NFC: Business Model issues in Switzerland?

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Abstract

This work is intended for all persons who have an interest in NFC technology and all researchers who want to understand the forces at play in the Swiss environment.

Reference

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« NFC : Business Model issues in Switzerland ?»

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1. Introduction to NFC

The Near Field Communication – NFC – is a technology derived from the Radio Frequency Identification – RFID - used to establish a wireless radio communication between two devices. The range of a typical transaction is up to 10 centimeter or less and operates at a speed from 106 kbit/s to 424 kbit/s according to Anthony J. Sammarco [1]. The RFID technology allows a user, typically the initiator, to send radio waves to a passive tag in order to enable a transaction: data exchange. Contrary to RFID, NFC is an active chip that allows bi-directional exchange. Its most common usage is to emulate smart cards to allow mobile payment. For both technologies, an initiator is needed in order to operate a transaction.

In fact, the NFC technology is not new; Sony and Philips worked together on it since 2004 and established the NFC forum to gather all the knowledge and the expertise from all around the world¹. In 2006, the first specifications were made for NFC chips and the same year Nokia was the first handset manufacturer to distribute a NFC enabled phone. Most of the technical problems were solved in 2008 due to these specification made by the NFC forum. This technology has now an ISO standard: ISO/IEC 14443 [1].

2009 marks the apparition the first Peer-to-peer standards for Near Field Communication. P2P allows the users to send some contact information, URLs and even to initiate Bluetooth connections to mention a few. Samsung announces the first Android NFC user friendly phone in 2010: it is the beginning of the democratization of this particular technology for the common people in Europe.

In fact, this technology was already used by the Japanese NTT DoCoMo with success in most of the shops and service providers as means to pay as J. Ondrus and Y. Pigneur explains us in [2]. Some roll-outs are done at this very moment in the United States of America. In 2015, there will be 300 million NFC enabled handset on the market according to Anthony Sammarco [1].

As the number of handset available on the market and the number of people possessing such an handset, mobile payment volume is also increasing. More and more companies are trying to get in this mobile payment business as Google and Samsung. These two major players are investing a large amount of money to be the first companies to offer this new technology.

NFC-enabled phones are available in Switzerland since the launch of the Nokia 6131 in February 2006. Nowadays Android driven phones such as the Google Nexus and the Samsung Galaxy S3 are NFC-enabled. The technology is available but yet still unknown by users and retailers.

According to a study of Comparis.ch, 48% of the Swiss people are possessing a smartphone² making 2,9 million smart phones holders. In Switzerland, Apple is still dominating the market but in a worldwide aspect Samsung is the global leader in front of Apple.

¹ http://www.nfc-forum.org/home/
² http://www.ictjournal.ch/fr-CH/News/2012/03/20/29-millions-de-Suisses-possedent-un-smartphone.aspx
Although this technology exists for 9 years and is now embedded in half of the phones present on the market, the NFC technology isn’t used significantly. This leads us to our research question: what are barriers for penetration of NFC technology in Switzerland? Ondrus & Pigneur, two Swiss researchers at the University of Lausanne, highlight the fact that there isn’t, in 2006, a technology that has passed the two disruptive phases needed to win over the Swiss market [2]. We are now in 2012 and we can’t see any of this technology.

Quoting the authors: “A technology is considered disruptive when its utilization allows the design of products, services, and processes, with different attributes that have not been valued by existing customers”. A disruptive product can transform the market place. In this specific case, the first disruption would be to pass from a card-based payment to a mobile payment, the second disruption would be to pass from a mobile network operator to a self-driven organization.

To answer this particular question, we will use the STOF - Service, Technology, Organization and Finance - framework described and used by Juntunen, Luukkainen and Tuunainen in [3] in order to understand which forces and issues are at play. The STOF model was created by Bowman and al. in 2008 to analyze the business model attached to the mobile business. The STOF model is an analytical tool to identify critical issues related to different parties [3]. We will therefore use this model to the Swiss situation in order to understand why; in 2012; this particular technology that is NFC isn’t working. This work will be an extension of the previous cited works.

This work is intended for all persons what have an interest in NFC technology and all researchers who want to understand the forces at play in the Swiss environment.

In section two we will review some works related to the NFC technology. In section three we will analyze the Swiss situation using the STOF framework and draw some results. In section four we will comment our work and open a window on future research.

2. State of the art

In this section, we will do a state of the art on the NFC technology in order to understand what are the major advances on this subject. We have decided to sort these papers into three different groups according to their date of publication: “user & services”, “technology” and “business”. We could have divided this related work in more domains but in the business, we have three main part: the user who uses the product and demands or worse abandon the product seen here as “user & services”, the providers and the others actors who have an financial interest seen here as the “business” and finally the technology (“technology”) aspect that is closely linked to security.

In the user & services group, all papers concerning use cases and services will be referenced. In the technology group, we will put all the papers related to the security and the technologies used, problems and solutions. In the business group, all the papers related to actors, business opportunities and business model will be referenced. We will focus on the last group as it is our focus in this paper.
When searching for a NFC paper, we realized the disparities between the different focus. A lot of papers are on technical solutions in order to use this technology and on social aspect to determine if this solution is viable and motivating for the user. Only a few papers are related to the Business Model that is behind these issues. The Business Model has to explain and understand the value-chain related to NFC: what benefits but also what risks for each actors at play.

2.1 User and services

Near Field Communication offers a lot of potential services to the users. According to E. Siira and V. Törmänen in [4], there are three main services with this technology: interaction with tags, data exchange and smart card emulation.

The first service offers the possibility to exchange data with an NFC tag like a smart poster or hotspot tag. With this service, the user can target the desired information with the smart poster or can define a meeting place with the hotspot tag. But this first service offers a lot more possibilities like writing some information on writable tags to exchange some knowledge between users or to sign in a place where friends can meet you. Data exchange permits the exchange of small amount of data through the activation of Bluetooth. In fact, the NFC chip enable and achieve a pairing between two Bluetooth devices. The user must not care about activating his Bluetooth, the NFC chip does it itself. Some examples like pairing a speaker or a printer would perfectly illustrate this service.

The smart card emulation is now the most appreciable service in the sense that the user can register all his smart cards in his phone and don’t carry them with him. His phone become a smart wallet. Google understood this advantage and has created its own smart wallet service: Google Wallet for Android terminals.

Through the review of an application named “Hot in the City”, Siira and Törmänen clarify the implication of the three modes available with NFC [4]. In fact, each possibility has one mode: reader(writer) mode for the tag interactions, peer-to-peer for the data exchange and emulation for the smart card. The user must switch between the mode before activating another service. The default mode is reader(writer) mode. It is not clear now for the user how to use each mode for each specific situation.

In [5], Franssila expose us a user experience and acceptance scenario based on professional guarding. Each guard must pass his NFC-enabled phone near to a NFC tag in order to check his guarding route. This real-life experience shows us that most of the users judge positive the NFC technology and would use it as a replacement for the old technology that is scanning bar codes. Usability and reliability are keys factors for user experience. Compared to the different alternatives (see 2.3 Business), NFC beats the older technologies.

Riekki, Sanchez and Pyykönen decompose for us the Interaction Model they have created in [6]. This model is composed of three phases: discovery, composition and application phases. In this model, the user is in an interactive space where tags are distributed all around. Before using the application, the user has to be aware of the environment around him. The user performs the discovery stage by scanning visually the space around him to find resources to interact with. A resources can be a token, a
tag or an object. Then the user compose the application he wants to use by selecting the relevant resource needed. He reaches the last stage by launching the application and communicating with it. But to interact with the space and resources around him, the user needs to be aware that some resources are located around him. That is where the NFC tag advertisement comes in. In fact, the tag must be visible and enough comprehensible in order for the user to utilize it. The authors of this paper list elements that must be visible for the understanding of the user: the attention element, the technology element, the interaction element, the action element, the context element and the action element. Further information on these elements can be found in [6]. They also developed a set of application prototype: “Touch&Control”, “Touch&Collect”, “Interactive Poster”, “Touch&Vote” and “Touch&Learn”. These application prototype will help to categorize and understand in which application the user is in. “Touch&Control” allows to the user to control a multimedia player, application by touching the different tags in the environment. In “Touch&Collect”, the user can interact with the tag by withdrawing the information stored in the tag and by dropping some information in the tag. It is a sort of data exchange. The “Interactive Poster” is the most common example when it comes to talk about the NFC technology: the user can access to some context sensitive information linked to the poster like some more information, some video and even to post a comment over the internet to cite a few. “Touch&Vote” allows the user to vote for some of his interests and “Touch&Learn” is mostly used in the school to touch some objects and to show information on the object.

As we have seen in these papers, there exist a lot of application linked to the NFC technology. This technology builds an easy to use and rich interaction with the user. Entering data, giving command or creating links between resources in the environment are key tasks that NFC can accomplish. It is perfectly suited for context-sensitive functionality but it does not replace the other means of communication with application as the keyboard and the mouse. NFC is suited for individual inputs and slow action. It is preferable for individual inputs but not for fast sequences. To illustrate this fact, we could consider the example of mobile payment. First the user needs to switch from reader/writer mode to card emulation mode which may take some time. Then he receives the input of the payment terminal and respond to it. In this action, there are only individual inputs: payment terminal and card emulation. As we know, this action is quite slow. Let’s take the example of someone rushing to take the train. In this case, NFC won’t be suitable for the situation. In fact, the user will prefer to buy the ticket using an online application like the Mobile CFF one. He is not bound to pass near to a NFC terminal to create a connection and enable mobile payment. He will pay online and receive the ticket later.

The Smart Card Alliance, in [13], give us a matrix containing all the mobile payment possibilities according to the size of the payment size (micro and macro) and the type of payment (remote and proximity). A micro payment is less than 25$ as a macro payment is above 25$. A micro payment doesn’t ask such a security infrastructure as a loss of such a small amount is not damaging. Micro payments are much easier to implement than macro payment because of this security need.
Remote payment is done without the proximity of the mobile device. Remote payment can be done anytime and anywhere without a physical need to be close to the POS. On the contrary, proximity payment requires the consumer to be close to the POS. Contactless and NFC are part of the proximity payment.

The next matrix resumes these conditions:

![Mobile Payments Sizing, Technology, Proximity](image)

In the next subsection, we will describe the technology used in order to enable NFC and the security concerns that are linked to this particular technology.

### 2.2 Technology

The use of Near Field Communication technology raises a lot challenges for engineers. Security is one of the most problematic issues as the user won’t trust this technology if it seems not enough secure to him. In his smart phone, the user has almost all his pri-

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3 Taken from: Smart Card Alliance. Proximity Mobile Payments : Leveraging NFC and Contactless Financial Payments Infrastructure 2007.
vate data stored in and sometimes even his work related data. Nowadays, smart phones are not just phones but are personal assistant and the major part of the users can’t even think about not having their smart phones with them. For these reasons, the NFC technology must be perfectly secured.

As the most common usage of NFC would be ticketing and credit card emulation, the security should be maximum in order to avoid fraud. In fact NFC requires less than 10 centimeters to establish a connection, it sensitively reduces “skimming” and “eavesdropping” [7].

Skimming consist in “an electronic method of capturing a victim's personal information used by identity thieves. The skimmer is a small device that scans a credit card and stores the information contained in the magnetic strip. Skimming can take place during a legitimate transaction at some business⁴”. Eavesdropping is “the unauthorized real-time interception of a private communication⁵”. It is better known as sniffing.

Ann Cavoukian of Privacy by Design [7] gives us 7 foundational principles to mitigate risks :

- **Proactive not reactive; preventive not remedial**: device manufacturers and application developers should always asks the users for a formal acceptance to enable an interaction. An example could be “would you like to enable a connection between your phone and this service?”;
- **Privacy as a default setting**: manufacturers and developers should adopt the privacy setting as a default setting meaning that no other device could initialize the connection with the users device;
- **Privacy embedded into design**: user should have the possibility to disable the NFC capabilities and the application should inform the user of which information will be exchanged;
- **Full functionality**: “a data governance policy should be defined that clarifies what personal data is being collected and its intended purpose, by the service launching the smart poster tag”;
- **End-to-end security**: on each interaction, the device identity should be regenerated and no persistent linkage should be done;
- **Visibility and transparency**: “keep the practices open and transparent to users”;
- **Respect for user privacy**: provide a privacy notice on each tag or POS to explain what and which information will be used for what purpose.

Linked to this topic of privacy and security, some engineers have proposed secure element (SE) alternatives to host information and applications.

“A Secure Element is a tamper proof Smart Card chip capable to embed smart card-grade applications (e.g., payment, transport …) with the required level of security and features. In the NFC architecture, the Secure Element will embed contactless and NFC-related applications and is connected to the NFC chip acting as the contactless front end. The Secure Element could be integrated in various form factors: SIM Cards, em-

⁴ http://www.investopedia.com/terms/s/skimming.asp#axzz2CCKz51j
⁵ http://searchfinancialsecurity.techtarget.com/definition/eavesdropping
bedded in the handset or SD Card\textsuperscript{6}. This secure element is used in the card emulation mode, the two other modes do not benefit of the secure element.

There exist four different SE alternatives: the non-removable ones and the removable ones. Reveilhac and Pasquet define these different solutions in [8]. The first class is composed of the Baseband processor and the embedded hardware. The second class of SE is composed of the Universal Integrated Circuit Card (UICC) and the Secure Memory Card (SMC).

The baseband processor is one key element that allows the smartphone to connect and manage operations. It is highly secured and could host information without having to modify the phone architecture. Plus the user would not have to insert an hardware that he could lost. But this solution has a drawback, there is no standardized protocol between the baseband and the secure element. The other non-removable SE is the embedded hardware. In this case, the hardware – a smartcard - is soldered into the smartphone. The security is high as a smart card but the user can’t remove the SE to put it onto another phone leading to some interchangeability problems (phone is lost or put the smartcard in another phone).

The SMC and the UICC are removable hardware. The first one is a memory card with smartcard attributes. It would be as secure as a smartcard plus it would be reusable with another smartphone. But the problem is that the phone or device should have a slot to put this SMC. Same problem as the baseband processor, there is no standardized protocol yet.

The last SE is the UICC, sort of SIM card mixed with a smartcard. This solution would replace the SIM card but though give access to GSM and UMTS. The UICC could host SIM and (U)SIM applications used by multiple application provider. This solution would be the most effective one. Since 2007, the European Telecommunications Standard Institute (ETSI) approved a standardized protocol named Single Wire Protocol (SWP). The UICC is in fact the most promising solution concerning the secure element as it is removable, secured and standardized.

The financial implications between Mobile Network Operators and banks of these secure elements will be discussed in the business part of this literature review.

\footnote{http://www.eurosmart.com/glossary/Glossary-1/S/Secure-Element-323/}
2.3 Business

This last part of our related work introduces us to the business aspects of Near Field Communication. In this part, we will review the actors who are playing in NFC and the relations they have between them. We will also introduce the notion of Platform Manager.

According to Ondrus & Pigneur in [9], we can class the different stakeholders in five classes: financial institutions, mobile telecoms, retailers, technology providers and public transportation.

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7 Taken from: Smart Card Alliance. Proximity Mobile Payments: Leveraging NFC and Contactless Financial Payments Infrastructure 2007.
Fig. 3 : five class of stakeholders

The authors use the multi-actor multi-criteria (MCDM) approach to conduct a market assessment for future payment systems including RFID and NFC. The MCDM approach has two phases: an assessment of the current situation (current alternatives – RFID) and an assessment of a possible future situations (current plus future alternatives – NFC). In 2005-2006, the Swiss market was still quite immature and not reactive to the NFC technology. In fact, this particular market could be seen as an enabler or a disabler according to Ondrus & Pigneur [9]. The first possibility could be realized because of the little actors on the market, this situation could simplify the agreements between these few actors. On the other hand, this particular characteristic could be a disabler because of the weight of these actors.

The financial institutions have big clout in the payment sector and they have the ability to put in place a good business plan. Mobile telecoms such as Swisscom have captured a strong relationship with their customer. Retailers like Migros have a high volume of transaction and a large amount of point of sale distributed in Switzerland. The results of their analysis show that in 2007, card technologies such as smart cards are still preferred by Swiss citizens. As NFC is not in 2007 a widely proposed technology, the authors can’t evaluate it. But in the second phase of their work the NFC technology is assessed. Results of their surveys show that in comparison with other mobile phone-based technologies, NFC performs much better.

In 2005-2006, there is a trend for contactless technologies as it performs better than the magnetic cards.

But the market is still immature to introduce the NFC technology: agreement between the different stakeholders must be made in order to see the near Field Communication technology rise in Switzerland. But what relations have these actors?

G.Madlmayr, J.Langer and J.Scharinger [10] assume that only a cooperation between mobile network operators (MNO) and all other actors is necessary to put in place the
ecosystem needed to implement the NFC technology. The problem is that each actor wants to make profits in introducing a new technology which makes their relationship tense. Many actors have not yet worked together and their Business Model are in conflict with the other participants.

As high lightened in Managing an NFC Ecosystem [10], the relation between financial services (FS) and MNO is competitive and not cooperative unlike in Asia. Remember the DoCoMo case, actors are in a cooperation state of mind and not in a competitive. It is in Europe that these two actors are the most sworn enemies and competitive industries. They are sworn enemies because they play in the same arena: customer relationship gathering. In fact, they want to keep for them the relationship they have with the customers. As we explained before, the technological aspects are pushing the UICC methods but this method would discard the banks from their main goal: gain & keep their customer.

As a consensus is not found yet between MNO and FS, Madlmayr, Langer & Scharinger are proposing a neutral instance: a Platform Manager (PM). This PM would have duties of managing applications in a secure element and keeping all the keys in order to update or remove data. This neutrally done, there would be no competition between MNO and service providers (SP) such as banks.
Introducing a PM would also benefit to the user in term of MNO change as all data would be managed by another instance as the MNO. He could freely change MNO without being bound by some secure element.

Sarah Clark in [11] addresses in her “NFC Business Models” white paper some key questions, divided in five chapters, that need to be resolved before deploying a NFC infrastructure:

- Infrastructures: what technical and operational functions does an NFC infrastructure need to perform? Who needs to be involved in planning an NFC infrastructure and how can the planning process be implemented? Who should own an NFC infrastructure and what are the advantages and disadvantages of the different ownership options available?

- Secure element issues: what options are available to MNOs, handset manufacturers and other service providers? How can service providers be persuaded to pay a large fee to cover the costs of developing and making NFC service delivery platform and of issuing NFC devices to consumers?

- NFC in payments: What are the possibilities available for delivering new types of payment instruments that can generate new business revenues? Will con-
sumers pay for NFC payment services? What are the benefits to the banks of providing NFC services? Do these benefits outweigh the costs?

- Gaining buy-in from consumers and service providers: What will drive consumers to choose devices that include NFC technology especially if they carry a higher price tag?

- Launch strategies: how can critical mass be achieved? What types of launch strategy will work best?)

In [11], Sarah Clark highlights in her “NFC Business Models” ten most important key findings on the twenty-five discovered in the full report of SJB Research:

- The way the NFC infrastructure is designed by the developer has a direct impact on how the providers will stand for NFC or not. An open infrastructure will foster business to business exchanges and innovation. This design will affect the whole NFC infrastructure.

- The ownership of the NFC infrastructure should not be in one hand or in a few. In fact, the service providers will be less inclined to use a NFC service backbone of one owner as this owner can decide to stop providing the infrastructure. Service providers prefer an open infrastructure that is flexible and more inclined to accept change. Sarah Clark gives us the example of internet and companies that have built a global business but who don’t own the internet infrastructure.

- Mobile payment is the core service promised by NFC. It is critical and complex. But customers will also want to use the other features of NFC (peer-to-peer and tag reader).

- NFC mobile payment will drive the market but this functionality is not used in a wide range of application. New NFC services will emerge as the adoption of NFC will grow. New applications will be targeted to some specific group of business and consumer.

- The NFC technology will redesign the whole payment process and the impact of this new payment means is only at the early stage. This redesign is seen as a threat for most of the financial services as they have to change their processes and way of doing their business but it will create major opportunities for newcomers.

- In order to be a success, service providers should foster consumers to use this technology. Using it only once a day/a customer won’t be enough to make profits out of the infrastructure.

- “The key to being able to bring service providers on board is to gain an understanding of how particular service providers’ business models work and what advantages NFC offers to them. In that way, means can be found to work with them to create NFC services that add to the profitability of their operations, ei-
ther by generating new revenues or by saving them money - or, ideally, both. A successful mass market NFC deployment will need to provide a unique selling point (USP) for each of the major consumer demographics and the businesses that serve them.”

- In order to fulfill the mass market deployment, the good demographic groups and target need to be chosen as they will foster the use of this technology. They will be the launch pads for later mass market deployments. For instance, [11] notes that business travelers and household budget owners are the perfect target groups. It is far easier to attract them then to attract service providers.

- “NFC’s ability to generate revenues from advertisers and marketers offers the potential to drive entire new revenue streams. By linking a consumers’ transaction history to their current location, NFC offers the potential to deliver the kind of highly targeted, location based advertising solutions that marketers will pay top dollar for.”

- “The current area of business in which a company is involved can color the way in which the NFC market is perceived, and this can result in a blinkered approach to building a business model for NFC. A mobile network operator, for instance, is likely to see NFC as a mobile technology. A card industry executive, on the other hand, is likely to see it as a payments technology. To make the most of the potential of NFC it is important to step back as far as possible from day to day responsibilities and to look at NFC from a neutral perspective in order to understand the true overall potential of the technology and how best it can be applied to the needs of a particular business.”

Written by Sarah Clark, this white paper [11] is the first paper on NFC Business Model and these findings will be helpful for our analyze in section three. It also comfort some solutions chosen by older papers.

This literature review leads us to our problematic: what is the Business Model of the NFC technology in Switzerland? As described in the introduction, we will use three articles [2, 3] in order to answer to this specific problematic. We will also use the findings of Ondrus and Pigneur in [9] which is the continuation of [2]. The first article describes an approach to explain why there is a delay in mobile payment in Switzerland. The authors use two tools: the disruption matrix and the multi-criteria decision-making method in order to analyze the causes of the delay.

The disruption matrix is split in two parts depending on: the technology used and the service providers involved. The first disruption would be a technology-based disruption and would be passing from smart-cards to mobile phones payment. The second disruption would be to switch from a dominant operator-driven to a self-organized solution meaning that Financial Services and Mobile Network Operators wouldn’t be the only ones to offer mobile payment.
The second method is the MCDM used usually for decision-making. This approach is based on the concordance and discordance indexes with the outranking relations. The concordance index measures the proportion of which action should be done over another and the discordance index measures the proportion of which action is worse than another. These indexes can be seen as satisfaction and dissatisfaction measures according to Ondrus and Pigneur in [2].

The result of this work provides a realistic view of the Swiss market in 2006. The first disruption never happened as the smart-cards are preferred in comparison to the mobile phones for payment. But a fact leads us to the conclusion that this disruptive phase will come: smart-cards are preferred to magnetic cards. The second disruption is less clear in the long term. In fact, an independent consortium or association would be a good solution for many Swiss actors but solutions need to be found in order to create such an independent organization.

Conclusion is that in Switzerland, in 2006, there is no disruption in favor of the mobile payment but there are signs that lead us to think that these disruptions will come. Note that is 2006, the NFC technology wasn’t available in Switzerland and that it could change the situation.

The second article [3], written by A. Juntunen, S. Luukkanen and V.K. Tuunainen, is an identification of the critical Business model issues of the NFC technology. Using the STOF model, the authors are holistically able to discover the reasons why this NFC Business Model isn’t working in Europe now. They are giving us clues of who are the actors and what stakes are involved in NFC. We will use this STOF – Service, Technology, Organization and Finance – in order to highlight the Swiss actors and the stakes involved.

The STOF model is a framework that allows the description and design of Business Model offering tools to identify issues related to different participants [3]. It is divided in four parts: service, technology, organization and finance. We will give a brief description of these four domains.

The service domain is focused on the customer value of the service. In the value proposition, we compare the existing service to similar services and previous versions of
the service. It also examines the notions of: customer segmentation, pricing, ease of use and context of use.

The technology domain concentrates on concepts such as technological architecture, applications, security authentication, management of user profiles and devices.

The organization domain focuses the value network needed to realize the specific service. This network consists of different actors and stakes. Each actor has his own resources and capabilities.

The finance domain analyzes the different financial arrangements between the actors. Each actor wants to create a financial benefit in the introduction of a new technology. This domain includes notions of costs, revenues, capital and risks.

In [3], the authors focused on some specific aspects of each domain. In the service domain, Juntunen, Luukkainen & Tuunainen have decided to focus themselves on the end-user value proposition and the use context & customer segmentation issues. In the technology domain, they proposed to analyze the handset availability and the secure element. In the finance domain, they propose some solutions and hints. Only in the organization domain, all aspects are covered. Conclusions can be found in [3]. In this work, we will propose to answer some of the others aspects of the STOF model regarding the Swiss current situation.

3. Analyze of Swiss situation concerning NFC

In the previous sections, we have seen a state of the art concerning the NFC technology divided in three parts. In this section, we will draw our hypothesis of work on the current Swiss situation and then give an overview of the framework and use it to analyze our national situation.
3.1. Hypothesis

When it comes to NFC, the lambda end-user is unaware of its existence. In fact, only people interested in new technologies know what is the Near Field Communication. This is due to the fact that there are only a few advertising of the NFC technology, only a few point of sale (POS) using NFC and almost no fixed NFC devices (NFC tags and smart posters). The major advertising will be made by the telecoms for the national situation and the technology providers for the international situation. In a few years, all POS will be replaced by contactless POS as the financial institutes and technology providers are pushing the retailers and public transport operator to update and change their equipment. We can assume that in a few years, all point of sale will be contactless. As the actors will be using this technology, fixed NFC devices will appear.

As we have seen, 48% of the Swiss population owns a smart phone and this number is constantly growing. A significant part of this population owns a NFC-enabled device in their pocket but is just not aware of what kind of service this technology could offer as they can’t experience it in real life. The major part of the Swiss population has an Apple device and these devices don’t support NFC, this might be also a reason why the Swiss people don’t know about it.

In fact, Apple don’t believe in this technology so they don’t put it on their handsets and communicate as few as possible on it. The reason is that if Apple doesn’t a non-proprietary technology in their smartphones. This company doesn’t want to depend on competitors, especially on Sony and Philips. The near field communication is an open technology standardized by ISO, everyone can use this technology and this is against Apple’s strategic plan. This open technology is more seen as a threat in the sense that if the Cupertino firm develop new applications and brevets based on this technology, other companies will try to appropriate and use them illegally. All these reasons explain why Apple is reluctant to use this NFC technology.

Just like Apple, this technology hasn’t been pushed by the different actors in Switzerland. Google with its Android OS is pushing NFC with the technology providers but we can’t see the results of this promotion in Switzerland. As explained in the introduction, there are countries like Japan where NFC is a total success, some countries like the United States are doing some large scale roll-outs but in Switzerland there are no such things. The question we will ask ourselves is “why aren’t we using and seeing NFC in Switzerland?”

The NFC technology is more or less a chicken or egg problem: the actors involved in the implementation of this technology want to have a consequent demand before putting in place an infrastructure and the retailers want to see the technology at work before upgrading their POS and devices.

Obviously, in Switzerland, there are some factors that are hindering the adoption of this technology. We believe that these reasons are on the upper level: the Business Model (BM) level.

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8 http://www.ictjournal.ch/fr-CH/News/2012/03/20/29-millions-de-Suisses-possedent-un-smartphone.aspx
9 http://www.patentlyapple.com/patently-apple/2012/09/apples-iwallet-is-inevitable-nfc-or-not.html
Let’s recapitulate the elements of the hypothesis concerning the Swiss situation:
- Swiss people are mostly unaware of the NFC potential;
- No NFC infrastructure to enable possibility of transactions;
- The problem lies in on the upper level: the Business Model level;
- It could be solved by creating an agreement between the big actors.

3.2. STOF Framework

In order to conduct an analysis of the Swiss situation, we need a consistent framework. We have chosen a framework that is especially made to analyze business models. In fact, it suits perfectly our problematic as it gives an holistic view of the situation and helps to identify key points that maybe cause a service to fail at the early stage of service innovations.

In order to have this holistic view point, this framework analyzes four domains: the Service, the Technology, the Organization and the Finance domains. Each of these domains contains their own key points and issues. The STOF is “a step-by-step approach to design business models for specific services10”.

In this work we won’t complete the whole framework, as we don’t have all the data to perform a consistent analysis, but only the first steps: the business model outline. In fact, to use the rest of the model we would have needed experts in all domains to confirm or infirm our conclusions. We will discuss this point at the end of this paper as opening for other researchers.

---

In the following picture, one can see how this framework is used and where are the keys questions and key points to use:

![STOF method diagram]

The exploitation of a new service or concept begins with the new service idea: “proposing a low range data transmission that is contactless and active”.

**Step 1** consists in asking the basic questions:
- what implies the offering of a such service?
- with which technologies?
- who are the actors and what organization will be put in place?
- What financials implications?

After answering these questions a first BM can be outlined.

**Step 2** will consist in applying the Critical Success Factors (CSF) in order to evaluate the outlined solution. These factors are the necessary element for an organization in order to achieve its mission. If the solution satisfies all the CSF then the process stops and the solution is validated. But in other cases, the specification of Critical Design Issues must be identified.

---

This leads us to step 3: identification of CDIs and redefinition of the solution. The new design for the Business Model is proposed.

Step 4 involves to check for both external and internal issues. It leads to a robustness check. Finally, if all these checks and steps are fulfilled, the BM is approved: the solution is viable and feasible.

3.2.1 Service offering

In a presentation\textsuperscript{12}, H. Bouwman gives us more details about his framework. He details the four domains and gives us the critical design issues linked to each domain. We will briefly see the content of each domain and the critical aspects of each domain.

In this picture you can see how the service is created and offered to the customer:

![Fig. 9 : Service offering](http://www.cse.tkk.fi/fi/opinnot/T-109.4300/2009/luennot-files/stof.pdf)

The service design depends on external stimuli: the previous versions of it, the financial arrangements, the technical functionalities and the technical architecture. Each of these stimuli will influence the service design. The service has four values, two from

the customer and two from the provider. When offering a service, the designer must take into account the value expected from the customer and the perceived value of the consumer. The perceived value and the intended value are the key points to consider when offering a service. The first one is the customers’ opinion of a product’s value. It depends on the product ability to satisfy the customers’ requirements. It may have no link with the market price. As we have seen with the Apple case, the product fulfills the customers’ requirements, this even with the high price. The second one is the value planned by the providers. In fact, it is the value that the providers wish to bestow to the product. The value planned is summarized in the value proposition. The value proposition is: “a promise of value to be delivered and a belief from the customer that value will be experienced. A value proposition can apply to an entire organization, or parts thereof, or customer accounts, or products or services”.

Based on this, Bouwman identified five critical design issues:

<table>
<thead>
<tr>
<th>Critical Design issue</th>
<th>Description</th>
<th>Balancing requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating value</td>
<td>How to create value for end users?</td>
<td>Technological possibilities vs. user needs and wishes</td>
</tr>
<tr>
<td>Branding</td>
<td>How to promote/brand the service?</td>
<td>Operator vs. content brand</td>
</tr>
<tr>
<td>Trust</td>
<td>How to enhance end users’ trust in the service?</td>
<td>Security vs. ease of use Privacy vs. added value</td>
</tr>
<tr>
<td>Customer retention</td>
<td>How to stimulate recurrent usage of the service</td>
<td>Customer lock-in vs. customer annoyance</td>
</tr>
</tbody>
</table>


Fig. 10: Critical design issues in service domain

There are five critical design issues in the service domain. Each of these issues need to get the right balance in order to be corrected. For example, the “Creating Value” design issue is resolved by balancing the technological possibilities and the real user’s needs. Companies want to push the technologies that generates high cash flows but these technologies aren’t always what the user needs. “MiniDisc” is one good exam-
There was a technologic possibility so the companies jumped into this but there wasn’t a real need from the users. In fact the Compact Discs were big enough for them. Sony pushed this technology and it failed in balancing requirements: there wasn’t a real need from the users.

Targeting can also become a critical issue. In fact, companies should consider two options: targeting private consumers or businesses. A service can be suited for a specific type of consumer. Taking the example of Blackberry, it is more suited for production and therefore for businesses consumers.

The branding of the service can also become an issue. In fact, a maladjusted promotion can ruin the service itself. When promoting a new service, providers should be careful on how to promote it. Providers should also ask themselves on which brand they should commercialize their service. Does it fit the actual brand or should we create a new brand and thus a new vision? That is the type of question that providers should worry about.

Trust is another issue: a service should always do the balance between security & ease of use and privacy & added value. Let’s take the example of the iPhone: the ease of use is spectacular but there are lots of security problems. The example of the lock-screen code bypass on the iPhone is typically one. Privacy should also be a concern for service providers.

Is the service offering an added value when using all these information or is it privacy issue? This is the type of question one should ask. The personal data collected should be reasonable and the service should access only to what it needs.

Apple is the customer retention specialist. With iTunes and its backup system, meaning that a non-specialist can’t access to the data contained in the backup, Apple keeps the customer to continue to buy Apple products. As the consumer can’t freely extract its data and transfer them on a different device, he or she thinks carefully when choosing a new device. Also an important fact is the fact that consumers don’t want to change their habits. One they are in the Apple Ecosystem, they stay in it like captured.
3.2.2 Technical architecture

In the next graph we can see how a technical architecture is implemented:

![Technical Architecture Diagram]


Fig. 11: Technical architecture

In this graph, you can see how the four domains are linked. The service domain influences the technical functionality. The service definition dictates the functionalities needed, the requirements gives the requests and desires of the service. The actors own and invest in the technological architecture. In fact, they influence directly the architecture. As they push the new service, they decide what will be the foundation of the service. By foundation, we mean how the technological side will be structured.

Last but not least, the technological architecture generates costs. Each architecture has its own particularities and therefore its own costs. Obviously, an easy design will induce low costs of both solution establishment and further maintenance. The technical architecture and functionality are the core of the technology aspects. Without these, the service wouldn’t exist. The technological architecture structure and holds the functionality of the service, they are linked. In fact, the functionalities desired influence the choice of structure and vice versa. A mistake in one of them can be fatal for the product.
To avoid this kind of problems, here are gathered the main critical design issues:

### Critical design issues in technology domain

<table>
<thead>
<tr>
<th>Critical Design issue</th>
<th>Description</th>
<th>Balancing requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security</td>
<td>How to arrange secure access and communication?</td>
<td>Ease of use vs. abuse and privacy.</td>
</tr>
<tr>
<td>Quality of Service</td>
<td>How to provide for the desired level of quality?</td>
<td>Quality vs. costs</td>
</tr>
<tr>
<td>System integration</td>
<td>How to integrate new services with existing systems?</td>
<td>Flexibility vs. costs</td>
</tr>
<tr>
<td>Accessibility</td>
<td>How to realize technical accessibility to the service for the target group?</td>
<td>Open vs. closed system</td>
</tr>
<tr>
<td>Management of user profiles</td>
<td>How to manage and maintain user profiles?</td>
<td>User involvement vs. automatic generation</td>
</tr>
</tbody>
</table>


Security, Quality of Service (QoS), system integration, accessibility and management of user profiles are aspects that can bring critical design issues. QoS is one main issue and not only for the technological aspect. The service should have a certain quality for the costs generated. A product or service that is way too expensive relative to the quality offered will fail.

As part of a complete ecosystem, a service should be able to integrate into the legacy system. It shouldn’t be independent and raise complexity. As mobile services are growing, car producers are starting to integrate them in their vehicles.

As for the customer retention aspect, Apple is also the champion of closed system and thus non-accessibility. Its iOS and iTunes are the best example to explain what is a closed system. Cupertino restrain the usage of non-proprietary applications in their products. The most recent example is the Lightning cable that contains a micro-chip to enable the loading of the iPhone. Without this chip, the phone simply can’t charge.

The Management of user profiles can also generate critical issues. Providers must maintain the fragile balance between user involvement and automatic generation. If the user feels that he or she must always put some input in the system, he will stop using the service.
3.2.3 Organizational arrangements

The next graph shows us how the organizational arrangements are made in order to create a service:

Like the previous graphs, we can identify what criteria of each domain influences another domain. Here the technological architecture, the investment sources, the costs, the financial arrangements and the delivered value are influencing the organizational arrangements.

The value network is the core of the organizational arrangements, consisting of actors and interactions between them. Each actor has different interactions with the other actors. Regarding our NFC case, the Mobile Network Operators will have some different interactions with the banks than with the public transportation operators. The arrangement between the value network will decide, in our case, if the service will work or not. It is true that the service domain and the technological domain are set and ready to introduce the NFC technology in Switzerland but the organizational and financial aspects are not ready and arranged to support this new technology.
There are four critical issues when it comes to design the organizational domain.

<table>
<thead>
<tr>
<th>Critical Design issue</th>
<th>Description</th>
<th>Balancing requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner selection</td>
<td>Who is offering access to critical resources and capability’s in order to offer service?</td>
<td>Limited number of partners versus quality of service and strategic interest</td>
</tr>
<tr>
<td>Network openness</td>
<td>Degree to which new partners can join the network, and are allowed to offer services</td>
<td>Openness and customer reach versus control and exclusiveness</td>
</tr>
<tr>
<td>Network governance</td>
<td>Dominant partners set and monitor rules over partnership, support partners. Customer ownership and control is key asset</td>
<td>Entry, compliance and exit conditions: individual versus network interest</td>
</tr>
<tr>
<td>Network complexity</td>
<td>Degree of complexity of network, both organizational and technical</td>
<td>Need to reduce complexity versus need of access to critical resources &amp; capability’s</td>
</tr>
</tbody>
</table>


Fig. 14: Critical design issues in org. domain

Selecting the right partner isn’t an easy decision. One must decide with a limited number of partners, a different quality of service and some strategic interests. This decision takes time and last during a couple of years. One should be careful when selecting partners.

The network openness is the degree to which new partners can join the network. Actors must choose between openness and therefore customer reach or control and exclusiveness. An open network will be more inclined to attract customer and funds than an exclusive network. The choice between openness and exclusiveness depends on the maturity stage and the conjectural conditions. To become a market leader, Google offered its mobile operating system to all manufacturers unlike Apple that gives exclusiveness to its product. This choice is a strategic one.

Creating and maintaining conditions in a network demands a lot of investment. The network should benefit to all users and not to an individual. Rules should be the same for every player and a control shall be put in place.

The complexity of the network has to find the right balance between complexity and need of access to resources. A simple network reduces complexity and costs but can’t pretend to access to some critical resources and capabilities. The complexity needs to be enough to allow the network to grow but needs to be consistent and as minimal as possible in order to reduce the costs.
3.2.4 Financial arrangements

The financial arrangements graph explains us how to create these arrangements:


Here lies the sinews of war: financial arrangements. We can see that each other domain influences the arrangements. Actually, the service domain generates revenues but also risks, the organizational domain and the technological domain generate costs. As we have seen, the four domains are linked.

Here we can oppose costs and revenues. The costs are generated by the network domain and the technological domain. The service provides some revenue sources but these are threatened by some risks.

The financial aspects are the midpoint of any arrangement. If there is no financial arrangement between the actors, no solution will be found. This financial arrangement depends on the repartition of the costs and the revenues between the network of parties. In our case, the Business Model isn’t defined and won’t be defined until the financial arrangements aren’t clear for all parties.
Like the other domains, the financial domain has got issues. Here are listed the three issues linked to the financial domain:

<table>
<thead>
<tr>
<th>Critical Design issue</th>
<th>Description</th>
<th>Balancing requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pricing</td>
<td>Price level</td>
<td>Pricing seems to be aligned with maximizing profits <em>versus</em> creating market share</td>
</tr>
<tr>
<td>Investments</td>
<td>Capital investment and risk assessment</td>
<td>Operational financial interest (ROI) <em>versus</em> intangible benefits (Options)</td>
</tr>
<tr>
<td>Division and valuation of costs and revenues between network actors</td>
<td>Assessment of valuation is based on access to resources, direct revenue and strategic benefits.</td>
<td>Costs-benefits valuation on level of network versus cost benefits for individual partners</td>
</tr>
</tbody>
</table>


Fig. 16 : Critical issues in financial domain

The pricing depends on the financial arrangement but all parties should keep in mind that there must be an alignment between maximizing the profits and creating market share. The two strategies are opposite and can’t be used together. As the maximizing of profits is based on giving a maximum of dividends to the investors, creating market share is centered on creating market value in keeping the benefits in the company.
3.2.5 Dynamic model

The STOF framework is a dynamic model. In fact, the business is dynamic and it wouldn’t make sense to have a static BM that can’t evolve with the market constraints. After defining the final Business Model, this one passes through 3 phases: the technology R&D phase, the Roll Out phase and the Market phase:

![Dynamic Business Model Framework](image)

Each definition of the BM pass through a technology, market and regulation test. Once the technology and R&D phase is passed, the BM passes to the next phase that is the Roll out. This phase is the concrete production phase where the service will run in market lookalike situation. If the BM passes this roll out phase, the service is pushed to the market.

3.3 Analyze of major business actors and their stakes

3.3.1 Major Swiss actors

In order to support the Business Model analysis, we will use the actors identified by Ondrus & Pigneur with the STOF framework. In fact, each actor has its own goals and constraints. Note that we will stick to the big picture as we want to describe the Swiss situation and not a certain arena.

In their paper, Ondrus & Pigneur identified five types of actors:

1) The mobile Telecos (also named Mobile Network Operator – MNO) regroups only a few actors like Swisscom, Orange and Sunrise. They are the new force at play in the payment business as they change the rules on the market by entering in direct competition with the financial institutes. Their dispersion is low meaning that only a few actors hold the total power of this sector.
Swisscom is the major actor as it holds the “last mile” of line. To be concrete this means that each mobile telecom actors must pay fees to Swisscom in order to access to the telecom infrastructure. Swisscom possesses here a real advantage that places it number one on the Swiss telecom sector.

2) The financial institutions regroups all the banks and financial service providers like Crédit Suisse, UBS and SIX Group. UBS and Crédit Suisse are the biggest banks in Switzerland. SIX Group is a financial solution provider, it plays as a custodian and a business enabler providing POS and financial solutions for banks and retailers. SIX Group is already offering contactless POS to all Swiss retailers. Like the MNOs, the financial institutes are only a few players to hold the power in the payment sector.

3) The retailers are very dispersed but can be represented by Coop, Migros and McDonald’s. This category is important in the sense that these players use the POS provided by SIX Group and have relationships with banks. They provide volume to both financial institutions. Coop and Migros are clearly the biggest retailers as they are widely spread and present in Switzerland.

4) Crealogix and Polyright represent the Swiss technology providers. There are only few big technology providers in Switzerland. In this category, we will also put the handset manufacturers like Samsung and Apple.

5) The public transportation category is represented by the CFF, the Transport Lausannois and the Zürcher Verkehr. The public transportation is a monopoly under the supervision of the Swiss confederation.

We can class these actors, in terms of weight on the market, like this\textsuperscript{14}:
- Telecoms : Swisscom > Orange > Sunrise
- Financial Institutions : UBS > CS > the others
- Tech. Providers : Samsung > Apple > Polyright > link-u & Crealogix
- Retailers : Coop > Migros > McDonalds > MyOne
- Public transportation : SBB > ZVV > TL

This ranking gives us the weight between the different actors. We assume that Swisscom can impose its decision to Orange for two different facts: the first is that it is bigger in transaction volume than Orange and the second that is closely linked to the first one is that Swisscom possess the “last mile” meaning that every competitor must pay Swisscom to use its infrastructure. Based on the news\textsuperscript{15}, Coop is now bigger than Migros but we assume that in terms of weight they are both the same. One can’t impose his model or decision to the others.

It is clear that the SBB, better known here as the CFF, is the ruler in this category. As it is part of the Confederation, it impose its will to the other companies such as ZVV and TL.

\textsuperscript{14}http://fr.wikipedia.org/wiki/Classement_des_plus_grandes_entreprises_suisses_en_2005
\textsuperscript{15}http://www.rts.ch/info/economie/4103634-l-entreprise-suisse-au-plus-gros-chiffre-d-affaires-s-appelle-vitol.html
As said before, the dispersion of the actors can be a positive or a negative situation, it depends on the strength of each actor within its group. For example, UBS is the biggest financial actor in CH followed by the Crédit Suisse and PostFinance. They will impose their will to the other actors. Like them, Swisscom rules the Telecom sector. If Swisscom decides to invest, all the sector will be influenced by its decision. Of course we don’t have the pretention to accomplish the complete Bouwman framework but we will sensitize the reader to the different stakes in the NFC adoption and the problems to resolve in order to put in place an NFC ecosystem.

Putting in place the NFC infrastructure and backbone will require a major investment from all actors. In fact, different BM are confronting and each actor wants to generate profit from a particular situation. There is no exception for the NFC case. Technical and commercial requirements must be fulfilled like Sarah Clark explains us in [11]: consumers must be able to access and use the widest possible range of NFC services and providers must provide the NFC architecture to their customers. These are the main conditions to create a NFC ecosystem. To be functional, an ecosystem must involve all stakeholders: consumers and providers. The proper functioning of an NFC infrastructure depends on the alignment between the physical environment and the coordinated Business Model. A BM is a situation where all actors can generate profits: tangible or intangible.

In order to align the physical environment and the BM, the actors must first find an agreement. Let’s see their stakes in order to try to understand where is the blocking.

3.3.2 Stakes

Now that we know a little more about the type and the weight of the biggest Swiss companies involved in NFC, we can analyze their stakes and constraints for the NFC solution. We will try to understand the big factors for each branch category according to the Swiss situation.

For the Swiss telecoms, the major actor in the NFC ecosystem, their stakes are quite clear:

- **Generate cash flows** by proposing new services linked to NFC. We think about proposing some space to rent for the UICC applications on their SIM cards, proposing space for NFC applications on their server and add some revenues with the data used;

- **Own the relationship** by creating a stronger relationship with their clients. They want to become the new owner of the customer relationship for payment, implying that it weakens the link between the banks and the clients;

- **Maintain their clients** with the complexity of changing the operator. The churn rate is the biggest issue for Swiss telecoms. Using UICC and thus NFC will help to reduce this churn rate. In fact when a client use the UICC solution, all his data and application are stored in his SIM card that is provided by the operator. If the client ends the relation with its operator, his SIM card will be obsolete and
it will be a burden to get all the information from the UICC back in another UICC.

For the financial institutions, the direct competitors of the telecoms, their stakes are also quite clear:

- **Generate some cash flow** with the NFC by proposing bundle solutions for retailers like Coop and Migros. They want to sell their payment solution: proprietary POS for SIX Group and become the intermediary between the telecoms and the end-users by proposing electronic money and currency for the banks;

- **Keep the ownership of customer relationship** that they have with their clients. Without their own payment cards, the banks and financial institutions could risk to lose their ownership of the customer relationship. Proprietary NFC payment cards are already existing, proving that NFC is a viable solution in Switzerland.

- **Reducing their expenses** by proposing soft cards on the mobile device therefore reducing the costs of cash handling and credit card distribution and issues;

We will use “technology providers” at a large sense meaning all the IT service providers but also the handset manufacturers like Apple and Samsung. They are also major actors in implementing the NFC ecosystem:

- **Generate some cash flows** by offering new possibilities on their handset/solutions which is increasing the price of their products;

- **Gain some reputation & maintain customer relationship** by offering a possibility that eases the users life but also try to be the leader in mobile technology. Offering a product that takes an important place in the users’ lives would increase their power and relationship with the customers.

Retailers like Coop and Migros[^16] have also some stakes to play in the deployment of a NFC ecosystem:

- **Lower the costs** of cash handling by proposing some contactless payment like the NFC. In fact, this technology will help to reduce the costs and the risks of using cash. As they are changing their POS to comply with contactless payments, the NFC will only improve their return on investments (ROI) on POS;

- **Speed up and improve** customers experience. It is true that wasting time at the checkout and always counting money is a burden for customers. NFC will ease the purchases of customers and will reduce the workload for cashiers.

Public transportation companies have more or less the same stakes than the previous players that are:

- *Generate some cash flows* by offering new possibilities of payment to their users and even attract new customers that judged that the solution was to inflexible.

- *Lower the costs* of cash handling and also reduce the risks inherent to cash handling.

- *Speed up and improve* customers experience. Public transportation’s point of sales are always crowded because user interface isn’t intuitive and payment process is slow. Using NFC to pay would accelerate the process and thus improve the customer experience and satisfaction.

We can clearly see that the two major groups of players are the Mobile Network Operators and the Financial Institutions, in fact their stakes are the same but on different arenas. They both want to catch/keep the ownership of the customer relationship and this situation blocks and blocked the implementation of a NFC ecosystem.

The two other actors aren’t playing in the same arena and therefore can’t compete with each other, we can say that their stakes are convergent concerning the adoption of the NFC technology according to P. Volle, D. Dion, M.L. Hellies-Hassid et S. Sabbah in [12].

### 3.3.3 STOF analysis

Let’s now pass to the STOF model to analyze the four domains remembering the information gathered in the actors analysis. Just like in [3], we will analyze the different aspects of each domain based on the Swiss situation in the previous section.

#### 3.3.4 Service domain

- **End user value proposition**:  
  As we know, 48% of the Swiss population owns a smartphone and this percentage is constantly growing over the years. In Switzerland, most of the shops have their own fidelity cards and coupons. For the user, NFC and thus mobile payment would imply that customers will no longer have to carry cards with them.
  
  Now, mobile services allow the user to review his historic and remaining value with his smartphone without passing to the bank and shops but can’t allow them to pay. The fact is that the user must still get his card with him to pay. The NFC technology will make the plastic cards “obsolete”.
  
  Swiss people have one of the biggest purchasing power in the world17 and therefore could easily access to this kind of services like mobile payment.

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Putting in place such an infrastructure will induce that the users will have the means to use mobile payment services with NFC minimum twice a day in order to make profit out of the infrastructure put in place.

- **Use context information:**
  Switzerland has an important road & rail network. Using the contextual information could help the Public Transportation companies to maximize their customers’ understanding. It would also mean a new and better service for the customers as their needs would be quantifiable. A new service would be to pay only for the path taken and not a subscription. Based on the data gathered by the means of customer path identification, PTO could offer new services and even cheaper services in addition to having a better understanding of their customers. Knowing when and how customers need transportation could open new strategies for PTO.

- **Customer segmentation:**
  The usage of this technology could help to identify certain types of users and offer them tailored services. Knowing the customers’ habits could help to offer new services dedicated to some specific types of customer. As the Swiss people is very varied and mixes a lot of culture and usages, the customer segmentation is consistent.

- **Pricing:**
  Quality of service (QoS) is important for Swiss people. The pricing applied takes into consideration the purchasing power of Swiss people. Switzerland is one of the ten most rich country in the world. Considering that Swiss people can afford expensive products, service providers could ask a certain amount of money in order to invest on infrastructure. Reducing the costs of fidelity cards and payment cards could also help to lower the price of the services.

- **Ease of use:**
  The ease of use is a very important criteria. Indeed, a technology that is too difficult to use won’t be acquired by the common people. In our case, the NFC technology solves this problem as this technology enables connection without pairing and issues linked to it. Swiss people are very demanding concerning new technology and won’t buy a technology that is a burden to exploit. It should be simple and convenient.
  Having an “all-in-one” smartphone would also be an advantage for the ease of use. In fact, using only one device for communication and payment could ease the users’ life.

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18 [http://www.huffingtonpost.fr/2012/12/10/pays-plus-riches-monde-forbes-qatar_n_2269623.html](http://www.huffingtonpost.fr/2012/12/10/pays-plus-riches-monde-forbes-qatar_n_2269623.html)
3.3.5 Technology domain

- **NFC handset availability**: When some companies offer only some low costs products to some countries, for example India where technology providers offer low costs products as the population can’t afford high quality products, Switzerland has the premium products and thus handset. Swiss people are fond of technological products and they mostly buy the latest handset available on the market.

- **Secure element**: As we have seen, there are four different solution concerning the SE: the baseband processor, the embedded software, the Secured Memory Card and the UICC. We believe that the SE selection is still a problem for the different actors. In fact, the UICC catches the customer relationship in favor of the MNO and the banks and financial services don’t recognize the solution as long as they don’t have proceed to an agreement. A cooperation between the two major group of actors should unlock the situation. We believe that a platform manager could, in the last chance, promote the dialog and find a solution.

3.3.6 Organization domain

- **Mobile Network Operator**: Swisscom is one of the European leader in terms of business adaptation and innovation. In fact, Swisscom was the first company to offer subscription in terms of data speed. This ease of changing the rule is favorable to adopt new technologies and business model like the NFC technology offers. As a leader, Swisscom will force its competitors to follow his business model. Swisscom will have the chance to be the first to rent application space in the UICC and capture the relationship between with the banks and financial services. Indeed, the first mover will attract the most benefits and could impose its will to the market as it is the only one proposing this service. Proposing an innovative service could also help to reduce the customer churn rate, one of the biggest problem of the MNOs. Taking the first means also taking more risks but it could also mean greater benefits. For example, Swisscom could be the UICC SIM card provider for the rest of the operators as he first impose its standards. As subsidizers, MNOs can decide which mobile phone or device will be sold in the Swiss market. Their concentration gives them power on the market as they are only a few of them. When there are lots of actors, making an arrangement with another player is obvious in order to survive but in our Swiss case, the few actors concentrate all the power in a few hands.

- **Public Transport Operator**: For the Swiss public transport operator, part of the confederation, the NFC adoption means a reduction of cash handling, reduction of ticket sales and dis-
tробution costs. NFC would be a great vector of benefit as there would be less distribution and handling. In fact, in Switzerland, most of the public transport operator own a contactless device. Using NFC mobile payment wouldn’t be a problem as the infrastructure already exists. In terms of benefits, using NFC would give them a new argument to use public transport more often. Public Transport Operator are NFC ready and are just waiting for an arrangement to be done.

- **Financial Institutions:**
The main concern of financial institutions is to keep their relationship with the client. As the whole market structure depends on the clients’ capital, the financial institutions can’t afford to lose their money. The NFC technology raises the problem of sharing profits. In fact, using NFC will not increase their volume or benefits but will push them to share a part of their benefits, which is unacceptable for them. The problem with NFC is that the MNO are in position of strength as everything passes through mobile phones. As they are the subsidizer they have their words to say. Banks have always been in control of this relationship without having another party at play. Using NFC would compromise their supremacy. In Switzerland, the financial institutions are very powerful, especially in Geneva. Same for the MNOs, the financial institutions like banks are only a few at play. Even more than that, they are rallied and their power is quite great. The Swiss situation is difficult as the two opponents have great power. This situation makes the arrangement tense.

- **Technology Providers:**
There are two main impacts: B2B (business to business) and B2C (business to consumer). For the handset manufacturers like Nokia or Samsung, enabling NFC will allow them to create value for their devices in terms of business to consumers (B2C). But one major impact will be the business to business (B2B) impact. Indeed, technology providers in a large sense offer a lot of possibilities to other business to create new services and open new market. NFC readers, software providers and all kinds of providers linked to NFC will make use of the new features and infrastructure. Technology providers will have to maintain these infrastructure and new features, providing them new revenues.

- **Retailers:**
Same for public transport operators, most of the retailers are already in possession of contactless devices. Accepting NFC will allow them to offer a new service of their clients and establish a stronger customer relationship and customer loyalty. In fact, the retailers are awaiting for the NFC to come in their stores.
3.3.7 Finance domain

- **Create a financially beneficial situation:**
  NFC will allow to create a beneficial situation but the repartition needs to be correctly distributed. Trying to gather all the benefits in short term will damage the NFC ecosystem. Banks have always been in possession of the relationship with the customers and the fact that another player could come and change this state is seen as a threat. There is a need to delay the benefits in order to preserve the whole NFC ecosystem. The same goes for MNOs.

- **Cost, revenues, capital, risks and sources of risks.**
  As the main actor in the NFC ecosystem, the MNO will bear the most costs and risks. There will be a great investment in order to maintain the NFC infrastructure and to replace their SIM into UICC. The investments and the risks taken by the MNO place them as the first and main NFC actor. The financial institutions are the second main actor in the NFC ecosystem. Their source of risks lie in the fact that the main actor could subtilize the strong relationship between the customers and the banks. Losing this relationship will weaken them as they need these transactions to operate properly.

3.3.8 Business Models proposition

It is now clear that the MNOs upsets the situation of the financial institutes. The problem is that without financial allies, the MNOs won’t be able to create their own financial structure as they are new in this domain and that it will cost them a lot of money and time to put in place such an infrastructure. The problem for financial institutions is that if they let the telecoms take in charge the sector of micro payment, they will lose a lot of cash. In the other way, telecoms need the financial institutions and vice versa. To build a consistent NFC ecosystem, these actors should work together according to a strong business model distributing the costs and revenues. An agreement between these two types of actors is essential for a proper functioning.

The Smart Card Alliance in [13] propose us some business models propositions and some hints to build them. The first aspects should be to determine who will be the center of the model. It could be bank centric or mobile-operator centric. The landlord-tenant is typically a mobile-operator centered model but the subsidies model can be on both sides. Knowing that they are in a power position, the MNOs will try to get the maximum profits. To create this ecosystem, the participation of all actors will be needed. In order to preserve the health of the whole ecosystem, the MNOs will have to rationalize their benefits in order to encourage the other actors to participate in the creation of the ecosystem. On the same principle, financial institutions will have to accept new players in their arena in order to profit from this ecosystem. The platform manager business model places the platform manager at the center of the business model removing the question of which actor should be in a power position. In our specific Swiss situation, if the actors can’t find an agreement, this business model could be appropriate.
G. Madlmayr, J. Langer, J. Scharinger in [10] and the Smart Card Alliance in [13] propose us three different models for an NFC ecosystem:

1) **Landlord-tenant relationship model:**
   The principle of this model is that the landlord lends the right to use, for a specified time, to the tenant. This one pays the landlord in exchange of the asset, here the UICC space. The landlord is represented by the MNO as the solution will most probably be the UICC, in possession of the mobile network operators. The tenants are here represented by the financial institutions renting space on the UICC. They can upload their own applications on the UICC for a fee.
   MNOs own the space but can’t modify the content on the rented space. Financial arrangements will decide if the tenants will pay on a usage-basis or a fee-basis. For a low volume of transaction, the usage-basis model will be the most suitable. A fee-basis will be adapted to a high volume model.
   This model is clearly mobile-operator centric. Controlling the space on the UICC provides them the power. The advantages of this model lie in the fact that whole infrastructure is managed by the MNOs therefore saving problems and costs to the financial institutions.
   The disadvantages are that one party holds all the power. Having all the power in one hand can be problematic in the sense that the MNO could decide to block some actors to enter the ecosystem. They would become the leader and impose their will, not necessarily beneficial for the whole ecosystem.
   This model could be applied if the MNO are willing to have an agreement and to keep this agreement for all actors. This solution would be the riskiest.

2) **Subsidies:**
   Subsidies are paid to encourage the customer to buy a product. Subsidies are typically paid by MNOs to keep their clients and reduce churn as the competition on prices are fierce in this arena. One example could be that the operator pays a certain amount as a subsidy, if the client wishes to sign up for a certain bank, it pays a part of this subsidy for the client to the operator. But it can also go on the other side. When a client opens an account in a bank, he can get special rates if he sign up for a mobile contract. The longer the contract the greater the rates.
   The advantages of this model is that both parties will profit from this situation. Joining forces will help to gather profit for both parties. The centering notion is here not consistent as the two players are engaged on the same path.
   The disadvantage could be that no one really gathers for himself all the profits. The two main actors have always been alone in their arena. Sharing profit could be a brake to this business model. In fact, this business model could only be possible if the two main actors are willing to share the profits.

3) **Platform manager (PM):**
   If no agreement can be found, the platform manager business model could be a solution according to G. Madlmayr, J. Langer and J. Scharinger in [10]. In fact, the
platform manager will issue the UICC in place of the MNO to ensure the independence of the parties. In fact, the platform manager will act as a third party to manage the relationship between the MNO and the service providers. The PM will be in charge of uploading and managing the applications contained in the UICC.

The platform manager and the platform provider can be two different entities as we can see in the following picture:

![Diagram of NFC ecosystem with a platform manager](image)

Using a third party will ensure privacy for all users and providers but also remove the management of UICC issuance for the MNO and service providers. The platform manager can build a trust relationship between the different parties.

For the user, a platform manager will free him of the service provider and MNO as he will pass through the PM to modify their contract. This business model could be the solution but it will reduce the revenues and increase the costs for MNO and service provider. Indeed, an intermediary will gather a part of the benefice in order to function.

### 3.4 Results

In the previous sections, we have analyzed the actors, their stakes and different business models possible. Depending on the agreement and the power of the actors, a certain business model will fit the situation. As ecosystem leaders, the MNO and the financial institutions will have to agree on a solution in order to generate some long
term profits. Finding no agreements will place them in a delicate situation where only a third party could unlock the situation and thus reduce the profits.

The results of our analysis showed us two principal issues concerning the creation of a business model adapted to Switzerland:

1) Arenas:
The communication and the payment arena have the same goals and merging the two arena will create frictions.

2) Players:
The two main players have different business models and goals that must be conciliate to find an agreement. Without an agreement, no NFC ecosystem will be put in place.

There are three business models possible in Switzerland: the lord-tenant model, the subsidies model and the platform manager model. Each of these models have their advantages and disadvantages. The players will have to get to an agreement and choose which business model fits their situation.

The landlord-tenant business model could fit the situation where an actor has the most power and could force its business model. Our Swiss situation has got big players with heavy weights, this solution could be possible if a strong agreement can be found. The subsidies business model could work if both player have the same weight and need each other in order to put in place the ecosystem. In our case, this solution could be the appropriate one.

If no agreement could be found, the last business model that we have passed in review could fit. A third party would temper the players in order to find a path for an NFC ecosystem.

4 Conclusion

The implementation of a NFC ecosystem depends on the different actors and the business model they have agreed on. Putting in place a common business model means finding a strong agreement where all actors is benefiting from the situation. The NFC technology through the mobile payment tries to reunite the payment sector and the mobile sector. Problem is that the two sectors have the same goals and constraints.

To get to an agreement, players will have to share the NFC revenues and costs with actors coming from other arenas. Retail, communication, payment and technologies arenas need to collaborate in order to draw an ecosystem. The Japanese NTT DoCoMo is the proof that such a complex ecosystem is viable.

The Swiss case is a bit different as we have seen in the previous sections. In fact, two main type of players have convergent goals but there is only one market available. The Mobile Network Operator and the Financial Institutions need to draw an agreement in order to put in place such an ecosystem.

In this work, we pointed out the critical issues encountered in the Swiss NFC ecosystem and the possible business models that could fit this situation. Further researches need to be carried in order to comprehend the whole complexity of this situation.
Sponsored by IEEE Switzerland section and some Swiss institutes, an international workshop on NFC has taken part in Switzerland on the 5th of February, proof that this technology is a subject of interest for the Swiss engineers. Unfortunately, this workshop aimed a technical audience and no big business actor was present. Nevertheless such an event proves that NFC has some possibilities in Switzerland.

5 Opening

Ondrus and Pigneur [2] states that the NFC technology hasn’t reached a disruptive phase yet. No other research have been made in order to see if this specific technology has now reach a disruptive phase. Such a research can only be done by completing interviews and analyzing the results. Approaching a disruptive phase could press the actors to draw an agreement and to put in place a business model. Other researcher could complete this work by completing interviews with the actors and expose our findings to see where this technology is right now.

Mobile payment is the natural evolution of payments. We believe that in the future, the communication arena and the payment arena will have to join in order to deal with the mobile payment. In fact, communication will remain in the hands of the mobile telecoms and fortune management will stay in the financial institutions’ hands but the micro payment will certainly see a new paradigm where the two arenas will have to join forces and not to be competitors. This would be the second disruption as Ondrus and Pigneur describe in their paper [2].

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6 Glossary

1) RFID
   “Radio-frequency identification (RFID) is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information.”

2) ISO
   “ISO (International Organization for Standardization) is the world’s largest developer of voluntary International Standards. International Standards give state of the art specifications for products, services and good practice, helping to make industry more efficient and effective. Developed through global consensus, they help to break down barriers to international trade.”

3) P2P
   “Peer-to-peer is a communications model in which each party has the same capabilities and either party can initiate a communication session.”

4) STOF
   Abbreviation for Service Technology Organization and Finance. The STOF model is a framework developed by Bouwman and al. This framework is used to describe business models in four interrelated domains that are the service domain, the technology domain, the organization domain and the finance domain. This model suits perfectly our analysis in the sense that is was designed evaluate mobile business models.

5) QSR
   Quality System Regulation is “a sets of checks and balances to assure safe and effective finished products.”

6) SE
   Secure Element can be a fix or movable element used to secure a device. In our case, the secure element will contain all the sensitive information of a specific customer and a specific financial institution.

7) SIM
   “A subscriber identity module or subscriber identification module (SIM) is an integrated circuit that securely stores the international mobile subscriber identity (IMSI) and the related key used to identify and authenticate subscribers on mobile telephony devices.”

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22 http://www.iso.org/iso/home/about.htm
23 http://searchnetworking.techtarget.com/definition/peer-to-peer
24 Taken from : http://www.stanford.edu/group/biodesign/regulatory/materials/quality_slides.pdf
8) SD card

“Secure Digital or (SD) is a non-volatile memory card format for use in portable devices, such as mobile phones, digital cameras, GPS navigation devices, and tablet computers.”

9) UICC

“The UICC (Universal Integrated Circuit Card) is the smart card used in mobile terminals in GSM and UMTS networks. The UICC ensures the integrity and security of all kinds of personal data, and it typically holds a few hundred kilobytes.”

10) SWP

“The Single Wire Protocol (SWP) is a specification for a single-wire connection between the SIM card and a near field communication (NFC) chip in a cell phone. It is currently under final review by the European Telecommunications Standards Institute (ETSI).”

11) POS

“Point of sale (POS) or checkout is the place where a retail transaction is completed. It is the point at which a customer makes a payment to a merchant in exchange for goods or services.”

12) BM

“A business model describes the rationale of how an organization creates, delivers, and captures value (economic, social, cultural, or other forms of value). The process of business model construction is part of business strategy.”

13) QOS

“The quality of service (QoS) refers to several related aspects of telephony and computer networks that allow the transport of traffic with special requirements. In particular, much technology has been developed to allow computer networks to become as useful as telephone networks for audio conversations, as well as supporting new applications with even stricter service demands.”

14) iOS

“iOS (previously iPhone OS) is a mobile operating system developed and distributed by Apple Inc. Originally released in 2007 for the iPhone and iPod Touch platforms, it has been extended to support other Apple devices such as the iPad and Apple TV.”

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26 http://en.wikipedia.org/wiki/SD_card
29 http://en.wikipedia.org/wiki/Point_of_sale
32 http://en.wikipedia.org/wiki/iOS
7 References


