

My Italy: Design and usability evaluation of an M-Tourism prototype

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Abstract

In this paper we describe the prototype of a location-based M-tourism application called My Italy, developed by the Usability and Accessibility Laboratory (LUA) University of Rome Sapienza. My Italy is a mobile multimedia tourist guide capable of supplying the mobile user with context-aware information during travel in a fast and easy way. My Italy was designed to optimize the user's experience through a user-friendly interface and proper information architecture. The design process has taken into account the specific needs of tourists as well as several variables that characterize the mobile context. The prototype developed as a result has been tested with users in a real scenario to evaluate its usability and performance.

Keywords: m-tourism, mobile application, interaction design, mobile usability.

1 Introduction

The widespread use of handheld devices, which are becoming increasingly powerful and flexible, and the development of robust and fast mobile communication networks offer a new way of accessing information anytime and anywhere, thus changing the habits of mobile users. Designing for a mobile user (Ballard, 2007), and particularly for a tourist, means dealing with a user who, while using the application, could rapidly change his objectives, his location and his physical and social context. The user/tourist will be using the application while physically moving through space, trying to avoid obstacles and following a route, and perhaps interacting with other people (chatting with friends, asking for information, buying things). As the user divides his attention between the application and the surrounding environment he will use his mobile phone to perform a specific task (finding the nearest restaurant, creating a route back to his hotel etc.) and then return quickly to the real world, so it is necessary to design efficient applications providing content with real value in a mobile context. As a result of the analysis conducted on LBS in general (Küpper, 2005; Steiniger et al., 2006) and on the activities related to tourism in particular (Dey and Abowd, 1999; Nivala and Sarjakoski, 2003; Reichenbacher, 2003), a range of actions have been identified as typical tourist behaviour regarding interaction with surrounding spaces. It is particularly important to analyze the types of users' actions to identify their goals and needs. The set of actions related to geoinformation seeking can be summarized by the following five basic categories (Reichenbacher, 2003):

- locating: actions related to orientation and localization;
- navigating: actions related to navigation and route creation;
- searching: actions related to people, places, object and event searches;
- identifying: actions related to identification of people and objects;
- checking: actions related to checking the state of events and objects.

These actions are combined into more complex activities that could also be driven by subjective cultural factors and by social situations. In this case, the information searched for by the user is not merely limited to the identification of a place or an object, but also includes the cultural and social sphere. This kind of information can be used to create tours of points of interest and to provide suggestions to the user. An example of this strategy can be found in Bellotti et al. (2008): the authors describe how context data can be used together with data on users' behaviour and preferences to predict their activities, give them useful suggestions and "serendipitous recommendations".

2 Application description

My Italy is a mobile, location-based, multimedia tourist guide, targeting tourists visiting a foreign city as well as citizens wanting to explore their own town. This application can provide context-related information using localization through GPS and downloading updated data through the mobile network. The main goal of this application is to actively support the user/tourist during his visit, enabling him to obtain information about places in his immediate vicinity, as well places worth visiting further afield, thus enriching his experience.

My Italy software is based on a client-server architecture:

- *client*: installed on a mobile phone, developed in Java Mobile Edition (J2ME). This client can obtain position data from the GPS embedded in the handheld device or can establish a connection with an external GPS receiver to achieve localization data. The application has a built-in SMIL (Synchronized Multimedia Integration Language) player to play slideshows with audio. The client supports both touchscreen and keypad phones;
- *server*: it provides a map service (for implementing the prototype, free Yahoo maps have been used) and a repository of geo-referenced content made of text, images, audio and multimedia presentations developed with SMIL. For implementing the prototype a single server has been used, but in a real architecture a distributed system would have to be considered.

The application presents three main branches: "Maps", "Guided Tours" and "Events", accessible from a tab menu. The "Maps" section presents a map tool that enables the user to have an immediate perception of his surroundings and it is used for displaying points of interest (POI), tourist itineraries, events and navigation routes. A different icon will represent every type of POI. Users can scroll between them while the application shows a text label with the name of the current selected POI. On

touchscreen devices, the user simply needs to click again on the area formed by the icon and the text label. The user can also access a text list of POIs via a command in the "Options" menu. The "Nearby suggestions" feature, in the "Options" menu, will communicate the proximity of POIs, routes and potentially interesting events for tourists through a vibration of the device. The user can access a detailed description of a POI, both on the map and on the simple text list, by selecting it. Following a principle of modularity, the choice was made to present a brief overview, then enable the user to access more extensive contents. Textual information will also be presented in a way that is compatible with third party screen readers. This means that the user does not always need to be looking at the display, and also ensures user accessibility to visually impaired or blind people. The application also supplies the user with short audio-video presentations consisting of a sequence of images with related audio information developed in SMIL. These slideshows are meant to give some brief facts in a far more engaging way than a simple text. The images will aim to show perspective and details that are not normally visible by the user, such as aerial and historical imagery.

The second main branch of the application is constituted by the tab "Guided Tours". A text list of the itineraries close to the user location is shown. By the selection of a list item the user can obtain basic information, such as the distance to the first stage of the route, the length and duration of the tour. Guided Tours have a textual description and link to start the tour, see an audio-video presentation and display the route to be followed. A navigation function is implemented to create a path to the starting point of the guided tour.

The third branch is the one represented by the "Events" tab. Its selection will display a screen where the user can make an initial selection, crucial for a tourist on holiday, of the timeframe in which the events will take place. The options will be the following: "today", "tomorrow", "this week", "all" and "select the date". After this initial selection the user gets a list of categories of events that will take place in the chosen timeframe. Events of each category are shown as a text list. Activating an item once will result in some basic related information being displayed, such as location, distance from user location, date, time and a brief description. Additional features will be placed in the "Options" menu, such as ticket buying, event multimedia presentation, displaying of the event as POI and using it for route creating purposes. Finally, the application may also be able to create a reminder of the event.

3 Usability evaluation

An on-field usability evaluation has been undertaken to test the design choices and to get directions for further developments. The prototype was tested by ten users: workers and students aged 16 to 50, 100% of whom use mobile phones to send text messages, 50% of whom have installed at least one application, and 30% of whom navigate the web on their mobiles. The methodology used is similar to the one implemented by Leitner (2006). The test session was recorded using the following tools:

- Portable video camera: used for recording the users' interaction with the environment;
- Head-mounted video camera: needed to reveal the personal view of the user, thus showing whether his attention was focused on the device or on the surrounding environment. The presence of an in-built microphone recorded the users' impressions voiced during the process;
- Screen-recording software: to display and record in real time on a PC what is happening on the mobile device display.

To provide a real test environment two different places were chosen inside the campus of Sapienza University in Rome, assigning GPS coordinates to two different POIs in the server: Piazza Navona and the Pantheon. Two large posters representing these POIs were placed in these locations. The test environment was chosen to reproduce the normal conditions of use for an M-Tourism application. Cars and people move freely within the University Campus, therefore the users were subjected to the same interruptions and distractions of typical outdoor use.

A Nokia e61i connected to an external Bluetooth GPS receiver was used for the purpose of the test. The users were asked to carry out a total of 7 tasks addressing different functionalities of the application. The first two tasks regarded the self orientation and the nearest POIs localization using the map. Then, to check information displaying, another task required the user to find detailed information (text and multimedia elements) about the nearest POIs found on the map. The subsequent three tasks were focused on the "Guided Tours" section: ask the user to find a specific tour ("Piazza Navona – Patheon"), understand the tour length and the main stops, and follow the route. The latter was useful also to observe the user behaviour while splitting his attention between walking and interacting with the application. The last task addressed the "Event" section, asking the user to search for an event and understand the main characteristics.

After the tests, users' impressions were recorded through a questionnaire. The results obtained from the analysis of the video recordings confirmed the ease of information retrieval and the proper management of interruptions by the prototype, even though the users were repeatedly obliged to interrupt their interaction with the application because of movement in space required by various tasks and external distractions.

An analysis of post-test questionnaires and think-aloud audio recordings revealed that users reacted positively to the My Italy prototype. They considered it easy to use and 80% of them had no major problems in completing the tasks. All the users felt that the terms used were understandable and that it was easy to access the main features of the application. My Italy's strengths were identified as the ease of use, the organisation and display of information and multimedia presentations, while its main weakness was the map. This latter finding, as confirmed by informal interviews with users and the analysis of video recordings, is largely attributable to the lack of responsiveness of the prototype in showing the user movement on the map. The problem is therefore ascribable to the failure in the optimization of the prototype system for remote access to the maps. Only two users answered the open question on the services that could be

added to My Italy: they would like to add personalized POIs on the map and have a buddy finder service. Most of the users thought that the multimedia slideshow was the more effective way of showing tourist information. Despite the positive views expressed by users, 60% of them felt that My Italy could be used alongside tourist handbooks, so there is no chance of a full substitution. The positive opinion of users, however, is confirmed by the fact that 100% would use My Italy during a journey.

4 Conclusion and future work

The M-tourism application prototype proposed implements very simple functions to help tourists during their exploration of a new place, both in terms of cultural and leisure activities. Usability test results have given positive feedback on the prototype. Further work on the prototype will aim to fix some problems that emerged from the usability evaluation. Moreover, the social dimension of the user's context will be considered through the implementation of a bookmarking system, allowing users to create personalized POIs and share information and suggestions on places visited. Other new features will also be implemented such as the integration of other location techniques (Cell-ID, Wi-Fi) to allow indoor localization. Experimental usability results will be used as guidelines for further implementation.

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