Commercializing a Multi-Service Mobile NFC Offering

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Abstract

This thesis explores service innovation and commercialization processes in a context that necessitates the collaboration of a large number of actors from different industries. Near Field Communication (NFC) services promise to revolutionize everyday life as an NFC-enabled mobile phone replaces the user's keys, credit cards and public transportation travel cards as well as enables new mobile services. Delivering on this promise, however, requires collaboration between actors from the mobile telephony industry, the finance industry, the public transport industry, and the retail industry among others. Reconciling the interests of all these actors is full of complexities.

The main contribution of the thesis comes from describing the commercialization of a muti-service mobile NFC offering. The French Cityzi initiative, launched in Nice in May 2010, is the largest commercial rollout of mobile NFC services in Europe so far. This thesis describes the perspectives of several key actors involved in the Cityzi project: a mobile network operator (MNO), service providers in the key application areas of public transport ticketing and contactless payments, as well as two smaller service providers. Based on interviews and secondary data, the different actors' motivations for going into NFC, their strategic choices during the service development and commercialization process, and their NFC-related networking activities are described.

The study suggests that the launch of a commercial NFC platform leads to network expansion as piloted applications move to commercialization and new service providers join the initiative. MNO resources, brands and business models are identified as key elements of a commercial NFC platform. These elements serve to structure the commercialization network but the beginning of commercialization does not mean the end of tensions. Discussions on branding and business models seem to be intensified by the move to commercialization. The using setting of service commercialization is strongly influenced by forces external to the focal commercialization net.

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1. Introduction

Mobile services using Near Field Communication (NFC) technology promise to revolutionize everyday life. Advocates of NFC paint scenarios where an NFC-enabled mobile phone replaces the user's keys, credit cards and public transportation travel cards as well as enables new mobile services. The NFC Forum, a non-profit industry association that advances the use of NFC technology, provides a typical description of what a day in the life of an NFC mobile phone user could be – in the near future, the association suggested in 2008.

> In the morning, Eric, the fictional NFC mobile phone user, takes a train to work. At the train station, he uses his NFC mobile phone to enter the gate and to obtain the latest updated train information and local information. On his way to work, Eric sees a poster announcing a free concert the same evening. He touches his phone to the NFC mark on the poster to get more information. He then uses mobile communications to reserve seats to the concert for himself and his wife. The tickets are sent to his mobile phone. When Eric arrives at the office, he uses the NFC mobile phone to open the door. At lunchtime, he pays for his meal using one of the credit cards stored in his phone. In a meeting, Eric and the other participants exchange business cards by touching their NFC mobile phones together. In the evening, Eric meets his wife, and they go to the concert venue, where they get immediate access, thanks to the tickets stored in Eric's NFC mobile phone. After the concert, Eric and his wife go to a shopping center, where Eric uses his NFC mobile phone to receive shopping center loyalty points and customized offers, retrieve and redeem discount coupons, and pay. (Paraphrased from NFC Forum (2008)).

In the year 2012, the reality of mobile NFC services is still far from the scenario depicted above. Instead of interoperable commercial services, an NFC mobile phone user is more likely to encounter separate NFC service initiatives, most of which have yet to reach a commercial stage. Mobile NFC services are a prime example of technological and industry convergence, the coming together of previously unconnected technologies and industries. To fulfill the potential of NFC, companies from the mobile telephony industry,

the finance industry, the public transport industry, and the retail industry among others need to work together. The extent of collaboration required by commercializing mobile NFC services presents the companies in the mobile NFC ecosystem with unique challenges that need to be solved before NFC will deliver on its promise of end-user value.

The members of an NFC ecosystem often have very different objectives for going into NFC. Reconciling the interests of mobile network operators (MNOs), financial institutions, public transport operators, retailers, and other service providers and technical partners is bound to be complex. Business model and branding questions are potential areas for difficulties and tensions, as are questions relating to managing the relationship to end-users or sharing information among actors, to name but a few of the areas.

The purpose of this thesis is to explore service innovation and commercialization processes in a context that necessitates the collaboration of a large number of actors from different industries. Empirically, the purpose is to provide insights into a multi-service NFC ecosystem, a context largely neglected in previous NFC studies that have tended to focus on a single NFC service at a time, most often mobile payments. Involving more actors and more industries than a single-service NFC initiative, a multi-service NFC ecosystem allows for studying the full complexity of mobile NFC service introductions and serves as a rich example of industry convergence. Acknowledging the centrality of collaboration in mobile NFC service introductions, I will focus on the network of relationships between the involved actors, contributing to our understanding of the relatively little studied area of commercialization networks. I will examine the dynamics of building a commercialization network, highlighting critical events and key decisions in the service development and commercialization process.

The research question is: What are the networking implications of commercializing a multi-service mobile NFC offering?

The path from emerging technology to commercial services is long. My exploration of the service innovation and commercialization process has as a point of departure the actor network involved in the geographically limited initial launch of a commercial multi-service mobile NFC offering. Rather than study the network as it appears during

the different phases, I focus on the paths of the key actors involved in commercialization and their networking activities. The earlier phases in the service innovation and commercialization process are seen through the eyes of these actors, in as much as the earlier phases are part of their stories. The same goes for the further geographical expansion of the mobile NFC services.

The rest of the thesis is organized as follows: The next section discusses service innovation and commercialization in business networks and presents the analytical framework of the thesis. This is followed by a discussion on methodology. The empirical study, a case study of the largest commercial rollout of mobile NFC services in Europe, is introduced next. A case analysis and a discussion of the networking aspects of commercializing a multi-service mobile NFC offering follow. The final section discusses the theoretical conclusions, the potential contributions, and the managerial implications of the study.

2. Service innovation and commercialization in business networks

The central issue in mobile NFC services and the focus of this thesis are the interdependencies that define the innovation and commercialization processes in the field. The central proposition of the Markets-As-Networks approach is generalized connectedness, or interdependence, the notion that it is not possible to understand one relationship without placing it in the context of the other relationships with which it coexists. According to this view, all firms exist within a relational context, irrespective of whether the network is recognized and actively managed. (McLoughlin & Horan 2000, 2002).

The interdependencies within a network are complex. The components of a network are actors, resources and activities: an organization's network position refers to its portfolio of relationships and the activity links, resource ties, and actor bonds that arise from them (Syson & Perks 2004). This is referred to as the ARA model (McLoughlin & Horan 2000). Actors usually refer to the organizations in the network (McLoughlin & Horan 2000) but other levels of analysis are possible (for example Syson and Perks (2004), Rusanen and Jaakkola (2010) also consider the internal networks of the focal company). Organizations require resources – the physical and intangible, financial and human assets that actors have access to or are in control of (Syson & Perks 2004) – to perform their activities, i.e. the processes involved in the production of goods and services (McLoughlin & Horan 2000). Innovation-induced network evolution takes place on each of the three dimensions of the ARA model – actors, resources and activities. Innovation can mean new actors entering the network, actors changing their relationships, resources being recombined, and activities being performed in new ways. (Baraldi et al. 2011).

The following sections discuss service innovation and commercialization in business networks. First, I discuss typologies and continuums of emerging business networks, networks dedicated to developing and commercializing new technologies, products and business concepts. Applying this literature to the empirical context, the network involved in the launch of a multi-service mobile NFC offering is identified as a commercialization network. The second half of this section argues for the usefulness of critical events in the study of processes and discusses the changes that can be expected

when a network moves from trials to commercial launch. I conclude the discussion by summarizing the analytical framework used in the case analysis.

2.1. Emerging business networks

Networks appear in different areas of business activity. Möller and Rajala (2007) focus on intentionally created business networks that they call nets and suggest a typology based on the level of determination of each net's value creation logics. Defined as a set of specific activities carried out by the actors constituting the net, using the resource constellation controlled by the actors, the value system of a business net is well in line with the ARA model. Möller and Rajala present a value-system continuum with three generic value systems: The first group, current business nets, is characterized by stable, well-defined value systems. Likewise, business renewal nets are relatively well determined – while being modified through incremental and local innovation activities aiming for improvements in current value systems. Finally, emerging business nets form the domain of radical, discontinuous, and system-wide change involving great uncertainty. The different network types serve different purposes, vary in actor composition, and present distinct management challenges.

Developing and commercializing new technologies, products or business concepts takes place in emerging business nets. Möller and Rajala (2007) identify three sub-categories of emerging business nets, each dealing with a different phase in network emergence. Innovation networks are relatively loose science and technology-based networks. They are not primarily business networks but are geared towards scientific discovery. Dominant design nets, created by proactive companies in the pre-market phase of business field evolution, aim to mobilize a net of actors with the purpose of establishing a dominant technological design. These nets might overlap with application nets, which in turn are formed in an attempt to achieve commercially viable business applications out of the evolving technology. It is argued that successful applications move on to the value creation logic of current business nets in the other end of the value-system continuum.

Möller and Svahn (2009) carry on the discussion on emerging business networks and suggest a framework for the emergence phases of new business fields during periods of radical technological change. They propose three overlapping phases: 1) exploration for

future business, 2) mobilization for applications, and 3) coordination for dissemination. In the first phase, competing actors collaborate to explore the application potential of the emerging technology. In the second phase, the actors compete and collaborate in constructing dominant designs and product applications. The final phase involves actors competing and collaborating in scaling up production and distribution networks to create markets. Similar to the above, Palo's (2011) framework of networked business model development has three phases: 1) the R&D phase, 2) the implementation phase, and 3) the market phase. The three phases take place in different strategic nets. In the R&D phase, the technology and its application are developed in an innovation net dominated by science and technology-based research organizations. In the implementation phase, an application net, consisting of technology producers and pilot customers, introduces and tests services in the form of pilots. In the market phase, commercial exploitation of the service takes place in an emerging business net that includes the actors producing and delivering the service.

According to Möller and Svahn (2009), a network is likely to expand as it moves from idea to innovation and from innovation to viable business. Aarikka-Stenroos and Sandberg (2011) observe network expansion as product innovations move from R&D to commercialization. The R&D network, aiming to combine technology and knowledge resources to create a new product, consists of the innovator firm and providers of technical and knowledge resources. The commercialization network, aiming to commercialize the product or create markets for innovations, expands with awareness builders, credibility builders, users (educators, benefit illustrators, and demonstrators), distributors, and providers of complementary offerings.

Most authors agree that the different phases of innovation, and the related networks or nets, are partly overlapping rather than strictly linear. Baraldi et al. (2011) emphasize the overlapping nature of the networks by referring to interrelated contexts or settings instead of phases. They suggest three contexts, each governed by its own logic, particular actors, and specific goals. The developing setting includes actors performing R&D activities with the goal of creating new solutions through new and often untried knowledge and resources combinations. The producing setting involves actors dealing with routine activities and the using setting a technology's direct and indirect users. It is worth noting the resemblance of the producing setting to the value logics of current

business nets, as defined by Möller and Rajala (2007) above. The producing setting can be seen as a stabilizing force, acting against innovation, as the actors in this setting tend to be wary of changes that could jeopardize the value of their considerable investments in achieving efficiency in daily operations. Likewise, the using setting points to the importance of overcoming several barriers to adoption among direct and indirect users. (Baraldi et al. 2011).

Nyström (2009) applies the three phases of network emergence suggested by Möller and Svahn (2003, 2009) – exploration for future business, mobilization for applications, and coordination for dissemination – to the context of technological convergence, defined as "a process in which technologies are merged together with the implication of forcing actors to re-evaluate their roles and position on a market and in relation to partners and competitors" (Nyström 2009, 245). Nyström sees networks and nets as a strategy for managing this convergence process. The empirical case, mobile TV, is similar to the NFC context in that both cases show how convergence on a technological level enables features from separate industries to merge into one device, the mobile phone. In the mobile TV case, the company that had driven the technological convergence process went on to activate a number of actors from different industry areas, forming cooperation around creating a new market area for mobile TV services, in other words forming a strategic business net. Nyström (2009) points out that while the goal of creating a market for mobile TV services is shared in the emerging business net, the actors' reasons for participating vary, ranging from seeking return on investment in infrastructure to seeking new business opportunities through moving closer to the end-customers to seeking larger sales volumes for mobile handsets. These different objectives have an impact on the roles and positions the different actors seek. While not discussed in detail, business models and ownership of the end-user are mentioned as key issues.

Service innovation and commercialization can be seen as a process of network transformation. The process has different phases, each with unique requirements when it comes to actors, resources and activities. Taking the above ideas to the empirical context of this research, it becomes clear that the actor network involved in the launch of a multi-service mobile NFC offering can be defined as a commercialization network, as it has the purpose of commercializing a technology and creating markets for innovations

(Aarikka-Stenroos & Sandberg 2011). Going from limited trials to first commercial launches, NFC technology is moving from mobilization for applications to coordination for dissemination (Möller & Svahn 2009) or from implementation phase to market phase (Palo 2011). After constant change during R&D and pilots, the commercialization phase means a new phase of stability, as the solution becomes embedded in the producing and using contexts (Palo 2011, Baraldi et al. 2011).

2.2. Critical events in service commercialization processes

Chou and Zolkiewski (2012) argue that using events is beneficial for studying network dynamics, changes in networks. Hedaa and Törnroos (2008, 324) define events in a network as temporally specific outcomes of performed acts by the actors. Critical or significant events are described as those interaction episodes that bring about changes in actors' interfirm relationships, in the combination of resources and connection of activities across firm boundaries. The actor, resource and activity dimensions are connected, meaning that change in one dimension brings about change in other dimensions. (Chou & Zolkiewski 2012). Event networks describe how events connect to past and future events, forming streams of interconnected events or event trajectories. Actors create events and react by noticing other events. Their reactions are influenced by how they imagine future consequences of the present events. (Hedaa & Törnroos 2008).

The antecedents and consequences of events have relevance to process research (Elo et al. 2010, Hedaa & Törnroos 2008). When it comes to the antecedents of events, Elo et al. (2010) see events as manifestations of change forces on different organizational or network levels, including business units, companies, dyads, nets, networks, and the broader environment. Empirical studies often consider several of the levels. For example, researching the process of technological convergence, Nyström (2009) identifies critical events in three levels: the technology, the network, and the institutional environment. Elo and Törnroos (2005) study internationalization processes and identify critical events on the product level, the activity level, the relationship level, the firm level, and the business network level. Change in networks may originate either from inside the analyzed unit (endogenous stimuli) or can be caused by actors and the environment external to the focal unit (exogenous stimuli) (Elo

et al. 2010, Hedaa & Törnroos 2008). Events in principle have two sources: human acts and nature (Hedaa & Törnroos 2008).

The consequences of events, changes that arise from critical events, can have an "enabling" or "inhibiting" character. Enabling changes assist or stimulate a process or activity, whereas inhibiting changes hinder or create difficulties for a certain process or activity. (Chou & Zolkiewski 2012). Elo et al. (2010) review other ways of categorizing change. According to them, events can trigger structural change, having a stabilizing or destabilizing effect to existing structures. Change can be characterized as incremental, i.e. adjustments within the ongoing structure, or radical, implying a break from the ongoing structure. Change can be confined to a dyad or be connected, influencing the other dyads in the network.

The distinction between enabling and inhibiting events is considered in Nyström's (2009) previously mentionned study of mobile TV services. In addition, the study categorizes critical events based on their level of impact (technological level, business net level, and institutional level) and their origin as internal or external to the network. The study finds enabling events on the technological level and inhibiting on the institutional level. These are both external events. Internal events identified in the study show the dynamics of the business net, shifts in the roles of focal actors, based on their strategic moves.

As established above, critical events can essentially be seen as episodes bringing about change in networks. The commencement of commercialization activities can be seen as a critical event in the service development and commercialization process. Writing about product innovation, Aarikka-Stenroos and Sandberg (2009, 2011) suggest that the commencement of commercialization activities leads to changes in resource requirements and thus changes in network relations. The point of view is that of a focal innovator firm that relies on the resources of diverse network actors in the development and commercialization process. Resources for trust creation, credibility establishment, awareness building, customer education, trial opportunities, distribution, and complementary offerings are needed in a commercialization net. I would like to extend the argument to service commercialization and suggest that while commercialization of services is likely to be characterized by changed resource requirements, further

research in a service context is needed to define the resulting changes in network relationships. Aarikka-Stenroos and Sandber (2011) conclude that research on product innovation networks has focused on the R&D phase, with lesser attention paid to commercialization networks. Within research on service innovation networks, studies on commercialization networks are even scarcer.

Aarikka-Stenroos and Sandberg (2009, 2011) emphasize the manageability of networks, describing them from the point of view of a focal innovator firm and its need for external resources. This is one level on which critical events in service commercialization can be observed. Heikkinen et al. (2007) point to the diffused nature of network evolution in their study of mobile service development. They consider five phases (initiation of the new service idea, planning of the new service, development of the new service, piloting the service, and commercialization stage of the new service) and show how the network evolves as the project moves through the different phases. The study identifies 12 roles for managing in networks, i.e. acting that influences resources and activities of the other actors in the net. The roles for influencing a service development net range from the webber role, initiating net connections by deciding which potential actors are contacted to service development, to the entrant role, joining the net (or interfering with the ongoing development process) based on existing resources and connections with the larger network surrounding the focal net. In other words, different actors are capable of causing changes in the network.

Heikkinen et al. (2007) argue that actors change the way they act depending on, for example, their ambitions, connections, and resources in each phase of the service development and commercialization process. The actors join and leave the network, as well as change their roles, influencing the net and the development process in different ways. In the commercialization phase, the authors see the new mobile service development net breaking into many separate nets as the actors continue to pursue their own commercialization goals. Breaking into separate nets is a possible development in the commercialization phase, demonstrating that the move to commercialization does not only mean network expansion or controlled change. Baraldi et al. (2011) argue that conflicts among actors tend to increase as technology embedding approaches the producing and using settings. Diverging individual goals, uncertain resource trade-offs, lack of trust and the fear that cooperation will turn into competition,

differences in strategic relevance, and disagreement about organizing systems are some of the reasons for challenges in mobilizing and organizing resources for commercialization (Aarikka-Stenroos & Sandberg 2011, 204). These can be seen in the background of critical events of inhibiting or destabilizing nature.

Innovating business models is a key challenge for emerging technology-based services (Palo 2011), such as mobile NFC services. This means critical events are likely to be found on the business model level. The development, production, and commercialization of novel technology-based services require a diversity of activities and resources from various actors, to whom the business models need to be attractive (Palo 2011). Palo (2011) sees the shift from trials to commercialization as the key challenge for business model development. Functioning business models are typically seen as a feature of the market phase, but the base for this is created earlier in the process. Palo (2011) claims that the right actors and roles need to be identified and determined already in the R&D phase. Also, Palo (2011) emphasizes the role of the service infrastructure and the infrastructure operator. The infrastructure operator is the focal actor in the network, acting as an interface for the service providers. In some cases, a distinction can be made between the business model for the service infrastructure and the business model for the services. It is argued that the infrastructure influences the business model of the services. (Palo 2011).

The move from trials to commercialization is suggested as a critical moment in services commercialization. Critical events bring about changes in actors' interfirm relationships and the combination of resources and connection of activities across firm boundaries (Chou & Zoliewski 2012), by way of actors reacting to different stimuli and previous events (Hedaa & Törnroos 2008). The move to commercialization can be observed on different levels, including dyadic relationships, the focal net, and the producing and using settings.

2.3. Summary of the analytical framework
Before discussing the choice of method in the next section, I will connect the above-discussed ideas to my empirical context, the commercialization process of a multi-service mobile NFC offering. It should be noted already here that the research prosess has involved moving back and forth between theory and empirical data, meaning that while supported by earlier research, the levels of analysis suggested next are even grounded in analysis of the empirical case.

Figure 1 summarizes the analytical framework, highlighting the different levels of analysis and the relevant questions at each level.

As demonstrated in the introduction, the basic assumption of this study is that the successful development and commercialization of mobile NFC services depends on a network of actors, resources and activities. Literature on service innovation and commercialization networks suggests that the different phases in the process imply different networks. The commencement of commercialization activities is proposed as a critical event leading to changes in the network.

As stated earlier, my research takes as a point of departure the key actors involved in commercialization. Above, it was suggested that the goal of creating a market for an emerging service is shared in a commercialization network but the reasons for participation vary among actors. A variety of different actors influence the network as each of them works towards the realization of their own strategic goals. Some join the network in the commercialization phase, some already earlier. Therefore, describing the key actors' strategic paths and focal nets is proposed as the first level of analysis in

Figure 1.

As said, the commencement of commercialization activities represents a moment of truth in the service development and commercialization process. As pointed out by Palo (2011), commercialization implies several strategic decisions from the part of the infrastructure operator, including decisions related to branding, technology, revenue formula etc. The infrastructure operator's actions in the commercialization phase are propsed as the second level of analysis.

The third level of analysis deals with the usage setting, consisting of the indirect and direct users of the services. This level is expected to highlight external challenges and the role of user resistance. After all, the success of an innovation is determined by its adoption in the using setting.

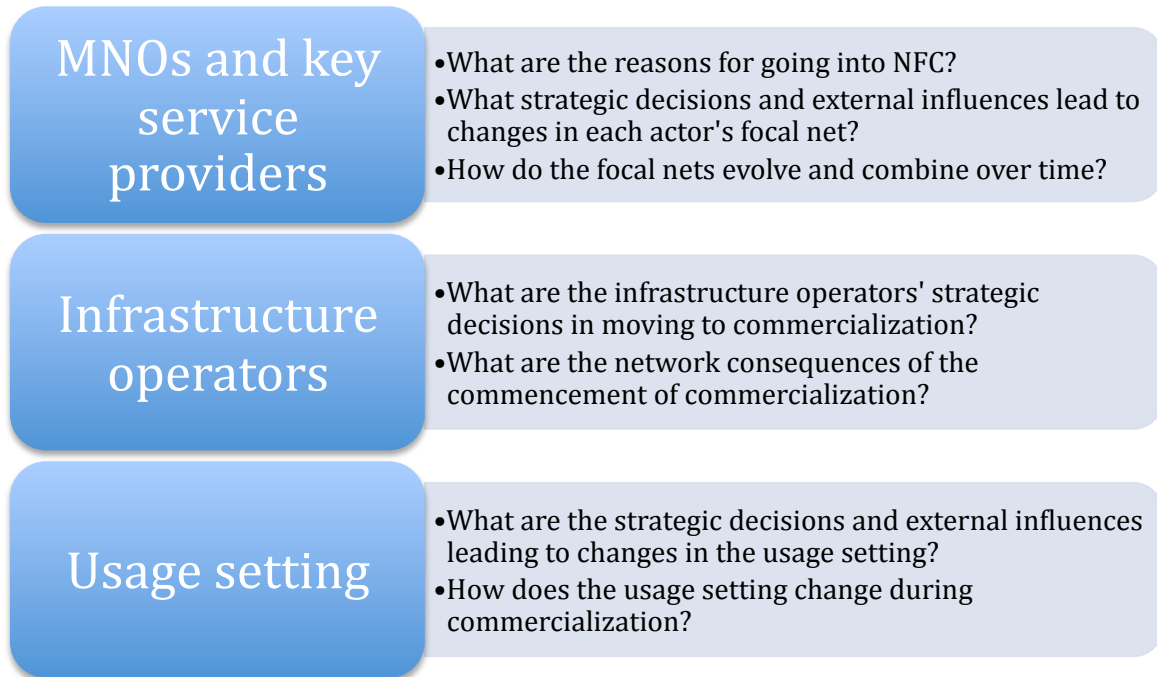| MNOs and key service providers	•What are the reasons for going into NFC? •What strategic decisions and external influences lead to changes in each actor's focal net? •How do the focal nets evolve and combine over time?
Infrastructure operators	•What are the infrastructure operators' strategic decisions in moving to commercialization? •What are the network consequences of the commencement of commercialization?
Usage setting	•What are the strategic decisions and external influences leading to changes in the usage setting? •How does the usage setting change during commercialization?

Figure 1. Levels of analysis in the analytical framework

3. Methodology

This thesis was written as part of a research project within the Center for Information and Communication Research at Stockholm School of Economics. The overall objective of the project has been to explore business models in mobile NFC services. In order to ensure the practical relevance of the results, the author of this thesis, together with the other research assistant working in the project at the time, conducted pre-study interviews with five Nordic experts in the fields of NFC and mobile telephony. The interaction of different mobile NFC services was identified as a research gap through a review of previous research efforts. The pre-study interviews confirmed practitioner interest for going beyond single-service initiatives and gaining insights into multi-service mobile NFC ecosystems. The pre-study interviews even highlighted the need to understand mobile NFC services from multiple actors' perspectives.

Given the explorative nature of the research objectives, a qualitative case study approach was chosen. In keeping with the need to explore the points of view of different actors, a rich, multi-perspective understanding of a single case was prioritized over a multiple-case study design. A focus on a single case allowed for complementing interview data with considerable amounts of secondary data, thus achieving a deeper understanding of the studied processes.

Following an overview of past and on-going mobile NFC pilots and launches, the French Cityzi initiative was identified as the most fruitful research context. As the largest commercial rollout of mobile NFC services so far in Europe, Cityzi brought together more services and more actors than most other initiatives. In addition to scale and complexity, accessibility was a factor favoring Cityzi. The involvement of the government and several industry organizations meant that many reports and presentations had been made available online, meaning good availability of secondary data – not something to be taken for granted with many other NFC initiatives. Furthermore, the author's skills in the French language and knowledge of the French culture were anticipated to be of great use in securing interviews and accessing secondary data.

Nine phone interviews with seven different interviewees were conducted between November 2011 and January 2012. Given the objective to understand the points of view of different actors, interviewees were sought from organizations representing the key actor groups in the Cityzi ecosystem. A snowball sampling approach was followed, meaning that interviewees were asked to suggest others to interview. The interviews were taped and transcribed.

Table 1 lists the interviewees. With the purpose of getting an overall picture of the Cityzi initiative and the participating actors, initial interviews were conducted with the president of Forum SMSC, a non-profit organization created by the French government to coordinate discussions around the deployment of mobile NFC services. This was followed by interviews with an MNO (this interviewee had a double role, even acting as President of the AFSCM, the association coordinating the Cityzi initiative) and service providers in the key application areas of mobile payments and public transport ticketing. Two actors were chosen to represent smaller service providers. After some of the interviewees communicated tensions between Visa Europe and some of the other actors, an interview with a representative of the organization was scheduled.

	Organization	Position	Duration of interview(s)
Interviewee 1	Forum SMSC	President	60 minutes + 50 minutes
Interviewee 2	Crédit Mutuel-CIC	Manager for payment systems	70 minutes
Interviewee 3	Nice Côte D'Azur	Project manager for Cityzi	50 minutes
Interviewee 4	HighCo	Director of R&D	60 minutes
Interviewee 5	Bouygues Telecom/AFSCM	Director of contactless services/President	40 minutes + 30 minutes

| Interviewee 6 | Veolia Transdev | BPass project manager | 50 minutes |
| Interviewee 7 | Visa Europe | Responsible for the development of mobile activities in France | 50 minutes |

Table 1. Data collection through interviews

The interviews can be described as semi-structured. The purpose of each interview was to understand the interviewed actor's perspective around the Nice initiative. The interviews included both more open questions asking for descriptions of the process and more detailed questions inquiring about specific aspects, such as the choice of secure element. Reviewing earlier research on mobile NFC and conducting pre-study interviews had served to familiarize the interviewers – the author of this thesis and the other research assistant working in the project at the time – with the common issues in mobile NFC. Before each interview, the interviewers acquired a basic understanding of the NFC activities of the organization in question. This meant that the interviewers were able to have a discussion with the interviewees. To make sure that all the relevant aspects were covered, a general interview guide was created in the beginning of the data collection phase and customized before each interview to reflect our preconception of the actor's network position, for example the banks were asked questions about their relationships with retailers and credit card companies. Also, the presence of two interviewers served to assure that all aspects we covered.

The general interview guide included questions dealing with the following areas:

- The used business model
- The actor's role in NFC and in the Cityzi initiative
- The actor's relationship to MNOs and TSM actors as well as other partnerships
- The actor's mobile NFC offering and benefits to consumers
- Marketing of the actor's mobile NFC services
- The actor's ideas on the choice of secure element
- The actor's involvement in pilots and trials before the Cityzi initiative
- The actor's plans for future
- The challenges encountered during the Cityzi project

As for secondary data, reports, conference presentations, brochures, online information, user guides, press releases, and other documents were used to complement the

interview data. The documents were acquired online or received from the interviewees. Both English and French documents were used.

For the purposes of case analysis, six actor stories were created based on interviews and other material. No story was created for Forum SMSC because the interest organization was not an active actor in the project but rather an observer. The information from this interview was used as a background for analyzing other data and also for mapping the ecosystem (initial picture, finding interviewees).

The stories seek to represent the point of view of each actor. The main narrative for each story comes from the interviews. Secondary data was used to add details and fill in gaps. All the quotes in the stories come from interviews. As much information as possible was included in these stories. The stories describe each actors path, starting with their motivations for going into NFC and going on to describe their involvement in mobile NFC before the launch of Cityzi, their role during Cityzi, and their plans for further expansion. Condensed versions of these stories are included in this thesis and form the main body of the case description in the next section.

As mentioned before, data analysis and literature review were conducted as an iterative process where the results of each guided the other. The levels of analysis included in the analytical framework are a result of both existing research on services commercialization networks and analysis of the empirical case.

Informed by the Markets-as-Networks approach and research on service development and commercialization networks, the six actor stories were analyzed for critical events leading to change in the networks. The purpose was to find the episodes that – from the point of view of each actor – lead to changes in their focal networks. Following this, the stories were analyzed together. Common themes in the stories were the indentified in an attempt to describe the development in the level of the network and to identify tensions and interdependencies.

4. Case description

The French Cityzi initiative that launched in Nice in May 2010 is the largest commercial rollout of mobile NFC services in Europe so far. Near Field Communication (NFC) is "a short-range wireless connectivity technology - - that provides intuitive, simple, and safe communication between electronic devices" (NFC Forum 2007, 1). An NFC-enabled mobile handset can connect with other NFC devices in close proximity (NFC Forum 2008), enabling a wide variety of services, as outlined in the introduction to this thesis. In Nice, residents can use an NFC-enabled Cityzi phone to access a variety of services, including card payments, tickets for public transportation, discount coupons, loyalty programs, and different kinds of information services. Table 2 introduces the different mobile NFC services available in Nice.

Application area	Services	Functionality
Payments	Crédit Mutuel CIC: m-carte Crédit Mutuel, m-carte CIC BNP Paribas: KIX	Paying by tapping the payment terminal with your mobile phone (password required for purchases over €20). The mobile applications even allow for consulting payments history, personalizing the service, and accessing online banking services (only m-carte).
Public transportation ticketing	Veolia Transdev: Lignes D'Azur BPass	Purchasing all types of tickets (billed on the mobile phone bill (<€10) or credit card payment using the integrated payment service PayByPhone (>€10). Validating the ticket in busses and trams. Renting city bikes.

Application area	Services	Functionality
		Consulting your account: tickets, remaining balance, validity, purchase history. Accessing real-time schedule and travel information, local information (news, neighborhood map, events) through the 1400 NFC tags on the city's bus and tram stops.
Information services	NFC tag-based tour of the old city of Nice NFC tag-based interactive guide to the Museum of Modern and Contemporary Art (MAMAC)	Old city of Nice: information on 16 monuments (including photos, videos, and audio guides). MAMAC: information on 20 works of art (e.g. the artist and the artistic movement).
Discount coupons	HighCo: Franprix "couponing wallet"	Accessing discount coupons (inside the application or through NFC tags in interactive promotions posters in-store or out-store) Using discount coupons by tapping the payment terminal before paying.
Loyalty cards	AIRTAG: FidBook (a loyalty card wallet giving access to the gaming store GAME and the fast food restaurant La Croissanterie) Adelya: Loyalty Avenue (an NFC loyalty and deal wallet giving access to several loyalty programs, including the multi-store loyalty card	Obtaining benefits, coupons, and discounts by using the mobile phone as a loyalty card. Keeping track of loyalty points. Learning about new loyalty programs.

Application area	Services	Functionality
	proposed by the Office of Trade and Handicrafts in Nice)	

Table 2. Cityzi services in Nice

Having purchased a Cityzi-compatible NFC mobile handset, consumers have access to a Cityzi "application store" where they can choose and install applications. Setting up some of the services requires registering a user profile or receiving a password from the service provider. The different services are compatible in that they work on the same device but separate in the sense that using a discount coupon and paying, for example, are two separate activities.

4.1. Introducing the Cityzi commercialization network

In addition to a mobile handset with NFC capability, many of the potential NFC applications require a secure element to store keys and applications (GlobalPlatform 2010). The principal secure element alternatives are the SIM card, the embedded secure element, and the micro SD card (Forum SMSC 2011). Cityzi uses the SIM card as the secure element. The key players in a SIM-based mobile NFC ecosystem are the service providers, the Mobile Network Operators (MNOs), and the users. The service providers are public and private organizations that transfer existing services to the NFC mobile phone or use NFC to introduce new services. They include for example banks, retailers, public transport operators, and city services providers. The MNOs issue the secure element, the SIM card, and make it available for the service providers' applications. The users are customers of the MNOs and users of the service providers' services. (Forum SMSC 2011).

An organization called Association Française du Sans Contact Mobile (AFSCM), French association for mobile NFC, is behind the Cityzi launch in Nice and owns the Cityzi label. The AFSCM is an organization founded, financed and controlled by the mobile network operators Bouygues Telecom, Orange, SFR and NRJ Mobile. The association's members include also the key service providers: the public transport operator Veolia Transdev, the banks Crédit Mutuel CIC and BNP Paribas, the loyalty operators Adelya and Airtag, and the discount coupon agent HighCo. While not members of the AFSCM, Nice Côte

D'Azur, Lignes D'Azur, Visa, MasterCard, Franprix, and others have roles in providing Cityzi-compatible mobile NFC services to consumers.

In addition to the MNOs, the service providers, and the users, a fully implemented commercial NFC infrastructure even depends on international standards bodies, central and local government organizations, trade bodies, merchants, handset manufacturers, Trusted Service Managers (TSMs), NFC solutions providers, and NFC component suppliers (Clark 2010). In the following, I will make notes on a few of the actors occupying these roles in the Cityzi commercialization network. The other organizations identified during the study are included in Table 3. The table should not be seen as a conclusive list of network members but as a guide for the reader.

Trusted Service Managers (TSMs) are organizations that sit between service providers and MNOs and enable the two types of organizations to work together more easily. Rather than each service provider being directly connected to each of the MNOs, and vice versa, the two types of actors connect via TSM actors. (Clark 2010). The organization of TSM services is a frequently discussed topic among NFC professionals and organizations. In the centralized infrastructure, one TSM actor serves all the MNOs and all the service providers. Cityzi is built around a decentralized TSM approach. A decentralized approach allows each MNO to offer business-to-business NFC services via their own Trusted Service Management platform while service providers can connect to each operator's TSM platform using their own secure platforms. (Clark 2010). Gemalto and Oberthur Technologies are the key TSM players in the Cityzi network, offering their services to both MNOs and service providers.

Table 3 mentions only a few of the merchants that are part of the Cityzi network. Franprix, GAME, La Croissanterie, and the 200 retailers belonging to the multi-store loyalty program La Carte Magique accept NFC discount coupons or NFC loyalty cards. As for payments, over 1800 businesses in Nice were equipped with point-of-sale terminals accepting NFC payments.

The French government hopes to stimulate the creation of mobile NFC services. Forum SMSC, the forum for contactless mobile services, was founded in 2008 by the initiative of the Ministry of Industry. The role of the Forum SMSC has been to encourage discussions and collaboration, whereas the AFSCM has taken care of the practical work. In addition,

the Forum SMSC took part in evaluating the project proposals submitted in response to a call for projects by the French government. Through this call for projects, the government provided financing for NFC initiatives. Government financing covered only a very small portion of the total investments in NFC.

Actor	Explanation
AFSCM	French association for mobile NFC, owns the cityzi label. Members include MNOs, service providers and technology providers.
Bouygues Telecom	MNO, member of the AFSCM.
Orange	MNO, member of the AFSCM
SFR	MNO, member of the AFSCM
NRJ Mobile	MVNO, owned by Crédit Mutuel CIC, member of the AFSCM.
Veolia Transdev	Public transport operator in Nice, member of the AFSCM.
Lignes D'Azur	Public transport network in the Nice areas. Operation is outsources to Veolia Transdev.
Crédit Mutuel CIC	Banking group, owner of NRJ Mobile, member of the AFSCM.
BNP Paribas	Banking group, member of the AFSCM.

Actor	Explanation
Visa Europe	Payments business. Organized as a membership association owned, controlled, and operated by its over 4,000 members (banks and other payment service providers) from 36 countries across Europe.
MasterCard	Financial services company.
Adelya	Loyalty operator, member of the AFSCM.
Office of Trade and Handicrafts in Nice (Office du commerce et de l'artisanat de Nice)	Independent retailer trade body. The organization's multi-store loyalty card La Carte Magique is available as a mobile service in Adelya's Loyalty Avenue platform.
Airtag	Loyalty operator, member of the AFSCM.
GAME	Gaming store. Loyalty card available as a mobile service in Airtag's FidBook platform.
La Croissanterie	Fast food restaurant. Loyalty card available as a mobile service in Airtag's FidBook platform.
HighCo	Discount coupon agency, member of the AFSCM.
Franprix	Retailer, partnered with HighCo to test an NFC couponing service.
City of Nice	Local area government.
Nice Côte D'Azur	Local area government.

Actor	Explanation
Gemalto	TSM, member of the AFSCM.
Oberthur Technologies	TSM, member of the AFSCM.
AEPM, Association Européenne Payez Mobile	French association for mobile NFC payments.
Crédit Agricole	Banking group. Part of the AEPM trials, did not move into commercialization.
LCL	Banking group. Part of the AEPM trials, did not move into commercialization.
Caisses D'Epargne	Banking group. Part of the AEPM trials, did not move into commercialization.
La Banque Postal	Banking group. Part of the AEPM trials, did not move into commercialization.
Société Générale	Banking group. Part of the AEPM trials, did not initially move to commercialization but has recently joined the AFSCM and launched their NFC mobile payment application.
LaSer	Provider of financial and marketing services, member of the AFSCM.
Snapp'	Specialist of mobile commerce and digital loyalty programs, member of the AFSCM.
Atos Worldline	Provider of critical electronic transaction services, member of the AFSCM.
Connecthings	Implementer of mobile NFC services, member of the AFSCM.

Actor	Explanation
Safran Morpho	Security solutions provider, member of the AFSCM.
Samsung	Mobile handset manufacturer.
Ministry of Industry	National government
Forum SMSC.	Forum for contactless mobile services. A not-for-profit organization with 34 principal members (mobile operators, banks, distributors, medias, public transportation operators, and technology companies) and numerous partners (associations, unions, clusters, regulators etc.), created in 2008 by the initiative of the French Ministry of Industry.
GlobalPlatform	A cross-industry, not-for-profit association which identifies, develops and publishes specifications in the field of NFC and secure elements.
The NFC Forum	Non-profit industry association that advances the use of NFC technology.

Table 3. Who is who?

I will now move on to actor stories. First, Bouygues Telecom's path is described from initial research to the commercial launch of Cityzi. Given that the AFSCM is founded, financed and controlled by the MNOs and chaired by a representative of Bouygues telecom, the formation and functioning of the association is part of the MNO's story. Nice Côte D'Azur puts into focus the aspects of local coordination. The key application area of public transport services is represented by Veolia Transdev. Crédit Mutuel CIC and Visa Europe offer two perspectives on mobile payments. Finally, services outside public transport and payments are considered through HighCo and the company's NFC couponing initiative.

4.2. Bouygues Telecom

The story of Cityzi begins in Japan in 2005 with research done by the third biggest French mobile network operator, Bouygues Telecom. In Japan, a "mobile wallet" service was already used for payments, train and flight tickets, membership cards, and house keys. While the Japanese solution with proprietary technology and a licensing business model was deemed unusable in Europe, Bouygues Telecom was convinced "*that using the handset to do something else than to communicate was probably the future*". In France, Bouygues Telecom observed interest for NFC in the areas of public transportation (NFC cards were already in use in 35 cities) and payments (some French banks were interested in using NFC for small amount transactions).

It was clear to Bouygues Telecom that, being only the third biggest operator, they could not start such an extensive initiative alone. Additionally, they recognized that the banks and public transport operators would not care what MNO their customers are using, they would want a solution for all MNOs and all handsets. As a result, Bouygues Telecom gave all the information they had gathered through the studies to Orange, the leading French MNO, to convince them of the importance of undertaking this NFC initiative, but more importantly to stress the fact that to succeed they must work together: "*If we wanted to create a new market, we needed to do that together.*" In addition, the president of Bouygues Telecom – having worked for banks and Visa in the past – used his connections in the banking industry to convince them that "*it was more clever to work together than to have insecurities about some threat that some MNO could represent to them or that banks could represent to us*". Even public transport operators, handset manufacturers and retailers joined the collaboration that would become the AFSCM in April 2008 when the association was officially founded.

The French MNOs and service providers started their work with mobile NFC from scratch. No technical specifications for mobile NFC services existed. The first step was creating these specifications. Between 2006 and 2008, the actors tested the technical specifications, one application or service at a time, in different cities in France: Paris, Caen, Grenoble, and Strasbourg. In addition to testing the technology, these pilots served to verify if the opportunity was real and to check assumptions about consumer behavior. Initially, young adults were seen as the target segment for mobile NFC services; after all, they are heavy users of public transportation, spend most of their income rather than

save, and were born with a card, meaning that they do not really use cash or checks anymore. However, during the pilots it became clear that the focus had been too limited. Bouygues Telecom realized that even the age group 35 – 45 used the NFC mobile phones "*quite a lot*". Consequently, they no longer segment consumers but target the general population with their mobile NFC offering.

Collaboration within the AFSCM went smoothly. Instead, the problems were between Visa and the AEPM. The AEPM (Association Européenne Payez Mobile, the European Association for Mobile Payments) has the French banks and MNOs working together on mobile payments – and Visa did not like the idea of having the French banks doing something on their own. They would have preferred that the banks bought the Visa solution. The discussions with Visa were not easy. It was the banks more than the MNOs that had difficulties with Visa Europe. After several months of negociations, the French banks and MNOs managed to convince Visa Europe of the value of the AEPM solution, already followed by other countries.

After the pilot phase, the members of the AFSCM realized that it was important to organize what they called the "*last rehearsal before launch*": "*real customers using real phones that they would buy with real money in real shops, downloading real services to use in real life*". The purpose of launching Cityzi in Nice would be to "*test, on full-scale, a multiservice offering with distribution and marketing as close as possible to the final vision*". In addition, Nice was to act as a dress rehearsal for the brand Cityzi. Mobilizing service providers would require offering a simple and unique technical experience.

The first version of the AFSCM specifications was released in July 2009. In the end of the same year, the AFSCM passed the message with the support of the city of Nice: "*we will equip 3000 people with the NFC phone, who wants to play with us?*". The MNOs would sell the phones in shops and cooperate with whoever wanted to cooperate with them. The four mobile operators, the city of Nice with the local government of the surrounding area, and a public transport operator had signed a charter committing to the project.

Cityzi uses the SIM card as the secure element. Bouygues Telecom prefers to refer to the arrangement as a SIM-based solution, rather than as a SIM-centric solution. SIM-centric would mean that the mobile operators required all the applications to be stored on the SIM card, which is not the case in Cityzi. With Cityzi, the service providers can choose to

have the application on the SIM card if they want "*a secure service, supported by the MNO --- before the installation and after the installation*". Among Cityzi services, payments, public transport tickets, and discount coupons all demand the use of a secure element. Information services, such as the cultural and heritage information that Nice Côte D'Azur makes available using NFC tags, can be realized without a secure element.

Providers of secure NFC services depend on the MNOs, needing access to USSD (Unstructured Supplementary Service Data) on the SIM card. In the core of each Cityzi service there is a cardlet, stored on the SIM card, that keeps all the sensitive information. Also, the download and blocking of applications happens using the MNOs' Over-The-Air (OTA) platforms. Beyond the technical side, service providers depend on the MNOs in taking care of technical customer support: "*We support the customer if anything goes wrong, and we have shops on the street.*"

From a marketing perspective, the Cityzi platform helps service providers communicate compatibility in a market characterized by numerous competing NFC logos and implementations. The diversity of standards and uses in NFC leaves consumers unsure on identifying compatible services, while service providers face a communication challenge. The AFSCM invented the Cityzi logo to pass one message: "*My Cityzi services work on my Cityzi handset*". Creating a common brand helps to create awareness of and familiarity with mobile NFC services, using a common name and logo that serve as a guarantee of compatibility and quality, promote a universe of everyday services benefiting from the support of operators, and create continuity between the different points of contact with the customer in order to help them locate spots where NFC mobile phones can be used in all security. For the service providers, the brand promises that the provider's Cityzi-compatible service works on the Cityzi mobile phones, can be found on the Cityzi menu on the customer's mobile phone, gets support from the operators in technical problems, and is transferred automatically to the customer's new mobile phone when they change phones.

The MNOs have a B2B2C business model when it comes to mobile NFC services. The service providers are charged a set-up fee, and then, depending on the partners and the different businesses, the business model follows a revenue per active customer per year model, that for example can be charged as a percentage of the transactions, a yearly fee,

or a monthly fee. The MNOs concluded that they should not charge the consumers anything because the consumers are not willing to pay for a technology but rather they want to pay for a service – and it is the service provider, not the MNO, providing the service; therefore, the service providers should decide how the consumer pays.

The AFSCM originally expected to launch the Cityzi mobile phones and the different services at the same time. However, they soon realized that "*a big bang strategy was nonsense because you cannot control the commercialization process of the service providers*". Even mobile phone introductions were outside the control of the MNOs and some of the better handsets models turned out to be late. In the end, Nice was launched as the first NFC city in May 2010. At the time of the initial launch, only one type of Cityzi phone, Samsung Player 1 Cityzi, was offered to the consumers. As for services, Veolia Transdev's BPass was the first service available, followed by payments, loyalty and coupons in the months after the initial launch. The two main applications were mass transit and payments.

Throughout the project, the AFSCM participated in international standardization work. The point was "*to ensure that it was not a French-only solution, to cooperate with international bodies, such as Global Platform, Visa, and Mastercard, and to convince players outside of France that it was something interesting".* The international part was extremely important because it was the only way to convince the handset makers to develop NFC handsets. The handset manufacturers understood the possible benefits of NFC but lacked the incentives for introducing NFC mobile phones as only the French ecosystem had a clear vision regarding NFC.

In December 2010, Cityzi was declared a success. Over 2500 people in Nice had already bought a Cityzi phone, and 3300 sold mobile phones was to be reached by the end of the year. According to the AFSCM, the diversity of the services offered in Nice as well as the number of users made it possible to draw the following learnings: The technical solutions are viable and operational, the processes are proven, and demand for the services is confirmed in a real context.

According to the AFSCM, the public transport services turned out to be a tremendous success while payments did not succeed to the same level. The adoption of mobile payments was hindered by confusion created by the different contactless payments

logos. The used PayWave and PayPass logos are signs for contactless technology in general, not mobile NFC, so they did not clearly state, "*here you can pay with your Cityzi handset.*" Consumers finding it difficult to find places where they can pay with the Cityzi mobile has been and continues to be a problem. The AFSCM tried to remedy this problem by conducting a game that rewarded merchants for NFC payments and thus encouraged them to adopt the Cityzi logo. Another idea has been to create a map with the different merchants that accept NFC payments. Visa and MasterCard have been active in this but some banks are "*extremely reluctant to share this information with other banks*". Due to competition between banks, there is no centralized point where you could find all the places where you can use your handset to pay. Furthermore, merchant education was a problem. Some retailer employees were never properly educated about the payment service and therefore either did not properly communicate how to use the handset or even told the consumer that they could not use the handset.

The success of Cityzi as a whole was attributed to the involvement of all the relevant actors. AFSCM created Cityzi to bring together the mobile operators, service providers and customers. AFSCM also developed the technical foundation and processes for complete interoperability of the different services. The mobile operators created the distribution network and customer support, designed offerings to help the adoption of the Samsung Player One Cityzi mobile and the Cityzi services. The service providers created, promoted and distributed attractive and functional services, smoothing the daily lives of the people of Nice. The City of Nice promoted collaboration, mobilized its resources alongside other actors and welcomed observers from France and abroad.[1]

From Nice, the mobile operators learned that the business model was realistic, the B2B2C business model. They learned from the failures and they learned how to implement the different processes. They have upgraded the specifications based on the Nice experience. They have more banks ready, for commercial launches and not just for pilots. They have finalized payments specifications and now have a payment agreement with Visa and Mastercard. Basically, the Visa solution in the SIM and the Mastercard

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[1] AFSCM press release, December 6, 2010

solution in the SIM are based on the French specifications. Finally, the Cityzi-compatible SIM cards have been approved at the required security level.

The next step after Nice was expanding the services to Strasbourg. One of the biggest improvements for Strasbourg was the diversity of available handsets. At the time of the Nice launch, only one handset was available. Now there are between 4 and 7 different handsets, depending on the MNO. When it comes to the service offering, not all of the services available in Nice are available in Strasbourg. In the beginning, only retail payments and paying for parking with your NFC mobile phone were offered in Strasbourg. Paying for parking is a new service, not previously offered in Nice.

Nationally, there are nearly 200,000 customers equipped with Cityzi handsets. However, this impressive number is not being communicated by the MNOs because unfortunately there are not sufficient amounts of services for the handsets. When they have new services like payments in Strasbourg and Caen or next year in Bordeaux and Marseilles, at least Bouygues Telecom will start to communicate to the customers in these cities that they can use their handsets for different services.

As the mobile operators move deeper into deployment, they are thinking of transforming the AFSCM: "*We think that we will transform the association into a joint venture, between the MNOs. So we will stop the ASFCM and create a joint venture, an operational joint venture.*" Up until now, the main objective of the AFSCM has been to define the common specifications. For the deployment, the members realize a need to change the main objective of the association and assume a more operational role. Bouygues Telecom is currently having discussions with the other MNOs on "*what we are ready to share, what we are ready to do in common, and to define a budget for that and to set up this new organization in 2012*". The reorganization would serve to reduce costs: "*rather than to do it four times because we are four MNOs in the association, and instead do it one time for all of us*". Another aim is to develop a common wallet application to be pre-loaded in all the Cityzi handsets sold by all the MNOs. Also, the mobile operators want to propose a simple Cityzi loyalty application for "*small merchants*", something easy to use and download, and not very expensive. The MNOs want to simplify the process of setting up a new application: "*Basically with the existing AFSCM, each player*

has to sign a contact with each MNO and to test its application with each MNO - -. So we need to invent new ways to do that and to do that in one unique way for all of us."

4.3. Nice Côte D'Azur

The Cityzi project is the first NFC initiative in which Nice Côte D'Azur takes part. The involvement of Nice Côte d'Azur in the Cityzi initiative is part of the city's strategy for innovation. They hope that the initial collection of services – NFC payments, NFC services in the transportation network, and cultural and heritage information provided through NFC – will serve as a basis on which other private initiatives can build, developing new services and creating more value for the territory.

In the beginning of the project, a charter was signed by the City of Nice and the local government for Nice Côte D'Azur. The other partners included the four mobile network operators and the public transport operator. These actors committed to the project and created a project management organization in order to monitor the different services, get feedback, and fix the different problems.

Creating the city's NFC services – cultural and heritage information provided through NFC tags in the Modern Art Museum and in the Old Town – involved internal collaboration with the city's cultural department as well as work with two private companies on the technical side. The cultural department was able to provide the content. The private companies' role was to provide the NFC technology, such as the NFC tags, and to translate the information of the cultural department to appear on the mobile.

Nice Côte D'Azur had a coordinating role in the launch of Cityzi. One of the areas that the city helped coordinate was communication, "*so that the same idea is given to the citizen, and it's not just some lonely* initiatives *performed by individual actors, which would have been more difficult for the citizens to understand in the end*". The coordination work of the city was needed as bringing private actors together is the biggest challenge in a project like Cityzi "*when they* [the different actors] *don't necessarily have the same vision on business*". Also, the city has had a role in putting new actors in contact with the AFSCM. For example, an entrepreneur wanting to integrate NFC to his online job search service came to the city with an idea. They gave the entrepreneur more information

about the Cityzi initiative in Nice and put him in contact with the AFSCM, so that he could learn about the technical side and spread the service.

Cityzi in Nice has been a success. The French government announced a second call for mobile NFC projects in July 2011. Nice has answered the new call for projects because they plan to continue investing in mobile NFC: The city plans to enable contactless payments in the different services of the municipality, upgrading the terminals to accept mobile NFC payments. One of the ideas is ticketing for the opera ("*you could have your ticket launched on your mobile and then go to the opera and have the access granted thanks to your mobile phone*"). They are thinking of bringing NFC to the tourism pass, currently a card giving you access to different museums and attractions in the territory (combined with NFC, the tourism pass would also give the tourists access to the public transportation network). Another possibility is to further develop the information services available through the Cityzi tags at bus/tram stops and also to extend the system to a wider territory within Nice Côte D'Azur. The final idea is experimentation with smart buildings, including access and information.

4.4. Veolia Transdev

Veolia Transdev has different types of contracts with public service buyers, cities and regions. The company can act as a supplier to the local public transport authority or operate the public transport network at a commercial risk. Both types of contracts more often than not put Veolia Transdev in charge of customer relationships, including the distribution of information and ticketing services. Investments in mobile NFC are motivated by the aim to cut operating costs in these two areas. Also, mobile NFC is expected to improve the attractiveness of the public transport network. In short, "*NFC is to offer better service for lower cost*".

Veolia Transdev started working with NFC in 2004. They made the first trial in late 2005. This trial was with only one mobile network operator. This first trial was followed by additional trials in Southern France. Step by step the scope of the trials grew as Veolia Transdev first worked with one MNO, then two, then three. When BPass was tested as a pilot in Nice, Veolia Transdev had different business models depending on the operator: "*Most of them, at that time, were interested in renting a space on the SIM card for a commission on when the clients were using the mobile phone account.*"

The commercial launch of BPass took place in Nice in May 2010, together with the launch of Cityzi. BPass was the first application available for Cityzi phones. Veolia Transdev is currently having discussions on the business model with the MNOs. They are gradually moving from a monthly fee to a one-time payment: "*We don't want to pay a monthly fee. We want to pay in the beginning for each installation a fixed amount which compares to the cost of manufacturing a card.*" This fee could at least partly be paid by the end-user, to avoid behavior where people download the application only to ever buy one ticket. After installation, the MNOs would only earn commission when the telephone bill is used as the method of payment: "*And once we have the installation in place, then we feel that there is no real added value from the mobile network operators. Except in the case where they are proposing the solution for payment.*" The MNOs provide the secure space on the SIM card. The BPass application also benefits from being visible in the Cityzi phones and the NFC store. Apart from this, Veolia Transdev is "*independent from the MNOs*" and "*truly autonomous throughout the operation, including the customer relationship management*". When the application has been properly installed on the mobile phone, customer support becomes the responsibility of Veolia Transdev.

Discussions on changing the business model continue. Some of the MNOs are fine with the change, whereas others would prefer having an identical business model in all applications, and for all operators. From the point of view of Veolia Transdev, a unified business model is not realistic, as there are differences between the industries: "*Public transport, it's a loss-making business. Let's say, when you pay a ticket for €1, usually it costs much more to the* community, *so we are not in a position to create additional revenue due to NFC. In fact, NFC is to offer better service for lower cost.*" Veolia Transdev sees its role in the ecosystem as very important: "*I think that without public transport any NFC scheme would have some difficulties to take off*".

Veolia Transdev uses the Cityzi sign to tell their customers that if they have a Cityzi phone, they can use the BPass service. However, they want to keep the two separate, not mixing the image: "*Cityzi,* it's *for phones, and BPass is for the transport application and it's not a service which is offered by the mobile network operators, otherwise it would create, I think, a problem of trust.*" Veolia Transdev uses the Cityzi logo for tag reading, because tag reading is the same in each service: in public transport, you tap the tag to access

schedule information, in the Old Town you tap a similar tag to get information on some monuments.

Launching BPass was "*a significant investment -- made by Veolia Transdev*". However, it wasn't made for Nice only but will be deployed in other areas. The next step is the Paris area where the public transport authority has asked Veolia Transdev to launch a commercial pilot in a part of the Paris region.

In Nice, the terminals were already compatible with the contactless standard used by Cityzi, so the ticketing system didn't require any changes. Some other cities in France are using a contactless protocol that is not compliant with standards. Veolia Transdev plans to first go ahead in networks that are compliant and wait for the terminals to be updated in the other networks. This means that Veolia Transdev will not necessarily follow Cityzi to new cities but will proceed on its own. Caen will have a public transportation solution defined by Orange. With Strasbourg Veolia Transdev has a partnership and is proposing a solution to the actors but nothing has been finalized just yet.

Simultaneously, Veolia Transdev is developing a version of BPass that would be compatible with tag reading. This would help them to deploy NFC in networks that are not compliant with the security or where they need to start from scratch, without any prior NFC systems. With this application, they would be in a position to deploy BPass by just placing some NFC tags in the network. Veolia Transdev's priority in deploying BPass are the cities where they are already the public transport operator.

4.5. Crédit Mutuel-CIC

In France, Crédit Mutuel CIC has been a forerunner in mobile NFC payments. The motivation for the banking group to go into NFC was that they were convinced that mobile payments would be in the future. They didn't know when this future would be "*but it will be there, that's for sure*". The first discussions on mobile NFC payments took place around 2005: "*At that time, there was nothing really available, so we started from the contactless card specifications and we built specifications to use on the mobile.*"

A lot of investments were needed to develop the mobile NFC payment service. First of all, a lot of time and money was spent on defining and testing the specifications. Many of these investments benefited both mobile NFC and contactless cards but there were also

investments made specifically in mobile NFC. Crédit Mutuel CIC launched the first pilot in the field in 2006.

As a next step, Crédit Mutuel CIC had discussions with the other players and convinced them to go further. A common project was started in 2006 or 2007 and later evolved into AEPM, where the French banks and operators work together to define the specifications for mobile payments. A project with just one bank and one operator, or a bank alone, or an operator alone, would be possible – if not for one big problem: "*our customers are customers of several operators and the operator's customers are customers of several banks*". Therefore, collaboration is needed. The banks cooperate on improving the technical standards and the security standards because this is something they cannot do alone, whereas they "*keep the competition very high on the offers, on the features of the product, on the prices of course*".

The role of the banks in the NFC ecosystem is processing the payments. Mobile NFC payments are card payments, so when it comes to the value chain, mobile NFC payments cause no change compared to the payments done using classical plastic cards. The bank uses the existing infrastructure, the card infrastructure, to process payments: "*We have an agreement with the retailers and with our customers, and we handle completely the payment with the existing infrastructure and, if I may say, the existing business model.*"

The main difference between classical cards and mobile payments is the "*completely different*" issuing process. The interaction between the issuer and the customer is different. Instead of issuing a card, a device owned by the bank, Crédit Mutuel CIC issues the payment application that will then reside on a third party device, i.e. a mobile phone provided by the customer's mobile operator. The bank needs to interact with this application remotely, creating new tasks. To deal with the changes in the issuing process, Crédit Mutuel CIC has formed relationships with actors that are new to the payments ecosystem, namely the MNOs and the TSMs.

The banks have worked together with the MNOs to build the solutions and to enable payments and other servies to be available on the same platform. Crédit Mutuel CIC has an agreement with the MNOs because the bank is using some of the mobile network operators' resources, including the secure space on the SIM card. The TSM role, on the other hand, is a technical role for Crédit Mutuel CIC, "*providing the links and the services*

to interact with our [the bank's] *customers*". The TSM actors have "*no commercial roles*" but are suppliers to the banks.

Crédit Mutuel's decision to accept the SIM card as the secure element had several reasons. First of all, it was the only solution that was working at the time. Second, Crédit Mutuel CIC is also a virtual MNO, issuing SIM cards, which made them keen to use the SIM card. Finally, the alternatives, the micro SD card and the embedded chip, suffer from the lack of mobile operator support.

The French banks and MNOs launched a pilot in 2007 in Strasbourg and Caen to verify that what they had designed was working. Six large banks – BNP Paribas, the Crédit Mutuel CIC group, Crédit Agricole and LCL, the Caisses d'Epargne group, La Banque Postale, and Société Générale – and four mobile network operators – Bouygues Telecom, Orange, SFR, and NRJ Mobile – took part in the joint field trial called "Payez Mobile", Pay Mobile. During the initial framework phase, the members had defined the concept, the roles and responsibilities of each participant, as well as the financial flows. Now they wanted to test the interoperability among solutions developed by several industrial partners. Another objective was to test users' level of interest for the new payment method and to identify possible reasons for reluctance. Banks and operators would refine their own economic value chains and conduct bilateral negotiations to finalize the financial and contractual terms underlying the service.

Strasbourg and Caen were chosen for practical reasons. The French "Secure Electronic Transactions" (TES) cluster is based in Caen. An earlier trial with Crédit Mutuel, NRJ Mobile and SFR had already equipped a number of users in Strasbourg, and this new pilot would give them a chance to benefit from new functions in a multi-bank, multi-operator context. 1000 test users and 200 stores in Strasbourg and Caen were invited to participate. This was the first European NFC pilot to bring together all the main banks and operators in a country. The two main acquiring networks, Visa and Mastercard, were both involved. The solution could handle customers with multiple cards and customers with accounts at different banks. It also provided a technical solution that could be further extended to other operators.

Indeed, the "Payez Mobile" pilot turned out to be a success. The actors succeeded in validating the interoperability of the NFC mobile payment solution: it works no matter

what bank, mobile network operator, or payment terminal is being used. By October 2008, 500 retailers had become involved in the pilot, and the number of consumers was close to 1000. The solution had been integrated in the cash register systems of three retail chains, Décathlon, Intermarché and Leroy Merlin.

Studies conducted during the trial showed that the new method of payment was easily adopted, both by the consumers and the retailers, and was easily integrated to familiar shopping practices. What the consumers said they were looking forward to was a wider range of mobile services, more contactless applications and a larger network of retailers with contactless terminals.

After the trials in Strasbourg and Caen, the actors decided to take a step forward: "*Then we decided to go further and to enable the commercial deployment under the umbrella of Cityzi because at the same time or a little bit later AFSCM was also created by the operators.*" For Crédit Mutuel CIC, Cityzi is a combination of basic specifications, consistency towards the end user, and some common communications with the purpose of creating awareness. Cityzi is a common way to interface with the MNOs in order to enable services on the mobile phone. It is a way to "*ensure consistency for the users, knowing that these services are known and supported by the operators*".

Branding is a difficult question in marketing mobile NFC services. There are the payment brands such as MasterCard, PayPass, and VISA. Retailers have their own brands. Public transportation uses different brands in different regions. Then there are brands used for NFC tags. "*And in order to make the customer aware where he can use or can find an NFC service, the idea was to have a common umbrella brand, If I may say, which is Cityzi.*" Despite this, the actors are still having discussions on what would be the best way to communicate the availability of NFC services: "*If you see a MasterCard PayPass brand, you can use a contactless plastic card or you can use a mobile. There is no difference between the two, it will be accepted using the same brand. If you use Cityzi, it is only for mobile.*"

Several changes take place when you move from trials to deployment. Trials are always easier because there is a reduced number of actors. It might be just one place and one vendor. A pilot or a trial is always with a reduced number of participants and some reduced features. Cityzi is different because "*it's interoperable, it's available for any bank,*

any retailer, any operator". Also, the service is becoming available for more and more devices. The banks have moved from handling just hundreds of mobile customers to integrating all the systems in their "*normal daily business processes*". It is a scalable system and a fully integrated process.

Still during the commercial launch of Cityzi, the biggest complaints coming from consumers have been related to availability: the service not being available on all mobile phones and there being too few locations where the service could be used. These two are the biggest challenges: "*So if we solved these two issues, I think it will be big use in the deployment of the service.*" The first issue is easing as more and more phones are becoming available. It makes a big difference from the consumer point of view that the solution is available on the latest smart phones. The work continues on the payment acceptance side: "*The main issue is that we need a sufficient acceptance base. Because if you can only use the mobile in dedicated places and not everywhere, it's difficult. That is the major issue we have still.*" Crédit Mutuel CIC is installing contactless PoS terminals at different merchants' and retailers' locations. Earlier, Crédit Mutuel CIC had pilot partners but now in the deployment phase they have discussions and are installing acceptance with all the retailers, all over the country. Over 1800 businesses in Nice and over 2000 in Strasbourg and Caen, the Cityzi cities following Nice, accept NFC payments.

Updating the PoS terminals, the biggest retailers did the investment first – and did it by themselves. For example, Carrefour, one of the biggest retailers, installed all of their acceptance points with contactless. This retailer has issued all of their own cards with contactless, so they have their own business case for updating the terminals. Other big retailers are doing the same as they have their own rationale for doing that. Slipping these investments suits Crédit Mutuel CIC: "*it is very interesting for us, even if we have to do tests in order to make it work*". When it comes to the smaller retailers, the SMEs, the situation is different. Crédit Mutuel CIC rents a lot of PoS terminals in this customer group, so it was the bank that upgraded the terminals and made the investment.

Since 2010, all of the new PoS terminals installed by Crédit Mutuel CIC have been contactless. The investments in new terminals are partly driven by the introduction of contactless cards, a more mature technology than mobile NFC payments. For a while these two technologies will coexist, the mobile becoming more and more used in the

future. The new terminals have the technology to accept contactless payments but Crédit Mutuel is opening them for contactless payments and mobile NFC payments progressively as the deployment moves to new cities or when big retail chains want to open it in all of their locations.

Crédit Mutuel CIC predicts a bright future for mobile NFC payments. A prerequisite for this is offering several different services in addition to payments – transit, loyalty and other applications – and making the technology attractive to the different actors. Patrice Hertzog explains the value of having a multi-service offering: "*As a bank for payments, - - there are two different things. One is the device which is used for NFC for instance for one application, one service, will then be available for another service. So it may be introduced to user in using NFC for transit, and then we can add the payment function and it, so it enables additional uses. If we are talking about loyalty, for instance, loyalty is often linked to payment so there is maybe an interest to combine these two to have a specific offering so to have added value services on top of the payment. So that's why these different services may have better way, it will be a better way to deploy, including the payment.*" However, he points out that this kind of interoperable solution is complex and will therefore take time to implement.

4.6. Visa

Being active in NFC services "*is really strategic*" for Visa Europe. The technology enables payments through the mobile phone, "*a very important device for customers*", and value-added services can also be brought to customers through the mobile. Visa Europe wants to be a leader in NFC and help its members in preparing to propose these new services to their customers.

For Visa Europe, mobile NFC payments are about two things: "*developing the usual business but in a different technical way, and also development of value-added services*". Visa Europe plans to earn money by developing the volume of Visa payments. Mobile NFC payments are seen as complementary to the card business, expanding business for Visa. As long as it is Visa that is used for payments, Visa gets its fee, both on the issuing side and the acquiring side. Therefore, it is important that Visa continues to be the brand that customers trust. In addition to developing the volume, Visa Europe is interested in

proposing value-added services that don't have a price at the moment but are still developing.

Creating specifications for mobile NFC payments has been "*really a long process*" for several reasons. First of all, the solution had to be "*absolutely secure*". Second, they wanted to create something that would last: "*it's not something we want to throw away once we have started with it*". Finally, they wanted to make sure that additional value-added services could be implemented in a later phase.

When it comes to the secure element, "*Visa is absolutely agnostic*". They identify three technologies – the SIM card, the embedded chip, and the micro SD card – and pursue each of them. Visa has done pilots in each of the three technologies. Their goal is one solution that can be used in all the technologies: "*we are not developing one solution per technical solution, it's one solution working on all the technical parts.*" Visa Europe will not pick any one technology because "*it's going to be the banks deciding and the market deciding the route they want to take*". Visa Europe believes in SIM-based mobile payments but for them it's not the only way to do payments on a mobile phone.

Visa Europe started having mobile NFC pilots in 2010. They continued with a lot of pilots in 2011. Through the pilots Visa Europe learned that NFC phones and making payments by phone were well accepted by the consumers. They learned a lot on the journey of the customer: "*how they can get the service, how they can activate the service, where they can use the service, what we have to do in case of any problems*". Another important area was learning to work together with all the actors: "*And this is one very, very important point to be successful, and on the other hand, this is really difficult for us. –– Of course, each actor has its own strategy, and want to earn money from the business, and this is the difficult part to plan out.*" They did even solve some issues on the technical side, which was easier than solving the collaboration between actors.

For Visa Europe, the key benefit of Cityzi was that it was "*live*". For them, Cityzi was a very good way "*to test all the pieces, which are the technical part, the marketing part, the communication part, collaboration, or the implementation part of this new service*". Especially, Cityzi was a "*good opportunity to work with all the actors and to have all the actors work together in the same direction*". They got to work with all the major actors in France. France is a major market for Visa Europe, so it is important to be on the market

and work in the same direction with the other actors. Also, the French banks are "*really often in advance regarding* innovation*, so it's important for Visa to help the banks*".

As for the Cityzi brand, it is not used by Visa Europe. They argue that Visa is the trusted brand, so when it comes to payments "*it's not the Cityzi brand which is important but it's really the Visa brand*", and the actors should be very careful in "*making sure that the customers understand what is the proposal, and that the customers trust the brand they are using and the service they are using*". The telecom operators are pushing Cityzi as a brand but Visa prefers to see it as purely technology-related, indicating that the phone can accept the payment application and the NFC application.

Visa Europe's role in the Cityzi project was coordinating the work done by banks. They provide the technical solution for the banks, and the banks then implement the service and propose it to their customers. The banks are even responsible for doing consumer research and improving the service, so Visa Europe stays out of this: "*it was really part of the business that Visa is not doing what the banks are doing*". However, Visa has spent a lot on communication to support the initiative. In addition to the banks, Visa collaborated with the telecom operators and the city of Nice during the project. Both Visa Europe and MasterCard are active in the Cityzi project. However, they are not really collaborating. The two actors have been working collaboratively in the card business. When it comes to NFC, it is too early to talk about collaboration. Both of the companies are developing their own service and proposing it to the banks; they have their own strategies and visions on the future of payments.

In a press release, announcing "the first results of an NFC payment pilot in Nice", Visa Europe does not mention Cityzi. In the Nice pilot, Visa Europe worked together with 11 banks. They talk about both NFC cards and mobile phones. By the end of February 2011, 1500 businesses in the Nice region had been equipped with terminals accepting NFC payments. 200,000 people in the Nice region had received either a Visa NFC card (replacing their classic Visa card) or an NFC-enabled mobile phone. The press release attributed the success of the trial to the complementarities in the actions of all the major actors: the increase in the number of businesses accepting NFC payments, the work of

the banks in educating their clients, and Visa Europe's media campaign informing the public of the benefits of this new mode of payment.[2]

Visa Europe's technical specifications for mobile NFC payments were finalized in 2011.The technical part might still evolve but they have something ready and working. What they don't know are the economics: "*There are still lots of discussions to have.*" It won't be Visa Europe having these discussions but its members, the banks: "*It's not Visa going to negotiate with the operators; it's really the banks that are dealing with the operators.*" Similarly, Visa Europe sees the TSMs as "*technical partners*" to the banks.

Visa Europe continues working closely with the banks as Cityzi expands to other cities. Some banks have already launched the service in Nice and are now expanding to other cities. Other banks have yet to introduce their solution, so Visa is working "*really closely with each bank at their own pace to propose this new service*". As for the future of NFC payments in general, Visa Europe has high hopes for 2012: "*And we do think that 2012 will be really the year when* everyone *wants to go and, everyone will go on the ship.*"

4.7. HighCo

One of HighCo's key activities is couponing clearing where the company manages couponing campaigns for brands. Starting with the objective of digitalization of discount coupons, HighCo very quickly realized that NFC would be the best technology for the purpose. NFC can be used to establish a secure and bidirectional communication channel between a mobile phone and a payment terminal. These qualities allow for secure automatic transmission of coupons from the mobile phone to the cash desk followed by the deletion of the used coupon on the mobile, making NFC the best choice.

HighCo decided to develop a couponing wallet for NFC mobile phones. This couponing wallet would be a solution helping consumers to first access discount coupons on their mobile phone and then use these coupons in a simple way, simply tapping the payment terminal before paying. HighCo saw Cityzi in Nice as an opportunity to test the couponing wallet solution that they had developed. They wanted to validate that this is

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[2] Premiers résultats de l'expérimentation du paiement sans contact de Nice [First results of the NFC payment trial in Nice], press release (April 14, 2011), received from Aglaé Emélien, HighCo

indeed a technology that is legitimate for the security and for automating the process of transacting the coupon from the NFC mobile handset to the cash desk.

To conduct this test, HighCo needed a retail partner. Franprix, a French retail chain, agreed to work with HighCo in setting up a trial in Nice. Franprix was ready to let HighCo set up the necessary systems to test NFC couponing in three of the five Franprix stores in Nice. Franprix also introduced HighCo to their cash desk system supplier Toshiba. HighCo then set up the interface needed to manage coupons treatment at the cash desk in the Toshiba cash desk system used in Franprix stores. To manage the transmission of discount coupons to NFC phones HighCo needed to interface with the mobile operators network. They had to comply with all the AFSCM specifications written by the mobile operators.

To participate in Cityzi, HighCo had to comply with the specifications written by the AFSCM. These specifications were written by mobile operators, so HighCo was "*completely dependent on the infrastructure, technical condition, bla bla bla, of the mobile operators*". HighCo experienced this dependence on the mobile operators as an obstacle, first of all, because of the costs involved in deploying an NFC solution but also because setting up an NFC service in this environment is painful. There are "*a lot of constraints technically and during the process*".

To comply with the AFSCM specifications, HighCo needed to find a TSM to secure the download of their couponing wallet. HighCo had two alternatives. Either they could buy the services of an existing TSM such as Gemalto or Oberthur or they could develop their own TSM platform. HighCo found the prices asked by the existing TSM players to be too high. They decided to develop their own TSM platform because this would be less expensive than buying the services of an existing TSM.

As for the business model, HighCo – for this test only – more or less accepted "*the business model imposed on them by the mobile operators*". The operators' business model is to charge each user a fee, initially they wanted to charge 8€ per active user, i.e. a user having the couponing application on their NFC mobile handset. From the point of view of HighCo, this fee is too high as it is very high in relation to the revenue HighCo can make on each user on their side. They cannot sell 8€ worth of couponing campaigns per each user because so few users are equipped with an NFC mobile phone. When HighCo

proposes a couponing campaign to a brand, the price is based on the number of consumers that can be reached through the campaign. For example, they can sell a web couponing campaign saying that the coupon will be printed by 10.000 consumers. They cannot do this with NFC because "*there is no audience*".

The service was launched on November 10, 2010. Around 15 national brands participated in the test and offered coupons through the NFC couponing application. HighCo saw their participation in Cityzi as a test. They did technical research and made progress in defining the interface for couponing transmission between the mobile handset and the cash desk and between the cash desk and the clearing platform. HighCo learnt about the interfaces and the infrastructure. They leant to integrate their modular program in the cash desk. They did this with Toshiba and are now doing it with other cash desk providers to be able to serve all the retailers. The benefits of digital couponing were established: Clearing is faster than with printed coupons. It is more secure as there is no risk of losing the printed coupons before they reach clearing. Thanks to this trial, HighCo developed the infrastructure on their side as well as the interface towards the retailers' infrastructures.

When it comes to getting feedback from users, HighCo were frustrated as they would have preferred a pre-defined panel of users for the test. Some of the users equipped with a Cityzi phone "*were not in the best profile to really test this kind of innovative service*" and they didn't make the effort to download the service, even less to use the service.

HighCo accepted the mobile operators' business model for the test but they realize that this business model is not the one that can be adopted in the future when these kinds of services are commercialized. A revenue sharing model is suggested for the future. The business model could be similar to the one used in web couponing. HighCo could for example sell 10.000 printed web coupons for 1.000€. Today, HighCo might publish the coupon on their own website, using their own infrastructure, in which case there is no revenue sharing. In the case that they use a partner's website, then they accept to share the revenue generated on this web couponing campaign with the partner. If the same model is applied to NFC couponing, the mobile operator is considered the partner and they get some part of the revenue generated through NFC couponing campaigns.

NFC is being integrated to more and more handsets. HighCo is currently waiting for the NFC mobile handsets to penetrate the market. Only when these devices are in the hands of the consumers can they start helping retailers and brands in deploying NFC couponing services. One million NFC phones is very little compared to 18 million smart phones in the hands of French consumers. You reach more consumers through an iPhone or Android couponing service than through NFC.

As NFC mobile phones gain popularity, new opportunities emerge in the promotion arena. HighCo will be able to manage more campaigns using the tag reading capability of NFC mobile phones. You can have an NFC tag on a leaflet or on a poster in a point-of-sale. Consumers with a mobile phone capable of reading NFC tags can get access to product and promotion information just by tapping the tag with their phone. Interactive promotions campaigns are likely to be the first NFC service that HighCo deploys as this service is independent of cash desk integration. These kinds of services will "*fly very quickly when we will have 10 – 20 % of mobile handsets being NFC tag reading capable*". Getting to NFC couponing services will take more time because the service is more dependent on "*cash desk integration and then the retailers' willingness to create this connected infrastructure on the cash desk*".

5. Analysis

The previous section introduced some of the key actors in the Cityzi commercialization network. The actors are bound together by their participation in the launch of mobile NFC services in Nice. Each actor has its own history when it comes to mobile NFC. Likewise, each actor plays a unique role in the Cityzi launch and has its own plans for the future. By exploring the paths of these key actors, I have sought to describe the network dynamics of forming a commercialization network. In the following, I will draw together the different perspectives and discuss critical events and key decisions in the process.

During the study, critical events were identified on three levels (see

Figure 1 on page 17 for a summary of the analytical framework). The first level considers the studied actors one by one, identifying events that lead the actors to form collaborative relationships with each other and other organizations. The analysis on actor level considers the development of focal nets over time, covering the entire process from first investments to commercialization. The second level puts the infrastructure operators (see Palo 2011) to focus. As the focal actors in a business model development network, the infrastructure operators – the MNOs in the context of SIM-based mobile NFC services – influence the network around them to a large extent. MNO resources, the Cityzi brand, and the business model are identified as key aspects structuring the commercialization net. The final level considers the using setting (see Baraldi et al. 2011), a subset of actors in the commercialization network. This level of analysis deals with the ways in which the studied actors' strategic actions and external influences impact the direct and indirect users of mobile NFC services.

5.1 Building networks for service development and commercialization

The path towards commercialization is a story of network and net expansion. Initiating investments in NFC leads to MNOs and banks forming inter-industry and intra-industry relationships, driven by the need for interoperable solutions. Launching pilots expands these application specific nets. The MNOs' decision to introduce Cityzi in Nice attracts new service providers to the network. When Cityzi is deemed a success, focus moves from proving the business opportunity to deploying the solutions. Based on these critical events, four broad phases can be identified: 1) defining specifications, 2) piloting

key applications, 3) initial launch, and 4) further expansion. Table 4 shows the participation of the studied actors during the different phases.

Actor	Defining specification	Piloting key applications	Initial launch	Further expansion
Bouygues Telecom	x	x	x	x
Nice Côte D'Azur			x	x
Veolia Transdev		x	x	x
Crédit Mutuel CIC	x	x	x	x
Visa Europe		x	x	x
HighCo			x	

Table 4. Participation in different phases

Phase 1, defining specifications, sees MNOs working towards defining the specifications for the handset and the SIM and defining the way the MNOs interact with the service providers. Collaboration defines the process from the start. Bouygues Telecom, initiating the work, is convinced that NFC is the future but demands interoperable specifications to succeed. Other MNOs joined the project, as did the French banks. This phase resulted in specifications that allowed the actors to conduct tests in the field. It should be noted that work on the specifications continues throughout the next phases. Throughout the process, international collaboration was continued to ensure compatibility internationally.

Phase 2 is characterized by pilots and trials where key applications are tested in terms of both technical specifications and business opportunities. This means networking around the different application areas. Between 2006 and 2008, Bouygues Telecom takes part in several trials where services or applications are tested one at a time. Veolia

Transdev had their first mobile NFC trial, with only one MNO, already in late 2005. The scope of the trials grew with every step as the public transport operator first worked with one MNO, then two, then three. Crédit Mutuel CIC launched the first mobile NFC payments pilot in 2006. This pilot was followed by common pilots with the MNOs and other French banks. In addition to the four MNOs and six large banks, the mobile payment trials involved MasterCard and Visa, three mobile phone manufacturers, two payment terminal manufacturers, two TSM actors, and an NFC component supplier. The interoperability of the NFC mobile payment solution was confirmed, meaning that it worked with all the banks, MNOs and payment terminals. In 2008, the AFSCM forms, having as a purpose to "*test, on full-scale, a multiservice offering with distribution and marketing as close as possible to the final vision*". The MNOs worked in close collaboration to offer both service providers and consumers a unified experience. The banks decided to go further as well and enable commercial deployment under the AFSCM's Cityzi initiative.

Phase 3, the initial launch, meant that, for the first time, mobile NFC services would be commercially available to everyone, not just pilot customers. The AFSCM's launch of Cityzi meant a move to commercialization for many of the piloted solutions. The commercial launch of Veolia Transdev's BPass service coincided with the launch of Cityzi. Soon after, Crédit Mutuel CIC and BNP Paribas launched their payment applications. Not everyone followed, however, as rest of the banks settled for only offering contactless card payments to their customers (Société Génèrale launched their mobile NFC payment service shortly before the publication of this thesis). Still, these banks were not without meaning for the commercialization network, as the large number of contactless cards issued in the Nice area boosted the adoption of contactless payment terminals among merchants. As will be demonstrated later, expansion of the using setting was a key effect of the move to commercialization. In addition, new service providers joined the project in the commercialization phase. Nice Côte D'Azur, with no prior experience of mobile NFC, introduced NFC tag-based information services. HighCo introduced its couponing wallet. Several loyalty applications were introduced. To sum up, the introduction of Cityzi meant that pilot participants moved to commercialization and new service providers joined the project.

Phase 4, further expansion, is ongoing. In this phase, the network moves deeper into commercialization. Cityzi expands to other cities and more NFC phones become available. Some of the service providers follow Cityzi to new cities, while new service providers become involved with each new launch. For example, the banks are gradually bringing the service to more cities but introducing a public transport application in Strasbourg or Caen demands new actors as Veolia Transdev is not the public transport operator in these cities. Simultaneously, Veolia Transdev has its own plans for geographical expansion. Nice Côte D'Azur plans to introduce more public mobile NFC services in Nice. HighCo saw their participation in the initial launch as a test and won't be commercializing the service until there is a sufficient audience to support its business model. In conclusion, the actors' paths diverge once again.

5.2. MNO resources, branding and business models in commercialization nets

In the context of SIM-based mobile NFC services, it is the MNOs that assume the infrastructure operator role, defined as the focal actor acting as an interface for the service providers in Palo (2011). The AFSCM's, or the mobile network operators', decision to launch Cityzi in Nice in May 2010 was above identified as a critical event resulting in changes in the constitution of the network, by way of inducing a move to commercialization in previously piloted applications and attracting new service providers to the network. In the following, the implications of the move are discussed in more detail, with special attention paid to MNO resources, the Cityzi brand, and the business models.

From the point of view of the MNOs, Cityzi represents a SIM-based solution to mobile NFC services, defined by the AFSCM specifications. For them, Cityzi is also a brand, communicating interoperability ("*My Cityzi services work on my Cityzi handset.*"). Finally, building on the assumption that consumers are not ready to pay for NFC technology, the MNOs propose a B2B2C business model to the commercialization network. These three aspects are what the MNOs use to structure the network. However, the actual network implications are realized in the actions of the different actors. The first point to be made here is that the different actors interpreted the launch of Cityzi in a variety of ways. Their interpretations influenced their reactions, and as consequence, the network.

- For Veolia Transdev, Cityzi is a type of phone that the MNOs market with the Cityzi logo.

- For Crédit Mutuel CIC, Cityzi is a combination of basic specifications, consistency towards the end user, and some common communications with the purpose of creating awareness.

- For Visa Europe, the Nice launch was an opportunity to test all the parts together (technology, marketing, communication, collaboration, implementation) and to work with all the key actors in France, a major market for Visa Europe and a leader when it comes to innovation in the banking industry.

- HighCo saw Cityzi in Nice as an opportunity to test the couponing wallet solution that they had developed, to validate the legitimacy of mobile NFC technology in terms of security and functionality, automating the process of transacting the coupon from the NFC mobile handset to the cash desk.

- For Nice Côte D'Azur, the Cityzi initiative was part of the city's strategy for innovation. They hoped that the initial collection of services would serve as a basis on which other private initiatives could build, developing new services and creating more value for the territory.

5.2.1. MNO resources in mobile NFC service commercialization

Announcing the commercialization of Cityzi, the MNOs promised interoperability, achieved through shared specifications for the handset and the secure element, as well as for the way the MNOs interact with the service providers. The solution is SIM-based, meaning that the SIM card is used as a secure element instead of the alternatives embedded chip or micro SD card.

For the MNOs, proposing the SIM card as the secure element means a central position in the network. Providers of secure NFC services depend on the MNOs for providing the secure space on the SIM card. Likewise, the MNOs' Over-The-Air (OTA) platforms are used in the download and blocking of applications. In addition to the technical side – the SIM card and the OTA platform – other MNO resources are made available to service providers: "*We support the customer if anything goes wrong, and we have shops on the street.*" (Bouygues Telecom). Bouygues Telecom suggests that the MNOs' customer support resources contribute to the acceptance of the SIM card as a secure element.

Indeed, MNO support is mentioned by the other actors as a reason for accepting the SIM card as the secure element. For Crédit Mutuel CIC the SIM card has an advantage over competing solutions because it gives access to mobile operators resources, especially customer support. Both with the micro SD card and the embedded secure element, the ownership and management of the secure element poses a problem. The representative of Crédit Mutuel CIC does not see the handset manufacturers taking this role. For Crédit Mutuel CIC, working with the MNOs has allowed for creating a complex system of customer service that can handle anything that can happen during the lifecycle of the solution. They see this as crucial in mobile payment services.

Veolia Transdev mostly uses the MNOs' technical resources, the SIM card and the OTA platform. They do not appreciate the MNOs' customer support resources to the same extent as Crédit Mutuel CIC. When the application has been properly installed on the mobile phone, customer support becomes the responsibility of Veolia Transdev. Another MNO resource used by service providers is the Cityzi application store accessed through Cityzi mobile phones. According to Veolia Transdev, their BPass application benefits from being visible in the Cityzi phones and the NFC store.

Apart from using the SIM card as the secure element, Veolia Transdev claims to be "*independent from the MNOs*" and "*truly autonomous throughout the operation, including the customer relationship management*". The only way they rely on MNOs after installation is as providers of the payment solution for purchases under €10. Veolia Transdev's independence is reflected in the organizations position on business models. They justify their rejection of monthly fees by explaining that, after installation, the MNOs only create value for them in the case that the mobile phone bill is used as the payment method.

Despite wide support for the SIM card as the secure element, not everyone agrees. Some banks still pilot mobile payment solutions based on one of the other alternatives. Visa Europe describes their position as "*absolutely agnostic*". They identify three technologies – the SIM card, the embedded chip, and the micro SD card – and pursue each of them. Visa Europe's goal is one solution that can be used in all the technologies. Visa Europe will not pick any one technology because "*it's going to be the banks deciding and the market deciding the route they want to take*". The most visible impact of this orientation

is on Visa Europe's own position in the network. Visa Europe limits its actions to supporting the banks and organizing awareness campaigns. Visa Europe's communication does not often mention Cityzi but rather talks about the benefits of mobile NFC payments and contactless payment cards.

5.2.2. Brands in mobile NFC services commercialization

According to the AFSCM, the context for the need to create a common platform, a common brand, is the diversity of the standards and uses in NFC, resulting in multiple implementations and an abundance of services: For example, NFC can exist on a mobile, on a plastic card, on a USB stick, on a chip in a passport, to name but a few of the possibilities. There are the different modes of working, card emulation, reader mode, and peer-to-peer. There are different alternatives for the secure element. Multiple brands and logos – created by standardization instances, groups of actors working together in a pilot, or individual actors – coexist in the NFC space. For the consumer, this can be confusing – how does the consumer find the NFC services compatible with their device? Likewise, service providers struggle with communicating about their mobile NFC services towards the consumers.

According to AFSCM, the answer to the confusion among end-users and service providers is the Cityzi brand and logo. Creating a common brand helps to create awareness of and familiarity with mobile NFC services. Using a common name and logo serves as a guarantee of compatibility and quality, promoting a universe of everyday services benefiting from the support of operators. The communications guidelines create continuity between the different points of contact, helping consumers in the task of locating the spots where NFC mobile phones can be used. Cityzi is described as a signal of compatibility, communicating that "*Cityzi-compatible services will work in your Cityzi mobile phone*". Cityzi allows the end user to recognize an NFC mobile phone as well as the services that can be used with this phone.

The MNOs suggest Cityzi as a way for the different service providers to communicate compatibility. That is the view of MNOs and the AFSCM. Some of the other actors are less eager to adopt the Cityzi brand. The key issue here is the ownership of the trusted brand. Both Visa Europe and Veolia Transdev put forward their own brand as the brand the consumers trust. However, the two brands deal with this issue in different ways.

Visa Europe does not use the Cityzi brand. They argue that Visa is the trusted brand, so when it comes to payments "*it's not the Cityzi brand which is important but it's really the Visa brand*", and the actors should be very careful in "*making sure that the customers understand what is the proposal, and that the customers trust the brand they are using and the service they are using*". The telecom operators are pushing Cityzi as a brand but Visa Europe prefers to see it as purely technology-related, indicating that the phone can accept the payment application and the NFC application. The insistence of Visa Europe for using the Visa brand can be explained by protecting their brand equity and business model. As long as it is Visa that is used for payments, Visa gets its fee, no matter what the medium. In other words, brand equity helps Visa maintain its position in the network and justify its business model.

Bouygues Telecom describes the commercialization of mobile payments as more of a challenge than the commercialization of public transport services. They suggest communications as the problem area in commercializing mobile payments. Using different logos risks causing confusion among consumers. During the initial launch of Cityzi services in Nice, brands like Visa payWave and MasterCard PayPass were used instead of Cityzi. These are brands for contactless technology in general (including both contactless cards and NFC mobiles), not mobile NFC per se. According to Bouygues Telecom, consumers finding it difficult to find places where they can pay with the Cityzi mobile phone has been and continues to be a problem. The AFSCM and the MNOs tried to compensate for the lack of a clear logo by conducting a game that rewarded the merchants for mobile payments. In this way, they bypassed Visa and the banks by driving the adoption of the Cityzi logo through retailers.

The second actor emphasizing their brand as the trusted brand is Veolia Transdev. The public transport operator uses the Cityzi logo to tell their customers that if they have a Cityzi phone, they can use the BPass service. However, they want to keep the two separate: "*Cityzi, it's for phones, and BPass is for the transport application and it's not a service which is offered by the mobile network operators*". Relying too much on the Cityzi brand would create confusion and a problem of trust.

5.2.3. Business models in mobile NFC service commercialization

The MNOs propose a B2B2C business model. They do not charge anything to the end customer but rather they charge the service providers. During the trials, the MNOs concluded that they should not charge the customers anything because the customers are not willing to pay for a technology but rather they want to pay for a service. Furthermore, it is not the mobile operators that provide the service, but rather it is the service providers and therefore the service providers should decide how the customer pays. According to Bouygues Telecom, the service providers are charged a set-up fee and a fee per active customer per year. The latter can be done as a percentage of the transactions, a yearly fee, or a monthly fee, depending on the partners and the different businesses.

During trials, service providers generally accepted whatever business models the MNOs suggested. Moving to commercialization, the business model rises in importance and some of the service providers conclude that the business model suggested by the MNOs does not work in their industry.

When BPass was tested as a pilot, Veolia Transdev had different business models depending on the operator. The business model suggested to them as part of Cityzi is a monthly fee. Veolia Transdev is currently in negotiations with the MNOs to change the business model, from a monthly fee to a one-time payment. A fixed one-time payment would be better aligned with Veolia Transdevs current cost structure, as it would correspond to the cost of manufacturing a card. In addition, a one-time fee could at least partly be paid by the end-user, serving to discourage behavior where people download the application only to ever buy one ticket. Veolia Transdev's suggestion is that after installation, the MNOs would only earn a commission when the telephone bill is used as the method of payment. This is in line with Veolia Transdev's pronounced independence from MNO resources: "*And once we have the installation in place, then we feel that there is no real added value from the mobile network operators. Except in the case where they are proposing the solution for payment.*"

According to Veolia Transdev, some of the MNOs are fine with changing the business model, whereas others would prefer having an identical business model in all applications (for banks, retailers, transport etc) and for all operators. From the point of

view of Veolia Transdev, a unified business model is not realistic, as there are differences between the industries: "*Public transport, it's a loss-making business. Let's say, when you pay a ticket for €1, usually it costs much more to the community, so we are not in a position to create additional revenue due to NFC.*" Quite to the contrary, Veolia Transdev sees investments in NFC as a way to cut costs.

HighCo suffers from the same problem as Veolia Transdev. The business model suggested by the MNOs does not fit its existing business model. As described by HighCo, the operators' business model is to charge a fee for each user. Initially the MNOs wanted to charge 8€ per active user (i.e. a user having the couponing application on their NFC mobile handset). From the point of view of HighCo, this fee is too high as it is very high in relation to the revenue HighCo can make on each user on their side. They cannot sell 8€ worth of couponing campaigns per each user because so few users are equipped with an NFC mobile phone. When HighCo currently proposes a couponing campaign to a brand, the price is based on the number of consumers that can be reached through the campaign. They cannot do this with NFC because "*there is no audience*".

For HighCo, their participation in Cityzi was motivated by testing their NFC couponing wallet. Therefore, HighCo – for the test only – more or less accepted "*the business model imposed on them by the mobile operators*". HighCo accepted the mobile operators' business model for the test but they realize that this business model is not the one that can be adopted in the future when these kinds of services are commercialized. A revenue sharing model would be preferred by HighCo. HighCo would be willing to partner with the MNOs. Together the MNOs and couponing agencies could deploy an NFC couponing solution to a mass audience. Once the couponing wallet is being deployed massively, everybody can again guarantee a reasonable reach to brands using this channel in couponing campaigns. Then the brands can turn promotional NFC couponing campaigns into sales. The proposed business model would be similar to the one currently used by HighCo in web couponing. Today, HighCo might publish the coupon on their own website, using their own infrastructure, in which case there is no revenue sharing. In the case that they use a partner's website, they accept to share the revenue generated on this web couponing campaign with the partner. If the same model is applied to NFC couponing, the mobile operator is considered the partner and they get some part of the revenue generated through NFC couponing campaigns.

5.3. Direct and indirect users in mobile NFC service commercialization

The commercial launch of a mobile NFC service or a multi-service mobile NFC offering leads to network expansion in the using setting. The using setting includes the direct and indirect users (Baraldi et al. 2011), in this case the consumers as well as the business users such as stores that enable NFC payments in order to cut down on queue times.

The commercial launch of Cityzi meant an increase in the number of consumers acquiring NFC mobile phones and becoming mobile NFC service users. The banks implemented NFC in retail, bringing retailers to the network. The experience of Crédit Mutuel CIC suggests that trials are always easier to manage because there is a reduced number of actors in comparison to commercial deployment. A trial might just involve a single location and a single retailer. Likewise, the number of users in trials is limited. The usage setting continues to expand as commercialization proceeds. Further launches of Cityzi in other locations will involve increased sales of NFC mobile phones in these locations as well as expanding the acceptance network locally. Beyond selling more NFC phones and installing more NFC-capable payment terminals, bringing new actors to the network might take place in other ways. Many retailers have already updated their terminals but the NFC functionality might not have been enabled yet. This will be done when Cityzi launches in these cities. As for the number of NFC mobile phones in the hands of consumers, some 200 000 people in France had a Cityzi compatible mobile handset at the time of the interviews, but the MNOs were not communicating this as there are not enough services available. When new services like payments in Strasbourg and Caen or later in Bordeaux and Marseilles are launched, at least Bouygues Telecom will start to communicate to the customers in these cities that they can use their handsets for different services. In terms of payment terminals and NFC mobile phones, potential members of the usage setting have sleeping or waiting resources that can be activated when NFC services are launched in the area.

The resources available in the potential using setting are taken into account when actors make launch decisions. Veolia Transdev will not necessarily follow Cityzi to new cities but will proceed on its own in rolling out its BPass solution in other locations. Veolia's path is partly determined by existing relationships: some cities buy public transportation services from other companies instead of Veolia Transdev. Veolia Transdev's priority in deploying BPass will be the cities where they are already the

public transport operator. Among these cities, different resources are available. Some cities are using a contactless protocol that is not compliant with standards. Veolia Transdev plans to first go ahead in networks that are compliant and wait for the terminals to be updated in the other networks.

The users of mobile NFC services are impacted by the availability of NFC mobile phones. France is one of the rare markets where a clear vision for mobile NFC services has started to emerge. This means that handset manufacturers lack the motivation to market NFC mobile phones. The availability of NFC mobile phones at the time of the Cityzi launch was not what the AFSCM and the MNOs had hoped so they had to proceed to commercialization with just one Cityzi-compatible phone. This phone, Samsung Player One Cityzi, was slow and unattractive in comparison to many other smart phones in the market. This meant that it was mainly purchased by people that were not especially interested in technology. This was reflected in the constitution of the user population for different services. When this was the only phone available, the average age of the BPass users was about 50 – 60 years. For HighCo, this meant a less innovative test population than they had hoped for. Additionally, the potential users of HighCo's application were limited to the clientele of the three Franprix stores where the solution was being tested. The application had enough users to be tested with regards to technology but not enough to allow for further developing the service based on customer feedback.

Throughout the process, the AFSCM worked "*to ensure that it was not a French-only solution, to cooperate with international bodies, such as Global Platform, Visa, and MasterCard, and to convince players outside of France that it was something interesting.*" (Bouygues Telecom). The international part was extremely important because it was the only way to convince the handset makers to develop and market NFC mobile handsets.

Still during the commercial launch of Cityzi, the biggest complaints coming from consumers have been related to availability in the using setting: the services not being available on all mobile phones and there being too few locations where the services could be used. Crédit Mutuel CIC identifies these two as the biggest challenges in the commercialization phase: "*So if we solved these two issues, I think it will be big use in the deployment of the service.*" The first issue is easing as more and more phones are becoming available. It makes a big difference from the consumer point of view that the

solution is available on the latest smart phones. The work continues on the acceptance side: Crédit Mutuel CIC is installing contactless PoS terminals at different merchants' and retailers' locations. Earlier, they had pilot partners but now in the commercialization phase they have discussions and are installing acceptance with all the retailers, all over the country.

6. Conclusions

The purpose of this thesis has been to explore service innovation and commercialization processes in a context that necessitates the collaboration of a large number of actors from different industries. NFC services promise to revolutionize everyday life as an NFC-enabled mobile phone replaces the user's keys, credit cards and public transportation travel cards as well as enables new mobile services. Delivering on this promise, however, requires collaboration between actors from the mobile telephony industry, the finance industry, the public transport industry, and the retail industry among others. Reconciling the interests of all these actors is full of complexities.

The main contribution of this thesis has been to describe the commercialization of a muti-service mobile NFC offering. The French Cityzi initiative that launched in Nice in May 2010 is the largest commercial rollout of mobile NFC services in Europe so far. I open the perspectives of several key actors involved in the Cityzi project: the mobile network operator Bouygues Telecom that initiated NFC-related collaboration among French MNOs, the public transport operator Veolia Transdev that launched a highly successful ticket and information application, the banking group Crédit Mutuel CIC and its partner Visa Europe, and the smaller service providers HighCo and Nice Côte D'Azur. Based on interviews and secondary documents, I describe the different actors' motivations for going into NFC, their strategic choices during the service development and commercialization process, and their NFC-related networking activities.

The study identifies the geographically limited initial launch of a multi-service mobile NFC offering as a distinct phase of the service innovation process. The launch of a commercial NFC platform is found to lead to network expansion as piloted applications move to commercialization and new service providers join the initiative. MNO resources, brands and business models are identified as key elements of a commercial NFC platform. These elements serve to structure the commercialization network but not exactly as imagined by the MNOs. The different actors give different meaning to the move to commercialization and to the elements of the NFC platform. The beginning of commercialization does not mean the end of tensions. Discussions on branding and business models seem to be intensified by the move to commercialization. The using setting is strongly influenced by influences external to the focal commercialization net

as the slower development of NFC services in many other markets means poor availability of NFC mobile phones.

Many areas for future research can be identified. The Trusted Service Manager (TSM) role is often emphasized in discussion on NFC. An interesting observation is that the interviewed actors do not have much to say about TSM actors, they are simply seen as technical partners. Hearing the perspectives of TSM actors would be of interest in order to confirm if the role of TSM actors really is this limited during service commercialization. Even other actor perspectives, e.g. retailers, could provide new information. For this study, I interviewed actors holding different roles in the commercialization network. This served to illustrate collaboration between actors form different industries. The interviewees even spoke about intra-industry collaboration, but getting a more detailed picture of the dynamics of collaboration between competitors would require studying several actors from the same industry, for example several MNOs and several banks.

While considering the future plans of the interviewed actors, the focus of this thesis has been on the geographically limited initial launch of a multi service mobile NFC offering. Further expansion promises more changes in the networks. This should be studied through case studies spanning a longer time period. Finally, MNO resources were identified as an important element influencing the commercialization network of a SIM-based mobile NFC solution. It would be interesting to see how commercialization takes place when one of the alternative secure elements that lack MNO support is used.

Theoretically, this study sheds light on the little researched are of service commercialization networks. Aarikka-Stenroos and Sandberg (2009) point out that research on product innovation networks has focused on R&D networks, only seldom referring explicitly to commercialization networks. In the context of service innovation, research on commercialization networks is even scarcer. This thesis points to the importance of further exploring this area. Interesting questions that this thesis has only begun to answer include the interaction of pilots and commercial offerings in the same network (e.g. HighCo testing their solution during the commercial launch of Cityzi), and business model tensions resulting from different industry backgrounds.

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