Global policy networks' involvement in service innovation
Turning the mobile phone into a wallet by applying NFC technology

Revised July

ABSTRACT

The mobile phone attracts an increasing number of service applications enabled by technical developments. On-going efforts aim to widen the scope of mobile payments and "turning the mobile phone into a wallet" with the help of Near Field Technology (NFC). A number of industries are involved in this development. To enable commercial application, at the local policy level, of the new technology for mobile payments reach necessary standardization, technical design, interoperability, security etc., what we call Global Policy Networks are involved. The paper analyses some yet to be settled design issues and their role for the innovation and for development of the business network structure

KEYWORDS

Service innovation, policy networks, technology, mobility

INTRODUCTION

In this paper we focus on how global policy affects local policy. Furthermore, our policy actors, both at a global and at a local level are predominantly businesses, and not government bodies.

We are concerned with what we label Global Policy Networks (GPN) that decide on, or in important ways affect, standard setting, certification of various norms, promote business application of a new technique etc. GPNs, often called a "forum", are not only involved in strictly technical matters but also discuss and describe "visions" about how a new technique might be applied in business life. They might suggest some kind of "business architecture", (not only a "technical architecture"), where roles of different type of actors and relations between actors are outlined based on ideas about so called "eco-systems" described in "white papers".

GPNs develop frameworks for local action, e.g. as regards shaping and implementing policies for financial flows, access to information infrastructure, research policy regarding ICT etc. In this paper we however are only concerned with local policies in the sense of business policies aimed at adopting new techniques for service innovations.

GPNs are of different kinds with reference degree of involvement by government bodies, NGOs and civil society, industry organizations and individual corporations. (GPNs with a broad category of membership is of increasing importance according to Reinecke, 2000) The type of GPN that we are interested in here is predominantly networks of private business and industry organizations.

Our *purpose* is to analyze the role of GPNs, in establishing *global* policies to enable business actors to develop and implement *local* policies, applying a new technology (NFC) for a new mobile service using the mobile phone as a device for making monetary transfers ("replacing the wallet").

Near Field Communication (NFC) is a new, still evolving, contactless mobile technology that is used, or has the potential to be used, for a number of new mobile services (e.g. parking, ticketing, control, getting access) for some of which payment is required in association with the service, but also, on a large scale, for payment services as such.

NFC technology and contactless services can be related to mobile phones in several ways. In the simplest form the NFC technology is used as a stand alone feature for contactless cards, e.g. access or key cards, credit cards or for public transportation tickets (SL Access in Stockholm). The NFC contactless features combined with some kind of mobile service can also be integrated in the mobile phone using built-in hardware, stand alone memory cards or using software functions. In this case the NFC service is linked to the phone as a physical device. Finally, the NFC based services can be stored in the SIM card of the mobile phone. Hence, the mobile operator will be involved and the use of this kind of NFC service needs to be linked to the subscription and the control of the SIM-card.

The concept "policy" is somewhat ambiguous as used both in day-to-day language and in professional/academic language. In this paper we take it to mean "*a course or principle of action adopted or proposed by an organization or individual"* (Oxford University Dictionary). In the term organization we include not only individual businesses but also government agencies and formal inter-organizational arrangements, such as trade organizations or GPNs.

The paper presents results from an ongoing research program on near field communication services in Sweden. The program was initiated in late 2008 by TeliaSonera Mobile Network, KTH Center for Wireless Systems and the Center for Information and Communication Research at the Stockholm School of Economics. Earlier papers from the program have been presented at IMP meetings on NFC and formation of new business ventures and on the market shaping role of the mobile phone as a technical device. (Andersson, Markendahl and Mattsson 2009; 2010). Currently we work on NFC related papers that focus on value creation and industrial change and on the interaction between technical innovation and service innovation Markendahl (2011) gives a detailed description of the technical aspects and of how primary and secondary data for the above papers been collected. For the present paper additional secondary data on GPN activities has been collected.

Why study GPNs?

The role of GPNs is a subject worthy of investigations in IMP studies of technical innovation. Business application of technical innovation always requires changes in business networks, and in the interfaces between the old and the new techniques. GPN policies, as reflected in technical and business architectures, influence network interdependencies between activities, resources and actors, and therefore also conditions for business network dynamics.
Furthermore, GPNs in their own right are networks and for specific applications of a new technique,(e.g. using the mobile phone for payments). A, number of GPNs, each with their own mission (e.g. regarding NFC in general, mobile payments, banking, telecommunication) might be involved. Their activities and actor memberships overlap.
To decide on how to standardize the technology, how to make new technology available to competitors and other actors and how to handle interfaces between interdependent resources is important and often matters of controversy between different interests because different alternatives might influence power and economic outcome differently for different actors.

Why study NFC based mobile payments?

Contactless payments using mobile phones is a new alternative for monetary transfers, competing with or complementing other established alternatives. Description and standardization of technical features have been ongoing for many years by the GPNs mentioned above and now agreed standards are available. However, the NFC based contactless payment services still do not take off. GSMA has identified a number of reasons for this. Besides a lack of commercially available NFC Handsets a number of business related issues are often mentioned as "roadblocks" (Markendahl 2011, p.150)

- Unclear Business Models
- Lack of contactless PoS infrastructure
- Co-operation between ecosystem players

This creates uncertainty and ambiguity among business actors about roles and relationships in business networks. Thus, for application of NFC to mobile payments, the uncertainty about global policy opens for a variety of local business policies. Global policy has not defined important rules of the game for this service innovation. When it comes to traditional credit card payment there already exists a globally accepted practice for both technical and business aspects. Hence, it is interesting to investigate to compare the business polices for NFC mobile payments with credit card based payments and also with other global standards, e.g. 3GPP for mobile communication, where this uncertainty cannot be identified.

Paper outline

1. First, we discuss how NFC enabled mobile payments currently attracts a lot of attention.
2. Second, we turn to the GPNs involved in the mobile payments issue, with specific emphasis on NFC Forum.We describe four *GPNs* involved in shaping *global* policies: NFC Forum, Mobey Forum, GSM Association (GSMA and European Payment Council (EPC).
3. Third, we show and discuss how GPNs describe the technical and business architectures for mobile payments, that we propose can be seen as a base for GPNs' global policies and for local policies by business actors.
4. Fourth, we select and compare some expressions for local business policies, selected from recently established and potential uses of NFC technique..
5. Fifth, we use two analytical approaches provided by practice research and network research.
   a. we use the business practice analytical framework by Kjellberg and Helgesson (2007) in which three interrelated practices are distinguished (normalizing, representational and exchange) to discuss how global policy addressed in section 3 relate to local policy visions in section 4.
   b. we discuss how the ARA framework can be used to identify some major problems in connecting global and local policies.
6. Finally we offer some comments on further research.

NFC AND MOBILE PAYMENTS

It has been argued that NFC will be one of the future dominating technologies for application to mobile phone services, enabling consumers and businesses to use the mobile phone for an increasing number of new services.

This has resulted in a large number of industry descriptions and representations on "what might happen and how it might work" in the near future. Several industry organizations were early to provide visions of the new technology and the new innovative services and systems that would result from it. One of the most widely diffused "picture" launched by these organizations is focused on mobile payment solutions and mobile wallet applications based on NFC. The idea being presented is that users should be able to store credit cards, loyalty cards, access cards "and tickets" in the mobile phone. The new emerging market descriptions entail many types of cooperating actors; banks, credit card companies, mobile operators, mobile service providers, trusted third parties, specialized payment providers – all connected in networks.

Mobile payments is a hot issue. At the Mobile World Congress in Barcelona in February 2011, most of the attention focused on this. Companies that presented their plans and visions came from many "industries", e.g. Google, Apple, Deutsche Telekom, Qualcomm, ZTE, LG Electronics. Trials are going on, or planned for the near future, in several locations with a variety of organizations involved. A search on the web in March 2011 for "NFC and mobile payments" resulted in almost 600.000 items!
The move from test status to full-fledged use of the mobile phone as a wallet presents companies in many industries with important technical and business problems, to a large extent relating to network dynamics and network uncertainty. The plethora of widely dispersed daily information from actors in different industries, from industry organizations, from consultants and research institutes are mostly about future opportunities, and less frequent, about identifying, defining and addressing problems to realize the potentials. There are important network changing forces, with many interconnected actors, activities and resources involved, that are somehow handled by in practice by a variety of actors.
Compared to a contactless card issued by a single service provider, an NFC mobile phone is a medium where multiple service providers are able to have their own services resident within a mobile phone. The introduction of NFC technology implies changes in "business models" and cooperation pattern among market actors. NFC has shown the need for extensive collaboration between industries previously not directly engaged in joint activities and markets, including: telecom operators, banks, credit card companies.

GPN'S INVOLVED IN MOBILE PAYMENTS

In the processes to develop ideas and formulate policies about "the mobile wallet", a set of different global policy networks are involved. Below we present NFC Forum GSMA(GSM Association), MobeyForum, and EPC (European Payment Council).

NFC Forum
The Near Field Communication Forum was formed to advance the use of Near Field Communication technology by developing specifications, ensuring interoperability among devices and services, and educating the market about NFC technology. Formed in 2004, the Forum in 2010 has 140 members. Telecom manufacturers, application developers, financial services institutions and others work together to promote the use of NFC technology in consumer electronics, mobile devices, and PCs. The goals of the NFC Forum are to

- develop standards-for Near Field Communication,
- encourage the development of products using NFC Forum specifications,
- work to ensure that products claiming NFC capabilities comply with NFC Forum specifications,
- educate consumers and enterprises globally about NFC.

The NFC Forum has organized the efforts of dozens of member organizations by creating Committees and Working Groups. In June 2006, only 18 months after its founding, the Forum formally outlined the architecture for NFC technology.
In 2009, it was time for the global NFC Forum to move from a "technology" to a "market and implementation" focus, by differentiating the growing members of the Forum into different groups, including the new, progressive so called "Implementer Members":

> "NFC Forum Introduces New "Implementer" Membership Level: The NFC Forum…today announced a new membership level called "Implementer" designed to further the NFC ecosystem and broaden the organization's global reach. Implementer membership is targeted at companies directly implementing NFC solutions in the field worldwide. It complements existing NFC Forum membership levels that are primarily targeted at technical specification development. As more commercial NFC applications are developed and deployed, Implementer membership provides a platform for companies that work with NFC on a daily basis." (press release, August 5, 2009)

As of September 2010, the Forum has released 13 specifications and 3 candidate specifications. The specifications provide a "road map" that enables all interested parties to create powerful new consumer-driven products. The Forum argues that "products with built-in NFC will dramatically simplify the way consumer devices interact with one another, helping people speed connections, receive and share information and even make fast and secure payments". A news release in December 2010 tells about the launch of a Certification Program that aims to give device manufacturers that are Forum members a means of establishing their products' compliance with the NFC Forum's technical specifications.

GSMA
The GSM Association represents the interests of the worldwide mobile communications industry. Spanning 219 countries, the GSMA unites nearly 800 of the world's mobile operators, as well as more than 200 companies in the broader mobile ecosystem, including handset makers, software companies, equipment providers, Internet companies, and media and entertainment organizations. The GSMA is focused on innovating, incubating and creating new opportunities for its membership, all with the end goal of driving the growth of the mobile communications industry. The GSMA's stated mission is to create value for operators and the mobile industry in the provision of services for the benefit of end users. GSMA aspires to lead the policy debate and to represent the mobile industry to governments and regulators. It aims to ensure that the interests of the global mobile community are effectively represented in the public policy debate. Its Government Programme of events provides a framework for regular interactive dialogue and relationship building between ministries, regulators and industry in both developed and developing countries. GSMA's Mobile Money Transfer (MMT) project focusing on international remittances and its Pay-Buy-Mobile (PBM) project aimed at the use of NFC for daily commercial transactions are initiatives in which the financial and mobile industries cooperate to develop global policies

MobeyForum
The purpose of MobeyForum is to create: "a prosperous Mobile Financial Services Ecosystem, where our members are able to create new profitable business, based on the following principles:

- Provisioning of Mobile Financial Services is open and standards-based,
- The services are interoperable and targeted for mass-market,

- Customer have the freedom to choose any service provider and to change them independent of others,
- The client trust in financial services is maintained.

MobeyForum's mission is to facilitate banks to offer mobile financial services through insight from pilots, cross-industry collaboration, analysis, experience sharing, experiments and cooperation and communication with relevant external stakeholders. One main focus of the forum is to build sustainable business model alternatives. The organization presents a three-fold strategy:
1) "Informational" – offering members first hand industry insight of MFS industry through Member Meetings, regular industry News- and Member Updates, documents (e.g. White Papers) produced by Mobey working groups and collected information on member's online discussion area.
2) "Networking" – Member Meetings collect the leaders cross industries to share experiences and to build new relationships.
3) "Shaping the Industry" – creating the future.
Liaison agreements with relevant industry organizations allow Mobey Forum to give its impact to the work carried out by the standardization organizations. Mobey Forum strategy is to be key source of independent industry information. Mobey Forum Member Meetings are global meetings. The Mobey Forum brings together industry leaders and has connections to leading industry stakeholders. Although Mobey Forum is driven by banks it is a multi-industry group containing all stakeholders of the MFS Business Ecosystem. In addition to the strong presence of leading International Banks there are key mobile operators, handset and "other relevant vendors and payment processors working together to create the future of MFS Business".
Mobey Forum Workgroups and Task Forces are actively working on creating a common understanding of business opportunities, trends and challenges of various mobile financial services areas: "Task Forces are bringing the industry leaders together - linking the parties cross industries that can solve the remaining barriers for creating a successful MFS ecosystem". Mobey Forum also co-operates with other industry organizations in the mobile financial services industry. Mobey Forum has a working relationship with European Payments Council (EPC), NFC Forum, Infocommunicational Union (ICU), dotMobi Advisory Group (MAG), Open Mobile Alliance (OMA).

EPC
The European Payments Council (EPC) is the decision-making and coordination body of the European banking industry in relation to payments. The EPC was established in June 2002 and adopted its current governance structure in mid 2004.The EPC develops the payment schemes and frameworks necessary to realize the Single Euro Payments Area (SEPA). SEPA is an EU integration initiative in the area of payments designed to achieve the completion of the EU internal market and monetary union. The EPC, working together with mobile operators and other stakeholders, is in the process of establishing the necessary standards and business rules with regard to the initiation and receipt of credit, debit and card payments through mobile phones. The aim is to develop proposals that are ripe for collaboration and standardization and which form the basis for interoperability. The intention is to create a trusted and secure environment that multiple stakeholders can use to facilitate SEPA payments initiated through the mobile channel in a convenient way. A common technical interoperability and business framework will avoid market fragmentation which would hinder the emergence of open, non-proprietary technology standards for user-friendly mobile payment services. Cross-industry cooperation is established through collaboration with

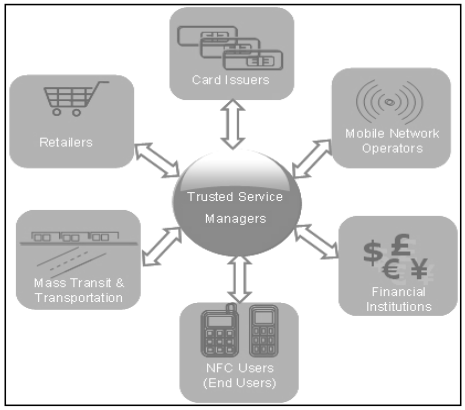
mobile operator associations, mobile payment pilot organizations and non-profit (standardization) bodies, including financial institutions, payment processors, system and infrastructure manufacturers and service providers. Through cooperation with these various organizations it is envisaged that the design of frameworks and supporting technologies will enable reachability for SEPA payment schemes via m-channels (mobile channels). Further development of contactless NFC-based payments is a project which enjoys the highest priority.
To this end, the EPC cooperates with GSMA. It is stated:

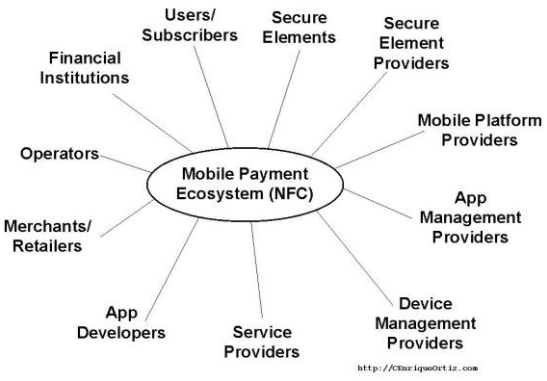
”The standards, rules and practices developed by the EPC in this area will be made publicly available to market participants and providers within the m-channel value chain. It will be the responsibility of each of them, or of any grouping thereof, to decide when and how to adopt these, and in particular towards which segment or segments of the payments market their products and services will be geared.”

Thus we can observe that in each GPN, actors carrying out activities and deploying resources in the realized or potential NFC enabled mobile payment processes are represented. Such actors are, in the “eco systems”, defined as belonging to specific “industries” and thus each GPN network is focused on complementarity between resources and on cooperation between actors as well as developing standards that promote competition.
For each GPN the concept “eco-system” is used to denote what specific types of actors that are involved and also how they are dependent on each other for the functioning of the NFC mobile payments. Much of the technical architecture is not yet settled. The use of NFC enabled mobile payments in practice is still in its infancy, use has not yet “taken off”. Visions and plans characterize the present situation more than realized commercial applications.

HOW GPNS DESCRIBE THE TECHNICAL AND NUSINESS ARCHITECTURE FOR MOBILE PAYMENTS

Different GPNs and companies present many descriptions of “Eco-systems” for NFC mobile payment services. The pictures below are presented by NFC Form and MobeyForum. A number of actors are listed but little is said about activities, roles or relations.





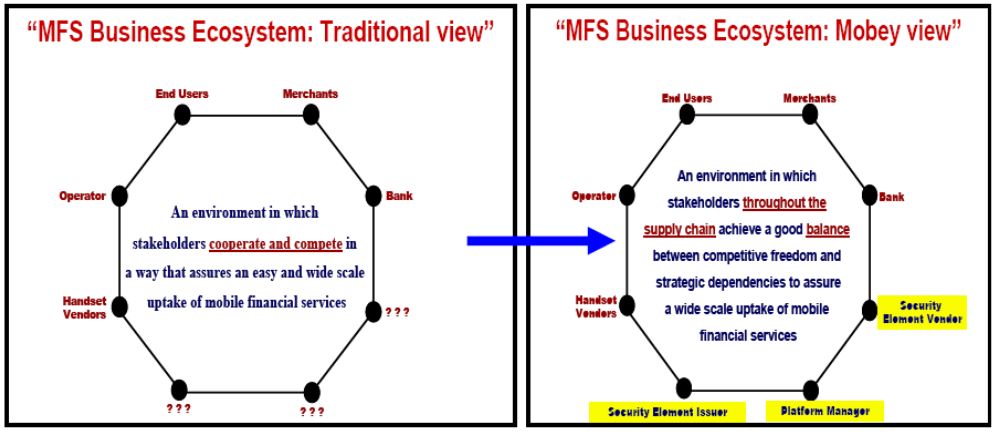


Figure 2. Defining the Mobile Financial Services Ecosystem

Figure 1 Descriptions of Eco-system from NFCForum (top) and MobeyForum (bottom)

Using the notion of "eco-system" it is interesting to compare with the concept "business ecosystem" as it appeared in *Harvard Business Review* (May/June 1993)

> "An economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world. The economic community produces goods and services of value to customers, who are themselves members of the ecosystem. The member organisms also include suppliers, lead producers, competitors, and other stakeholders. Over time, they co-evolve their capabilities and roles, and tend to align themselves with the directions set by one or more central companies. Those companies holding leadership roles may change over time, but the function of ecosystem leader is valued by the community because it enables members to move toward shared visions to align their investments, and to find mutually supportive roles"

Other representations of "eco-systems" include a mix of actors, functions and relations. However, often this mix is confusing and the area of use of this kind of representation is unclear. An example from NFC Forum is shown in Figure 2. Actors and functions are mixed without describing what actor that takes the responsibility for a certain functionality. In addition, different types of business are mixed; mobile services, the handset business and the business of handset subsystems.

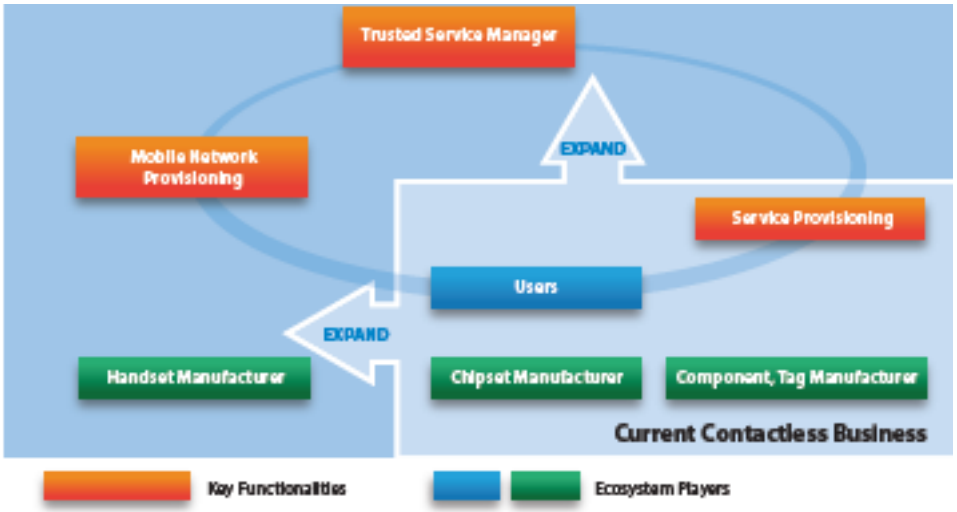


Figure 2. Example of eco-system from NFC Forum with actors and functionalities

GSMA has similar representations but has managed to take some steps further since their ecosystems describe actors, relations and to some extent the distributions of responsibilities. In Figure 3 a traditional credit card based ecosystem is compared with the so called "pay-buy-mobile" ecosystem. Here, two new types of actors are added, mobile network operators (MNO) and the trusted service manager (TSM). The role of the TSM is to take care of the life cycle management of the NFC service and security applications stored at the SIM card.

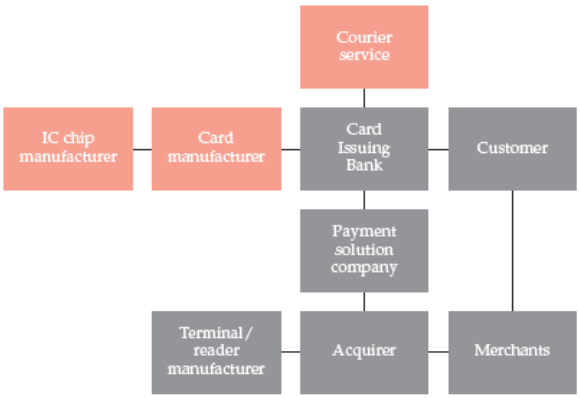


Figure 5 : Existing credit card ecosystem

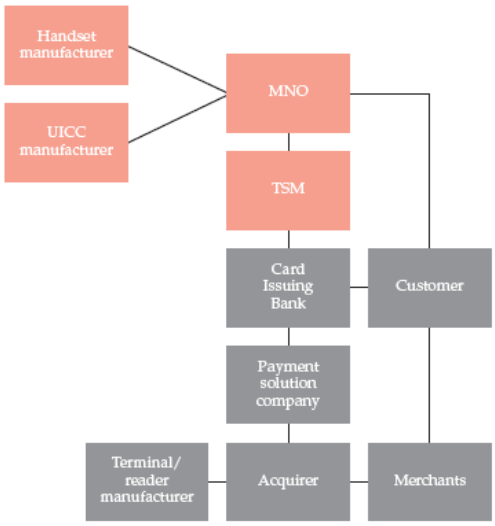


Figure 6 : Pay-Buy-Mobile ecosystem

Figure 3 GSMA descriptions of credit card based and pay-buy-mobile eco-system

GSMA and EPC have jointly tried to resolve the uncertainty about the TSM role by defining technical and business interfaces for different actors taking different roles for this so called service management. Left part of Figure 4. illustrates one example (four party model) of distribution of service management roles.
EPC has also made descriptions of mobile payments based on SEPA (Single Euro Payments Area) card payment standard. One example is shown in the right part of Figure 4 with detailed descriptions of sequence actions for transactions.

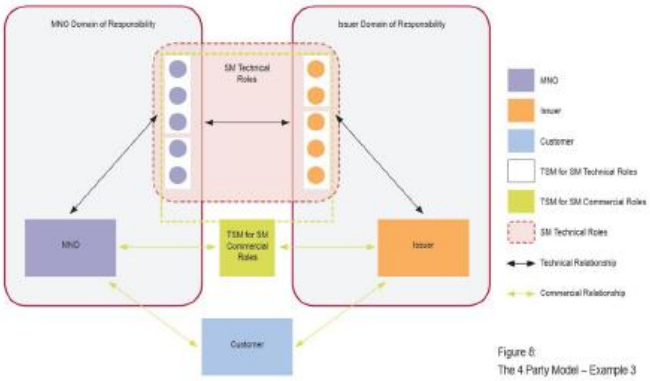


Figure 8:
The 4 Party Model – Example 3

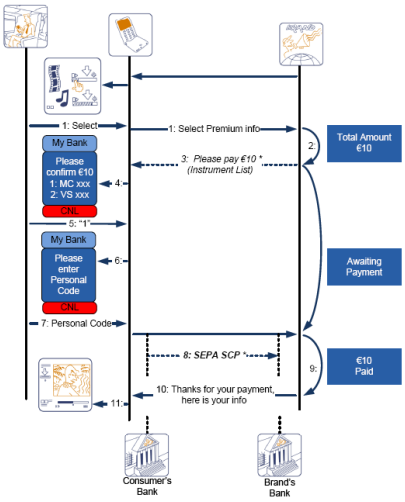


Figure 6: Example of Person to Business Mobile Remote SEPA Card Payment.

Figure 4. GSMA/EPC illustration of distribution of service management roles (left), EPC description of sequence of action for a mobile payment transaction (right).

Secure elements and trusted service managers

An area of specific interest is the use of and control of the Secure Element (SE). A SE is used for storage of the Security and service applications in a mobile phone. An example of a SE is the SIM card with it security functions and subscriber data. New types of SIM cards (UICC) are discussed for the use of mobile payments and NFC services. Other options than UICC are to use dedicated hardware in the phone, separate memory cards or software ("apps").
The control of the SE is a key issue for the distribution of roles among actors. Is the role taken by some of the existing actors or will it be taken by an independent actors?

Different technical alternatives were associated with several alternative options for the technical architecture related business architecture. For example, Mobey Forum, discussed three major alternatives of business architecture, given that the SIM card (here: UICC) becomes the central attractor. An extract from a White Paper by the Mobey Forum below shows how the SIM card becomes the major focus:

"UICC-based SE business models are most likely alliance models between the MNO (mobile network operator) as SE Issuer and an Application Issuer (for example a Financial Institution or Other Service Entity) to "share" the UICC. Financial Institutions are only likely to become SE Issuers for UICCs if they act as a Mobile Virtual Network Operator (MVNO) and thus also control the UICC. For collaboration agreements between MNOs and Financial Institutions, three Business Model Scenarios can be distilled:

- The so called "Rental Model": The UICC is owned by the MNO. Partitions of the UICC are rented out, e.g. to Financial Institutions as App Issuers. The MNO may have risk sharing agreements with a Financial Institution via long term contracts or even shared investments into this infrastructure. The main business control over the UICC, however, is in the hands of the MNO. This model is favored by many MNOs.
- The so called "Hotel Model": The UICC is fully owned and managed by the MNO. Contract durations can be shorter than in the "Rental Model". The MNO covers capital expenditures as well as operating expenses. Financial Institutions rent partitions of the UICC short term as "guest".
- The so called "Ownership Model": The UICC is co-owned by the MNO and a Financial Institution. The concept allows independence to manage each UICC partition separately. Capital expenditures and operating expenses are shared between the MNO and the Financial Institution. Each App Issuer is individually responsible for the maintenance his own MFS Application, based on agreed joint business principles. The distribution of the UICC may even take place through the FI." (From White Paper: "Alternatives for Banks to offer Secure Mobile Payments"

(Mobey Forum, 08/03/2010, pp. 26-27)

However, global negotiations had to go deeper into the heart of the mobile phone. The SIM card alternative for the secure element also encompassed different alternatives. In other words, the SIM card could also be "organized" in several different ways, depending on what roles, services, consumer activities and industrial networks of organizations that should be associated to the phone and to its SIM card. Depending on, for example, how the secure elements should be managed on (or outside of) the SIM card, different organizations would

assume different roles. Discussions in the NFC Forum and in the Mobey Forum, for example, circled around this issue. (White paper, Mobey Forum 08/03/2010)

The SIM card may have separate "Security Domains" for each NFC application, administered by e.g. an Application Issuer and based on the use of secret administrative keys. The card's operating system usually implements a firewall that can establish secure partitions on the SIM card (UICC) and prevent the different applications from accessing, sharing or corrupting data between them. Technically the SIM card can create such secure domains and also secure sub domains. Actors, for example a new "Trusted Service Manager" can have the technology to manage the memory space on the SIM card and create secure domains. Applications can be preloaded to the card or can be provided over the air. Applications can be taken to Secure Domains over e.g. SMS. Thus, various ways of organizing the "domains" and "sub domains" of the SIM card will have consequences not only for what services and applications mobile consumers like Jan will be able to connect to the SIM card of his phone. It will have substantial consequences for the organizational processes of economic organizing, including what actors that will assume the most central role(s) as intermediaries.

Later in the NFC process, as applications of NFC for consumer services became a more important issue, a diversified set of actors with little or no history of earlier interdependencies also became attracted to the NFC Forum

LOCAL POLICIES

As shown in the section above there exist a large number of GPN representations of different business eco-systems for NFC enabled mobile payments. At the same time we know that the services according to these representations do not take off – not even slightly.
We also know that there exist a number of mobile payments and ticketing services, some of which also contactless technology, where there actually exist eco-systems for mobile payments. Are these "existing" services different to the NFC enabled payment services using eco-systems proposed by the GPNs ?

For the analysis and comparison in the next section we have selected a number of existing mobile payment solutions. The corresponding eco-systems will be described in this section in terms of actors and their relations and the distribution of activities among actors. We will start the description at the level of activities using SMS payment solutions and two types of emerging contactless payment solutions as examples, from Markendahl (2011).

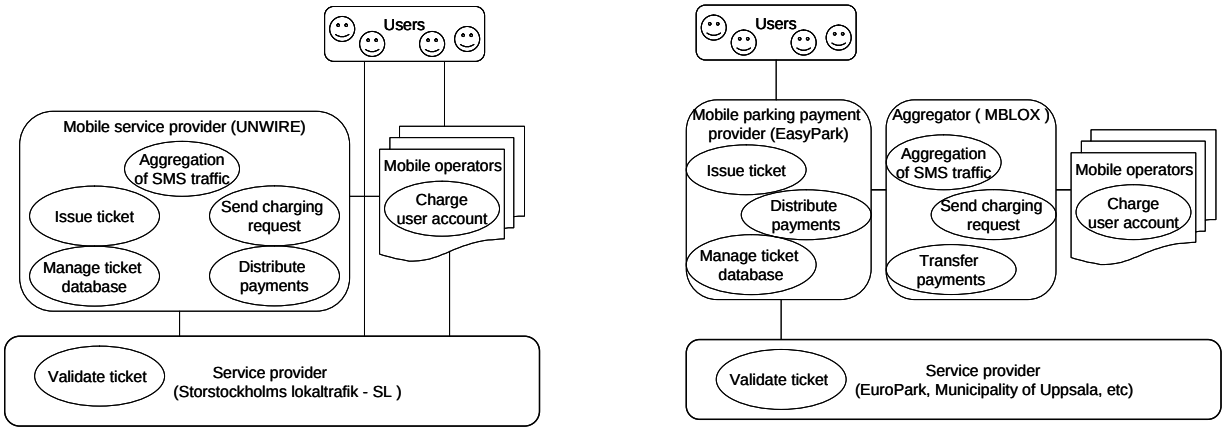


Figure 5 Distribution of activities among actors for two types of SMS ticketing services

Distribution of activities among actors for SMS payments for ticketing is shown in Fig 5 illustrating two options for distribution of activities. The SMS tickets and payments are handled by two or three actors, one or two intermediaries and a mobile operator. Another example is shown in Fig 6 for two mobile contactless payment solution provided by the small start-up Payair and by the payment provider PayEx respectively. These two services are launched in a small scale in some Swedish towns 2009 and 2010.

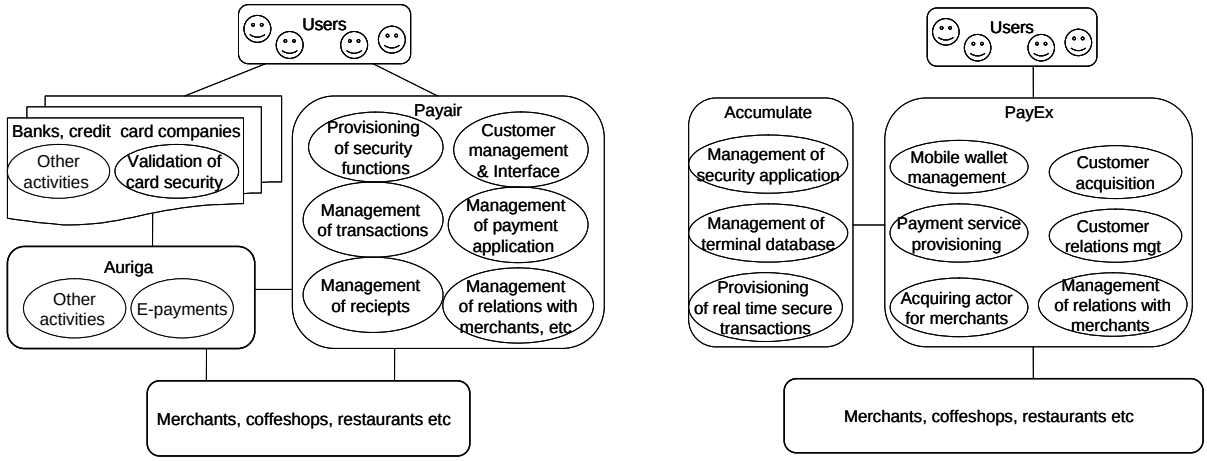


Figure 6 Distribution of activities among actors for two types of mobile payment services

Figure 5 and 6 illustrate that the activities can be distributed among actors in a multitude of ways. This distribution of activities, and roles and responsibilities, is not outlined by the technical standard. It is a result of negotiations and agreements among actors for each special case. The examples in Figure 5 are just two among a large number of different ways for interaction between actors. The technical standard provides a foundation and the final form of eco-system is a result of the actor interaction for a specific service.

The same variation can be identified when we describe these cases at an actor level in order to illustrate the relations between actors for these payment services, see Figure 7. The different types of distribution of activities and configuration of actor networks are a result of case by base negotiations and agreements for specific services and/or regions or towns.

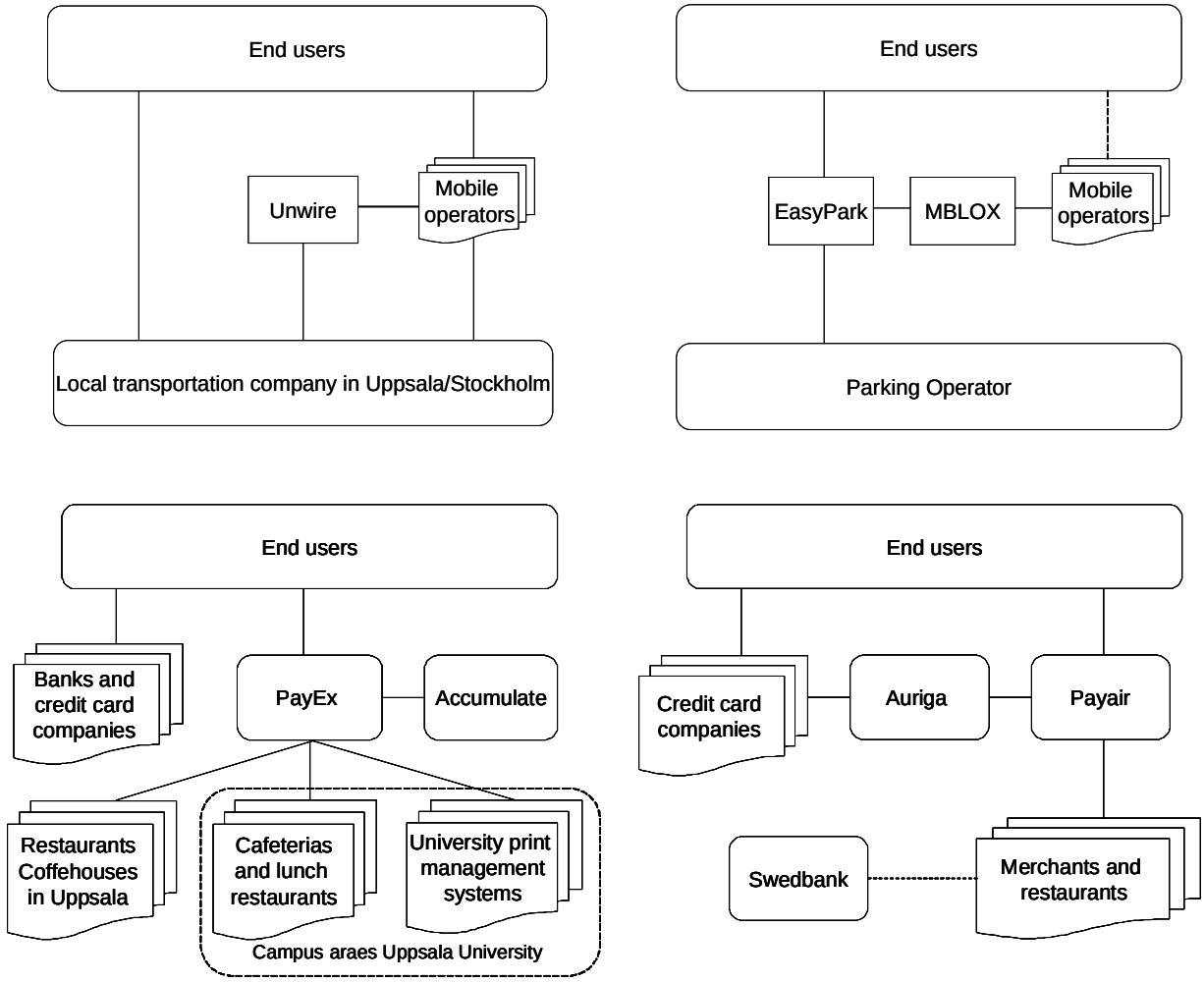


Figure 7 Maps of actors and relations from the examples in figure 5 and 6.

For these types of services we can conclude that the main actor that actually provides the mobile payments service is some kind of intermediary actor, it is not the mobile operator, a bank or a credit card company. In the SMS payment cases the operators are slightly involved but for the PayAir and PayEx cases the operators are not involved at all.
For the Payair solution the financial institutions are involved mainly through the end-users, the solution is based on the use of the existing bank or credit card account of the end-users.

It can be interesting to know that the Payair security solution is a key component in the recently (February 2011) presented Ericsson Money Service. According to the press release by Ericsson this service will be offered to mobile operators in countries with many "unbanked" mobile customers. At the local market the operators can cooperate with merchants in order to establish a payment infrastructure based on mobile phones and the phone subscriptions. Hence, mobile operators can enter the payment business.

Similar types of activity and actor maps are found when we study the mobile and contactless services that have existed in a large scale in Japan for many years. The contactless service "Suica" using plastic cards was initially introduced by JR East for transportation services but could later also be used as *electronic money* (Bockish and Alexandro 2010).

An actor map for the Suica service is shown in figure 8. The actors and relations in this figure can be compared to the PayEx case as described in Figure 7. The payment solution with an initial intended usage, i.e. for printing services and transport ticketing respectively, found new application areas. In both the PayEx and the Suica cases the usage started in the local environment, i.e. the campus area and the train stations, and was later extended to be used outside these areas.

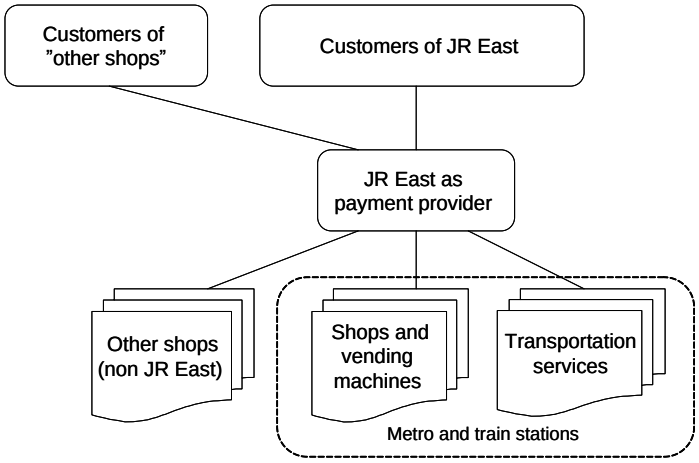


Figure 8 Actor map for the Suica payment service provided by the train company JR East

Later on a “Mobile Suica” was introduced and the mobile network operator NTT Docomo launched the mobile wallet service, “Osaifu-Keitai”, in June 2004. Osaifu-Keitai was developed in order replace the physical wallet with a digital one in the mobile phone. The handset is equipped with the FeliCa contactless IC card technology and extended memory to register many different services. Today the service is a de facto standard in Japan for mobile payments and is currently being offered by two other mobile operators, Softbank and KDDI.

It is interesting to follow how NTT Dodomo used the mobile wallet service to enter the payment business ending with the launch of an own credit card brand. The story in summary:

In *July 2004* JCB and AEON Credit Services presented a payment solution for contactless IC cards, *QUICPay*, compatible with DoCoMo’s mobile wallet service. The service enables the customers to do mobile payments without the disadvantage of charging the card or mobile with money beforehand. The mobile expenses are covered by the customers’ credit card of choice.
In *April 2005* DoCoMo founded a strategic alliance with the partners Sumitomo Mitsui Financial Group, Inc. (SMFG), Sumitomo Mitsui Card Co., Ltd. And Sumitomo Mitsui Banking Corporation (SMBC). The objective was to launch a credit-payment service using DoCoMo’s mobile wallet phones.
DoCoMo acquired 34% of the shares of one of the partners (Sumitomo Mitsui Card). This alliance resulted in the launch of DoCoMo’s *iD* credit card brand in *December 2005*. *iD* enabled companies to link credit cards to DoCoMo wallet phones and thus offer contactless mobile payment services.
The knowledge and experience with *iD* in the credit card business enabled NTT DoCoMo to launch its own credit card service *DCMX*, in *April 2006*. Now NTTDoCoMo had entered the financial service market. Every new customer, purchasing an Osaifu-Keitai phone was automatically enabled as a *iD* customer. In *August 2009*, *iD* gained over more than 10 million subscribers.

It is interesting to identify the different ways of cooperation that was used by NTT Docomo. The position of NTT Docomo was different for the different types of credit card services.

- the *QUICPay* service was offered by other financial institutions
- the *iD* service was offered by NTT Docomo in collaboration with financial institutions
- the *DCMX* is the credit card brand of NTT Docomo that now *"is"* a financial institution

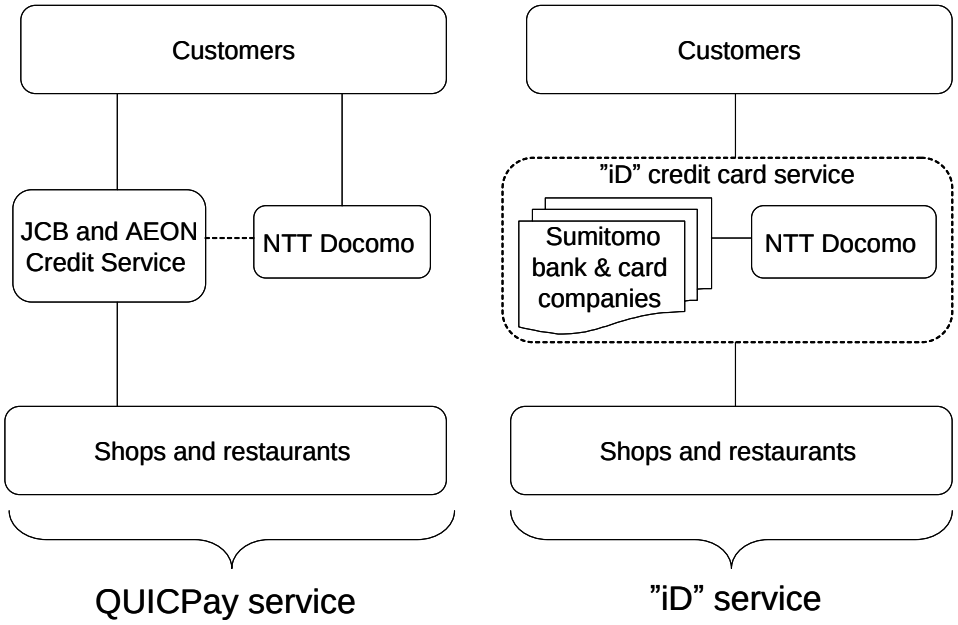


Figure 9 Actor map for credit card services where NTT Docomo is one partner

ANALYSIS

In the analysis section we aim to answer: why do mobile payments according to the NFC Forum and GSMA eco-systems are difficult to implement? We first compare different service or type of service solution in terms of what technical and business aspects are defined or not by standards and/or descriptions of eco-systems. Then we discuss the question with reference to the business practice framework.

Comparisons between different types of service solutions

From the above sections we can identify gaps between eco-system descriptions and descriptions of activities, actors and relations for existing services. To create a implementable eco-system a number of aspects need to be defined, clarified or agreed upon. This applies to technical functionality and interfaces for exchange of data as well as to distribution of roles and responsibilities among actors.

The descriptions by GPNs cover technical functionality (the standard) and to some extent the business related aspects (eco-systems and specification of roles). However, this is about "how it could be", actors really need to discuss and agree about how to implement the standard or "policy".
This is illustrated by table 1 below where we compare two of the GPN descriptions with two types of existing mobile payments systems described in the previous section. We also compare with two other types of global policies that turn out to work well; the 3GPP standard

used for mobile communication systems (GSM, UMTS (3G), etc) and the credit card based system for payments.

3GPP standard covers what the actors (i.e. mobile operators) should do technically to implement the standards. This also includes the customer interface and how to interact with other operators. This includes e.g. interconnection, termination of calls and roaming. The regulator may provide directives about fees and when to apply different types of interaction, e.g. national roaming. However, there is no uncertainty of "how" the actors should implement the standard or "how to" cooperate.

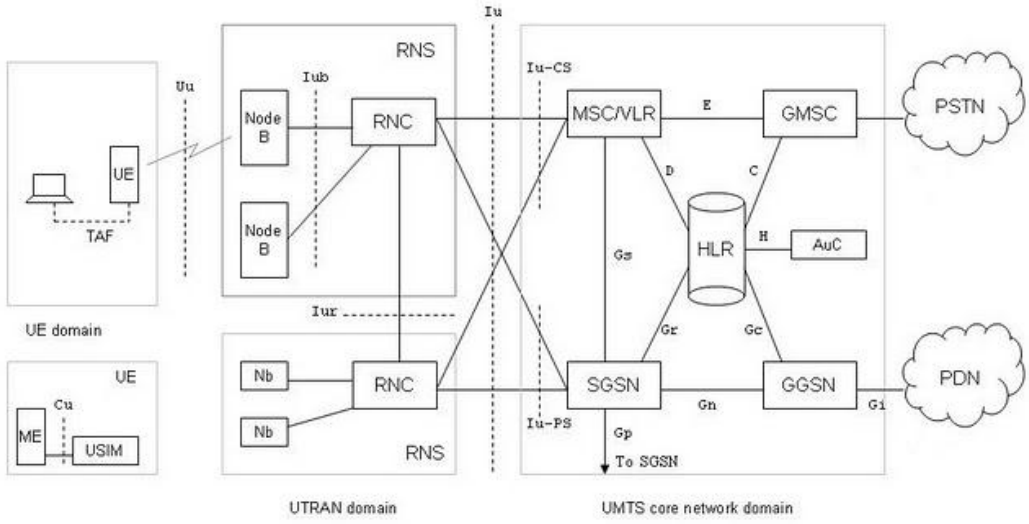


Figure 10 Architecture of mobile network according to the 3GPP "3G standard"

The credit card payment services are based on a "policy" that is a mix of technical standards, government/EU directives and agreements among actors. The technical standard covers technical functionality and exchange of data among the actors. The technical standard describes mechanisms for security, authorization, clearing and settlement of payments. The actors are cardholders, merchants, cardholder´s bank, merchant´s bank and companies responsible for the clearing, typically a credit card company.

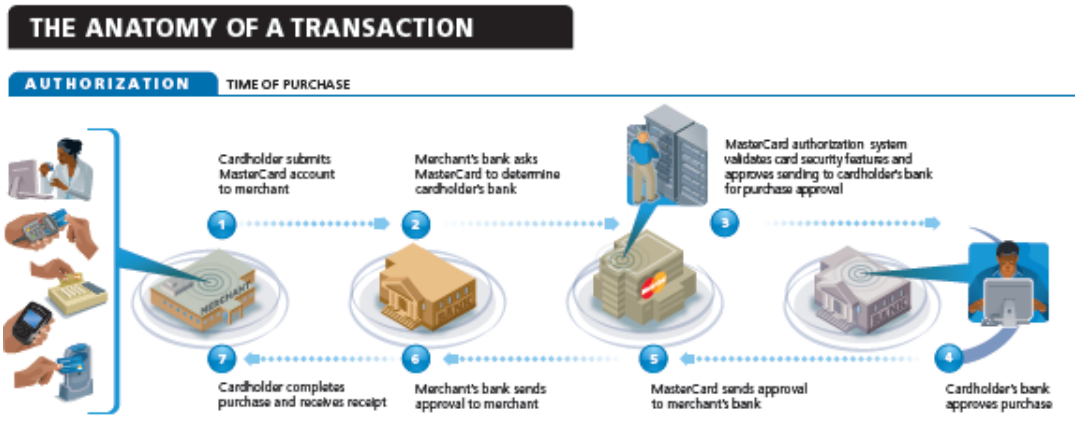


Figure 11 Business architecture and data exchange for credit card payments ("Anatomy of a transaction " by Mastercard)

Figure 11 depicts the activities and actors involved in credit card payments. An example of government policy is the Single Euro Payments Area (SEPA) initiative. SEPA is a European

Commission (EC) and European Payments Council (EPC) initiative that plans to remove the barriers to movement of cross-border electronic Euro payments. In order to implement the credit card payment schemes merchants and service providers need to "connect" to this network, hence the case by case agreements as indicated in table 1.

System or type of service solution	**Technical functions**	**Exchange of data**	**Type of actors**	**Roles and responsibilities**	**Distribution of roles**
Networks for mobile communication , 3GPP	Defined in standard	Defined in standard	Defined in standard	Defined in standard	Defined in standard
System for credit card payments	Defined in standard	Defined in standard	Defined in standard	Defined in standard	Defined by agreements
Mobile payments by NFC Forum	Defined in standard	Defined in standard	Partly by ecosystem	Not defined	Not defined
Mobile payments by GSMA/EPC	Defined in standard	Defined in standard	Defined in ecosystem	Partly defined by ecosystem	Partly by ecosystem
Mobile payments from SMS ticket cases	Defined in standard	Defined in standard	Defined by agreements	Defined by agreements	Defined by agreements

Table 1 What aspects are defined by standards, agreements and/or descriptions of ecosystems?

The local business networks represented by the SMS payment cases and the Japanese contactless mobile payment services are similar to the credit card cases. There is a technical standard as a foundation for providing services and to do business. The SMS and Suica cases illustrate how business is done in a local network with a limited number of actors. In all these cases there is a service provider (a transportation company), one or more mobile service providers that actually provides the mobile payment or ticketing services, and finally mobile operators that provides the customer base for the services. In some case the mobile subscription is used for payment but this is not the key issue.

As regards the mobile payments schemes proposed by the GPNs a number of aspects are not defined or agreed. For all GPNs the technical standards are well defined when it comes to technical functionality and how data should be exchanged.
However, for NFC Forum the business aspects are hardly addressed. The ecosystem includes listing of actors but nothing is said about roles of actors or their interaction.
The GSMA standards and eco-system descriptions provide some more information about actors, roles and responsibilities. However, the description of interaction between actors is limited to a minor part of all roles that are needed to describe a complete eco-system. GSMA (and EPC) provide description of just one role, the one concerned with the life-cycle management of the security and service applications to be stored at the SIM card in the mobile phones.
Nothing is said about responsibility for providing the service to be paid for, management of customers, business relations or payment streams. In the SMS and Suica cases this is defined by negotiations and agreements among the involved actors.
Another drawback with the GSMA/EPC solution is that it assumes that the service will use the SIM card for storage. Other solutions may be to store the service application in dedicated hardware in the phone, in a memory card or as a software application (e.g. an Iphone "app"). For these case the GSMA/EPC solution with banks, mobile operators and 3rd party TSM are of no value since the service can be provided without any involvement of any of these actors. This is the motivation for the word "partly" in table 1.

So the question remains, why don't mobile payments according to the NFC Forum and GSMA eco-system descriptions take off?

Analysis with reference to the business practice model

To apply new technique for service innovations always require changes in network structures. To apply NFC to mobile payments is clearly a case in point. Such network changes are driven by local business actors that develop local policies in interaction with other actors. Such policies are influenced by global policies. Both global and local policy actors can be seen in a business practice perspective. To understand the complex interaction between such global and local practices is the aim of this paper.

GPNs and individual business firms are involved in the market shaping practices that are conceptually formulated by Kjellberg and Helgesson (2007) as consisting of three interrelated practices: normalizing, representational and exchange practices and translations between them. Representative practices describe and analyze, make sense, of the context in which economic exchange takes place. When application of new technology evolves, exchange practices (e.g. as regards payments) are affected. It is during this process important to consider how actors make sense, "represent" the context, be it called market, industry, network or something else, that is reshaped. As in processes that concerns us here: converging technologies, converging industrial sectors and converging markets, a diverse set of policy actors will be involved in representational practice that also translates into developed norms and other aspects of normalizing practice. In the sections above we have shown how global and local policy actors represent the market and have identified some gaps between the global and the local practices. We believe that these gaps reflect some problems in how global representational practices translate into normalizing practice. Currently (Spring 2011), the unsettled nature of global normalizing practices, has negative effects on the development of local exchange practice that applies NFC enabled mobile payment services.
We suggest that there are differences between actors depending on their network position and role (e.g. as operators, banks, retailers or hardware or software suppliers) and also between involved GPNs depending on their specific purpose.
The representative and normalizing practices of NFC Forum and GSMA/EPC, as shown in Table 1, do not define or only partly define relevant actors, actor roles and responsibilities nor distribution of roles and responsibilities. For other service solutions in Table 1 the business architecture in those dimensions have been defined in standards or by agreements by local actors. For the NFC enabled mobile payments to be realized in line with visions expressed in media by business firms, industry organizations and experts, local actors have to develop normalizing, representative and exchange practices through business network interaction and agreements.

With reference to the ARA model (Håkansson and Snehota (1995) we can ask if the eco-systems, as representative practice, include all important actor categories in a web of actors and all necessary resources in resource constellations that need to be involved for the service innovation process. Some GPN eco-systems represent activity links, actor bonds and resource ties at a generalized dyadic level but are by definition not translated to exchange practice because GPNs do not engage in exchange practice.
If global policies are unsettled, as they are for NFC enabled mobile payments, there will be more apparent gaps between global and local. Local actors will have to find their own ways, in interaction with others without clear guidance by global policies.

SOME IDEAS ABOUT FURTHER RESEARCH

In this paper we have only been able to propose some links between global and local policy in service innovation processes that are based on a new technique. Our empirical observations are not sufficient to more than suggest how this process works. Let us systematically again list the most important links we have proposed and somewhat explored.

1. *Global policies affect local policies*. In our cases we have found some such influences, mostly as they relate to the still uncertain policy regarding the secure element. We suggest more research, especially on reasons why local policies on NFC enabled mobile payments are still not taking off compared to use in more established uses of NFC payments for parking, ticketing etc.

2. *Global normalizing policies are based on representative practice*. We have seen that GPN representations do involve multi-market, multi-industry, multi-technology "eco systems" more or less reflecting network interdependencies to be considered for changes in exchange practice. The "network theory" thus includes complementarity, and the idea that standardization should promote both cooperation and competition. But we have not studied how the specific policy decision processes and their outcomes are dependent on representational practice. That could be a further aspect to be developed in future research as well on how the How GPN representations translate actual exchange practices is also a matter for research.

3. *Representative practice by GPNs is more rather than less but to varying degree of importance for local business practice.* That leads to questions about on what principles GPNs base their eco-system analyses. Despite some differences that we have found, common ideas are clearly that they have ambition to be holistic, embrace several, different components: technical functions, business entities, roles and responsibilities, information flows, and more. They seem to be guided by the same modeling principles as in "Enterprise Architecture Modeling" or "EA modeling" (Lankhorst et al 2009). The EA modeling principles have the ambition to affect business behavior like the GPN eco systems also do. But to what extent do eco-system maps function as "policies" and to what extent are they "translated" into business behavior? What actually is the role of the eco-systems in the development of global normalizing practice and for the development of local practices? We have seen a gap between the business ecosystem architectures and the local interactions and negotiations that are needed in order to implement the schemes.

4. *Impact of local policies on global policies* If we relate our *global to local* policy framework to the *local to global* policy framework, we could of course also propose links in the other direction. Local policy actors take part in GPN activities.
   Furthermore, if we take the more usual standpoint that local policies are national government agency formulated and global policies is more a matter of business practices in a "globalizing economy" then it would be interesting to learn more about how representative practices (how the government agencies view the world, e.g. linked to industry delineation, theory about innovation, role of competition, network horizon) translate into normalizing practice at the local level and then if there are important gaps between the local and the global in this respect

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