# A MOBILE TECHNOLOGY FRAMEWORK FOR THE DISSEMINATION OF CULTURAL MEMORY

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**ABSTRACT**
The current research proposes a mobile technology framework in cultural heritage setting for the dissemination of cultural memory among its visitors. The framework studies the complex concept of human memory and attempts to adopt the human information perception, as a learning process, on a mobile framework that will allow their users to interact and share common knowledge concerning their personal knowledge and experience of the certain cultural setting.

## 1. INTRODUCTION

Human brain is quite complex mechanism. It absorbs information from the environment and recalls this information whenever becomes necessary. In a cultural heritage site there is information that is provided only by the observation of just the monuments and information that becomes available by the curators of the site. The progress of technology has allowed for visitors in museums and cultural heritage sites to access electronic information relevant to the site and to the monuments. Moreover it allows the communication between the various visitors either at the same time or on different time of visit in order to exchange thoughts and ideas on the specific cultural elements. The information on the monuments accompanied with the individual information and experience on the monuments is what forms the cultural memory of the monuments. There are various factors need to be considered in order to be able to capture and disseminate the cultural memory of the heritage setting which relate not only to the potentials of technology but also the limitations and possibilities of human cognition.

## 2. MEMORY

For more than 2.500 years, philosophers and scientists have been concerned with the issue of memory. In 350 B.C. Aristotle, defined memory in his work on Memory and Recollection (Aristotle, 1935) as *"the recreation of past experience accompanied by the consciousness that this experience existed beforehand"*. He also argues that *"there is no such thing as memory of the present while present, for the present is object only of perception, and the future, of expectation, but the object of memory is the past."* Therefore, for the memory to be meaningful, time elapsed is presumed. Memory, based on Freud (1900), is developed in the form of fading traces as it is mainly perceived, stored and erased. Psychology defines memory as the ability of an organism to store, retain and retrieve information which may have the form of ideas or even personal experiences. Memory processes can be explained in terms of information processing. The perceiving process of memory includes the combination of information that has been received through human sensations. The storing and retaining processes of memory create a permanent record in one's mind. Finally the retrieving process of memory recalls the stored elements as a result of an external or internal trigger or to be used in a certain situation. Marcel Proust (1913) argues that the retrieving or recalling process of memory may happen due to unconscious cues and not necessarily intentional purposes. This is, what he calls, involuntary memory.

Memory can be declarative or procedural depending on the type of creation source. The first is the feature of the human memory to store facts. This type of memory can be explicitly shared with others and is related to the typical learning from resources process and to flash-back situations. Procedural memory resembles with Proust's involuntary memory. It is the implicit and unconscious long-term memory of one's skills and internal learning procedures. Declarative memory can be either episodic or semantic depending on the nature of the information to be remembered. Episodic is the memory of events, places, times and related emotions and experiences based on conceptions. Episodic can be either scenic memory if it is organised in visual terms or narrative if it is organised with verbal means. Semantic is the memory of meanings, understandings and concepts unrelated to experiences. Therefore, memory, apart from being a process of reconstructing elements from past experiences in one's mind, is directly connected with the sensations and the perceptions of the human body. This type of physical and conceptual experience in a specific setting can be delimited as someone's context.

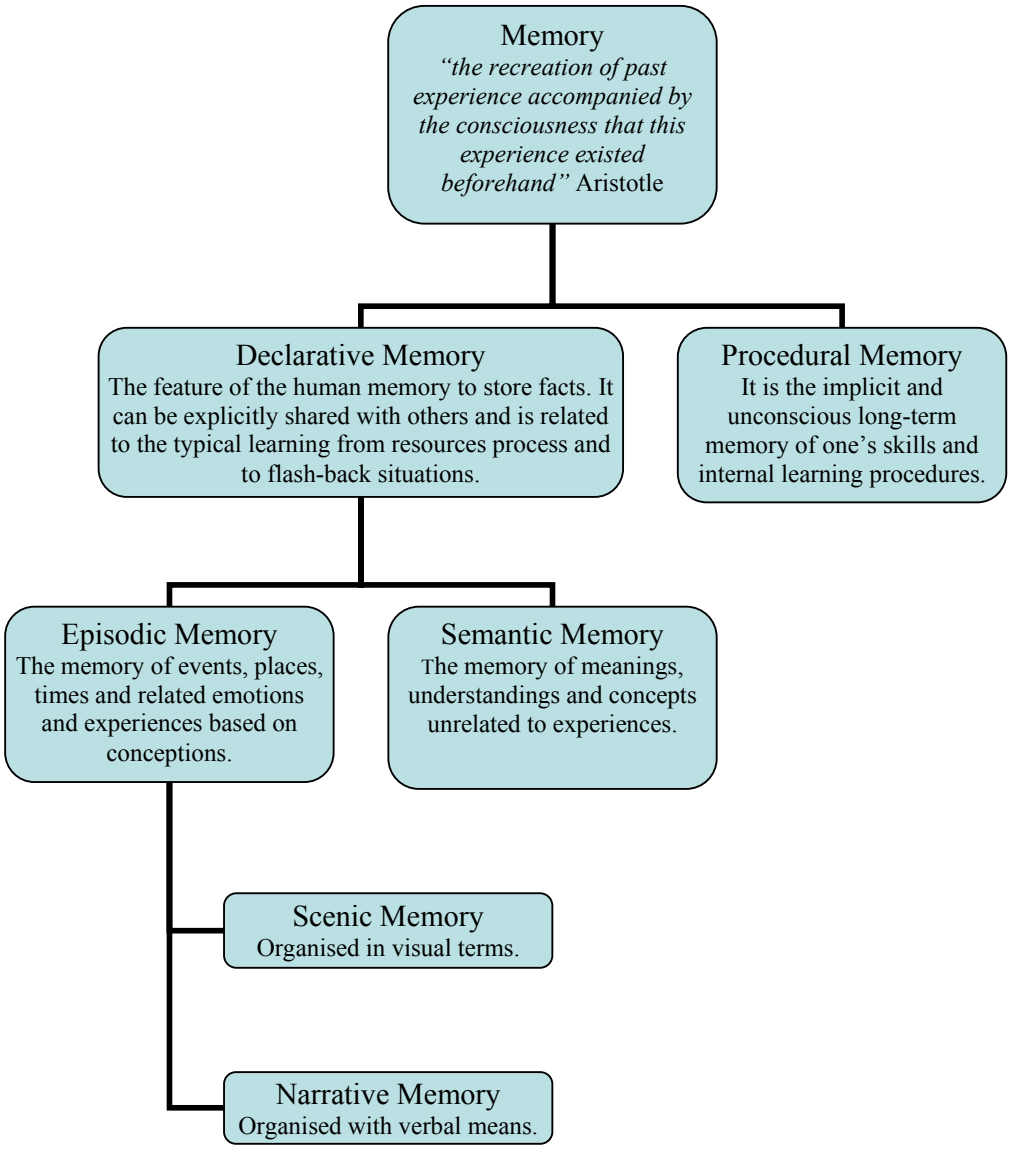


**Fig.1 Memory classification by information type**

## 3. CONTEXT

The term of context has been used in various scientific disciplines such as linguistics, pragmatics, ontology, sociology, architecture, knowledge representation, computer science and others. It is difficult to provide an accurate definition of context as most of the times it is defined in relation to examples for a specific situation or through synonyms. There is not a single definition of context (Finkelstein et al., 2002) as, while it is something that is usually understood, it is difficult to be explained. Oxford English Dictionary (2008) provides two definitions for context. The first one is a linguistic definition and defines context as the parts that immediately precede and follow a word or passage and clarify its meaning. The second one, more general, defines context as the circumstances that form the setting for an event, statement, or idea. In order to be able to manipulate the contextual information so that they could develop context awareness devices, computer scientists have done a great attempt in giving accurate definitions of context. Focused on an example-based definition, Schilit *et al.* (1994) identify as the three most important aspects of context to be where someone is, who is this person with, and what resources are nearby. In addition, Schilit and Theimer (1994) define context as the location, the identities of people and objects nearby and the changes that are happening on them. Ryan *et al.* (1997) adds the concept of time to the above mentioned definition of context. Day (1998) defines context as not only someone's location, time and the people and objects of the environment but also the emotional condition, the orientation and the attention of the person. Day *et al.* (2001) define context as the location, identity and state of people, groups and computational and physical objects. On the other hand, in terms of synonyms, context is the environment

(Hull *et al.*, 1997), the setting (Rodden *et al.*, 1998), the current situation (Franklin & Flaschbart, 1998), or even the elements of someone's environment that the person is aware of (Brown, 1996). Based on the definitions provided, we will attempt to determine context in our case.

## 4. MEMORY AND CONTEXT

In an archaeological site, an individual is moving around various locations, watching the monuments or the artefacts of the place. The items the individual perceives with the various sensations are becoming knowledge through the direct relation to its memory. That is the process of conceptualisation which is entirely personal and unique. Any object is observed, is analysed through memory and is stored as a new piece of memory. The result of the analysis might cause specific emotions to the individual. The individual might use a mobile device (e.g. PDA) which brings up multimedia information regarding the site or a specific monument or artefact of the place. The information provided from the mobile device is also conceptualised, after filtered through individual's memory. There might be other people on the site with whom the individual either directly (e.g. friends or family members) or indirectly (e.g. foreign visitors who the individual is following or attending) interact. Interaction with other people is also a conceptualisation process. The result of information conceptualisation may be the creation of new beliefs and thoughts, the impact on the emotional status of an individual, trigger specific behaviour in the physical environment, motivate specific social interaction, or even initiate a new interaction task with the electronic resources. We could say that each individual in an archaeological site, has in internal and external environment. The internal environment consists of the individual's conception which we call Conceptual Context (e.g. memories, thoughts, believes, etc.) and emotional situation which we name Emotional Context (e.g. emotions, feelings, etc.). The individual's external environment consists of the physical setting and objects that is the Physical Context (e.g. archaeological site, location, monuments, artefacts, etc.), its relation to the others which is the Social Context (e.g. other people, social situation, etc.) and the available electronic resources that is the E-Context (e.g. electronic equipment, mobile devices, multimedia applications, available information, interaction style, etc.). Therefore, for the purpose of our study we define the individual's context as the information that characterises the conceptual, emotional, environmental, social and digital information accessibility situation of an individual as the accumulation of the Conceptual, Emotional, Physical, Social and E-Context respectively.

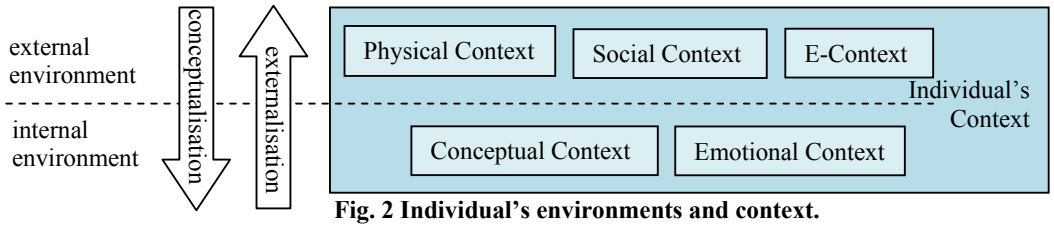


**Fig. 2 Individual's environments and context.**

An individual's interaction with its external environment is therefore a continuous process of conceptualisation of information and externalisation upon the result of the information analysis. The externalisation could have the form of emotional expression, thought verbalisation, physical movement or action, social intervention, device interaction, etc. Therefore the relation between memory and context is like a continuous pendulum among them where the one side feeds the other as an exchange between the internal and external environment of an individual. Within an archaeological site, the development of memory therefore, depends on the various physical, social and electronic resource factors of an individual.

## 5. INDIVIDUAL AND COLLECTIVE MEMORY

This perspective of memory has an externally emphasised focus which Halbwachs (1980) supports, contradicting Freud on the nature of memory. He argues that, even if memory has obviously an internal nature, it develops only through social interaction with collective narratives. This is, what he calls, collective memory. This social aspect of individual memory was defined by Aleida and Jan Assman (2006) as communicative memory which develops during contextually and emotionally depended interaction among people. Emotions provide with better storing of memories in human minds and better definitions in the relevant social and cultural settings. Both narrative and scenic memories benefit from the emotional features of human communication. The experience that is derived from this interaction or through stimulus effects during this interaction (imagination) relates mutually to culture and memory. The relationship between experience and culture is bidirectional. Culture affects experience by providing intermediate perceptions on specific contexts. On the other hand, experience influences culture, as a collective force of individual shared experiences. The impact of memory is by turning the past into a present experience.

## 6. ABOUT CULTURAL MEMORY

Jan Assman (1992) was the first who defined cultural memory as the "outer dimension of human memory". This would include the potentials of a society to preserve its collective memory from one generation to another with the use of cultural artefacts, and its capability to reconstruct a cultural identity from this collective memory. Holtorf (1996) also defined cultural memory as the collective understandings of the past in a certain social and cultural setting. Cultural memory is therefore a subset of the collective memory of two random individuals. For a great number of individuals, their collective memory tends to receive its minimum size that is their cultural memory. Therefore, cultural memory is not history but it is about understanding the past in a present cultural setting (Friedman, 1992). Places like national cultural monuments and sites which tend to have a vast amount of multicultural visitors every year are these which tend to necessitate more a meaningful collective understanding of the past culture within a contemporary setting. With this focus, our research investigates the capabilities of potential technologies to support the dissemination of cultural memory in such environments.

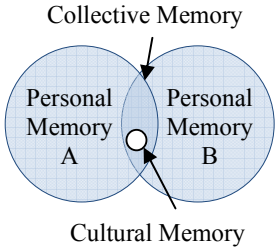


**Fig. 3 The relation between collective and cultural memory**

## 7. THE GROUNDING PROCESS OF CULTURAL MEMORY

Friedman's definition on cultural memory reminds us of Clark's Common Ground Theory. Clark argues that the background and previous knowledge of the individuals, the assumptions and various information, relevant to a joint activity, that people bring in is part of their common ground, the process of establishing a common understanding (Clark, 1996). The coordination process, which is a repetitive and emerging process, aims at increasing the common ground among individuals. This observation divides the common ground into three main parts at any time of a joint activity: the initial common ground, the current state of joint activity, and, the public events so far.

For the purpose of cultural memory, individuals enter an archaeological site having individual memory on the site. This is the initial cultural memory which is the personal interpretation of cultural memory. At each stage of interacting with their external environment, they conceptualise the information perceived from the physical, social and electronic context maintaining an understanding by identifying and recognising the external cultural representations, which is the current state of individual's context. Finally, the events that have happened since the entry of an individual in the current context are the public events so far (Kammas *et al.*, 2003).

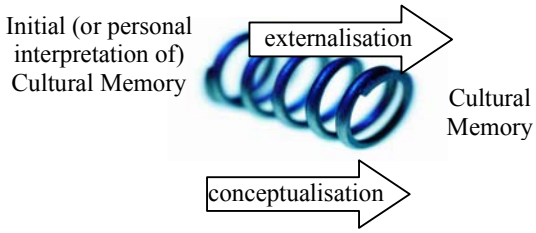


**Fig. 4 The process of maintenance and development of cultural memory**

This process is an endless loop of conceptualisation of perceptions that individuals receive and respond through externalisation of actions. Their actions depend on their initial cultural memory which is their background knowledge and beliefs about the common culture. These actions have an impact on the current state of individual's actions, something that may return as a new perception to other people in the social context of the individual. Furthermore, the individuals' actions change their perceptions on the public events of the situation.

## 8. MOBILE TECHNOLOGY AND CULTURAL HERITAGE

We have seen that memory is not just remembering the past but it is strongly connected with physical artefacts, places and social interaction. Memory, for example, can be contained in objects, buildings, images, sounds, tastes, smells, narrations, texts. Since the challenge about memorising an absent past is the reproductions of it, to

the certain extend that is meaningful, a solution would be the reconstruction through the valid combination of various artefact types that would create a collective nostalgia through a grounding process. Visiting an archaeological site is more that a multimodal experience of the monuments and certainly more that learning about a specific culture and its heritage. Such a place is a centre of interaction and communication for exchanging ideas in a certain socio-cultural setting. Therefore cultural memory can be supported through a collective interaction among people with various artefacts and electronic resources in a certain social and cultural setting. To be able to maintain distractlessly such a collective experience, people need to achieve a situation for interaction with others and with artefacts in the versatile environment of a cultural setting. Freedom, mobility, understanding, communication, lack of distraction and guidance are factors that need to be satisfied respectively.

Mobile technology nowadays offers a wide range of learning and communication opportunities. In the area of cultural heritage mobile technologies provide complete solutions for the dissemination of multimedia enriched content related to the cultural elements and new methods for perceiving and understanding information. Since experience with cultural artefacts can be a social event, mobile technology creates virtual and conceptual environments for people to talk, discuss and exchange their experiences either synchronously or asynchronously. The following are characteristics of the mobile technology necessary to facilitate the dissemination of cultural memory:

*User Centred and Accessibility Design*: In order to provide a technological solution appropriate for the dissemination of cultural memory we need to understand the user needs but also the possibilities that the available technology can provide (Beyer & Holtzblatt 1998). A user is a visitor in an archaeological site who wants to be culturally informed regarding the monuments and the artefacts of the site. The design includes device and application solutions the provide ease and most comprehensive access to the cultural content even for people with disabilities.

*Multimedia*: The content that a visitor of an archaeological site is accessing, needs to be provided with various ways to meet the different sensory modalities of the user. Therefore, text, sounds, images, graphics, videos are various media types to present the necessary content. The media types should be used either in combination or in alternation of each other depending on the contextual setting of the visitor.

*Adaptive Learning*: A user is a visitor in an archaeological site who is of a specific age, speaks a specific language, is a student, or an older person, who visits or not the place for first time and have or not a close connection to the specific culture, and is alone or with other people. A mobile device has to provide profile-based content that is appropriate to the specific situation which is predefined by the user.

*Connectivity Infrastructure*: Mobility means freedom and access from anywhere. A mobile device within an archaeological site has to be able to follow a user within the site and provide information to the user either this information exists on the device, or on a central system at the site, or even on the internet. Therefore, wireless, infrared and Bluetooth technologies should be used for the connection to content.

*Social Networking*: Since cultural memory is a result of social interaction, we should not neglect the role of various people within the archaeological site. Either someone has visited the site alone or with others, the mobile technology should provide the individual with opportunities for discussion and exchange of information either synchronously or asynchronously through common and shared virtual spaces.

*Context Awareness*: Earlier we identified the importance of context to create and recall an individual's memory. Individuals have the ability to perceive and conceptualise their context in order to respond with specific actions. Even in the case of communication with others, Common Ground Theory determines that there is a repetitive process towards understanding the context. In the case of electronic device this is not so obvious. When someone is using an application which provides information on the individual's context, the application should be able to recognise this context and provide only the necessary information. Context awareness combined with metadata content enrichment will be able to provide easy access to more appropriate content whenever this is necessary.

## 9. MOBILE TECHNOLOGY FRAMEWORK

The current research proposes a mobile technology framework for the implementation of customised solutions to support with the dissemination of cultural memory. The framework will move along three axes: the perception, the memory and the expectation. The perception is about the current situation of the physical, social and e-context. The memory is about the conceptual context, the experience of the past that has been preserved until the present. The expectation is about the externalisation process, which is the intention to be achieved concerning the past experience for the present physical, social and e-context. The following figure represents this process.

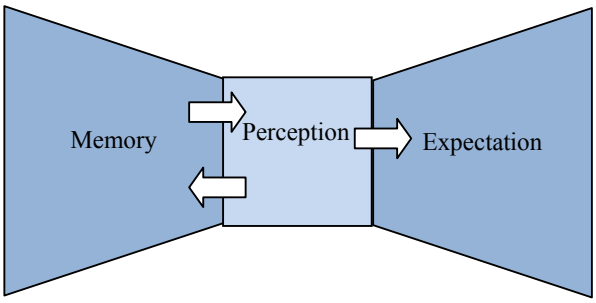


**Fig. 5 A generic mobile technology framework.**

The framework will be able to provide with a mobile technology solution with the six different sensory modalities: auditory, visual, kinaesthetic, tactile, olfactory and gustatory in respect to the certain perception, memory and expectation axes. Since individuals are learning either alone or within a social context, the available technology should be able to provide with alternative views and experience recreations that would create a more pluralistic collective memory. Therefore changing places, changing time, changing people and interpretations, correspond to a changing and dynamic cultural memory.

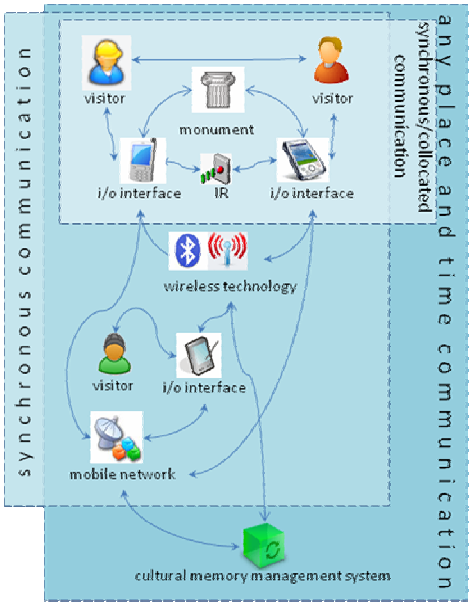


**Fig. 6 Mobile communication for any place and time (adapted from Kammas et al. 2003)**

A mobile device would respectively provide with human memory capabilities for perceiving, storing and retrieving information. Connectivity among the various devices is also important for the social interaction. Finally, semantic organisation of stored memory for easier information retrieval is vital. The following figure provides the extended mobile technology framework for the dissemination of cultural memory.

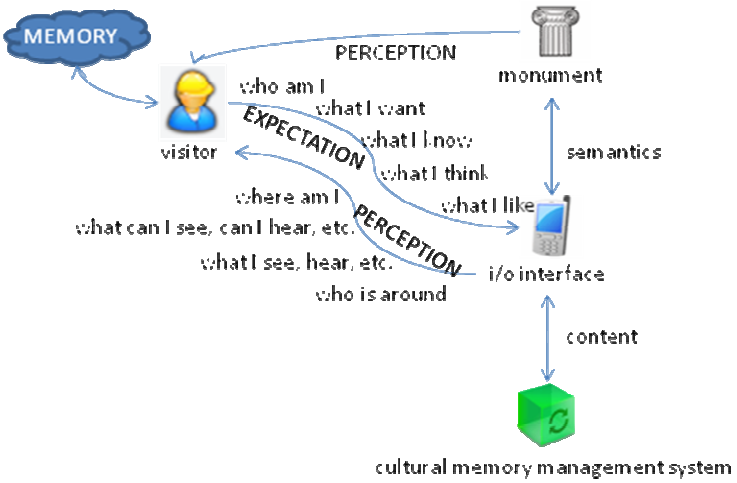


**Fig. 7 Extended mobile technology framework for the dissemination of cultural memory**

A visitor in the archaeological site is using a mobile device to define identification and preferences on the use of the device and the site visit. The device interacts with the monuments of the site through bluetooth or wireless technologies and with the use of semantic annotation (metadata) is bringing relevant content to the visitor from the cultural memory management system. The cultural content is related to information on the available monuments on the site, the current location of the visitor, information on the current monument where the visitor is nearby, and information on the social setting of the visitor (who else is around). The visitor can still enter a learning process by expressing personal knowledge on the subject, so that the device may better adapt the content to the visitor's needs. Finally the visitor may provide thoughts and preferences on specific monuments or information provided which will become annotated content to the specific content in the cultural memory management system. The final information may be available to other visitors through the system as the result of building collective memory on the specific archaeological setting.

## 10. CONCLUSIONS

Cultural memory is more than information and experience and sometimes it regards things so tacit that cannot be expressed. The current research claims that the use of mobile technology infrastructure is able to solve the problem of organising and especially disseminating cultural memory. The theoretical approach of the issue might sound too simplistic for the operational success in a realistic situation. Designing a mobile technology framework for the dissemination of cultural memory, demands the consideration of multiple parameters for representing the present situation of the monument, the multicultural visitors and their previous knowledge on the situation, the available resources, the past experience that exist on the current cultural setting and the desired outcome. Towards implementing this theoretical framework, technological limitations as well as human cognition limitation will be able to provide us with valuable information on the limitations of the framework itself.

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