ICT Driven Platform for High-Quality Virtual Contents Creation and Sharing with e-Tourism Purposes. The Interreg IT-HR REMEMBER Project

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ABSTRACT

This paper describes REMEMBER, an EU project which aims at establishing a network for joint valorization of 8 ports in Italy and Croatia, trying to shift the paradigm of touristic flows toward a sustainable tourism. The key point is an innovative ICT architecture, modular and scalable, to share information at different system levels of detail and fruition, with an interoperable and multi-channel approach. Given its flexibility, contents can be conveniently displayed in different ways: Web portals, fixed installations, mobile devices etc. This infrastructure enables a great number of Digital Experiences (DEs) that can be exploited at both global and local scale. Since the project is on going, the paper presents a first overview of the instantiate methodology, as well as briefly introduces the DEs that are currently designed and, finnaly, reports a prospective outlook related to the post-pandemic scenario.

CCS CONCEPTS

• **Information and Communication Technologies** → **Virtual Museums**; *Tourism*; • **eXtended Reality** → Digital Cultural Heritage.

KEYWORDS

Virtual Museum, Digital Cultural Heritage, ICT, e-Tourism

ACM Reference Format:
Paolo Clini, Emanuele Frontoni, Ramona Quattrini, Romina Nespeca, and Roberto Pierdicca. 2020. ICT Driven Platform for High-Quality Virtual Contents Creation and Sharing with e-Tourism Purposes. The Interreg IT-HR REMEMBER Project. In *Proceedings of AVI²CH 2020: Workshop on Advanced Visual Interfaces and Interactions in Cultural Heritage (AVI²CH 2020).* ACM, New York, NY, USA, 4 pages.

1 INTRODUCTION

Digital tools have demonstrated to be an enabling process, not a solution [7]. As several experts in digital humanities, economic operators, private touristic stakeholder testify digital is a stimulus to start a new agenda in sharing responsibilities and opportunities coming from tangible and intangible cultural heritage. According to this idea, the authors of the present paper participate in an Interreg project, REMEMBER (REstoring the MEmory of Adriatic ports sites. Maritime culture to foster Balanced tErritorial growth) that aims to develop a joint valorization of a network of 8 ports in Italy and Croatia, trying to shift the paradigm and the touristic flows toward a sustainable tourism 1. A key point is the development

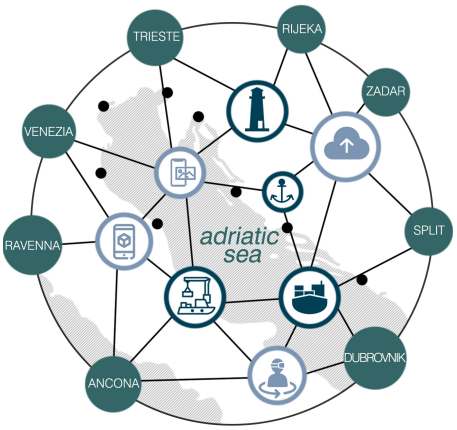

Figure 1: The network of the REMEMBER project. The authority ports, the Adriatic sea as the common identity cultures and their digital links with the new Virtual Museums.

and exploitation of a cloud-based platform, allowing the important feature of the cross-border collaboration among partners and facing the challenges that are endangering the integrity and the same existence of the Adriatic maritime cultural heritage. REMEMBER VM is expected to increase the attractiveness of local economies using ICT for the digitalization of cultural contents, growing the touristic offers to reduce tourism seasonality and create new and qualified jobs linking digital and cultural competences. As research unit we serve as domain expert and advisors, thanks to previously carried out experiences [2] [1] for the development of Virtual Museums for 8 Adriatic Italian and Croatian ports sites (Ancona, Venice,

AVI²CH 2020, September 29, Island of Ischia, Italy
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CEUR-WS.org/Vol-2687/paper11.pdf

Trieste, Ravenna, Rijeka, Zadar, Dubrovnik, Split). The main goal is to promote the valorisation of the important maritime cultural heritage of more competitive and balanced development paths in the programme area. Another key aspect is constituted by the digitalization: both tangible and intangible cultural heritage is involved in a digitalization process in order to guarantee a huge and significant data collection for exploitaiton and preservation of the involved ports identity. In fact, preservation is a mandatory step for promotion, as well as those action are a form of projection beyond the current state, to the future development directions [6]. The port-maritime intangible cultural heritage is continuously recreated by the community. Fixing this aspect means to recover and enhance the relation between ports and cities, by linking the present with the past. This double-faced view remarks origins of port-cities identity and its richness in terms of culture, works, productions, investments and how the port system is still operating as an engine for the local community. The ports operating in the project share a territorial proximity with a consequent common background and sense of belonging resulting from the commercial and social relationships between the two Adriatic shores. Those concepts are condensed in the brand of the Network and in its name: ADRIJO. Adrijo joins the Adriatic Sea. It combines the Italian word ADRIATICO with the Croatian word JADRANSKO. The new brand constitutes an invention, it is the result of a cognitive and creative process, the result of a linguistic construction that unites, by mean of the language, the two shores.

2 METHODOLOGY

The mainstream upon which will be built the exploitation of REMEMBER project is an innovative ICT architecture. It is modular and scalable, representing an important communication system that facilitates all the stakeholders involved in the project to exploit many kinds of information at different system levels of detail and fruition. It allows to manage multiple information with an interoperable and multi-channel approach. Given its flexibility, contents can be conveniently displayed in different ways: Web portals, fixed installations (totems, digital signage), mobile devices (smartphones and tablets) etc. The final goal, will be to create a great number of Digital Experiences that can be exploited at both global and local scale. Such Digital Experiences will be built on the backbone of the cloud service, and in particular relying on three main items:

- **content**, such as texts, images, photos, audio-visual contents, 3D models, diagnostic data;
- **equipment**, namely hardware and software components;
- **technology development** deployment of the experience, considering the adaptation to the different devices, according to the type of desired experience.

The big picture of the developed framework is depicted in Figure 2

2.1 Cloud Based platform

The architecture is developed following the cloud-based services paradigm, with the aim of creating a long-term and linked open data platform, designed for CH-related repositories. This approach allows interoperability between different platforms (on site, online, mobile) and between different users (augmented usability of

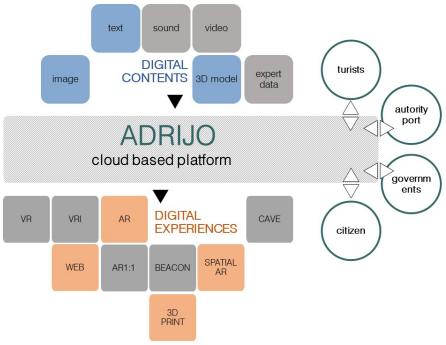

Figure 2: ADRIJO cloud-based platform. The same digital contents are used for the different digital experiences (DEs). The user of ADRIJO have an active role for the production and fruition of the DEs.

metadata for both experts/non-experts). Moreover, the architecture allows different kind of users to manage and maintain it in a simple, fast and secure way. Particular attention is paid to the integration of the information. In fact, while populating the data base, different stakeholders, as well as heterogeneous data, can be involved. The key value of the whole project is that the ICT system is able to convey information at different scales, providing the users with updated contents; at the same time, administrators can constantly monitor its performances, being able to infer useful information about tourists' needs, habits and preferences [3, 5]. The main features of the system can be summarized as follows:

- creation of the single cloud-based architecture that allows the management of multiple multimedia contents, to be exploited in various platform;
- development of the unique content management system for all stakeholders to share cultural information;
- monitoring user's preferences and needs by collecting users' generated data

2.2 Data

The architecture assures efficiency in the management of context-aware services, analysing data arising from different experiences. The cloud platform will be able to offer a great number of IT services, relying on two mutual task: from the one hand, the managing of information about Heritage and, from the other, allows the single instruments to exchange data in an interoperable way. The platform is designed for managing heterogeneous data, with the aim of enabling all the stakeholders to contribute with their own content. As such, the system enables:

- the integrated management of data and resources to ensure the integration and cooperation of the technologies used in the platform;
- the management of levels of interoperability between applications and services present at different levels of the platform;
- the management of rules according to the context of application and user typology.

2.3 Digital Experiences

The use of digital technologies plays an essential role in the creation of highly evocative and engaging products and installations, which allow visitors to learn about cultural heritage and sites through more stimulating, emotional and interactive experiences. However, the design of digital technologies requires a strategic vision that allows to place the technological element in a coherent plan of communication of identities, memories and cultural contents, starting from a clear identification of the objectives and aims of the interventions. These different approaches, which may also intersect or overlap, have to enhance the cultural asset/site in a user-centred perspective. The Digital Experiences allowed by the project are briefly summarised in the Figure 2.

In addition, it should be pointed out that the ADRIJO platform already enables interactive and engaging Digital Experiences. Every innovation and research action is successful and achieve an important impact, if it establishes good connections with interested researcher and user communities. The web platform plays a fundamental role in exchanging information, keeping up to date with the latest developments and disseminating the results. Nowadays, this can be best achieved through digital channels and social media exploiting the advantage of being able to present information to a diverse group of people at the same time and on demand. It can not only provide basic information that is static but also deliver reoccurring and constantly changing pieces of information. The web-platform will enable users to look for specific content on the website and/or on mobile applications. All contents developed by the partners during the project will be made accessible on both the website and the mobile application. A major challenge in the development of the platform, that is currently under design phase and usability validation, is the multi scale approach to the Adrijo Heritage. In fact, the platform will contain contents covering the 8 ports of the Adriatic sea and, if necessary, the hinterland and it can be visited remotely, i.e. in geographical locations far from the POIs. In this case, Adrijo will propose all the contents with a keywords-based strategy, within the geographical interface. On the other hand, if the platform will be used in one of the ports, the platform will react responsibly to the geographical coordinate of the mobile device, proposing firstly content closer to the user. In this way it will also automatically become the local version of the VM, trying to maximize the usability of the interface and not requiring the user to use too many menus and steps. In addition it is worth to mention that the database manages Virtual Tour (by panoramic images or 360° videos also taken by drones), offering a simple but efficient tool to visit the spaces. It consists in the panoramic photos (scene) linked together, visible at 360° in immersive mode, and enriched by other metadata (popup), e.g. texts, sounds, HD images and videos. A simple graphic interface allows to enjoy the 360 experience for all users, also not experts or not digital-friendly users (e.g. google maps, with few control and global icon). When it is possible, the virtual tour would have a marked map where the 360 view hotspots are shown. This allows to move in the interested panoramic photo, skipping the obligatory path.

For the development of DE in the local level of the VM, in particular in Ancona VM, the UNIVPM unit is analyzing and studying the adaptation of an hybrid form of geo-located contents displacement, merging also AR Vision-based tracking, as summarized in Figure 3. Firstly the user receives an overview of the surrounding area of the POIs, in fact after framing a QR code or the Adrijo logo, an automatic play of the introductory video of POI is foreseen. Then, the device tracks camera pose by detecting and recognising geometric features in the real environment to establish 3D world and 2D image coordinate correspondences. This approach can provide realistic real-time camera pose tracking. However, rendering virtual objects over the real environment could be slow due to the large amount of processing required. Considering this fact, we are planning to use AR only to displace tags that link to videos or VR experiences.

Figure 3: ADRIJO cloud-based platform. The same digital contents are used for the different digital experiences (DEs). The user of ADRIJO have an active role for the production and fruition of the DEs.

3 PROSPECTIVE OUTLOOK

The pandemic scenario depicted new challenges for virtual museums curators, in fact the COVID-19 outbreak has underlined the critical importance of digital access to cultural heritage. In this light, because the REMEMBER partnership is currently instantiating its main tool and gate, that is the Adrijo platform, the idea of putting it at disposal to a new plethora of stakeholder seems particularly interesting. Considering the turning point in which all European countries need to democratise access to our heritage in order to support diversity, inclusivity, creativity, and critical engagement in education and knowledge sharing [4], the already outputs foreseen by the project should be very important. The REMEMBER partnership and the new Adrjio network should assess new experimentation in strengthening the capacity for innovation and promoting the use of digital technology and expertise, improving our cultural institutions role in telling our European stories. In particular it is mandatory to constitute permanent networks in which public institutions cooperate and involve the private sector in digitising cultural material, in order to increase online accessibility of European cultural heritage and boost growth in Europe's creative industries [8]. .

ACKNOWLEDGMENTS

The project here presented is funded under the Interreg IT-HR programme 2019-2021, Application ID 10042741. The content of this document reflects only the author's view and the Programme

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