New customers services based on contactless technologies

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Abstract

People transportation is quickly changing all around the world: higher speeds, higher traffic, less energy consumption, less pollution, are some of the key drivers of this ongoing transportation revolution. This revolution could also be made in the field of services offered to customers through the use of contactless technologies. That's why, SNCF wanted to evaluate the possibilities offered by contactless technologies: where and when can we use them to improve customer services in transportation context?

The first section of this article introduces a study of use cases of contactless gesture carried out by SNCF early 2010. Then some innovative applications developed in order to improve customer's life in stations by providing contextual and personalized services are presented. Finally some conclusions and perspectives for future work are given.

Introduction

Last years, services based on contactless technologies on mobile phones have been deployed in some countries. In Japan for example, NFC technology (Felica Standard) is used for payment and transportation ticketing purposes by passengers in partnership with NTT Docomo [1].

In Europe, different services based on contactless technologies on mobile phones have been tested in the transportation domain and some of them are being deployed (Touch and Travel by DB in Germany [2], intermodal transportation applications on mobile phones in Valencia in Spain, contactless payment in Amsterdam...).

In France, NFC technology on mobile phones was tested in Nice in June 2010 through transportation, payment and information services [3]. At the end of 2010, fifteen French cities were testing the use of contactless technologies on mobile phones or on other types of media (NFC Cards, USB Keys). In 2011, 12 major projects using contactless technologies (BarCode, RFID, NFC) were selected in the framework of “IPER SMSC Projects” [4] and will be carried out in France.

In general, contactless applications rely on the use of two different technologies (NFC and 2D BarCode) available on various media types:

- NFC Cards - Use of an NFC card (NFC Ticketing, Access Control...) that is presented to an NFC reader.
- NFC Mobile Phones - Use of a mobile phone that can be both an NFC reader and an NFC card. Today, manufacturers and mobile operators offer for this type of mobile phones is still quite limited. However, recent announcements by phone manufacturers and mobile operators suggest a fast evolution of this context in the years to come.

The mobile phone market is also evaluating. More and more people buy and use smartphones (+24% of smartphones sold worldwide in 2010 compared to 2009). With them, the use of new mobile services and applications (APPS) is exploding. According to forecasts, 2011 will see a large deployment of contactless technology on smartphones in France: sale of NFC smartphones (Samsung Galaxy S and Google Phone in March 2011), field experiments like the one in Nice in 2010, operator packages regrouping mobile access and NFC contactless services (more than 500,000 NFC terminals should be distributed in Orange stores in 2011)[5].
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Today, deployed NFC-based or 2D BarCode-based contactless applications are mostly:
- For controlling access to buildings through people authentication. For instance, employees must use an NFC card to access to their office.
- For transportation ticketing purposes, using NFC cards or smartphones (many NFC cards in Europe: Navigo card in Paris, Oyster card in London, Touch and Travel with mobile phone in Germany...). The customer uses contactless card or his smartphone to travel in metros, trains, buses, trams, bikes...
- To access to tourist information in a city or in a museum. A simple gesture allows to access to the history of a monument or a sculpture by reading the text on his smartphone or listening to a descriptive text in speech synthesis from his mobile. For example, access to contents of an exhibition visit et Centre George Pompidou or at Musée des Arts et Métiers in Paris.
- For payment of purchases using an electronic wallet function (contactless credit card in partnership with PayPass MasterCard for example).
- To get loyalty points using a contactless card or a mobile phone (M-couponing).
- In advertising, the customer can get information about a product, promotions, access to the nearest store...
- For maintenance or security applications. By using the 2D BarCode on a particular device or system, the user gets its maintenance manual or safety instructions.

In fact, use of contactless technologies offers a very large scope of possibilities. SNCF wanted to deepen the potential contribution of contactless technologies in travel context to determine if the deployment of contactless applications was justified and if it was a real added value either for customers either for SNCF Company itself. Gains in customer satisfaction or in productivity for the company can be foreseen thanks to them. The study aimed first at proposing some innovative applications, and then selecting the most appropriate ones in order to develop and experiment them.

The following section presents the two selected applications and their implementation, which took place between March and December 2010 at SNCF’s Innovation & Research Department.

SNCF’s project: the contactless gesture, when and for what?

SNCF’s project started with a study of contactless gesture use cases. To determine these use cases, customers’ path in the station and their use of existent SNCF services were studied in order to determine their current practices for different types of customers (needs and expectations are of course different according to the different types of passengers). Interviews with questionnaires were conducted in order to assess needs by customer profile which allowed the project to determine the nature of their needs, when and where? This study allowed also to determine what services can be improved using contactless technologies before travelling by train (from railway station entrance to departure) and at the end of travel by train (from take off the train to the railway station exit).

Note that some customers do not come to the station to take the train immediately but just to buy or book ticket or get information, so they need services tailored to these needs, such as avoiding waiting too long in a line to book and buy tickets or finding quickly the information they are looking for.

For these different types of customers in the stations, the study searched to answer to the question what are their current practices and what are their expectations?

Concerning customers who come to the railway station to take the train immediately, two major customer groups exist: the regular customers and the occasional customers. Regular customers usually know well enough their railway stations. The expectation of this kind of customer is to know the earlier the better if their train departure has been delayed and its departure platform, and in the case a specific seat has been booked, to know the position of their coach in the departure platform.

Occasional customers who come to the railway station to take the train arrive in general to the station with more time before train departure, and will be more concerned about the station. Which is the path to the departure platform of the train? how much waiting time they have? what can they do during this waiting time in the station? (what are the services and stores available in the station?).
Concerning customers who come to the station for another reasons (buy or book tickets, get information about a trip), again we have regular customers and occasional customers. Regular customers know where they can find the information they need. They just want to get quick and reliable information (information quality, optimization of latency). Occasional ones need first to know where they can get the desired information or service (a rack of brochures for tourist information or containing train schedules, booking or buying tickets...).

It should be noted also the existence of other customer profiles with specific uses and expectations, who can be classified by activity (business, leisure), socio-professional categories (manager, employee, worker, retired), age...

The study showed that existent information in the station (location of platforms, of an access, of a store, of a service, of the departure/arrival displays) is normally present at many places in the station, and under different forms, but it is sometimes inaccessible or difficult to understand by customers.

Contactless technologies could meet at least some of these expectations if their use is simple, fast and if the contactless tags are correctly positioned in the station. In the customer's usage study, some areas in the railway station were identified where a simple contactless gesture could address a large majority of customer expectations.

The use of contactless technology was identified as relevant:
- To improve access to information (faster and more simple access to information)
- To customize the information that is delivered to the customer (personalisation)
- To facilitate booking and ticket purchase
- To locate himself in the railway station and get contextual information (maps, itineraries to go to particular places of the railway station like waiting lounges, toilets...)
- In some cases, to replace the lack of human contact (SNCF staffs) in the railway station
- To facilitate access to virtual services

Here are some of the applications that could meet the expectations of different customer types:
- Simplifying access to transport information: getting information about my train (platform, real-time schedule, path to get to the platform...) from the accesses of the station (when arriving from the metro, getting off the taxi or the bus, from the parking area...)
- Last minute ticket purchase: "I want a ticket for that train in front of me"
- Tickets desks without waiting lines: the user gets a waiting number on his phone through a contactless gesture and follows number evolutions on its phone while doing other things in the station than just waiting in a line.
- Securing luggage with contactless tags
- Obtaining visual and/or audio translations of transport information and other accessibility services (for disabled people, blind people...). For example, identification of the coach on the platform for blind people.
- Getting information on a system for maintenance purposes
- Loyalty related services (winning points, giving access to a specific service...)

Among these different service propositions, SNCF decided to develop and test an application allowing to assess the two first services of the list:
- Simplifying access to transport information.
- Last minute ticket purchase.

**SNCF’s project: the developed application**

The application was developed for iPhone and Android platforms and it's named “Tag&Go”. Interactions, both to simplify access to transport information and to buy a last minute ticket, are based on the use of 2D Barcodes and/or NFC chips. The services were built using customer’s position, personal profiles and ticket details.
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Simplifying access to transport information

1) Help the customer to find the departure platform for his train using the electronic ticket existing in his smartphone.

Use case

![Figure 1: Departure platform information for the electronic ticket existing in the smartphone](image)

If the customer has already bought the ticket with his smartphone (1.1), the “Tag&Go” application can access to it and use it to consult schedule data-basis. The customer can then, thanks to a contactless gesture over a passive tag placed at station accesses (1.2), get the number of the departure platform of his train (1.3).

A map of the station with the path between the station access and the departure platform may also be proposed to help the customer to be guided until the platform of his train.

2) If there is no electronic ticket in the customer’s Smartphone, the application allow to the customer to consult the departures board and to buy an e-ticket immediately.

Use case
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Figure 2: Consultation of departures board and purchase of an e-ticket

When there's no ticket in the customer's smartphone, and thanks to a contactless gesture over a passive tag placed at station accesses (2.1), the application displays a mobile phone version of the departures board (2.2). The customer can then go to the departure platform of the train he wants to take and purchase, at the same time, a ticket to one of the destinations covered by the train. The payment will be done automatically in his account, at the end of the month. After the validation of the payment procedure, the application recovers the e-ticket corresponding to the ticket (2.3). For the ticket control onboard, the customer presents the 2D Barcode corresponding to the e-ticket that has been stored in the terminal (2.4).
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Last minute ticket purchase

Allows the customer to buy a last minute ticket for the train he wants to take, once in front of it, at the departure platform.

Use case

![Image](image1)

![Image](image2)

![Image](image3)

![Image](image4)

Figure 3: last minute ticket purchase once at the departure platform

From a customer’s gesture over a passive tag (NFC or 2D barcode) placed in the departure platform of the train (3.1), the Tag&Go application provides the opportunity to purchase a ticket to one of the destinations of the train in that platform. After the validation of the payment procedure (3.2), the application recovers the e-ticket corresponding to the requested trip (3.3). For the control onboard the
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train, the customer can present the 2D Barcode corresponding to his e-ticket to the train conductor (3.4).

Conclusions and perspectives

The SNCF project presented in this article has allowed a first demonstration of these features in the laboratory but also making the company aware of the very close arrival of contactless technologies into the smartphones of its passengers.

Taking into account that the arrival of new NFC smartphones is planned for early April 2011 in France, SNCF Voyages Department has decided to test the application developed in 2010. The application will first be adapted to these new smartphones, according to the platform and the NFC equipment. Then, the application will be evaluated ‘in vivo’ with different customer panels (selected customers, surveys...).

Beyond testing the developed application, the integration of these features with existing mobile applications, already known and used by its passengers, is being considered. SNCF is also considering the integration of new contactless features in the future.

The objective of SNCF in this area is to develop more intelligent and targeted customer services. These projects allow SNCF evaluating and assessing of features and services and better answering the questions what information? for who? at what moment? in which way?

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