

# Usage Patterns of FriendZone – Mobile Location-Based Community Services

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## ABSTRACT

FriendZone, a suit of mobile location-based community services has been launched. FriendZone's social services include Instant Messaging and Locator (IM&L), Location-based Chat, and Mobile Dating, with supporting Privacy Management. A 16 months usage survey of 40,000 Swiss users, most of them young adults, is reported herein.

The results indicate that Mobile Dating is the most popular service, more than IM&L, with lower use of Location-based Chat that was introduced last. The extent of use of the IM&L service was found to predict the use of other services, so it has an important role in introducing the system to new users. Mobile users have shown low concern for privacy issues by gradually neglecting the use of Privacy Management tools. Observations and conclusions from the experiments have led to improvements such as a simplified user interface and have influenced plans for future services, such as community games.

## Keywords

Location Based Services, LBS, Mobile Communities, User Interface, Mixed Reality, 3G, WAP, SMS

## INTRODUCTION

Virtual Communities connect people with common interests by forming virtual worlds on the Internet. These worlds include varied community services, such as Forums, Chat, Dating, Instant Messaging (IM), etc. [19]. The interaction in these worlds is mostly composed of symbolic and anonymous communication. Hence, designing these virtual environments is a non-trivial task [2]. For examples see Babble [1], Chat Circles [3] and RVM [8].

The success of these communities has drawn mobile content developers and users to try and implement this type of applications in Mobile environments. Wireless and mobile handsets distribution has expanded to reach over a billion subscribers [4]. The emergence of new technologies, such as Short Message Service (SMS) and Wireless Application Protocol (WAP), has turned mobile phones into enhanced data terminals. SMS, the leading service, mostly among young adults, has reached billions of messages each month [7]. In spite of obvious technological limitations, Mobile Communities have the promise of "access, anytime, anywhere" [16].

An example of such a mobile community is Freever, a European commercial product, which implemented mobile Information access, Forums, and Chat [5]. Two implementations of IM and Chat that include presence awareness and have been extended to mobile platforms are Hubbub [10] and ConNexus-Awarenex [20].

In mobile devices, location is a factor. Thus, a new concept of Location-Based Services (LBS) has emerged [22]. In fact, LBS were identified as the Killer Application for wireless Internet [22]. Most of the developed LBS offered applications such as personalized information and mobile e-commerce [11, 18], but hardly any social applications.

Furthermore, the integration of LBS and mobile communities has lead to a new applications branch - Mobile Location-based Communities. Some social applications (rather than a complete suit) have been implemented in this branch. Examples of such applications in the market of mobile phones are "find friends" [13] and InirU [9] that alerted users when their friends or optional dating matches entered their physical zone.

Yet, because of the option to locate a mobile user, social LBS raise further privacy concerns. However, extensive privacy management tools have already been integrated in the regular presence awareness applications [8, 10]. When implementing privacy tools, the risk of disturbing the normal use of the application arises. An example for that is RVM - Its initial privacy model was too strict and disrupted the introduction of the system [8].

Yet, a major question remains open: considering the low-level user interface (UI) in most mobile devices, combined with the requirement to pay the operator for the service and the need for privacy, how will users accept a whole suit of Community Services on their mobile handsets?

In this paper we focus on a large-scale, long-term study of FriendZone, a suit of mobile location-based communities services [6]. FriendZone consists mainly of Instant Messenger and Locator (IM&L), Mobile Dating, and Location-based Chat, with a Privacy Management tool.

The contribution of this paper is in studying the long-term usage pattern of location-based community services on a large scale and without extensive user guidance. This paper explores the relative usage of the different services offered,

pattern changes over time, and the specific interaction style of users within each application. The paper also addresses the issue of how mobile users consider the importance of privacy regarding their location and availability. An additional contribution of the paper is in providing a design concept for mobile community services on various platforms, mostly those with low-level graphics devices.

This paper is structured as follows. The next section describes FriendZone's services and user interface, with emphasis on location information. The section following explains the evaluation method and reports the results. In the section before last, we discuss the results. Lastly, we describe some future directions, before concluding.

## FRIENDZONE

The FriendZone application, developed by Valis [23], consists of the following location-based community services: IM&L, Mobile Dating, and Location-based Chat. It was developed considering the following requirements and design principles:

### 1. Multi-platform -

FriendZone should be accessible via many platforms, such as different mobile phones, PDAs, PCs, etc., with similar functionality.

### 2. Integration -

The different services should be integrated. Thus, they should share the same look and feel and enable the manipulation of data objects between them. For example, a user will be able to invite a buddy from the IM&L application to join a Chat session.

### 3. Location and Accuracy -

Location-based information should be integrated into all the services. Its accuracy is a few hundred meters in urban zones, and several kilometers otherwise.

### 4. Privacy -

Privacy should be inherent in the system to prevent abuse of location information. Users will be provided with an extensive Privacy Management tool.

These design principles were put into effect in FriendZone's applications described below.

#### 1. Instant Messenger & Locator (IM&L)

Mobile communication adds an element of location uncertainty. Perhaps the most common question mobile users ask each other is "where are you?" [21]. Yet, new technologies enable the operator to locate its network subscribers, whenever their handset is turned on [11].

To answer that need, a service to locate friends and acquaintances is offered. The "L" (Locator) has been added to the IM to form IM&L. The option to view enhanced presence (online/offline, and more) and (real) location of other users stands at the core of the FriendZone application.

The service design is based on popular Internet Instant Messaging (IM). IM&L adds to that a new layer of location information. Users are able to manage buddy lists by

adding friends, based on their approval, using phone numbers as identifiers. They can then view their buddies' enhanced virtual presence, send them textual messages which they receive instantly, and view their location.

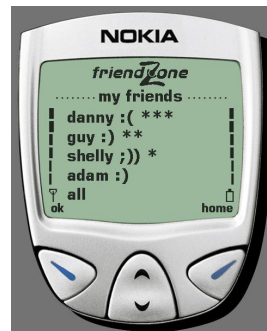
On non-graphical mobile interfaces, the virtual presence is shown by a set of ASCII emotion icons – emoticons [17]. A double smiley :) indicates that buddy is eager to communicate. A smiley :) stands for "available". A sad face :( stands for "not available". In figure 1(a), which presents a typical buddy list, shelly is eager to talk; guy is online; while danny is not available.

Location information in IM&L may be displayed in two possible resolutions:

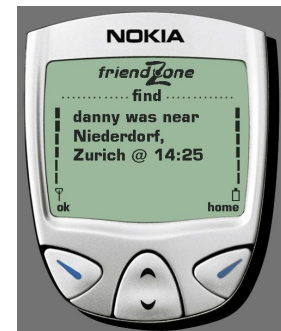
1. Relative distance to the users.
2. Absolute cell-ID based location.

The relative distance is attached to the buddy list. In addition to the standard buddy list information, such as nickname and virtual presence, there is a vicinity indicator. The vicinity is depicted in four levels: very near (0-0.6km), moderate distance (0.6-1.3km), far (1.3-2km), and out of zone (more than 2km).

The vicinity indicator is presented using a set of ASCII asterisks. Very near is three asterisks (\*\*\*) ; moderate distance - two (\*\*); relatively far - one (\*); and out of zone - no icons. Figure 1(a) presents an example UI in which danny is very near, guy is within moderate distance, shelly is relatively far, and adam is out of zone. On graphics-enabled devices, a graphic map is available (see figure 3).



1(a) Buddy list



1(b) Locator

Figure 1: Instant Messenger and Locator interface

In the second resolution, a more accurate location of a specific buddy is given upon an explicit request. The user selects a buddy and clicks "find". The buddy's location is then presented by a textual description of the cell's area, with the time of relevancy (see figure 1(b)).

IM&L lays the foundation for a location-based mobile community by creating social circles. Community members can physically map their inner circle of friends at all times.

#### 2. Mobile Chat

Similar to Internet Chat, the mobile version allows users to exchange textual messages in virtual chat rooms. Anonymity is preserved and therefore cell-ID based

location is hidden. Nevertheless, the relative distance of chat roommates is available.

In contrast to the Internet topic-based chat rooms, a location-based chat room, called a “Local Chat Room”, is available for mobile users. The Local Chat Room hosts users who are located in the same zone. The room is named after the nearest cell-ID description, e.g., “London Soho Room”. The chatters in that room might not share common interests, but they share the same location at present time.

By adding location, the Chat (and also the rest of the services in FriendZone) forms a type of a mixed reality environment by contrasting the real and the virtual reality (the latest often includes false identities and information).

### 3. Dating

The dating service enables an automatic match of two anonymous users, based on their profiles. In contrast to IM&L, dating users are not friends in reality and thus don't have each other's phone numbers. Consequently, they cannot be added to IM&L, nor can their absolute location revealed, that is, until they exchange phone numbers.

Relative distance plays an important role here too. Users have the option to define location as a leading criterion for the matching process. When doing so, only matches within their zone would be presented to them.

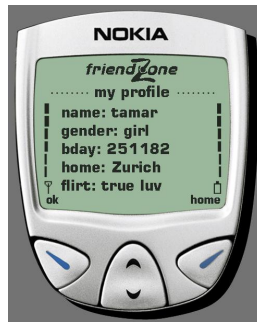
Users start by defining their personal profile (see Figure 2(a-c)). The profile includes demographic and personal information (presented in 2(a-b)); and a personal (virtual) picture (presented in 2(c)). This feature is limited to WAP devices that support images. The virtual picture is chosen from a picture gallery that is designed to represent socio-psychological types.

In order to find matches, users define a preferred matching profile. Consequently, they get a list of matching results (see figure 2(d)). The list offers somewhat different information than the buddy list. Instead of the virtual presence, a concise presentation of gender (b-boy, g-girl) and age of the match is given. In addition, an exclamation mark (“!”) indicates a Perfect Match (the matched profile was exactly like the preferred matching profile).

For example, see Figure 2(d). The first line is “jo! \*\*\*b18”, that means that jo is an eighteen (18) years old boy (b), who is very near (\*\*\*) and he is a Perfect Match (!). Similarly, mo is a boy, which is also very near, whose age was not given; cloe is a 21 years old girl (g) who is relatively far (\*); momo has not defined gender, nor age, and is also relatively far (\*), etc.

When receiving a list of matches, users can choose to overview the results' complete personal profiles, contact them, or find degrees of separation from them. Finding the degrees of separation is based on the “Six Degrees of Separation” theory, which claims that the distance between any two individuals in terms of direct personal relationships is relatively small [14]. By using it, people can check their levels of social connection with an anonymous match. The algorithm checks the database of buddy lists to find a

connection between the two persons. A result between 1-6 degrees is presented. For example, “3 degrees” means that there are three connections via two people in the social network that leads from the user to the anonymous match. For example, here is an example case of three degrees: User <knows> John <knows> Alicia <knows> match.



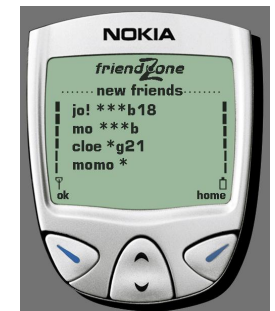
2(a) User Profile



2(b) User Profile cont.



2(c) Personal (virtual) picture



2(d) Dating query results picture

Figure 2: Dating interface

The information about the degrees of separation adds a teasing clue regarding a match real identity, while preserving the basic principle of anonymity. It also adds a conversation topic to the future date.

### 4. Privacy Management tools

Considering our belief in the importance of user's privacy, the following extensive privacy tools have been integrated in FriendZone:

1. When registering to FriendZone, the users are made aware and required to confirm that they understand that, subject to their consent, their location will be made available to other users (called here Disclaimer).
2. Adding users to a buddy list is not automatic; the users should consent to it.
3. A tool, “The Block List”, provides the users with a full control over their presence and personal location information. Using the Block List, users can see who is capable of receiving their availability and location, and are able to block one, some, or all buddies on the list from seeing them. Blocking means that the buddy will always see the user as unavailable. It can be temporal or permanent. The Block List enables retracting a

previously given consent to be added to a contact list, by deleting oneself from it.

4. Inactive users are alerted after a period of a month that their location information will be blocked to protect their privacy. If they do not show any activity for the next three days, the automatic blocking is preformed.

### 5. Other Services

Other services in FriendZone are those not included in the rest of the applications, such as registration, customization, find self-location (“where am I?”), language substitution, online help, etc.

### Access platforms and user interface

FriendZone supports different platforms, networks and protocols. Thus, FriendZone provides each platform with a UI that supports its specific limitations and opportunities:

1. SMS only handsets - textual presentation, operated by short menu commands.
2. WAP enabled devices – textual, with some graphics (see figures 1 and 2), operated by textual menus, and based on relatively short online sessions.
3. Third Generation (3G) devices – richer, usually color, graphics, operated by menus and pointing device.
4. Internet (PC) – rich color graphics.

3G devices and PC UI enable enhanced presentation. On these platforms, the buddy list is presented in a radar-like graphical map, with distances and compass directions presented around the user (see figure 3). Buddies in the user’s zone are plotted inside the circle and those out of zone are plotted outside the circle, with distances attached.



**Figure 3: 3G device user interface**

The Internet platform of FriendZone is also interesting. The Web site offers users an option to join the mobile

community with all the location-based features on a stationary basis. Users log into the site using their mobile phone number, and their location information is presented to their friends according to their mobile handset location.

### EVALUATION

This current evaluation was meant to learn how mobile services are accepted and utilized by a large scale of users on a commercial basis. As opposed to small-scale trials, in this study, users used the system naturally and were charged for each command they activated. Other significant differences are that the users were not guided extensively, and that the community evolvment was not controlled or limited, as usually done in a trial.

FriendZone’s preliminary user study in Switzerland took place between January and April, 2001. It evaluated the user interface and the usage of different services. A group of 3000 users was guided and closely helped to start using the system in a pilot. The results of that study showed that the new services were accepted very well. IM&L was the most popular service, with the Dating widely used. Similar results were found in earlier, smaller scale studies in other countries, such as Spain and Israel. Chat was not yet developed at that time and thus was not tested.

The statistical data regarding FriendZone usage patterns was collected over a period of 16 months, between May 2001 and August 2002. The beginning of the survey is marked by the commercial launch of the service in Switzerland. At the end of that period, the application had more than 40,000 paying subscribers. The data collected included all the commands issued by all users over the entire period of time, which summed to millions of commands. The Swisscom Customer Care team provided additional user feedback.

Most of the users accessed the service through mobile low-graphics handsets. A relatively small number of users accessed it occasionally through the Web interface. All the users paid for the services through their mobile phone bills (airtime and/or transactions). During this period, two enhanced software versions of the application were installed, reaching the final design described above.

IM&L and Dating were included in the very first version launched. Chat was added on June 2002, with data collected about its use for three months only.

Our expectations were that like for the small-scale study, IM&L would be the Killer application of FriendZone. We believed that the ability to reveal the location of other friends and people would be the main attraction for the location-based community. Presenting such a new concept to the public, we also predicted high privacy concerns and awareness among users regarding their own location information.

As for the Internet site, we were curious to discover how the usage will be as the users are billed for their Web actions through their cellular phone bill, a concept new to the “all free” orientation of the Internet.

### Services popularity

In order to check the relative popularity of the different services (IM&L (including Privacy Management), Dating, Chat, and Others (see section “Other Services” above)), the number of monthly commands performed in each service was counted. The relative usage of the four services in the month of August 2002 is presented in figure 4. It includes all the system’s platforms. By using the percentages of usage instead of absolute counts, the effects of external changes, such as the increase in number of users, are eliminated from the analysis.

The information reveals a clear dominance of the Dating application (71%). Users have used Dating five times more than they used IM&L (14%). Chat is last with 7% usage.

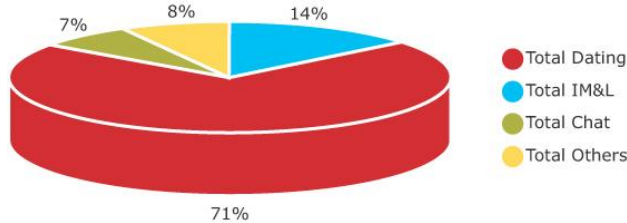


Figure 4: Services popularity (September 2nd 2002)

### Commands popularity

Table 1 presents the top popular commands<sup>1</sup> in FriendZone and their relative usage percentage. The table is structured as follows: the first column is a serial number for each command (that will be referred to in the text in parenthesis), the application it belongs to (column A) using a one character code (D-Dating, C-Chat, M-IM&L, O-Others), the command description, and the right column is its relative usage percentage.

The table shows that the Dating commands are clearly leading, with the command ‘Check a specific match’ (1) at the top of the list. Three of the Dating commands, including get possible matches (2), check a specific match (1) and contact a match (3), cover more than 50% of the overall FriendZone usage. However, only 6.2% out of it is actually for direct contact with the potential matches (3) by sending a textual message. It seems that dating users spend most of their time on “window-shopping”, checking and aiming at the right target.

Even more interestingly, Dating users are much more interested in getting new matches (command 2, with 17%) than checking again on their previous contacted matches (command 6, with 5.2%). We should consider, however, that some Dating “couples” simply moved to other channels of communications by publishing their phone numbers. Thus, they might have continued their relations in voice conversations, generic SMS (direct one-on-one, without the mediation of FriendZone), by adding each other to IM&L’s buddy list, and eventually even meeting face to

<sup>1</sup> The commands appear as in their description and not by their “interface-name” in the application.

face. That means that other services in the system actually support the Dating services, and therefore, that the Dating activities are even higher than explicitly measured.

#	A	Command	%
1	D	Check a specific match (profile)	28.4
2	D	Get possible matches (5 at a time)	17.0
3	D	Contact a match	6.2
4	D	Check my dating preferences	5.3
5	M	Get my buddy list	5.2
6	D	Get contacted matches list	5.2
7	M	Find a friend	4.3
8	C	Refresh Chat messages	3.4
9	D	Change my dating preferences	2.8
10	C	Get Chat topics list	2.6
11	D	Get possible matches in my zone	2.0
12	M	Find all friends on my buddy list	1.4
13	D	Set my profile	1.3
14	D	Get degrees of separation	1.1
15	O	Find my location	0.7
--	--	Other commands	13.1

Legend: A-Application, D-Dating, C-Chat, M-IM&L, O-Others

Table 1: Commands distribution

In fact, the Dating application use is so high relatively to other applications, that minor dating features are more popular than IM&L major commands. An example of it is the command Change my Dating Preferences (9, with 2.8%) compared to Find All Friends (12, with 1.4%).

### IM&L correlation to the overall system usage

We found a strong correlation between the number of users in a user’s buddy list to the total number of commands performed in the system. The correlation is significant, with correlation coefficient (spearman) of 0.644.

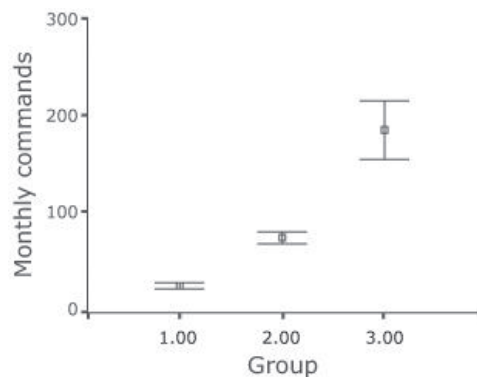


Figure 5: Internal Correlation

We divided the users into three groups:

1. Users with 0 or 1 entries in their list.

2. Users with 2 to 5 entries in their list.
3. Users with more than 6 entries in their list.

Figure 5 demonstrates the strong correlation between the number of buddies in the list and the total number of commands the user performed in the system (95% of the group is between the lines).

#### Pattern changes over time

The over-time distribution of the services usage is presented in figure 6. Note that each line does not represent an absolute number but a relative amount of use. The results show that in the early days of FriendZone, IM&L was the most dominant service with over 60% of the use per month. Since then, Dating popularity was rapidly increasing, reaching the height of more than 70%. It seems that the newly introduced Chat service was drawing most of its usage from the IM&L service.

When we reviewed the detailed data, we found that the "Block list" (Privacy Management) use has decreased over time. Being once one of the 10 top commands (3%), it decreased to less than 1%. This emphasizes the surprisingly low concern of the users regarding privacy issues that arise by sharing their location information with others.

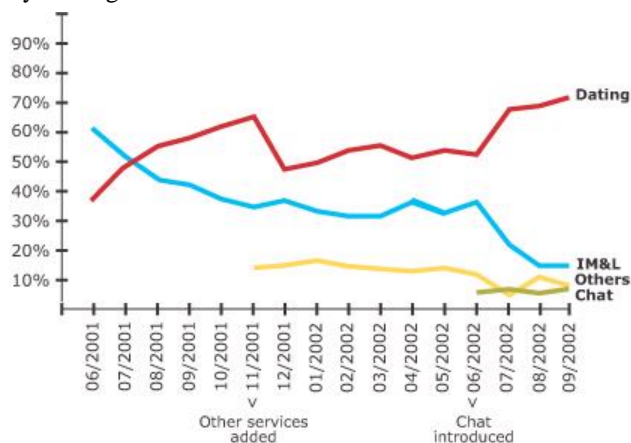


Figure 6: Usage percentage over time

We should note that when studying FriendZone usage over time, we have to take into account the following factors:

1. The community had evolved constantly, with new users joining it on a daily basis.
2. Improvements and changes were made in the software, hardware, and user interface.
3. Chat was added as a new service only on June 2002.

Nevertheless, considering the size of the population and the length of the experiment, and the clear trends over time that were found, all make these effects marginal.

#### Web interfaces

FriendZone Web site usage itself increased over time, but is still relatively low compared to mobile usage. However, the Web site's usage statistics reveals the same dominance of Dating as the leading service of the application. It is important to note that in addition to the natural Dating

attractiveness, the customer team reported that users testified that it is much easier to manage personal profiles and preferences using the Web interface than on the limited mobile handset. It basically means that the matching process is much more efficient and faster that way.

It is also interesting to note that even though the users were paying for FriendZone, unlike many other Internet IM, Chat, and Dating services, they still found a reason to use it. This means that when users get an added value from a certain service, they will pay for it also over the Internet.

#### DISCUSSION

Our discussion goal is to obtain deeper understanding of the unexpected results gleaned out of the services utilization by the users.

#### Dating Is a Killer Application

The results regarding the services popularity (i.e., Dating) are highly coherent. We suggest some possible explanations:

##### 1. Anonymous SMS

FriendZone Dating suggests an extension to popular SMS. It allows users to send anonymous SMS to other users, without knowing their phone numbers. As opposed to IM&L that provides an alternative to standard SMS, anonymous SMS is unique and absolutely dependent on the mediation of FriendZone.

##### 2. Surfing with a Target

Mobile data sessions are much shorter than Internet sessions due to several reasons (among them pricing). In addition, the content exchanged between mobile users in the form of short textual messages is limited. As a result, it seems that FriendZone usage is more goal-oriented compared to similar Internet applications. While Internet users can be involved in hours of casual surfing, most FriendZone users log on the system for a reason. Mobile Dating seems to be a natural solution: promises for high action and excitement in a relatively short time. As noted before, Dating users prefer to spend their precious session time on receiving new potential matches, rather than re-contacting their older ones.

##### 3. Easy to Meet

Dating is an outdoors activity. In most cases, at least one of the two users involved (usually the contact initiator) is located outside his house. In some cases, both users are out. Coupled with the availability of location information, it seems that Mobile Dating leads faster to face-to-face encounters and thus is more tempting to use.

#### IM&L requires more user guiding

The surprisingly low usage of IM&L is hard to explain; we can try and reason as follows.

##### 1. No IM&L with other Operators

The objective explanation is that the Swiss version of FriendZone is offered only to Swisscom subscribers. As a result, Swisscom users might not be able to add some of their close friends to their lists, if those are unfortunately subscribed to a different Swiss operator.

## 2. *Hard to learn and to start using*

A possible explanation to the lower use of the IM&L could be lack of expertise. A significant number of the users have had a surprisingly low number of friends in their buddy lists, and consequently, didn't use IM&L often. The high correlation between the low number of buddies in IM&L list and the low usage of FriendZone in general suggests that the users need guidance on how to use these services efficiently. This is also supported by the higher usage of these services in the smaller study group that was closely helped in building buddy lists and in starting up.

Another explanation could be the need for an initial investment to build the buddy list. Those users might not have invested the required time to create and manage their buddy list at the beginning, and were quickly drawn by the immediate-results dating attraction.

### **Chat needs more evaluation**

Chat, an Internet favorite, shows low mobile usage compared to Dating and IM&L. Apart from its longer sessions nature, it seems that current mobile handsets are not a natural to chat applications. Conducting a Chat with phone keys is tough and is relatively slow [12], not to mention the limited display. However, the interest our users have expressed in the location-based Chat service in previous surveys, combined with the late introduction in the survey, leads us to consider further evaluation before we "bury" this interesting service.

### **Location features as bait**

Some users have claimed that location features were the "bait" and their initial attraction to the system. When they first heard about the FriendZone application, it was the ability to find their friends, which led them to register. Analyzing commands' popularity suggests that location capabilities have been truly accepted well. However, they are clearly not amongst the most popular features of the application. It seems that the location properties are helpful and interesting to promote use of other services that materialize the interaction.

### **Design implications: Less Is More**

The commands' popularity table shows that the 15 most popular commands cover as much as 85% of the total usage. This information brings us to the following conclusion: **being a new breed of application, operated mostly via very limited handsets, and paid by transaction/time, services and user interface design should be extremely focused and simplified.**

Thus, a lot of resources have been invested in recent months in removing less popular features and simplifying the navigation over and over again, according to users' feedbacks. Hence, the design of all interfaces was affected:

1. The list of SMS commands communicated to users was shortened in order to give SMS users access only to some of the features of FriendZone, while supplying them with a "quick list" of the most significant actions.

2. Navigation and hierarchy of WAP menus were changed in order to enable WAP users to access the more popular features in the fastest way possible.
3. The design of the new 3G interfaces was already based on past conclusions. Some unpopular and redundant features were dropped in the new design.

### **Young adults have less privacy concerns**

Privacy was a corner stone in FriendZone design and a condition for its legal distribution. The Privacy Management tools were all discussed and approved by the Swiss Justice Department. However, it seems that privacy is certainly not the main concern of the application users themselves. Privacy tools are not only less popular, but their usage decreased over time even with the spread of the community.

This is consistent with the observation that privacy management is critical for giving people peace of mind that they *can* control access, even though they rarely do so [10].

However, we should point out the low age of FriendZone users (18-25 average). It seems there is some connection between their young age and their low awareness for their privacy. We suspect that by exploring a larger distribution of ages, the results might be different.

### **FUTURE DIRECTIONS**

In addition to the current update of the FriendZone's applications as a result of the study, future directions should include further studies. An interesting direction is to focus on the connection between the demography of users and their usage patterns. Such surveys should take into consideration gender, age and education, and their effects on general use of the various services. Another interesting aspect is analyzing the usage patterns of users, according to their acquaintance with the system - regular users vs. casual. This can also lead to further improvements in the user interface. In addition, as the services are introduced in other countries, it might be possible to learn about the differences in usage patterns amongst different cultures.

Other planned directions are to enhance the user experience by adding Skins and new location-based applications such as location-based games.

### **Skins**

Skins make the UI more attractive by offering users to personalize their UI. Skins port into most mobile devices as textual and low-level graphics. Skins are inherent to FriendZone for multi-linguistic support. In addition to replacing the standard UI (menus, commands and design) with a more creative one, FriendZone will enable use of metaphors in real location descriptions to form a mixed reality environment.

For example, users can use a "Harry Potter" Skin. In this Skin, the environment is called "Hogwarts"; users can become invisible by wearing "the invisibility cloak"; and the train station can be called "platform 9¾". It would be interesting to observe how users would react to this Skins.

### Location-based community games

Location-based community games are different than desktop or standard mobile games. Mobile LBS games take place outdoors, in reality, and the handset is merely used as a control. Using location information about players enables the creation of a mixed reality game. An example of such an implemented game is BotFighters [15], in which players track and shoot fellow players using their mobile handsets.

Treasure Hunt and Mobile Monopoly are two location-based games that are currently under development in FriendZone. In Treasure Hunt, "clues" are given through the mobile handset. Arriving to each "station", as well as finding the "treasure", is monitored using the location. The game is integrated with IM&L and enables IM between the participants. In Mobile Monopoly, the real world turns into a Monopoly board. Mobile Monopoly integrates traditional Monopoly with real-life places and locations. Players can virtually "purchase" and "own" places that they physically enter into, and get paid "rent" when other players physically enter "their" places, or "trade" properties with them. As opposed to Treasure Hunt, the users' communication here is an essential part of the game.

### CONCLUSIONS

The main goal of our extensive study was to determine the acceptance and use of LBS community services on mobile devices. Whilst Internet virtual communities are common, we feel that implementing these services on mobile handsets is more than just porting them – it calls for different design concepts: a focused and simplified UI, with innovative features to exploit the unique qualities of mobility. These services should not be a mere extension of Internet services but a complementary application. Hence, the future of virtual communities would offer full access for their users - anytime, anywhere.

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