

Mobile technologies: new ways to access tourism, culture and cities

Introduction

Technology, whether one likes it or not, is becoming ever-present in our everyday life as mobile devices provide users with new ways to connect with the digital world. Recently, a wide offer of applications and services not only shaped a new market, but also generated a new development opportunity regarding the access to novel contents and use related to the cultural sector. Combining powerful computing activities with several embedded tools, 3G and 4G wi-fi, and wide touch screens, smartphones and tablets now allow users to access contents in museums, exhibitions, monuments and city centres. The location-aware systems could provide additional information, give directions, and customise the offer, delivering therefore an individualised content, and thus enhancing the user's experience according to his/her particular interests. This paper outlines the data and trends of the mobile service market, focusing on the use of portable technology and location-based services in the cultural and tourism sectors.

Culture and tourism on-the-go

According to Comscore's 2012 Mobile Future in Focus report, 2011 saw a significant growth in the smartphones and tablet market and a shift towards cross-platform digital media consumption. Nearly 42 per cent of American users have a smartphone in comparison to 44 per cent of French, German, Italian, Spanish, and British users. Mobile activity also rose due to the proliferation of high speed networks and public wireless connection. As a result, this growth furthers online interaction through social networks, content browsing, and information access, and the www paradigm – whatever, whenever, wherever – never seemed more appropriate.

Mobile devices are changing the way people access information. According to Gartner (2010), by 2013 people will access internet mainly through mobile technology. In fact, tools such as the GPS, accelerometer, and gyroscope allow richer experiences for smartphone users, enabling innovative and attractive applications in the cultural heritage field.

These technologies have been increasingly exploited by galleries, libraries, archives and museums – GLAMs –, and are also expected to be widely adopted in the cultural heritage field within two years.

The last fifty years have seen a strong evolution of mobile technologies in the cultural heritage sector, which began offering basic contents on standard devices and now delivers customised contents on several different platforms with personalised functionality (Tallon, 2008). These technologies enable users to connect with others, search information, and create personal and shareable contents (Gammon, 2008; Burch, 2008). Features such as games and social networks are also introducing new ways to share data and contents, generating various opportunities and models of relationship between users and data, and the users themselves. According to the 2010 Horizon Report: Museum Edition (Johnson et al., 2010), location-based applications will be extremely useful in the cultural heritage field as these allow users to access contextual information while visiting museums or/and cities, and therefore encouraging situated learning (Lave & Wenger, 1991).

Mobile technology

Three words provide a comprehensive definition of the term mobile technology: mobile – portable as it is not dependent on its location –, digital – as it is based on an electrical system that uses discrete values –, and personal – as there is a one-to-one relationship between the user and the device (Tallon, 2008). Another useful description to outline the trend had been constructed by Mark Weiser, Chief Technology Officer at Xerox Palo Alto Research Centre, who first coined the term ubiquitous computing, connoting not only the idea of using computers in everywhere, but also for all uses. Weiser's was concerned with the possible integration of microchips in the everyday life. The concept is also explained with another rather original word, everyware, as "such ubiquitous information technology – everyware – will appear in many different contexts and take a wide variety of forms, but will affect almost every one of us, whether we are aware of it or not" (Greenfield, 2006). Nowadays, smartphones and tablets combine several different tools and enables access to various media at the same time, all in a single device: music, photographs, movies, chat, online browsing, digital maps and, finally, make calls. This is what Kim Veltman (2005) defines as UCT Universal Convergence Technology in place of ICT. The convergence of one medium into several other functions allows users not only to develop a new form of interaction, but also to move towards a different cultural approach in which one could access information through mobile devices anytime and anywhere, and create new contents using collaborative tools such as blogs, forums, and social softwares.

This behaviour slightly changes the approach in which the audience may access touristic and/or cultural information, whether it is indoor or outdoor. Let's think about the usual way in which one could access touristic information when visiting a cultural attraction: the audio guide is the medium visitors usually use to access information and to broaden their knowledge when visiting a church, an exhibition, or simply moving around a historic city. Even if this method can be considered old as the first portable guide was used in Stedelijk Museum in Amsterdam in 1952, its evolution is still important as new digital devices allow visitors to not only access contents as they wish, easily browsing as they are not forced to follow a unique path as in old analogical tools, but also do so interactively, having the opportunity to provide feedbacks as well as to access social media channels (Johnson et al., 2010).

Devices that can therefore provide not only audio, but also pictures and video, are a further step towards what could be defined as a mobile experience, a way to access the world around us and interact with it and other users through our own devices. Moreover, accelerometer and compass embedded on smartphones and tablets could define users' location and orientation, driving them to meaningful points based on their position; a wider touchscreen fulfils all requirement to access information online and offline and browse a map to follow a path or identify points of interest. Using these media one could interact completely with several applications specifically created to access touristic and cultural heritage, making a further shift from the passive audio guide model towards what Henry Jenkins define participatory culture, or rather the possibility to socially contribute creating and sharing knowledge and experience with others. "Participatory culture is emerging as the culture absorbs and responds to the explosion of new media technologies that make it possible for average consumers to archive, annotate, appropriate, and re-circulate media content in powerful new ways" (Jenkins, 2006).

Location-based services and augmented reality

Location-based services (LBS) provide consumers with services linked explicitly to their current location and often prioritised by the known interests of the user. From geographically-targeted advertising to applications that suggest services, special offers, and activities in the immediate area, location-based services supply a growing demand for personalisation (Johnson et al., 2010). Smartphone and tablet devices are the coherent platforms for delivery of location-based services, as these tools are able to track

the user's position. Location-based services are one of the fastest growing areas for mobile applications and their use in cultural and touristic applications is an innovative field. Museum and cities are providing visitors with applications to support their visit, and according to 2010 Horizon Report: Museum Edition report, by 2013 LBS will be widely adopted in the cultural heritage field, as well as augmented reality applications.

Oomen et al. (2011) categorise and cluster LBS in the cultural heritage sphere into five groups according to their main features: location-aware display of content (all applications that deliver contents to visitors automatically when they are in a specific location), contributing content by end-users (users provide multimedia contents through their mobile devices related to a particular place or object and upload them with metadata related to position, date and time in which the action has taken place), QR codes, augmented reality applications, and geocaching. QR code (Quick Response Code) and RFID (Radio-Frequency Identification) tags are frequently used to access information directly; instead of typing names and selecting codes on the device's keyboard, visitors are asked to take photos or draw the device up to a tag. LBS based on augmented reality browsers (Layar, Junaio, Wikitude) takes advantage of several positioning systems which enable to show third-party information, providing pictures or 3D models that are geo-located in front of the user. However, geocaching is the most prominent example with a large community; the game revolves around finding, through the use of a GPS receiver and a mobile device, locations containing hidden treasures.

A myriad of applications have been created for cultural institutions to enhance and support visitors' experience, and LBS offer various possibilities to engage users in a deeper level of interactivity. Some museums were able to pin points of interest on a map and drive visitors to see them as well to provide information on the location where works of art were created or places that influenced an artist's work. Cultural paths could be also organised throughout a city and multiple media contents could enhance the visiting experience, enriching the audio tour with multimedia and deepening a subject with valuable documents.

Looking for Achille Castiglioni is a mobile location-based application designed to lead visitors to the discovery of Achille Castiglioni's projects in downtown Milan. Documents, drawings, photos, and models tell the story of the architecture, temporary exhibitions, and design projects that shaped the history of Italian design. About 70 projects developed between 1947 and 1999 and referred to 30 different locations have been geo-tagged in downtown Milan. The bilingual tour does not demand a defined path to be followed and users are free to decide where to go. At a point of interest, a brief audio description in Italian or English can be accessed as well as other related contents (Spallazzo et al., 2011).

These location-aware display of content applications can enrich an experience, highlighting the presence of other works of the same artist or nearby works. Time and technology can therefore provide educators, institutions, and cities tools that are evermore sophisticated, producing a myriad of applications to design cultural and touristic mobile experiences.

A separate discussion should be set aside for pervasive and location-based games, applications intend to foster and to enhance learning experience (Klopfer, 2008), occasionally through the use of augmented or hybrid reality. Augmented reality refers to additional data generated by a computer that partially or entirely overlays the real world and that can be exploited through the use of mobile devices. This information can be a simple additional text as well as entire 3D models. Using image recognition, pictures can be used through the device camera as a portal to access an online library. Still according to Klopfer (2008), mobile games are based on existing social ties and mobile devices do not need to develop new means to foster

new social relationships because they already allow real time connectivity; these allow people to be surrounded by the real world, enabling authentic experiences that also keeps in contact with the environment. Research and experience have already shown that games as a mean of learning can be applied very effectively in many contexts, and can engage learners in ways other tools and approaches do not. For this reason, gaming will probably become more useful and prevalent in higher education and in cultural learning (Johnson et al., 2011).

Discussion and conclusion

Mobile technology and location-based services are a great novel opportunity for cultural institutions and cities to reach a wider audience and to enhance traditional means of exhibiting it (Proctor, 2011). The capability to add social engagement is a chance to involve communities with a different active approach in generating cultural contents. Digital resources are a great opportunity to connect anytime and anywhere allowing online interaction; multiple tasks could be performed quickly and easily allowing a deeper understanding of a subject, works of art, and cultural heritage in general.

Unfortunately, major constraints and challenges in adopting these technologies are still present. Among them, cost is one of the main constraints to its diffusion as cultural institutions and municipalities struggle to find the resources to develop applications, organise contents to proper formats, and therefore enhance multimodal learning through mobile devices.

Digital divide is another key issue. According to the latest comScore report on mobile technology, smartphones' in Italy in 2011 reached an equivalent of about 43.9 per cent among all mobile phones, one of the highest percentages in Europe, but only 33.7 per cent of these use the iOS4 (15.8 per cent) or the Android (17.9 per cent) operating systems, even if the trend almost doubled the previous year's totals (comScore, 2012). This means that a very restricted audience could make use of novel applications even if this gap was reduced in a few years.

A third significant issue is the development of contents for mobile devices as the options are two: mobile or web applications (Proctor, 2011). Whilst mobile applications are designed for a specific operating system and provided through a dedicated distribution channels (meaning different versions for different platforms), web applications or mobile websites are optimised to be accessed from a wide range of mobile devices and thus do not need further customisation.

At the Design Department of Politecnico di Milano, I am experimenting innovative ways to promote cultural heritage and connected services through digital technologies. This does not only mean a bare use of tools and devices, but also finding new interactive ideas with a large amount of data available. The vision is to foster exhibitions, archives, and architecture culture through a multimodal approach properly customised to different users using geo-located services, interactive digital catalogues, and cross-media platforms. These activities had been carried out through research activities, testing, the new curricular course at the Design School of Politecnico di Milano on augmented reality and mobile experience, and a workshop on mobile gaming experience in partnership with Touring Club Italiano. Results can be seen on the blog (<http://arandme.wordpress.com>) where the research phase, design framework definition and the concept development are outlined through the final presentation of a prototype.

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