European Commission

ReInHerit

Redefining the Future of Cultural Heritage, through a disruptive model of sustainability

ReInHerit
Redefining the Future of Cultural Heritage

www.reinherit.eu

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Acronyms and abbreviations

European Commission	**EC**
Research Executive Agency	**REA**
Grant Agreement	**GA**
Consortium Agreement	**CA**
Description of Action	**DoA**
Project Coordinator	**PC**
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Contents

Executive Summary

The “Free Smart Tourism Apps Report” (D7.9) documents the material to be included in the Smart Tourism application, its technical features, and its availability. It shows the types of interaction between users and the integration of the application into social networking. More specifically, it aims to present the objectives of the application, its target group and potential impact for the cultural organisations who will use it along with an outline of its suggested routes. Detailed technical specifications of the app and the description of its functionalities are included. This report also features examples and reporting of the pilot testing of the app on selected sites. The aim is clearly to enhance user engagement and interaction and to offer users an enriched cultural experience.

Introduction

The Smart Tourism app of WP7 has been developed to provide an interactive and engaging experience for the users. To this end, AI and CV have been used to add functionalities to recognize landmarks, inviting the users to look around to recognize them, and to recommend landmarks and interesting spots based on the interests of the users. The aim is to enhance the experience of the visitor, providing authentic, active, and unique "like a local" experience using AI, computer vision and the specific preferences of the users of the app. Hence, the focus of the app is increased user engagement, interaction, and co-creation.

The goal is to go beyond providing a simple list of categorized visits; Computer Vision is used to either inviting the user to look around and recognize the landmarks or answering the user about landmarks that attracted their attention; AI is used to evaluate automatically how a landmark is related to another, based in the descriptions provided in the guide, and use this information in a recommender algorithm that suggests similar content and also some unexpected suggestions to account for some serendipitous discovery.

The app has been developed as a native Android application, because of technical limitations that don't allow it to implement it as a web application, due to the limitations of the current main frameworks for computer vision based on Javascript. On the other hand, Android is the most popular type of device in Europe (~66% in 2022[1]) and caters for low and mid-end devices, making the app thus more inclusive.

The application has been designed to ease its deployment in contexts other than ReInHerit, to simplify its reuse. To create the content of smart guides it's enough to write descriptions in a simplified text format that uses HTML tags for formatting, so any organization capable of producing a web site can create its own version of the app.

As for the rest of the ReInHerit toolkit, the full source code is available on the Digital Hub. The application has been co-designed by the ReInHerit partners, in particular a series of meetings have been organized by the Museum of Cycladic Art with UniFi-MICC; ECTN and BoCCF, to discuss features, design of the app, establishment and content of tours.

What is the definition of Smart Tourism?

Smart Tourism as per the European Union's Smart Tourism Initiative looks to "promote smart tourism in the EU, network and strengthen destinations, and facilitate the exchange of best practices". Following this definition, smart tourism "responds to new challenges and demands in a fast-changing sector, including the evolution of digital tools, products and services; equal opportunity and access for all visitors; sustainable development of the local area; and support to creative industries, local talent and heritage."

[1] https://www.statista.com/statistics/639928/market-share-mobile-operating-systems-eu/

European cities recognized as smart tourism destinations are assessed taking into consideration four criteria: sustainability, accessibility, digitalisation as well as cultural heritage and creativity. Smart Tourism is thus closely associated with the preservation and promotion of cultural heritage and digitalisation, in sustainable cultural tourism development and promotion.

Another definition defines smart tourism as the type of tourism that requires the integration of many factors and components such as high-level physical and information technology infrastructure services, well-trained human resources, increased management understanding and leadership spirit, effective promotion and marketing practices, cooperation between stakeholders and environmental awareness (Ödemiş, 2022).

The aim of Smart Tourism is to promote innovation for the benefit of smart destinations in Europe, to enhance tourism offers for visitors and to facilitate new partnerships. It also aims to foster the EU's forward-thinking tourism offer to global audiences and sustainably increase attraction to pioneering destinations that offer unique visitor experiences. Cultural Heritage aspects are about protecting and capitalising on the cultural heritage, as well as local potential and its creative assets for the benefit of the tourism destination, the industry and the visiting tourists in general.

According to the United Nations World Tourism Organization (UNWTO), a smart tourism destination is a destination with a strategy for technology, innovation, sustainability, accessibility and inclusivity along the entire tourism cycle: before, during and after the trip. A smart destination is also one which plans services and tourism offers taking into consideration the needs of residents as well as tourists, multilingualism, cultural idiosyncrasies and factors of seasonality for each destination.

Main features of the app:

Taking into consideration the framework of the Transition Pathway for Tourism – EC DG GROW (2022-2030) and the smart tourism definition, this app is created with the aim to contribute to the digital and green transition as well as to the digitalization of SME's, especially smaller museums and cultural heritage organizations which lack the know-how, human resources or budget to invest in smart tourism apps which enrich the visitors' experience. The app is also expected to enrich the cultural offer of different destinations as it is easily adaptable and contribute to a multimodal travelling style, introducing visitors to a like-a-local experience through smart tourism digital tools.

The Smart Tourism App also contributes to the following:

Accessibility:

The Smart Tourism app aims at offering an app which will be digitally available to all travellers or visitors– regardless of age, cultural background or any physical disability. At the same time,

through audio descriptions, the app will also cater to the needs of visually impaired people who could use the app accompanied by their escort.

Sustainability:

Beyond seasonality of tourism, the smart tourism app aims at offering an enriched tourism experience for visitors all year round in all the countries it will be offered. It will also manage to include the local community from the scope of professionals of cultural heritage who can integrate it in their cultural offer and from that of the residents, who will have the opportunity to revisit important sites of their city using an interactive digital tool.

Digitalisation:

The Free Smart Tourism app aims at supporting museums, cultural heritage organisations or tourism businesses, especially smaller ones, by offering the opportunity to use a digital tool which is free of charge, easily customizable to the needs of their customers and offering an enriched customer or visitor experience. Organisations can create their own app based on the smart apps prototype as it is open source and freely available as part of the ReInHerit toolkit. The app, apart from offering digital information on attractions and specialized guided tours, it will also offer the possibility for users to purchase tickets for different museums or sites online by offering links to the organisations' online ticketing pages.

Cultural Heritage and Creativity:

The focus on cultural heritage and creativity means protecting and capitalising on the local heritage as well as cultural and creative assets for the benefit of the destination, the industry and tourists. The Smart Tourism App achieves that by offering information on attractions also located near more famous ones which tourists would not notice without the app. This way, it is used to promote lesser-known attractions, history facts about different neighborhoods which are not the typical touristic neighborhoods and boosts the local economy by putting thriving local businesses or businesses with important history on the spotlight. Moreover, the sites and points of interest of the app are also chosen based on the way they promote creativity and cocreation through their events or workshops they offer for the public. By incorporating the tangible and intangible heritage of art, history and culture in its centre and surroundings, from local cafes to specialized museums, parks and open-air archaeological sites, the smart tourism app contributes towards an enhanced and holistic tourism offer.

Application objectives and target groups

As a valuable contribution to ReInHerit project's recommendations for sustainable cultural heritage management, as mentioned in the CH Sustainable Management Guidelines, 2nd Policy Brief produced in the framework of the project, the Free Smart Tourism App is an open access app available to all heritage professionals with technical documentation through the Digital Hub. This will allow especially small organizations with limited resources to re-implement the

app. It aims at creating human ecosystems, by strengthening the collaboration of professionals through digital infrastructure and experimentation (testing) of innovative technologies via the app.

Based on the "user-centered" approach adopted for the ReInHerit Toolkit, the Free Smart Tourism App aims at developing phygital interaction and expanded user-experience, by offering all visitors the opportunity to use an app where they can customize its content based on their needs and, at the same time and at the same time experience more in an area, like a local, especially sites they may have missed otherwise as they are lesser known, promoting immersivity and interactive experiences.

In line with definitions of smart tourism given by the European Union and the definition of smart tourism destinations by the UNWTO, the Smart Tourism App of ReInHerit aims to become part of the next generation of cultural tourism promoting sustainable mobility, accessibility, creativity as well as community engagement and co-creation.

Smart destinations deploy digital applications which offer increasingly customized services and add value to cultural tourism destinations. At the same time, they respect and preserve the natural, social, and cultural environment of the destination.

The Smart Tourism app of the ReInHerit project aims at enriching tourism experience and quality of life by promoting sites of interest which are based on users' preferences and at the same time make resourceful use of cultural heritage and creative industries. They are more accessible, greener, foster creativity and promote sustainability through their actions. More specifically, the Smart Tourism Apps will promote museums, archaeological sites, galleries, tangible and intangible heritage in the local area, using new technologies and taking into account the needs of the users.

The objective of the app is to become an easy to adapt prototype which can be passed on to other museums and organisations who wish to offer a holistic and enriched experience to their visitors, paving the way for synergies between cultural heritage institutions, creative industries, cultural tourism, and other stakeholders. At the same time, the app will offer a" like-a-local" perspective, as each institution which takes it up, will have the opportunity to present its neighborhood, the top things to do and can also promote lesser known but still very important sites.

The app provides information on sight-seeing routes, museums, archaeological sites, hotels, shops, and restaurants, ticketing, opening hours etc., while letting the service providers who will later take on the app customize it to their own needs and create their own content for better targeting of their audiences.

1. Target groups

The app addresses two main target groups:

1. **Visitors:** tourists who visit a museum or cultural heritage site wish to explore the area further and are interested in its cultural offer. This app offers them the opportunity to have a say on what they will visit and customize what the app has to offer to them based on their own interests and criteria. The smart tourism app aims also at increasing local community engagement and subsequently the number of locals who visit museums and cultural sites in their own country. This can be an attractive offer also for those who want to have the opportunity to revisit important parts of their city and rediscover it.
2. **Cultural heritage institutions and museums:** cultural heritage institutions were involved throughout the development of the content of the app and are the ones who can also take it up and use it after its final development. The Smart Tourism App will be available for free and particularly beneficial for smaller cultural organisations which aim at increasing audience engagement through digital tools. Each institution will have the opportunity to use the app and feed it with content tailored to their own organization and area.

Application description

The application has been designed to be self-contained and capable of working even in case of no internet connection, providing the main functionalities (although some features like links to external resources will not work in this case).

Fig. 1 - loading screen

When the application starts, the users are asked to provide some preferences about the type of landmarks (e.g. museums, monuments, places, parks, buildings, etc.) that they prefer, and then they are asked about attributes or properties of interest (e.g. green tourism, accessibility, “like-a-local” places, etc.). This information is used to personalize the experience, and a set of suggestions on places to visit is provided. The user can always update the interests later, in the settings of the application.

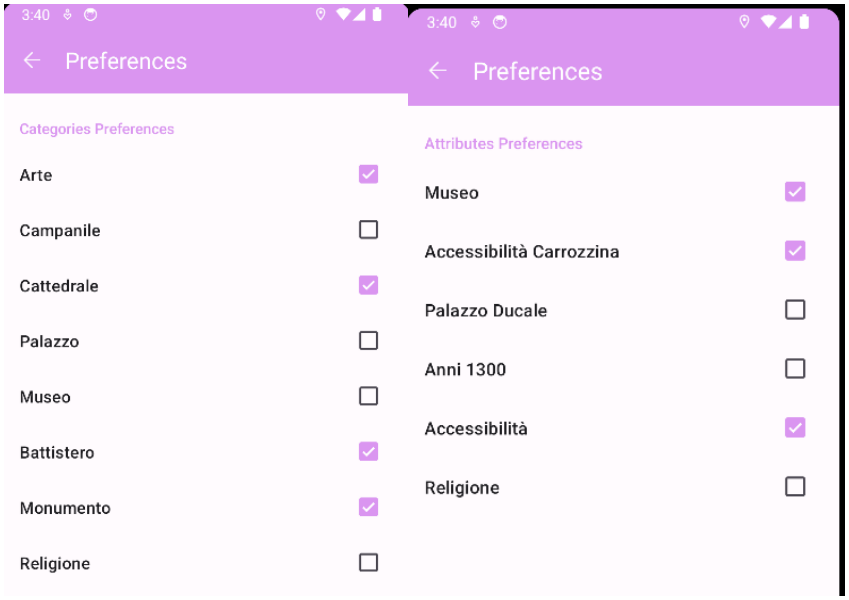

Fig. 2 - example of categories selection

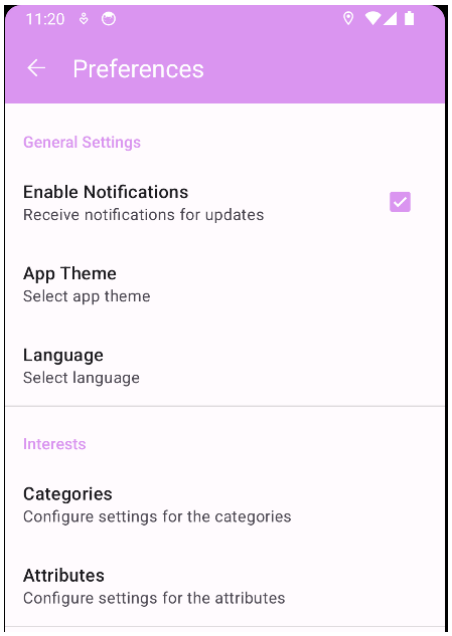

Fig. 3 - app settings: categories and attributes of interest can be updated by users while using the app.

The order of the suggested landmarks changes as the user interacts with them, e.g., reading their content, taking photos of them, based on how many attributes match with the interests and based on the whole history of the visit. Distance to the landmark is also considered.

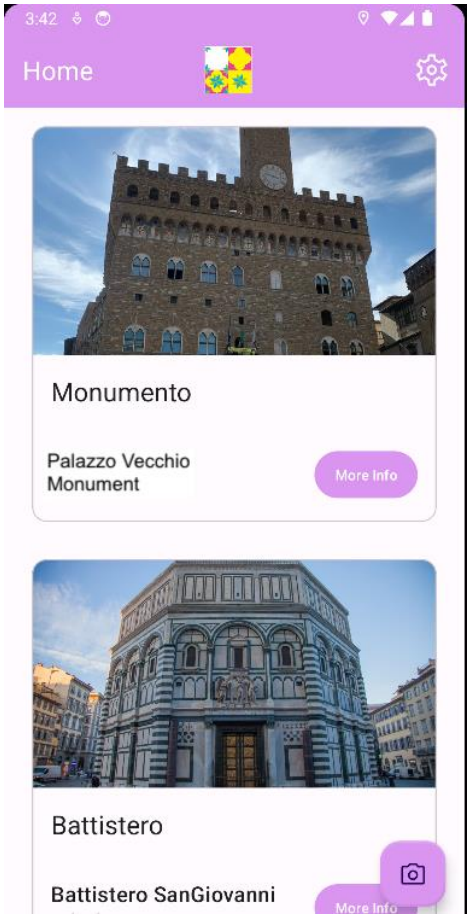

Fig. 4 - home page: start of the visit with suggestions based on user's preferences

Each landmark is described by a multimedia description that includes:

- text (this text is used by the recommender component of the app)
- images
- videos
- audio
- links to external services, e.g. official website, ticketing service, etc.
- link to Google Map to get directions to the landmark
- recommendations to other landmarks

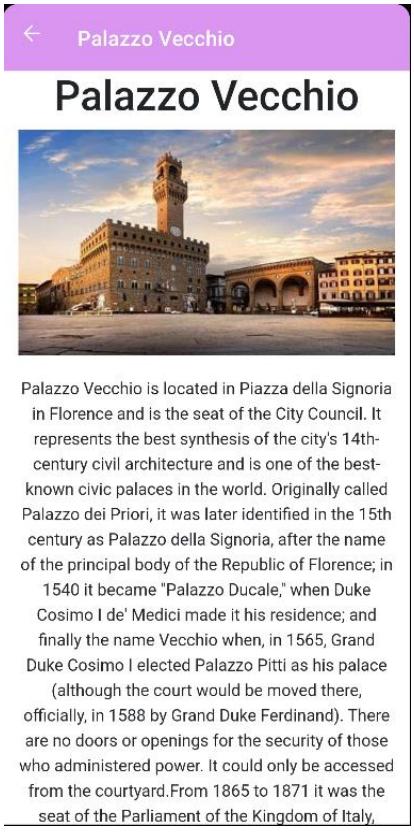

Fig. 5 - example of information on a selected or photographed landmark

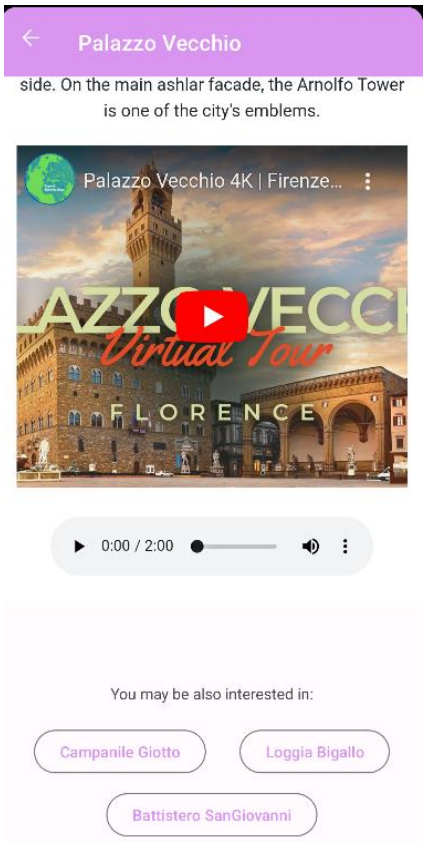

Fig. 6 - multimedia information and recommendations of other landmarks

Interactions with the information are considered as implicit signs of interest and used as an additional element when suggesting places.

The “Floating Action Button” (FAB) at the bottom of Fig.4 allows one to recognize a landmark using the camera of the smartphone. When the landmark is recognized, the corresponding information is shown. The act of looking for information using the camera is considered as an implicit sign of interest by the user and is used to compute recommendations.

The application notifies the user if he is near one of the landmarks that are part of the tour/guide, to elicit an interaction and drive the curiosity to discover what landmark is nearby. The FAB gets activated only if the landmark is near to avoid frustration of the user in case nothing in his surroundings is part of the planned visit.

Main components

The app is composed of two main components:

- a Python package that generates the database of routes used in the application; this package is executed before packaging the app for distribution;
- an Android application that contains all the functionalities of the app, from landmark recognition to recommendation

The Python package has been dockerized, following the strategy of the ReInHerit toolkit, to ease the installation of the system to create new versions of the apps and new tours. The Docker file will manage the installation of the following libraries needed to create the route description database:

- imutils
- albumentations
- tensorflow
- opencv
- pandas
- gensim
- progressbar
- faiss-cpu (Anaconda required)
- scikit-learn

The database created with the Python package is a set of SQLite files, copied in the Android package so that they are included in the APK file used to distribute the app, e.g., on an app store.

The Android app is used to generate the APK from the Android Studio IDE. Each time the route information is changed or created for a new location the APK is re-generated.

The Android app is developed in Java, the most popular language for this type of development, avoiding the use of Kotlin as it is more recent and less developers may be acquainted with it, in case of future open-source development.

Route description

The format used to describe routes is based on a simple director-name schema for landmarks. Each landmark is described using text files written in a simplified Markdown format that also allows the use of HTML tags to include multimedia elements. Multi-linguality of the app is supported in the guide itself, providing the files in directories named after the provided language. The app, during the database loading, finds all the available languages and let users select the appropriate one as shown in the following figure.

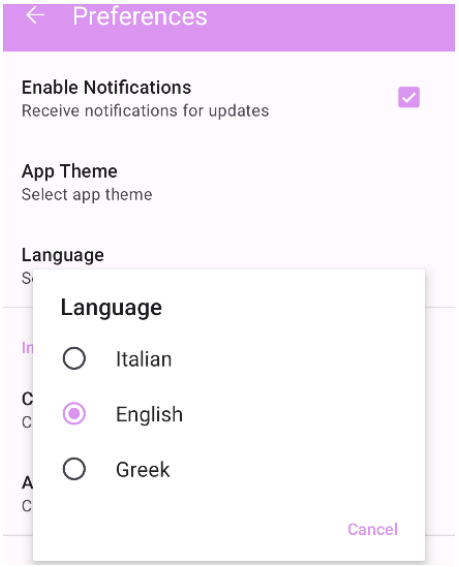

Fig. 7 - language selection

The first rows of each file are used to provide landmark coordinates, categories, and attributes. Since neither markdown nor HTML have specific tags for these, markdown comments are used to mask the information. These metadata are used to match the interests of the users with the routes and provide recommendations.

The content of markdown files is then used in the application when presenting the information of each landmark, using a rich viewer capable of displaying formatted and multimedia content such as videos, audio, images, and external links.

To implement the visual recognition of landmarks each landmark description is paired with a set of images that are used to create a database of images representative of each landmark.

Landmark recognition

The visual recognition of landmarks is based on the system developed in the Smart Tourism Guide component in WP3, using a Content-based Image Retrieval system. Details on the system are provided in D3.8 Toolkit Phase II deliverable, in this section, we briefly summarize them and highlight a novel addition to the system implemented to improve its performance.

When using the camera to recognize a landmark, e.g., because the app alerted the users that they are nearby it, or because the users got curious about a monument or building that is of interest for them, the image captured by the smartphone camera is automatically augmented, creating a zoomed in and a zoomed out version. Then the original image and the two augmentations are processed by a neural network that computes an "embedding", i.e., a numerical vector that describes their contents. This description is compared with the visual descriptions of the images used in the guide that have been computed when the guide has been created. The neural network used in the app has been designed to work on mobile phones, even in case of low-end devices.

In addition to visual recognition, GPS information is also used to restrict the choice of the landmarks to be matched. This reduces the risk of false detections and has been introduced to deal with the set of locations provided by The Cycladic Museum.

In addition to the use of the neural network, a second step of image matching is implemented in case the distance between the most similar and the second most similar landmark is too small, i.e., the neural network is unable to correctly recognize the landmark. In this case also local visual features, called ORB are used as an additional step to evaluate the match. These local features have been selected as their computational cost is very low which make them suitable for mobile devices. Their computation has a negligible effect over the overall speed of the process.

The function to take photos of landmarks to be recognized is activated only when the user is nearby them; the application alerts the user about this possibility. This happens to prevent the user from taking photos of locations that cannot be recognized and getting frustrated in the process.

It must be noted that no image is ever stored; the images taken by the users are not stored on the device, same applies to the images used to create the routes since only their numerical descriptors are stored in the database of the app.

Recommendation

The recommendation of landmarks to visit is based on different elements; when the application starts the first time it is based on the preferences explicitly selected by the user in the first two screens of the application; landmarks are shown based on the distance w.r.t. the position of the user, to ease reaching the first location of interest. Then, as the user interacts with the application is getting information about the landmarks of interest, both through recognizing them thanks to images or by selecting their descriptions, other elements are considered including, the semantic description of the landmark and the number of interactions with the landmarks.

To represent the semantic description of each landmark, an embedding is computed from the textual part of the description of each landmark. This numerical representation is used to compute which other landmarks are related. The embedding is computed during the creation of the SQLite files of the guide, using a Doc2Vec representation. Again, tied relevance scores are solved based on distance from the position of the user.

To allow some serendipitous discovery of locations it is always also recommended a landmark that has relatively low relevance for the user. Since this recommendation is done only to allow discovery of unexpected locations, it is presented as the last element of the list of recommendations.

It must be noted that the computation of the recommendation is performed on the device and that the history of the visit is maintained private on the device. No data is shared with external servers, and GPS locations are not stored.

Privacy concerns

Following the Android standard GPS and camera access is requested to the user the first time that the app is started. As reported in the previous sections this data is not stored nor shared with any third party and is kept private.

The history of the visit, the interactions with monuments and landmarks and the recommendations are kept private in the app and are not accessible.

The neural network used is called MobileNet v2. No model card was written by the authors of the model, developed by Google. The description of the network, taken from the original read-me file says:

“MobileNets are small, low-latency, low-power models parameterized to meet the resource constraints of a variety of use cases. They can be built upon for classification, detection, embeddings and segmentation similar to how other popular large scale models, such as Inception, are used. MobileNets can be run efficiently on mobile devices [...] MobileNets trade off between latency, size and accuracy while comparing favorably with popular models from the literature”.

The network is indeed used in the application to compute embeddings. So far, the computer vision community has not reported any critical aspect regarding biases or unfairness in the computation of such embeddings. The network has not been fine-tuned and the original checkpoints provided by the creator have been used.

As far as the image and content rights are concerned, the images used for the purpose of programming of the app were kindly offered by the cultural heritage organisations which represent the landmarks or were taken by the Museum of Cycladic Art.

All texts produced were the result of thorough research based on available biographical resources. All organisations representing the landmarks have given their approval of the texts and images and agreed to be included. They are also asked to fill in an online form mentioning that they consent to be included in the Free Smart Tourism App developed in the framework of the ReInHerit project.

Social media sharing

Social media sharing of the landmarks of interest, to create a shared track of a route, is supported through the Facebook Android SDK that allows to share content on the social

network. This requires the creation of a Facebook Developer Account to compile the application and the Facebook app must be installed on the device when sharing the content.

Smart Tourism App Content

The development of the app was the result of brainstorming and cocreation. Initially, the idea behind the app was to create a smart tourism app which uses Computer Vision (CV) to identify landmarks and monuments and give information on them. This would be used as an additional digital tool at the disposal of the users who would visit a site, in our pilot case the Museum of Cycladic Art in Athens, and then discover the area in which the museum is located and its cultural offer.

Later on, taking into account the broader smart tourism and destinations definitions by the European Commission and the UNWTO along with the results of ReInHerit's primary research which called for greater visitor engagement and the development of tools that allow to create personalized visits, the Museum of Cycladic Art presented certain types of tours to be offered through the smart tourism app. The main aim is to create an app which will allow user interaction and also the creation of specialized tours based on the users' interests and preferences.

To ease the testing of the algorithms of the app in the field, an initial small guide has been developed using landmarks of the city of Florence. This step has allowed us to test critical cases like the ability of the computer vision system to distinguish visually similar landmarks especially in cases of occlusions, like the Duomo of Florence, the Giotto's bell tower and the Battistero. This type of testing was only partially possible using the Paris dataset described in D3.8, where the landmarks did not have occlusions.

The field tests show that the system is able to correctly recognize also similar landmarks that are geographically near, even in cases the GPS information cannot help.

The Museum of Cycladic Art has developed a set of contents related to Athens, reported in the following, providing both textual descriptions for the guide and images for visual recognition of landmarks. Indeed, testing with these images has led to the introduction of two elements of the application:

- the addition of the GPS location to filter the number of visual matches to those geographically nearby, to address both a reduction in the computational cost of the operation and an increase in the detection performance;
- the addition of the "Floating Action Button" in the interface that appears when the user is in a location nearby the point-of-interest, given the relatively large area of all the selected landmarks, w.r.t. the restricted area used in the tests implemented in Florence.

The user of the app will have the opportunity to choose among the three main categories "Culture", "History" and "Nature & Surroundings" which are further divided into a number of

categories reported in the following schemas. The design of such a schema of planning routes has led to the implementation of the category/attributes metadata in the application, and its use in the recommendation system.

Since the format of the guide allows to assign landmarks to multiple categories and to describe it using multiple attributes, these elements of the planned types of visits are mapped to categories and attributes, to let users select their interests and adapt the types of visits based on them. The recommender system will allow to explore, for example, museums that are part of the Culture tour also when following a History tour, or will reorder the different possible components of a selected tour based on the specific types of landmarks or on their attributes (e.g. family friendly, smart tourism, green tourism, etc.).

Figure X:

A more detailed description of the types of tours is the following:

Culture

Museums, Galleries & Cultural Organisations	Archaeological Sites	Religious Sites
Benaki Museum **Museum of Ancient Greek Technology Kotsanas**	**Archaeological Site of the Lyceum of Aristotle**	**Holy Temple of the Saints Isidore on Lycabettus** **Church of St. Dionysus**

Stathatos Mansion - Museum of Cycladic Art	**Panathenaic or Kallimarmaro Stadium**	**Petraki Monastery** **Rizarios Seminary**

History

Museums, Galleries & Cultural Organisations	Archaeological Sites	District History
Benaki Museum **Museum of Ancient Greek Technology** **Stathatos Mansion - Museum of Cycladic Art**	**Archaeological Site of the Lyceum of Aristotle** **Panathenaic or Kallimarmaro Stadium**	**History and development of the Kolonaki district** **The Dexameni Square** **History and development of Pagkrati Area**

Nature & Surroundings

Parks & Monuments	Natural Scenery	Urban Scenery

National Garden **Rizari Park** **The Runner**	**The Lycabettus Hill** **National Garden**	**Vasilissis Sofias Avenue** **Kolonaki district** **Pagkrati district**

As far as the texts are concerned, a headline (2-6 words) as well as a main text of 150 - 400 words is suggested, including coordinates and important links. For the sake of conciseness three samples of English descriptions of the landmarks are reported in the following.

1. **The Kolonaki District**

The Kolonaki district is a wealthy and upscale neighbourhood in central Athens. Kolonaki is known for its iconic neoclassical buildings, high end shops and of course its numerous entertainment options. From fine dining restaurants and cafes to over 20 galleries, big and small, scattered around the area and world-renowned museums including the Museum of Cycladic Art and Benaki museum, there is always a reason to visit the area which can be considered as the museum district of Athens.

The word "Kolonaki" means "little column" in Greek and it took its name from a two metre column that was found in the area. A bustling and popular area, around its central square, there are bars and restaurants which offer local or international cuisine for every taste. Outdoor seating on pedestrian walks is typical and throughout the day one can see the locals enjoying their food and drinks, creating a lively atmosphere. The area is also home to many embassies, ministries, the European Commission's representation in Greece as well as private companies.

It is easy tIt is also a well-known shopping district for its high-end shops and haute couture where one can find always something to buy choosing between international and Greek designer clothes. One of its main shopping streets, Voukourestiou Street, is known for its jewelry.

The first urban buildings of the area were built in the interwar period in the 1920's and 1930's by important architects of the time. These multistory buildings offered unusual and luxurious amenities for their residents at that time including elevators with internal door and a shelter in the basement. (Google Maps: https://shorturl.at/mCFX6) The past and present mingle in this area where one can see buildings which follow eclecticism and modernism and also modern-day buildings as is the case in the main streets such as Skoufa street, around the church of St. Dionysios. (Google maps: https://shorturl.at/lCHV3). These buildings take you to a journey in time from neoclassicism through to art deco and the dominant style of apartment blocks in Athens since the interwar period.

Important and influential people have lived or still in the area including writers, poets, actors or politicians.

Apart from the main, Kolonaki square (Google Maps: https://shorturl.at/hzN34), another popular open space is Dexameni square. Dexameni is named after Hadrian's Reservoir. It has a small square and it is also a popular, laid back and recommended spot for parents with young children.

Easily accessible, Kolonaki is near the Vasilissis Sofias avenue, a main avenue in Athens named after Queen Sofia and approximately 10 minutes' walk from the Greek Parliament and Syntagma Square, Greece's most famous and legendary square. The closest metro station is Evangelismos Station – line 3. Another metro line is expanding into the famous Kolonaki square and is currently under construction. The Lycabettus Funicular, a funicular railway, links Kolonaki to the summit of Mount Lycabettus.

2. The National Garden

The National Garden is a public park of 15.5 hectares (38 acres) in the center of the Greek capital, Athens and it is a lovely environment to relax but also take in some history. It is located between the districts of Kolonaki and Pangrati, directly behind the Greek Parliament building (The Old Palace) and continues to the South to the area where the Zappeion is located, across from the Panathenaiko or Kallimarmaro Olympic Stadium of the 1896 Olympic Games.

The garden was commissioned by Queen Amalia in 1838 and it is considered her biggest work. At the time, the National Garden was the Royal Garden and was completed by 1840 by the German agronomist Friedrich Schmidt. He imported more than 500 plant species from Greece and around the world, including many tropical plants. Unfortunately, not all of these plants survived the Mediterranean climate. The National Garden is considered as characteristic of the 19th century landscape design. A Roman floor, uncovered -during 19th-century excavations- at a depth of one meter, belonging to the courtyard of a Roman villa very near from what is now the entrance on Vasilissis Sophias Avenue.

The Garden encloses ancient ruins, column drums and Corinthian capitals of columns, mosaics, rare plants and birds. There are leafy labyrinth paths, wooden benches, animals and small pods which make it an oasis in the heart of Athens . On the Southeast side are the busts of Ioannis Kapodistrias, the first governor of Greece, and of the Philhellene Jean-Gabriel Eynard. On the South side are the busts of the celebrated Greek poets Dionysios Solomos, author of the National Anthem of Greece, and Aristotelis Valaoritis.

Nowadays, the garden is home to 7,000 trees, 40,000 bushes, and other plants, making up 519 species and varieties. More than 100 of them are Greek while others come from countries all over the world, such as Australian pines or Chinese trees-of-heaven.

It is a popular area where locals and visitors can have a walk, jog or simply enjoy the shade of the trees during a hot summer day. As Henry Miller wrote in 1939: "It remains in my memory like no other park I have known. It is the quintessence of a park, the thing one feels sometimes in looking at a canvas or dreaming of a place one would like to be in and never finds."

Exhibitions, actions for the protection of the environment as well as initiatives for the planting and adoption of new trees everywhere in the city also take place in the national garden. It hosts a small zoo, a Botanical Museum, and a conservatory which is the place where plants are initially cultivated

before being replanted in the garden - considered as the country's first working greenhouse. Moreover, it hosts the Camp of the Evzones, a children's library with more than 6.000 books, a playground, and a small café, while particularly popular are also the duck pond and the sundial, a traditional method of telling the time. The garden is open all day until night falls, and it is also wheelchair accessible.

More information is available here: https://www.cityofathens.gr/episkeptes/aksiotheata/diadromes-stin-istoria-tis-athinas/o-kipos-tis-athinas

Google Maps: https://shorturl.at/ijlB1

3. The Museum of Cycladic Art

The Museum of Cycladic Art was founded in 1986 with the aim to host the archeological collection of Nikolaos and Aikaterini (Dolly) Goulandris with works of Cycladic and Ancient Greek Art. The museum features four permanent exhibitions, namely Cycladic Culture, Ancient Greek Art, Cypriot Art and Scenes from Everyday Life in Antiquity. The Museum of Cycladic Art is housed at the Stathatos Mansion which was designed by the Bavarian architect Ernst Ziller. The mansion is one of the most important examples of Neoclassical architecture in nineteenth-century Athens.

The Museum of Cycladic Art houses one of the most complete private collections of Cycladic art worldwide, with representative objects from all phases of the distinctive Cycladic island culture that flourished in the central Aegean during the Early Bronze Age (third millennium BC). The collection of Ancient Greek Art covers a wide time span from the 2nd millennium BC to the 4th c. AD. Ancient Cypriot Art exhibition is one of the largest outside Cyprus. It is a fascinating example of cultural amalgamation in antiquity and exemplifies the intense level of interaction among ancient Mediterranean cultures.

All exhibitions are enriched with interactive media including a permanent exhibition titled "Scenes from Everyday Life in Antiquity" which takes visitors on a journey in time, immersing them into the world of antiquity. All exhibitions are fully accessible to people with hearing impairments. The Cycladic Culture exhibition is also accessible to people with blindness.

The Museum has a contemporary art programme which presents important works of art of contemporary artists from Greece and abroad. In 2017 the Museum launched the exhibition series "Divine Dialogues". Ancient artefacts are presented next to modern and contemporary artworks, initiating a dialogue.

The museum organizes a variety of educational workshops and events which aim at bringing children and students closer to the Cycladic civilization and Greek cultural heritage. The Cycladic Café is also a popular hub for people loving art and the city centre. It features the Cycladic Art Café Project, part of the Museum's Contemporary Art Programme, which presents works of contemporary artists in the café area.

The building is accessible from Neophytou Douka, 4 Street and it is wheelchair accessible.

Opening Days and Hours are Everyday 10.00-17.00, Thursday 10.00-20.00, Sunday 11:00 to 17:00, Tuesday closed.

More information is available here: https://cycladic.gr/en

Ticket purchase: https://cycladic.gr/en/page/isitiria

Google Maps: https://www.google.com/maps/dir/37.9787032,23.7513826/museum+of+cycladic+art+google+maps/@37.9770153,23.7443805,17z/data=!3m1!4b1!4m9!4m8!1m1!4e1!1m5!1m1!1s0x14a1bcdf6afd52bf:0x87e97dab6fafd9d8!2m2!1d23.7422236!2d37.9758705?entry=ttu

Expected Impact

The Free Smart Tourism App is expected to reinforce the ReInHerit network of collaborations and exchanges between experts in the cultural heritage sector and at the same time, redefine the relationship between museums and their audiences.

As highlighted in the CH Sustainable Management Guidelines, 2nd Policy Brief of the ReInHerit project, museums and cultural heritage sites need to cater to the needs of complex and multilayered communities whose demographics constantly change over the years. Museums and cultural heritage sites are expected to include local communities, digital natives, digital heritage tourists or groups with varying capacities. Nowadays, museums find it harder to retain their audiences and keep their communities engaged. However, the development of a much-needed deeper connection with the various communities is a complex process for heritage professionals who need to consider major diversities in motivation, interests, barriers, experiences, and needs across different age groups.

Further research was conducted by the ReInHerit project that mapped the current use of digital tools in Europe with the aim to examine whether organizations have made important steps towards digital transformation and innovation. The ReInHerit research has shown that many museums and heritage sites are not able to follow the digital transformation and still face many obstacles in entering the digital world and innovation. A core issue here is the sustainable digital transformation for all museums, which has not been fully implemented.

During the focus group conducted in the ReInHerit project, it was identified by the participants that there is lack of open-source digital solutions to design visitor experiences. Museums most of the time had to design them themselves and outsource them. The free smart tourism app offers a valuable tool as it can be easily adapted by cultural heritage institutions and increase user engagement. Being a user-centered app, the app caters to the needs of different visitors by offering different suggested tours. At the same time, it makes a walk around the city a truly interactive experience.

The key aspects of digital sustainability that have been identified are cost, skills, development, maintenance, IPR and collaboration. The cultural heritage sector needs to facilitate various forms of collaboration among various public and private stakeholders within the context of digital innovation, for actions to be supported by policy frameworks.

To increase the app's impact and visibility, different stakeholders were informed and involved even during the stage of the application development. During the stage of the development of content, institutions which were chosen to be featured were involved at an early stage. The content related to

institutions, sites or monuments to be featured, was confirmed by the institutions themselves when it was necessary. Collaborating for the development of the app's content has the potential to extend collaborative relationships within and outside the world of culture to empower cultural heritage professionals.

In the case of the Museum of Cycladic Art, the museum involved other museums, archaeological sites as well as the Municipality of Athens to confirm the validity of the material. This is also contributing to the creation of a strong and interdisciplinary network of stakeholders, policy makers, local governing bodies and cultural heritage organisations to develop and implement smart tourism solutions for facilitating access to European heritage. All these organisations are also likely to use the app in the future. At the same time, the app will also boost the local economy as it will promote lesser known but important landmarks, in an area which does not directly belong to the touristic area of Athens.

References

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Appendix

List of **meetings and workshops** associated with the production of this deliverable:

- Smart Tourism app meeting - WP7 partners, 20/7/2022
- Consortium meeting - session on WP7 - 3/11/2022
- Smart Tourism app meeting - WP7 partners, 30/11/2022
- Smart Tourism app meeting - WP7 partners, 19/12/2022
- Smart Tourism app meeting - WP7 partners 12/06/2023