Old Town of Bar there is an incompatible ambient whole consisting of the settlement and the suburban area of the Old Bar, while on the southern and eastern side there is a preserved natural setting of the slopes of Mount Rumija.

Figure 14 - Old Town in Bar and its fortresses

It is in the historical sources from the 10th century that the Old Town of Bar is mentioned for the first time, however it is assumed that it had existed even in the 6th century in the form of the rehabilitated Roman 'castrum'. It was established in a naturally protected place and surrounded by strong walls with towers and bastions. The residential architecture of the town is characterized by Late Gothic, Renaissance, Baroque and oriental elements.

The Old Town of Bar has been deserted since the end of the 19th century. After the 1979 earthquake, technical specifications and project design documents were made, along with the research programmes and the plans for the protection and presentation

of the Town core. The most significant structures of the upper part of the town were being explored, conserved and presented during the first and the second round of the works.

Figure 15 - Fortresses of the old town of Bar

Yet another drafted and fully implemented project included infrastructural works on the route leading from the main gate to St. George's Cathedral. This clearly shows the unambiguous interest in rehabilitation of certain structures and in reestablishing corresponding functions of the same, all-in line with the programmes relative to their purpose. The electrical supply network enabled the installation of public lighting, the illumination of certain monuments and communications. Thanks to the regular investments and technical maintenance related to the cleaning of vegetation, the upper part of the town is accessible to public.

The lower, southern part of the town with the suburban rampart has not been treated and it is rather dilapidated. Ample vegetation endangers the remains of the architecture and makes them invisible.

In the area of the Old Town of Bar there is rich cultural-historic heritage of outstanding significance. The most important single structures in the Old Town of Bar are: Main Gate from the 14th to 16th century, Customs House from the 15th century, Summer Stage, Saint Nicola's Church from the 13th century, Gun Powder storage from the 18th century, Tatarovica Citadel from the 10th to 19th century with the military chapel, Aqueduct at Tatarovica, the town's oldest section, dates back to the 18th century, Saint John's Church from 1927, with the 15th century palace, Saint Veneranda Church from

the 14th century, Saint George's Cathedral from the 11th to 15th century, Saint Catherine's Church from the 14th century, Clock Tower from the year 1752, with the southern gate at its foot, medieval multi-story house with a coat of arms, Turkish Bath from the 18th century, reconstructed and functional, Prince and Bishop's Palace from the 15th to 16th century, Tower in the western corner of the ramparts, Ramparts from the 11th to 19th century.

Figure 16 - Cultural-historic heritage of the old town of Bar

Underground Fortress in Trebinje:

Figure 17 - Underground Fortress in Trebinje

In Trebinje, there were two locations selected to be treated through project pilot intervention, former command post of Austro-Hungarian army in Trebinje, now building of Herzegovina Museum, and fortification "Strač" which used to be the biggest Austro-Hungarian in this part of Europe, both having its undergrounds characteristics. Another aspect of selected approach was presenting

"Trebinje as fortification" and some other fortifications, since whole town had defensive military role in that period.

Even if numerous buildings including the basis of Museum building origin from older times, these objects were built or rebuilt to actual form during Austro-Hungarian occupation of BiH, from 1878 to the end of WW1. Some of them, including "Strač" were not completed until 1918.

As a preparation and developing foundation for creation of digital contents of interactive installation, study on cultural attractors and survey/photo campaign were conducted to provide required contents to be translated into Digital & virtual contents productions.

Former command post or Museum of Herzegovina building was built on the place where it is believed Trebinje was founded, on the foundations of former building also reconstructed by Ottomans. The complex has main building, dovecot and two more depots, all surrounded by opened and still unexplored micro locations. There are explorations initiated even inside the building where some remains of former objects are being unearthed.

Figure 18 - EMOUNDERGROUND interactive installation

One of aforementioned depots are the place where EMOUNDERGROUNDS interactive installation is placed and available to visitors (see the picture).

While the information on today's Museum of Herzegovina building is mostly available, "Strač" fortification is still shrouded in mystery, such as legend about 365 underground rooms and similar. Unfortunately, due to the pretty bad condition of the object, it cannot be easily checked today as it would require significant means. The volume of the object can be imagined by looking from outside, and some segments such as cisterns for water and arms protecting cupolas, are accessible and witnessing how complex and powerful this fortification was.

Fortification was built into a steep conical hill from 1910 to 1916, with the aim of protecting the south-eastern border of Bosnia and Herzegovina. The dimensions of the Strač fortress are about 150 m by 100 m.

Figure 19 - Strač fortress

Today, former command post has role of Museum of Herzegovina, while "Strač" and other fortresses around Trebinje are waiting for its reconstruction and tourist valorisation.

Further activites following cultural attractors studies and literature analysis

During the cultural attractors studies and literature analysis conducted by all Partners to catalogue each site, Partners started and carried out the procedures to purchase the equipment as listed in the respective bills of quantities. Partners mostly made some minor changes in their lists of equipments without altering the scope of the planned interventions and the functions of such tools. Equipping interventions were aimed at creating permanent or moving stenographic and technological exhibits for outdoor and/or indoor performances to allow to virtually explore cultural sites, their undergrounds and cultural routes. The purchased equipments were thematic and functional to the implementation of the planned pilot actions (small scale investments as pilot applications of technological, multimedia and interactive installations for the management, enjoyment and enhancement of cultural heritage), and they included: 1. Furniture and fittings (such as: armchairs, benches, stackable chairs, tables, stackable, small cabinets, and others); 2. IT hardware and software (such as: totem, Mini PCs, VR Visors, Videoprojectors, stands, Back projection screens, vertical panels graphic, Workstations, sound system, LED lamps, LED monitors, sensors, lights, holographic panel and access, outdoor signages; SW per headset: headsets for visual and audio reproduction and all necessary ad-ons relevant to fully functioning VR, kiosks for Outdoor/Indoor Digital Signages, Digital billboard, others). Technical drawings of the exhibits for outdoor and indoor performances with the purchased equipment, have been provided by the Partners.

Deviations from the Work-Plan and approved budget changes requests occurred during the project lifetime and affected the equipment. In fact, the characteristics of the purchased equipment compared to what was planned in the original AF, have been changed along the project implementation for some Partners due to specific different arisen needs, such as: the impact of COVID10 which imposed the choice of different equipment for health safety reasons, the lack of space/brightness in the place that would have hosted the equipment, the change of the original installation space with consequent new reduced available space for hosting the equipment, the PP4 replacement with the new needs for equipment to improve the visitors experience, the market research results that showed the availability of new more advanced technologies, the presence of building with low ceiling that couldn't allow the installation of certain equipment in that place. So, during the different reporting periods, some Partners (PP2, PP3, PP4, PP5, PP6, PP7, PP9) made changes in their equipment following Work-Plan and Financial adjustments and/or Minor Budget Changes requests.

Partners purchased a total number of **No 2.502 equipment**, of which No 211 furniture and fittings and No 2.291 hardware and software (that includes also No 2.000 hygienic protective masks for VR).

Specifically, each Partner purchased and installed the following equipments:

LP: no.81 furniture and fittings and no.63 IT hardware and software;

PP2: no.32 furniture and fittings and no.28 IT hardware and software (PP2 had 2 minor budget changes approved on equipment, the 1st dated February 2021, and the 2nd March 2022, and 1 Work Plan adjustment approved by a JS email on 24.03.2022);

PP3: no.28 furniture and fittings and no.64 IT hardware and software (PP3 had a Work Plan adjustment approved by a JS email of 27.10.2022 as the Greek Ministry did not approve PP3 placing the equipment inside the Castle but gave them permission to install technological exhibit in a smaller space in a building owned by PP3. Due to the smaller new space, PP3 was obliged to reduce the furniture and fittings quantities increasing that of hardware and software, maintaining the same functionalities of the interventions);

PP4: no.6 furniture and fittings and no.16 IT hardware and software (PP4 had a Work Plan adjustment approved by a JS email of 25.10.2022 and a minor budget change approved on 4.11.2022);

PP5: no.4 furniture and fittings and no.20 IT hardware and software (PP5 had a Work Plan adjustiments sent by email to JS on 02.02.2021 and a minor budget change approved on 22.02.2021. IT hardware and software were functionally grouped in No 20, but the total quantity of such equipment was higher, with 2.040 pieces that included headsets with protective case, power banks VR protective masks);

PP6: no.0 furniture and fittings and no.17 IT hardware and software (PP6 had a Work Plan and financial adjustment approved by email by JS on 23.06.2020);

PP7: no.6 furniture and fittings and no.24 IT hardware and software (PP7 had a Work Plan adjustiments sent by email to JS on 02.02.2021 and a minor budget change approved on 22.02.2021);

PP8: no.18 furniture and fittings and no.16 IT hardware and software;

PP9: no.18 furniture and fittings and no.7 IT hardware and software (PP9 PP had a Work Plan adjustment approved by a JS email of 04.11.2021 and a minor budget change request approval on 4.11.2022);

PP10: no.18 furniture and fittings and no.16 IT hardware and software.

Then, the studies and analyses conducted for the participating cultural attractors have been integrated by the Partners thorough surveys, 3D relief, photogrammetric and photographic campaigns, one for each site.

In each cultural attractor, this activity was drawn up according to the following methodology:

- Historical architectural analysis of the rooms and spaces of the cultural site;
- Photographic/photogrammetric campaign of the internal and external environments, useful for the dimensioning and design of the technological and cultural services;
- Synthesis and graphicisation of the real state in 2D and 3D.

The activity involved the cataloguing of the targeted sites and the respective literature analysis. Multidisciplinary experts' teams were involved in these studies and surveys phases. The results of these researches were necessary for digital and technical activities and for the consequent activity phases. For each site were conducted survey and reliefs on activities site, in order to collect digital and technical data. For the above-mentioned activities, Partners used different advanced equipment such as 3D laser scanner, drone, total station, 3D cameras, 360° cameras.

Then, after the collection of these data in project sites, Partners conducted post - production activities aimed to translate survey data into digital contents (2D/3D): through these activities, it was possible to propose the analyzed cultural assets in different historical phases. More in details, Partners carried out in each project site the creation of the final multimedia contents by digital and virtual contents productions, for the different adopted technologies such as: holographic technology system, the video wall, virtual reality system-tours-rooms, augmented reality, smart mobile software applications, interactive screens/projections, web-based applications.

The digital production was propaedeutic to the storytelling phase and to use 2D/3D contents for virtual reality, augmented reality and multimedia and interactive demos. Different techniques were used for the post-production phase: character building, landscape and weather advanced simulations, visual effects sequences and motion graphic footage. The scanned images were used as contents to the storytelling design and for the production of digital contents for virtual reality and interactive exhibits.

Then, Partners implemented the further activites of the multimedia technological exhibits design to be provided in the undergrounds or in the other chosen spaces of the identified cultural attractors, as identified by each Partner. Partners identified exactly the areas necessary to accommodate the purchased equipment and technological systems, aimed at entertaining users and multi-target people (tourists, families and schools). All the authorizations for these interventions from the competent Authorities, where necessary, were obtained by the Partners. In some cases, preliminary interventions to make the rooms healthier and to allow the correct use of the premises, were implemented, by some measures useful to give a sense of cleanliness to the environments. These interventions made it possible to create internal paths with a simple and linear course, without hindering the transit of people on wheelchairs. There

were no bottlenecks and furnishings that could prevent the passage or that could cause injuries to users.

Finally, Partners adopted Wireless Monitoring Systems for Audio Assistants for tourist's counter, automatic audio-guide, highlight emergency events and visitor's position. The latest frontiers of ICT systems and the use of mobile application provide new models of exploitation and enjoyment of cultural heritage goods. The application of these technologies at the identified cultural assets (castles, fortresses, other cultural buildings/cities with undergrounds) were able to enhance the tourists' experience, giving life to the undergrounds and immersing the visitor in the different Ages. Interactive installations connected to advanced control systems create points of contact between the tourist and the people who wrote the history of the Castle. In order to transform the traditional guided-tour to an interactive and experiential guided tour, in such cases the adopted system also provides an app accessible from mobile devices: an audio guide dedicated to foreign tourists and an application dedicated to the tourist guide for controlling the installations and for monitoring visitors.

The final project Output was: 10 small scale investments as pilot applications of technological, multimedia and interactive installations for the management, enjoyment and enhancement of the ten identified cultural sites.

In the pages below, it is possible to have a clear description of each pilot action per Partner.

Environmental impacts and social inclusion

All these project's interventions aimed to ensure at the same time the environmental and social sustainability of the related activities, thanks to an integrated and renewed cultural tourism offer with a reduced seasonality of tourism and with environmentally friendly pilot actions and events related to those emotional paths (for the techniques, the materials and the solutions used).

With the possibility to contribute to minimize the environmental footprint and enhance social inclusion, Partners provided:

1. Cultural tourism services Offer integrated, so, reducing the tourism seasonality and the mass tourism impact, in some cases also delocalizing the tourist offers attracting

people from the marinas and coasts where is higher the tourism environmental impact towards spaces not yet popular and frequented by tourists such as buildings undergrounds;

2. Environmentally friendly events and pilot actions, with specific models, techniques, materials, technological solutions, that kept under control all the aspects of pollution emissions, produced waste, resources efficiency such as eco-friendly or low-energy materials and devices as well as measures to properly manage the produced waste (e.g., low-energy light bulbs, recycled materials such as paper used for printing promotional material, reusable utensils for eating and drinking, bio-based materials as produced gadgets, separate waste collection). In addition, also measures to ensure the visitors safety and accessibility, were adopeted.

3.2 Results achieved by each Partner

In the following pages, the results achieved by each Partner in its cultural attractor, have been described.

LP – Municipality of Nardò:

At the Castello di Nardò, the visitor has the chance to live several experiences and learn about the history of the city with accuracy and precision but also with passion, involvement and wonder. The exhibition itinerary starts from the Welcome Area.

Figure 20 - Welcome area

Visitors are welcomed by the highly qualified staff of the Castle who provide all the necessary information about how to access the undergrounds area and the multipurpose spaces of the atrium, the terrace and the fortified towers and how to use interactive technologies.

Continuing along the path, through a video wall, it will be possible to discover the wonders of the territory of Nardò, its marinas and take a virtual tour of the castle.

Using ICT, visitors are able to travel to the past and virtually face-to-face with the holograms of eminent figures of Nardò, such as Giangirolamo II Acquaviva di Aragona, the Guercio of Puglia, and with the prisoners who were locked up in the dungeons. Visitors also discover through multimedia content and Virtual Reality the events that involved the Castle of Acquaviva di Aragona and the rich area of Nardò.

EMOUNDERGROUNDS in Nardò improves socialization and integration and at supporting the creation of cultural and creative itineraries.

The images re-elaborated by the Virtual, Augmented Reality and Multimedia team experts selected by the Lead Partner, gave life to a hologram that "bring back to life" the Duke of Nardò also thanks to a qualified creative actor, who played the character.

Figure 21 - Holographic area

The hologram of Giangirolamo II is part of this project, aimed to enhance the Castle of Nardò and its history thanks to technological and computer aids, audio-guides, panels, augmented reality, simulations, intelligent mobile applications, interactive screens and projections through which visitors can take a step back in time, finding themselves virtually face to face with dukes and barons or with prisoners locked in the dungeons. A focus on Giangirolamo II Acquaviva d'Aragona, Count of Conversano and Duke of Nardò until 1665, was provided; he was considered by his citizens to be an evil and vindictive man, and therefore much feared. Known as the "Guercio" because of a visual defect, it is said that he made use of the *ius primae noctis*, that, as a drill, he shot poor women from the castle tower who drew water from the wells, and that he had the rebellious canons of Nardò skinned to upholster the chairs of the hunting lodge with their skins.

Figure 22 - Video wall area

The main room of the basement is entirely dedicated to the figure of the Guercio who is animated through a hologram. A sequence of jokes between the narrator and the character of Guercio transports the visitor to the first half of the 1600s, making him discover the events and horrors of which the duke was stained, through his personal point of view. The holographic system was integrated with a scenography of a large wooden door. This door has been restored and integrated into the exhibition itinerary.

Once the "meeting with the Guercio" is completed, the visitor goes back and enters the third environment, whose interest is purely architectural (emotional room). The tour concludes.

In order to implement all the described interventions, the Municipality of Nardò already obtained by the "*Superintendence for Archeology, Fine Arts and Landscape for the Provinces of Brindisi, Lecce and Taranto*" the authorization for the installation of equipment and hardware and the accessibility to the undergrounds of the Castle. In the same way, the other external spaces, has been guaranteed according to the in-force regulations.

PP2 - Municipality of Carpi:

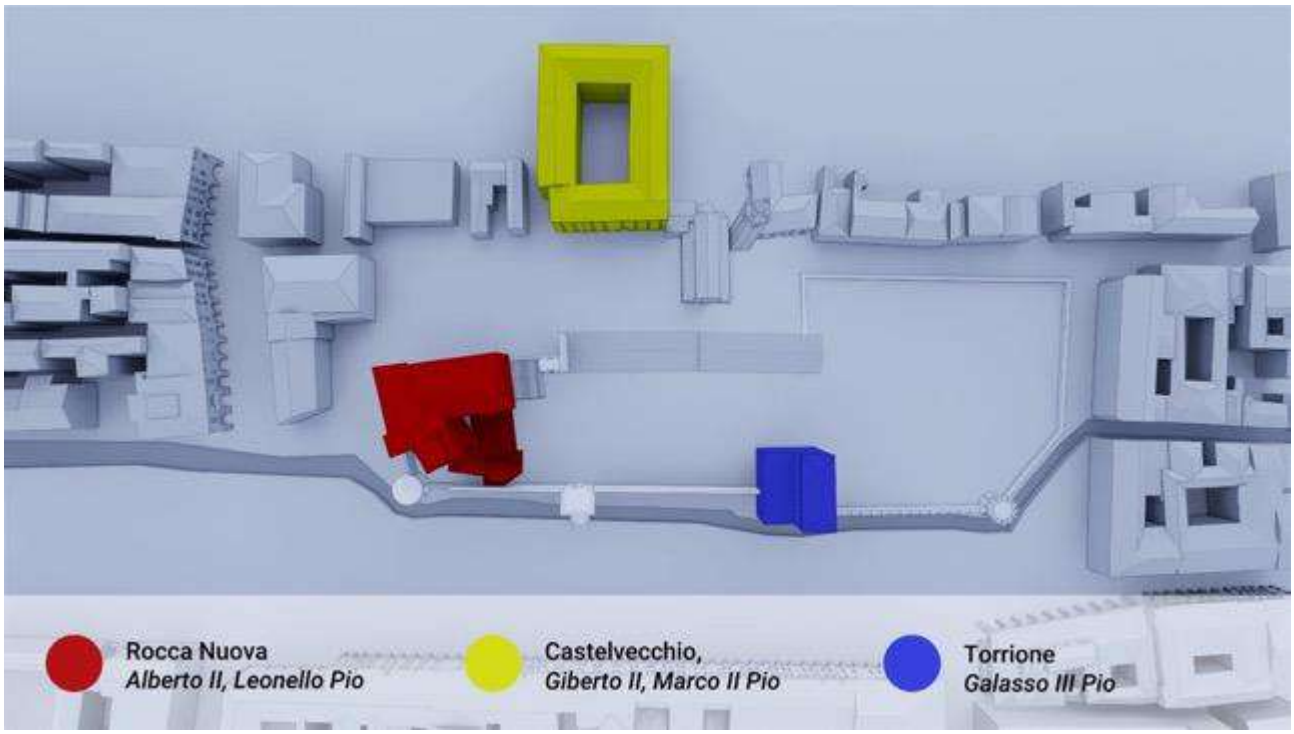
Figure 22 - Multimedia installation in Tourist office

The innovative technological and emotional path, in the rooms of the Palace, dedicated to the historical and artistic heritage of the city of Carpi, was inaugurated on June 14, 2022. Architectural context, historical evolution and relationship with the present are at the center of the new attractions that branch off from the Sala delle Poste to the other rooms of the Palazzo dei Pio in Carpi, offering a new idea of usability of the site, an increasingly point of access to the system of sites cultural (and not only) of the city.

Figure 21 - Multimedia installation in Tourist office

Specifically, in the renovated tourist office of InCarpi, the first place of reception for tourists' intent on accessing the network of

monumental, museum and naturalistic sites of the city and the territory, the multimedia installations concerning the relationship between the evolution of the Palazzo and the city of Carpi are strategically placed.



The experiential journey continues in the undergrounds of the Guerrieto and in the interior of the historic building, where the story moves on to the decorations in the main rooms, the Chapel, the ancient Sala della Dama, the Sala of the Petrarchian Triumphs. Also involved are the two squares dei Martiri and Re Astolfo in relation to the Palazzo: through an APP and QR code, visitors will be able to interact with the surrounding spaces, capturing the historical evolution that goes from the Middle Ages to the present day.

Figure 23 - AR (augmented reality) of Palazzo dei Pio

PP3 - Municipality of Andravida-Killini:

The implementation of the actions includes technological interventions, for the highlighting and utilization of the cultural monument (Chlemoutsi Castle) of the Municipality of Andravida-Killini.

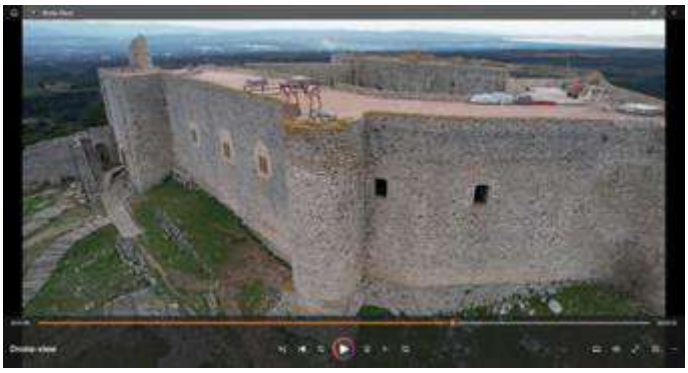


Figure 24 - Technological interventions of Chlemoutsi Castle

The preservation, promotion, utilization of historical monuments and the model of sustainable tourism are concepts linked to each other. The impact of the activities of this project is not limited only to the directly involved public authorities, but also extends to the citizens of the intervention area, since

the main aim is to raise awareness and promote participation in the preservation of the cultural wealth of the area. The development of a new methodology that integrates different IT technologies is a valuable tool that can be used by local authorities to promote policies for the sustainable use of cultural assets that, due to their nature, will continue to exist after the end of the project, giving significant added value to the project. In addition, the development of tourism products that incorporate the latest IT techniques (3D models, virtual reality, holographic projection) will be sustainable, because the technological facilities are expected to be a particularly attractive feature for the aforementioned cultural space, contributing to the increase of visitors. The actions that had been implemented included the photogrammetric mapping of the castle and the production of digital 3D content, the development of multimedia 3D animation content and the development of a wireless iBEACON monitoring system and audio assistant.

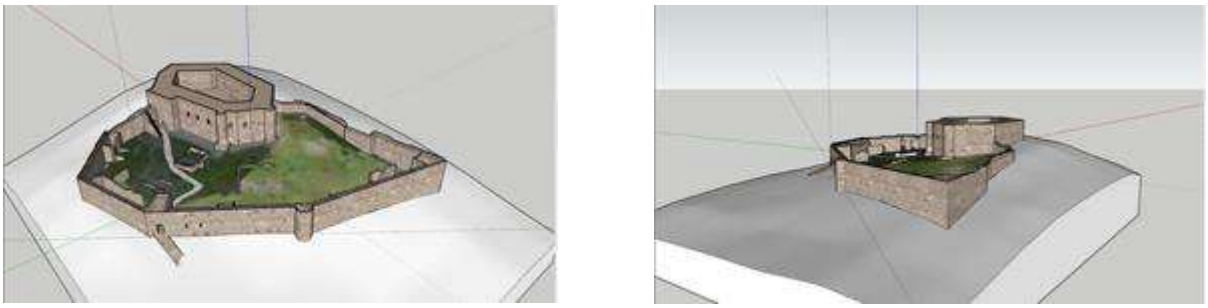


Figure 25 - 3D model of the castle exterior used for the application

Figure 26 - Screenshots of the application in walkthrough mode

Figure 27 - Screenshots of the application in fly-by mode

PP4 - Rijeka Tourist Board:

Figure 28 – First chamber for ideologically connection

The main motive of the exhibition is the history of the Trsat Castle and the role of Count Nugent, presented through various media, so there are interactive panels, a seven-minute educational film, as well as 12 interpretation points connected in a new application. The interpretation points work using the technology of beacons that are placed in and around the castle to give the visitors the unique and personal experience. The new exhibition divided the space into three chambers that represent three ideologically connected, but partially different interpretive experiences.

The first chamber is an initial incubation experience and at the same time a preparation for further exploration of Trsat castle.

It includes the positioning of a bench on one side of the room for those who want to rest during the visit to the castle or who want to passively follow what is happening on the LCD touch screen located on the other side of the room and which allows access to content about the development of the Trsat castle. The LCD screen allows the visitor to explore the Trsat castle throughout history. There are also graphic maps that in high resolution provide additional interpretation content for research in the classic way.

Figure 29 - Second chamber for ideologically connection

The second chamber is focused on the cave, a natural attraction, and a static graphic map is placed in that part, due to the specific shape of the space (narrow space and natural rock).

In the third, last chamber, a purpose-made interpretation film is projected on the screen, which sensitizes the visitor about the development Trsat castle, including parts of its interior spaces. Interpretive film, in accordance with the ideas of heritage interpretation, it implies the translation of scientific facts in the language of ordinary people/visitors in a pleasant, interesting and memorable way.

Figure 30 - Third chamber for ideologically connection

Visitors can see in high resolution the areas of the Trsat castle which, due to spatial barriers, are inaccessible to visitors.

Figure 31 - Digital kiosk in Trsat castle

In addition to the above, the digital kiosk placed at the entrance to Trsat castle enables visitors, especially those with reduced mobility (there are many stairs at Trsat castle), to take a virtual walk through Trsat castle. In addition to the real version, it is possible to walk around the Trsat castle in all stages of construction, through the 3D model of the Trsat castle.

As part of the mentioned exhibition, there is also the first point of the virtual self-guided tour of Trsat castle. The mobile application serves as an independent tourist guide that guides the visitor through 12 points around the Trsat castle and sends information to the mobile device via beacon technology. In addition to textual information, it is possible to listen to the information in audio form, in Croatian and English.

PP5 - Public Cultural Institution Fortress of Culture Šibenik:

Thanks to funds provided through project, Fortress of Culture's dream came true: implementation of virtual reality pilot actions on St. Michaels and St. John's Fortresses.

Figure 32 - Screenshot from VR content

After successful implementation of augmented reality (AR) at Barone Fortress in 2016 and 3D mapping technology at St. Michaels' Fortress in 2019, the time came to make a step further into technology. By using VR reality, the visitors of the fortresses

will feel they are immersed in their surroundings and given the opportunity to learn more about significant events in Šibenik across multiple historic periods by taking part in defending the city and fortresses from attacks, escaping from the dungeon of the fortress or participating in a race of some (very) unusual vehicles set in past centuries. All these adventures are accompanied with a narrative that consists of historical stories and facts.

Figure 33 - VR in use at Inauguration ceremony

This combination of software - specially designed animation and storytelling and hardware - device known as a Virtual Reality headset or helmet allows visitors to immerse themselves in video games as if they were one of the characters. This concept can be adjusted to any location that has an interesting story to tell, making it a great addition to cultural site. VR provides a great content not only for local community but also has a strong pulling factor to tourists – this may be its greatest potential.

At the time of preparation for procurement of Wireless Monitoring System, predictions, and expectations of various health experts (including those from WHO) were indicating that the complete cancellation of COVID-19 measures is not to be expected in the near future. With that in mind, Fortress of Culture wished to provide visitors of their locations all the information related to the activities of Public Cultural Institution Fortress od Culture Šibenik in health crisis, therefore ensuring a safe and enjoyable visit to all locations under Fortress of Culture's governance. Aside for its obvious functions (highlighting routes in emergency events, counting tourists etc.), PP5 saw WVMS as a perfect tool to use during COVID-19 crisis considering the fact that the system will monitor the number of visitors - thus preventing possible risky situations related to social distancing.

Figure 36 Welcome screen of WMS in English

In time, this app will replace physical tickets, brochures and flyers which will provide better, faster and safer means of entering and experiencing PP5's locations for members of its loyalty (Friends) Club and PP5s employees while simultaneously acting as a member ID for its Friends Club members – thus ensuring the installation of application by all of PP5's Friends Club members (around 4.000 of them) and its continuous use over a long period of time.

PP6 - Regional Development Centre Koper:

Through the app, a virtual character (a man) named Aviko, reveals the rich history of Štanjel, which has been inhabited since prehistoric times. Legend has it, that he is a boy who still wanders around Štanjel, because his parents forgot him when they moved to another location. Since then, the boy Aviko has been following the development and events in Štanjel all the time. The adventure itself starts at the Tourist Centre, where the visitor is given instructions and guidance to try out the adventure and see Štanjel with Aviko. The app works by strategically placing you at the most important points to get to know and experience the history of Štanjel. You are invited to discover the

prehistoric period with Aviko through Štanjel through time. The E-Guide is a virtual presentation of Štanjel, where every visitor can get to know Štanjel first-hand. The guide contains 360 photographs taken throughout the whole of Štanjel, including a 360-degree photo and a 3D render of the now-defunct North Tower. The entire website contains historically rich information about the products (prehistoric products), workshops, visits and cuisine typical of the area in prehistoric times. The virtual presentation of Štanjel allows the visitor to feel the pulse of the town, its historic architecture and beauty, and thus to arouse interest in visiting the town in reality.

Figure 34 - Info screen, welcome center

Figure 35 - Aviko, app, Aviko trigger

Figure 36 - Wall monitor 65'', tower

Figure 37 - Info screen 45'', tower

Figure 38 - 360 Virtual tour

Figure 39 - 3D render of the now-defunct North Tower

PP7 - Municipality of Ivančna Gorica:

As a Partner of the ADRION - EMOUNDERGROUNDS project, Municipality of Ivančna Gorica got an opportunity to digitalize valuable heritage of Podsmreka Castle. Through this partnership, the Municipality was able to develop smart tourism and new tourism products, so, with the project's support, local public and tourists can learn more about the history of Podsmreka Castle.

New interactive and innovative tools were used to present the castle in the context of the House of the Carniolan Honey Bee in Višnja Gora, with a comprehensive presentation of the history of one of the most widespread honey bee species in the world that originated here. Through a unique virtual reality experience, using smartphone apps, holographic presentations and interactive projections, the

Municipality of Ivančna Gorica has created a tourism offer model based on utilizing and innovating cultural heritage, increasing the attractiveness and accessibility of the local environment, and creating additional tourism offers linked to the heritage of Podsmreka Castle.

Based on conducted study and analysis of the history of the castle, visitors can learn more about life in the castle and about Podsmreka Castle itself in the virtual environment using information points placed in prominent positions and translated into English.

Figure 40 - House of the Carniolan Honey Bee in Višnja Gora

Figure 41 - EMOUNDERGROUNDS area in House of the Carniolan Honey Bee in Višnja Gora

Figure 42 - Digitized Podsmreka castle

PP8 - Municipality of Kukes:

The Kukes Municipality pilot project installs virtual reality equipment in the Kukes Ethnographic Museum. Using this installation, visitors can learn about and understand the city's underground heritage. Spreading the knowledge of the impressive system of tunnels built in the subsoil of the new city during the Enver Hoxha regime is the prerequisite for designing and developing new ideas for its enhancement through uses that can produce a greater awareness of citizens of the cultural value of their territory. This process could potentially attract investors interested in exploiting portions of the "Underground City", both for tourism purposes and for agro-gastronomic and commercial activities, thus generating economy and jobs for local people. It is also easy to activate social and cultural promotion activities. These project proposals will be able to stimulate the necessary involvement of the Ministry of Defense and the public institutions responsible for culture, tourism, economic development and social cohesion, which will have to express themselves on the methods of recovery and reuse of the tunnels, as well as on the forms of partnership between public and private entities.

Kukës Municipality has contracted an external expert to design a study and analysis of the identified local cultural asset, with the scientific research of historical and legendary sources to reconstruct the origins and evolution of the identified cultural heritage. The analysis includes: - a scientific study of the cultural attractor and literature analysis to catalogue the undergrounds of the old Municipality of Kukës; a geological and historical research of the cultural attractor identified within the Municipality of Kukës and its undergrounds; also was designed a tourist map on the identified cultural asset. For this activity, the working group within the Kukës municipality drafted the terms of reference. The studies were produced in two languages, English and Albanian.

Also, a company was contracted by the Municipality of Kukës where the technological and digital equipment was purchased and installed in a suitable environment of the ethnographic museum, near the building of the Municipality of Kukës.

The purchased equipment is thematic and functional to the implementation of the planned pilot actions (small-scale investments and demonstration projects as pilot applications of technological, multimedia, and interactive installations for the management, enjoyment, and enhancement of cultural heritage).

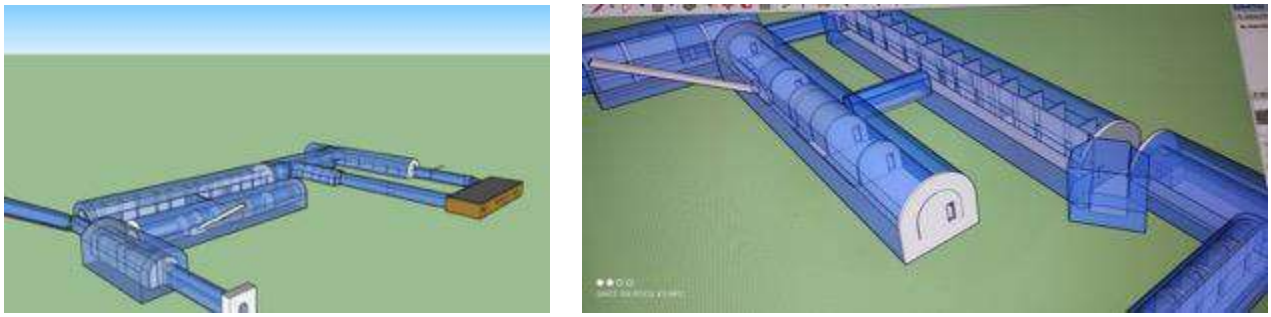


Figure 43 - Survey, 3D relief, photogrammetric and photographic campaigns

Figure 44 - Installations on-sites of furniture and fittings and IT hardware and software for equipping the identified cultural assets

Figure 45 - Virtual, digital and multimedia contents productions

PP9 - Tourism Organisation of Municipality of Bar:

Pilot location in Montenegro was placed in the Old Town of Bar, where the synergy of culture and tourism was created, creating a new story that included a more attractive presentation of the location through innovative solutions that show in more detail the five points of interest of the old fortified town. Digital displays, 3D animations, 360-degree shots, descriptions of locations designed by historians and tourist guides are included in an interactive mobile application. In addition to the new digital content, the area of the fortress of the Old town is covered by a wi-fi signal for the first time, which enables both domestic population and foreign tourists to use smart devices at the same locations.

A center for visitors in the old town is now equipped with new furniture and audio-visual equipment that provides the opportunity for additional presentations of tourist attractions of Bar and other partner cities.

Additional value is represented by the new digital info-panel (billboard) which is positioned on the most frequented public square in the center of the city of Bar, where

touristic and cultural contents will be presented on the spot with a special focus on the attractions of the old town of Bar.

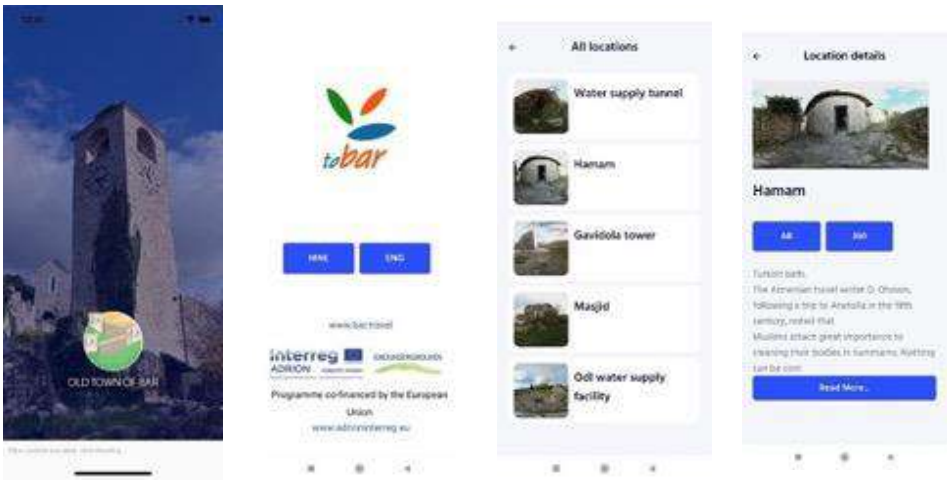


Figure 46 - Mobile phone interactive Application "OLD TOWN OF BAR" - screen shots

Figure 47 - New digital info-panel (LED display) positioned in the center of the city of Bar

Figure 48 - A center for visitors in the Old town of Bar equipped with new furniture and audio-visual equipment

Figure 49 - Old town of Bar is covered by a wi-fi signal for the first time

PP10 - Trebinje Development Agency:

Former command post of Austro-Hungarian army in Trebinje, now building of Herzegovina Museum which dominate the Old town, was the central spot of all Trebinje fortifications. Its preserved dovecot tower was used as main communication point as there were total of 30 fortified buildings from the Austro-Hungarian Monarchy in the urban part of Trebinje and on the surrounding hills, according to engineer Volker Konstantin Pachauer.

Figure 51 - Old town Trebinje walls with Museum of Herzegovina

Figure 50 - Interactive installation in Museum of Herzegovina, Trebinje

The VR tour through the most important fortifications, placing the visitor in the role of carrier pigeon or fortification staff operating the objects, characterize the digital interactive installation presenting "Trebinje as fortification" and the biggest Austro-Hungarian fortification in this part of Europe "Strač", with its immense undergrounds.

Interesting artefacts from Austro-Hungarian period, in digital form and nicely integrated into the presentation, just fulfill the experience of this virtual adventure.

Figure 52 - Digitally reconstructed Austro-Hungarian "Strač" Fortress in Trebinje

Whole installation includes also touch platforms, wall projections, wireless monitoring system, audio assistant etc., while previously performed study of cultural attractors as well as relief & photo campaign, had set the basis for development of the contents later translated into digital form in post-production.

Exhibition is placed in one of museum depots with still unexplored locations in its close surrounding, fitting the ambient to full experience for visitors and combining new technologies and old architecture.

In the basement of the Museum of Herzegovina, VR equipment is set up offering a virtual tour of the Trebinje fortresses. The tour starts from the same room in its virtual iteration, where a hologram of Baron Leighter appears to give an introduction about the VR experience.

After that, we go to the dovecote and then take on the form of a pigeon to fly above the fortresses of Strač, Golo brdo, Petrina and Kličanj. We can visit each of the fortresses and walk through its rooms, with Baron Leightner providing narration.

Once we have visited all four fortresses, we go back to the dovecote where General Ferdinand Zahradnik asks us questions and gives us the task of taking a message to the Strač Fortress.

While flying, we can be attacked by an eagle. If we successfully avoid the eagle's attacks and deliver the message, we will get another task in the basement of the Strač Fortress. After we successfully complete our mission, we can take a virtual Museum tour where we can pick up select exhibits and examine them from all sides.

EMOUNDERGROUNDS project introduced another good practice of promoting sustainable tourist valorization through digital preservation of fortification complex placed in the wider area of Trebinje, which will trace the path for future application of this approach in order to protect various objects and places with historical heritage and interesting stories.

4. PUBLICITY OF PILOT ACTIONS

The "EMOUNDERGORUNDS pilot actions were made publicly available and the reached achievements have been made public, within the project web-site (https://emoundergrounds.adrioninterreg.eu/library) and the four project social web pages (Facebook, Twitter, Youtube, Instagram) as: https://www.facebook.com/emoundergrounds/ , https://twitter.com/emoundergrounds , https://www.youtube.com/channel/UCtHl1dcXdswpA9WxB2RR7Ng?view_as=subscriber , https://www.instagram.com/emoundergrounds/. Moreover, Partners also used their institutional web and social pages to promote the contents of this project outputs.

Another dissemination channel was the implementation of ten Inauguration Ceremonies, one for each project site. More in details:

1. The **Lead Partner opening Event** was held on 27.05.2022 and it was participated by 301 people on-site. Moreover, there were n. 16.247 viewers of videos on Facebook as the livestreaming was assured.
   The Lead Partner's Mayor and Councillor presented the project to the general public and technicians presented the technological paths before their enjoyment, illustrating the purposes, technologies and methodologies used for their design, development and implementation.
   The ceremony of the emotional paths through the undergrounds passages and terraces of Nardò Castle, allowed visitors to jump into the past for finding

Figure 53 - LP Inauguration Ceremony

themselves virtually "face to face" with the holograms of the illustrious characters who lived in the town of Nardò: Giangirolamo II di Acquaviva di Aragona, known as the 'Guercio di Puglia' and the prisoners locked up in the castle undergrounds, discovering, through the multimedia contents and virtual reality, the events that affected the Castle and the rich territory of Nardò. List of Participants, invitation, photos and video have been produced and attached to the last Project Progress Report No 5.2. The Partner No2 took part in this Lead Partner event.

2. The **Partner No2 opening Event** was held on 14.06.2022. It started from the reception and tourism promotion office Incarpi, to create by immersive 3D installations new paths able to tell, in the monumental context of the historic centre, the artistic, architectural and functional value of the Palazzo, both for one new idea of monument usability, both as an access point to the system of cultural sites through the Carpicard. PP2 assured media coverage with the VOCE newspaper and it was streamed live on Facebook

Figure 54 - Inauguration Ceremony at Carpi

(https://www.facebook.com/emoundergrounds/videos/434964735144376) .

Events materials were also provided. All Project Partners, except Slovenians, participated by live in it.

3. The **Partner No3 opening Event** was held on 28.12.2023 and it was participated by 19 people on site. The PP3's Mayor presented the project to the general public and the Deputy Mayor of technical services presented the technological paths for visitors trying to explain the importance of this project. He explained why the area of Chlemoutsi castle could not accommodate these interventions (the refusal of the local Ephorate of Antiquities and the approval of MA/JS for changing the presentation place – "Warehouse ASO").

Figure 59 - Inauguration Ceremony at Andravida Killini

The ceremony of the emotional paths of Chlemoutsi Castle, allowed visitors to "travel", through audiovisual material and 3D animation of the castle, in different historic period. All information based on photogrammetric mapping, architectural drawings, plans, sections and appropriate historical documentation sources provided by the Ephorate of Antiquities of Ilia, 3D models and 3D environment of older historical periods (e.g., the Medieval period of Clermont Castle) were produced to be rendered in 3D animation video.
Moreover, they had the opportunity to take a Virtual Tour of the Castle alternative in the sense of serious game for a "Walkthrough" in the outer Castle area and an aerial navigation Castle site (Fly-by).

List of Participants, invitation, photos have been produced and attached to the last Project Progress Report No 5.2. Video is uploaded to PP3's Youtube channel for the project.

4. The **Partner No4 opening Event** was held on 30.12.2022. Rijeka Tourist Board organized an inauguration to present T1, T2 and T3 activities completed within the project to the wide public with the emphasis on the successful completion of the project and newly renovated exhibition space at the Trsat castle and a new virtual tourist guide. The exhibition space under "Mir Junaka" mausoleum has been enriched with new interpretive content that enables the visitor to have a completely new experience and get to know Castle with innovative technology.

Figure 55 - Inauguration Ceremony at Rijeka

The presentation took place in the exhibition area where visitors had an opportunity to explore the new setup and try new technologies. Rijeka Tourist board invited local media and promoted the event on social media and web to attract visitors. In total, 236 people and 12 media representatives were present during the inauguration. The video coverage was disseminated in local and national media and a reportage.

5. The **Partner No5 opening Event** was held on 12.12.2022 in an intimate space of House of Arts Arsen – a venue managed by Fortress of Culture Šibenik (also the location where Literary event took place), with members of quadruple helix (local and regional authorities, members of academia and NGOs, but also entrepreneurs) and media being invited.
   This location was chosen as it is more suitable for a more intimate type of event where Fortress of Culture director, Gorana Barišić Bačelić presented the project and WPT2 results to media and general public, with an emphasis on VR and Wireless Monitoring System (mobile application) and their potential and the possibilities for different stakeholders to participate in and further develop the cultural offer of Šibenik's fortresses and the cultural offer of the city itself.
   Stakeholders were actively encouraged to try out VR content and mobile app. 202 people were present (84 male, 118 female).

Figure 61 - Inauguration Ceremony at Šibenik

6. The **Partner No6 opening Event** was held on on 19.06.2022 as part of the Gledanica festival. The event included a short presentation of the project and the possibility of guided tour using the AVIKO app with an official guide. This was an all-day event where a guided tour took place at 16:00. 33 people were present, unfortunately due to technical problems, solved in later events, the stream was not possible, a short video of the event was made. The event was promoted on the local tourist web site https://www.visitstanjel.si/prireditve/festival-gledanica_1 , PP6's web site https://www.rrc-kp.si/emoundergrounds-delavnica-venckov-sv-ivana/ and invitation were sent to the main stakeholder in the area.

Figure 62 - Inauguration Ceremony at Stanjel

7. The **Partner No7 opening Event** was held on was held on 03.11.2021. EMOUNDERGROUNDS project shared opening event with the House of the Carniolan Honey Bee in Višnja Gora. It was an event with cultural program, where were presented the House of the Carniolan Honey Bee and Podsmreka castle, which can be visited by the virtual glasses. Both these interventions in Municipality of Ivančna Gorica followed the same goal – bring people, locals and tourists, the meaning of cultural heritage, in this case especially meaning of Carniola Honey Bee, which is closely connected to the Podsmreka castle. The opening event was media coverage with the local newspaper and it was streamed live on Facebook.


Figure 63 – Inauguration Ceremony at Ivančna Gorica

2. The **Partner No8 opening Event** was held on 27.12.2022 at the Ethnographic Museum in Kukes. It was attended by 30 participants. The participants in the ceremony were from: - Kukes municipality; - civil society; - NGOs; - Tourism expert; - Technology and information experts; - Kukes District Council. It was assured media coverage. Further Links to available invitation and video on institutional channel of the Municipality of Kukes, are: https://kukesi.gov.al/invitation-to-the-inauguration-ceremony/ ; https://kukesi.gov.al/emo-undergrounds/ .

Figure 64 – Inauguration Ceremony at Kukes

3. The **Partner No9 opening Event** was held on 28.12.2022. It started with the presentation of the Thematic path with the representatives of cultural and tourism sector, visiting Old town of Bar and finalized with the final presentation organized in the local restaurant in Bar.

Figure 64 – Inauguration Ceremony at Bar

In total more than 50 representatives of the key tourism, cultural and local administration stakeholders attended the events. PP9 assured media coverage presented via following link: https://feral.bar/post/18413.

4. The **Partner No10 opening Event** and formal presentation of interactive multimedia installation to wider public was on inauguration ceremony which was held on 06/12/2022 in Trebinje. Invitations to the inauguration ceremony were sent to public, non-governmental and private organizations - project actors and interested parties, tourism operators, citizens and tourists, organizations engaged in research and development of technologies, associations and organizations engaged in business development support, educational institutions. Also, the event was strongly promoted through different channels. There were announcements on five different media as well as on social pages of Museum of Herzegovina and Trebinje Development Agency.

There were 105 participants who signed list of participants during the inauguration ceremony and these include representatives of Trebinje Development Agency, City of Trebinje, Museum of Herzegovina, Museum of Vojvodina, Cultural center Trebinje, Tourist organization of Trebinje, NGO Center for Development of Herzegovina, NGO Corie, NGO Vasila, High school for Tourism and Hospitality Trebinje, Technical school Trebinje, Secondary school center Trebinje, Agrarian fund Trebinje, General public and tourists.

Program of the event included addressing by TREDEA, City of Trebinje which was represented by Deputy Mayor and Director of Museum of Herzegovina. It covered presentation of project achievements and following subjects: "role of innovations through transnational projects", "tourism and heritage in Trebinje" and "possibilities for protection and tourism valorization of local heritage".

After media conference, program event was concluded by presentation and demonstration of interactive multimedia installation, while the opportunity was used to invite all interested potential visitors to come and experience the exhibition.

Figure 65 – Inauguration Ceremony at Trebinje

Live stream of the inauguration ceremony was streamed on Herceg TV Facebook page and was shared to EMOUNDERGROUNDS Facebook page. Live stream on project FB page was followed by 639 people in total, and it is accessible on the links in the next pages.

Furthermore, this project Output has been made publicly available and the reached achievements have been made public, by the participation of EMOUNDERGROUNDS project in several events/ initiatives among which the main ones are:

1. the ***"ADRION Annual & Capitalisation event".*** The event held on December 7th, 2021, was focused on the motto "*Together for a resilient Adriatic-Ionian Region*" to mark the contribution of the Programme to the EU Green Deal objectives. EMOUNDERGROUNDS project attended the event with an intervention entitled: "*Challenges and opportunities of digitalisation in tourism: not only a response to COVID-19*", by which the Lead Partner had the opportunity to present the project goals, the partnership, the multifaceted impacts of the main project results and two of its ten emotional paths (pilot actions) virtually represented as:
   - a *Virtual walk through the time around the castle Podsmreka* in the Municipality of Ivancna Gorica in Slovenia. The castle was brought back to life and digitalized thanks to innovative solutions such as Virtual Reality technology, three hundred and sixty video, laser measurement, and others, giving the opportunity to the visitors to revive a past in which the Castle lived its greatest prosperity.
   - an **Emotional and evocative path between history and legend across the Castle of Acquaviva d'Aragona in Nardò** in Italy, in which visitors can jump into the past, finding virtually face to face with dukes and barons or prisoners locked in the prisons, thanks to audio-guides, panels, augmented reality, simulations, intelligent mobile applications, hologram and interactive projections.

2. The **Event** organized by the Lead Partner **of CREATURES project** (the Metropolitan City of Bologna) **on "*Sustainable tourism and creative itineraries***", was held on-site on the 20th December, 2022 at Palazzo Malvezzi - Sala Zodiaco – in Bologna. CREATURES project is another funded ADRION project that is part of the Sub-Cluster focused on Cultural and Creative Industries, coordinated by EMOUNDERGROUNDS project.

The event gave the opportunity to EMOUNDERGROUNDS project to participate by its Lead Partner within the session on "*Culture and Tourism Clusters, experiences and best practices: an interactive discussion among local actors and organizations*", with a specific intervention aimed to present mainly the implemented pilot actions as ten emotional exhibits for experiential tourism across the Adrion-Ionian regions.

Figure 22: CREATURES Capitalization event

3. Finally, this project Output has been promoted and made publicly available by several videos designed, developed and disseminated by Partners, such as:
   1. The EMOUDNERGROUNDS project video, available at: https://emoundergrounds.adrioninterreg.eu/activities/short-video-about-the-emoundergrounds-intervention
   2. Partners videos, available here:
      - LP: https://www.youtube.com/watch?v=o3wY4rSysBs
      - PP3: https://www.youtube.com/@emoundergroundsmunicipalityand
      - PP7: https://www.ivancna-gorica.si/objava/518451
      - PP8: https://kukesi.gov.al/emo-undergrounds/
      - PP9: https://www.youtube.com/watch?v=JZit7XedORo
      - PP10: https://www.facebook.com/herceg.tv/videos/722383102142085/?extid=NS-UNK-UNK-UNK-AN_GK0T-GK1C&mibextid=2Rb1fB https://www.facebook.com/herceg.tv/videos/1089592968399735/?extid=NS-UNK-UNK-UNK-AN_GK0T-GK1C&mibextid=2Rb1fB

5. ANNEXES

List of Annexes:

1. *Annex 1 – LP' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Nardò cultural site: Report on LP' D.T2.5.1;*
2. *Annex 2 – PP2' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Carpi cultural site: Report on PP2' D.T2.5.1;*
3. *Annex 3 – PP3' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Andravida Killini cultural site: Report on PP3' P D.T2.5.1;*
4. *Annex 4 – PP4' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Rijeka cultural site: Report on PP4' D.T2.5.1;*
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7. *Annex 7 – PP7' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Ivančna Gorica cultural site: Report on PP7' D.T2.5.1;*
8. *Annex 8 – PP8' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Kukes cultural site: Report on PP8' D.T2.5.1;*
9. *Annex 9 – PP9' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Bar cultural site: Report on PP9' D.T2.5.1;*
10. *Annex 10 – PP10' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Trebinje cultural site: Report on PP10' D.T2.5.1. .*

ANNEX 1 - LP' Small scale investment as pilot application of technological/multimedia/interactive installations to manage/enjoy/enhance Nardò cultural site: Report on LP' D.T2.5.1

"EMOUNDERGROUNDS" - "Project N° 905"

"EMOtional technologies for the cultural heritage valorization within transnational UNDERGROUNDS"

Adriatic-Ionian Programme INTERREG V-B 2014-2020 - 2nd call

Report on LP's multimedia, interactive, accessible indoor /outdoor installation designed and developed, for Nardò project site (Del.T2.5.1)

Municipality of Nardò – Leader Partner

Contents

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Abstract

The "EMOUNDERGROUNDS" project aspire to systematize a set of interventions for the promotion, enhancement and better use of cultural heritage (castles, fortresses and other cultural buildings with underground passages) and consequently to reinforcing, in a sustainable way, the attractiveness and competitiveness of the Adriatic-Ionian tourist destinations, through the use of advanced information and communication technologies (ICT) - new media and emotional technologies - and innovative marketing tools. The project intends to enhance tourism development and sustainable growth, smart and inclusive growth of the areas involved, improving the quality of tourism and promoting new market-oriented cultural-creative tourism products. To achieve this objective, the project envisages the implementation of an integrated set of actions to jointly manage and promote, in a sustainable and innovative way, the identified cross-border cultural sites, integrating the offer of existing tourist services and improving their quality.

Introduction

The "Acquaviva" Castle in Nardò currently houses part of the municipal offices, including the representative offices, the Mayor's room, the "Sala Giunta" ,the Council Hall, other "multi-purpose" spaces on the ground and first floors for exhibitions, events and cultural associations. The "EMOUNDERGROUNDS" project aims at a set of interventions to promote, enhance and improve the use of cultural heritage through the use of advanced information and communication technologies (ICT) - new media and emotional technologies - and innovative marketing tools. These interventions were carried out in the basement, central atrium and two terraces of the Castle. The castle's basement are made up of a first large room (room n.1), barrel-vaulted, to be used as the "Welcome Area", and by adjacent consecutive spaces (rooms no. 2,3,4), also barrel-vaulted, where, through technological and multimedia aids (multi-projection and holographic videos), visitors can take a leap into the past and find themselves virtually "face to face" with the holograms of the illustrious characters of the territor: Giangirolamo II Acquaviva d'Aragona (the "Guercio di Puglia") or with the prisoners locked in the dungeons, and discover through audiovisual content the rich history of the castle and, in part, of the town of Nardò.

1. Historical-architectural analysis of the 'Acquaviva' Castle in Nardò

Carrying out an architectural survey,means truly understanding the work being studied, understanding its profound reality and all its values.It is necessary to understand that distinguish a particular work from many others similar to it, to arrive at an intimate and effective knowledge of the building organism. In the definition of the operative procedure, a fundamental priority role has been attributed to the definition, development and implementation of methodologies of historical analysis of the cultural asset and its urban context, flanked by the application of techniques and tools of architectural and topographical survey, to obtain a correct and exhaustive diagnosis of the object. Operational considerations of this type presuppose a very thorough preliminary knowledge of the building in question, using as the means of investigation the survey, as direct as possible, or, if indirect and instrumental, in any case thoroughly verified on site.

For the castle of Nardò a historical and topographical reconnaissance activity was carried out, for planning correctly the survey activities e development of multimedia and interactive system. The proposed cognitive procedure was divided into:

a) Preliminary historical, topographical and archival reconnaissance;

b) Direct survey of the environments integrated by an exhaustive and autopsy check on site, including every two-dimensional projection necessary to obtain a three-dimensional volumetric model;
c) Photographic mapping;
d) Design of the space and virtual environments.

1.1 Historical notes on the acquaviva Castle in Nardò

A town of Messapian origin, it was founded south-west of Lecce and is the largest town after the capital. In 1055 it was conquered by the Norman Gottfredo who formed a duchy comprising twenty-four hamlets and in 1480 Nardò was conquered by the Turks. In 1487 the city became the property of the Royal State, which in turn sold it ten years later to Belisario d'Aragona, who elevated the city to the main cultural centre of Salento; it remained an Aragonese fief until 1806.

Figure 1 - Planimetry of the territory of Nardò in the 18th century

Mortier, Perspective plan of the town of Nardò in Apulia, Amsterdam, 1704

Between the 15th and 16th centuries Giovanni Antonio Acquaviva of Aragon built the present castle, which has a quadrangular plan with imposing almond-shaped bastions at the top. At the top of the latter are cornices resting on small corbels; decorations and friezes on the curtains recall those found in the castles of Otranto and Corigliano, typical of the sovereign families of that historical period. The moat that once existed has now been completely filled in and the castle now houses the Town Hall.

2. Design of technological, multimedia an interactive exhibition

The visitor's journey begins in the welcome area where he can wear a construction helmet and embark on his journey inside the cellars of the Castle.
The activities were the executive design of the multimedia and technological systems in the undergrounds and terraces of the "Acquaviva" Castle in Nardò;
- The Municipality of Nardò obtained from the "Soprintendenza Archeologia Belle Arti e Paesaggio" of the provinces of Brindisi-Lecce the authorizations for the installation of equipment and hardware;
- The Municipality of Nardò used its own funds to carry out the minimum interventions to make the spaces healthier;
- The accessibility of the undergrounds of the Castle, as well as of the other external spaces, has been guaranteed according to the regulations.
- The Municipality of Nardò has designed the technological space and hardware of the holographic system.
- The Municipality of Nardò wrote the digital stoytelling and critical analysis of Holografic video of Guercio di Puglia
The contents are structured as follows:

Figure 2 - Welcome Area

2.1 Videowall Area

After the entrance, the first encounter is a large-scale, backlit 17th-century view of the city of Nardò. Next, the visitor will be confronted with an infographic or time-line of the main events that have specifically affected the town castle from the 11th to the 21st century.

Continuing along the path, through a video wall, it will be possible to discover the wonders of the Nardò territory, its marinas and take a virtual tour of the castle.

- The Municipality of Nardò has replaced the multiprojection with a videowall system. The multimedia system will see a 360-degree video of the Nardò territory.
- The wall has the timeline with the historical periods of the city of Nardò and the large image of the Guercio di Puglia.
- The Municipality of Nardò wrote the digital stoytelling, and it organized the video activities with drone.

Figure 3 - Multimedia History and videowall area project

Figure 4 - Videowall Area

Figure 5 – Hardware and interaction system

2.2 Holographic Area and other spaces (emotional room)

The main room of the basement is entirely dedicated to the figure of the Guercio who is animated through a hologram. A sequence of jokes between the narrator and the character of Guercio transport the visitor to the first half of the 1600s, making him discover the events and horrors of which the duke was stained, through his personal point of view.

Once the "meeting with the Guercio" is completed, the visitor goes back and enters the third environment, whose interest is purely architectural (emotional room). The tour concludes.

Figure 6 - Holographic Area

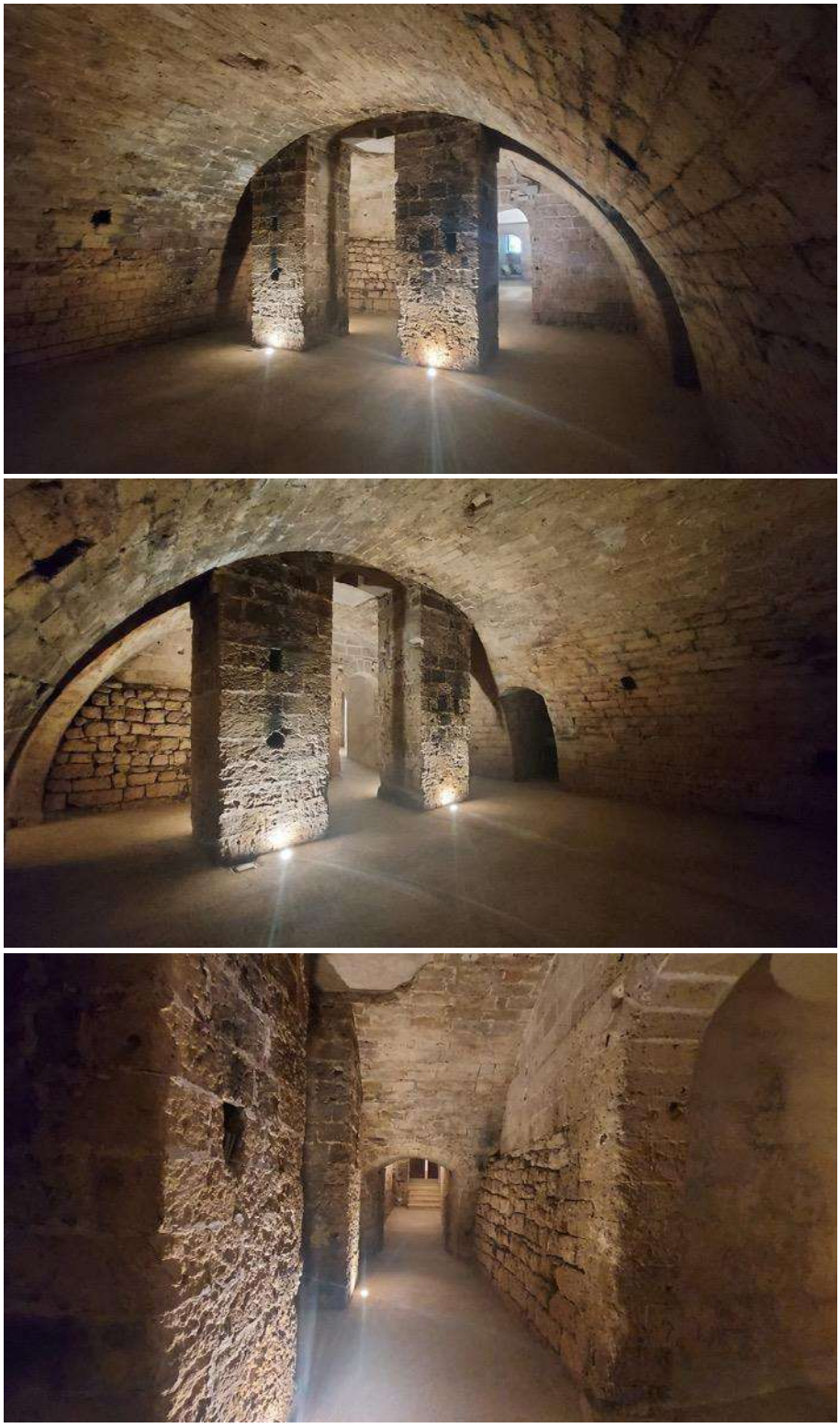


Figure 7- Emotional Room

3. Furniture, multimedia an interactive exhibition

The furnishings have been tested, as well as all the multimedia systems. In these spaces the lighting and electrical tests of the furnishings were carried out.

The museum tour begins in the reception area. People can put on a construction helmet and explore the castle rooms.

A new lighting system (led-streep) and backlighting was installed in the second room. In this space the visitor will be able to observe the infographics and the chronology of the main events that have affected the castle and the city of Nardò, from the 11th to the 21st century.

Figure 8 - Welcome area

Continuing along the path, through a video wall, it will be possible to discover the wonders of the territory of Nardò, its marinas and take a virtual tour of the castle.

The Municipality of Nardò has replaced the multi-projection with a videowall system. The multimedia system displays a 3D video of the castel prisons.

Figure 9 - Video wall area

The main room of the basement is entirely dedicated to the figure of the Guercio who is animated through a hologram. A sequence of jokes between the narrator and the character of Guercio transport the visitor to the first half of the 1600s, making him discover the events and horrors of which the duke was stained, through his personal point of view.

Figure 10 - Holographic area



The holographic system was integrated with a scenography of a large wooden door. This door has been restored and integrated into the exhibition itinerary.
Once the "meeting with the Guercio" is completed, the visitor goes back and enters the third environment, whose interest is purely architectural (emotional room). The tour concludes.

ANNEX 2 - PP2' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Carpi cultural site: Report on PP2' D.T2.5.1

"EMOUNDERGROUNDS" - "Project N° 905"

"EMOtional technologies for the cultural heritage valorization within transnational UNDERGROUNDS"

Adriatic-Ionian Programme INTERREG V-B 2014-2020 - 2nd call

Report on PP2's multimedia, interactive, accessible indoor/ outdoor installation designed and developed, for Carpi project site (Del.T2.5.1)

Municipality of Carpi – PP2

Contents

Abstract

The "EMOUNDERGROUNDS" project aspire to systematize a set of interventions for the promotion, enhancement and better use of cultural heritage (castles, fortresses and other cultural buildings with underground passages) and consequently to reinforcing, in a sustainable way, the attractiveness and competitiveness of the Adriatic-Ionian tourist destinations, through the use of advanced information and communication technologies (ICT) - new media and emotional technologies - and innovative marketing tools. The project intends to enhance tourism development and sustainable growth, smart and inclusive growth of the areas involved, improving the quality of tourism and promoting new market-oriented cultural-creative tourism products. To achieve this objective, the project envisages the implementation of an integrated set of actions to jointly manage and promote, in a sustainable and innovative way, the identified cross-border cultural sites, integrating the offer of existing tourist services and improving their quality.

Introduction

Multimedia contests are realized by video immersive installations placed in Sala ex Poste, a room in Palazzo dei Pio (see the attached plan), seat of Incarpi – promotion and tourism office.
This is the first space upon entering in the Palace that visitors meet; in this room they can receive the first information about the palace history, paths and how to visit: tourists can buy the Carpicard and enter, physically and virtually, to the network of monumental sites, museums and nature sites in our town and territory. It's really a "gateway to knowledge".
The space is divided into three parts: first the central room in which the Incarpi's reception is placed.
Then in the next large room, the museum path begins: here visitors can see three immersive video projections, on screens and also in videomapping model, through a shaped projection on architectural elements. Projectors are placed on supports (a kind of column) so that the three multimedia contents, being synchronized, can dialogue with each other and with visitors.
The length of videoprojections is about 10 minutes.
Finally, visitors enter in the Guerriero room: this is an underground space at present, but until the 15th century it was one of the access door to the palace. Here visitors can find a multimedia installation on holographic screen, reproducing the architectural development of this area.

1. Historical-architectural analysis of the Torrione di Galasso and Guerriero in the Palazzo dei Pio in Carpi

The main purpose of the research developed within the *Emoundergrounds project, WPT2 - design and development of innovative emotional paths in the undergrounds of the Palazzo dei Pio according to methods of transversal cultural enhancement* concerned the reconstruction and therefore the digital use of two nuclei of the Carpi complex, the Torrione di Galasso or degli Spagnoli and the Warrior room, based on an integrated survey of the buildings' current state and on the historical analysis of the available sources, all coordinated and based on BIM methodology. This process of study and digitization had the ultimate goal of making people understand the transformations undergone by the Palazzo dei Pio over the centuries through the production of diversified multimedia content to be integrated into the new exhibition itinerary of the Palazzo dei Pio Museums. The work was conditioned by the different degree of knowledge related to the two portions of the building to be investigated. The Torrione, in addition to being the protagonist of an exhibition in 2019 and the subject of in-depth publications over the years, has been affected, since 2014, by a conservative restoration project and technical adaptation in view of its inclusion in the new, expanded, museum itinerary. The Warrior Room, on the other hand, did not share a comparable knowledge base, neither from a historical-critical point of view, nor for the importance of the architecture. It is a heterogeneous space, in which the various construction phases are partially visible and superimposed on each other, taking its name from the great figure of a warrior in arms frescoed on a pillar that emerged from the walls during twentieth-century restorations. In the absence of detailed studies, the idea that the pillar and the fresco were the fragment of a portico that constituted the access to one of the noble residences of the Pio family in the fifteenth century, the so-called Rocca Nuova, the seat of the court of Lionello Pio (who died in 1477), had to be verified. This entrance was then literally canceled by the construction of the large colonnaded courtyard ordered by Lionello's son and heir, Alberto in the early 16th century.

2. Design of technological, multimedia an interactive exhibition

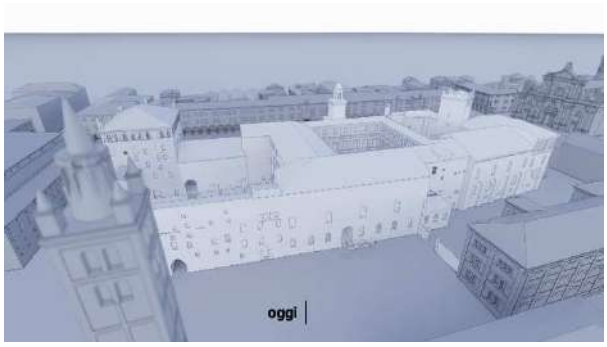
The contents of three videos that tell the results of the research in an agile and intuitive way, integrating them within the museum circuit, in particular in the first phase of welcoming the visitor, will be briefly presented below. Each video has a common theme, which would allow these results to be shown at multiple levels and from various points of view, in order to best enhance the contents. Different representation techniques then enable the understanding of the results, conclusions and interpretations resulting from the entire multidisciplinary study process.

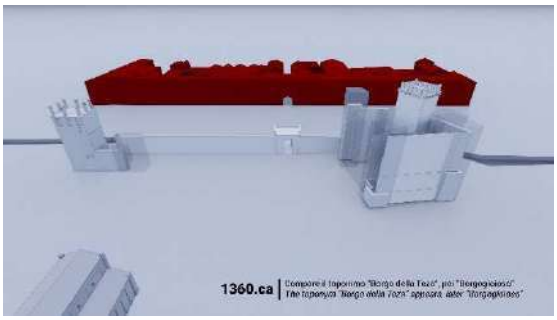
The first video is functional to present the Palazzo dei Pio to the visitor within a general context, the city of Carpi, in order to reveal the close relationship between the complex and the surrounding urban fabric. Starting from the representation of how the building looks today and going back in time, the changes that have taken place in the city and in the stately complex over the centuries up to the time of Alberto Pio, are displayed. It was in fact Alberto who reorganized the two fifteenth-century residences of the Pio family, the Rocca Nuova, home of their father Lionello, and the Torrione di Galasso, into a single sumptuous palace. To visualize the city as a whole, capturing some of the most important architectural moments, it was decided to use the extraordinary iconographic source constituted by the bird's eye view of Carpi by Luca Nasi in 1677. A fundamental junction for understanding the development of the city, however, is the era of Alberto's lordship with the architectures he commissioned, in particular the demolition of the naves of the ancient parish church of Santa Maria, the foundation of the new Collegiate at one end of the current Piazza dei Martiri and the construction of the new building with the main facade facing the same square. This construction site was to unify two independent building complexes, the Rocca Nuova and the Torrione, whose appearance in the fifteenth and fourteenth centuries has been partially restored thanks to recent historical research. In particular, the turreted aspect of the Rocca Nuova in the fourteenth century and the fifteenth-century extensions with the hypothesis of restitution of the portico of the Warrior, constitute the most relevant unpublished data.
In the second video, the development of the complex between the fourteenth and sixteenth centuries is told by taking as a reference the internal and external pictorial decoration still existing today. In this case it was decided to highlight one of the methodological approaches with which the research was conducted, since the reading of the paintings, mapped and inserted in the model, made it possible to verify the reconstructive hypotheses especially in reference to the Rocca Nuova. Its external walls, in fact, were covered by the construction, in the fifteenth century, of new wings built around the fourteenth-century fortress, hiding under new layers of plaster some fragments of the original decoration that covered the fortress since its origin. The presence of these fragments made it possible to accurately identify the boundaries of the ancient fortress. The mapping in the orthophoto model of the decorative elements of some rooms located in various areas of the complex and displayed in

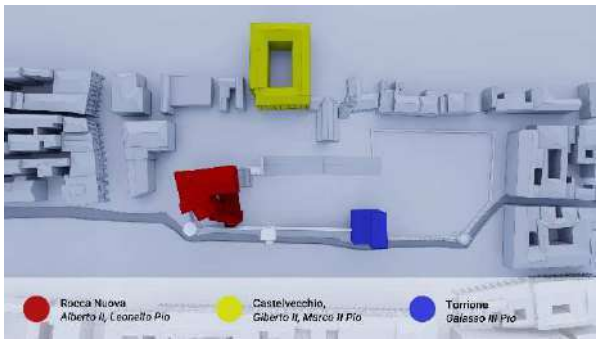
the video, also allows us to grasp at a first glance the richness of the building, that the visitor is invited to discover in the museum itinerary.

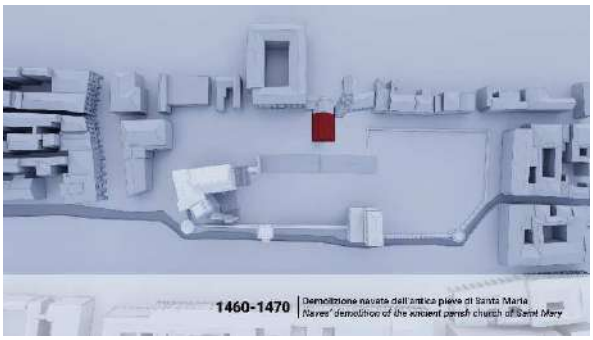
Finally, the third video deals with the problem of accesses to the Palazzo dei Pio, how they have changed over the centuries, a key theme of the *Emoundergrounds* project. In the present conformation of the building, designed at the beginning of the sixteenth century by the most ambitious of the counts of Carpi, Alberto, the main access is the one located under the clock tower, corresponding to a posterula opened in the citadel walls already in the fourteenth century. Further south is the so-called Passo degli Sbirri, next to the Torrione, considered a secondary access which in the fifteenth century must have been the main connection with the city of the residence of the Pius pivoted around the Torrione. These are counterbalanced by the two passages facing the Piazzale Re Astolfo, the ancient square of the citadel, in front of the parish church of Santa Maria: the first is an extension of the Passo degli Sbirri and certainly existed as early as the fifteenth century, the second opens in the east wing of Alberto's palace. However, before the construction of the large colonnaded courtyard, the connection of the Rocca Nuova with the heart of the Carpi citadel must have been moved further north, leaning against the fortress itself and consisting of a portico of which it is still possible to see the fragment with the fresco of the Warrior. This first building phase, which can be placed around 1470, at the time of the lordship of Lionello Pio, was superimposed a few years later by a second one, which can be placed chronologically in the nineties of the same century or shortly after, in which the Rocca Nuova was connected to the fifteenth century building curtain, facing Piazzale Re Astolfo - currently occupied by the Post Office room on the ground floor and the Vigarani room on the first - by means of an elevated passageway resting on columns and vaults, perpendicular to the Warrior portico. It was probably at that juncture that the fresco was covered, preserving it until the twentieth-century discovery, while the rest of the portico was demolished for the construction of the great court of honor of the Albertine palace.

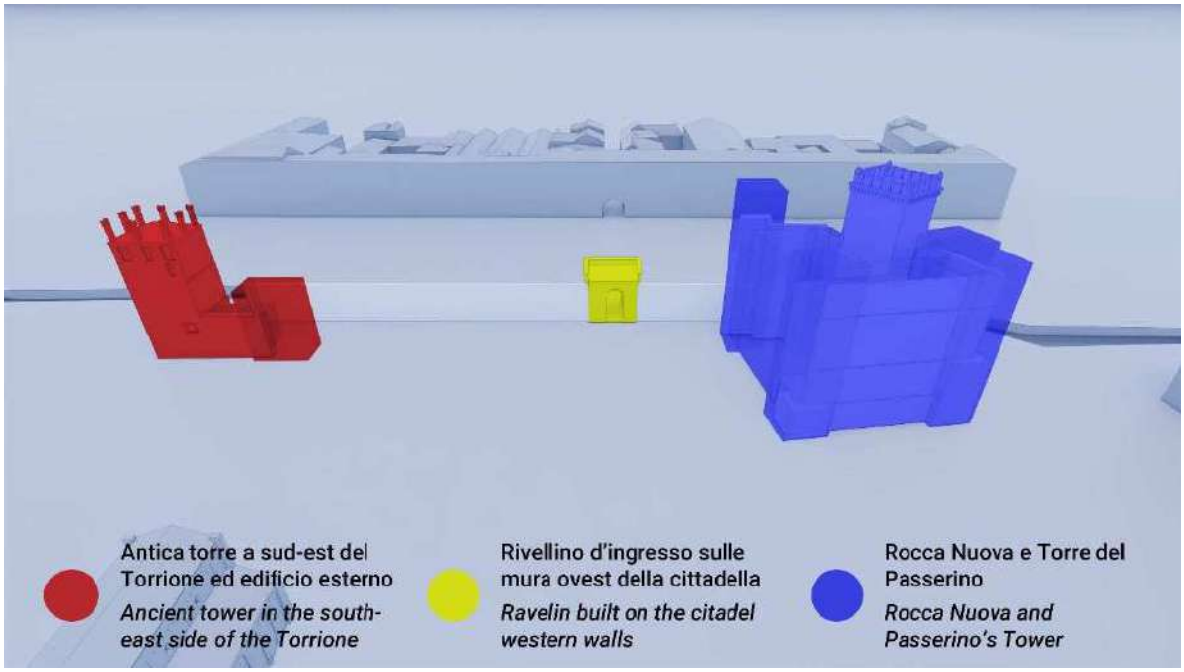
2.1 Contents of the video

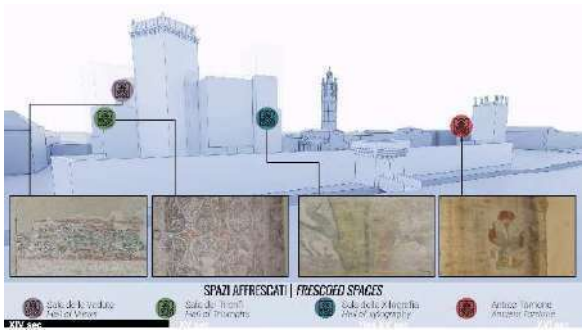








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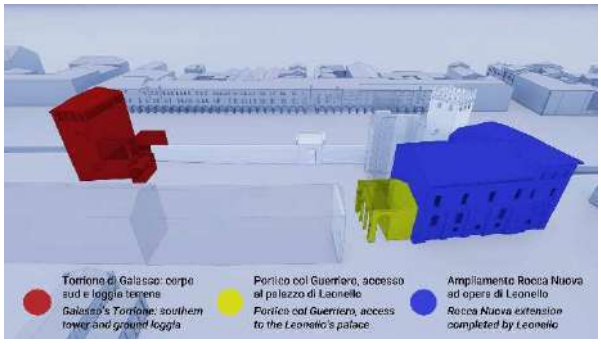
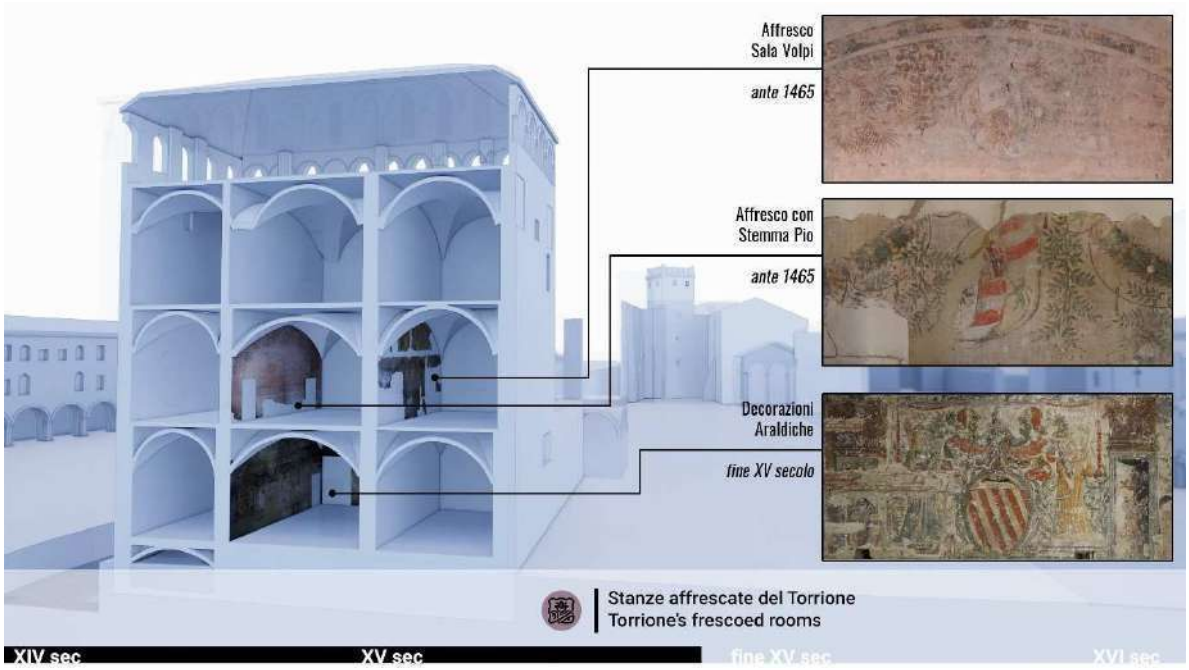
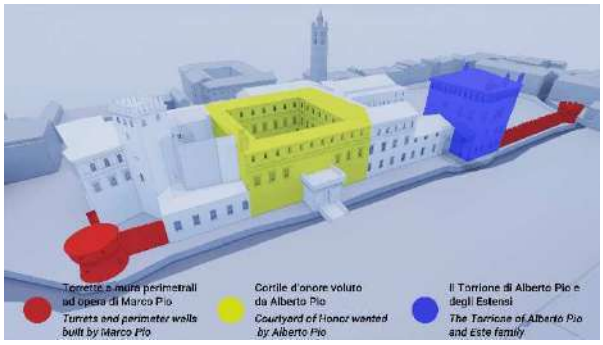
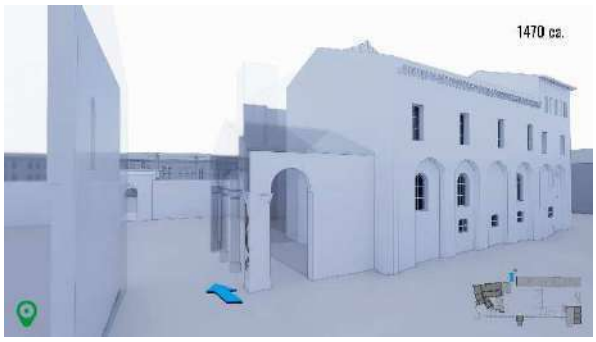

Torrione di Galasso: corpo sud e loggia terrena
Galasso's Torrione: southern tower and ground loggia
Portico col Guerriero, accesso al palazzo di Leonello
Portico col Guerriero, access to the Leonello's palace
Ampliamento Rocca Nuova ad opera di Leonello
Rocca Nuova extension completed by Leonello


Affresco Sala Volpi
ante 1465
Affresco con Stemma Pio
ante 1465
Decorazioni Araldiche
fine XV secolo
Stanze affrescate del Torrione
Torrione's frescoed rooms
XIV sec
XV sec
fine XV sec
XVI sec


SALA DELLA DAMA
Hall of the Lady

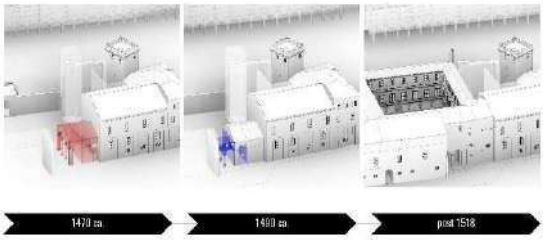

SALA DEI TRIONFI
Hall of Triumphs


Torrette e mura perimetrali ad opera di Marco Pio
Turrets and perimeter walls built by Marco Pio
Cortile d'onore voluto da Alberto Pio
Courtyard of Honor wanted by Alberto Pio
Il Torrione di Alberto Pio e degli Estensi
The Torrione of Alberto Pio and Este family


1470 ca.


CAPPELLA DEI PIO
1500 - 1504
Chapel of Pio
XIV sec
XV sec
fine XV sec


SALA DEI MORI
1506 - 1519
Hall of Moors


1470 ca.
1490 ca.
post 1518

3. Furniture, multimedia and interactive exhibitions

The innovative technological and emotional itinerary, in the halls of the Palazzo, is dedicated to the historical and artistic heritage of the city.
Architectural context, historical evolution and relationship with the present are at the center of the new attractions that branch ofdf from the Sala delle Poste towards the other rooms of the Palazzo dei Pio, offering a new idea of usability of the site, increasingly a point of access to the system of sites cultural (and not only) of the city. Specifically, in the renovated InCarpi tourist office, the first place of reception for tourists intent on accessing the network of monumental, museum and naturalistic sites of the city and the territory, the multimedia installations concerning the relationship between the evolution of the Palazzo the city of Carpi are in a strategic position. The experiential journey continues in the basement of the Guerrieto and inside the historic building.


CARPI

ANNEX 3 - PP3' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Andravida Killini cultural site: Report on PP3' P D.T2.5.1

"EMOUNDERGROUNDS" - "Project N° 905"
"EMOtional technologies for the cultural heritage valorization within transnational UNDERGROUNDS"

Adriatic-Ionian Programme INTERREG V-B 2014-2020 - 2nd call

Report on PP3's multimedia, interactive, accessible indoor / outdoor installation designed and developed, for Andravida Killini project site (Del.T2.5.1)

Municipality of Andravida – Killini (PP3)

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Introduction

The application produced is a standalone first-person Virtual Reality (VR) application (for the Virtual Tour of the Castle) for PC use. The application serves as a virtual tour alternative in the sense of serious game for:

- Autonomous ground movement of the user in the outer Castle area (Walkthrough)
- Autonomous aerial navigation of the user in the Castle site (Fly-by)

1. Standalone first-person navigation Virtual Reality application

1.1 General – Game Engine to be used

The application is created using Unity3D Game Engine. Unity 3D is a cross-platform game engine with a built-in IDE developed by Unity Technologies. It is generally used to develop video games for computer platforms such as web and desktop, consoles and mobile devices, and is applied by several million developers in the world. Unity is primarily used to create mobile and web games, but there are various games to be developed for PC. The app was programmed in C/C++. Unity provides an excellent entry point into game development, balancing features and functionality with price point. The free version of Unity allows people to experiment, learn, develop, and sell games before committing any of their hard-earned cash. Unity is very affordable, feature-packed Pro version is royalty free, allowing people to make and sell games with the very low overhead essential to the casual games market.
Unity 3D game engine is one kind of visualized game engines. It integrates Animation Mechanics, Character Mechanics, Player Mechanics, Environment Mechanics and Programming Developer together. Also it supports online assets shop to designers. The designers could find and buy abundant game assets. As well the designers could design their own assets by themselves.

1.2 General details

The application produced is a standalone first-person Virtual Reality (VR) application (for the Virtual Tour of the Castle) for PC use. The application serves as a virtual tour alternative in the sense of serious game for:

- Autonomous ground movement of the user in the outer Castle area (Walkthrough)
- Autonomous aerial navigation of the user in the Castle site (Fly-by)

1.3 Technical details

The application consists of a first-person virtual tour of the exterior of the Chlemoutsi castle. It is produced using the Unity Game Engine platform. For the successful development of this application a critical element was the initiation, configuration and implementation of an asset library that creates first-person motion (imitates the movement of an avatar/user) with realistic environment rules, gravity, appropriate human motion (running, walking, jumping), 360-degree overview, as well as free fly-motion (drone motion) if selected by the user. the avatar movement is accomplished

using the keyboard and the mouse, sound effects are available and colliders for natural behavior between objects and avatars are present. Throughout the application, basic gamification elements and methodologies were observed.
After the 3D environment is completed then 3D models are placed scattered in space. The goal is a first-person tour in which the visitor can navigate the space in the form of a serious game. The application is run on PCs, but with minor modifications, it is possible to run on virtual reality masks.

1.3.1 Character Controller Package

The package contains a 3rd character model which was used to make prefab with enemy game objects, a First-Person Controller which can simulate the animation of player/user, and few scripts which were used to make model and controller to work. The animations “idle”, “walk”, “run” and “jump” are achieved for the player/user.

1.3.2 Terrain Assets

The app contains terrain model, a few textures and rendering materials, such as grass and palm. The designer made the terrain similar to the one in the monument and renderer all elements on the terrain with the Terrain Editor.

1.3.3 Skyboxes

Skyboxes were introduced in the previous section. The main function of skyboxes is filling colourful dyestuff to the sky space in the application. In this case, the basic blue sky and white clouds were filled.

1.3.4 Basic nature elements

To ensure natural appearance and real-world physics, all the basic nature elements have been observed, namely gravity (normal gravity approximately 10m/sec^2), collision mechanism, natural sounds, light diffusion according to the materials and texturs used etc.

1.4 Building and Running the Application

The Unity game engine is a cross-platform engine. It is limited with the interfaces among the different game platforms. Unity game engine supports almost all game platforms in the world, but because of the file size of the executed files, the games designed with Unity are released on computer platforms. The game is also built on the Windows 10 system. The final application operates in PCs.

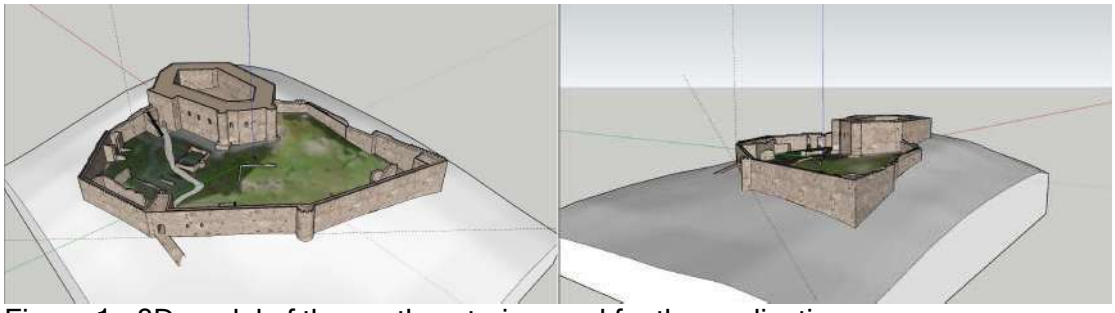

Figure 1 - 3D model of the castle exterior used for the application

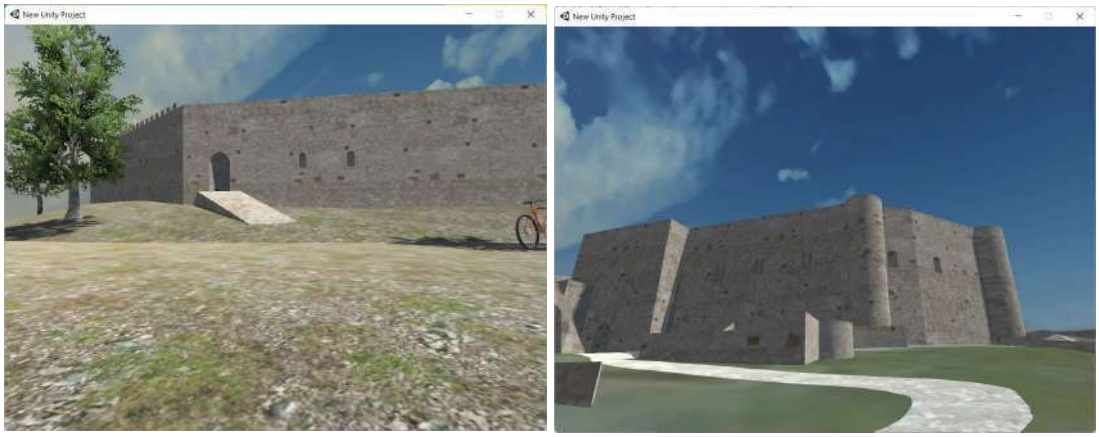

Figure 2 - Screenshots of the application in walkthrough mode.

Figure 3 - Screenshots of the application in fly-by mode.

Figure 4 - Screenshots during the export of the application.

ANNEX 4 - PP4' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Rijeka cultural site: Report on PP4' D.T2.5.1

"EMOUNDERGROUNDS" - "Project N° 905"

"EMOtional technologies for the cultural heritage valorization within transnational UNDERGROUNDS"

Adriatic-Ionian Programme INTERREG V-B 2014-2020 - 2nd call

Report on PP4's multimedia, interactive, accessible indoor/ outdoor installation designed and developed, for Rijeka project site (Del.T2.5.1)

Rijeka Tourist Board – PP4

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Introduction

This deliverable describes the new interactive exhibition created as part of the EMOUNDERGROUNDS project, created at the Trsat castle by the Rijeka Tourist Board. Trsat castle is one of the most visited cultural attractions in Rijeka. Considering that its history has not been sufficiently interpreted and shown to visitors, a new exhibition has been created that expands the visitor's experience. The new interpretation content will certainly attract a large number of domesticand foreign tourists.

Considering that the Trsat castle is a protected cultural property of the Republic of Croatia, the exhibition was made according to the guidelines of the conservation department in Rijeka, the competent authority for the supervision of the Trsat Castle. The entire exhibition was designed and placed on already existing elements so as not to damage or interfere with the space.

1. Trsat Castle exhibition

1.1 About pilot area

Trsat castle has been one of the most visited cultural attractions in Rijeka and its surroundings for years. The local population uses it as a place to meet and socialize. Apart from the interpretation center The Routes of the Frankopans, which covers only one historical era of Trsat Castle, there was no interpretation at Trsat castle and visitors did not have the opportunity to learn more about the history of the castle. Rijeka Tourist Board, as the manager of the Trsat Castle, has been investing in the maintenance of the castle and the improvement of its offer for many years in order to improve the experience of visitors and to popularize the object itself and thus contribute to the attractiveness of the entire destination. Participation in the Emoundergrounds project enabled the Rijeka Tourist Board to use innovative technologies to provide visitors with an improved experience of the Trsat castle and to experience it in a different way, previously impossible. In the space where there is a natural cave, which once upon a time connected Trsat with the Rječina (river), a new interactive exhibition was designed and installed.

Figure 1: Trsat Castle

1.2. Interactive exhibition

The new exhibition divided the space into three chambers that represent three ideologically connected, but partially different interpretive experiences.

Figure 2: Graphic map

The first chamber is an initial incubation experience and at the same time a preparation for further exploration of Trsat castle. It includes the positioning of a bench on one side of the room for those who want to rest during the visit to the castle or who want to passively follow what is happening on the LCD touch screen located on the other side of the room and which allows access to content about the development of the Trsat castle. The LCD screen allows the visitor to explore the Trsat castle throughout history. There are also graphic maps that in high resolution provide additional interpretation content for research in the classic way.

Figure 3: Chamber one

The second chamber is focused on the cave, a natural attraction, and a static graphic map is placed in that part, due to the specific shape of the space (narrow space and natural rock).

Figure 4: Chamber two

In the third, last chamber, a purpose-made interpretation film is projected on the screen, which sensitizes the visitor about the development Trsat castle, including parts of its interior spaces. Interpretive film, in accordance with the ideas of heritage interpretation, it implies the translation of scientific facts in the language of ordinary people/visitors in a pleasant, interesting and memorable way. Visitors can see in high resolution the areas of the Trsat castle which, due to spatial barriers, are inaccessible to visitors.

Figure 5: Chamber three

In addition to the above, the digital kiosk placed at the entrance to Trsat castle enables visitors, especially those with reduced mobility (there are many stairs at Trsat castle), to take a virtual walk through Trsat castle. In addition to the real version, it is possible to walk around the Trsat castle in all stages of construction, through the 3D model of the Trsat castle.

Figure 6: Kiosk with virtual walk

As part of the mentioned exhibition, there is also the first point of the virtual self-guided tour of Trsat castle. The mobile application serves as an independent tourist guide that guides the visitor through 12 points around the Trsat castle and sends information to the mobile device via beacon technology. In addition to textual information, it is possible to listen to the information in audio form, in Croatian and English.

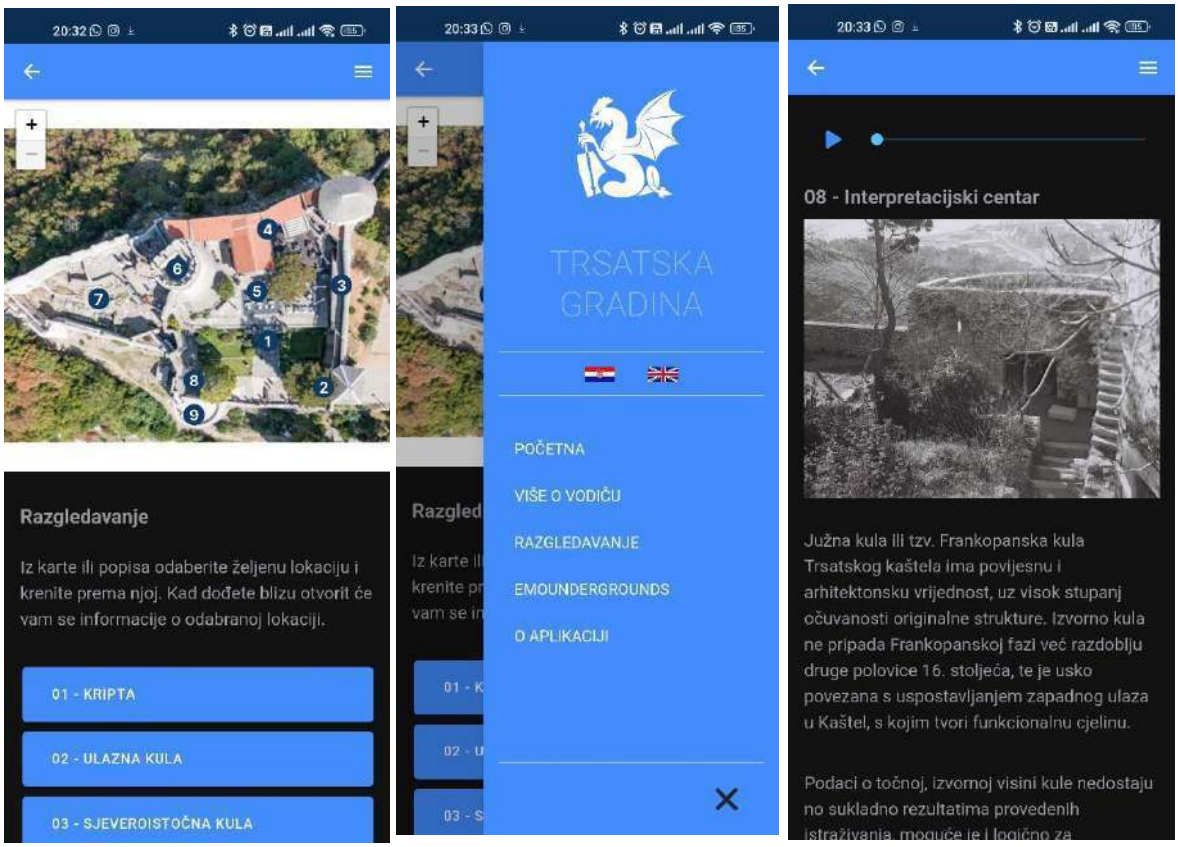

Figure 7: Mobile App – audio-visual guide

ANNEX 5 - PP5' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Šibenik cultural site: Report on PP5' D.T2.5.1

"EMOUNDERGROUNDS" - "Project N° 905"

"EMOtional technologies for the cultural heritage valorization within transnational UNDERGROUNDS"

Adriatic-Ionian Programme INTERREG V-B 2014-2020 - 2nd call

Report on PP5's multimedia, interactive, accessible indoor/ outdoor installation designed and developed, for Šibenik project site (Del.T2.5.1)

Public Cultural Institution
Fortress of Culture Šibenik – PP5

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Introduction

Fortress of Culture Šibenik developed four VR scenarios and procured VR equipment as a part of pilot actions within the project, therefore enriching the existing cultural offer of the city with new, interactive, and immersive experience for the visitors of Šibenik's fortresses. This report contains a list of equipment that was purchased as part of the EMOUNDERGROUNDS project and VR content which was installed on the aforementioned equipment.

The four interactive games are intended for people over ten years old and can be played by anyone who wants to try their hand at using old weapons virtually, defending Šibenik and its fortresses, escaping from a dungeon or racing through the old city center, with an incredible feeling of how realistic it all looks once visitors put on their VR headset. New (VR) content was presented to general public in VR Snow Fort, i.e. Šibenik Technological Experience event, placed in city centre in December 2022 as a part of Advent festivities.

Thanks to the implementation of new technologies in the interpretation of heritage, visitors to the St. Michael's, St. John's Fortresses, and other locations under the management of Fortress of Culture Šibenik will learn about the history of Šibenik in an interactive and modern way. The special emphasis in VR scenarios is on city's' fortification system development and its use over the centuries.

Link for promo (in-game) video can be found here: https://www.youtube.com/watch?v=5bG8YwadAz4

As previously mentioned, the equipment, i.e. VR content is used on all of Šibenik's fortresses under the Fortress of Cultures' management as needed – mostly on St. Michael's Fortress, but sometimes on St. John's and Barone Fortress, House of Arts Arsen and on other locations (such as The VR Dome which was rented within Šibenik Technological Experience event) – as all parts of the VR equipment are mobile.

1. Equipment

The equipment was envisioned as modular, mobile VR stations that are easy to assemble and dissasemble: it consists of VR headsets with all of necessary add-ons and VR stands. As St Michaels' fortress hasn't got much space inside of it and most of it is multifunctional, PP5 will sometimes have to remove the equipment from the fortress in order to implement PP5s usual programmes which require a lot of space.

The equipment procured within the projects is as follows:

1.1 - 4 furniture and fittings: includes 4 cabins (with small lockers in each cabin)
***1.2.*20 IT hardware and software** includes:

- **8 VR sets (each set includes Oculus Quest 2 headset with protective** case, power bank, 2.000 hygienic protective masks)
- 8 charging docs (hardware)
- 4 monitors (with 4 associated monitor mounts)

1.1 4 Furniture and fittings

Figure 1 VR cabins

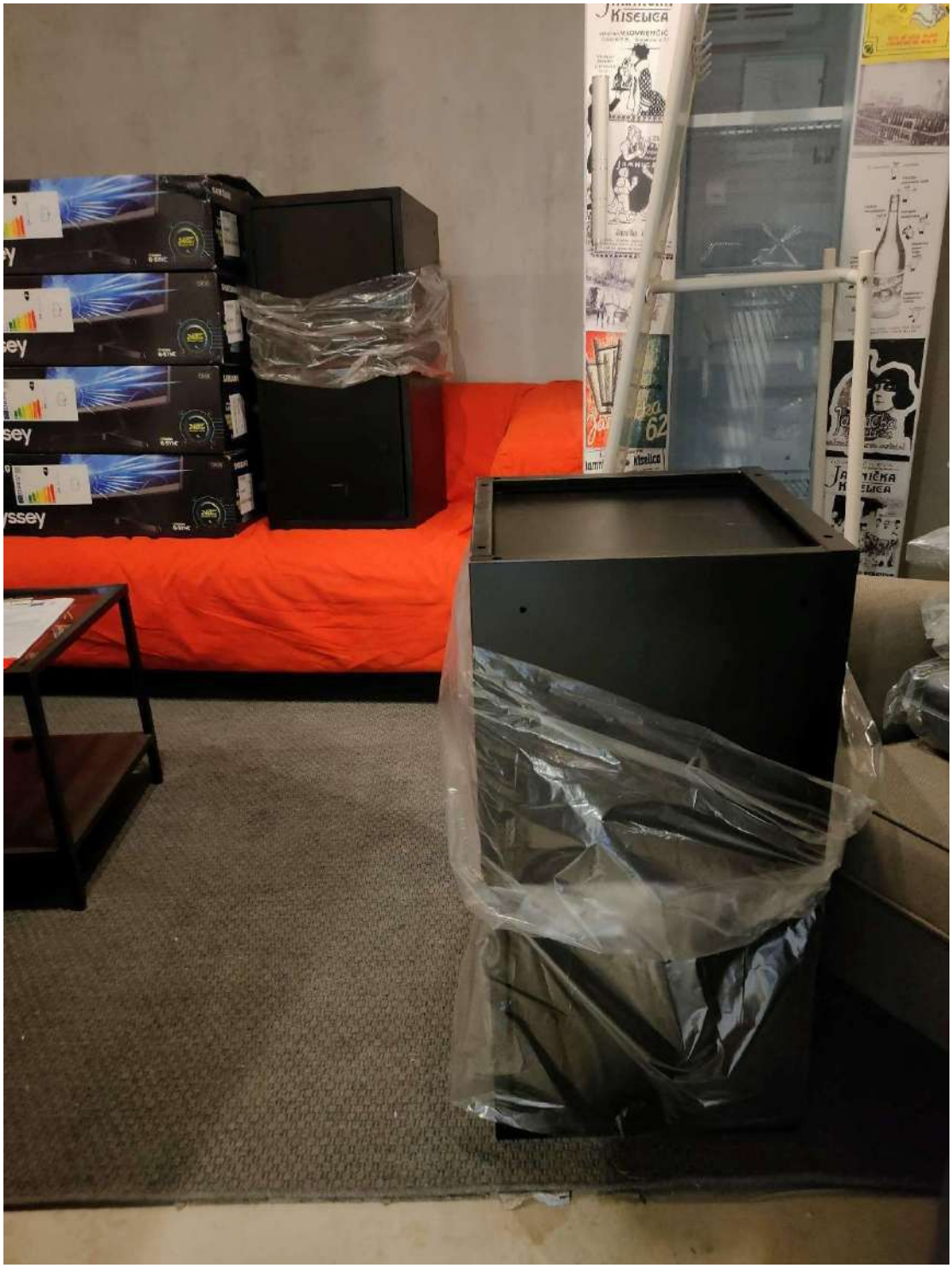


Figure 2 Small cabinets for VR cabins

1.2 20 IT hardware and software

1.2.1. 8 VR sets

Figure 3 Oculus Quest 2 headsets

Figure 4 Oculus Quest 2 headsets, protective cases and monitors

Figure 5 Power banks

Figure 6 Hygienic protective masks

1.2.2. 4 monitors and associated mounts

Figure 7 Monitors

Figure 8 Monitor mounts

Figure 9 VR equipment in use

2. VR content

The goal of the VR scenarios is to inform and educate visitors to Šibenik's fortresses in a fun and interactive way about the history of the city of Šibenik, with special emphasis on the development of the Šibenik fortification system and its use over the centuries. Additional goals are the application of new technology in heritage interpretation; as well as the presentation of hitherto lesser-known historical events, professions or characters, i.e. the diversification of traditional historical narratives. VR contents/games will be available to all interested visitors to Šibenik's fortresses, and will be (like the technology itself, i.e. the way of interpretation) further promoted through different channels in accordance with the institution's marketing strategy.

The target users of VR content are visitors to locations managed by Fortress of Culture Šibenik: users aged 10 years and older with an emphasis on beginners in the use of virtual reality or people who have never come into contact with virtual reality technology.
The user interface is adapted to the target group so that players can use the VR headset without excessive preparation and a long learning process.

Description of content/games in virtual reality

1) *Escape from the fortress/dungeon:* user age 10+
   EDUCATIONAL GOAL: get to know the area of the St. Michaels' Fortress through a character who somehow played a role in the history of Šibenik.

2) *Defense of the fortress (development of weapons over the centuries):* user age 10+
   EDUCATIONAL GOAL: to get to know the various weapons (and tools) that were used in the area of Šibenik over the centuries

3) *Old Town Race:* User age 10+
   EDUCATIONAL GOAL: in a fun way, through a race in different vehicles, to get to know the central streets of old (and today's Šibenik), as well as basic information about certain historical figures significant for the development of Šibenik and human history in general

4) *Puzzle game/Escape room (with an emphasis on the older population or the population with a minimal level of experience in playing video and other games):* user age 15+
   EDUCATIONAL GOAL: find out information about certain items important for the history of Šibenik, the Kandian War and Baron Degenfeld

Approximate duration of each scenario, i.e. game: 15 - 25 min

VR platform: Oculus Quest 2

Figure 10 Screenshot from VR content

Figure 11 Screenshot from VR content

Figure 12 Screenshot from VR content

Figure 13 VR content in use

Figure 14 VR content in use

Figure 15 VR content in use

ANNEX 6 - PP6' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Štanjel cultural site: Report on PP6' D.T2.5.1

"EMOUNDERGROUNDS" - "Project N° 905"

"EMOtional technologies for the cultural heritage valorization within transnational UNDERGROUNDS"

Adriatic-Ionian Programme INTERREG V-B 2014-2020 - 2nd call

Report on PP6's multimedia, interactive, accessible indoor/ outdoor installation designed and developed, for Štanjel project site (Del.T2.5.1)

Regional development centre Koper, PP6
Location: Štanjel, Municipality Komen, Slovenia

Contents

1. Abstract

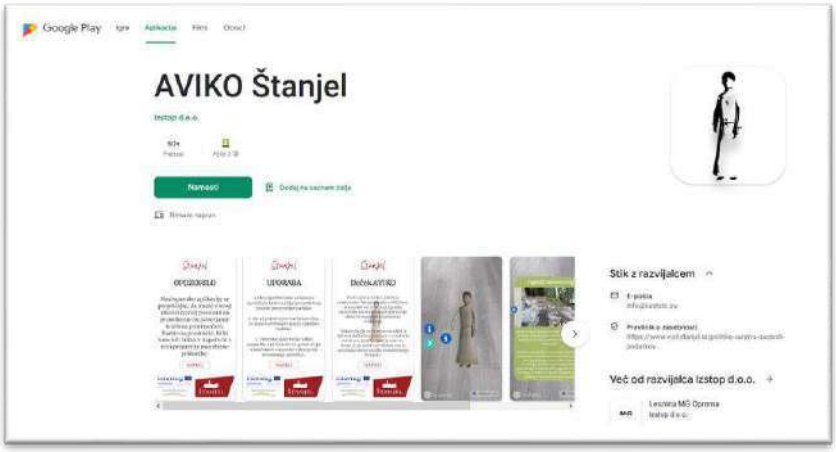
Štanjel is one of the oldest settlements in the Karst. Due to its strategic location, the Turn hill, on which the terraced settlement is spread today, has been inhabited since prehistoric times. Invisible traces from the Bronze and Iron Ages, when Štanjel was a prehistoric hillfort, protected by stone walls, will be revealed to you by the virtual boy Aviko. The boy from prehistory will guide you through the points, marked with a special QR code, and walk you Through Štanjel through time.
In order to make the experience even more complete, a 360 guide was created, which shows the castle and the village as they are today. On the way, we meet a digital 3D reproduction of the destroyed north tower.

2. Introduction

The multimedia interactive installation in Štanjel roughly covers 3 parts.
The first set is the Android app, AVIKO Štanjel which provides a self-guided tour of Štanjel, with the help of an application downloaded at the tourist information centre Štanjel or Google play shop. The guide directs visitors for a walk through eight points, guided by an avatar, discover of prehistoric Štanjel from the bronze and iron ages when there was a hillfort, visit to the village square with the karst house and the well, getting to know about life in a prehistoric hillfort, visit to the prehistoric Štanjel acropolis with the Gledanica tower, which offers views of landscapes ranging from the mountains to the sea and a visit of the remains of the northern tower.
The second part is the virtual 360° tour through Štanjel's Castle and the mediaeval village how it looks today. The route takes us through the Štanjel Castle, the tourist information center, renovated halls, basement restaurant rooms, through the castle courtyard to the streets of the fortified medieval village, to the highest point - Gledanica where a defense tower once stood, but unfortunately no historical records have been preserved. From the Gledanica there is a descent towards the north side, where leys the foundations of the destroyed northern tower. And here we enter the third part of our story – the 3d model of the north tower.
There are pictures and well-preserved foundations of the north tower, so it was possible to make a complete 3D model. In the 360° guide the user can enter in the modelled tower, go up to the 2nd floor and see what the surrounding landscape looked like. In the archive we found watercolours that decorated the inner walls of the tower.

3. AVIKO Štanjel

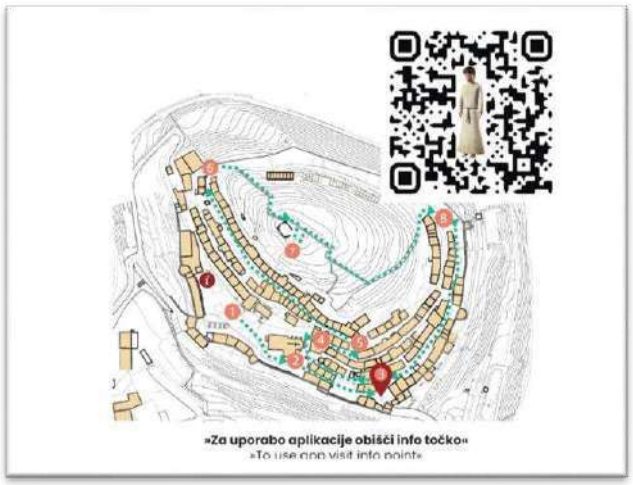
The application can be downloaded in the Google play store.



8 location were defined in the previous activity and on each point a trigger was installed.

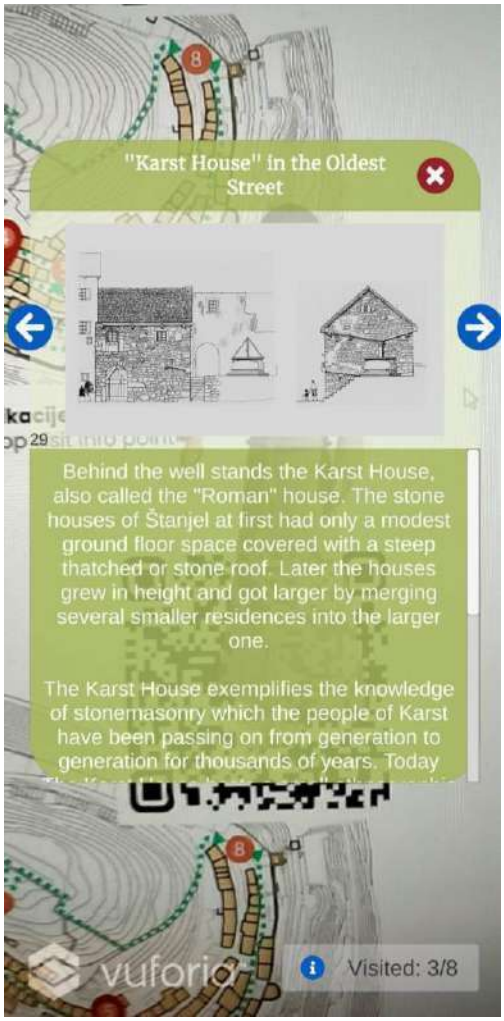
Picture of a trigger

Trigger design



The avatar Aviko enters on the screen

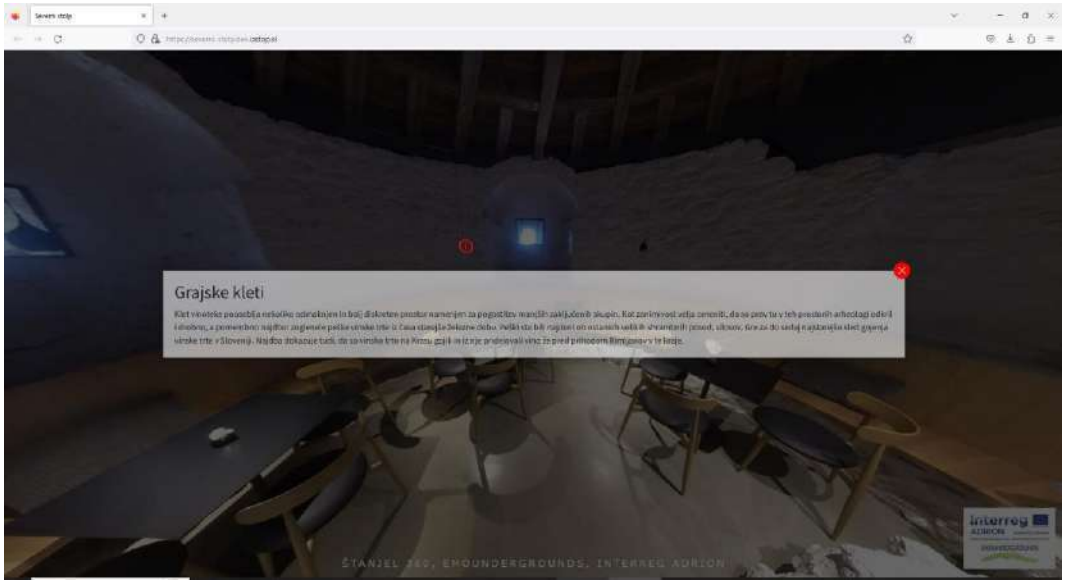
Explanation of the stories behind the trigerrs:

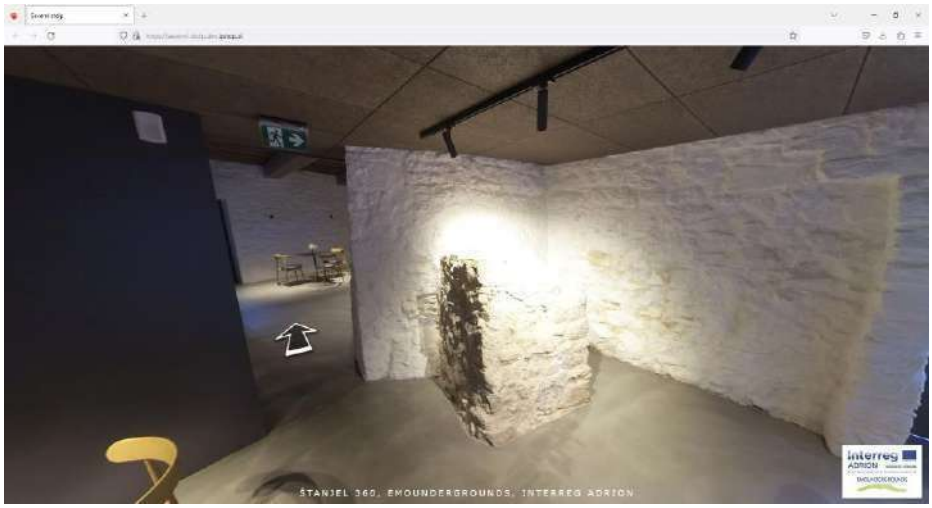


4. Štanjel 360

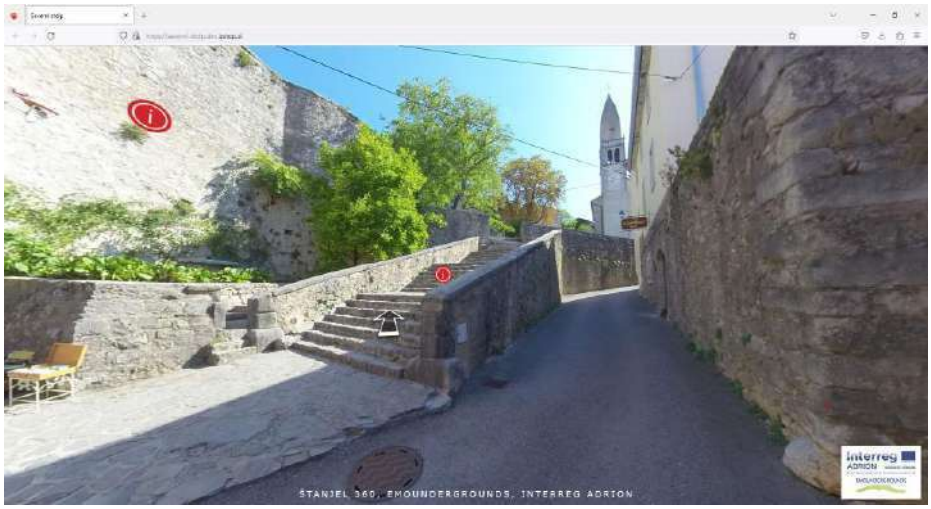
The virtual 360° starts in the castle courtyard

There 25 possible location the user can navigate, from the castle dungeon





throug the medieval streets

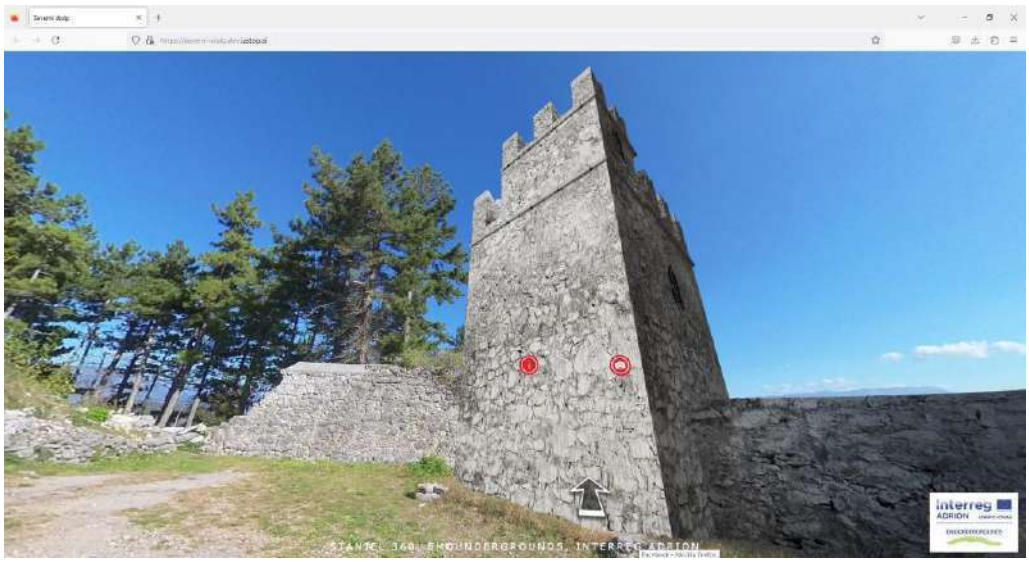


to the highest point, Gledanica:

5. Northern tower

The northern tower represents the missing part of the former Štanjel medieval defensive walls. In terms of shape, the northern tower was similar to the Kobdilj tower, also called the "Gate Tower", standing further south. The north tower was completely destroyed during II. St. war, when the castle and several other buildings in Štanjel were mined and burned.

3D model of the northen tower



The remains of older structures at the base of the Northern Tower were discovered during archaeological research in 2017.

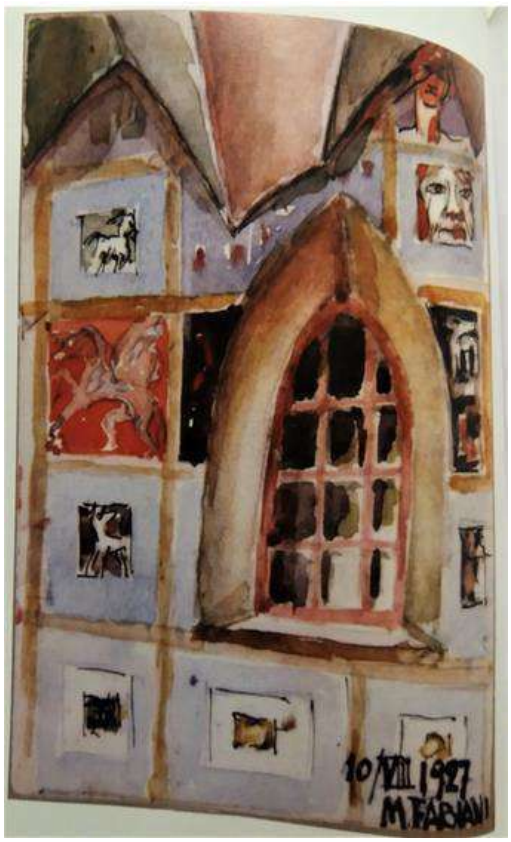
Photo: Patricija Bratina, Institute for the Protection of the Cultural Heritage of Slovenia.

The Northern Tower, 1927

Source: Archives of the Maks Fabiani Foundation, Štanjel

The interior of the tower

The young painter and ceramist Neera Gatti, a family friend and student of the architect Max Fabiani, probably also spent the nights in the tower. In cooperation with the architect Fabiani, Nerra also painted the interior of the tower, as indicated by the preserved watercolors of Max Fabiani.



ANNEX 7 - PP7' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Ivančna Gorica cultural site: Report on PP7' D.T2.5.1

"EMOUNDERGROUNDS" - "Project N° 905"

"EMOtional technologies for the cultural heritage valorization within transnational UNDERGROUNDS"

Adriatic-Ionian Programme INTERREG V-B 2014-2020 - 2nd call

Report on PP7's multimedia, interactive, accessible indoor/ outdoor installation designed and developed, for Ivančna Gorica project site (Del.T2.5.1)

Municipality of Ivančna Gorica – PP7

Contents

Abstract

After the completion of the creation of the multimedia material, the municipality of Ivančna Gorica wanted to present it to visitors in the simplest possible way through IT equipment. For this purpose, quite a few interfaces have been created that allow visitors to easily use and view the prepared material.

The interfaces were integrated on the TV and the tablet in the hive. To facilitate the use of digital kiosks, we used websites where we installed important information about the project, tourism providers and the tourist map. To view the video and photo material, an interface was created that acts as a gallery. the virtual environment of Podsmreka Castle is equipped with various information points and points that take us to the present.

Also, the visitor of the virtual environment is allowed to move within the virtual environment and allows them to move freely. The video material on the history of Podsmreka Castle over time is made of several parts, which are combined into a whole and present the visitor in an interesting way the different periods at Podsmreka Castle.

The main goal of equipping with various applications was to make it as easy as possible to present information to visitors and to inspire them to see and hear.

Introduction

The external contractors involved in the EMOUNDERGROUNDs project drew on their experience in designing various applications as an interface. at the same time, they listened carefully to the needs of the client, the Municipality of Ivančna Gorica.

In this way, we successfully integrated the material into the newly created applications and website, and made sure that visitors get accurate information in an easy and fun way.

1. VR environment

The received 3D models had to be formed into spherical composites with appropriate transitions and content data. For the processing of spherical composites, we used the Krpano program, in which we defined the transitions and placed them in a meaningful way. The equipment with content inputs was implemented in the Unity program, in which the relevant content information points were defined.

Spherical photo processing is also ready for implementation and upgraded to display realistic 360 photos. 360 spherical photos will be captured on location with a 360 camera; Insta 360 pro, with 11k photo capture.

1.1 Virtual walk around the castle Podsmreka

Creating virtual walks is an innovative technological solution that puts the user in an allocated place with the help of VR technology, it takes you on a 360-degree view of the past in which Podsmreka Castle experienced its greatest prosperity. We based the virtual walk on the literature, records and announcements we received, and we also had to build beehives because they can no longer be seen in physical form. The virtual walk begins when the user appears in front of Podsmreka Castle and looks around. The surroundings of the castle include a view of the beehives, which are equipped with information points and facilities. The virtual tour then continues to the entrance to Podsmreka Castle, where the walls, wrought iron doors and a fountain can be seen. The user can see in detail the "decorations" and beauties that Podsmreka Castle once had. After entering the central courtyard, the user can choose between the possibilities of visiting the beekeeping workshop, the outbuilding and the living quarters. The living areas are furnished in accordance with the furniture, which we could see and photograph and then redraw into 3D models. We were able to equip and prepare other details (floor, staircase, stove ...) in a similar way.

The basic platform on which 3D modeling and display of Podsmreka Castle is based, can also serve as a starting point for continuing the story, upgrading and implementing 360 real photos, videos and other content, if the client wants you in the future.

The content of the 3D modeled castle Podsmreka has been prepared in such a way that it can be recorded as a promotional video and placed in other technological solutions ...

A virtual walk around the castle in the picture

Entrance view - a view of the castle, a 90 degree turn shows a view of the apiary

first passage through wrought iron doors (no longer available)

tower and fountain

Interior of the castle 1

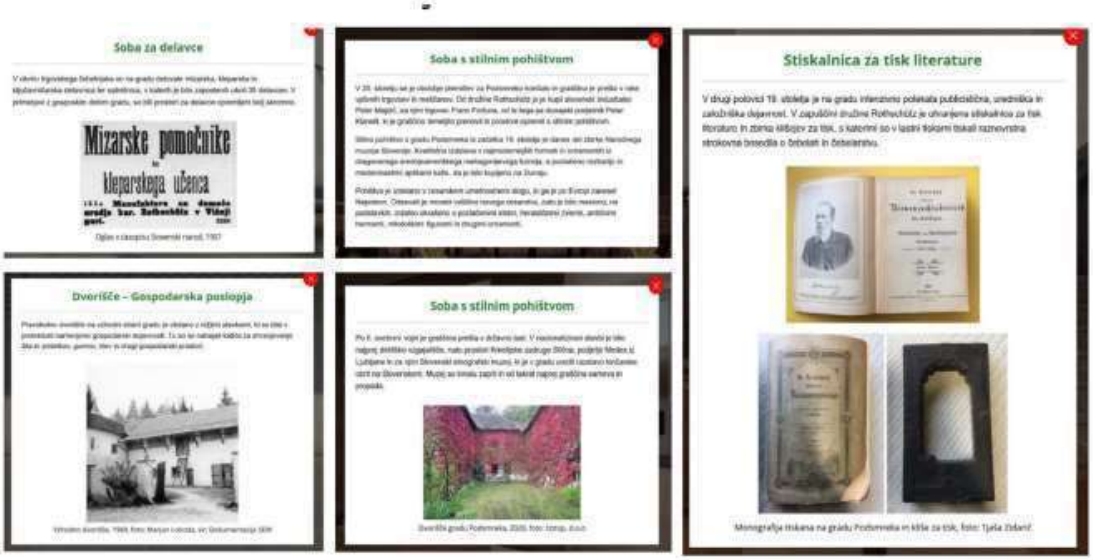

Interior of the castle 2


Interior of the castle 3


Working part of the castle


beekeeping workshop

content of information points:



2. Podsmreka Castle through history

The film about Podsmreka Castle was made on the basis of studies and discussions made in the first phase of the EMOUNDERGROUNDS project.

An external contractor for the mentioned studies did extensive research, through which it was established that Podsmreka Castle was built as early as the 16th century. Due to its interesting location, Podsmreka Castle has replaced countless owners who rebuilt and changed the castle according to their needs.

The castle flourished at the end of the 19th century, when it was inhabited by the Routhsic family, who were engaged in beekeeping. The second most widespread bee species, the Carniolan bee, originates from the castle, which was important for the castle as gold, as it enabled the castle to develop and exist at that time.

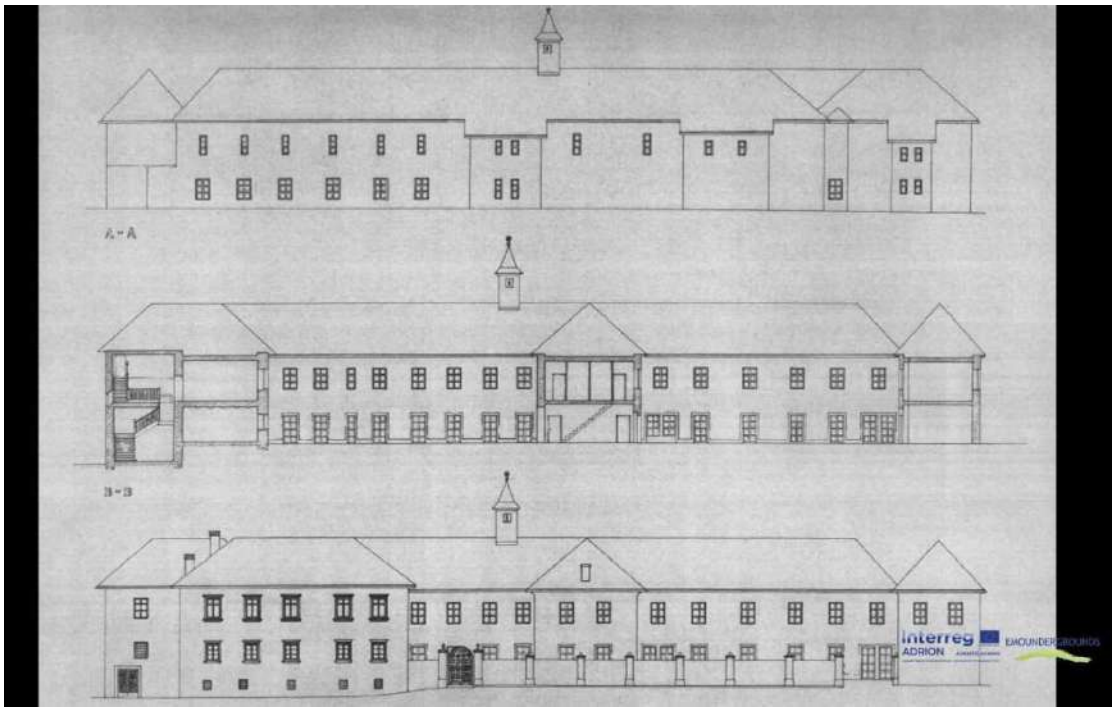
With the film, which is informative, we wanted to revive the castle of twilight, as it once was and teach visitors about the importance of the castle and beekeeping activities at that time and of course the importance of bees today.

The film consists of three parts, which we have successfully combined to take the visitor through the course of history. We supported the visual content with a text that

is the result of studies and analyzes. At the same time, we added a lot of pictorial material to the video, which confirms the importance of the castle over time. The length of the film is a little less than ten minutes, but during this time the visitor learns all the details and the most interesting turning points in the history of Podsmreka Castle.

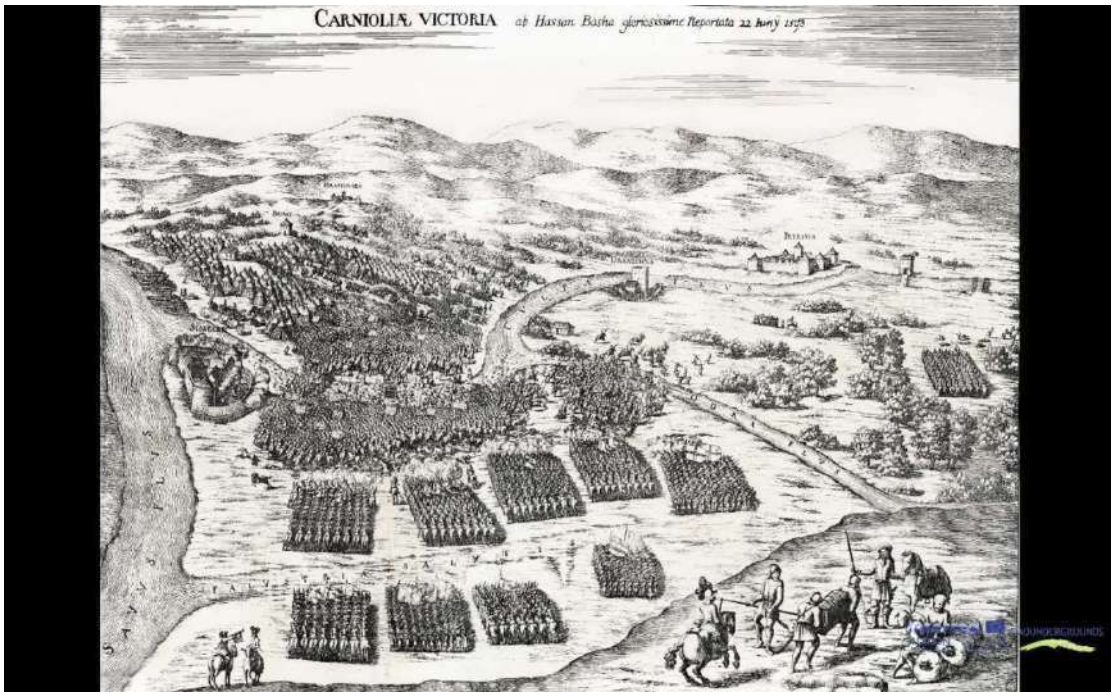
movie title: Grad Podsmreka skozi čas

The first mention of the castle in the Stična manuscript



Reconstruction plan of Podsmreka castle

3D rendering of Podsmreka Castle in the age of digitalization



The famous battle of Sisak influenced the change of owners at the castle of Podsmreka

Emil Rouschitz

Final text with graphics for the film

3. Life in the hive

As we have already written, we have found through studies that a beekeeping trade operated at the castle, which was very important for the time and life at Podsmreka Castle.

So, we decided to show visitors a life that is usually hidden from view, a life in a hive. In the first phase, a scenario was prepared of what and how we want to capture footage that will be available to visitors, when we managed to capture it with a macro camera, we equipped the footage with inscriptions and interesting facts from life in the hive. We were able to clearly show the birth of a bee, drinking honey, hatching eggs, ... To facilitate the search for content, a programming interface has been prepared, which works on the basis of selection buttons and is in the so-called kiosk mode. The visitor then chooses various pre-prepared contents via the interface and enjoys the unique shots of the Carniolan bee.

We went a step further in showing life and installed a smaller camera in a living hive with bees, which actually captures lives in the hive in real time. These recordings are also available via a digital programming interface and can be chosen by the visitor from any modified content.

Eggs in the honeycomb

The queen lays eggs in the honeycomb

Bees drink honey

The birth of the bee

4. Digital kiosks

The purpose of setting up digital kiosks is to inform random visitors and encourage them to visit the Ivančna Gorica area and Podsmreka Castle in a digital environment.

Digital kiosks are equipped with an application on which various multimedia content (photos, videos, websites ...) is installed. The hardest job was to make digital kiosks transparent and usable for anyone new to the aforementioned technology. We have made sure that the content is prepared in a way that guides the visitor through the tour and at the same time provides interesting information.

Digital kiosks are also equipped with a tourist map, which presents the area of Ivančna Gorica and its tourist attractions to the visitor through interesting graphics. the outsourcer who prepared the interface worked hand in hand with the client and tried to implement all the ideas provided by the client.

Digital kiosks are programmed to switch to the so-called rest mode after a short period of non-use, where the most beautiful photos from 2021 from the area of Ivančna Gorica are automatically played.



Various content presented at the digital kiosk

ANNEX 8 - PP8' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Kukes cultural site: Report on PP8' D.T2.5.1

"EMOUNDERGROUNDS" - "Project N° 905"

"EMOtional technologies for the cultural heritage valorization within transnational UNDERGROUNDS"

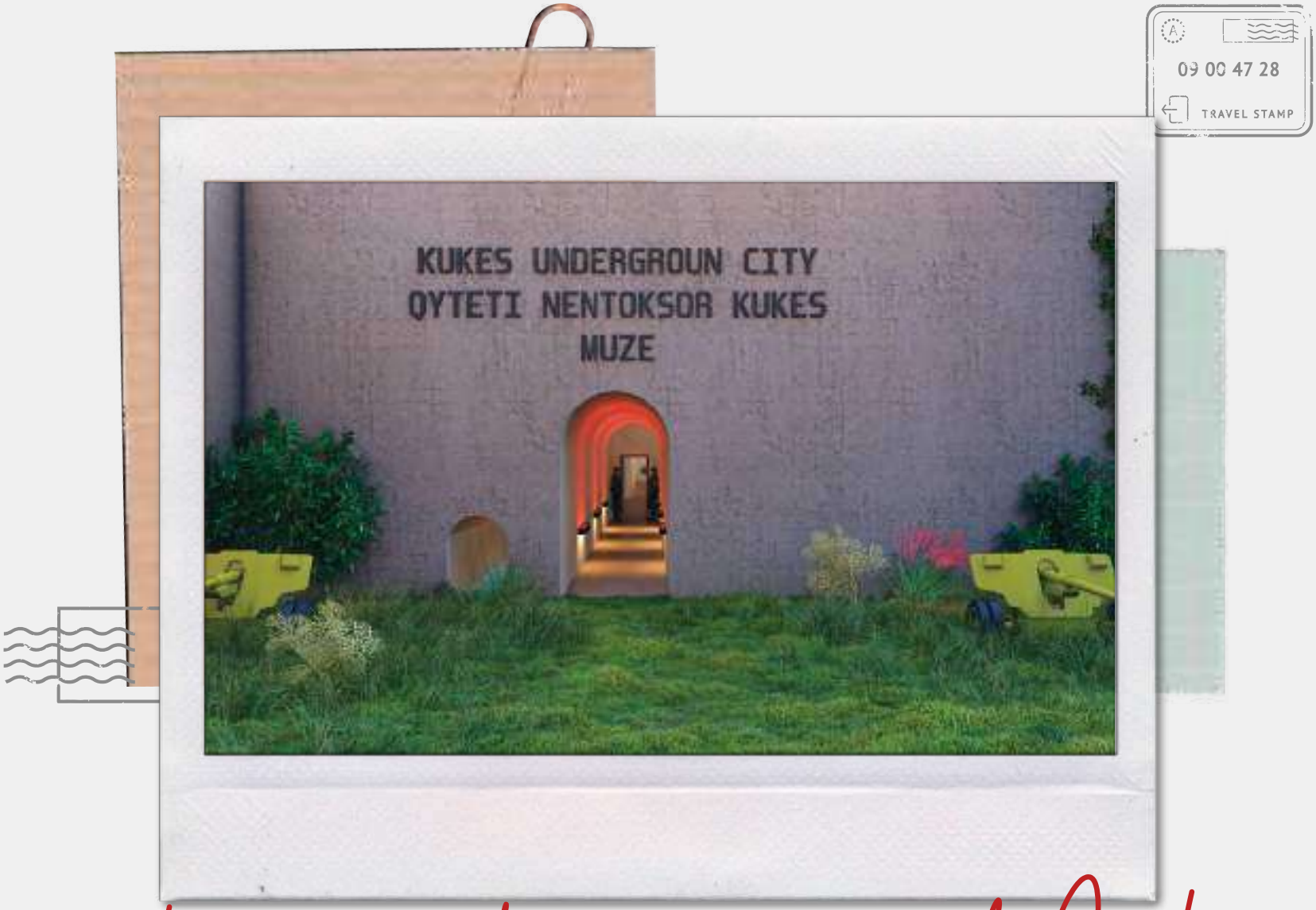
Adriatic-Ionian Programme INTERREG V-B 2014-2020 - 2nd call

Report on PP8's multimedia, interactive, accessible indoor/ outdoor installation designed and developed, for Kukes project site (Del.T2.5.1)

Municipality of Kukes

2. Abstract

The Municipality of Kukes (PP8) completed its multimedia, interactive and accessible installation on the undergrounds' tunnels city of Kukes. The physical interactive emotional setup was located and installed in the Ethnographic Museum in Kukes; multimedia contents refer to the undergrounds' tunnels of Kukes. It offers a virtual tour of the rebuild tunnels to enhance the visitors' experiences. The following pages describes the work done by PP8.



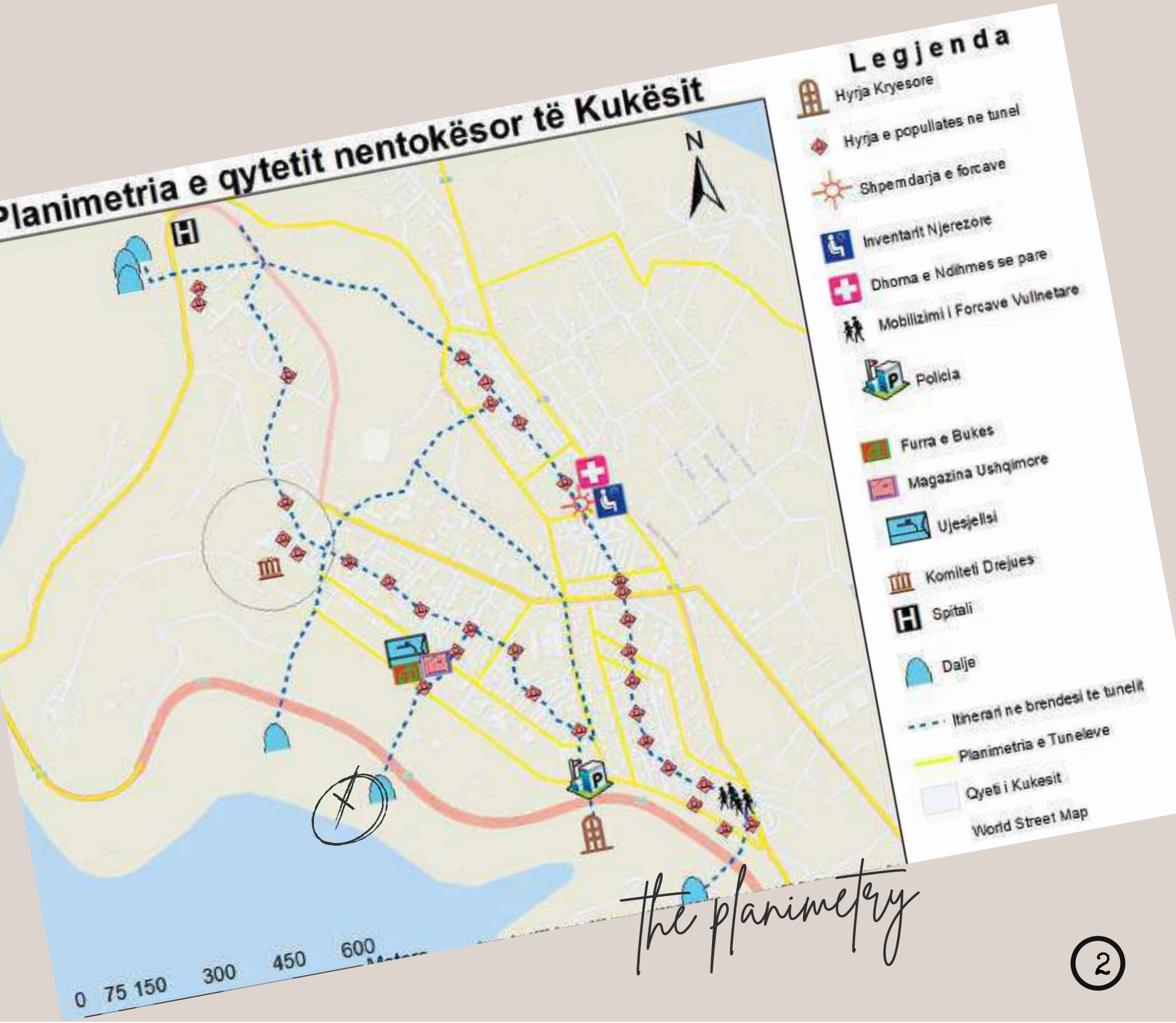
Kukës Underground City

the tunnels

The political developments of Albania in the years I945-I990 caused Kukësi to assume the role of a military zone. This is due to the geographical position on the border with the former Yugoslavia. The policies of the state of the period I945-I990, where its focus was on protecting it from the imaginary enemy, led to the construction of the underground city in parallel with the construction of the new city of Kukës.

The underground city (Tunels) is witness to a difficult period for the population of Albania and the municipality of Kukës in Veccanti, as a border region. The tunnels clearly express the illusion of the time, where the people had to protect themselves from the imaginary enemy. Underground tunnels with a surface area of I000 meters are built under the city of Kukës i Ri. It was built in the early I980s and has a I.5 meter thick cement ceiling.

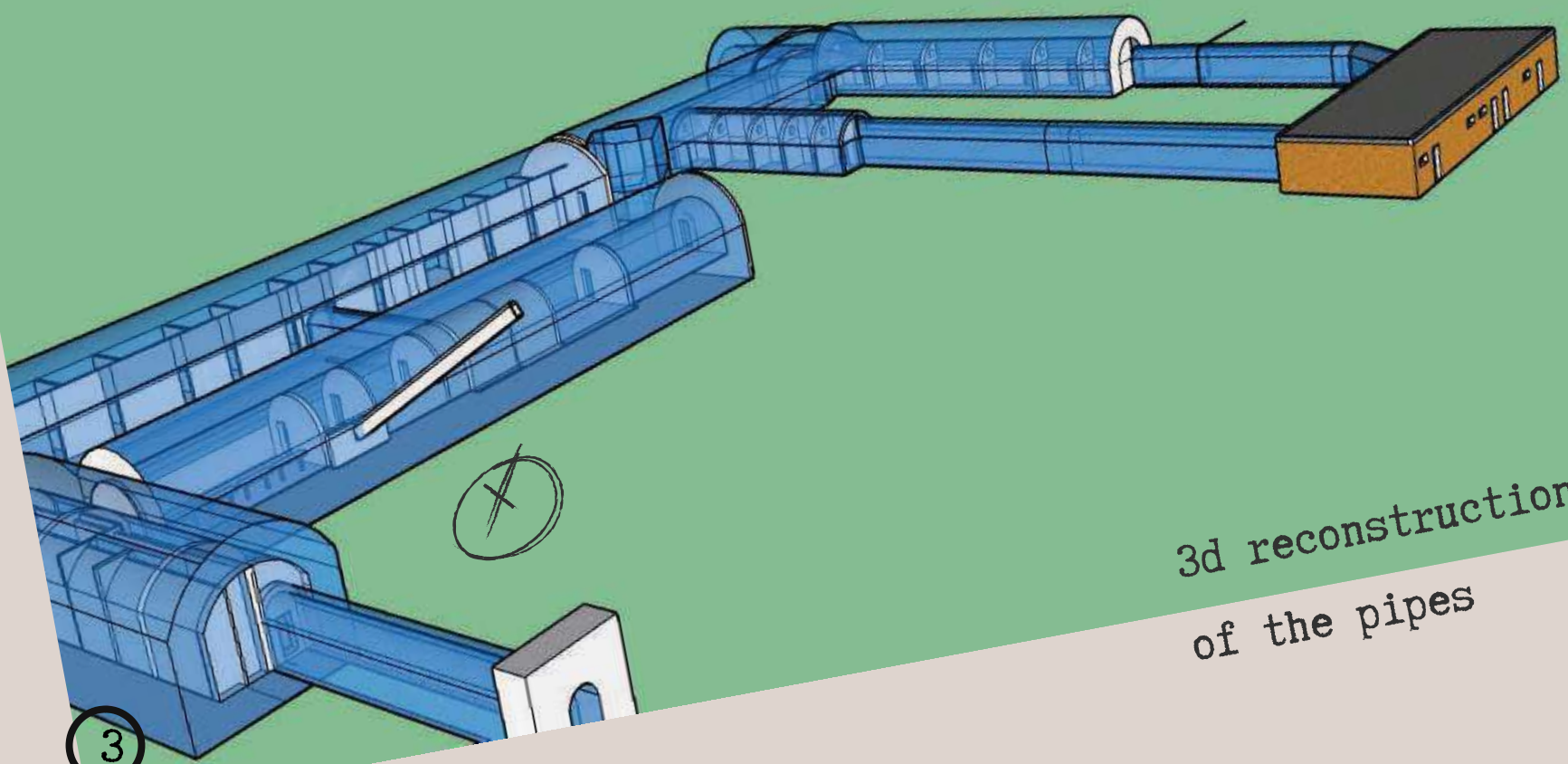
The underground tunnel of Kukës met all the needs of the population. There the population could receive all services such as: water supply, which was provided by means of a well inside the shelter, which had been tested for drinking water. Ventilation system, which still works today. Electricity was provided through a generator. The health service, as there was also a hospital with all the equipment of the time. The phone line would ease the isolation inside the tunnel as long as they stayed there. The interior minister had a hotline connected to the senior leadership.



the planimetry

TO ENTER THE UNDERGROUND TUNNEL THERE WERE SEVERAL ENTRANCES:

- The main entrance was directly in the courtyard of the civil hospital
- In the area of Ramhas
- An entry for the police (but which is secret and not known)
- An entry for each of the neighborhoods



3d reconstruction of the pipes

the actual situation of the tunnels

The revitalization of the "underground city" is thought to be realized from the entrance of the Police, which will also serve as the main entrance.

We propose to switch the tunnels from a place of fear, to a place of memory and a major tourist attraction for the city of Kukës

tunelet

a place of memory

- ✓ cold war
- ✓ enemies
- ✓ interrogation

Space of governing bodies:Here were concentrated the offices and meeting rooms; warehouses of equipment and tools. There were meeting rooms and secret offices, where they gathered to make decisions and distribute time directives.

Political propaganda halls and daily information halls. It had independent electric lighting and telephone network installed. Many of the spaces do not have free access and were directly connected to the basements and downstairs of the ALP Committee or to the Executive Committee.


SEKRETARI 1-E

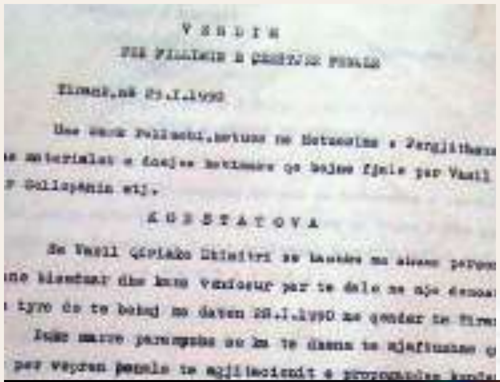

IO


MARKSIZEM
LENINIZMI
FLAMURI
FITIMTAR

The secrecy of the police entry into the underground tunnel is interesting. This actually goes into symbiosis with the philosophy of the time, but strange nowadays. The construction of the highway also affected the closure of exits with concrete walls. Thus everything has remained in mystery as a big question mark, seeking answers.

Three decades since communism's fall, thousands of Albanian families are still waiting to learn how and where their relatives were killed. The exact number remains unclear: post-communist governments of all stripes have not figured that out. Most estimates circle around 6,000 people who were killed or died in state custody between I944 and I99I, their bodies never returned.

Fred Abrahams / HRW


V E N D I M
K O N S T A T O V A

The torture methods employed by communist interrogators, which included pressing scalding eggs taken directly out of boiling water against their armpits (thus giving them third-degree burns in a highly sensitive place) or slicing open their calf muscles, pouring in salt, and sewing the wounds back together…

Convinced that everyone from neighbouring Yugoslavia to Greece, Nato and even his former allies in the Soviet Union wanted to invade his country, Hoxha embarked on a bunker-building programme of titanic proportions. Hoxha had a name for the state of preparedness all Albanians should be in - gjithmone gati, or “always ready”. This state of mind came in part from his experiences in World War Two.

Stephen Dowling / BBC

THE BORDER

the hell beyond or within?

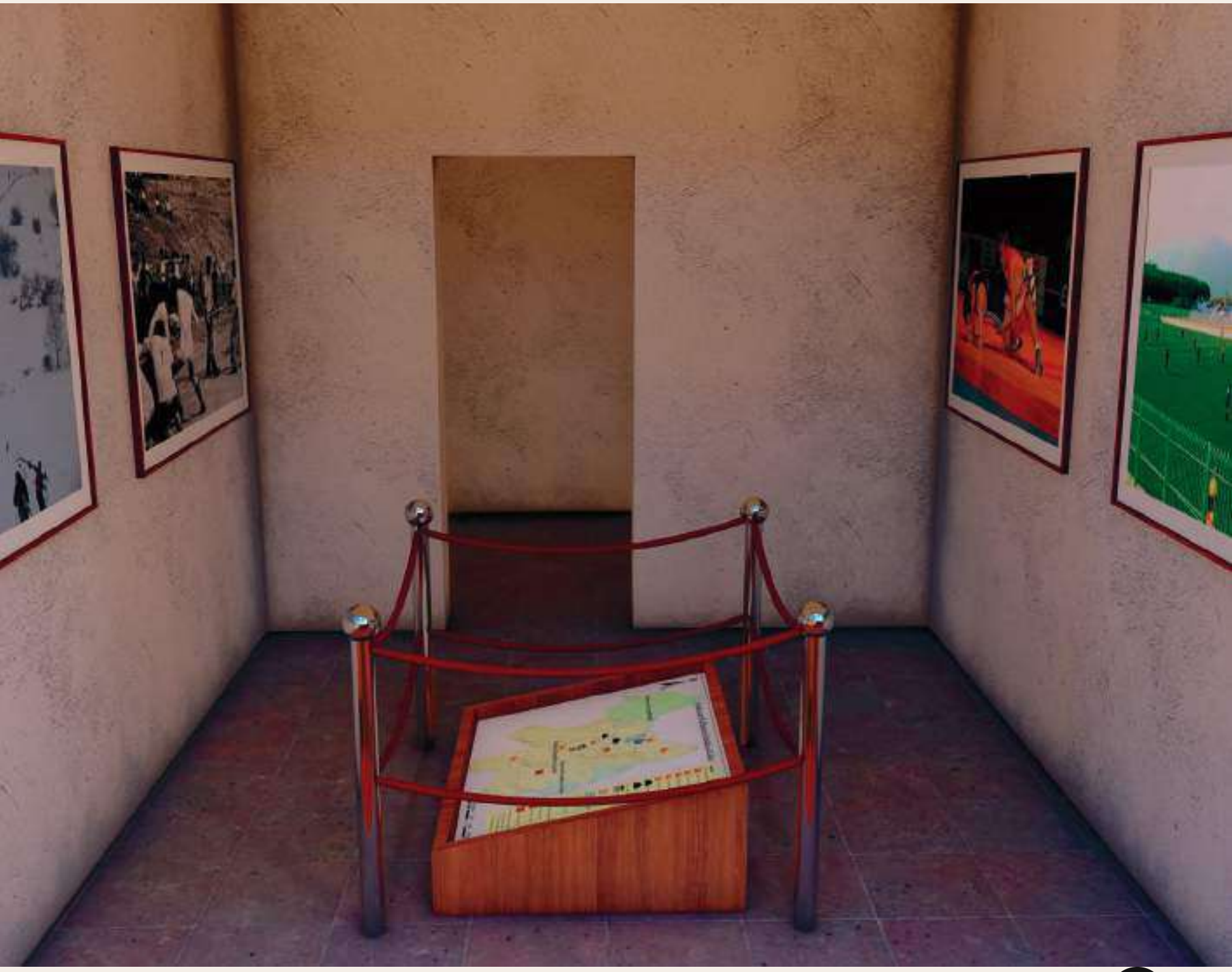
This tyrant understood that to "perfect" a totalitarian system of control you need totally impermeable border for the system to work. What made the Stalinist/communist borders so dystopic was the very intention to distort any classical perceptions of "borders," given that the main objective was to keep the entrapped inside, walled-in. When someone retells the story of these borders, it sounds like a description of some disturbing futuristic tale.

Gazmend Kapllani / BIRN

Safet Gjici, mayor of Kukës, was convinced that any underground museum would shed light on the dark side of the communist years. "It was a terrible time," he said. Half the country was informants and there were restrictions on everything. "We do not want to see those times again, not just for ourselves, but for anyone else on earth," he said.

Nowadays, where the vision of the mayor of Kukës, local tourism experts is to turn it into a tourist attraction. Financial support from the government, donors, businessmen would play an important role in realizing this vision.

The revitalization of the "underground city" is thought to be realized by the entrance of the Police, which will serve as the main entrance.




I GJITHE POPULLI ESHTE USHTARE


TE JESH MIK I LIBRIT, ESHTE NDER I MADH


TE GJITHE NE VOTIME


ballit
lhe dijen
bijve te sa


BETEJA E LUMES

The Battle of Lumë, also referred by the Albanians as the Uprising of Lumë (Kryengritja e Lumës), was a series of clashes between the Albanian locals of the region of Lumë in Ottoman Albania against the invading Serbian army in I9I2 during the First Balkan War period. The Serbians sought access to the Adriatic Sea but against predictions were defeated by the Albanian forces. As a result, Serbia's advancement to the west was delayed, which contributed to the safety of the independence of Albania on 28 November I9I2.

history

a place to remember
what we went through


YJET E PASHUARA


18 NENTOR 1944 ÇLIRIMI I KUKESIT

ethnography

The tradition of working wool in the avlémend is very ancient among women. Wool was used in the production of clothing and all the fabrics that a house needed. The popular motifs used in the production of carpets and rugs are characteristic and ancient, with colorful combinations with fine artistic taste, which cannot be found in any other area in Albania. In I963, a large handicraft enterprise began to operate in Kukës, which had I000 workers in the city and 200 in the village of Bicaj.


ODA E ZARMIT
ZEJTARIA
ART DHE MUZIKE

The old Kukës was located at the confluence of the White Drin and Black Drin. In 1976 the town was submerged beneath the Fierza Reservoir, which is held back by a dam. The new town (Kukësi i Ri - "New Kukës") was built in the 1970s in the plateau nearby which is 320m over the sea level.

With the completion of the central square in Kukës, the bust of National Hero Gjergj Kastriot Skënderbeu returned to his "home" on January I7, 20I8, which also coincides with the 550th anniversary of the death of the national hero. The famous bust, made by Odise Paskali, was first placed in old Kukës in I939, and since that year, due to various circumstances, it has been moved several times.

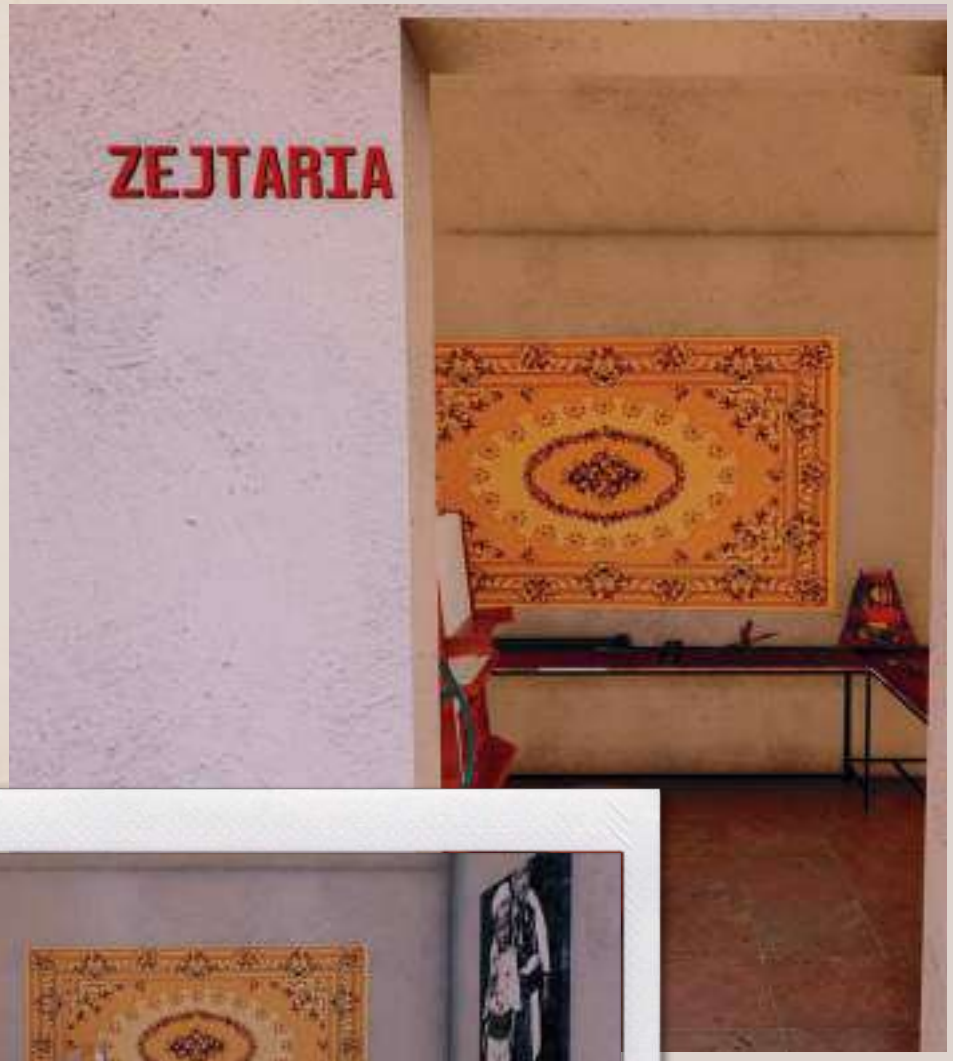

ART DRAMATIQUE

Artizane Lumës je
shoqen tande nuk e gjen,
nat' e dit' në vegj punon,
qylyma t'bukur prodhon.

Cucë lumjane t'lumshin durët
artizane, en' (end) qylymat.

Ti punon pa u lodhun,
me gëzim në vegjët,
lule t'bukra ti qenisë
mori lulja e malsisë.

Cucë lumjane t'lumshin durët
artizane, en' (end) qylymat.



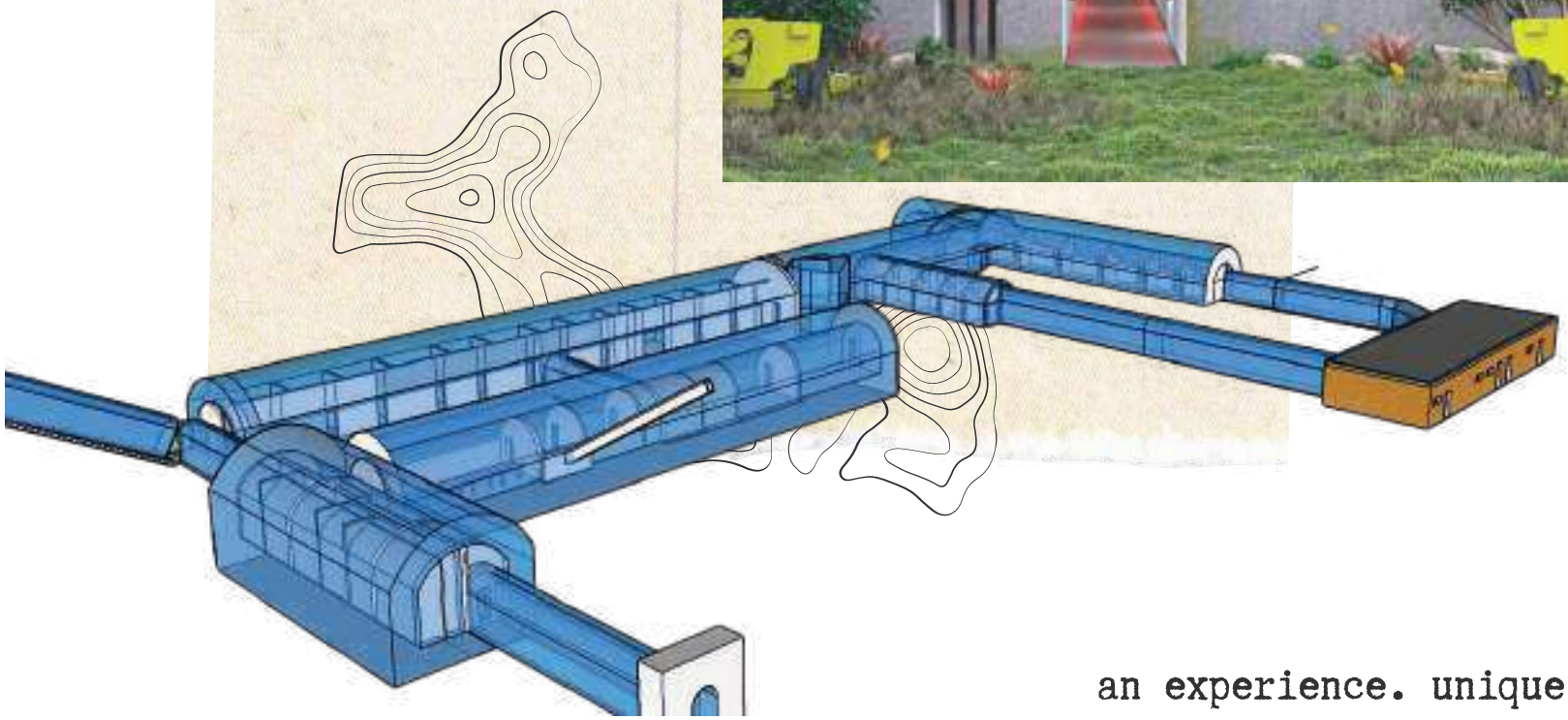
The pruchase of food, even with rations, could only be done at authorised cooperatives and with a tollon issued by the Central Committee. Here, too, there we long lines and desperately empty shelves.

Aldo Renato Terrusi / Memories


MINIERAT
BAKRI ÇAN BLLOKADEN


BAKRI ÇAN BLLOKADEN

Prepared by Msc. Bukurosh Onuzi
Architect Stiven Dragoshi
Ing. Florian Afrimi
Ing. Ermal Qazimi
Design by Hekuran Koka



an experience. unique.

ANNEX 9 - PP9' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Bar cultural site: Report on PP9' D.T2.5.1

"EMOUNDERGROUNDS" - "Project N° 905"

"EMOtional technologies for the cultural heritage valorization within transnational UNDERGROUNDS"

Adriatic-Ionian Programme INTERREG V-B 2014-2020 - 2nd call

Report on PP9's multimedia, interactive, accessible indoor/ outdoor installation designed and developed, for Bar project site (Del.T2.5.1)

Tourism Organisation of Municipality of Bar – PP9

Contents

Abstract

The "EMOUNDERGROUNDS" project aspire to systematize a set of interventions for the promotion, enhancement and better use of cultural heritage (castles, fortresses and other cultural buildings with underground passages) and consequently to reinforcing, in a sustainable way, the attractiveness and competitiveness of the Adriatic-Ionian tourist destinations, through the use of advanced information and communication technologies (ICT) – new media and emotional technologies – and innovative marketing tools. The project intends to enhance tourism development and sustainable growth, smart and inclusive growth of the areas involved, improving the quality of tourism and promoting new market-oriented cultural-creative tourism products. To achieve this objective, the project envisages the implementation of an integrated set of actions to jointly manage and promote, in a sustainable and innovative way, the identified cross-border cultural sites, integrating the offer of existing tourist services and improving their quality.

Introduction

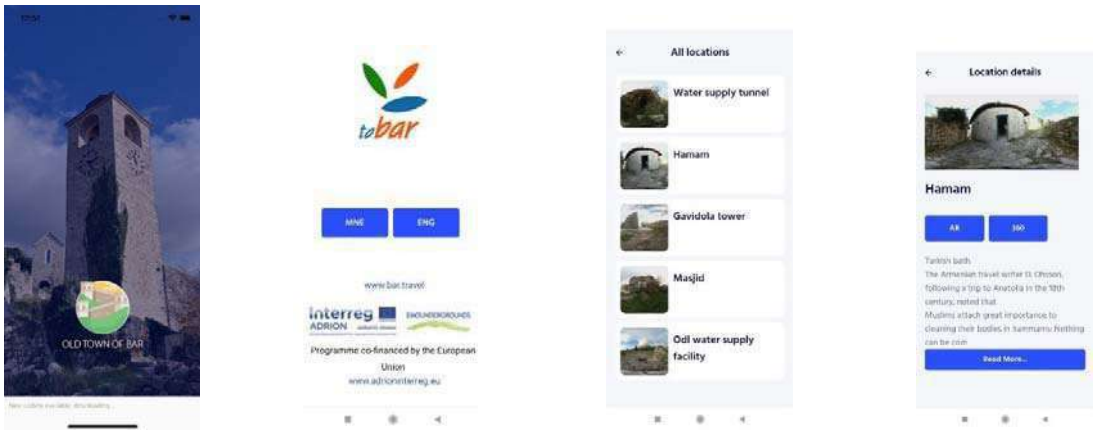
The specific goal of the small-scale investment implemented in Old town of Bar has been to design, develop and promote a cultural emotional and evocative path between history and legend for residents and foreign visitors, through multimedia technological exhibits settled in the centre for visitors and cultural path connecting five attractions in the old town. The areas hosting the equipment and technological systems, aimed at entertaining users and multi-target people, such as: tourists, families and schools. Digital displays, 3D animations, 360-degree shots, descriptions of locations designed by historians and tourist guides are included in an interactive mobile application. In addition to the new digital content, the area of the fortress of the Old town is covered by a wi-fi signal for the first time, which enables both domestic population and foreign tourists to use smart devices at the same locations.

1. Interactive mobile application

Pilot location in Montenegro was placed in the Old Town of Bar, where the synergy of culture and tourism was created, creating a new story that included a more attractive presentation of the location through innovative solutions that show in more detail the five points of interest of the old fortified town. Digital displays, 3D animations, 360-degree shots, descriptions of locations designed by historians and tourist guides are included in an interactive mobile application. In addition to the new digital content, the area of the fortress of the Old town is covered by a wi-fi signal for the first time, which enables both domestic population and foreign tourists to use smart devices at the same locations.

A center for visitors in the old town is now equipped with new furniture and audio-visual equipment that provides the opportunity for additional presentations of tourist attractions of Bar and other partner cities.

Additional value is represented by the new digital info-panel (billboard) which is positioned on the most frequented public square in the center of the city of Bar, where touristic and cultural contents will be presented on the spot with a special focus on the attractions of the old town of Bar.



Mobile phone interactive Application "Old Town Of Bar" - screen shots

The Application can be installed in mobile phones from Google's "Play store"

ANNEX 10 - PP10' Small scale investment as pilot application of technological/multimedia/interactive installation to manage /enjoy /enhance Trebinje cultural site: Report on PP10' D.T2.5.1.

"EMOUNDERGROUNDS" - "Project N° 905"

"EMOtional technologies for the cultural heritage valorization within transnational UNDERGROUNDS"

Adriatic-Ionian Programme INTERREG V-B 2014-2020 - 2nd call

Report on PP10's multimedia, interactive, accessible indoor/ outdoor installation designed and developed, for Trebinje project site (Del.T2.5.1)

PP10, TREDEA

Contents

Abstract

The idea of creating multimedia installation including procurement of appropriate equipment and digital contents production was derived from project's intention to develop joint cultural project to be valorized in tourism of whole project area. The EMOUNDERGROUNDS locations identified in all partners territories needed to be presented through various technologies defined by the project.

Creation of contents included usage of preliminary prepared material such as study on cultural attractors, material from photo campaign, then storytelling phase and usage of produced 2D/3D contents for virtual reality and multimedia/interactive demos. Different techniques were used for the post-production phase: character building, landscape and weather advanced simulations, visual effects sequences and motion graphic footage.

The equipment procured included outdoor and indoor totems, VR equipment, projection screen, audio equipment, furniture etc.

Introduction

Practical appliance of the EMOUNDERGROUNDS main idea meant development of almost unique installations by all project partners in order to make transnational tourism product which would include fortresses and similar EMOUNDERGROUNDS locations.

As already mentioned, this included installation of the equipment and usage of corresponding, already developed contents allowing technology to tell stories from the past.

The formal presentation of multimedia installation to wider public was on inauguration ceremony which was held on 06/12/2022 in Trebinje.
The event was organized in such way to present project itself but particularly new tourist offer of digitally presented fortresses which are normally not available to tourists due to its bad condition, long distances and inappropriate access roads.

1. Short description of the process

1.1 Procurement procedures

Digital contents

Procedure that was selected was Single tender procedure due to the total available funds of 17.000 EUR. First step was market research which was initiated in January 2022 by call for collecting info offers. Best offer was received by DIGI.ba Sarajevo which was offered to submit full tender documentation. Tender was opened in February 2022, process of submitting tender and selection procedure were successful and Contract was signed on 01/03/2022.

Equipment

Selected procedure was simplified procedure due to the total available funds of 44.300 EUR. After market research and collecting info offers, tender was sent to 3 addresses on 15/04/2022. The company KapitalSoft doo Trebinje was selected as provider through evaluation procedure. Contract was signed on 10/06/2022. All required equipment was delivered according the agreement and in time to be available for installation of contents and realization of inauguration ceremony.

1.2 Delivery of goods and services

Delivered equipment and contents was followed by establishing full multimedia installation of VR presentation of Austro-Hungarian fortresses (5 fortresses in total with presentation of authentic artefacts and authentic people from that time), audio assistant, two outdoor and 1 indoor totems filled with maps, texts, 3D models and other interesting interactive contents representing perfect introduction and kind of invitation for visiting VR presentation. Complete VR experience can be followed by other present visitors on projection screen from perfectly fitting furniture within the space at Museum of Herzegovina which was central commanding point of Austro-Hungarian army at the time.
On the entrance to the VR room, there is proper board corresponding with visibility rules with information about the project.

1.3 Formal introduction of multimedia installation

Multimedia installation is available to citizens and tourists from 06/12/2022 when inauguration ceremony planned by the project was held. It was an opportunity for formal opening and introduction of the product to visitors and media who covered the event properly.

Invitations to the inauguration ceremony were sent to public, non-governmental and private organizations – project actors and interested parties, tourism operators, citizens and tourists, organizations engaged in research and development of technologies, associations and organizations engaged in business development support, educational institutions.
Also, the event was strongly promoted through different channels. There were announcements on five different media as well as on social pages of Museum of Herzegovina and Trebinje Development Agency.

There were 105 participants who signed list of participants during the inauguration ceremony

Program of the event included addressing by TREDEA, City of Trebinje which was represented by Deputy Mayor and Director of Museum of Herzegovina. It covered presentation of project achievements and following subjects: "role of innovations through transnational projects", "tourism and heritage in Trebinje" and "possibilities for protection and tourism valorization of local heritage".

After media conference, program event was concluded by presentation and demonstration of interactive multimedia installation, while the opportunity was used to invite all interested potential visitors to come and experience the exhibition.

Live stream of the inauguration ceremony was streamed on Herceg TV Facebook page and was shared to Emoundergrounds Facebook page. Live stream on project FB page was followed by 639 people in total, and it is accessible on the following links:

https://www.facebook.com/herceg.tv/videos/722383102142085/?extid=NS-UNK-UNK-UNK-AN_GK0T-GK1C&mibextid=2Rb1fB
https://www.facebook.com/herceg.tv/videos/1089592968399735/?extid=NS-UNK-UNK-UNK-AN_GK0T-GK1C&mibextid=2Rb1fB

1.4 Photos of multimedia installation in Trebinje


KONCERT

The project is supported by the INTERREG ADRION Programme funded under the EuropeanRegional Development Fund and IPA II Fund