

CityFlocks: Designing Social Navigation for Urban Mobile Information Systems

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ABSTRACT

CityFlocks is a mobile system enabling visitors and new residents in a city to tap into the knowledge and experiences of local residents, so as to gather information about their new environment. Its design specifically aims to lower existing barriers of access and facilitate social navigation in urban places. This paper presents a design case study of a mobile system prototype that offers an easy way for information seeking new residents or visitors to access tacit knowledge from local people about their new community. In various user tests we evaluate two general user interaction alternatives – direct and indirect social navigation – and analyse under what conditions which interaction method works better for people using a mobile device to socially navigate urban environments. The outcomes are relevant for the user interaction design of future mobile information systems that leverage off of a social navigation approach.

Categories and Subject Descriptors

H.5.1 [Information Interfaces and Presentation]: Multimedia Information Systems – *hypertext navigation and maps*. H.5.1 [Information Interfaces and Presentation]: Group and Organization Interfaces – *collaborative computing, web-based interaction*.

General Terms

Design, Experimentation, Human Factors

Keywords

Social navigation, Interaction design, Information systems, Mobile services, Geotagging, Locative media, Mobile web 2.0, Expertise finding, Urban informatics, Knowledge networks

1. INTRODUCTION

Information is a significant factor in our everyday lives. Having access to the right information sources has not only become crucial for the success of commercial businesses, but also for the

social pursuits of individuals. People often need certain types of information to problem solve as they go about their day-to-day lives. The process of finding the right information source (e.g. a book, journal, website) and then identifying the relevant component requires time, money and effort. An alternative method is to gather information by directly asking other people for advice. If we have a question concerning a specific field in which a friend or colleague is an expert, it might be more efficient to consult them rather than trying to figure out a solution independently [21, 22]. Experts deal with issues in their field every day, so it is likely that they would easily identify with our problem and offer precise recommendations. This exchange of knowledge can be facilitated on the basis of a material (money) or immaterial (status) gain, altruistic reasons or anticipated social reciprocity, if indeed they expect us to reciprocate the help. Tourists visiting an unfamiliar city might choose to ask residents for directions rather than looking them up on a map. Motivated by the fact that asking other people for advice or ‘doing what other people do’ is a seemingly popular way of navigating new environments, this paper elaborates on opportunities for mobile information and communication technology (ICT) to lower existing access barriers to urban public places and facilitate social forms of navigating such places.

2. SOCIAL NAVIGATION

Our physical world holds certain characteristics that enable us to interpret what other people have done, how they behaved and where they have travelled. Sometimes, we can see traces on physical objects that provide hints about people’s actions in the past. Footprints on the ground left by previous walkers can show us the right way through a forest, or in a library, for example, dog-eared books with well thumbed pages might be worthwhile reading as they indicate the popularity of the text. The phenomenon of people making decisions about their actions based on what other people have done in the past or what other people have recommended doing, forms part of our everyday social navigation [8].

In contrast to physical objects, digital information has no such ‘visible’ interaction history per se. We do not see how many people have listened to an MP3 file or read a webpage. In a digital environment people do not leave interaction traces, leaving us, according to Erickson and Kellogg [9], ‘socially blind’. However, the high value placed on social navigation in the physical world has motivated people to start thinking about it as a general design approach for digital information systems as well. For example, many websites have counters that indicate how

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often specific information has been accessed or is currently being accessed, e.g. Youtube's 'Views: 16.873' or 'Videos being watched right now' (www.youtube.com). Previous studies have covered design approaches for social navigation in electronic environments in various domains, such as online grocery shopping [32] or web browsing [4, 6, 35]. These studies suggested some key principles, e.g. privacy, trust, personalisation or appropriateness, which should generally be considered when designing social navigation for digital systems [11]. However, it is still unclear what types of social affordances and design principles are most significant for each case or domain [7].

The rising trend of embedded mobile broadband internet access and GPS navigation, means mobile phone users are able to employ 'geo-tagging', a technique to combine longitude and latitude coordinates with all kinds of location-specific multimedia content and information [17]. We believe that such a digital augmentation of physical spaces, combined with user-generated information, opens up opportunities to design and develop more sophisticated, interactive approaches for social navigation in the physical world using mobile devices. In this study, we explore the appropriateness of principles that guide the design of a mobile phone application to support social navigation in physical environments. Targeting the specific domain of public inner-city places, we have designed 'CityFlocks' – a mobile system enabling urban residents to leave digital annotations with ratings, recommendations or comments on any place or physical object in the city. Thus, CityFlocks turns residents into in-situ amateur journalists for the benefit of visitors or other residents who have questions or need navigational aid related to any place in the city. Based on the outcome of previous studies, CityFlocks employs two different user interaction alternatives – one following a direct and the other an indirect social navigation approach [5, 31]. Direct social navigation could entail asking individuals for advice, e.g. when stopping someone on the street and asking for directions. Following the path of previous people (e.g. going to a particular restaurant because it is crowded and seems to offer good food) is known as indirect social navigation.

Much of the previous work in mobile spatial interaction (i.e. applications that create or provide access to information attached to physical places or objects) is on enabling users to access or add content to physical places or objects [15]. They focus on techniques that allow people to retrieve locative information or share it with others by attaching stories, thoughts, experiences and knowledge to specific places. Besides the various use scenarios, the applications primarily differ in the interaction design of specific features [33], e.g. access virtual post-it notes from remote places [10, 25] vs. in-situ access [3, 20, 26], push [10, 18] vs. pull services, expiration dates of the messages or private vs. public messaging [3, 10]. While most of the previous projects discuss such different features around indirect and asynchronous interaction methods (i.e. people exchange information by attaching text or multimedia content to specific places), not much work has yet been carried out on studying direct interaction methods (e.g. phone call, text message) in the context of spatial interaction.

Our study aims to fill this gap and focuses on evaluating the performance of people using direct and indirect social navigation methods when gathering information about a specific place. Users can request a list of user generated comments and access a

calculated average rating about the respective place that are stored in the system (indirect social navigation). In addition the system provides users with the option to find and set up a voice link or send a text message to a local resident who can provide them with direct advice (direct social navigation). In related projects, solely the George Square study [2] supported a voice connection and has shown to be the most valuable channel for people when collaboratively exploring a city sight. In contrast to George Square though, our participants were not recruited as pairs of friends, but complete strangers. Furthermore, the context is information and knowledge sharing in urban environments rather than collaborative exploration. In our user tests at the Kelvin Grove Urban Village (KGUV) – an inner-city master-planned community site in Brisbane, Australia – we evaluated how the different design approaches would influence the success of participants to socially navigate and harness social capital and the collective intelligence of urban residents in order to identify particular places in new urban environments. The outcomes provide valuable input into the process of designing future community-driven, mobile information systems that are also effective and efficient navigation tools. This study continues and expands our work in the area of urban informatics [12-14, 19].

3. METHODOLOGY

As CityFlocks is a user-centered ICT system, we found it crucial to thoroughly understand the users' needs when they search for information and recommendations about local places in new urban environments. In this work we developed an iterative design strategy following the contextual inquiry approach [1, 24] in order to collect detailed information about people's practice and successfully translate the findings into a corresponding user interface and interaction design.

For the contextual inquiry, we chose the focus group method to get some qualitative insights on how people employ social navigation techniques in their everyday life and what obstacles they might be struggling with. We used the key findings of the focus groups as design implications for the system architecture and user interaction.

Based on these outcomes, we developed an early, paper-based prototype of a mobile phone application to sketch some basic use cases and features of the social navigation system. Various design iterations were conducted to refine the user interface, user interaction and screen work flows. Finally, we developed a mobile web application offering different interaction alternatives that the user could select from in order to gather appropriate information about the physical locale and its local services.

In various user tests we evaluated the application on an internet enabled mobile phone and observed which interaction alternatives were used by the participants under what conditions. Finally, we consolidated the data from the user tests and propose a set of guidelines for designing social navigation affordances for future mobile information systems.

Focus Groups

The primary intention of our focus group sessions was to let people talk freely and discuss topics relevant to their usage and existing problems of social navigation. Because of the high interaction between the participants, focus groups are likely to provide unanticipated hints that can be valuable for the future

design of the system. This method has been selected as part of our contextual design process, because it allows for the gathering of diverse qualitative data in a relatively short amount of time.

We have conducted four focus group sessions with a duration of 25-30 minutes each. The groups consisted of 8-12 participants each. This number was kept rather low to ensure a smooth flow of conversation and to allow everyone to get involved in the discussion. The participants came from various age groups, nationalities and levels of education. Furthermore, people in each group were selected to have diverse backgrounds, mainly in an attempt to avoid the formation of 'cliques' and to establish a setting conducive to a constructive discussion.

Each group had one discussion leader who introduced the questions to be discussed and kept the discussion focused on the topic. The leader also made sure that no participants were left out of the discussion or small groups took over the opinion of the whole group. A different person was in charge of recording the entire discussion so it could be analysed later.

One part of the focus group interviews was conducted following the scenario-based usability engineering approach [27]. The participants were given a problem scenario that they had to provide a solution for, e.g. how do they find a good restaurant for dinner after having recently arrived in a new city. The outcome of using scenarios revealed that people use two general approaches to gather local information when in a new environment.

The first approach involves people observing the situation and making a decision dependent on what other people are doing. For the 'find a good restaurant' scenario, one participant suggested that he would, *"look around for the busiest shop; the place where the most people go to determine it probably has the best food. I tried it a couple of times, it mostly turns out to be good"*.

Another participant shared how she mastered a very similar situation when she was in a foreign city: *"Once I went with my boyfriend to Cairns, and we were just travelling and stuff and didn't know anyone. So we just walked through the town and found the place with the most people, you know, that's where the good food is! We would just pick the busiest place..."*

People also tended to pick a place that was previously selected by a number of other people as well. This phenomenon where people follow the tracks of earlier navigators has been introduced as indirect social navigation (see section 2 above). The fact that we see for example, a bunch of people having lunch at a particular place, makes us more confident to follow suit. According to Surowiecki [30], one can trust the collective "wisdom of the crowds". The more people we see in a restaurant, the safer and more trustful it appears to be. Obviously, locals have selected this place for a reason and chances are slim that a well-crowded place serves bad quality food.

The second approach which people use to gather local information in a new environment is in accordance with the phenomenon of direct social navigation. Rather than observing how a number of people have previously been navigating a place, they rely on the recommendations and subjective answers of other individuals. People would directly approach and ask other individuals for advice. Some participants explained how they make use of this direct approach:

"I think I would ask the local people. I would probably go to a shop and ask the local business people."

"I wouldn't normally go somewhere unknown to me unless I've read about it somewhere saying it's good, or someone says to me that it's really good and I should check it out."

"You can only learn from asking around. We do read a lot but you also have to talk to people and use any source of information you can get, that's the way you learn. I would like to hear everybody's version!"

"It's just about trying to get some knowledge. And I will actually ask a couple of people to find out what the best idea is to do in that way, you know. Everybody has different thoughts and different opinions about things, so I would ask several people in that way."

When searching for a particular place in a foreign city, there is usually more than one place to go. Although we are determined to select 'the best' option – for example, the place with the best quality produce, the friendliest staff, the quickest services, etc. – the assessment criteria we use to select a particular place are subjective and based on personal experiences and circumstances. Some people might find a place excellent, whereas others do not like it at all. In order to find the place that specifically meets our personal needs and current situation, we take the experiences of different people into consideration and the reasons why they liked or disliked it. That is what two participants conveyed when they said:

"... use any source of information you can get, that's the way you learn. I would like to hear everybody's version!"

"Everybody has different thoughts and different opinions about things, so I would ask several people in that way."

Designing Social Navigation

The outcomes of the focus groups illustrate that people regularly use both direct and indirect social navigation to seek information about facilities, local services and places in a new city. We argue that social navigation is thus an important factor to consider when digitally augmenting the decision making process of information seekers who are exploring unknown terrain. Accordingly, we designed and developed CityFlocks, a mobile phone application, to specifically facilitate both direct and indirect social navigation in urban public spaces. We designed CityFlocks in a way that gives a voice to many different people. In contrast to other city information sources, such as city magazines or websites that are mostly run by a single editorial entity, CityFlocks enables any person who has experienced a local service, shop or other urban public place to share this experience with others. O'Reilly describes this concept as 'The Long Tail' [23], one of the main drivers of successful Web 2.0 services. Amazon for example, benefits from the book reviews written by its customers. Before buying a particular title, a prospective buyer can scroll through a list of user comments and reviews to get an impression what the book is like and how people generally liked it.

Appropriating this strategy for a mobile urban scenario, we designed CityFlocks as an information medium that enables urban residents to collectively share the information available about places in their city and neighbourhoods. Rather than being restricted to recommendations by a city magazine or website, CityFlocks enables users to hear the voice of many other individuals (see Figure 1). It provides comments and experiences with these places from local residents, the people who best know

the quality of the shops and services in their neighbourhood. Having mobile access to these experiences can help a visitor or new resident find the right place to go.

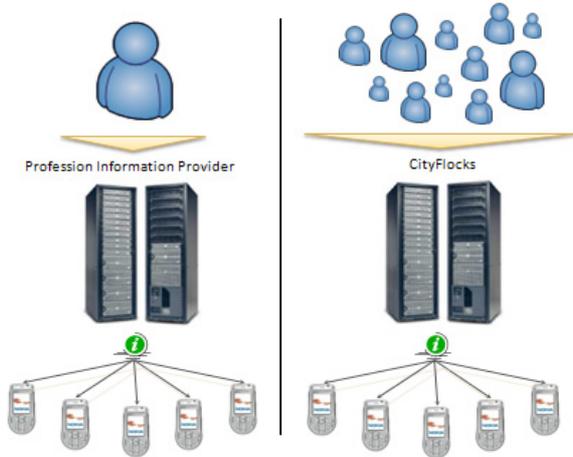


Figure 1. CityFlocks leverages the collective intelligence of local residents to provide urban information for mobile users

The unique proposition of CityFlocks is that it dynamically creates such a list of user generated comments for any urban place and local service in the city. CityFlocks has a built-in search function based on the folksonomy concept (see section 4 below). Users who search for keywords like ‘fast food’ for example will get a list of places which other users have annotated with the same tag. Moreover, the places are sorted by their level of popularity which is represented by an individual rating code and consists of the number of submitted recommendations for the respective place and its average grade. Figure 2-2 shows such a list for the tag ‘food’ with the most popular place on top having nine submitted comments and an average rating of 9.1 out of 10. On this screen, users can see at a glance where the hot-spot places for fast food are in the area. For further information, users can follow the link which brings up a new screen displaying a list of user comments related to this place (Figure 2-3).



Figure 2. Facilitating indirect social navigation: Average ratings (2) and comments (3) from local residents describe the quality of urban places

This provides qualitative contextual information, based on the social knowledge and experiences with this place submitted by a number of local residents. In addition to each comment in the list, CityFlocks provides some personal information about its author. It tells the user when the comment was posted and whether the local resident lives, works or studies in the KGUV. Furthermore,

there is a link below each comment to call or text message the respective resident. In case users who read the comments need more information, they can set up a direct voice link or send a text message by selecting the respective link. This function enables CityFlocks users to connect to local residents who are willing to provide help with local knowledge, but have never previously met. Due to privacy issues, the phone numbers of the local residents remain secret, so they can only be called or text messaged via the CityFlocks interface. As the keywords and location based comments are based on user generated tags following the folksonomy concept [34], the system is not restricted by the kinds of places that can be submitted. The community of urban residents is able to upload and organise recommendations for any existing facility or place in the city.

Incorporating the location based comments submitted by local residents, CityFlocks tackles two crucial problems that people usually have with social navigation. How do you identify for example, a good restaurant at non peak-times, when it is hard to make a decision based on how many other people are sitting in the restaurant? And how can somebody get a recommendation for example, about a place that she is heading to the next day? In both scenarios it is hard to employ a conventional direct or indirect social navigation approach as there are time and space constraints which prevent us from asking or observing other people. In the case of time differences or spatial remoteness CityFlocks makes information accessible asynchronously. Popular paths from earlier navigators and recommendations from local residents are logged in the CityFlocks database and can be requested anytime. Additionally, the fact that CityFlocks runs as a mobile phone application allows local recommendations to be accessible to anybody from anywhere.

4. TECHNICAL OVERVIEW

As a community driven service, CityFlocks is highly dependant on its users’ participation and engagement in the content creation process. In order to facilitate content creation, we employ recent Web 2.0 technology and provide a web based framework that allows residents of the KGUV to become authors and publish their personal experiences with urban places to a shared online community database. Utilising a mashup application with the Google Maps API, we provide easy-to-handle user interface where people can directly pinpoint places on a map to attach comments and their contact details to specific geographic locations.



Figure 3. CityFlocks utilises a Google Map web interface to let people become authors of location based content that can later be retrieved by mobile phone users

The Google Map interface abstracts from technical implementation issues and provides an intuitive way for people to create location based content on a web application, which can later be retrieved by mobile phone users (Figure 3). As the urban information that CityFlocks provides is entirely generated by users, we had to deal with the issue of how to organise all the submitted data. From a content management point of view, the CityFlocks database needed to be designed in a very flexible way. Users should not be restricted to fit their entries into fixed categories, but rather be encouraged to upload comments about any type of place they want to. On the other hand the content needs to be organised in some way to be searchable for later users. We tackled this issue following the folksonomy principle, which is defined as a user-generated taxonomy to categorise and retrieve web content such as web pages, photographs or videos, using open-ended labels called tags [34]. CityFlocks applies the folksonomy concept to categorise and retrieve location based comments in urban places. For every entry users make, we let them attach a number of tags to describe the comment and place they are submitting. Other CityFlocks users can then search for such tags to find the recommendations and places they are looking for. The CityFlocks database is designed in a flexible way, supporting dynamic requests taking any variable as an input parameter, for instance 'find all comments that were tagged with a particular keyword', 'find all places submitted by a particular user' or 'find all tags that describe a certain place' (Figure 4).

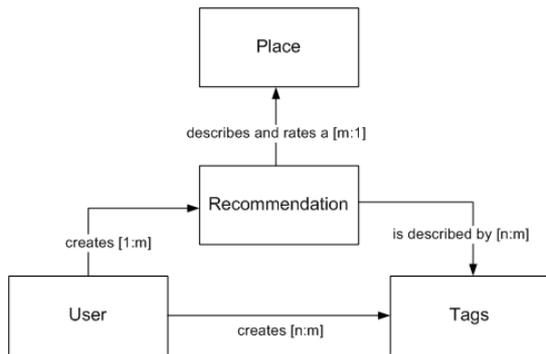


Figure 4. The CityFlocks database model deploys user generated tags to organise its content and enable dynamic search requests

The dynamic tag search implementation turns CityFlocks into a mediated social environment. For any folksonomy tag, a user can see tags that other people have used to describe similar places. In doing so, one can use the community's collective intelligence to find related places. Figure 5 illustrates an example of a place that was tagged with 'food'. For each listed comment the user interface provides a link that leads to a list of related tags that were submitted by the respective user. As it can be seen in Figure 5-3, one of the related tag lists contains 'coffee', 'dessert', 'ice-cream' and 'sushi' which link to places in the city that are related to 'food' (Figure 5-4). Similarly to Amazon's recommendation feature ('customers who bought this item also bought this item'), CityFlocks identifies correlations between the user generated tags to propose places that are related to one's initial search request.

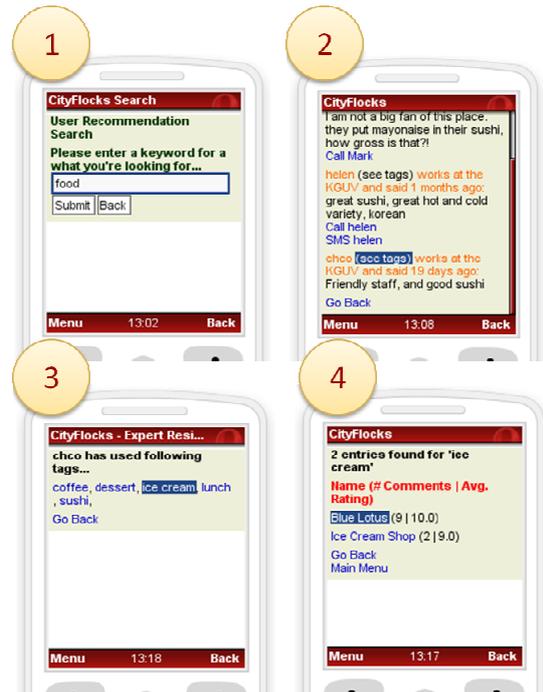


Figure 5. CityFlocks identifies correlations between the user generated tags to propose places that are related to one's initial search request

5. USER TESTS

The expected outcomes of the user tests were twofold. On the one hand we wanted to verify the capability of social navigation as a suitable design approach for mobile urban information systems. On the other hand we wanted to evaluate which of the social navigation concepts known from earlier studies [11, 16, 31, 32], that is, direct or indirect social navigation, is more effective and under which conditions.

For the user test environment, we selected the Kelvin Grove Urban Village (www.kgurbanvillage.com.au) in Brisbane, Australia. The Kelvin Grove Urban Village (KGUV) is the Queensland Government's flagship urban renewal project. Through its Department of Housing, and in partnership with Queensland University of Technology, this 16 hectare master-planned community, situated 2 km from Brisbane's CBD, seeks to demonstrate best practice in sustainable, mixed-use urban development. Since planning for the Village started in 2000 and construction started in 2002, AUS 1 billion have already been committed to deliver a heterogeneous design that brings together infrastructure with educational, cultural, residential, health, retail, recreational and business facilities within one precinct. In 2007, there are 375 residential units (incl. 7 townhouses and 155 affordable housing units) in the KGUV. This is anticipated to exceed 1,000 two-bedroom equivalent units once the Village is complete (incl. student and senior accommodation). We built a web page that utilises the Google Maps API (www.google.com/apis/maps/), enabling users to upload comments about particular urban places to the CityFlocks database and optionally leave their contact information if they wish to be contacted. Subsequently, these location-based annotations are accessible to the mobile test users in order to gather information about those places. After

having advertised and encouraged KGUV residents to feed the database through a local web page for a period of two months, we commenced the actual user tests.

We recruited six participants, two people who worked at the KGUV and were familiar with the environment, two Brisbane residents who knew of the KGUV but had never visited, and two European backpackers who were in Brisbane on a quick stop-over and had never heard of the KGUV. We carefully selected our participants from different demographics to identify if there were any differences in their respective usage behaviours and how the different interaction modes in CityFlocks were appreciated by each user. All participants were between 21 and 36 years old and owned a mobile phone which they predominantly used for SMS and phone calls. They were all familiar with the internet and reported accessing web services at least a couple of times a week. However, no one has frequently been using the internet on a mobile phone.

The actual user tests were conducted in inner-city Brisbane which is a 2 km / 10 minute bus-drive away from the KGUV. Each participant was given a particular scenario. They were asked to find a local service or place in the KGUV to solve a fictional problem-based scenario, such as, *“You are a new student at QUT and just sitting on a bus that will arrive at the QUT Kelvin Grove Campus in 10 minutes. You are hungry, but you only have about 20 minutes before your next lecture starts, so you are looking for some quick food to go. It is important to you that the food is affordable (< \$10) and really quick. Additionally, you prefer to eat healthy food. Use the KGUV print material and the CityFlocks system to find a good food outlet for you to go.”* Participants were asked to follow two goals. First, they should identify the different options of local services available at the KGUV to solve the scenario task. Second, they should try to identify which option meets their need best. In the scenario above for example, this may be a good low-cost, fast-food service that provides healthy sandwiches ‘to go’. In order to find respective places at the KGUV, the participants were equipped with the CityFlocks application installed on an internet enabled mobile phone, as well as a set of paper based, KGUV information material from professional sources.

Using the CityFlocks mobile phone application, the participants could choose between two core features to gather the information they needed. The first feature, designed to follow the indirect social navigation approach, allows them to browse through a list of comments and recommendations related to specific places at the KGUV that were previously uploaded by KGUV residents (Figure 2). Those comments include personal experiences and a subjective rating of a place on a scale from one to ten. Based on the general opinions and comments as well as the average rating, the participants could get an idea of what the place is like and then decide if it suited their needs. Representing the direct social navigation approach, the second feature allowed participants to set up a direct link to an ‘expert resident’, that is, local KGUV residents who allowed us to store their contact details in the system so people could ask them for personal advice about the location (Figure 6). Rather than extracting the information from the average rating and reading comments from a number of previous users, visitors could use this feature to get personal, first hand recommendations, having a direct conversation with a local KGUV resident. Each expert resident specified the mode of

communication by which they preferred to be contacted, e.g. via phone or SMS.

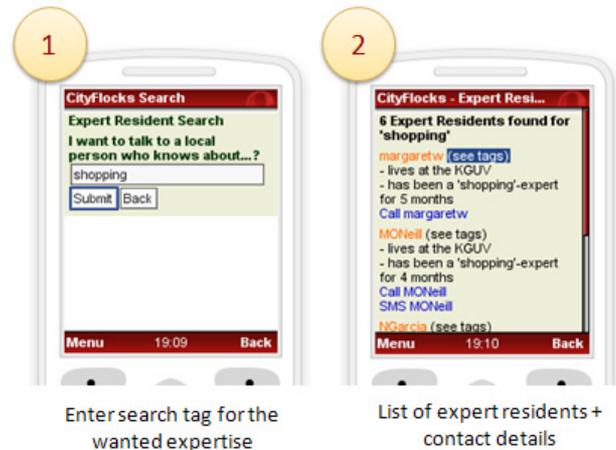


Figure 6. Facilitating direct social navigation: CityFlocks enables users to search and connect to local ‘expert residents’

The paper based information was selected from the official KGUV community magazine, a city-handbook and some relevant printouts of the official KGUV website. These are the primary resources available for residents and visitors to inform them about news and upcoming events as well as information about public places and services in the KGUV.

In order to familiarise the participants with the CityFlocks application they were initially walked through all available functions and options of the system (that is, searching for user comments, sending an SMS request as well as setting up a direct voice link to an expert resident). Then they were asked to read through the scenarios and use either the printed material, the CityFlocks system, or a combination of both to solve each of the given problems.

Obviously, each information source provides different types of information. The community magazine and city-guidebook come from a professional and authoritative source, whereas the information CityFlocks provides, is created by the residents themselves and based on subjective views. However, the CityFlocks rating-module provides recommendations from a number of residents and implicitly leverages ‘the wisdom of the crowds’ [30], the collective intelligence of community members, to inform the user about the quality of a place. Furthermore, CityFlocks enables information seekers to create a voice link to an expert resident who can provide a customised response to their current situation or assist them with location specific directions. The synchronicity of a voice call allows the expert resident to ask questions and consequently personalise the recommendations based on the background, interests and current context of the person who is calling. It also offers a greater level of social richness compared to indirect modes of communication; for example you can hear the tone and speed of voice and tell something about the mood of the other person. On the other hand the information seeker might prefer the indirect social navigation mode CityFlocks offers if they feel uncomfortable talking to an expert resident on the phone or prefer their inquiry to be processed by the system anonymously.

We observed under what conditions the participants chose which information source and CityFlocks interaction method. Moreover, after each scenario, we interviewed participants to determine why they preferred their chosen mode of communication, that is, printed material, SMS, direct voice link or browsing through the user comments.

6. EVALUATION OF INTERACTION METHODS FOR SOCIAL NAVIGATION

The user tests tackled two issues. The first aim was to find out if people perceived the information provided through CityFlocks by the local community of residents as beneficial, compared to information provided by professional sources, such as a street press magazine. Furthermore we explored which feature and communication mode (based on direct and indirect social navigation) the participants would use to gather the information they needed. They were able to choose from reading user generated comments or directly connecting to a resident via SMS or voice link (Figure 7).

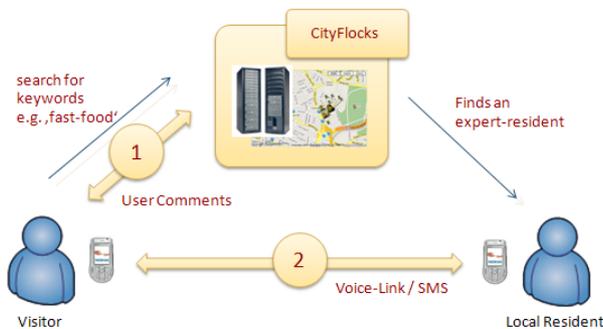


Figure 7. CityFlocks can either provide a list of user comments related to a specific urban location or set up a direct voice link allowing users to consult a local resident

All participants were observed while using the system and were subsequently interviewed. We wanted to know which features and interaction modes they were making use of under what conditions and why; for example, if they felt comfortable talking to strangers on the phone and asking them for recommendations or if they would rather use text messaging or the anonymous comments browsing feature.

Browsing Location Based User Comments

All our field study participants found that the tag-search was a convenient method to get a quick list of options of where to go. Furthermore, they perceived the rating notes as a valuable first impression of a place's quality and evidently, the more positive recommendations a place had, the more trustful it appeared to be. When a particular place was selected from the list, a number of user generated comments regarding this place was displayed. The participants' feedback on those location based, user generated comments was positive.

"It sounds really vague, but it's a feeling that you're connected with somebody. There's a persuasive element to it as well, so you're connected with somebody and they said this is good for these reasons. That's very different from seeing an ad or article that you're not going to engage with. There is no exchange really, and you're left still feeling like you know nothing, whereas here

you've connected to somebody and they've almost talked you in something or talked you out of this... So there is a little bit of persuasion going on, but that's important, that's what you want to do. You want to be persuaded because it takes away from you to make a decision when you don't have enough information to make it. So it's somebody else who's got that information and they can give you a shot, you know what I mean? You feel like you're not alone in the place. Other people have made experiences and share that with you, I think that's really cool!"

The most valuable characteristic about the user comments list is that it provides a culminated list of different opinions from various independent people, which can be requested by any facility in the city. The participants used the list as a snapshot of what a place is like without having to go around and ask a number of people or try each service personally. In contrast to city magazines and other information material from professional sources, CityFlocks was perceived as a channel where information was being published uncensored, by people who had no conflict of interest with the places they wrote reviews about. As it reflected the opinions of many individuals it was perceived as a rather democratic source of information.

The comments not only tell people about the place itself but also about the people that socialise there. Providing hints about what kind of people usually are present, can also provide some valuable information about the location itself. In one problem scenario for example, a participant was asked to find a good park at which to have a barbeque with some old friends from high school. After she had read the comment *"I love to spend time here with my granddaughter"*, she decided that this might not be the right park for her and her friends, since the anticipated noise level might not be acceptable. Furthermore, the participants drew conclusions about things the users did not mention in their comments. Searching for a good park at KGUV to have a barbeque and a relaxed afternoon with some friends, one participant said, *"I guess if there was a busy street or something you know, people would have mentioned it in their comments"*. Other than the people who had never been to the KGUV before, the two participants who are familiar with the KGUV used the system to compare their opinion about certain places with those of other residents, for example if a place was expensive or had unfriendly staff: *"Oh, I wanna see the [local grocer], somebody told me it's quite expensive, let me check this out!"*

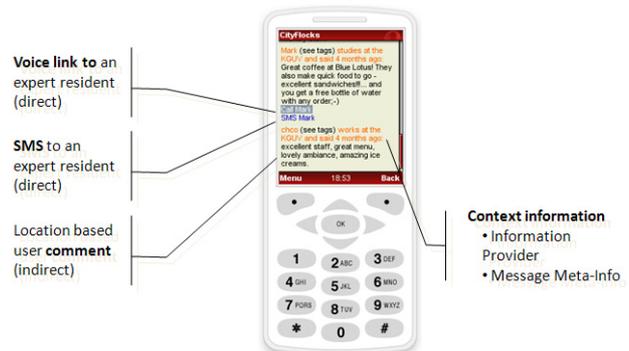


Figure 8. CityFlocks enables users to read local residents comments or to set up a direct voice link if they have further questions

One drawback of the user comments that was identified during the tests is that some places had none or only very few comments, so an information seeker would not get sufficient feedback on what a place is like. We anticipated this outcome beforehand and therefore implemented a voice link channel (see figure 8) that enabled information seekers to directly connect with a local resident who was likely to know the answer to their question.

Direct Voice Link

In order to offer a rich mode of communication between the information seeker and the adviser, CityFlocks provides a direct voice channel option. Obviously, the direct voice channel holds many benefits compared to the asynchronous user comments, such as enabling the seeker to provide more contextual information about their question and current situation. Taking this contextual information into account, the local resident can personalise their answer to the needs of the seeker, which would probably result in a richer interaction. However, the participants in our field tests would barely use the direct voice link function. This was in spite of the fact that they were aware that all expert residents who left their number in the system had acknowledged that they are happy to provide direct advice to any information seekers in the city. The main reason for not making use of that function was that they were scared of talking to a complete stranger.

“No, I wouldn’t call them, unless I know them. I don’t know, I don’t think I would call them, because I don’t want to bother people, although they acknowledged I could call them.”

“I wouldn’t just call a random person. I would like to know at least something about them, before I call them. If it said, for example ‘Anne, 23, medicine student’ I would consider ringing her up for advice, but what if it’s a professor or doctor or whatever, you know. That could be awkward. I wouldn’t really know how to talk to them.”

“Probably no, I prefer to call people that I know. During the day, you know, people work, I don’t know. If I had the option to send an SMS, I would always go for the SMS.”

Some of our non-native English speaking participants perceived the language barrier as an additional reason not to make use of the direct call. They were fine with reading user comments in English; however, they said that they would never ring local residents to ask them for advice. Another reason that made it hard for our users to utilise the direct voice link was that they were afraid to interrupt them, which was generally considered to be rude.

“I think I liked the comments better... I would be scared that they would be rude to me if I interrupted them. And if there’s some comments there, I can just check them.”

“Well, I usually prefer to look at the comments before I annoy people, because they might say, oh I entered that in the system, just look it up.”

“And even if they leave their number, well they’re busy people, too, I guess, and have jobs. So I would rather check out the comments.”

One participant did ring a local resident to find out where to get a good coffee at the KGUV. After the phone call, she explained why she found it awkward: *“Well, she was in traffic and couldn’t*

hear me, that was kinda awkward. And then she said she wanted to call me back and I thought no, it’s okay... I was just gonna find out about the quality of the coffee at this place, you know what I mean? If she had to call me back, I would have felt bad making her to call me back. I mean when it was just about the bloody coffee I would just go, I mean it’s \$3.”

Similarly, another participant explained: *“It’s just because I wouldn’t call random people about information which park they like or where they usually drink their coffee for example; I just wouldn’t do it. I guess, if I was desperate, and the information that they provided is something I really wanna know but is not specific enough, then maybe. But I’d have to be quite desperate to find out about that information you know. It would have to be kinda important to me or whatever.”*

“It’s tricky, because if the information that I want is very important, like getting furniture, you know, and if I worried about the quality of the furniture, then it’s a matter of trust, right. If I don’t know these people, I wouldn’t know if I can trust them. If I knew it was a friend or friend of a friend, I could calculate the trust rate somehow; that would help me with how much I can trust their recommendation.”

Evidently, people feel awkward calling other people directly if the information they are searching for is not really important. This especially holds true if those people are strangers. Our findings indicate that for local city information the asynchronous upload / download communication mode works better. Our participants in the user tests felt much more comfortable requesting location based comments from the CityFlocks database that were uploaded by local residents beforehand. This is particularly true when searching for rather unimportant everyday-like information such as ‘where to get a good coffee’. People would only make use of the direct voice link if they want to find out about something that is really important to them, for example a recommendation for a shop before they buy something expensive, such as furniture. In this case one would need to provide contextual information about the caller to give the respondent an idea who they would be talking to in the first place. Participants indicated that gender, age and occupation would already give them a rough idea about the other person. More importantly, a feature that indicated the level of trust in the stranger or highlighted direct friends who can provide the information a user is looking for, would be much appreciated. In order to give a sense of trust to information seekers before calling an expert resident, we are thinking of implementing a ‘friend of a friend’ feature in the form of a facebook.com add-on application that highlights contacts that one is connected to through a number of degrees.

The evaluation responses also illustrate that information seekers are scared of interrupting people when calling them for advice. One possibility that would tackle this issue would be to upgrade CityFlocks with a real-time context awareness function that tells the information seeker when the other person is really ready to take calls. Satchell’s avatar based mobile phone application ‘Swarm’ [29] is a good example of such a system.

Direct Text Message

Similar to the direct voice link, the participants in the user tests hesitated text messaging strangers who the system proposed as expert local residents for a particular topic. Moreover, they were

very aware of a major drawback of the asynchronous SMS-function: It sometimes takes quite a while until people respond to text messages. Consequently, they would not use SMS when they were in a rush, because obviously, there was no time to wait for the response. However, in scenarios where they had quite some time, for instance, when trying to find out about a good park with a barbeque that they could go to next weekend, they found text messaging a convenient feature, as this response demonstrates:

“SMS is fine if you want to find a place that you need to go to in the next couple of days. But if I was hungry and want to find really quick food, then text messaging doesn’t make much sense, since you know, it would maybe take people five or ten minutes to write back”.

As one participant from the KGUV claimed, sending a text message to a stranger was no option for her. However, when she found a friend of hers being an expert resident for parks, she decided to send her an SMS. Thus the friend-of-friend feature mentioned above may similarly be applied to the SMS option as well.

7. CONCLUSION

The CityFlocks system was conceived and designed to provide two options for its users to access local knowledge from urban residents about the services and places of a city. They can either use the system to set up a link via phone call or SMS to a local expert resident who would provide direct help with questions about particular urban places, or they could request a list of location based comments and recommendations left behind by local residents. In the field study we evaluated the two different approaches and different design alternatives towards a proposition for mobile services following the social navigation concept.

The outcomes of the user tests have shown that mobile users mostly prefer gathering information following the indirect approach, i.e. reading the location based comments left behind from previous navigators. The user comments were perceived as an extremely valuable source of information when navigating new urban environments. In contrast to information material from professional sources, such as magazines or city guide books, the CityFlocks comments were considered as reflecting people’s uncensored opinion about places in the city. They were able not only to request a list of different places available according to their request, but also able to get an idea of what each of these places are like and what local residents thought about them, before even getting there. However, for some places there were just not enough entries and the participants would have liked to get more information. We tried to tackle this problem by providing a direct voice link to the author of the comment.

The second design approach was aimed to connect information seekers with local residents via direct voice link or a text messaging function. Even though those direct channels generally provide a richer form of communication, our test users would not bother using them. First of all they often felt uncomfortable talking to a complete stranger, even though they knew that the respective person had previously agreed to provide direct advice to any information seeker. Secondly, even users who knew the local resident hesitated calling, because they were afraid of interrupting them. Text messaging was perceived as an appropriate channel to contact known local residents if the

request was not urgent, i.e. when the answer was expected up to a day after. In this study we have identified some of each channel’s benefits and drawbacks. The user comments were perceived as the most convenient and accessible method, but sometimes lack of interaction possibilities that are for example provided by SMS or a phone call. In a survey among KGUV residents we have discovered that a majority of people are willing to provide direct navigational help for information seekers. This presents an opportunity to address a lack of interactivity when accessing user comments. However, the user tests have shown that information seekers are unlikely to take advantage of this offer, chiefly due to a lack of contextual information about the information provider.

In the next version of CityFlocks we will use this consolidated data and redesign the current affordances and features of the system accordingly. We will elaborate what kind of personal information, for instance, age, occupation, gender, etc., people need to know in order to feel more comfortable in contacting registered CityFlocks residents directly. Moreover, we are planning to implement features for real-time context awareness such as being researched in Satchell’s Swarm prototype [28, 29]. This would ensure that information seekers are not interrupting the local resident with their call. In addition, we want to evaluate the Multimedia Messages (MMS) and the Press-to-Transmit (PTT) technology as further interaction methods between the information provider and the information seeker. In analysing how people use the different channels to navigate socially in new urban environments, we hope to eventually find the right mix and to design new communication affordances that leverage the benefits of all those channels to facilitate social navigation in the context of urban public places.

CityFlocks helps visitors and new residents of a city to identify popular urban places that are tagged and commented on by the local community. Furthermore it allows them to hear the opinions from different people to facilitate and inform their decision making process. Once the information seeker has seen enough information and decided on a place to go, we want to extend CityFlocks with a navigation system that provides directions. As the database structure supports geo-coded messages and all user comments submitted so far are tagged with longitude and latitude coordinates, CityFlocks is well prepared for this extension.

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