

# Arianna: a GPS-WiFi enabled multimedia guide for tourists visiting art cities

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**Abstract.** Arianna is a PDA based guide for tourists visiting cities. First goal of the project is to transform cities in open-air museums in which tourists can get reliable information, in the moment they prefer and in the best format technology can allow today at acceptable prices. Second goal is to reach the first via a commercially viable venture, in which requirements of paying tourists are systematically implemented in the Arianna platform.

**Key words:** Mobile guide, GPS, Wi-Fi, multimedia, Flash

## 1 Introduction

In the last few years, technological progress has increased the availability of mobile devices and allowed the creation of new applications, providing services over the power of traditional desktop systems. New devices can be made to behave differently depending on, for instance, the location (via GPS or via Wi-Fi), the environmental situation or particular needs of the user, becoming real location and context aware devices.

A suitable application domain for developing such innovative tools is tourism, which offers the right condition for exploiting new technologies in a mobile environment. A number of research projects have dealt with location-aware tourist guides, such as the Georgia Tech's Cyberguide [1], the Lancaster GUIDE system [2], Xerox Parc's electronic guide [5], the Venice walking tour through PDA, developed by a team of researchers from MIT and University of Venice IUAV [4], and the HCI Lab's Tech4Tourism from University of Udine, a mobile guide for tourists available for Pocket PCs and mobile phones [3].

In this paper, we present the Arianna Guide product, or simply Arianna, a mobile hand-held location and context aware tour guide for art cities. Arianna could not be implemented and commercialized 5 years ago. Being a guide for tourists that uses heavily many mature technologies available today, it enters in a series of convergent situations that allow for the first time such a project:

1. people start to get used to complex electronic gadgets for doing what in the past was done with low level technology or no technology,
2. several technologies used in Arianna are now commodities,
3. there is a political momentum for pushing good and innovative services for tourists in Italy.

In February 2006, following this analysis Econoetica SRL decided to enter in this venture and asked SofiHa Collaudi to develop the software for the device and for the management of the information inside it. In august 2006 Arianna went live in Florence. It is now distributed in information points for tourists and Hotels.

Making the project working is a matter of details: technological and commercial, concerning how to communicate the product to potential customers.

We begin in section 2 by describing the functional architecture of Arianna, laying emphasis on location and context awareness. Section 3 explains the technology employed in Arianna. Then, in Section 4 we deal with commercial issues related with our product and we describe the strategy we followed in distributing Arianna.

## 2 Functional architecture of Arianna

The functional architecture of Arianna can be roughly divided in two main sets of information processing capabilities: either it can be seen as a descriptive tool suitable for obtaining and searching information within multimedia components, or as a dynamic map viewer. The first set of features is achieved via interactive audio and video contents. For example, users who need particular information about places or monuments are provided with specific contents containing hyper-text, images and audio. Figure 1 *a*) shows the main menu of Arianna's interface, while figure *b*) depicts a screenshot for the content referring to "Palazzo Vecchio", in Florence. The second set of features allow for dynamic interacting with maps: users can perform searches to find the position of a given address, highlight interest points on the map and can be updated of their actual position through GPS. Maps are used for showing itinerary as well, by tracing paths which can be either predefined or personalized. Figure 1 *c*) shows an example of map visualization and figure *d*) shows Arianna search engine.

In order to gauge customers' satisfaction level and to identify areas for further improvement, we developed a back-office component used to collect statistics on users' main actions and movements. This information is stored as special click stream data, that are recordings of what users click on and do while visiting the city with Arianna. As the reader may note from figure 1 *a*), the human interface has been thought as simple as possible: for example, we designed the menu icons big enough to be clicked directly with fingers. According to the click stream analysis we continuously discard or modify components that are not really used by tourists.

Because of its feature of adapting to users' position in space, Arianna can be seen as a location-aware device. Indeed, Arianna can locate the user on high detailed cartography through GPS, by tracking his movements and keeping the

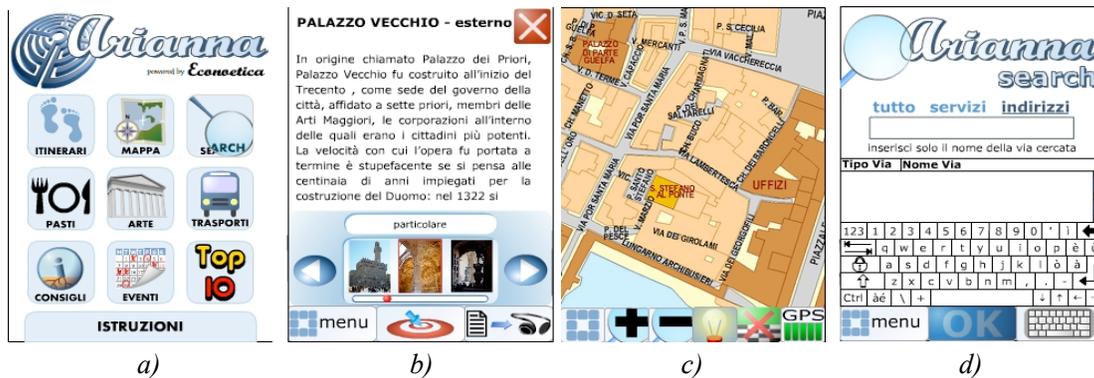


Fig. 1. Example screenshots of Arianna guide.

map centered on his position. It can lead to a chosen place by making path from the position retrieved by the GPS and it can automatically show contents related to particular places, which are of interest for the user. Users are free to deactivate the GPS tracking system when needed. This feature is useful in indoor places, such as hotels and restaurants, where the positioning system cannot work. When GPS is disabled, users can choose between six different zoom levels, exploit a drag function over the maps, look for interesting places and play multimedia contents.

Arianna is provided with high detailed raster maps, which are obtained from vector data. Maps are generated on the basis of a considerable amount of layers, which includes buildings details, road and street borders, green areas, road furnishings. Each zoom level is composed of fixed dimension maps which are dynamically assembled by the application. Zoom layers span from panoramic to high detailed view: the first corresponds to a generic view of the city, while the latter produce views of blocks, with a scale of 1:3000.

Within Arianna, several paths along the city's interest points are at user's disposal. It is possible indeed to choose predefined routes together with functions for generating point to point itinerary. Predefined routes are of artistic and cultural interest: these are associated with an audio introduction and a path on the map where interest points are connected. On the other hand, custom tours can be generated by choosing the shortest path or the more interesting path according to the user's desires. Through the GPS system, users can follow the itinerary proposed by Arianna directly on the map and play multimedia contents which refers to interest points.

Being highly customizable by users, Arianna can be considered a context aware as well as a location aware device: users can choose what to see on the display according to their needs. Interest points are grouped in categories, that can be selected from a tree-like menu and depicted as icons on the map. In order to make the use of Arianna more intuitive, most important categories, such as the ones referring to restaurants and arts, are being made accessible through buttons on the main menu.

### 3 Technology inside Arianna Guide



Fig. 2. Arianna guide

The Arianna application runs on Windows Mobile 5.0 operating system for Pocket PC, installed on ASUS A636 (Figure 2), provided with GPS, Wi-Fi and Bluetooth technologies. The software is developed through .NET Compact Framework 2.0, using C# programming language. All data within Arianna is derived from a web-based back office system, based on MySQL database and PHP user interface. The contents update per each palm is obtained via Wi-Fi connections: the system generates a binary file and a set of data, most of them encrypted, which are copied onto SD cards.

The system use Player Flash 7.0, exchanging information between the main application, which allows to add multimedia features inside the palm contents. These are composed by templates, ad-hoc developed per each category, and XML files, built upon the data extracted from the database via back office. Audio files can be listened to either via normal headphones or via Bluetooth. Different language versions of Arianna are loaded into different SD cards.

### 4 Commercial strategy

Tourists are by nature a global community, therefore it is quite difficult to communicate them the existence of Arianna before they leave their home country. The best strategy is to intercept them when they arrive in the city. The second important piece of strategy is to have partnerships with those that work already with tourists, like hotels or tour operators; it is particularly important to place Arianna inside packets of services sold by these operators. Analysing the entrance flow in the city, train station, airport, bus stations and Hotels are typically the first points where tourists get into contact with the city for the first time. Being there distributing Arianna is the obvious thing to do. For this reason, we started opening a distribution desk close to the main station, trying to catch the high flow of tourism arriving by train. The potential market for the first launch of Arianna is constituted by tourists, among 3700000 which arrives in the city in a year<sup>3</sup>, that are willing to use a high-technology device during their visit. Language is a very important factor in reaching them efficiently: being the 75% of tourism in Florence composed by english and italian speaking people, at present we developed english and italian versions. Other languages will come depending on market requirements.

<sup>3</sup> Direzione Turismo Ufficio Strutture Ricettive e Statistica, Provincia di Firenze, Movimento Turistico 2005, <http://www.provincia.fi.it/urp/6.03.21Turismo.pdf>

The main problem in following this strategy is linked to costs. If the personal distributing is focused on the product, therefore is 100% a cost for the project, it has high costs and high impact. Viceversa if the distributor is doing other activities costs will go down but also the effectiveness of the communication with tourists. At the beginning of the project, when the awareness about the product is low, proprietary distribution can have higher costs than income. On the other side, being present where tourists are, allow us to study in a careful way what they really want and this means a speedier convergence of the product towards what people really want.

## 5 Conclusions

Arianna just got into the market, therefore we cannot provide reliable data about commercial penetration and click-stream analysis, that are the most interesting pieces of information in such a project (we plan a paper with about one year of data). Nevertheless, in the first few months we were able to collect useful information from users, asking them to fill up a questionnaire, and we already modified Arianna interface from its very first definition. Users' comments pushed us to insert into the main menu direct links to restaurants and transports categories (see Figure 1 a)), which showed to be high demanded contents, while in the first interface these were hidden in submenus.

We started the project building conditions for fast reaction to market requirements and highly customizable technology features. Being among the first in trying such a venture we are exposed to the typical high risk-high return economic pattern. As showed in this paper, we went through a pragmatic application of existing technology trying to keep costs as low as possible and spending quite a lot of energy in adapting the product to user requirements. Contacts with paying customers give us a unique possibility for analysing what they ask for and what they really use. We are at present looking for collaborations and financing from private and public institutions interested in leveraging Arianna platform in their particular environments.

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