

“I Expect Smart Services!” User Feedback on NFC Based Services Addressing Everyday Routines

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Abstract. Smartphones are central to everyday activities. Paired with short distance radio technologies the range of smartphone application is extended and development of “smarter” services is enabled. A trial, including 60 pilot users, shows that the smartphone itself and its capability to emulate transaction and access cards are highly valued. In order to meet expectations adaptive and personalized features/services should be added, based on knowledge of the individual users’ activities and communicated needs, as well as their curiosity for new adventures.

Keywords: Smartphone · NFC · Everyday routines · User study

1 Introduction

The mobile phone has changed from initially being a means for making individuals directly addressable to becoming a platform that provides innovative opportunities for smart services. A recent survey of mobile phone usage shows that in addition to making calls and sending messages people use the phone extensively for more than 30 different tasks on a daily basis, and they would even want to use it for more if the needed services were available [1]. These mobile services play an increasingly important role in transforming people’s everyday lives and empowering societies to grow and progress.

Today about 90 % of handset sales worldwide are of so-called smartphones, with more advanced computing capability and connectivity than basic phones. A smartphone typically combines the features of a mobile phone with those of other popular consumer devices, such as a media player, a digital camera, or a GPS navigation unit. It also includes touchscreen computer features such as web browsing, Wi-Fi, and third-party apps.

Near Field Communication (NFC) technology has been part of this development since Sony and Philips agreed on a new specification based on RFID technology back in 2002. NFC consists of a set of close-range wireless communication standards that

enable devices to transfer small amounts of data to each other. It is considered a promising input to an innovative and sustainable mobile agenda.

The contactless feature of NFC enables the user to bypass several, often laborious, steps on the way to reaching the core service. Furthermore, a gentle tap on specific tag points can activate information services or transactional services and thus contribute to bridge the gap between digital and physical worlds [2].

This paper presents user feedback on a set of NFC services addressing everyday life routines, in a framework that recognizes mobile phone usage as highly individual [3]. The initiative referred to as the NFC City project has been run in the spirit of open innovation and included partners in the telecom, banking, transportation, physical access and information service sectors as well as academic institutions and governmental bodies [4].

2 The Multi-service Trial

Many trials have been conducted to explore user reactions to NFC services [5]. Most of them focus on single services and single routines and address the purchase/adoption phase of a technology usage cycle. These limitations were challenged in the NFC City project by conducting a trial where users were exposed to several services that they could naturally relate to. The trial lasted for 17 months and involved 60 students (mixed gender sample, 19-34 years, 25 % had no prior smartphone experience). They all received an NFC enabled smartphone (Samsung S3) when entering the trial.

The following services were implemented and launched stepwise during the trial period [6]: Prepaid coffee card; city bus travel card; housing access key; fitness poster at the gym; check-in tags at campus; information tags for canteen menus, evening events, timetables, and recent news from the student paper; and programmable tags for the students to develop their own personalized services.

The project applied an explorative approach to a set of research questions [7] and user feedback was collected throughout the trial (Fig. 1). This paper focuses on how attractive NFC services should be implemented.

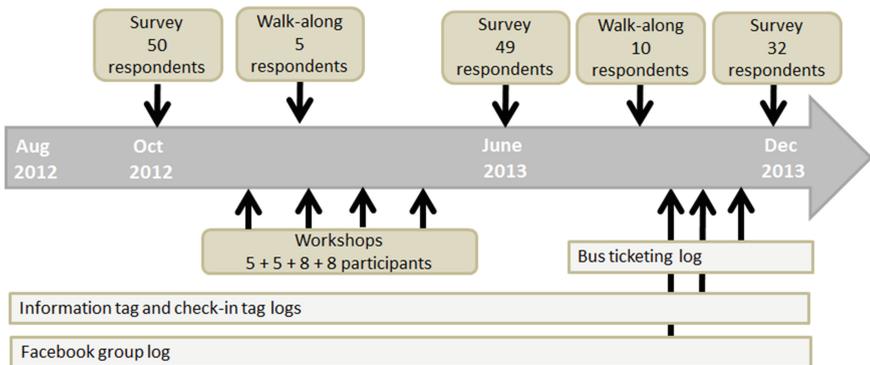


Fig. 1. User feedback was collected throughout the project period (Aug 2012 - Dec 2013)

3 Findings

Key findings are here presented relative to the students' daily routines. We will however first describe the role of the smartphone within the sample.

Smartphone Usage. The new phone was positively received by the pilot users. One of them put it this way (Dec2012 survey): *“For the first time I use mobile Internet. Web pages are easy to read – more easily than with my previous phones. Thus it is more interesting. I discover new stuff almost every day.”* A check some months later (June2013 survey) showed that they used the new phone more often than the one they had before. The number of downloaded apps varied from just a few to more than 50, but most of them reported a number between 10 and 30 apps. They also claimed that the phone had become a more essential artefact to them, illustrated by this quotation: *“Often I use the phone as pastime, - for instance when I wait for the bus or during commercial breaks on TV. I can't remember how I coped with these pauses before – I would not like to return to an ordinary phone. I like the always on access to Internet. Whenever I need information I can check. I like the camera as well – I don't use my digital camera any more. I fancy the way my phone substitutes my diary, camera, mp3 player, and so on - and thereby relieves me from the hassle of dragging all these devices around.”*

Leaving Home – Housing Key. Only 3 of the 60 participants got the opportunity to use the NFC based housing key solution. The whole sample was asked about their locking routines and where they kept their keys, etc. (most of them carried the key in their pocket of their jeans or jacket), and a digital key integrated into the mobile phone was regarded an attractive scenario.

We used an off-the-shelf hotel solution which included a snap lock feature, presumably a handy solution for hotel guests but not at all appreciated by the students. Locking guests into their house was also mentioned as a drawback while on the positive side the new solution ended numerous searches for keys. The possibility to distribute temporal keys over the air – for instance to a visiting friend – was requested but unfortunately not implemented in the trial solution. All in all, this rather simple version of an NFC based key did not completely meet the users' expectations.

Transportation – Travel Card. The students lived in different lodgings within a distance of 5 km from the university. All of them were pretty close to bus lines passing the campus area. The ticket validation was similar to ordinary plastic card validation – one touch only. The bus ticketing card was only available during the four last months of the trial period (see Fig. 1) but the pilot users responded very positively when asked in the Dec2013 survey. One of the students phrased it this way: *“It's cool to have the bus card on the phone. I bring it [the smartphone] with me almost all the time – then the card is always there. No problems in use.”* However the students were aware of the potential add-ons that were not provided to them and exclaimed rather clearly that *“online topping-up of travel cards is a must!”* They had also expected to be able to download and install an app (from an ordinary app store) with options to check the status of the card. A wish for lending out the travel card to friends was revealed as well.

Organize the Day at Campus – Information Tags. Information tags were accessible at campus from the start of the trial period. The overall usage was still limited. One of the students explained it this way: *“This was a very simple way of accessing information. I would have used them [the information tags] even more if they better met my personal needs”*. The June 2013 survey showed that the users enjoyed the immediate and easily accessible information, emphasizing the daily menu tag and the bus schedule tags as particularly useful. These two information sources were both of the “quick check” kind that seemed to be a preference, and the bus schedule tag was contextualized as the content shown to the users was adjusted to the geographical position of each individual tag. We also found that the need of educating the users should not be underestimated, like for instance those who answer this way: *“I did not use the tags because I did not know how to use them and I was afraid of making a mess”*.

Visiting the Canteen – Prepaid Coffee Card. The emulated prepaid coffee card was accompanied by a status app showing the number of coffees left. The students got the coffee by touching a dedicated tag on the coffee bar counter with the smartphone. Disregarding some technical problems and the corresponding feedback related to that, the coffee card was welcomed as a convenient and cool way of paying. Some of the users pointed to cost as a reason to ignore the technical hassle: *“I did not buy a coffee card before it was offered at a reduced price. Until then the cost of problems and inconvenience was too high”*. Others emphasized efficiency aspects: *“The machine is very frequently out of order, which is disappointing, but when it works it is much cheaper and faster to buy with phone”*.

Training – Smart Poster Guide. A smart poster was placed nearby the training equipment in the campus gym, providing access to detailed information on muscle groups and how they best could be trained. The descriptions were accompanied by instructional videos and pictures. The feedback varied from one extreme to another: *“... this is rather useless”* / *“... this is a fantastic opportunity”*. Others were more concerned about potential problems: *“The phone is big, and without a cover, well, I think the phone can be damaged by staying close to warm and sweaty skin... when exercising I will focus on the activity – not paying attention to my phone.”* However, they reflected eagerly on what a more attractive smart poster might look like: *“The content could be more relevant”*; *“The poster should have more instructional videos”*; *“I would like to check in at the gym with my mobile phone – that would make it possible to count the number of visits and then calculate the actual price per visit”*.

Back Home Again – Private Services. Carrying the mobile phone whenever and wherever at home was normal behavior among our pilot users. Thus it was interesting to see whether they welcomed the possibility to program tags for their private sphere. Some expressed joy and enthusiasm, like this one: *“Above the kitchen Table I have placed a tag that activates a calendar app. Below another table there is a tag activating YouTube on the PC – which again is connected to the TV-set. I have tags for managing burglar alarms, placed besides my bed. And more tags will come;-)”* Others were not fascinated at all. To encourage the tag production we invited them to join workshops. Here one of them explained: *“I did try to program a tag but I stopped because I became uncertain. You know, I have my entire life stored on this phone”*.

She was afraid that content on her phone could be lost or accidentally transferred to the NFC tag, or that unwanted data could be downloaded to her phone. The barrier was removed when the manner of operation was explained to her, guided by her questions and objections [8].

4 Discussion

The users were exposed to both pre-commercial services developed by professional actors as well as dedicated information services developed by students for the project. Furthermore, the everyday tasks that were addressed varied extensively. To select the most successful service is thus neither fair nor feasible. Still the travel card solution deserves particular attention as being by far the most used service.

Why did the travel card become the chosen one? One plausible explanation is that we had a biased sample that already used the bus on daily basis. Hence, the users could easily fit the service into existing routines of travelling. They experienced the smartphone as an easier means of validating tickets as it was always at hand (compared to travel cards found in wallets, pockets or purses). As such the *smartphone itself* and its *capability of emulating* a traditional plastic travel card provided the extra benefit. And further, when the first travel was done they had a prepaid card and an easy way ahead for the next travels.

Even though smartphones and NFC technologies add a new dimension to the existing services by way of tapping for immediate access to services, a simple substitution strategy seems too weak [9]. This is particularly the case for existing services that are experienced as efficient and successful. The travel card should, according to the pilot users, be improved with “reading card status” and “online topping-up” features. These functionalities can easily be offered by utilizing smartphone assets and resources (screen, security mechanisms, computational power, storage, etc.).

In addition to asking for extra features the pilot users also wanted more relevant services. These expectations can either be met by tailoring the features to individual preferences or by implementing contextual or personal content filters. A touch on today’s menu tag would appear personalized and smart if the result on the mobile screen was presented according to individual taste, price and location preferences, written in the user’s native language, and so on. By enabling users to tailor their own features and services an extra dimension to the quest for personalization could be added. This implies that service designers must not “lock” services into a particular mode, but allow for adaptive and situated services.

Making the smartphone a versatile tool for nearly every task in daily life may create paradoxical situations [10]. The more features added, and the more dependent the user becomes regarding his/her smartphone, the more anxiety may arise in terms of trust, security, privacy, etc. These concerns may reach a tipping point where the users become reluctant to use new services.

A key issue seems to be whether users foresee the smartphone as the ultimate device for “accessing the world”, or whether they feel a need to diversify risks and pleasures by allowing other artifacts to address specific tasks. This implies that research

must not only address the adoption or appropriation of *services* but also of the *specific devices* that allow for services to be accessed, and the *service environments* for device interaction.

5 Summary and Conclusion

In this paper we have presented findings from a longitudinal multi-service field trial involving NFC-services developed for smartphones. The services were highly different, addressing various aspects/tasks in everyday life. The house key was useful in the sense that the key was never lost (people take care of their smartphones), while easily accessible travel tickets were found most convenient by those taking the bus. The training poster as well as the other information services did not add much to existing habits but users believed them to have potential if more dynamic and tailored information was added. Technical problems seemed to overshadow expected benefits of keeping the coffee card on the mobile phone. The self-programming tags ended up being used sporadically by many, while others embraced them fully, finding a range of purposes they could address.

The services provided different benefits and evoked different emotions among the users, and the list of drivers and inhibitors is as long as the list of services. This means that transferability of adoption knowledge across services is not a simple task.

All in all, the “contactless” feature of NFC-services created an immediate wow-effect. At the same time expectations were high as to what these services could bring in terms of “new adventures” or in terms of “consolidating existing tasks and routines”. Consequently, marketing something as “smart” implies that users expect novel services with adaptive and personalized features and a sustainable wow-effect. Hence, the real task of smart innovation is not (only) understanding technology itself, but grasping both the “adventurous” and the “mundane” needs of consumers and how technology may address these.

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