

Travelogue with Augmented Cultural and Contemporary Experience

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Abstract. TRavelogue with Augmented Cultural and Contemporary Experience (TRACCE) project aims to design and develop an innovative ubiquitous platform for cultural routes, and different computing devices, using cultural inventory of travelogue literature, the digital material of today's travelers and new information and communication technology. It will offer cultural interpretation services that combine the visit of an area with the acquaintance of the historically recorded and the contemporary touring experience. The services address mainly to tourism professionals and cultural institutions, in order to design specialized tours (routes, guided tours, exhibition guides, interpreting programs, etc.) that will enhance visitor's experience. Through the study of the travel material and today's travel experience, as is found in social media, the conceptual representation of the wider travel experience will emerge, bringing together yesterday and today. By exploiting semantic web technologies, the computational representation of domain knowledge will be achieved and it will facilitate intelligent data management. As a result, data management will lead to data organization, data enrichment from openly interconnected data and data visualization through augmented reality technologies, while user evaluation methodologies will contribute to the improvement of cultural experiences. The TRACCE ubiquitous platform will include the aforementioned technologies and methodologies, eventually creating a synthetic digital narrative that combines digital representations with natural tours. Intelligent Interaction research group of the University of the Aegean and the Honest Partners will collaborate with the other members of the consortium within the context of TRACCE and contribute to its main research goals.

Keywords: Travelogue Experience, Ubiquitous Platform, Augmented Reality, Storytelling, Semantic web technologies.

1 Introduction

As modern trends indicate, visitors seek to be involved in extraordinary and unique experiences [4, 9, 10], especially those who enable them to live new cultural experiences with creative services. Meanwhile, modern developments in the information and communication field facilitate the access to extended cultural databases, thus being able to shape new cultural products and “edutainment” methods. In the same context, TRavelogue with Augmented Cultural and Contemporary Experience (TRACCE) project proposes an innovative approach that will enrich and enhance the modern visitors’ experience.

TRACCE will offer cultural interpretation services that combine the visit of an area with the acquaintance of the historically recorded and the contemporary touring experience: the user follows the historical trail of a 17th or 19th traveller, while retains access to a variety of contemporary information sources and other travellers experiences, as well as having the ability to compose his own. The services address mainly to tourism professionals and cultural institutions, in order to design specialized tours (routes, guided tours, exhibition guides, interpreting programs, etc.) that will enhance the visitor experience. The operation of the platform will be indicatively presented through the creation of six (6) routes with content from the Laskarides Foundation.

The main idea of TRACCE derives from the significantly interesting material of the touring secretariat and the look that the travellers brought at the societies of Ottoman Greece from 17th to 19th century. The concept of travelogue accounts covers all texts and images handed down by travellers of Western Europe, who in a printed document or manuscript related their experience, knowledge or vision of travelling in the area of the Mediterranean and Southeastern Europe or who described the area in their work. This material reflects the perception of how Europe, at any given time of its history, has viewed the places, people and monuments that travellers saw during their voyages. The combination of documented iconography with the census of rich testimonies found in the travel texts and images, can be valuable for the development of cultural applications. In this context, Honest Partners has the experience of a relevant multimedia application titled “Athens through the eyes of travellers: 17th to 19th century” (Benaki Museum, 2006), thus will contribute to TRACCE for the expansion of travelogue material use in culture and tourism domains. Intelligent Interaction Research Group will undertake the overall TRACCE project coordination. In addition, utilizing existing know-how and, in particular, exploring the relevant scientific fields, will contribute to its research activities.

2 TRACCE Project

2.1 Idea and Main Goals

Today, more than ever before, Cultural Heritage Institutions provide the digital documentation of their collections to the public using the world wide web. In this

context, semantic web technologies could efficiently support the management and promotion of cultural information, considering its variety and heterogeneity [1, 5, 8]. Especially the use of ontologies and linked open data (LOD), as well as their combination with geodata, seem to be a very popular idea for cultural knowledge diffusion and presentation [1, 2, 3, 6]. Furthermore, focusing on the aspect of information visualisation at indoors and outdoors cultural spaces, the combination of LOD and augmented reality technologies have been proved very interesting for the users on the sectors of cultural heritage and tourism respectively [7, 11].

Through the study of the travel material and today's travel experience, as it is found in social media, the conceptual representation of the wider travel experience will emerge, bringing together past and present. By exploiting semantic web technologies, the computational representation of domain knowledge will be achieved and it will facilitate intelligent data management. As a result, data management will lead to data organization, data enrichment from openly interconnected data and data visualization through augmented reality technologies. The TRACCE ubiquitous platform will include all the above mentioned technologies, eventually creating a synthetic digital narrative that combines digital representations with natural tours. Primary objectives of the TRACCE project are:

- Design and implementation of a new cultural product that will provide complex cultural tourism services and can be directly commercially exploited.
- Connection of the project to the National Strategy for Research and Innovation based on Smart Specialization (RIS3 strategy), combining two of the eight critical sectors of the National Strategy: Information Technologies and Tourism - Culture - Creative Industries.
- Transfer of technology and knowledge from research institutions to companies through their synergy within the Project.

Based on the aforementioned objectives, TRACCE project proposes the combination of digital storytelling with physical tours in order to enhance the historical touring experience, with the use of organized data based on ontologies. Moreover, the narratives will be further enhanced by reconstructing the physical and virtual echoes of the past travelers and the use of special effects that travel users to the past. The historical three-dimensional stochastic sound environment that will be created can be explored by the user experientially, moving in the space, as mobile data from the device's sensors about positioning, movement and orientation will be used to track user's position. Meanwhile, TRACCE's narratives can be merged with modern experiences provided by the users. This new information could potentially be incorporated into the existing narrative, bridging the time distance between past and present.

In conclusion, the center of TRACCE project activity will be the study, design and development of a ubiquitous platform, accessed by different devices, which will combine the visit of an area with the presentation and promotion of historical and temporary travel experience. Therefore, it will provide the necessary content and tools for the creation of cultural routes enriched with related texts, images and sounds, which will accompany travellers during their tour and will inspire them to add new material.

2.2 Methodology and Development Stages

Key for the success of TRACCE objectives is the development of a pervasive platform (web platform and hybrid mobile application). TRACCE's implementation is based on the following methodology (a) research for travel publications as well as modern tourist experiences; (b) research and development of standards for the digital representation of travel experiences in order to semantically organize and link data; (c) implementation of the pervasive platform and its services for the creation of Augmented Reality narratives; (d) Design, development and distribution of interactive applications (e) evaluation of the pilot application and research for future business exploitation.

To begin with, research and study modern travel information will result in a comprehensive understanding and analysis of the touring experience, related to both the intangible and tangible Cultural Heritage, as well as to the modern tourism industry. Metadata collection and concept definition from the lifelong learning experience - which will also benefit from the ToposText results of the Aikaterini Laskaridis Foundation, which is a partner in the project - will lead to the creation of a wider ontology using RDF ontology development technologies, OWL and OWL2, that will include related areas of interest. Basic requirement for expanding and correlating the concepts is the research of ontologies and metadata standards that have been exploited in the Culture, Tourism and Geography fields. Ontology development will be accomplished by using free software that facilitates the definition of classes, subclasses, relationships, individuals, constraints and attributes that will further enrich the ontology and allow the intelligent management of the travel information.

By exploiting ontologies and the SPARQL query language of the Semantic Web, data stored in repositories will be retrieved and can be semantically integrated into the pervasive platform to be constructed. Linked Open Data (LOD) that have been collected and assigned to the narrative ontology will be stored in an RDF repository. Data integration and storing will facilitate to the creation of dynamic Augmented Reality applications. As a result, a number of versatile digital tours will be created, surrounded by contextual data. All the information that has been derived from the travel material and its further enrichment with relevant data from Cultural Institutes repositories will be displayed on digital maps that exploit geodata and semantic web techniques.

The pervasive platform that will be constructed during the project, should utilize the necessary development tools and services to support the two most popular platforms, iOS and Android. This platform will also incorporate augmented reality techniques by using the camera and screen on user's mobile device to display digital information in layers in front of natural environment (see Fig. 1). To achieve this, mobile development platforms that use digital data and 3D models will be used, using GPS sensor-based tracking techniques and possibly image recognition to achieve better accuracy. The basic goal is to display the appropriate information in situ based on parameters like position and orientation of the user's mobile device, which will then be adapted to the user's preferences and interests with LOD framework and integration techniques. Selected tools should allow free use, giving full potential for deploying an application without commercial restrictions. Also, these tools should support MVC (Model - View - Controller) architectures to optimize the data flow to the user, allowing the construction of complex programs, friendly user interface and natural interaction.

Finally, selected tools should be widespread and popular enough to be supported by a living community of developers.

It will also be possible to instantly share experiences and add new points of interest (PoIs) into the narratives through the pervasive platform. While walking through proposed and predefined routes, users will be able to add geotags to the map with comments or photos from their experience that will be visible in both their social profiles as well as other users who will be participating in the corresponding route in the future. As a result, it will be possible to enrich the interaction between users in the application, and integrate the application in the social networking cloud, adding also to its promotion and advertising.

Additionally, the final platform with its services will be evaluated by cultural tourism. Selected user experience evaluation methodologies will be used for the review process. The most appropriate methods for evaluating cultural heritage applications will be selected, and the platform's evaluation will be carried out before its official release. Finally, a further analysis of needs and opportunities will be made to exploit the results of the project, and then a feasibility study on product sustainability and market promotion will be conducted, and also the results of the project will be published to the public and the wider scientific community.

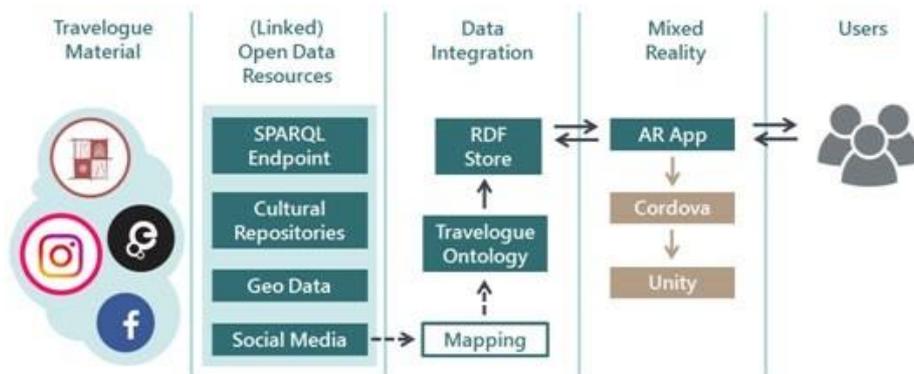


Fig. 1 Ubiquitous platform architecture according to TRACCE approach.

3 Project Partners

TRACCE consortium includes Intelligent Interaction Research Group of University of the Aegean, Tourism and Entrepreneurship Research Lab of the Technological Educational Institute (TEI) of Crete, The Laboratory of Music Acoustics and Technology (LabMAT) of the Department of Musical Studies (DMS) of the National & Kapodistrian University of Athens (NTUA), the companies Honest Partners and Communication & Information Technology (Comitech), as well as Aikaterini Laskaridis Foundation. The partnership of the cooperating bodies is a fundamental

obligation at all stages of the project development until its completion. More specifically:

- Intelligent Interaction (II-<http://ii.aegean.gr/>) research group established in 2016 and it is active in the areas of Human Computer Interaction, Intelligent Systems and Cultural Heritage Management. George Caridakis, Professor of the Department of Cultural Technology and Communication of the University of the Aegean is founder of the group and he is coordinating its educational and research and development activities. The group's activities are supported mainly by a Digital Cultural Heritage Management Center through Regional Business Program (PEP South Aegean) which provides relevant services to the cultural institutions, enabling the management of cultural heritage. In its third year of operation, the research team has participated in National and European conferences and has publications in reputable scientific journals. Additionally the team has joined and is an active member of National and International Organizations and Associations such as the [gi-Cluster](#) (Cluster of Creative Industries), [Alliance for Internet of Things Innovation \(AIOTI\)](#) (AIOTI), [Lora Alliance](#), [Arterial Network](#), [RISE](#) and [Culture Action Europe](#). In the same context, the team participates and coordinates the TRACCE (TRavelogue with Augmented Cultural and Contemporary Experience) research project, recently funded by the GSRT in Greece. In addition, utilizing existing know-how and, in particular, exploring the relevant scientific fields, will contribute to its research activities in identifying system requirements, semantic content representation, platform implementation, pilot implementation and evaluation.
- The Tourism and Entrepreneurship Laboratory serves a dual research and educational mandate upon the fields of tourism, culture, entrepreneurship and local and regional economic development. All these are achieved through the use of applied Economics and Management science. At the same time, the tourism and entrepreneurship laboratory aims to contribute towards the facilitation of business decision making, and the dissemination of consultancy research in order to inform policy making and planning at a local, regional and national level. Tourism and Entrepreneurship Laboratory (TenLab) – TEI Crete will participate in scientifically exploring the users' needs of the application, evaluating its implementation and exploring the business uses of the results.
- Honest Partners (HPA) specializes in digital value adding projects for public, private and commercial clients, producing digital media, interactive software and immersive installations. Experience in providing integrated IT services that combine strategic planning, modern design and innovative performance along with outstanding technical know-how in delivering solutions for distinguished culture organizations, constitute HPA's competitive advantage. On the Culture Consulting / Culture Informatics field, HPA is covering digital strategies for cultural organisations, having a wealth of experience in planning and analysis. HPA's competitive advantage is its reputation of excellence in Digital Cultural Heritage Management and Digital Culture Consulting, with the appliance of HPA's own technical infrastructure and unique methodology. The Company studies each organization's profile, cultural capital and target audience so that it can shape its digital identity in a way which will make the institution digitally recognizable. Projects around the

audience's creative output, show HPA's experience and systems to handle everything from small scale programmes to huge open art competitions or building an interactive community for institutions' target audience. Digitization, web and mobile apps, in-gallery interactives and digital marketing are indicative of HPA services for culture organizations. For TRACCE, Honest Partners company has developed an initial investment plan with a clear defined activities in Greece and mainly abroad in fields covered by the activities of the proposed project. In this project, Honest Partners will be involved in designing and developing the digital cultural product and the feasibility study on the final product, and will be responsible for two work packages related to Development of ubiquitous platform services.

- Communication & Information Technology (Comitech) has experience in providing consulting, IT and communications solutions and applications, and producing multimedia content for the Internet. In this project, Comitech will participate in agreed actions on the design and development of the digital cultural product and the feasibility study.
- Aikaterini Laskaridis Foundation scope is to promote Greek arts and letters as well as maritime tradition and history. As an active and lively cultural – educational organization, it organizes and performs every year a large number of cultural and educational programmes. The Foundation participates in TRACCE in the provision of primary iconographic material from its depository, the study and the scientific documentation of nine book publications, its contribution to the design of cultural routes and the expertise gained from the innovative projects Travelogues and ToposText as support for platform's design.
- The Laboratory of Music Acoustics & Technology (LabMAT) (NTUA) was founded in 2004 under the Department of Music Studies (DMS) of the School of Philosophy of the University of Athens with the initiative of the Professor Charalampos Spiridis while he was the Director of the Department from 2004 to 2015. The Laboratory will participate in the creation of sound-walks for the augmented narratives of the platform.

3.1 Intelligent Interaction Contribution

Despite being a new research group, II will participate in TRACCE project to a large extent, undertaking the management of the whole approach. This is due to the fact that TRACCE project aggregates a number of different fields and applications which are included in II group's areas of research.

More specifically, II will work on requirements definition for the designing and the services of TRACCE main system, as well as their integration on the architecture of the ubiquitous platform. In the same context, different use case scenarios will be developed, complementing the whole design. The members of II group have already worked on User Experience design and evaluation, focusing their research on cultural applications and services. Therefore they have defined a different aspect of UX, the one of Cultural User Experience, studying its value and impact on different categories of users. Based on these UX models, in the context of TRACCE, II will conduct interviews and focus on groups, but also observe how potential users react on their tours. At the same time II

would create standard prototype screens to be analyzed and discussed with the respective focus groups.

Furthermore, II will contribute on knowledge representation and information modelling of historical and contemporary travelogue experience. To this aim, it will define and organise relevant concepts and relations, based on the study of historically documented travelogue experience as well as the current touristic experience and its perception. In the same direction, II members will continue their study on the capabilities of semantic web technologies, the use of ontologies, thesaurus and metadata standards on the domains of Cultural Heritage and Tourism. The aforementioned technologies will be included on the organization and management of travelogue information and its use on storytelling and visualization modules.

Eventually, II's interest on cultural heritage LOD and the use of augmented reality will be included as well on TRACCE project. One of the II's goal is to use Augmented Reality techniques in order to achieve natural interactions in their implementations, enriching the interface of the applications and facilitating smoother interaction between user and application. Augmented Reality techniques can be also utilized in displaying complex content using graphics, multimedia and 3D models, thus providing a more friendly and practical way. Finally, II members exploit Augmented Reality methods to contribute in mobile guides for museums and cultural heritage institutions, aiming in enriching cultural user's experience.

3.2 Honest Partners Contribution

Honest Partners (HPA) will participate in TRACCE developing a specific investment plan with a clear identification of activities and areas focused on the project interest. HPA will also be involved in the digital product design/development process and the feasibility study on testing the market and the impact of the final culture product.

HPA's study on new business models is going to highlight sustainable and innovative products (e.g. tourist guides) exploring multiple ways of digital cultural content production and audience development. HPA wishes to capitalize on Company knowledge acquired by participation in Cultural tourism projects with the ultimate goal to create an integrated approach to cultural routes practice. Within this framework, we need to explore a sustainable business model where technology meets the wider economy of culture and creativity. As expected to become a catalyst in culture services, our high added value product will have competitive advantages in international cultural market while also promoting the intercultural dialogue through travelers over time.

More specifically, HPA will participate on the following:

- Technical/Functional requirements and System architecture
- Use cases and scenarios that include the different role of users and the way they will interact with the platform.
- A study exploring digital technologies and social media issues in contemporary tourist experience.
- User interface design for social networking and interconnected data engaging innovative approaches for multimedia material sharing in order to provide a personalized experience model.

- Implementation of the mobile web application, built on a core hybrid technology platform that contains primary and transformed content, spatial mapping and content targeted to multiple operators.
- Developing the computational infrastructure for crowd sourcing experience, enabling the visitor to record and share dynamic multimedia content using her personal device. The approach adopted will exploit the semantic representation of both content and travel experience.
- Design/Developing the application for six thematic cultural routes
- Approaching market mapping and strategy perspectives / Sustainable investing

4 **Project Challenges and Discussion**

TRACCE project suggests a different approach for the exploration of travelogue experience and its exploitation using historical material and innovative technologies. While there are some interesting publications and related projects in the wider area, TRACCE consortium has identified many exciting challenges and opportunities that remain open for further research and development.

First and foremost, cultural LOD based on georeferences have been exploited by mixed reality mobile applications, emerging as interactive and useful tools for exploring a user's environment. Nevertheless, the semantic correlations between geographic and cultural data have been proven far more complicated, due to the parameter of historical time which differentiates the presentation of data for a specific place. The challenge in this case is the semantic representation of geographic knowledge, as it has arisen according to the historical evolution and the changes of the structured and unstructured landscape. TRACCE will work on this direction in order to achieve the best possible knowledge modeling. Furthermore, TRACCE study will focus on a domain of historical material, the one of travel accounts, which has not been highly processed and promoted yet.

One more disadvantage of approaches which combine georeferences and cultural LOD is that they place the user's position as the only criterion for information search and retrieval. In particular, the scenario of semantic information presentation with AR technology has the potential to overload user's screen, preventing the readability of the collected information and making difficult for the user to observe his environment. Therefore, TRACCE will face this difficulty by filtering LOD to keep only what meets user's expectations and then enrich the AR application with information. Semantic web data gathering can thus be used to create a virtual layer that overlaps the analogue world, enriching the user's perception.

In the same context, it would be interesting the information personalization based on metadata automatically extracted via social media or cookies which are related to particular points of interest. On top of that, the possibility of user to directly choose an area of interest or document its orientation and motion will be examined. Consequently, the material presented will be customized and targeted according to each user, a process that is still considered as a challenge for this domain.

In conclusion, the targeting of TRACCE is very ambitious since it includes the creation of a pervasive platform that will facilitate the production of enhanced

narratives and, on the other hand, incorporates the current state of the art technologies and extends beyond it for optimized augmented reality applications with linked open data, linking digital application with physical space.

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