ICT Tools
FOR SUSTAINABLE TOURISM MANAGEMENT
The HELAND Project

Edited by
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Heland
Promoting Mediterranean Heritage Tourism

ENPI CBCMED
CROSS-BORDER COOPERATION IN THE MEDITERRANEAN

ICT Tools
FOR SUSTAINABLE TOURISM MANAGEMENT
The HELAND Project

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Promoting socio-economic sustainable development through innovative technological actions for Mediterranean tourism heritage and landscape protection clusters.
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INTRODUCTION
The Heland Project

This training manual is developed within the parameters of the HELAND Project.

❱ HELAND is a European framework project aiming to promote socio-economic sustainable development through innovative technological actions for Mediterranean tourism-heritage and landscapes protection clusters.

❱ The 2007-2013 ENPI CBC Mediterranean Sea Basin Programme is a multilateral Cross-Border Cooperation initiative funded by the European Neighbourhood and Partnership Instrument (ENPI). The Programme objective is to promote the sustainable and harmonious cooperation process at the Mediterranean Basin level by dealing with the common challenges and enhancing its endogenous potential. It finances cooperation projects as a contribution to the economic, social, environmental and cultural development of the Mediterranean region. The following 14 countries participate in the Programme: Cyprus, Egypt, France, Greece, Israel, Italy, Jordan, Lebanon, Malta, Palestinian Authority, Portugal, Spain, Syria, Tunisia. The Joint Managing Authority (JMA) is the Autonomous Region of Sardinia (Italy). Official Programme languages are Arabic, English and French.

❱ The European Union is made up of 28 Member States who have decided to gradually link together their know-how, resources and destinies. Together, during a period of enlargement of 50 years, they have built a zone of stability, democracy and sustainable development whilst maintaining cultural diversity, tolerance and individual freedoms.

❱ The Heland Project was led by the Institute of Tourism Travel and Culture of the University of Malta. The partners in this project were Fondazzjoni Temi Zammit (Malta); GEREDIS (Spain), Larnaca Development Agency (Cyprus); ARIJ (Palestine), Lebanese University (Lebanon), Al-Shouf Cedar Society (Lebanon), Jordan University of Science and Technology of Jordan (Jordan) and JREDS (Jordan).

MAP 1

THE HELAND PARTNERS AND COUNTRIES

STRUCTURE OF THE MANUAL

This training manual is aimed at assisting cultural heritage professionals to familiarise themselves with the main uses of ICT in heritage. It also serves as an introduction to the technologies used. By means of the examples presented and the case studies outlined, one is able to have clearer understanding of the extent in which the natural and built heritage can be better managed and more importantly better appreciated by visitors and maintained for future generations.

The Manual is divided into 3 main sections:

Section 1: Heritage in the Mediterranean

Section 2: ICT Usage In Heritage

Section 3: Case Studies from the HELAND Project of ICT usage in Natural and Built Heritage

Literature Review
HERITAGE IN THE MEDITERRANEAN

The Mediterranean region is considered one of the oldest tourism destinations. In 2014, 343 million international tourists visited a Mediterranean destination. According to UNWTO's long-term forecast, this number will reach over 500 million in 2030 (UNWTO, 2015).

The Mediterranean is seen as the cradle of civilisations and it abounds in cultural heritage including natural heritage, tangible heritage as well as intangible heritage. The countries bordering the Mediterranean Sea have 195 World Heritage Sites including both cultural and natural sites. To these, one has to include numerous other cultural activities such as festivals, food, agricultural practices, etc. All these act as an attraction to visitors. In fact historic interest was chosen as the reason for travelling worldwide by 32% of respondents ((Ecosystems, 2003) cited by Arnold and Geser, 2007). In countries like Malta, historic and cultural interest is responsible for 34% of annual visitors to the islands (MTA 2015).

The abundance of heritage in the region in conjunction with high number of visitors raises issues of management and sustainability. In particular in sites where there is high risk of deterioration of the site due to visitor impact. Various studies have been conducted in the region and these clearly demonstrate that visitors unless appropriately managed can adversely effect the quality of the site as well as the quality of visitor experience.

In recent years, more awareness about the need for managing heritage sustainably has emerged, including making use of information and communication technologies which can improve the management of the sites, have an impact on visitor experience and consequently have a positive impact on the communities.

Bkassine Pine Forest, Lebanon

POSITIVE AND NEGATIVE IMPACTS OF VISITORS TO HERITAGE SITES

NEGATIVE

- Deterioration of Site
- Lack of Visitor Quality
- Decline in Site Popularity
- Adverse impact on local communities

POSITIVE

- Appreciation of heritage
- Increase in identity awareness
- Positive Economic Impact on local communities

Literature Review
ICT USAGE & HERITAGE

- ICT and its application in digital heritage has brought about a revolution in the way we recreate and understand our past as well as manage sensitive natural and built heritage areas.

- By empowering local stakeholders, ICT assists in creating an innovative interaction between host communities and tourists (Go et al., 2003).

- ICT is required for developing added value through the diffusion of information between networks (Timmers, 2000).

HERITAGE, ICT & STAKEHOLDERS

INPUTS

- Assess unique identity
- Highlight heritage assets
- Ethical considerations of heritage exploitation
- Educate host community to minimize the damage

PROCESSES

- Interaction and collaboration between locals, public sector and tourism industry
- Heritage entrepreneur manages this network

OUTPUTS

- Guest satisfaction
- Profitability
- Employment creation

CHALLENGES

- It is difficult for heritage organisations to contribute towards researching new ICT tools for enhancing the touristic potential of the attraction due to:
  - Insufficient funds
  - Limited human resources
  - Absence of specialised expertise

- Without the contribution of heritage organisations, new and improved technologies may not be appropriate for attracting tourists

(Arnold and Geser, 2007)

METHODOLOGIES
3D DATA CAPTURE

- Digital cameras enable high-resolution pictures to be taken and transformed into 3D objects through laser scanning

- These 3D objects can be used effectively to demonstrate both large and small scale representations of artefacts

- Objects appear in 3D. Thus, when incorporating the artefact into a digital database it should appear in 3D to be as similar to the original as possible (Arnold and Geser, 2007)

EXAMPLES

(1) Byzantine Crypt of Santa Cristina, Carpignano Salentino, Italy

Using 3D modelling, the Byzantine Crypt of Santa Cristina in Carpignano Salentino, Italy was virtualised after a time consuming process, involving 92 hours in the crypt taking scans, one month to make the 3D model, adding texture for 3 days and the mapping took 4 days. Using this 3D model, other technologies were utilised to demonstrate the crypt to tourists, such as holograms and a 3D film (Beraldin et al., 2005).

(2) Temple C of Selinunte, Sicily, Italy

Another example of using 3D data capture techniques is Temple C of Selinunte, Sicily, Italy. This site has been destroyed with only some temple ruins. Thus, the aim of capturing 3D data was to create a digital restoration to demonstrate the magnificence of the original site (Beraldin et al., 2005).

ADVANTAGES AND DISADVANTAGES OF 3D DATA CAPTURE

ADVANTAGES

- 3 D models comprise of large amounts of information which can be studied and improved (Godin et al., 2002)
- 3D models can provide access to artefacts and images from culturally or environmentally sensitive environments which are closed to the public
- 3D modelling is quick and cheap for routine buildings. Therefore, large-scale modelling projects can easily be commenced as demonstrated by the Pompeii model that was created as part of the EPOCH project (Mueller et al., 2006)
- Access to sensitive sites enabling heritage to be experienced and transferred to visitors without impacting the sites themselves

DISADVANTAGES

- Can't be completely trusted (Hebert and Krotkov, 1992)
- Some materials cannot be accurately modelled, e.g. marble (Godin et al, 2001)
- Inaccurate modelling of artefacts with complex shapes (Buzinski et al., 1992)
- Uncertainty of digital recreations
- To overcome these factors it is possible to:
  - Merge data from various sensors and information sources (El-Hakim et al., 2004)
  - The operator can make corrections to the 3D model (Beraldin et al., 2005)

METHODOLOGIES
AUGMENTED REALITY

- Gaining access to information about an object by aiming a camera at it (Jain et al., 2015)
- It can be used by tourists to help them navigate around heritage locations due to its ability to recognise important landmarks (Denis et al., 1999)
- A useful tool to enable visitors to enhance their understanding of unfamiliar locations by combining both information:
  - Generated by the actual site visit
  - Stored on computers and accessible when tourists want to learn more about certain aspects of the heritage location

(Feiner et al., 2004)

- Mobile phones are increasingly being used to work as a tour guide around major European cities
- Wireless Application Protocols (WAP) are becoming more frequently utilised to provide real-time and place information, facilitating flexibility and allowing tourists to choose a different route around the city based on current and up to date information.

(Go et al., 2003)

EXAMPLES

Edinburgh Augmented Reality System (EARS)

An example of a successful use of augmented reality is the Edinburgh Augmented Reality System (EARS) which allowed for a hands free approach as it used speech recognition technology to give the user more information based on their interests. Even more significantly, this software does not require the user to view the screen and therefore the tourists experience is not impeded by constantly looking at a screen. Thus, the tourists can fully immerse themselves in their experience in Edinburgh by engaging in self-discovery of the heritage of Scotland's capital (Bartie and Mackaness, 2006).

Museum in Venice

An example of the interaction between WAP and augmented reality comes from a museum in Venice which conveys information to mobiles which are near the museum. Consequently, visitors to the museum are able to receive information about the displayed artefacts and obtain a guide for seeing various areas within the museum (Go et al., 2003).

ADVANTAGES AND DISADVANTAGES OF AUGMENTED REALITY

ADVANTAGES

- Does not intrude on the users' plans
- The tourist is less conscious of the system operating in the background
- The visitor acquires knowledge and information of the heritage location based on their own process of discovery

Bartie and Mackaness, 2006

DISADVANTAGES

- Does not intrude on the users plans
- In some cases it does not provide satisfactory results when searching for information
- Indoor sites with an absence of exact localisation are not in the current scope of the technology

Jain et al. (2015)

METHODOLOGIES
HOLOGRAMS

- It is impossible to have an indisputable recollection and interpretation of history

- History is always incomplete and depends on viewpoint of the historian (Heimann-Jelinek, 1996a). Therefore, holograms are a visually effectively tool for demonstrating the 'blurriness' of showing a conclusive historical representation

- Holograms capture this idea as they materialise and vanish as you walk past them

    - Tourists must find the optimal location for obtaining the clearest view to examine the holographic display

    (Bunzl, 2003)

- **EXAMPLES**

VIENNA'S JEWISH MUSEUM

An interesting example of this technology being used is Vienna's Jewish Museum, where there are 21 holograms on the third floor (Heimann-Jelinek, 1996b). Consequently Vienna's Jewish Museum is aiming to encourage visitors to think about what is being displayed and come to their own conclusions about past events. As Bunzl (2003) explains, at Vienna's Jewish Museum, a short description of the depicted items and a quotation supplements the aim of remembrance and consideration of the past.

ADVANTAGES AND DISADVANTAGES OF HOLOGRAMS

ADVANTAGES

- Helps tourists to consider history and culture as a never ending explanation of the past due to an uncompleted process of contemplation (Heimann-Jelinek, 1996b)

DISADVANTAGES

- People left confused by its meaning

May be used at the expense of other important information that tourists want to see

Castel de l'Alcala de Xivert
Castellion Spain

METHODOLOGIES
IMAGE CAPTURE | PHOTOGRAPHS

DIGITALISATION OF CULTURAL HERITAGE

As a result of developments in ICT, the use of photographs has changed, which has influenced our knowledge of heritage locations. Moreover, by uploading these pictures onto computers, specific software will enable these pictures to be resized, changing the brightness and generally made clearer (UNESCO, 2005).

ABILITY TO ZOOM ON CAMERA

Due to improvements made to cameras, it is now possible to zoom in to get a closer and more in-depth photograph of heritage sites. Thus, it is now possible to view the intricate details, which may have previously been unable to be captured in a photo, such as cross above the dome at St. Peter's Basilica in Rome. Moreover, it is the photographers themselves that determine the amount of detail and vantage point for the pictures they take (Ott and Pozzi, 2011).

Therefore, due to these transformational techniques it becomes easier to study the pictures in more detail, which may result in new information about the heritage sites or ancient civilisations being studied.

METHODOLOGIES
GEOGRAPHIC INFORMATION SYSTEMS (GIS)

Internet-based maps used for various aspects of tourism activity

1. Management of visitors – through mapping of traffic patterns in order to alleviate pressure on heritage sites and to distribute tourists more evenly (Arnold and Geser, 2007).

2. Providing additional information to tourists by providing information about specific points of interest, detailed maps with additional information that would enhance one's visit to an area or locality.

METHODOLOGIES
VIRTUAL REALITY TECHNOLOGIES

Virtual cities and museums put online for people to digitally visit (Go et al., 2003)
Protects environmentally and culturally sensitive sites

EXAMPLE
'ROME REBORN' PROJECT

The 'Rome Reborn' project is a good example of virtual reality being used for educational purposes allowing virtual field trips (Frischer, 2003). Therefore, actual field trips are not always required and thus, less visitors will come to the actual site resulting in less degradation of this non-renewable heritage resource.

CASE STUDIES from HELAND

ICT AND THE MANAGEMENT OF NATURAL HERITAGE

ICT AND THE MANAGEMENT OF BUILT HERITAGE

The following case studies focus on heritage management case studies from around the Mediterranean, using a combination of ICT tools discussed in the previous slides. The case studies bring together the tangible and intangible heritage as well as the physical and environmental heritage of the region.

THESE CASE STUDIES, ILLUSTRATE HOW ICT HAS HELPED IN:

- Creating awareness about the rich and diverse built and natural heritage of the Mediterranean
- Re-creating the past through virtual reality and 3D technology
- Promoting Mediterranean communities and generate business for these
- Providing new experiences to visitors
- Managing visitors in areas that are already established tourist destinations
- Highlighting the importance of unknown destinations with potential for tourism activity
- Assisting visitors to plan their itineraries ahead

THE LARNACA MOUNTAINOUS AREA

CYPRUS

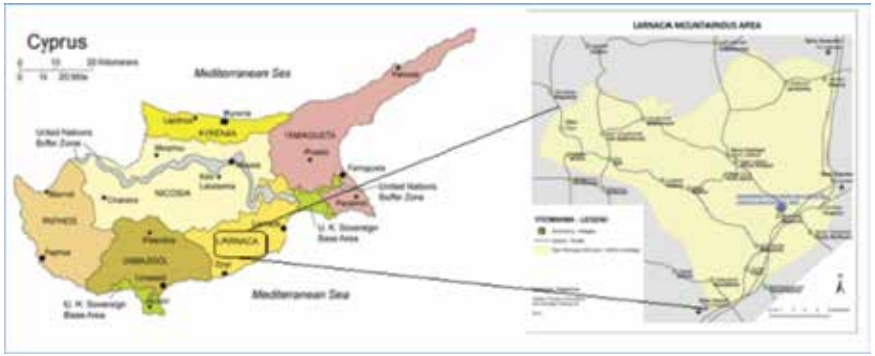
The Larnaca Mountainous Area brings together 18 communities. It has a total population of 10,573.It is an area very rich in natural and built heritage spanning a number of centuries. It includes important sites including WHS.

It is just 25km from the Larnaca International Airport and main tourist areas. The total annual visitors in the area are approximately 50,000, 90% of who are same day visitors coming mostly from Russia, Scandinavia, United Kington and Greece. The area has only one hotel however, there are 25 agritourism units offering in total 116 rooms for the visitors. Finally, there are approximately 30 restaurants and many small traditional coffee shops.

The main objectives of this product are to:

- Promote sustainable tourism
- Inform about activities, highlighting in each moment the most relevant
- Show the tourist resources of the area
- Enhance the enjoyment and quality of the travel experience allowing a better understanding of the landscape
- Develop an innovative tool with international character
- Enhance productive diversity through the enhancement of heritage as a tourism resource

This innovative way of experiencing the area will enable visitors to explore the rich heritage, landscape and cultural territory prior to their visit.



THE PROPOSED TECHNOLOGICAL TOOLS

The proposed solution consists of an innovative, RWD and Mobile Application that allows exploring the territory in a different and motivating way. The tool aims to provide:

- Integration of Google Earth/ Google Maps for geolocated representation of landscaped grounds, paths and viewpoints
- 360 degrees high resolution panoramic images
- Connecting with social networks to publish the geolocation and other information of interest
- Structuring of layers and categories
- Panoramic interactive network of viewpoints.
- Creating custom routes
- Contains information about other attractions in the area.

RESULTS

TECHNOLOGICAL

- Multiplatform WebPage
- Responsive Web Design (RWD)
- Web-GIS architecture
- Relational database with information
- 360° panoramic views
- Social Media
- Personalisation
- Routes Services
- CMS
- Analytical Tools
- Mobile App

CONCLUSIONS

- The tool is a solution which enables the visitors to enjoy the natural and cultural tourism in sustainable way as an experience to share. It is an innovative way to explore the rich heritage, landscape and culture legacy.

- It was instrumental in the revitalization of the territory as through innovation, creativity, originality and quality of the technology it has helped the local partners to share information about their products and services thus further assisting in the promotion of tourism in the area.

- Visitors are able to prepare in advance prior to their visit to the territory, enabling them to create personalized itinerary combining several Viewpoints / Points of Interest, and access to all information in an easy manner.

- The end results being a tourist product that enhances the quality of the travel experience allowing a better understanding of the landscape, develop an innovative tool with international character and creating product diversity through the enhancement of heritage as a tourism resource.

WADI AL BADHAN, PALESTINE INTRODUCTION

- Wadi al Badhan village in Nablus Governorate is located in the West Bank area. It is a place which brings together nature, history and the Palestinian people.

- It is a main tourism destination for many Palestinian people and one of the most important landscapes that needs to be managed environmentally in order to promote tourism in the area.

- The objective of the developed tools by ARIJ has the following objectives:

    - Raising awareness to Palestine's rich cultural attractions and landscapes

    - Introduce visitors to Al Badhan' s natural and cultural heritage

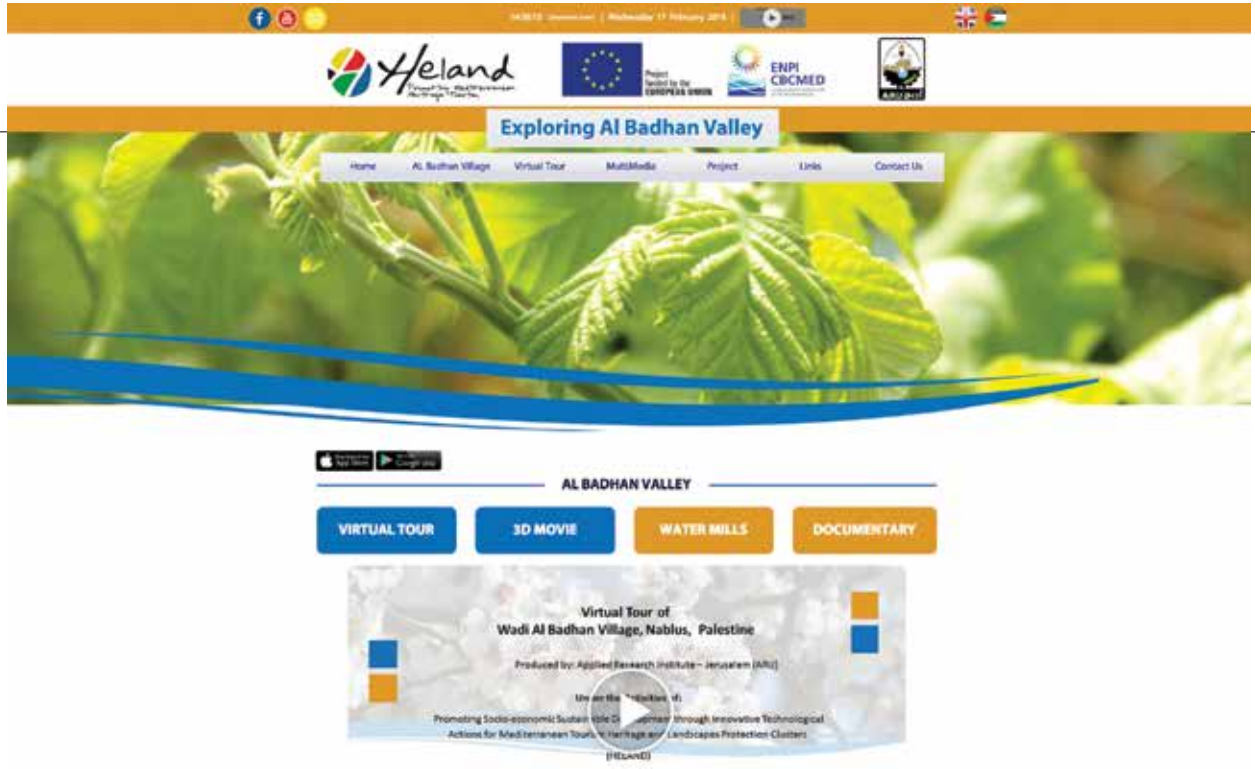
    - Provide useful information through virtual reality of past industrial heritage and environmental management and the interrelationship between these and daily life

THE PROPOSED TECHNOLOGICAL TOOLS

- The Wadi al Badhan experiences can be accessed through the website of the project

www.albadhantour.ps

- The website provides links to a virtual tour of the valley, two 3D movies on watermills and grain, and a documentary on the Palestinian Culture



RESULTS

- **Virtual Tour:** The visitor is invited to take a virtual tour of the Wadi al Badhan hiking trail and the village. A hiking stop can be selected and a panoramic 360-degree view of the are can be seen. Each POI on the tour is described and there are videos and picture clips.

- **3D animated movie:** Two movies one depicting the Glory of Life a feature on - telling the story of a traditional Palestinian farmer who works his land with the help of his family, grows wheat plants and grains. This feature focuses on the traditional watermills used to grind the grains to make the staple food products. The second 3D movie also focuses on watermills – no longer operational – which try to describe the ancient milling process which use water as the maiin power source.

- **Documentary movie:** documentary that gives information about Al Badhan village, landscape, water springs and culture, handicrafts etc.

CONCLUSIONS

- The technological tools have brought about the following benefits:

    - Better appreciation of the local heritage, both tangible and intangible

    - Foreigners getting to know about the area, thus generating interest for visiting

    - Increase in domestic tourism to the area

    - Positive impact on the local economy – leading to the setting up of a number of micro enterprises, some of which are run by women

‘CEDAR PRIDE’ - GULF OF AL AQABA, JORDAN

› INTRODUCTION

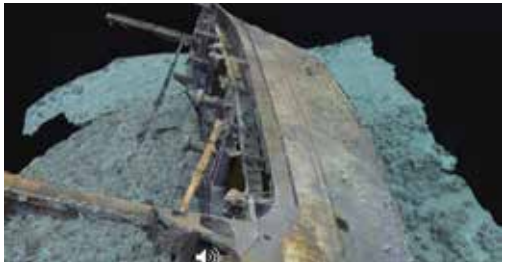
The Gulf of Aqaba is located at the most south western parts of the Hashemite Kingdom of Jordan in the vicinity of Aqaba. It is considered the only maritime region in Jordan and has a global importance that stems from its geographical location. The coastline of the Gulf of Aqaba extends for 27km with more than 13km length and is characterized by a discontinuous series of fringing coral reefs and reef flats. It hosts a vast number of marine life species endemic to the area.

› OBJECTIVES OF THE PILOT

The objective was to prepare a documentary recounting the story of the sinking of ‘Cedar Pride’ to build an artificial reef at the same time giving would be divers and non a glimpse of the rich sea life in the area.

PROPOSED TECHNOLOGICAL TOOLS

- A media video with sub-titles combining real life filming of the wreck and the surrounding sea life and 3D virtual reality imagines of the sinking of the Cedar Pride vessel



RESULTS

- A clear and informative video depicting the sea life
- A view of the account of the explosion and sinking of the vessel in Aqaba beach
- 3 D imagery of the wreck including its positioning on the sea bed
- Close up of all the main fish and coral species that can be found on the wreck

CONCLUSIONS

- A tool that enhances the role of Al Aqaba as a diving site
- An opportunity for non-visitors to appreciate the richness of the sea life in the area
- An advertising and PR tool for diving activities – in that would be divers are enticed to visit the region

SIERRA DE IRTA, SPAIN

INTRODUCTION

Considered to be one of the most fascinating natural parks of the Iberian Peninsula, the Natural Park of Sierra de Irta is located in north of Castellón within the municipalities of Alcalá de Xivert, Santa Magdalena de Polpis and Peñiscola.

The area is very rich in built and natural heritage including castles of the Templars, Christian hermitages, the remains of Moorish villages, cliffs that open to the waterfront, sandy beaches, dune fields, etc.

- The pilot site partner, Geredis proposed a solution that will allow an innovative Web and App that allows the exploration of the territory in a different and motivating way
- The model of culture and tourism has changed radically
- A reference project for the revitalization of the territory
- The natural and cultural tourism as an experience to share
- Enhance the enjoyment and quality of the travel experience
- Develop an innovative tool with international character
- The enhancement of heritage as a tourism resource

THE PROPOSED TECHNOLOGICAL TOOLS

- **PROPOSED TECHNOLOGICAL TOOLS**
  - Integration of Google Earth / Google Maps for geolocated representation of landscaped grounds, paths and viewpoints
  - 3D elements geolocated on points of interest
  - Connecting with social networks to publish the geolocation and other information of interest
  - Make comments, ratings and geolocated content uploaded by the users. This will create a georeferenced database
  - Structuring of layers and categories
  - Panoramic interactive network of viewpoints
  - Creating custom routes
  - Information about other attractions in the area

RESULTS

› CREATION OF A MULTIPLATFORM WEBPAGE THAT HAS

- Viewing capabilities that can be optimized from any device with Internet connectivity such as desktops and laptops, smartphones and tablets.

- Contents organized in layers and categories to make it easier to find information.

- A website designed in a way so that all the users, both experienced in the use of new technologies and those first time users, could find the information with ease and intuitiveness.

- The opportunity to prepare to get to know more about the area can do so prior to the visit and share their experiences during and after it.

- The ability to combine the web with the mobile application, so that visitors can upload photos, videos or link comments and ratings, all through geo-location capabilities of the tool, allowing amongst other things, the creation of a virtual community around the visit and a geospatial database.

› SPECIFIC APPLICATIONS OF THE TOOL

Detailed map of the area with POIs, 3D Models of specific POIs, 360 degrees panoramic views, possibility to request itineraries, detailed Route plans, links, calendar of events.

Mobile App with same functions

THE PROPOSED TECHNOLOGICAL TOOLS

- **It is expected that the will bring about:**
  - A heightened awareness of the area from both domestic and international visitors
  - Better appreciation of the built cultural heritage, including knowledge of architecture and use of buildings
  - An increase in the number of visitors to the area

BKASSINE, LEBANON

INTRODUCTION

Bkassine is a village in South Lebanon, lying next to the largest pine forest in the Mediterranean spreading over 200 ha. It is a part of Jezzine district and is 70 Km away from Beirut and 32 Km away from Sidon. It has an altitude of 800m. Its surrounding villages include Benwateh and Besri valley from the north, Aray from the east, Jezzine and Homsiyyeh from the south, Sabbah from the West.

The Pine forest is the most important feature of the village that attracts tourists.

Bkassine has several traditional features: water, water sources; a festival held on September on a yearly basis. Several attempts are made to preserve the heritage and cultural traditions.

Bkassine is mainly a summer resort for most of its villagers; elderly, retired people stay all year round. A major part of the youth have either moved to Beirut or migrated outside Lebanon due to economical problems. The main income of the municipality is selling the pine kernels of the Pinus Pinea forest. Some villagers.

THE TOOLS DEVELOPED AIM TO:

Map the various attractions of the area

Provide additional information to the visitors to the site on the main features of the forest and the village

Attract more visitors to the area

Inform the virtual visitors and the public about traditional practices

THE PROPOSED TECHNOLOGICAL TOOLS

- A web-based GIS tool with information
- Virtual tours
- 3 D Models

RESULTS

- Bkassine Promotional Video"Enjoy Bkassine"
- GIS Map of the area with detailed information about the main attractions of the village
- Interactive 360degree panoramic photography
- 3D models of water mill and Mar Takla Church

CONCLUSIONS

- A tool that enables a better understanding of the rich cultural and natural heritage of the area
- Models of important aspects of the cultural and religious life of the area
- Visitor experience is enhanced through the provision of additional information about POIs
- Visitors can also prepare in advance for their visit to the site

MDINA, MALTA

INTRODUCTION

Mdina is the fortified town located in the central part of Malta. It is the second most popular destination in the Maltese islands after Valletta, with ca 1.3 million visitors per annum. Mdina has a population of 237 residents.

It has a long history of various settlements that go back to the Phoenicians. It has evolved in nature, function and size throughout the different occupations. Mdina has evidence of at least six strata of settlements beneath the walls of the city with today's present layer being the seventh. Today's Mdina has an Arab feel with winding streets and is about two-thirds the size it was during the Punico-Roman times. Apart from being shrunk in size, the Arabic Medina also had further defence purposes since a moult was dug around the city. With the arrival of the Normans, the 'Citta Notabile, gained its importance as a commercial and trading centre where the Universita, which was the highest aristocratic body of the islands was located and further fortifications were built. Mdina was the capital of the islands until the arrival of the Knights of St John, in 1532 Mdina went through various restructuring works and hardship through the Great Siege of 1565 against the Ottomans, the earthquake of 1693, the revolts within Mdina during the French occupation in 1798. Moreover, during the British rule Mdina lost all its legal, administration and commercial importance, since trading activities were shifted to Valletta.

THE PROPOSED TECHNOLOGICAL TOOLS

- The objective of the developed tools by the University of Malta had the following objectives:

  - To provide additional information to the visitors visiting Mdina by means of totems placed at tourist information points and apps

  - Provide insights and views through virtual reality of the main square in Mdina through different times

  - Through these tools manage better the visitors at the site

  - Provide useful information through virtual reality of past industrial heritage and environmental management and the interrelationship between these and daily life

RESULTS

◗ APP |The app focuses on the main square of Mdina, which although it has remained the focal point of the city it has changed architecturally over time. The app provides the visitor with four layers of the city of Mdina – the Medieval Mdina, the Baroque era (Knights of Malta), the British and today.

By choosing an era, and pointing the mobile or tablet at the square, the visitor is able to relive Mdina at that particular era, see the costumes, and read about traditions, festivities and foods of the time. The app also provides information about important sites within the city.

◗ TOTEM | Placed at strategic points in Mdina the totems provide additional information about the city.

◗ DEDICATED WEBSITE | The website contains all the information obtained through the app and totem with further details to enable prior preparation by potential visitors.

CONCLUSIONS

- The technological tools have brought about the following benefits:
  - Mdina's past is brought to life – something that the current buildings are unable to demonstrate
  - Visitors have experienced better understanding of the historical importance of the city
  - Increased stay within the Cathedral area thus enabling better visitors flow in other parts of the city
  - Overall improvement of the experience of the city

XAGĦRA, GOZO

› INTRODUCTION

› Xagħra is second largest locality on the island of Gozo. It is also the locality that receives most visitors on the island, with ca 158,000 visitors per annum visiting the WHS of Ġgantija Temples.

› Xagħra is also an important tourist destination since it also houses a number of interesting attractions including the Ta' Kola Windmill which is a museum dedicated to rural life in Gozo, natural caves and valleys. The coastal area of Ramla l-Hamra Bay is a Natura 2000 site. The site is also reputed to be the location where Odysseus was held captive by the nymph Calypso.

› One of the main issues with the locality is that few visitors spend time in the locality after visiting the main attraction – the Ġgantija Temples.

› The tools developed aim to:

- › Promote the locality of Xagħra as a holistic site
- › Provide additional information about the various POIs of the locality of Xaghra, thus encouraging visitors to stay on the locality
- › Promote the island of Gozo through nature walks based around 7 panoramic valleys of the island

PROPOSED TECHNOLOGICAL TOOLS

- A web-based GIS tool with downloadable information.
- Virtual tours using google maps with geolocated detailed information on specific POIs.

RESULTS

- 7 virtual valley walks.
- Detailed focus on Xagħra's most important attractions can be experienced both remotely and at the site itself.
- Detailed 360 degree panoramic view of the 5 main areas of the locality of Xagħra including the built and natural environment of the locality and its immediate surroundings. Each POI provides, a panoramic 360 degree view of the site, information, photographs and downloadable information.

CONCLUSIONS

- A tool that enables the locality of Xagħra to promote itself as a destination in its own right.
- Visitor experience is enhanced through the provision of additional information about POIs.
- Visitors can also appreciate the natural sites and landscapes of Gozo through the walks and prepare for their visits in advance.

NIHA FORTRESS, LEBANON

› INTRODUCTION

› The Fortress of Niha (also called Cave of Tyron) is an ancient fortress in Lebanon located within the Shouf Nature Reserve. First mentioned in 975AD the site is today a cultural heritage attraction in the area. Carved into the rock of a cliff overlooking the Bisri and 'Aray valley, the Fortress of Niha has been monitoring the road between Sidon and Beqaa Valley. It was controlled by the Crusaders and local Muslims until its destruction in 1261. It was rebuilt in 1270 and remained inhabited by Muslim rulers until 1584. Shaped like a cave over a hundred meters deep, the fortress features chambers and rooms which were dug in order to shelter the soldiers. Water resources were provided both by an intricate rain collecting system and through a pipe from the 'Ain el-Halquoum' spring. It also had a considerable number of silos for storing provisions. The fortress was well fortified and enclosed in a wall pierced with openings. Several levels of habitations were leaning against the cliff and built using beams which were based on the rock and rested on the cliff wall.

› THE TOOLS DEVELOPED AIM TO:

› Give detailed information about this unique structure, its architecture and systems employed for survival in inaccessible area

› Demonstrate by means of 3D animation videos life within the fortress

› Provide visitors with a geo referenced map available online with downloadable material

› Recreate by means of GIS information rendered into paintings scenes of the Fortress

› Entice more visitors to the area by means of virtual tours

PROPOSED TECHNOLOGICAL TOOLS

- GIS Mapping
- Virtual tours of the Fortress and the Nature Reserve

RESULTS

- 14 360 degree virtual tours
- Detailed GIS modelling of the Niha Fortress
- Two 3D animations
- Interactive GIS map of the area with downloadable information
- A book about the history and architecture of the area
- 7 paintings of the fortress

CONCLUSIONS

- A tool that enables us to appreciate the complexity of the architecture of the fortress and its role in economic and political history of the area in the past
- Promotional tool for both domestic and international tourism

MADABA AND AS SALT CITIES IN JORDAN

› INTRODUCTION

› Madaba City, capital of Madaba governorate has 22,700 households. It is a city well known for tourism activity. Madaba city has a promising future in the tourism sector, it is characterized by its urban morphology that attracts various types of tourists. Its location in the mid- southern region enables it to be accessible from different directions and close to other popular tourism destinations such as; mount Nebo, Mukawir, Hammamat Main, Um Al-Rasas, and the Dead sea.

Historically, it has been inhabited since 4500 B.C. witnessing many old civilizations. It flourished as a city during Moabite and Ammonites times [ca.800 B.C], and through the Hellenistic periods; Madaba also, was part of the Roman province of Arabia around 106 A.D. During the Ottoman period Madaba witnessed major urban development especially after lands reform.

The main attractions of the city include: mosaics and many archeological sites. The archeological park, one of the main attractions in Madaba presents the remains of an ancient roman road flanked by columns and paved with mosaics. Within the park the church of the Map (contains the most preserved mosaic map of the holy land) is located; additionally, the Burnt Palace, the Church of the Martyrs "Al.Khadir", The Church of the Virgin Mary create an attraction to the tourists who are coming as pilgrimage. In addition several other urban structures dating to the 19th and early 20th century such as the Houses of Twal, Jumean, Karadsheh, and Hamarneh families (USAID, 2007) are part of Mdaba's historical core.

The main issues of Madaba city is how to sustain the continued tourism growth in the city without adversely affecting the cultural heritage.

› As-Salt City is an ancient town located about 30 km northwest of Jordan's capital, Amman with an altitude of 850m. As-Salt is known as a city with steep topography located on well-defined hills separated by deep valleys, special to its character built of distinctive yellow stone with more than 900 stacked houses, narrow streets, and old popular and traditional markets. This combination of built form and topography give As-Salt its distinctive physical identity.

As-Salt was known since ancient times by its central location with links to western bank of Jordan River including Nablus, Jerusalem and others, the desert to the east and Damascus to the north, which made it an attractive trading and market center.

Moreover, the biodiversity of its lands, the presence of a number of springs, and the moderate climate make as-Salt an attractive place for settlers and civilizations back to the bronze and stone ages. The city today is the capital of the Balqa governorate and has a municipal population of approximately 500,000.

The earliest evidence of human settlement at as-Salt goes back to 1600 B.C when Hyksos came from Egypt and settled in the region. Most of the present Salt was formulated in 1516 AD by Ottoman Empire after the Battle of Marj Bin Amer (1516) between Mamluks and Ottomans armies. That's way this period called the "Golden Age" of as-Salt; between 1890 and 1920 AD, where the development of as-Salt was completely different from the one in the other periods. Following the establishment of Amman as the capital city of Jordan in 1922, as-Salt declined in its popularity as an influential city.

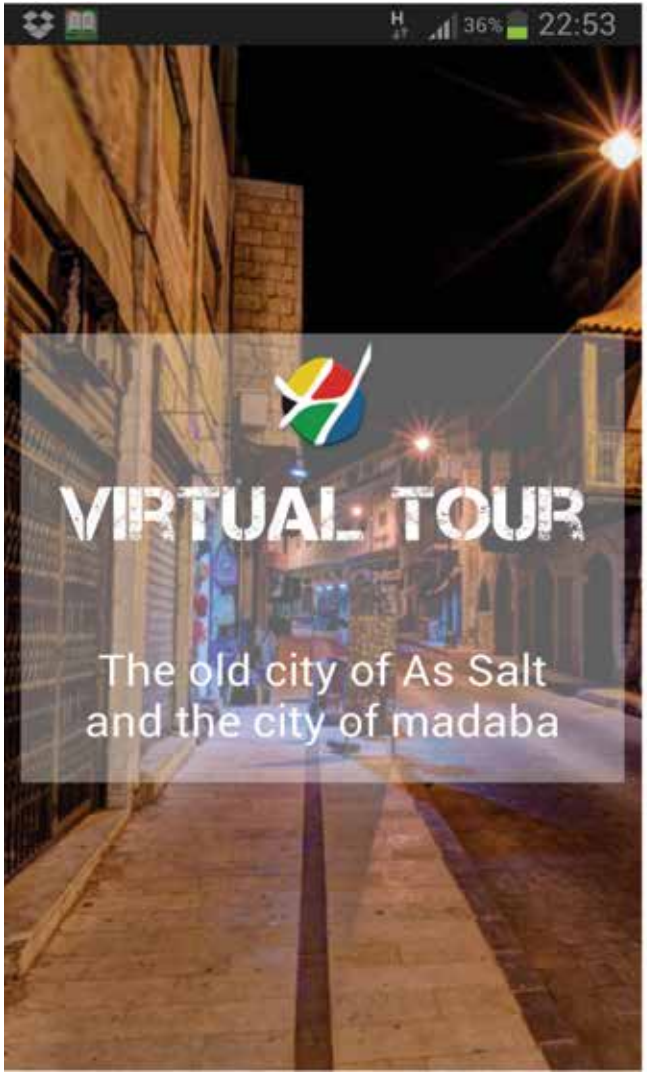
Despite its heritage , As-Salt is not well known on the tourist itinerary and hence it is the aim of the pilot project to promote the city's heritage and to work towards its sustainable development.

› THE TOOLS DEVELOPED AIM TO:

- Technological Tools
- The tools developed include:
- GIS maps
- Virtual tools of the two cities
- Onlinewebsite and mobile applications

› RESULTS

The main objective of designing these tours is to offer new ways to interact with the target groups that are the tourist that visit this region, meanwhile, to transfer of advanced technologies for the cities integrated management.


22:53
VIRTUAL TOUR
The old city of As Salt
and the city of madaba


10:40
ABOUT
JORDAN
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MADABA TOUR
ASSALT TOUR
ABOUT
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AS SALT MAP
Search
Documents
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22:54
Virtual Tour
Mobile application
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CONCLUSIONS

This manual is an attempt at demonstrating to cultural heritage professionals the variety of uses that technology can have for the better management of cultural heritage. These case studies provide a number of examples in which heritage can be managed in a way that it adds to the quality of the visitor's experience due to the additional information provided, yet at the same time safeguarding the sites and attractions themselves.

Primarily these case studies have continued to highlight the richness and diversity of the Mediterranean heritage. The GIS technology has enabled us to discover different physical as well as cultural layers that lie beneath the current visible tangible and expressions of intangible heritage. Thus allowing us to show to the outside world that this region continues to be worth visiting as there are yet new dimensions and experiences waiting to be discovered.

The case studies have also demonstrated that technology can be both of benefit to established tourist destinations such as Mdina in Malta, Xaghra in Gozo, Al Shouf Nature Reserve Park in Lebanon and Madaba in Jordan, to sites that want to attract a different type of visitor such as Castellion in Spain, Larnaca in Cyprus and sites that are aspiring to become an active cultural tourism destination such as Wadi al Badhan in Palestine, Bkassine in Lebanon and As Salt in Jordan. Moreover it has also been demonstrated that technology can also promote underwater attractions as the case study of Cedar Pride in Al Aqaba in Jordan clearly shows.

Since the setting up of these technological applications, sites have reported an increase in traffic, and although further research needs to be conducted, it is indicative that such tools are beneficial.

The amount of detailed research generated in creating these case studies cannot be underestimated and indeed most of the partners have produced publications supporting the discoveries of their lengthy and laborious research. These publications will support the technology developed and vice versa.

Finally, it has to be pointed out that projects such as HELAND can indeed be instrumental in fostering new partnerships and relationships across borders, increase economic activity within an area, promote sustainability and help towards the better management of cultural and natural heritage. Indeed HELAND has set in motion various actions with pilot sites that have been of direct benefit to the communities that inhabit them, leading to the overall improvement of the quality of life within the areas concerned.

LINKS TO HELAND PROJECT ICT CASE STUDIES

www.albadhantour.ps - Wadi al Badhan, Palestine

www.aqaba.jo - Cedar pride Diving Site, Gulf of Aqaba, Jordan

www.fthm-heland.com - Bkassine Pine Forest, Lebanon

www.ftz.org.mt/heland_virtualtour - Xaghra, Gozo

www.heland.geredis-society.org - Sierra de Irta, Castellion, Spain

www.heland.just.edu.jo - Madaba and As-Salt Cities, Jordan

www.larnaca-mountainous-area.com - Larnaca, Cyprus

www.mdinathroughtime.com - Mdina, Malta

www.shoufcedar.com/heland - Niha Fortress, Lebanon

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'Cooperation that Counts'

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