

# GUIDE@HAND: Digital GPS Based Audio Guide that Brings the Past to Life

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**Abstract.** In the digital age the internet and the ICT devices changed our daily life and routines. It means we couldn't live without these services and devices anywhere (work, home, holiday, etc.).

It can be experienced in the tourism sector; digital contents become key tools in the tourism of the 21st century; they will be able to adapt the traditional tourist guide methodology to the applications running on novel digital devices.

Tourists belong to a new generation, an "ICT generation" using innovative tools, a new info-media to communicate. A possible direction for tourism development is to use modern ICT systems and devices. Besides participating in classical tours guided by travel guides, there is a new opportunity for individual tourists to enjoy high quality ICT based guided walks prepared on the knowledge of travel guides.

The main idea of the GUIDE@HAND service is to use reusable, and create new tourism contents for an advanced mobile device, in order to give a contemporary answer to traditional systems of tourism information, by developing new tourism services based on digital contents for innovative mobile applications. The service is based on a new concept of enhancing territorial heritage and values, through knowledge, innovation, languages and multilingual solutions going along with new tourists' "sensitiveness".

**Keywords:** cultural heritage, digital presentations, tourism, mobile development, smartphones, GPS

## 1 Premises

The roots of the GUIDE@HAND project go back to the domestic project of CityGuide [1] started in 2005, the idea of which arose at the eLearning Department of the Computer and Automation Research Institute, Hungarian Academy of Sciences (MTA SZTAKI). The Department was the main developer of the system and the project coordinator also. The CityGuide system provides basic travel information through the Internet as early as the planning phase of a travel in order to assist in selecting the destination of the journey. As the travellers arrive in a town, the mobile version of the CityGuide (at this time we applied PDAs as mobile devices for renting) ensures confidence for them almost as if they were at home.

The tourists can find everything they need, can get anywhere and can learn anything in their areas of interest about the location and sights. Nearly 200 Points of Interest (POIs) are processed in each participating Hungarian towns (Pécs, Sopron and Eger) within the framework of the project. Textual, audio and video information are created on each POI digitally in Hungarian, English and German.

The pilot project experience was that the target group was not prepared to use this type of service-oriented technology. They are averse to these devices because they didn't know how to use them. At this time for the rather complex mobile application development the technological conditions were reported in serious constraints (memory leak, CPU capacity, GPS inaccuracy, etc.). During the pilot project we collected a lot of feedback from the users. We realised, that they prefer the alternative of predefined tours, less information and they don't want to collect their own from the local options.

After the spread of car navigation devices, MTA SZTAKI experienced a growing number of smartphones with integrated GPS support, which made the preparation of new services for walkers possible.

## **2 GUIDE@HAND Service**

Based on the experience gained in the project of CityGuide, MTA SZTAKI started a new development project on new up-to-date mobile and web platforms by renewing our preceding methodology and focusing on guided walks<sup>1</sup>. We have released our next generation service, named GUIDE@HAND.

### **2.1 Mobile Service of the GUIDE@HAND**

GUIDE@HAND application is available on mobile devices with Global Positioning System (GPS) exactly determining the location of the traveller.

The most important differences between the above-described pilot project in relation to the new project are the followings:

- The application have been moved to users' personal tools (smartphones), so they can use it without any technological challenge.
- The development level of the devices meet the demands of quality service.

#### **Core features of the application**

Our aim with the walks in GUIDE@HAND is to enable the visitors to change their view on new or familiar locations, objects and motives and explore the past and present of their own neighborhood in an entertaining and exploring way, using an offline map. Involving experts in tourism, not more than three-hours-long walks were

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<sup>1</sup> The travellers are guided from sights to sights during the discovery and all necessary information and stories are played automatically at the proper place and time. Involving experts in tourism, the walks were designed not more than three-hours-long.

designed. During the walks tourists may gain unique knowledge about the sights and attractions of a town.

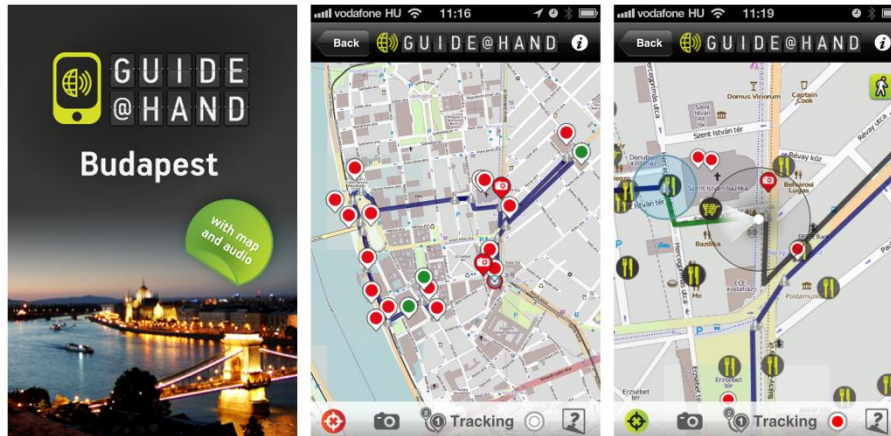


Fig. 1. Screenshots of GUIDE@HAND application

Our walks are designed in a way that it is enough to put only the gadget into the pocket as a sound travel guide. The travellers are guided from sights to sights during the discovery and all necessary information and stories are played automatically at the proper place and time.

Tourists can always find their current position on the map with the help of GUIDE@HAND and, if they like, they can follow and review the audible information with the help of pictures and texts. They can proceed an own place during the guided walk and they can have a break and then continue the sightseeing any time.

The sights can be explored individually as well with help of the “Explore“ function. As the travellers approach the sights, the most important information connected to those specialties is automatically played and then several stories related to the sights can also be listened to.

With the help of GUIDE@HAND, the users can select from numerous tourist services close to their current positions. For example, hotels, amusement places and shops can be shown on the map. By using GUIDE@HAND, not only tourists can feel like home in an unknown town or region, but due to the walks enhanced by the stories of bygone times, locals are provided with an unforgettable experience as well!

#### Content-sharing on social websites

While using the map, the program will automatically track the route of tourists. At any point they can capture a "Moment": take a picture, record a voicemail or take a note about something which catches their eyes. When they have finished their sightseeing they can save these Tracks. They can upload these Tracks to the website

of the service. This way they can share their experiences with their friends and give them a personalised virtual tour of the city!



**Fig. 2.** Screenshots of GUIDE@HAND application (Record)

Application also allows users to share the available tourism contents (Sights, POIs, walks) on social networks.

## 2.2 Web-based Services

The GUIDE@HAND official portal [2] provides the possibility for new and already existing users and visitors to view the aims of the service and the guided walks, sights of the city or the services of the region (e.g. restaurants, amusement places, shops, etc.). On the website the users can also take virtual walks before the travel, by using 3D maps.

They can also manage the tracks which had been made and uploaded with the mobile application to the website.



Fig. 3. Virtual walk in Budapest, Hungary

### 2.3 Further Development Steps

One of the relevant factors in spreading the GUIDE@HAND application is the goal to make the executable application available for as many (mobile) platforms as possible. Currently, the application is available on iOS (iPhone, iPad), Windows CE (PDA, PNA) and Android operating systems. Depending on the market's platform sharing (e.g. Windows Phone 7 environments), we will implement GUIDE@HAND on new platforms as well.

We also plan to develop new and useful features, which are the followings:

- Evaluation of POIs (sights, services, etc.) known by the application and the option to view the evaluations written by others;
- Downloading user-generated walks shared by other users;
- Providing actual information about the event of the destination.

### 3 Content Development

The service gives a new model, method and perspective for the key players in tourism (e.g. older SMEs) to reuse their available digital contents, to renew their business model and to give chance for the new actors (start-up companies) and local service providers to support and guide the visitors, tourists nearby the famous historical, archaeological, etc. sights and attractions at the destination.

Besides widespread end-user applications, providing high-quality tourist contents represents a service component with high relevance. It can be realised by involving existing and new professional content developing partners and content providers. Beyond domestic content development, another relevant aim is to make our content packages available for tourists interested in them, in as many countries, cities and sights of the world as possible but first of all in Europe. The content packages enable the visitors to familiarise themselves with the given area through our system.

To achieve our goals MTA SZTAKI is looking for partners and service providers with professional knowledge and connections who would contribute to extend the availability of GUIDE@HAND in the area of content development and service distribution.

#### 3.1 Theoretical Background of Guided Walks

The Guided walks <sup>2</sup>are represented by directed graphs <sup>3</sup>or digraphs. The nodes of the directed graphs are different events, which are edited by the Content developer in mobile phones, and the Content Package Developer Tool online and handled by the GUIDE@HAND mobile application. The Content Package Developer Tool supports all the steps of the development phases to create well-prepared guided walks.

The following list contains the items of an events' graph:

- *wait\_pos*: This event occurs when the tourist approaches a GPS Coordinate. The properties of the object are the followings:
  - GPS Coordinates;
  - radius.
- *show\_poi*: This event activates the display of a Point Of Interest. The property of the object is the following:
  - Unique ID of the POI.
- *play\_voice*: This event activates the play of an instruction voice. The property of the object is the following:

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<sup>2</sup> A walk is an alternating sequence of vertices and edges, beginning and ending with a vertex, where each vertex is incident to both the edge that precedes it and the edge that follows it in the sequence, and where the vertices that precede and follow an edge are the end vertices of that edge. [3]

<sup>3</sup> In mathematics and computer science, a directed acyclic graph (DAG), is a directed graph with no directed cycles. That is formed by a collection of vertices and directed edges, each edge connecting one vertex to another, such that there is no way to start at some vertex  $v$  and follow a sequence of edges that eventually loops back to  $v$  again. [4]

- Unique ID of a sound file.
- *multi\_select*: This event activates the display of a question with several possible answers. The properties of the object are the followings:
  - Unique ID of a question;
  - possible answer;
  - pointer to the next event.

The Content developers edit guided walks with the help of the Graph editor, which is the part of the online Content Package Developer Tool. The following figure shows a sample graph in the online Content Package Developer Tool:

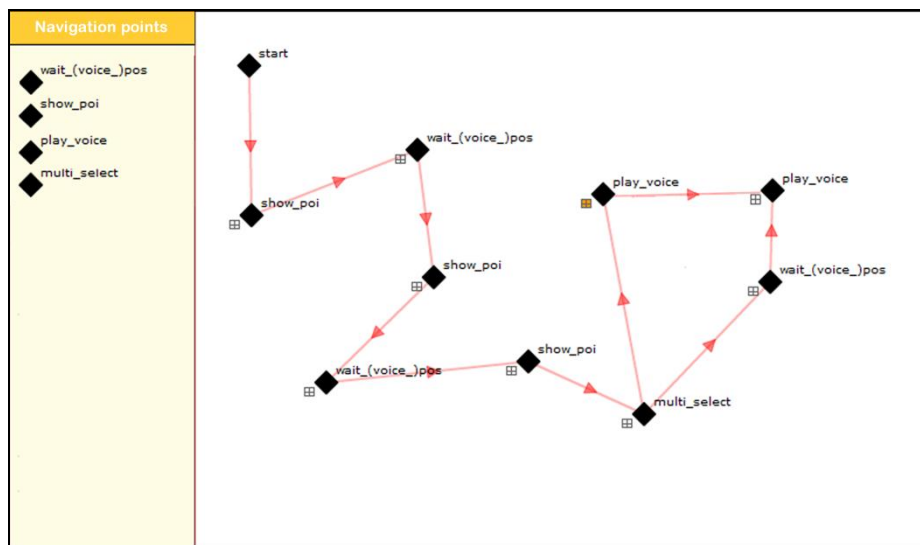


Fig. 4. The Sample graph

The events help to assemble the entire path of the walks. Some event occurs automatically under the way (show\_poi, play\_voice), but some event occurs only with the interaction of the user (wait\_pos, multi\_select). There are events that had occur undetected by the user (wait\_pos), but some of them is noticeable (for example on the 'show\_poi' event, the application displays all the information of the connected sight).

The following figure shows the preparation of a guided walk in map view of the online Content Package Developer Tool:



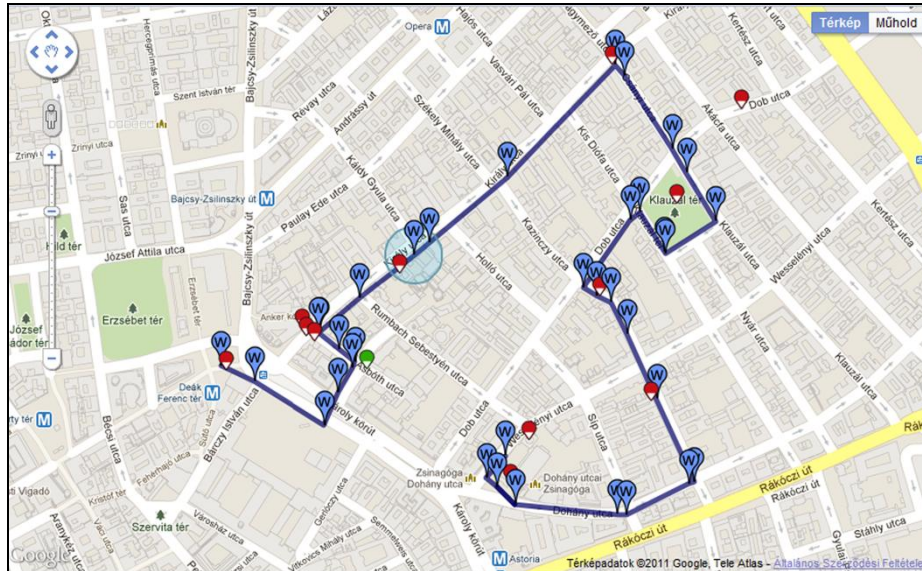


Fig. 5. Examples of a guided walk

### 3.2 Content Development Process

We have prepared the methodology and procedural rules of content development based on the experiences gained during the development of walks in Budapest, which guarantees the development of further efficient and high-quality contents using the mobile and online Content Package Developer Tool.

The following table shows the main steps of the Content development process of a new guided walk in one language:

StepID	Steps name
1.	<p><i>Creating collection in online Content Package Developer Tool for a new Guided walk.</i></p> <p>The Application Developer has to develop separate GUIDE@HAND applications for each city or region, as a collection of Guided walks from this city or region. One collection could contain many Guided walks.</p>
2.	<p><i>Defining and creating maps for the planned new guided walk.</i></p> <p>The Application Developer has to create a city or an outdoor map for the created Collection. This map will be available offline for those, who will download the selected Guided walk to their smartphone’s marketplace. They can identify their exact position using a GPS.</p>
3.	<p><i>Collecting Local services and Point of Interest (POI) and classify them into a category list.</i></p> <p>Content Developers has to collect and categorise Local services and</p>



StepID	Steps name
	Point of Interests (POI) of the city or region. There is a 2-level, multilingual and rich Category list in the GUIDE@HAND application for POIs.
4.	<p><i>Guided walk development with tourism experts.</i></p> <p>The Content developer has to know many famous sights and places, interesting stories and data about the selected city or region for local and foreign tourists. He/she had experiences as a tourist guide and be able to link those sights together in an enjoyable and memorable walk for GUIDE@HAND's users. The content developer has to prepare instructions from sight to sight navigation and other interesting anecdotes between the sights during the walk too. These are main items of the Guided walk.</p>
5.	<p><i>Preparation of the summaries of the Guided walk.</i></p> <p>The Content developer has to prepare an imaginative description (title and summaries of the walk) of the developed walk for visitors of the GUIDE@HAND application and walk lists to catch their interest before buying it.</p>
6.	<p><i>Developing Taster for the new Guided walk.</i></p> <p>The Content developer has to develop a taster for the new Guided walk. After starting the GUIDE@HAND application, all users could see these presentations first under the <b>Taster</b> tab. These contain the most important and useful pieces of information for first time users: "About the City" and "How to use". These details could support them about the following things:</p> <ul style="list-style-type: none"> <li>— to get acquainted with the GUIDE@HAND services and features,</li> <li>— to get experiences about the content and quality of our walks,</li> <li>— to promote purchase of our walks.</li> </ul>
7.	<p><i>On field preparation of the guided walk.</i></p> <p>Tracking the route of the planned walk the Content Developer can use the mobile version of the Content Package Developer Tool to create, edit and finalize the following objects of the walk:</p> <ul style="list-style-type: none"> <li>— route of the walk,</li> <li>— position of POIs and Voices.</li> </ul>
8.	<p><i>Uploading the prepared guided walk and all developed objects into the online Content Package Developer Tool.</i></p> <p>The Content developer uploads the prepared guided walk from the mobile device to the online Content Package Developer Tool and imports the objects (POIs, Voices) from the Content Pool to the guided walk, edit</p>

StepID	Steps name
	the properties of the imported objects.
9.	<p><i>Guided walk preparation for local testing.</i></p> <p>The Application developer has to prepare a new guided walk with all the developed sources and download it to the mobile Content Package Developer Tool for local testing.</p>
10.	<p><i>Local (on field) testing.</i></p> <p>The Application and Content developer are testing and fine-tuning the prepared new guided walk and with the mobile Content Package Developer Tool. He/she has to test, verify and update all the objects of walk.</p>
11.	<p><i>Finalisation the the guided walk.</i></p> <p>Before open publishing of the guided walk, based on the results of local testing, the Content developer has to modify and update the necessary items into the online Content Package Developer Tool using the tested and fine-tuned version of the upload package and the results of the further smartphone tests, supporting by the application developer.</p>
12.	<p><i>Open publishing the first Guided walk.</i></p> <p>The Application developer has to prepare different content packages for different smartphones and publish them to market places for tourists.</p>

**Table 1.** Developing process

The content process can be change to the current development and depends on the experience and background of the Content developer. The new Content Developer has to develop the first Guided Walk in English at first, because using common language the Application developer team could support (based on previous experiences) the Developing process of the First Walk as “Pilot” walk.

After the finalisation and publication the first language version the developers only have to manage the translation and finalisation tasks of Guided walk into other languages. At the end of the first “pilot” walk development, the content developer will be able to develop the other walks independently from Application developers.

## 4 Summary

Tourism is one of the major European economic, social and cultural sectors. However, information and support services for tourists are often inadequate and not easily available. Tourists nowadays need real-time and tailored information services. Static information is overcome. In order to be competitive the tourism information has to be dynamic and interactive, offering personalized digital contents. ICT applied for tourism service can overcome cultural and linguistic barriers guaranteeing access to

cultural heritage, strengthening a multilingual digital market through the provision of better services for tourists. This will increase visibility and, as a consequence, competitiveness of internal European tourism destinations.

MTA SZTAKI develops the GUIDE@HAND as a European best practice and we shall work on the dissemination of this best practice in the most possible European regions helping their internationalisation.

## **Reference**

1. <http://mobilvaroskalauz.hu/>
2. [http://en.wikipedia.org/wiki/Glossary\\_of\\_graph\\_theory#Walks](http://en.wikipedia.org/wiki/Glossary_of_graph_theory#Walks)
3. [http://en.wikipedia.org/wiki/Directed\\_acyclic\\_graph](http://en.wikipedia.org/wiki/Directed_acyclic_graph)
4. <http://guideathand.com>