Context-Aware Historical Route – The Old Tampere

Veikko Ikonen
VTT Information technology
Sinitaival 6
33101 Tampere
+358 3 316 3351
veikko.ikonen@vtt.fi

Juha Kolari
VTT Information technology
Sinitaival 6
33101 Tampere
+358 3 316 3311
juha.kolari@vtt.fi

Minna Kulju
VTT Information technology
Sinitaival 6
33101 Tampere
+358 3 316 3386
minna.kulju@vtt.fi

ABSTRACT

The WLAN trial of a context-aware historical route was made as a part of the Kontti (Context-aware services for mobile users) project. The route was built on the context-aware portal that was developed in the project. The portal was developed from an earlier media conversion and adaptation proxy for mobile devices. This paper covers the description of the context-aware historical route and the findings of the trial

Keywords

Mobile guides, field trial, WLAN –positioning, context-awareness.

1 Introduction

Context-aware services have already come to the consumer markets. Most of the solutions for this kind of services are customised for the mobile phones. In these services context-awareness has mainly meant positioning by cell-id positioning or the user has actively made service searches by adjusting his/her own location for the search. [6,7,8]

The information and service needs vary according to the user's contexts of use. A context-aware service responds to the user's current situation by offering contextually relevant information. By identifying these contexts and the information needs users have in them, mobile services can be made more topical, personal and easily available. [1-5, 10,11]

In order to study the technology and concept of context-awareness, VTT has developed a context-aware mobile portal. The contents of the service are adapted to the user's current context and device. The contexts can be identified automatically according to time or location. They can also be manually defined and activated by the user. The content of the portal includes mobile services and web pages as well as personal notes and files. [9]

The WLAN trial of a context-aware historical route was made as a part of the Kontti project. The route was built on the context-aware portal that was developed in the project. The portal was developed from an earlier media conversion and adaptation proxy for mobile device [8]. The trial and evaluation of the historical route took place in the summer of 2003. This paper covers the description of the historical route and the findings of the trial.

2 Description of the historical route – The Old Tampere

The aim of the Kontti trial was to study the concept of a context-aware historical route and service package. The route was made for walkers and/or bicyclists. The service identified the user's current location and offered historical information (pictures, text and video) of the location. The images depicted mainly buildings and city views from the 19th and 20th century. The Tampere Museum's Photo Archives allowed their use for the research purposes.

Other features that were evaluated with the users were:

- Context-aware messages from friends
- Context-aware messages from other users of the service
- Commercial messages/ads related to the nearby environment.

The user accessed the content through a web-based mobile portal, which was used with Compaq iPAQ. Several WLAN base stations covered the test area. Our initial aim was to use WLAN positioning in the user trial, but due to technical problems and time constraints, positioning was simulated in the actual test; inaccurate positioning would have interfered with the evaluation. One of the researchers switched the zones and hot spots manually with another PDA. For the users, the positioning appeared seamless; there was no indication that the positioning was manual.

The structure of the route service was very simple. The service displayed automatically the nearest points of interest with thumbnail images (Figure 1.). After clicking the thumbnail, the user could view more information and a larger image. From there the user could then return to 'Nearest sights'. If there were messages to the users in the current spot, an envelope icon appeared at the top of the screen. By clicking on the icon, the user could access unread messages.

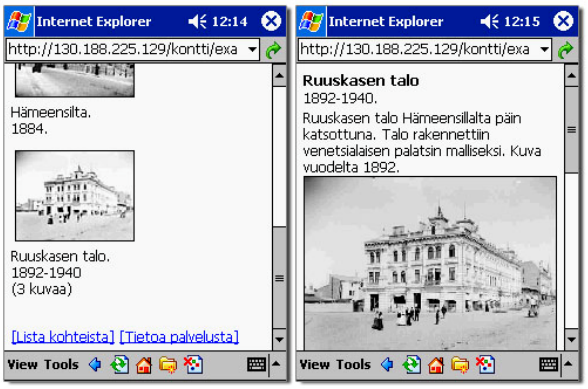

Figure 1. The service displayed nearest points of interest. The user could choose from a set of thumbnail images the sight that he or she was interested in.

The trial followed a pre-determined route. Figure 2 displays the route and the hot spots. We started our route from the east of the Hämeensilta Bridge and ended it by a fast food restaurant on the other side of the river and the Market Square. We had a total of five spots with varying topics and information:

1. Tour Start (Instructions, sight information, message from a friend)

2. Hämeensilta bridge (sight information)

3. Central square south (sight information including video)

4. Central square north (sight information, message from another service user, future ideas)

5. Fast food restaurant (sight information, location-based ads)

The hot spot areas (areas with content available) were approximately from 50 to 100 meters in diameter. In the final spot the service information included sights that were almost 300 meters away from the central point of the spot. With the variation in size we demonstrated to the users how the contents could be linked to either a more pinpointed area or an area covering several points of interest.

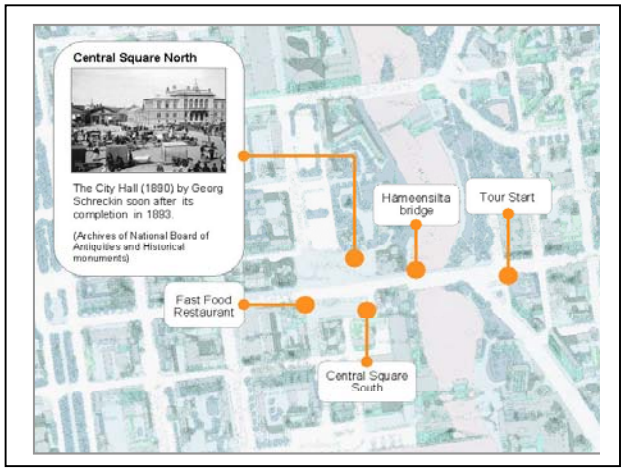

Figure 2. Hot spots and an example of sight information in the context-aware historical route.

3 User evaluation

The field evaluation was conducted at the centre of Tampere (Figure 3.). Heuristic evaluation of the historical route was carried out in May and June 2003. The actual user evaluations took place on the 12th and 13th of June. The evaluation was carried out as an observational walk with users, a sort of laboratory evaluation in the field. An average session took two hours per user.

The users were using Compaq iPAQ with a WLAN card for the tour. Users were motivated to perform the tasks by telling them a story. In a fictional story they had made an appointment with a friend at the library nearby. Because there was some spare time the user decided to try out the Old Tampere historical route service, given to him or her at the Tourist Info Centre. While walking to meet the friend the user tried out different features of the context-aware service package.

Figure 3. Four users tested the service in June 2003.

The field test consisted of five different zones or spots. The information that was offered was automatically updated according to the spot the user was at. The route started on the East Side of the Hämeensilta Bridge. At the start the user was given the instructions for using the service. The user could also see the first piece of information of the Old Tampere historical route. In the first spot he or she could evaluate how the location and the information matched each other. Another topic in the first spot was to present the first context-aware message from a friend. The message reminded the user that they would meet in the evening in the building next to the starting point.

Two researchers carried out the evaluation. The interviewer guided the session. He walked with the test user, instructed in the use of the device, gave him or her tasks and conducted the on-the-spot interview. The observer's main task was to ensure that the service was working. Observer also interviewed the user. Observer also activated each spot the user was at to simulate positioning. Both researchers took care of safety, looked out for the traffic etc. The session was recorded with a minidisk recorder. Photos were taken from critical points.

Users

There were 4 users, who tested the service in the ReLab WLAN network. All users lived in Tampere region and they varied in age from 23 to 73. The users were selected from different age groups to enhance the DfA (design for all) approach.

All of the users were familiar with mobile phones and web applications. Only one (id 4) had not use a PDA device before the test. Three others had experience in PDA use both in their work and in leisure activities.

4 Evaluation results

Device and network specific observations

All users used the device incredibly well. Even the elder ones (id 4 – who had no previous PDA experience and id 3 – who had a broken arm) had no critical problems in using the service with the PDA. The display had reflections from the sun but however the visibility of the display was possible to cope with. Using the pen for the touch screen was a bit more problematic for the elders

The users were asked whether they would rather use a device that is loaned or a mobile phone of their own for such a service. A separate PDA device could be loaned from a tourist office or the service could be ordered/downloaded to the user's own phones. The users commented that if one is as a tourist, they usually want to find out in advance what they want to do or discover. In that case, the PDA or other kind of separate device was favoured rather than a service package for the mobile phone.

"You visit an info centre in any case, to pick up maps and other information about the place. Why not borrow one of these devices as well." (id 1)

It was obvious that the size of the PDA display was one of the main reasons users wished to use PDA for browsing the pictures. Users also commented that they were afraid of downloading services to their own phones – some of them were afraid that it could be difficult to download the service and also to remove it from their phones after using the service. It also came out that if the service is used in one's own hometown, or occasionally somewhere else, the mobile phone was seen as a suitable device for this kind of use.

The WLAN connection of the service was seen as sufficient. In general, the connection speed of the services/internet was mentioned as one of the most critical factors when using this kind of services.

Service concept

The users liked the idea of the context-aware historical route. The contents of the prototype service fit the idea well. The pictures and descriptions of the sights were considered interesting by the users. The video clip was seen as a very nice extra in the service. However, the quality of the video clip and the short description were rather poor in the demonstration. The users would also like the option of listening to information about the sights with headphones.

Ordered or offered service? An ordered service would usually be selected and downloaded beforehand to the user's own device. An offered service would not need such preparation. The users found use for both kinds of services. Services could be offered to the users if they are in an unfamiliar region. For example, if a user has not made detailed plans in advance for her holiday in Spain, she would probably want to get information of the services available there. Different kinds of organisations could offer the service, e.g. stores, companies and cities. The service could be offered to the potential users who have given their permission to have services offered. The user could then choose whether to order the service or not. The user could also rent a device to which the service is downloaded, for example, from a tourist information office.

In more familiar environments a service of this kind might be less used or valued in everyday life. Ideas for different kinds of service packages and/or routes came up, e.g. shopping guides and/or routes, event service (ref. Tampere Theatre Festival), communal services, event calendar with list and links of services, art gallery route.

Maps routes and positioning. The lack of a map was seen as a shortcoming. Maps were seen as an essential part of the service where people are moving in an unfamiliar environment. Maps give people confidence about their location, especially if the pictures (like the ones in the historical route) do not match the current environment. Route suggestions should also be presented on a map. One user mentioned that there could be an extra fee for the maps.

Accurate positioning was commented as a necessary for this kind of service. The route and the user's own position could be presented on the same map. Attitudes towards positioning were mainly positive: users were not afraid of potential misuse of their location information, even when the interviewer suggested the idea. The positioning of the device should also be a choice for the users.

All users commented that interpersonal positioning (e.g. watching who are already at a regular meeting place) and context checking (e.g. meeting) would add value to the service.

Price. The users were quite ready to be charged for a service. The price for this kind of service without advertisements could be approximately 2-3 €. The price would cover the downloading of the route package and use. If there are ads on the service then the service should be free of charge or very cheap.

Q: "How much should it cost?"

A: "Hard to say, I can't remember what I paid for one of them phones in Barcelona. At the Miro museum, was it? And a nice account of the fortress...what was it then, wasn't very much. Two or three euros, I'd say. Was well worth it."(id 4)

Zones / Hot spots

The users wanted some kind of an alert or indication for when a new zone is activated, i.e. when the user enters a new area of information. Since the different partitions or zones looked so similar in the service, the shift from one area to another could be notified by a sound and/or vibration. The sign should be discreet but noticeable because the service is used in outdoors noise and in other crowded environments (e.g. exhibitions).

The zone should be activated in a close vicinity of the sights, clearly referring to the sights that are in view. However, people should also have manual access to the information of points of interest further off.

"There's always the danger that you get too confused to get information out of it. You just whirl around looking where the target is when it's not in sight. It's a big problem if the user has to take pains to do that." (id 1)

Overlapping zones were mentioned as a challenge to the system but they were accepted in general. The user should be able to browse also the previous zone and its sights while moving. He or she may also want to view the following zone or other nearby zones in advance. This would allow the user to return to the sight information if necessary and even to choose between optional route alternatives.

The users were also asked if they would be willing to design their own routes e.g. for their friends. This idea did not attract the users. One reason for this was that they expected the making of zones to be pretty laborious.

Messages

Context-aware messages between friends were seen as an interesting idea. It took some time before users could think of concrete usage scenarios, but in general people liked the idea:

"That's excellent...terribly good, but we can already do that" [makes a reference to SMS – the differences in location-based messages are further clarified]..."What would the significance be then? Like if someone knows that I'm going to the market, they can send me a message – they assume I'm at the market hall – like 'buy some horse sausage while you're there'. That would be one where it would work and then if the train is leaving or there are changes to the plane schedules and if the person is going there...Like in connection with sudden unexpected changes, that could be it. When he steps of the train, he gets one of these messages like 'there has been a change', like if he has one of those phones that do not work all the time [on the train]...Not all people like to talk on a train."(id 4)

One problem that was mentioned by the users was the trouble to know where there might be a context-aware message for oneself. Should there be a kind of agreement between users where the messages are left, or should there be another message to announce the existence of the context-aware message or some other option?

Some indication for context-aware messages waiting to be delivered was expected. Context-aware messages left by other users concerning attractions or nearby surroundings were considered a "nice to have" feature. The recommendations could also cover areas that are not seen directly from the user's current spot. Event or restaurant critiques were mentioned as possible uses. The users realised that once the service were in use for large masses of users, the moderation of discussion and the control of the volume of messages would have to be solved.

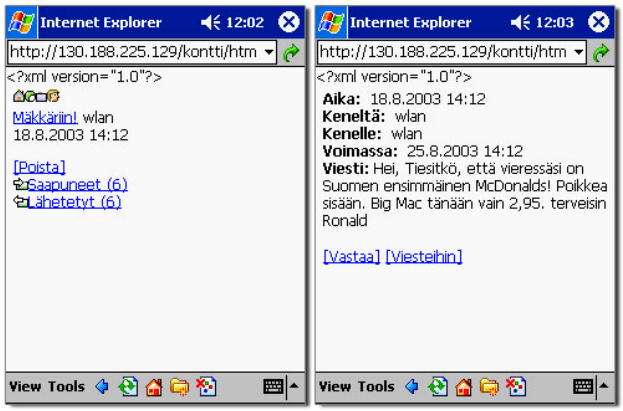

Figure 4. An advertisement that was used in the trial. A location-based message offers a discount and information about the restaurant.

One content type available at the end of the route was context-aware advertisement. At first, context-aware advertisements were commented mainly negatively. In the trial, the ad for the fast food restaurant (Figure 4.) that was used as an example also contained information about the place: "Did you know, that this is the Finland's first McDonalds." The information was found rather interesting despite the fact that it was part of an advertisement. Advertisements would be more readily accepted if they made the service otherwise free of charge and if the user could moderate and personalise the ads somehow.

5 Future ideas

We introduced our users to new ideas of how to use mobile devices and how to control the information about the surrounding physical and immaterial contexts. One of these ideas was to use pointing as well as positioning to increase the accuracy of the information. In general, the idea of pointing at sights was accepted and found very interesting.

"Wouldn't that be grand...fabulous really...would I then point there [points at theatre] and get next year's program line-up from the Theatre and what they're service in the Kivi restaurant this week. That would be very nice...but like, being as versatile as it is, would people know how to use it. I can point well enough and then this would say by the Tampere Theatre like "Running at the moment" and "Reserve ticket" and "Description of this and that" and when you click it comes up correctly...Right? And then there'd be a historical fact like who designed it and next show with vacant seats and then here we go with information about the church and..." (id 4)

Some other future concepts were also well accepted. The idea of x-ray vision through a mobile service (to be able to see or get information through the impending obstacles or buildings or to get indoor information) was accepted as a potentially useful addition to the service.

6 Conclusions

In the trial a context-aware historical route service prototype was demonstrated and tested. The service was built on the context-aware portal developed in the project Kontti. The service was evaluated tentatively with four users. The trial took place as a part of larger scale field trials in Kontti project and added one point of view about context-aware services. We can draw some conclusions about the result, but further evaluations should take place for more accurate generalisations.

Context-awareness is added value for the service. Users saw real advantages in identifying the user's geographic context. Automated shifts from zone to zone were seen more comfortable than manual ones. Location-based information and messages were commented useful within the demonstration service. In addition, many other possible service packages, such as an event guide, were mentioned as potentially beneficiary. Positioning the users was not a real fear but more seen as a benefit.

User should have a choice. One clear result based on the trial is that users of the service really want to have a choice in receiving, ordering and using context-aware services. Users mentioned that they could use different kinds of devices in different kind of contexts. They want to choose services with or without advertisements and this should have an effect on the price of the service. Users want to have different kinds of routes for different kind of purposes (shopping, art, etc.) and they want to have alternative routes/choices even within the one service (e.g. historical route). They were willing to adjust the zone shifting and zone radius according to their own abilities and needs. They also wanted choices in positioning, maps and in zone shifting alarms. These options should be simple to select. Context-awareness could be used to make the selections so simple that the users may not even notice they are making choices.

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