
Creating Community Fountains by (Re-)Designing the Digital Layer of Way-finding Pillars

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Abstract

Way-finding pillars for tourists aid them in navigating an unknown area. The pillars show nearby points of interest, offer information about public transport and provide a scale for the neighbourhood. Through a series of studies with tourists and locals, we establish their different needs. In this space, we developed Mappy, a mobile application which augments and enhances way-finding pillars with an added digital layer. Mappy opens up opportunities for re-appropriation of, and engagement with, the pillars. Seeing the pillars beyond their initial use case by involving a diverse range of people let us develop the digital layer and subsequently overall meaning of way-finding pillars further: as "community fountains" they engage locals and tourists alike and can provoke encounters between them.

Author Keywords

Way-finding; Digital Layers; Augmented Reality; Smart City; Urban Spaces; Reappropriation

ACM Classification Keywords

H.5.m. [Information Interfaces and Presentation (e.g. HCI)]: Miscellaneous

Introduction

Visitors of larger cities have several options to find their way around by foot: paper maps, digital maps on their mobile

device or, usually in areas with a high amount of pedestrian traffic, way-finding pillars. While digital maps excel at finding the most direct way to specific targets, way-finding pillars potentially offer a more exploratory view into their environment. However, the content on way-finding pillars remains static and, subsequently, this content is also limited to stable aspects of the environment. This might be suitable for visitors, but it makes attention from, or even retention of, locals unlikely.

A digital layer comes with the opportunity for more volatile content like events, pop-up stores or points of interest which change with the seasons (such as parks). We developed Mappy, a mobile application which digitally enhances a public urban space [6] by providing timely relevant and spatially rich information about the immediate neighbourhood of a particular way-finding pillar. We are investigating how such a digital layer could be designed so that it is meaningful for tourists and locals alike.

In this paper, we present related work, followed up by the description of our technological prototype Mappy along the axes of technical features such as the AR mapping system and the user interface. Interaction evaluations with experts, residents and nearby-visitors as well as passers-by are supplemented by a discussion on different types of mobility and the range of people Mappy addresses. We critically reflect our methodological approach and provide implications for the future design of digital layers of urban way-finding installations. Finally, we conclude on opportunities for future work in this area.

Related Work

Stemming from ageing studies, we understand mobility on the one hand as the ability to move independently and have flexible access to a community [10]. On the other hand, we

see mobility as "an entanglement of movement, representation, and practice" [3]. This guided us in reflecting which modes of mobility our work enables and for whom.

In support of mobility, way-finding in urban environments is heavily influenced by differences in city layout. For example, grid-like layouts like those in North America afford different strategies when it comes to way-finding than the circular or sprawling layouts of Asian and European cities [4]. Since Vienna is located in the heart of Europe and very much follows a circular layout, the construction pillars on which Mappy is based, follow a similar approach to the pillars in London [1]. Mappy ties physical and digital way-finding together with exploration and implicitly assumes a non-grid layout.

Within HCI, there have been several research endeavours trying to guide and augment way-finding in (urban) environments. Socio-physical approaches, such as Just-for-Us, attempt to tie co-location and potentially non-interactive mobile phone use together [9], whereas other projects develop digital way-finding strategies for areas of interest instead of solely points of interest [5]. What is missing, however, is a design that enables otherwise unlikely interaction between locals and tourists.

Even though most research on augmented maps has been conducted with stationary and conceptually closed maps on a table (e.g., [2]) instead of dynamically expandable maps in an urban landscape, some research is similar to ours. For example, Weissenberg et al. present an augmented map with superimposed landmarks, even in areas with no or little historically relevant landmarks, which aides in navigating unknown places [12]. Instead of advancing the technology behind augmented maps, we show how maps on way-finding pillars can be augmented flexibly to a person's desires.



Figure 1: User interaction between Mappy and pillars

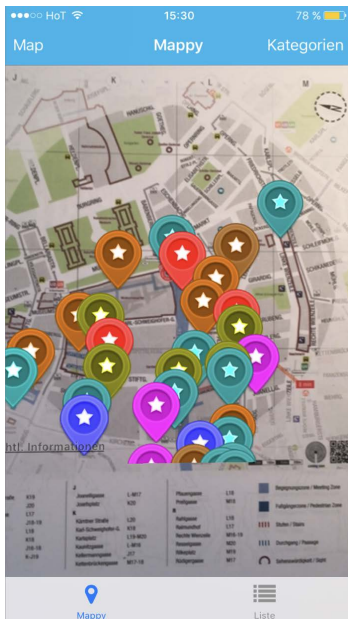


Figure 2: Screenshot of the Mappy App. The map is in the background with pins leading to specific additional content superimposed.

Mappy – A Technological Prototype

We explored our options for Mappy through iterative prototyping. We present the state of the application as it was developed for the final user study.

The way-finding pillars were already constructed when we were invited to augment them. As such they present an analogue map of the area surrounding the pillar, and point out landmarks or potential places of interest, mostly focused on touristic endeavours. Additionally, they show options for public transit, walking or biking. We took this design opportunity to redefine the existing interaction with the classical pillar and explore the potential to engage tourists and locals alike beyond the physical surface. Augmenting already existing signage also opens up interaction to those people who would not necessarily use already existing purely digital solutions on their smart phone (such as Yelp or Google Now!) to explore their environment.

The pillars lacked image markers, with which we could reliably identify them (and, subsequently, a pillar's location). Hence, we used Markerless Augmented Reality in the implementation made available through Wikitude¹. By doing this we also follow a call for more applications making use of the AR paradigm [13]. Essentially, the maps themselves are the images recognised along the differences in each of their layouts. That way, users can use the pillar as such as an identifier without having to take a middle step via QR codes or blue-tooth technology.

A person holds up their phone with Mappy in front of the physical map on the pillar (see Figure 1) and points of interest are superimposed on the map image on the screen, along chosen categories (see Figure 2). Users are, hence, confronted with an interface that does not require a lot of

training to use.

When they tap on a pin, they can get more information about it along different categories such as shopping, neighbourhood stories, events, restaurants, insider tips and historical points of interest. As tourists often have limited data plans, we also ensured that pins are cached and can be accessed without an active Internet connection if downloaded beforehand. In case a person is looking for a specific, already known, point of interest in the area, available pins can also be shown in a list format. The application can also open an already existing navigation app on the phone to start a navigation to that location.

Interaction Evaluations

Our evaluations of the interactions with Mappy can be seen as a series of studies ranging from 'in-situ' to 'in-the-wild' [8]. This involved two participatory workshops - one with expert users from the research community in urban-related fields, another one with possible future users with diverse backgrounds. After each workshop the prototype has been revised according to the respective workshop outcomes and the final evaluation took place with random pedestrians in order to understand how the prototype is perceived by tourists and locals who have not been pre-selected by us, as it was the case within the workshops. The first two workshops were comprised of a mix of methods: observation, quick ad-hoc interviews and structured feedback rounds, which also elicited further design ideas. The third workshop followed a semi-structured interview guide with single or paired participants.

Since we were not pre-set on the provided content, we did not solve a specific problem in our design, but rather explored a range of opportunities.

¹<http://www.wikitude.com>

Professional Experts

At the international conference "IJWalk21" we launched an urban lab with fourteen international participants from different fields of expertise including urban planners, geographers and people from local authorities coming from four different countries in Asia, America and Europe. After a brief introductory session, we show-cased the prototype and let our participants explore it individually. We collected feedback in a meeting room afterwards by prompting their individual preferences filtered by their professional standpoint.

Participants indicated that non-permanent information such as open passages through houses, pop-up stores or events would offer interesting and novel avenues for exploration. Additionally, they saw a benefit in having historic stories told by locals for a diverse range of users including tourists, locals or even schools.

Participants suggested different colours, shapes or icons along different categories. Having lots of categories and potential points of interest around Mariahilfer Straße, a large shopping area in Vienna, makes it essential to enable meaningful reduction, otherwise users could become overwhelmed with the amount of options.

Seeing that the audience for this workshop comprised mostly non-local expert users who are already familiar with urban planning, this workshop had a heavy focus on first-hand tourist perspectives whereas the perspective of locals was mostly hypothesised. For a subsequent workshop we paid close attention to include the perspectives of more locally placed participants.

Local Experts

For the second workshop we recruited a heterogeneous group with diverse backgrounds to be able to generate a

holistic picture about their preferences and possible future use scenarios. We had a total of nine participants, five of them female. Six of the participants were locals of the district, three just recently moved to Vienna. One participant was hearing-impaired, another was involved in local politics and yet another participant was an active senior. Since we planned for quite a long walking distance between pillars, we did not explicitly invite less mobile seniors, but we made sure that representatives of a neighbourhood centre were present who were able to empathically bring these perspectives.

In this workshop we met with participants at one pillar, navigated them along several pillars and then moved to a meeting room for a final discussion. During that time, two researchers took notes of observations and what participants stated, one took pictures throughout.

Initially, participants engaged with their devices silently and individually. They experimented with different angles around a pillar, but all of them picked up a preference for the front position. People changed places informally between them. This resulted in a mode where a participant would pick up content at the pillar and then go somewhere else to engage with it by listening or reading. Several of them commented that they had seen the pillars before, but had not engaged with them as they did not see any benefit in interacting with them, especially since all of them knew the area well enough to navigate it confidently by themselves.

Local: I've seen the [pillars] before, when they put them in, but didn't pay attention to them much after.

After the initial pillar the participants felt comfortable in their interaction with further pillars and the app. They immediately explored new content when they encountered a new pillar.



Figure 3: Workshop with potential users. Participants are leaning in on other participants' devices to contrast and compare their experiences.

From the second pillar on, we also watched people leaning in and sharing tips and tricks from their experience with the app (see also Figure 3). At one point, uninvolved pedestrians enquired about the activity and wanted to try the app for themselves as well. During the interaction and the discussion round, we prompted participants to tell us what they missed and what they liked when interacting with the app and what they felt was making the app unique or just like any other. The participants made many suggestions for improvement such as digital zooming on the map, localised filter options for the list or scan & freeze options so that the device does not have to face the map at all times, which is cumbersome and tiring over time. Additionally, they asked for slightly different categories, a way to tackle overlapping pins and visual feedback for pins which have already been explored.

As a resident local who grew up in a different country, one of the participants pointed out how helpful such an application would be for people moving into the area or even just getting inspiration for where to guide private visitors.

Local: This app would really have been helpful, when I moved here, during my first year. (...) I lived here for five years, taking visitors around with the app might be interesting, because it shows something different than just the church I already know.

On the other hand, the hearing impaired participant pointed out issues with the recordings of our stories.

Hearing-Impaired: Regarding the audio; the volume is very uneven. I have to adjust it on the phone and even my hearing aids the whole time.

This also tells us that we probably missed other marginalised perspectives and have to always be mindful about the state

of the currently available prototype and how to make it more accessible to a large user base.

In the later meeting room discussion, participants came up with the analogy of dropping information or news at the pillar and others picking it up. That way, locals could have a 'home pillar' which defines their immediate neighbourhood and could interact with other pillars according to vicinity of their home pillar. One participant inspired the metaphor of the community fountain, in particular by saying: *A water fountain right next to it would be great.*

Locals want to engage with the pillars as a shared place of meaning. The water fountain suggestion also points to an interesting issue about how to draw more attention and traffic to the pillar and making it an actual stopping and meeting place.

Our findings challenged the stereotypical notion of tourist, that was prevalent in our previous discussions and broadened our understanding of who could be a tourist and under which lens. Ultimately, the same person might classify as a tourist or as a local along different purposes and goals that makes them come to an area. So called nearby-visitors fall most likely into that category, but also people living close-by to a certain pillar can fall into a tourist mode, e.g. when they have visitors themselves.

Passers-by

In our final study the main aim was to gather spontaneous reactions and ideas from pedestrians passing by, who had not previously heard about the app or the project. We expected to gather quick feedback on other modifications within the prototype after the preceding workshop. Three researchers spent half a day at one of the pillars presenting the prototype to passers-by and collecting spontaneous impressions, which were recorded on a sheet of paper which

also contained the questions for opportunistic interviews with a set of potential questions to ask.

Participants were aged between 20 and 50 years. A total of thirteen people took the time to engage with us, six of them female. Four of the thirteen interviewees were living either in Vienna or close by. Given the nature of MariahilferstraÙe as a large shopping street all others were national or international tourists.

Most of these participants (except two) immediately saw a use for enhanced way-finding pillars with additional digital and dynamic content for themselves. The kind of content people would find most interesting or helpful varied; tourists and locals showed different desires here as well.

The tourists were mainly interested in getting suggestions for moving around in the area and creating individual routes between places of interest to them. Furthermore they would expect finding interesting places "that cannot be found in Lonely Planet" like hidden gems with their own history in a backyard of a house where access is not apparent or necessarily noted down in travel guides. Restaurant, event and shopping recommendations were deemed helpful as well.

Residents or people coming to the area more frequently stated several things that would make Mappy appealing to them: information about what is currently going on, leisure activities in the area or shops and restaurants in side streets, where they usually do not go to; especially, if they have short-term special offers. They liked the vivid stories about the area in 'the olden days', but did not necessarily expect to stop and listen to them. Most of them also indicated that they would create an account within Mappy, if they could see an added value for them personally. However, two of the participants, young international tourists, did not see any use for the technology for them at all.

This study mostly confirmed the appeal of the base line technology for a larger audience. Thinking about locals and tourists together and establishing a useful functionality and interaction mode for both of them enriched our understanding of how way-finding pillars might be augmented.

Discussion

Our user-inspired technology exploration produced insightful results when exposed to user groups with very different goals and intentions. While tourists engage with the pillars already to gather information, for locals, the pillars have to become visible first. However, we deem Mappy has the potential to become a mediator between the social space created by mobile phones and co-located others. It will aid in creating a space that is made up of spatial proximity and social presence (see for the discussion of this gap, e.g., [6]).

In terms of social interactions we can expect simultaneous eponymous and anonymous interaction [11] from a community fountain which also functions as a lighthouse for tourists, but merges both functionality. In eponymous modes of interactions users can be identified in space. This is only the case for longer-time residents or temporal co-location and subsequent identification through that. While Mappy does not provide this information on a digital layer, its interaction enables eponymous encounters.

In developing the lighthouse analogy further into an understanding of a community fountain, we were also challenged in our notions of mobility. Who did we include or exclude when we thought about mobility in context of the way-finding pillars, who as their first prerogative try to encourage walking mobility? Thinking beyond the pillar and making the map available in stationary contexts as well is

particularly important for the role of the pillar as a community fountain.

Through visually augmenting the map, the interaction is not necessarily confined to the pillar, but can open access to less mobile users e.g., by hanging a map on their fridge. In order to not exclude those for whom it would be difficult or impossible to physically be near the fountain, we have to take a step back from the pillar and looked at the added value that we design for in order to extend it again and enable participation of the whole community.

Conclusion

We have presented the development and initial user studies of Mappy, a mobile application which adds a digital layer to physical way-finding pillars and shows points of interests nearby according to user preferences. Instead of finding a solution for a fixed problem, we explored the opportunities in the design space of digital layers on way-finding pillars. This enabled us to expand the notion of a digital layer on way-finding pillars in general and develop the apparent use that focuses on the already existing user group of way-finding pillars further. What was initially just a lighthouse for tourists became a potential fountain for community engagement. Through the digital layer, we are able to create interest for way-finding pillars from tourists and locals alike.

There are some limitations to this work. We have not yet had the chance for a longitudinal in-the-wild study that would give us more information about the actual use patterns for both types of user groups over time (see for a discussion of the appropriateness and the need for more such studies [8]). In that regard, it would be especially important to find out which information users would drop off at the pillar and which one would be picked up as it could be understood as a hidden non-moderated community 'display'

(compare [7] for similar work).

Further development on Mappy, also in direct participatory co-design sessions, in order to establish meaningful initial categories and the type of information people care about is needed. Only then we can get closer to a truly community owned and operated technology on the side of the community fountain functionality.

However, our results show that it can be of benefit to think beyond initial project constraints. When thinking local users and tourists together, digital layers can add a whole new meaning to physical objects, in our case, as a community fountain.

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