

Diffusion of the International Creditor Reference Standard

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Alexi Aalto

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Author Aleksi Aalto

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Abstract

The aim of this study is to determine which perceived attributes of the Diffusion of Innovations theory affect the diffusion of the international creditor reference standard and to what extent. The purpose of the international creditor reference standard, RF, is to automate the reconciliation of the payment to the invoice. The automation of reconciliation is believed to lead to cost savings and mistake reduction. In order to determine the potential adopters' views on RF, an academic study on the perceived attributes of RF is needed. This study will focus on the view of the creditor, that is the party that sends the invoice to the payer, and whose responsibility it is to reconcile the payment to the invoice.

To gain insight into the organizations considering RF adoption, case interviews were chosen as the main source of empirical evidence in this study. Four internationally operating Finnish companies handling international payments were interviewed for the cases. The case companies were selected from different industries in order to form a more comprehensive view of cross-border payment handling amongst creditors. The case company interview questions were devised according to the Diffusion of Innovations theory, with emphasis on the perceived attributes of innovations. A series of organization background questions was also included. A supportive survey was also created, and its results discussed.

Relative advantage was found to be the most important perceived attribute of RF innovation. Based on the case interviews and survey results, the main advantages of RF adoption are cost savings, reductions in reconciliation mistakes and the automation of payment handling processes. Information system compatibility and complexity was viewed as the largest risk and cost factor in RF adoption, but based on payment system vendors interviews, these fears are mitigated by the inclusion of RF support in general payment system upgrades.

The results of this study strongly support the notion that real-time automated processes lead to cost savings through the reduction of man-hours and mistakes within processes. These are the relative advantages of the RF creditor reference standard over both manual payment reconciliation methodologies as well as existing national creditor reference standards. The ability to automatically reconcile cross-border payments makes international transactions both faster and less costly to handle.

Keywords Diffusion of Innovation, International Creditor Reference Standard, Single European Payment Area, payment reconciliation, Real-Time Economy

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1 Introduction

The automation and digitalization of financial services is one of the key areas for development in the banking and treasury management industries. This movement has been driven by both European Union initiatives, mainly the Single Euro Payment Area (SEPA), academic communities, such as the Real Time Economy (RTE) community, and financial consortiums. As any given economy is driven by monetary transactions, their handling is a key concern for that economy. Therefore the real-time handling of monetary transactions is a key concern for the real-time economy, and in the heart of a monetary transaction between the creditor and the payer is the reconciliation of the payment to the invoice. The RF International Creditor Reference number, later RF, aims to automate that aforementioned process. The automation of reconciliation is believed to lead to cost savings and mistake reduction. In order to determine the potential adopters' views on RF, an academic study on the perceived attributes of RF is needed. By studying the perceived attributes of RF, its actual effects on payments, creditors and real-time banking in general can be specified. The RF creditor reference number could be implemented in cross-border payments in Finland since December 1st 2010. The deadline for SEPA payments replacing domestic payments in Finland was October 31st 2011.

Studying the adoption of innovations in various social systems, i.e. *diffusion*, has long and widely acknowledged traditions in academic research. Particularly in the 21st century diffusion research has become a major faction in information systems science, as innovations are nowadays predominantly technological in nature. The Diffusion of Innovations theory popularized by Everett Rogers has become a staple of innovation research. It is possible to determine the features and effects of a given innovation as perceived by its adopters in a social system by using the *perceived attributes of innovation* described in Rogers' theory. This model can therefore be directly implemented into studying the adoption of the RF international creditor reference standard. This study aims to determine the attributes that contribute to RF adoption, as well as their significance. The results of this study can then be used to communicate the effects of the adoption of the standard to creditors and therefore further promote RF adoption and usage.

1.1 Aims

The aim of this study is to determine which perceived attributes affect the diffusion of the international creditor reference standard, and to what extent. By determining which perceived attribute(s) affect the diffusion of RF, it is possible to determine the significance of the perceived attributes to the actual diffusion process. Determining the perceived attributes can enhance the process itself by addressing the attributes that might affect diffusion in a negative way. The study will focus on the view of the creditor, i.e. the party that sends the invoice to the payer, and whose responsibility it is to reconcile the payment to the invoice.

The Diffusions of Innovations theory developed by Rogers (2003) has been systematically researched and applied for decades, also the field of information systems science. Due to the technological nature of contemporary innovations, the vast majority of subjects researched with DOI in the recent years are related to technology, and lately particularly information technology. However, there has been little research done on the diffusion of official standards (for example, by the International Organization for Standardization), which can also be innovations. Webster Dictionary defines a *standard* as “something established by authority, custom, or general consent as a model or example” (Merriam-Webster Dictionary, 2010), hence an authority mandated standard does not have to initially benefit from general acceptance and consent. In order for a standard, and its diffusion, to be studied using the DOI theory, one must be able to perceive it. The study of innovations in banking or finance is also fairly uncommon using the DOI theory. In addition to its primary aims, this study aims to increase the study of standard and banking related innovation diffusion, as well as their visibility.

As a conclusion, the aims of this study are as follows:

1. What attributes do creditors perceive to be the most significant for RF adoption?
2. What is the estimated significance of the attributes perceived to be significant for RF adoption?

The limitations of the research centre mainly on the scope of RF use, and the use of the theory of innovation diffusion framework. RF adoption is discussed from the point of view of the creditor, where for example ERP-vendor views are used to assess the accuracy of case study and survey respondent perceptions. The use of the DOI framework is limited to the perceived attributes of innovations, as the other parts of the theory are transparent and similar amongst respondents.

1.2 Structure

This study constitutes of four main sections – the RF international creditor reference standard, the theoretical framework, the case studies and the international survey. The concept, goals and development of RF are described first, followed by the theoretical framework used in the study, supported by academic research on innovation diffusion. The empirical research of the study focuses on the results of four case interviews, and is supported by results from an international survey.

The RF creditor reference standard is introduced in the second chapter of this study. As the standard is closely tied to the Single Euro Payment Area (SEPA) process, this is discussed first. Then the concept of creditor reference numbers and their historical use is outlined, with a special focus on Finland. As this study focuses on RD adoption from the creditor's point of view, the reconciliation process is discussed mainly with this focus in mind. Naturally the whole scope of payment reconciliation and RF use is discussed. Finally, the ISO standardisation process of the RF creditor reference is described.

The theoretical framework used in this study is introduced in chapter three. The framework is based on the Diffusion of Innovations Framework (Rogers, 2003), focusing on the perceived attributes of adoption. The section will first introduce Rogers's framework, and discuss innovation diffusion research in general. Previous research on diffusion will be covered with special interest of innovations in the field of information systems, and to a more limited extent, banking. Other theories of diffusion research and their relevance will also be covered. The actual framework used in this study is then presented and discussed in relation to previous research and the case of the International Creditor Reference Standard.

The empirical research in this study is comprised of case interviews and a survey, with an emphasis on the former. Four case interviews were conducted in four Finnish companies receiving significant amounts of cross-border payments. The results of the interviews were then used to determine the perceived attributes of RF diffusion, and to assist in the creation of the survey. The case interviews and their results are discussed in the fourth chapter of this study.

The fifth chapter of the study comprises of the international survey, and its results. Despite arduous promotional efforts, the survey was not able to yield the desired amount of responses; hence it will not be used as the primary source of empirical data. The results of the survey are nevertheless in line with both the case interviews, as well as previous academic research, thus being a valuable addition to this study. Finally, the conclusions drawn from these two aforementioned sources of empirical data are discussed in the sixth chapter.

1.3 Glossary

DOI	Diffusion of Innovations theory
ERP	Enterprise Resource Planning
IATA	International Air Transport Association
ISO	International Organization for Standardization
MRP	Material Requirements Planning
RF	International Creditor Reference Standard
SEPA	Single Euro Payment Area
SME	Small and Medium Enterprises
SWIFT	Society for Worldwide Interbank Financial Telecommunication
TAM	Technology Acceptance Model

2 International Creditor Reference Number Standard

The RF Creditor Reference was accepted as an international standard for information remittance by ISO (International Organization of Standards) in March 2009. The standard provides a means to convey customer payment details in a machine-readable form. The standard also makes provision for validation of the RF Creditor Reference by making use of a computational check digit.

Creditor reference numbers have existed worldwide for more than three decades, and their use has been particularly widespread in the Nordic countries (Ranta, 2009). A creditor reference number allows payments to have unique identification numbers, which is beneficial for the payer, payee as well as the bank as it makes classification, reconciliation and identification of the payment simpler (Keski-Nisula, 2009). Hence compared to manual payment methods like cheques, a creditor reference allows for payments to be processed with higher speed and accuracy. Creditor reference numbers usually consists of a set amount of reference digits and one or more check digits that are used to electronically ensure the validity of the reference digits.

Existing national creditor reference numbers have only been usable in their respective countries. For example, using the Finnish creditor reference number is not possible in Sweden, since the Swedish creditor reference number follows a different algorithm and has a different number of digits. Cross-border payments in addition to the Single European Payment Area initiative have created a need for the better validating, identification and securing of international payments. The RF Creditor Reference was developed for these reasons.

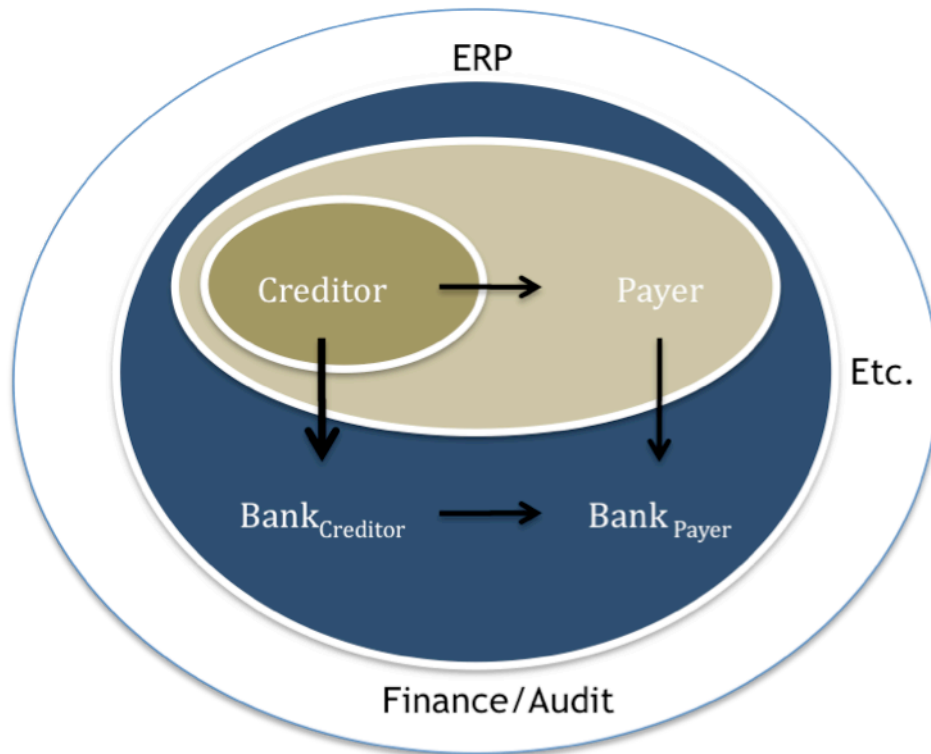


Figure 1 Creditor reference domain (Hautala, 2009)

The domain of creditor reference number is shown in Figure 1 (Hautala, 2009). The Creditor issues the creditor reference number to the Payer on an invoice. The relationship between the Creditor and the Payer also includes both parties' banks as they process the payment. All the actors that indirectly affect the payment process and the use of the creditor reference number are displayed on the outer ring. These actors include, but are not limited to Enterprise Resource Planning software and other information/financial system providers as well as accounting or auditing firms.

2.1 The SWIFT Credit Transfer Process

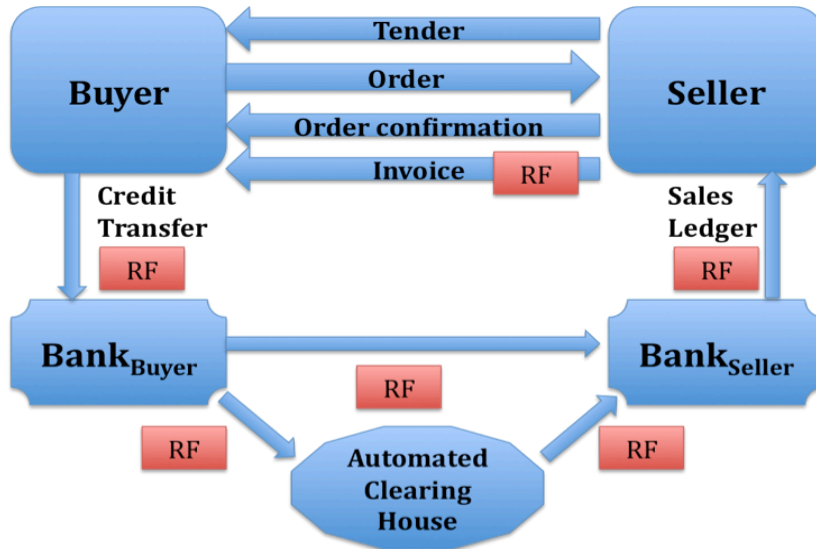


Figure 2 SWIFT Credit Transfer (Hautala, 2009)

The SWIFT credit transfer path is portrayed in Figure 2. The relationship of a Buyer and Seller usually involve one or more tenders, an order, an order confirmation, and finally an invoice. A creditor reference number, in this case RF, is first noted in the invoice. The Buyer then proceeds to commit a payment for the invoice. The payment carrying the creditor reference number first travels to the Buyer's bank. After this, the payment can either travel directly to the Seller's bank, or go through ACH for clearing. Finally, the payment reaches the Seller, ready for reconciliation.

The aforementioned process occurs instantaneously through automated real-time processes and the use of RF. The payment for the invoice is reconciled accurately and automatically, removing the need for any manual processes. Based on case interviews manual reconciliation takes on average 1-2 minutes, and in problem cases even days.

2.2 Domestic creditor reference number standards

It is not surprising that the international creditor reference number standard was invented in Finland, a country with one of the earliest domestic creditor number systems. Initially the Finnish creditor reference number began with postage transfers, which included an optically read account number, invoice amount and creditor reference. The use of creditor reference numbers in postage transfers persuaded banks to develop a creditor reference number. This was developed as a service for companies in order to allow for payments to be organised and reconciled more accurately and quickly. Nowadays practically all Finnish companies and organisations use the domestic creditor reference number.

Domestic creditor reference numbers are in use in other Nordic countries as well. Sweden's creditor reference number is called OCR, and Norway's is called KID. These creditor reference numbers use the same functional principles as the Finnish creditor reference standard, but they differ in composition, i.e. using different character lengths and check-sum algorithms. Hence domestic creditor reference numbers have only been useful in their representative countries, highlighting the need for an international creditor reference standard that makes automation of cross-border payments possible.

2.3 SEPA and its effect on international payments

The Single Euro Payments Area (SEPA) is an initiative of the European banking industry that will make all electronic payments across the euro area – e.g. by credit card, debit card, bank transfer or direct debit – as easy as domestic payments within one country are now. The SEPA project is strongly supported by the European Commission and the European Central Bank (European Commission, 2010). SEPA aims to offer benefits to consumers, companies, public administration and banks through simplification of payment processes and increased safety and efficiency.

The main objectives of SEPA are:

1. Standardization of euro payments: equal standards, equal time limits, equal fraud-risk levels, equal processes, and all-electronic straight through processing, and
 2. Fostering of competition in respect to higher number of competitors as well as fewer niches, special fields, and incompatibilities through standardization.
- (Palva & Penttinen, 2012)

The European Central Bank views SEPA as a pre-requisite to the completion of the monetary union. The integration of the euro payments market and the establishment of SEPA would be possible only within a common legal environment that would harmonize the rules and remove the local differences (Palva & Penttinen, 2012). In SEPA, the euro currency will be systemically strengthened by a harmonised set of euro payment instruments. In addition, the European Commission and the European Central Bank expect SEPA to serve as a stepping stone towards revolutionising electronic services in the payments and public services sectors, leading to further cost reductions and efficiency gains to the benefit of customers. (European Payments Council, 2010)

SEPA originated as an initiative of the European payments council. It has 32 members across Europe, including all current EU countries. SEPA pan-European instruments became available for use in 2008, and were planned to replace all national payments in the Eurozone in 2011. Table 1 displays the history of SEPA and related initiatives.

The RF Creditor Reference is an integral part of payment standardization, since it allows cross-border payments validation. RF was included in SEPA rulebook version 3.1. in 2008 (SEPA Rulebook, 2009), and is now a part of the Direct Debit Mandate Form.

1957	Treaty of Rome creates a European Community
1992	Maastricht Treaty creates the Euro
1999	Introduction of the euro as an electronic currency, including introduction of the RTGS system TARGET for large-value transfers
2000	Lisbon Agenda. The meeting creates a European Financial Services Action Plan
2001	EC Regulation 2560/2001 harmonises fees for cross-border and domestic euro transactions
2002	Introduction of Euro banknotes and coins

2003	First pan-European ACH (PE-ACH) goes live. EC Regulation 2560/2001 comes into force for Euro transactions up to €12,500
2006	EC Regulation 2560 cap increases Euro transactions up to €50,000
2008	SEPA pan-European payment instruments become operational in parallel to domestic instruments on 28 January.[7]
2009	PSD - Payment Services Directive (PSD) to be implemented in national laws by November
2010	SEPA payments will become the dominant form of electronic payments
2011	SEPA payments will replace all national payments in the Eurozone

Table 1 History of SEPA (Wikipedia, 2012)

2.4 The RF Creditor Reference

The RF international creditor reference standard and its development and approval processes are described in this section of the study. RF was developed in Finland using best practices of national creditor reference standards as well as other financial standards (such as the checksum algorithm of the IBAN) as benchmarks in its development. RF became an official standard in March 2009, when it was approved by ISO.

2.4.1 Development and approval process

The development and approval process of the RF creditor reference follows the standard approval process demanded by ISO. The first step in the process is a standardisation proposition, which domestic standardisation instances have to approve for further development. In the case of RF, the team responsible of developing the RF creditor reference standard consisted of Olli Kähkönen, Markku Ranta and 6-7 members from other countries.

Once the proposition is voted for approval, ISO members comment it. The development team then has to reply to the comments and change the proposition if necessary. After this, a draft version of the standard is handed in for voting and commenting. This is followed by the final draft. If voting ISO members approve the final draft, it will be published. In the case of RF, this process lasted over two years. The RF creditor reference standard was accepted and published by ISO in March 2009.

Despite multiple rounds of comments and suggestions, the proposition for RF remained relatively unchanged throughout the process. Suggestions and comments that were implemented to changes mainly regarded text corrections. In other words, the RF creditor reference standard, and its principles and composition, was published as an ISO standard in the same format as it was first drafted.

2.4.2 Structure

The Creditor Reference is 25 characters long and alphanumeric. In the beginning there are two letters 'RF'. After it there are two check digits. Check digits will confirm that the reference will be entered correctly. The remaining part of the Creditor Reference (up to 21 alphanumeric character) is the Reference. The content of the creditor reference part can be determined without any restrictions. (ISO, 2009)

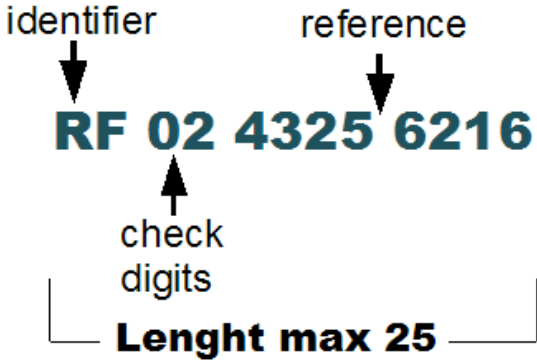


Figure 3 Structure of the RF Creditor Reference (ISO, 2009)

The structure of RF is illustrated in Figure 3. The reference number begins with the identifier “RF”, that signifies it as the RF Creditor Reference number. The second part consists of the check digit numbers. The check-digit algorithm uses the same logic as the check-digit of the International Bank Account Number (IBAN), which is also an ISO standard.

2.4.3 Promotion

Despite being accepted as an international standard, the diffusion of RF relies heavily on its promotion to be successful. ISO is not a promotional organisation, so the promotion has to be handled by other organisations. Currently the promotion of RF is mainly organised by its developers. In order for RF to be properly promoted, large financial organisations need to advertise its use and make RF use mandatory.

Based on RF developer and case interviews, the four main target groups for RF promotion were identified as:

1. Banks and financial institutions
2. Information systems and enterprise resource planning companies
3. Companies with cross-border billing and reconciliation
4. Companies and individuals with cross-border payments

The relationships between these target groups can be seen in Figure 1 (The domain of RF), which was presented earlier in this study. Variety in the probability for adoption should also be considered within the target groups. Malhotra and Singh (2007) found that in the case of internet banking, banks that were large in size, young and had large amounts exhibit a higher probability for adoption. A positive relationship between organizational size and diffusion has also been suggested by Eder and Igbaria (2001) in their study of intranet adoption

Promotion is also covered at length in Roger's DOI theory. It has specific sections for both communication channels and the change agents' promotional efforts. Promotional agents can be either wide scale international RF promoters, like its developers or international banking forums, or local and organisation specific, for example treasury managers and payment reconciliation professionals in the organisation planning to adopt RF. There are multitudes of possible promotional channels for RF, but based on interviews of Kähkönen and Ranta (2009), Table 2 was constructed, which displays the main communication channels for RF promotion.

RF developers	The developers of RF use their personal channels and contacts to promote RF.
Official RF document	The official RF document will act as a guide and promotional tool for the standard
SEPA rule book	Inclusion in the SEPA rule book grants RF an official status within the initiative
Banking community	Financial innovations such as RF are discussed regularly at national and international banking and financial industry conventions and forums
GT News, EPC News etc.	Banking, finance and treasury publications offer a widespread promotional tool for RF.
ERP vendors	ERP vendors add RF support to their service offering and version updates
Creditors	Creditors promote RF use in their invoices, and can offer incentives, such as discounts, for its use
Payers	Payers, particularly in high invoice volume relationships, can introduce RF to creditors

Table 2 RF promotion channels (Kähkönen, 2009 & Ranta, 2009)

2.4.4 IS Support

Information systems vendors are a critical player in the scope of RF use, as was displayed earlier in this study in Figure 1. As RF is included in invoices and payments, it will be handled by all information systems that handle financial transfers. This includes ledger software, payment handling software as well as large enterprise resource planning systems, which could cover all financial information handled in a given organisation, or possibly even along its supply chain. Hence IS support is vital for the successful adoption and diffusion of RF. Practically this means that financial and ERP system vendors must include the possibility to reconcile payments automatically with the use of RF.

Particularly the importance of information systems is tied to the perceived attributes of compatibility and complexity in innovation diffusion. Compatibility in this case applies to the systems being compatible with RF. Complexity refers to how complex the actual migration from previous non-RF versions is to RF-supported versions.

All the companies interviewed for the case studies viewed IS support as extremely important. Three of the interviewed companies had more than one information system handling payments, and naturally all of them noted that all of these systems must support RF for adoption to be successful. All of the interviewed companies estimated that actually coding the information systems to support RF would not be a large operation, hence increasing the possibility of successful and prompt RF support. An important factor to be noted is that all of the interviewed companies act in Finland, where all information systems already de facto support the national creditor reference standard. On one hand this makes adding RF support simple, as the vendors already have one, quite similar creditor reference supported in their systems. On the other hand, information systems vendors who do not currently support any creditor reference numbers or methodologies face a larger challenge. This applies mainly to smaller and national financial system vendors, as large international ERP vendors like SAP, Oracle and Microsoft already support creditor reference numbers on a national level.

3 Literature Review and development of conceptual framework

Innovation diffusion is one of the key areas in academic studies conducted in information systems. There are numerous theories and frameworks developed, but only few of them have gathered wide acceptance. Perhaps the most cited theory of innovation and technology acceptance is Rogers' theory of Innovation diffusion. After studying the relevance of various IS theories, DOI was also found to be the most useful for the study of RF diffusion. This section will discuss diffusion research in general, followed by the introduction of the framework used in this particular study.

3.1 Innovation diffusion theory and research

The Diffusion of Innovation theory states that *innovations are communicated through certain channels over time and within a particular social system* (Rogers, 2003). This process is called *Diffusion*. The definition of Diffusion can be henceforth divided into four main elements:

1. An *innovation*
2. Is *communicated* through certain *channels*
3. Over *time*
4. Among the members of a *social system*

Hence, the purpose of the theory of Innovation diffusion is to determine to what degree a given innovation is taken into use in a given social system.

The innovation is an idea, practice or object that is perceived as new by an individual or other unit or adoption, for example an organization or company. In the field of information systems science, diffusion of innovations theory has been applied in numerous studies (e.g. Agarwal & Prasad, 1999; Karahanna et al., 1999; Hsu et al., 2007). A large proportion of current diffusion research (e.g. Malhotra & Singh, 2007; Yiu et al., 2007, Lee 2008) is focused on technological innovations, but also organizational innovations, such as Total Quality

Management (Ravichandran, 2000) has been researched. Therefore innovation, and subsequently innovation diffusion research can be conducted under multiple scientific disciplines. In their study of measuring organizational innovations, Armbruster et al. (2008) divide innovations into four categories:

1. Technical product innovations
2. Non-technical service innovations
3. Technical process innovations
4. Non-technical process innovations i.e. organizational innovations

Communication is the second element of the diffusion process. *Communication* is a process in which participants create and share information with one another in order to reach a mutual understanding. A *communication channel* is the means by which messages get from one individual to another. These channels can range from interpersonal connections between individuals to mass media.

The third element of the diffusion process is *time*. The *time* function's inclusion in innovation diffusion research involves:

1. The innovation-decision process
2. The innovativeness of an individual or other unit of adoption
3. An innovations *rate of adoption* in a given system

The fourth element, the *social system*, is a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. The members or units of a social system may be individuals, informal groups, organisations and/or subsystems. The social structure of the system affects innovation's diffusion in several ways, as it sets a boundary within which the innovation diffuses. This involves:

- The effects of norms on diffusion
- The roles of opinion leaders and change agents
- Types of innovation-decisions
- The consequences of innovation

Diffusion is hence concerned with the adoption process of an innovation, and not the use of the innovation. There is however research conducted on the relationship between the adoption and the use of innovations, for example Karahanna et al. (1999) studied pre-adoption and post-adoption beliefs related to the adoption of the Windows Operating System.

3.1.1 Stages in the Innovation Process

The innovation process is typically divided into multiple phases. Rogers (2003) outlines the innovation process in an organization into five stages functioning under the realms of *initiation* and *implementation*. The first two are *Initiation* stages - *Agenda-setting* and *Matching* lead to an innovation decision. After the decision, *Implementation* begins in the organization. It consists of three stages: *Redefining/restructuring*, *clarifying* and *Routinizing*. The stages are explained by Rogers as follows:

1. *Agenda-setting*. General organizational problems that may create a perceived need for innovation.
2. *Matching*. Fitting a problem from the organisation's agenda with an innovation
3. *Redefining/Restructuring*. The innovation is modified and re-invented to fit the organization, and organizational structures are altered.
4. *Clarifying*. The relationship between the organization and the innovation is defined more clearly.
5. *Routinizing*. The innovation becomes an ongoing element in the organisation's activities and loses its identity.

Zmud and Apple (1989) present a variation of this implementation process specifically designed for IT implementation. They divide the process into six stages, *Initiation*, *Adoption*, *Adaptation*, *Acceptance*, *Routinization* and *Infusion*. All of these stages are discussed both from *process* and *product* point of view.

Carter Jr. et al (2001), who studies diffusion in the field of information technology, simplify Rogers' model to only three stages of adoption. They have contracted the five stages described by Rogers into their two respective phases, *Initiation* and *Implementation*, and

added the *adoption* stage to describe the transferral between the two. The stages of adoption according to Carter Jr. et al are:

1. Initiation. The stage during which the adopting unit acquires information about the innovation and goes through an approval process for using the innovation.
2. Adoption. Developing capabilities for using the innovation, such as training and/or hiring personnel, or physically acquiring the innovation.
3. Implementation. Using the innovation in production for any complete software development projects.

Their research on software adoption indicates that the importance of adoption factors vary by stage and adoption measure considered.

3.1.2 The Diffusion Process

As explained earlier, diffusion is concerned with the adoption of innovations. This section outlines the actual process of diffusion. Individuals are said to have different degrees of willingness to adopt a given innovation. Rogers (2003) argues that this willingness amongst individuals is normally distributed through time and can be divided into five categories based on an individual's innovativeness. The five categories are as follows (from most to least innovative):

- Innovators
- Early adopters
- Early majority
- Late majority
- Laggards

Figure 4 displays the process of innovation on a graph where cumulative adoption is plotted against time. Each group of adopters have a differing willingness to adopt a given innovations as well as adopting the innovation at different times. Innovators and early adopters adopt the innovation first, but represent only a minority in total adoption. The speed of adoption is also slower amongst these adopter groups. The early and late majorities make up the bulk of

adopters and are represented by the section of steep incline in Figure 4. Finally laggards, or late adopters in the figure, are the last to adopt the innovation, and are represented by the section showing a levelling off at the end of the cumulative adoption.

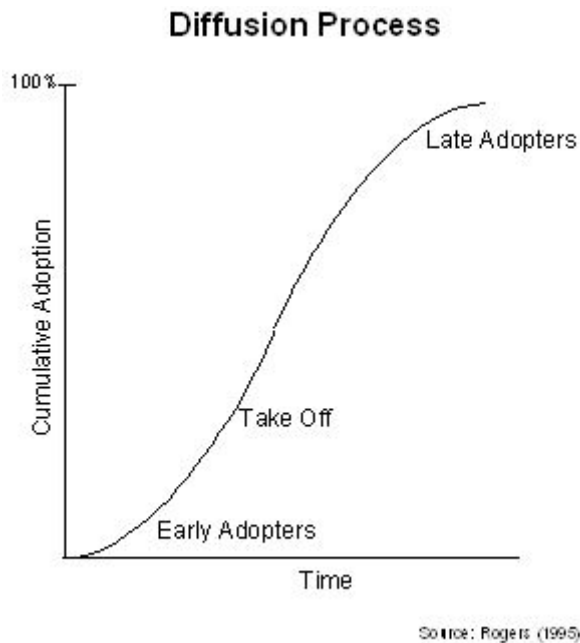


Figure 4 The Diffusion Process (Rogers, 2003)

Hsu et al. (2007) studied the factors affecting adoption of the mobile internet separately for each category of innovation adopters in the diffusion process. Relative advantage was found to be the most significant perceived attribute affecting adoption for all adopter categories except Laggards, for whom no significant relationships were found.

According to Ram & Sheth (1989) resistance towards innovation (which is typical to laggards) is divided into three characteristics:

1. Innovation resistance affects the timing of adoption
2. Innovation resistance varies in degree
3. Innovation resistance exists across product classes

Innovation resistance affects the timing of adoption, since adoption can only begin after initial resistance is overcome. Szmigin and Foxall (1998) outlined the degrees of innovation resistance to postponement and opposition. The resistance *across* product classes is derived from the degree of change and extent of conflict to the adopter's belief structure, as opposed to the actual product class of the innovation (Ram & Sheth, 1989).

Based on these characteristics, Ram & Sheth constructed the theory of innovation resistance (1989), which separates innovation resistance to *functional* and *psychological resistance*. Product usage, value for money and perceived risks are classified under functional barriers, whereas conflict with traditions and negative image are classified under psychological barriers. A further observation is that for technological innovations, product usage is related to the two attributes of the Technology Acceptance Model (TAM) – usability and ease of use. When both types of resistance are present, Ram & Sheth describe it as *dual resistance*.

3.1.3 Alternate theories in diffusion research

Rogers' theory on the Diffusion of Innovation is the basis of most modern diffusion research, and the most widely used and accepted model for diffusion. However, the large amount of variables in the theory allow for the framework to be adapted based on the study at hand, and many innovation diffusion researchers present slightly modified frameworks of the original. These alternative frameworks were not used in this specific study since they do not have the empirical support of Rogers' framework, but they are nevertheless introduced to display the adaptability of the theory of Innovation diffusion.

Most commonly the *perceived attributes* of the innovation are used, possibly with eliminating of some attributes, or including new features, for example from the Technology Acceptance Model. Perceived ease of use and perceived usefulness are the most notable factors influencing adoption according to TAM. Especially perceived usefulness has been found to have a significant effect on the adoption of online banking (Lee, 2008). The study also took into account perceived risk and perceived benefit, of which the latter is comparable to *relative advantage* under the DOI theory.

Karahanna et. al (1999), who compared pre-adoption and post-adoption beliefs, built their framework of perceived innovation attributes with the attributes listed by Rogers (Relative advantage, compatibility, complexity/ease of use, trialability, observability/visibility) along with image and result demonstrability. This was similar to the framework developed by Moore & Benbasat (1991), which also included the factor of Voluntariness. This has been

found to be especially significant for the early majority adopters of an innovation (Hsu et al., 2007)

Despite the popularity of Rogers' theory of the Diffusion of Innovations, Lefebvre et al. (1991) research adoption in SME's, and identified four factors affecting new technology adoption:

1. Characteristics of the firm
2. Competitiveness and management strategies of the firm
3. Influences of internal and external parties on the adoption decision process
4. Characteristics of new technologies adopted

Iacovou et al. (1995) researched the adoption of EDI in small business and came up with three affecting factors:

1. Perceived benefits
2. Organisational readiness
3. External pressures on the organization to adopt the technology

Mehrtens et al. (2001) used the above model as basis to create a model to study Internet adoption by SME's, which involved examining seven case firms. Their model is presented as follows:

Factors	Perceived benefits	Organisational readiness	External pressure
Definition	<p>Efficiency benefits from the relative advantage over traditional methods</p> <p>An effective way to gather information</p> <p>A business tool to build the firm's image</p>	<p>Level of internet knowledge among non IT-professionals, often from an owner-manager</p> <p>Adequate computer systems within the firm</p>	<p>Pressure from existing internet users, particularly customers but also suppliers and potential employees</p>

Table 3 SME Internet adoption model (Mehrtens et al, 2001)

Agarwal and Prasad (1997) studied the acceptance of information technologies, and suggest three improvements that should be made to diffusion research:

1. A unitary model may not work if both current and future use intentions are researched
2. Theoretically sparse and parsimonious models should be developed for each outcome that contains a limited number of perceptions
3. Models of technology adoption should take the nature of the technology into account, as not all perceptions may be salient for each technology.

It is also not uncommon to create a parsimonious model based on variables that have empirically been discovered to affect diffusion. Premkumar & Ramamurthy (1995) built their decision model for measuring adoption of interorganizational systems in this way. The items measured in their study were net dependence, exercised power, competitive pressure, transaction climate, organizational compatibility, top management support, internal need, champion, information systems infrastructure, extent of adaptation, internal integration and external connectivity.

3.2 Diffusion of Innovations Conceptual Framework

The Diffusion of Innovations conceptual framework is divided into five variables that determine the Rate of Adoption of a given innovation. Most of the variance in the rate of adoption of innovations, from 49 to 87 percent, is explained by these variables (Rogers, 2003).

The *rate of adoption* is the relative speed with which an innovation is adopted by members of a social system (Rogers, 2003). The rate of adoption is usually measured as the number of individuals adopting an innovation within a specific period, but the adopters can also be companies or nations. Goldman (1994) for example investigated diffusion amongst local chapters of an US organization, March of Dimes. However, when the number of people involved in making an innovation decision rises, the rate of adoption slows down.

In order for the perceived attributes of innovations to be described in universal terms, a standard classification scheme has to be used. The approach used in the theory of the diffusion of innovations divides the perceived attributes of innovations into five attributes –

relative advantage, compatibility, complexity, trialability and observability. Rogers (2003) argues that individuals' perceptions are more important than the attributes themselves, hence emphasizing its measurement over the objectively classified attributes.

Condensing perceived attributes into five categories is naturally problematic, since they might not be the five most important attributes of an innovation in a given case. Yet studies (Kearns, 1992) have shown that the five attributes listed in the DOI theory are perceived to be important consistently.

Relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes (Rogers, 2003). When measuring the relative advantage of an innovation, it is not necessary to evaluate whether it has objective advantage over the precedent idea. It matters whether an individual perceives the innovation as advantageous. The theory suggests that the greater the perceived relative advantage of an innovation, the more rapid its rate of adoption will be. Relative advantage can be described as a ratio of the expected benefits and the costs of adoption of an innovation.

Compatibility is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters (Rogers, 2003). Technical compatibility refers to the level of compatibility between the task being conducted and the technology being used (Cooper and Zmud, 1990; Tornatzky and Klein, 1982). In the case of electronic invoicing, this implies that electronic invoicing implementation success will be more likely to occur when invoicing characteristics are compatible with the technology characteristics (electronic invoicing solutions).

Complexity is the degree to which an innovation is perceived as difficult to understand and use (Rogers, 2003). Technical complexity refers to the level of task complexity related to the innovation. Prior research has shown that there is a negative relationship between the complexity of a technology and its successful implementation (Cooper and Zmud, 1990). In the case of electronic invoicing, a higher level of task complexity in electronic invoicing application suggests inhibited success of the implementation process.

Trialability is the degree to which an innovation may be experimented with on a limited basis (Rogers, 2003). The theory suggests that innovations that can be experimented will, in general, be adopted more quickly than innovations that are not trialable. This is due to the decreased uncertainty gained by experimenting.

Observability is the degree to which the results of an innovation are visible to others (Rogers, 2003). This observability stimulates discussion surrounding the innovation as the peer group requests evaluation information about the innovation. The theory suggests that the easier it is for individuals to see the results of an innovation, the more likely they are to adopt it.

A conceptual framework based on the theory of the diffusion of innovations will be used study the diffusion of the Creditor Reference standard. The object of the framework is to determine the effects of perceived attributes of the innovations on the diffusion of the Creditor Reference standard in Finland, and later within the SEPA area and finally worldwide. The study is conducted from the point of view of the Creditor. The scope of the study, that includes the framework used as well as the point of view, is portrayed in Figure 5.

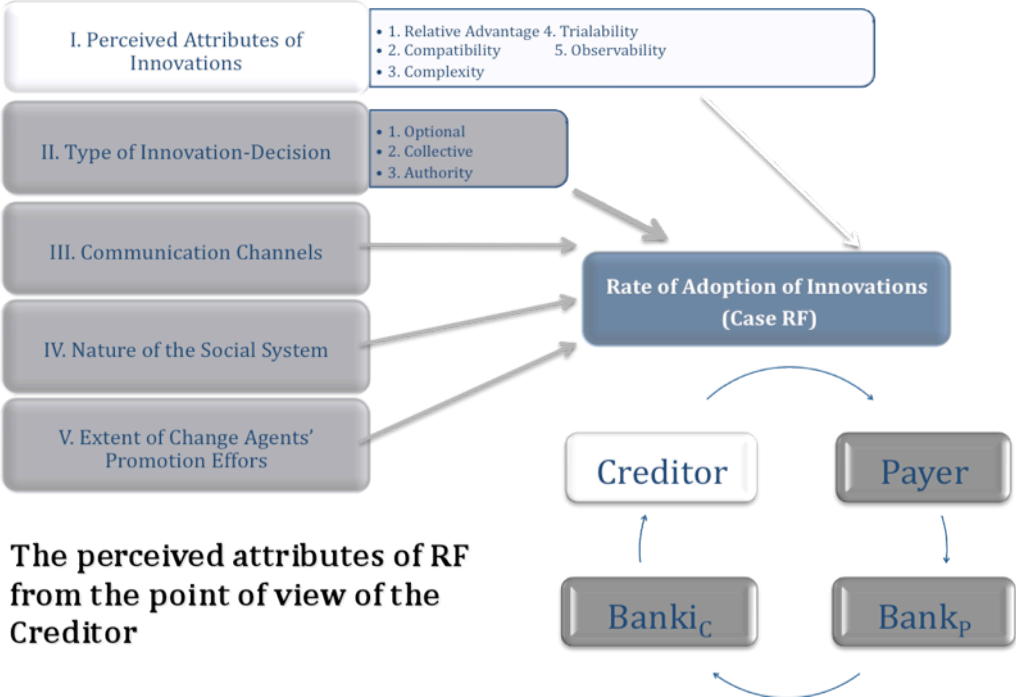


Figure 5 The scope of the study

This study will take into account the other variables of diffusion introduced by Rogers (2003) other than the perceived attributed of innovations, for example the efforts of change agents. However, they will not be featured in the actual conceptual framework constructed for the study concerning the diffusion of the international creditor reference standard.

3.2.1 Relative advantage

As stated earlier, *relative advantage* is the degree to which an innovation is perceived to be better than the idea it supersedes. Often relative advantage is expressed as economic profitability, but the nature of the innovation ultimately determines the type of relative advantage that is important to the adopters. Other common factors that are perceived to give an innovation relative advantage are social aspects (for example, increasing social status) or technological advancements. Innovations that facilitate reusability and maintenance, speed development time or help control costs are potentially valuable for adopters (Carter Jr. et al, 2000)

In addition to knowing the reasons why an innovation is relatively advantageous, adopters often also want to know the degree by which the innovation is more advantageous than the innovation it supersedes. This degree can for example be presented in monetary terms (% savings in costs) or for example, technological terms (for example, % faster processing power). Communicating this degree to adopters is highly beneficial in increasing rate of adoption. Rogers (2003) argues that *the relative advantage of an innovation, as perceived by members of a social system, is positively related to its rate of adoption.*

Perceptions of relative advantage have also been found to relate to implementation success in E-Business (Lin, 2008), virtual banking (Liao et al., 1999) and use of Healthy-Heart Kits by physicians (Scott et al., 2008). Research conducted by Carter Jr. et al. (2001) indicate that perceived advantages and disadvantages of an innovation are especially important early in the adoption process. Effectively communicating the *relative advantage* to adopters is suggested as a means to overcome functional resistance towards an innovation by Laukkanen et al. (2009) in their study of resistance towards the adoption of internet banking.

The relative advantage of the creditor reference standard can be divided by two principles:

1. Relative advantage compared to manual payment allocation
2. Relative advantage compared to a national / company specific creditor reference standard

The relative advantage compared to manual payment allocation regards the degree by which the use of the creditor reference standard is advantageous compared to manually allocating payments to their respective invoices. The key issue here is the movement from manual payment allocation to automatic payment allocation in international payments.

The relative advantage compared to a national creditor reference standard regards the degree by which the use of the creditor reference standard is advantageous compared to existing creditor reference standard. The key issue in this case is the transition from one standard to another, in most cases from a national level on to an international level.

3.2.2 Compatibility

Compatibility is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters (Rogers, 2003). An innovation can be compatible or incompatible with:

1. Sociocultural values and beliefs of the social system
2. Previously introduced ideas, i.e. mental tools that individuals utilize to assess new ideas and give them meaning
3. Client needs for the innovation

Compatibility can also be a measure of consistency with existing *technological capabilities*. This refers to both the capability of individuals to handle technology as well as the technology itself. Hence the concept of technological capabilities is closely related to the second and third types of compatibility mentioned by Rogers (2003). In their study of software adoption, Carter Jr. et al. (2001) discovered that organizations that have developed capabilities for using given innovations are more likely to bid on contracts mandating their use. Their research indicated that earlier and smoother development of capabilities is associated with earlier implementation of the innovation. Research on e-business innovation diffusion by Lin (2008) showed that greater compatibility between e-business systems and existing IT environments is

more likely to facilitate diffusion. Compatibility is especially important for the early- and late majority adopters in the adoption process (Hsu, et al., 2007). Agarwal and Prasad (1997) highlight the relationship between systems development and perceived compatibility of the system users – it is critical that work patterns and work flows are understood in early stages of systems development, so that compatibility with the actual work patterns and work flows are achieved.

In this specific study compatibility deals with previously introduced ideas such as client needs for the innovation and technological capabilities. The importance of previously introduced ideas is highly related to the individuals experience with creditor reference numbers in general. If they have used for example a Finnish creditor reference standard, the new international standard will be a very compatible innovation. In this study technological compatibility is related to the information systems that deal with payments. These can be for example enterprise resource planning systems, accounting systems and electronic ledgers. The larger the number of systems affected by the standard, the larger the possible issues with compatibility will be.

Compatibility with existing systems has been shown to be linked to adoption rates. In the study by AFP Research (2009) on providing remittance information with wire transfers, 91% of respondent companies stated that they would use the information if it were made available by banks/treasury workstations and accounting and ERP software providers. Therefore making information systems compatible with the innovation, such as RF, would increase the rate of its adoption.

3.2.3 Complexity

Complexity in the current study is related to the difficulty in implementation of the Creditor Reference standard. Difficulties in implementation can relate either to users or information systems. Users familiar to some creditor reference standard, such as the one currently used in Finland, will not find the use of the global standard complex as it follows a similar logic in use and organization. On the other hand, users that have not used a creditor reference standard will find its use far more complex. The degree of the complexity for these users depends on their experience with electronic money transfers.

Perceived complexity was found to have a negative but insignificant influence in e-business diffusion (Lin, 2008). Hsu et al. (2007) reached similar conclusions, with the addition that complexity had no significant effect on mobile Internet adoption regardless of the stage of the adoption process. An explanation to this was stated to be that complexity was not viewed as a major barrier to e-business implementation. Cooper and Zmud (1989) concluded that low complexity correlates positively with Material Requirements Planning (MRP) implementation.

Another aspect of complexity for the diffusion of the Creditor Reference standard is the adopters information systems' ability to handle the standard. Programming a given accounting system to understand the reference number and to allocate payments is not difficult, but the upgrading process for the adopter could be costly and time consuming. Also, the complexity of IS upgrading increases with the number of systems in use. Some companies use international enterprise resource planning systems like SAP to handle their payment allocation. Upgrading these systems is relatively the least complex. Some companies have multiple information systems, in some cases over a dozen that have functions related to payment handling and allocation. Upgrading a large amount of systems in this case will be relatively complex, especially if the systems have to be upgraded separately. The complexity of upgrading a large amount of systems depends on the support of the IS providers and the complexity of the actual upgrading process. If all the systems are made RF compatible by their providers at the same time, and through simple, perhaps downloadable systems updates, the process can be relatively simple. If the schedules for RF support between providers vary greatly (or some do not offer RF support at all), and the upgrading process needs considerable system downtime and consultant work, the upgrading process can be considered complex.

3.2.4 Trialability

Individuals will be less likely to experiment with new technologies if they perceive a significant risk associated with such exploration; the notion of *trialability* of a technology helps mitigate this risk (Agarwal & Prasad, 1997). Offering a trial for the innovation to adopters is suggested as a means to decrease the perceived risks barrier of functional innovation resistance (Ram & Shath, 1989). A trial has also suggested by Laukkanen et al. (2009) as a strategy to overcome resistance towards the adoption of Internet banking.

In this study, trialability is best tested via pilot project. Specifically, the creditor reference standard is first tested by the adopting company in a small scale piloting project. This can be conducted in various ways. One method is to test using the creditor reference number with one client that conducts regular payments to the company. This way there will be substantial amount of payments under the trial, but a single payer will make risk management and communication easier. Another benefit of a pilot project is that not all of the trial company's information systems need to be updated to handle the creditor reference number, just the ones relevant to the pilot project at hand.

Trials could be less arduous to arrange if they are held between two different subsidiaries of the parent organisation, or within an industry alliance or partnership. Testing and later adopting RF within the whole, multinational organisation or alliance would lead to increased systems compatibility and integration, as well as potentially creating an relative advantage over competitors in the same industry. This kind of testing process is commonplace for IS innovations, but it is uncertain if such a trial has been carried out for RF.

3.2.5 Observability

In the case of the diffusion Creditor Reference standard, observability refers to the ability at which the effects of Creditor Reference number can be observed by its users. This contains the observances of users of the Creditor Reference number as well as the availability of statistics representing the use of the Creditor Reference number.

The research on software diffusion conducted by Carter Jr. et al. (2001) indicated that more observable innovations would not be adopted more rapidly. However, observability was found to be an influential attribute of adoption in medicine by Scott et al. (2008).

It is possible for information systems to present data on the number of payments that have been allocated automatically based on the use of a creditor reference number. This allows for the user to determine how many payments have been allocated automatically compared to those payments that demand manual allocation. Many companies in Finland use this to determine the rate of automation in Finnish payments, which use the Finnish creditor

reference. Hence the same methodology can be used by international companies for international payments using the Creditor Reference standard. The benefit of this would be that companies could calculate the cost and time savings generated by RF adoption. In addition to being valuable information for the company itself, this can be used to promote RF to the company's payers, creditors or other stakeholders.

In order to increase observability, information systems producers should integrate the possibility to collect statistical data on the use of creditor reference numbers as well as the manual allocation of payments. This however can be considerably difficult if the organisations using RF use multiple information and financial systems. In these cases integration between systems can be difficult. At the minimum, RF support should be ensured in all the organisation's systems that handle cross-border payments.

3.2.6 Type of innovation-decision

Concerning the types of innovation-decision, optional innovation-decisions are choices to adopt or reject an innovation that are made by an individual independent of the decisions by other members of a system. Collective innovation-decisions are the ones made by consensus among the members of a system. Authority innovation-decisions are made by a relatively few individuals in a system who possess power, high social status, or technical expertise. Authority and collective innovation decisions are more common than optional decisions in most organizations, whilst optional decision-making usually guides consumer behaviour. (Rogers 2003).

In the case of RF, the adoption would be decided upon by an authority-decision, represented by executive decision-making within the organisation adopting the standard. Optional decision making would mean that, for example, individual payment handling employees could freely decide if they were to adopt RF or not. If law, for example through SEPA and the European Union, would require RF-adoption the decision would also be based on authority.

3.2.7 Communication Channels

Communication channels are categorized roughly in mass media and interpersonal channels. Rogers (2003) posits that mass media channels are relatively more important at the knowledge stage, and interpersonal channels are relatively more important at the persuasion stage in the innovation-decision process.

Carter Jr. et al (2001) divide communication into being either formal or informal, and have devised a framework for Communication types based on this as well as the needed resource level. This framework is portrayed in Table 4.

		Resource level	
		Low	High
Structure	Formal	Pre-packaged formal technical information Seminars & Conferences	Trained by outside personnel Trained by inside personnel
	Informal	Written documentation Site visits	On-site regular consultation On-site ad hoc consultation

Table 4 Communication types (Carter Jr. et al, 2001)

The research by Carter et al. (2001) on software adoption indicated that extensive use of formal communication mechanisms have a significant, positive, effect on adoption. Especially training provided to staff affected adoption positively, regardless on the source (internal or external) of the training. Communication mechanisms have more impact in the latter stages of the adoption process.

Laukkanen et al. (2009) suggest different communication strategies depending on the type of innovation resistance. For functional resistance they suggest one-on-one adopter education, marketing the benefits of relative advantage and offering the innovation on a trial basis. For psychological resistance the authors suggest the use of change agents as marketers and target mass media communication to enhance the innovations image.

3.2.8 Nature of the Social System

Persuading opinion leaders is the easiest way to stimulate positive attitudes towards an innovation. The nature of the social system informs on the types of opinion leaders that change agents (discussed in 3.2.9) should target. According to Rogers (2003), social systems can be characterized as heterophilous or homophilous.

Heterophilous social systems tend to encourage change. There is more interaction between people from different backgrounds, indicating a greater interest in being exposed to new ideas. They have opinion leadership that is more innovative because these systems are desirous of innovation. Homophilous social systems, on the other hand, tend toward system norms. Most interaction within them is between people from similar backgrounds. People and ideas that differ from the norm are seen as strange and undesirable. These systems have opinion leadership that is not very innovative because these systems are averse to innovation.

3.2.9 Extent of Change Agents Promotion Efforts

An individual or group of individuals who have the power to affect decision-making in an organisation are called change agents, especially if the said power is considerable in conjunction with organisational change. Change agents are not necessarily decision makers themselves, but they still have significant influence over the decisions being made. Examples of change agents are analysts, process owners or project managers. There is no distinct position or role for a change agent however, as often a relationship with the innovation is the key characteristic in making a member of the social system a change agent.

The extent of the promotion efforts of change agents are often critical to the successful diffusion of an innovation as they are often the driving force behind the adoption process within an organisation. For RF the high-level change agents are the standard developers and the banking/SEPA community. Change agents can also be those members of a RF adopting organisation who hold responsibility over payment processes and creditor/payer contacts. For example a payment process owner could influence dozens, or even hundreds of payers to adopt RF in their own organisations.

4 Methodology

Case interviews form the main empirical evidence used in this study. Case interviews were chosen because they allow a thorough insight into organizations adopting RF. A purely quantitative approach would not be able to determine all the individual facets of the organizations, or take into account more detailed corporate strategies of payment handling. A set of four company case interviews and a widely distributed questionnaire were used to gather data on the perceived attributes of the RF Creditor Reference. Four internationally operating Finnish companies handling international payments were interviewed for the cases. The case companies were selected from different industries in order to form a more comprehensive view of cross-border payment handling amongst creditors.

Since there are a multitude of organisation specific factors affecting payment handling and reconciliation, an in depth analysis methodology is needed. For example, payments can be handled with accounting systems, ERP-systems, or by an external partner. These payment-handling methods are unique to companies, and thus each organisation represents a case of its own. Hence the strength of case studies is their ability to capture “reality” through covering a greater amount of detail and variables than other analytical methodologies (Galliers, 1991). Yin (1994) outlines that case studies are particularly effective in answering “how” and “why” questions about events which the investigator has little or know control over. Choosing case studies as the main source of empirical evidence for this study allows the capture and analysis of these organisation specific factors. Particularly analysing the current reconciliation methods and needs of organisations benefits greatly from this characteristic of case studies.

The case company interview questions were devised according to the Diffusion of Innovations theory, with emphasis on the perceived attributes of innovations. A series of organization background questions was also included. The questions asked were identical in all the interviews. The interviews were conducted in May and June 2009.

A supportive survey was used because it would allow for accurate quantification of results, i.e. assigning values for each perceived attribute. The recent success of a survey on wire remittance transfers (AFPRResearch, 2009) that received 331 responses acted as a source of

motivation for creating a survey for this study as well. The questionnaire has been divided into three sections. The first one covers background questions concerning the recipient and their organization. The second section investigates the recipients and their organizations current payment reconciliation capabilities and familiarity with RF. The third section investigates the perceived attributes of the diffusion of RF of the recipient.

The questions in the first to section are multiple-choice questions where the recipient will select the most appropriate answer from the given alternatives, for example relating to the number of employees in their organization.

To measure the perceived attributes of innovation, 26 statements were devised that reflect the recipients stance on perceived relative advantage, perceived compatibility, perceived complexity, perceived trialability and perceived observability. A seven point Likert scale was used to measure the recipients' opinion of the statement ranging from extremely disagree to extremely agree. The statements were crafted from three sources, expert opinion from RF creators Mr. Kähkönen and Mr. Ranta, in-depth interviews conducted with organizations, and previous diffusion of innovations literature.

The basis for a number of statements and the overall format of the questionnaire came from Moore & Benbasat (1991), who presented a questionnaire framework for innovation diffusion research in the field of technology. Bakos & Brynjolfsson (1999) made improvements to Moore & Benbasat's initial question framework, and some of these suggestions were implemented into the current study.

The first draft of the questionnaire was reviewed by Assistant Professor Esko Penttinen of the Aalto University School of Business, as well as the RF developers. The reviewed questionnaire was then transferred to a web questionnaire format with the Webropol-tool. The questionnaire was then reviewed by the Professors of the department of Information and Service Economy of the Aalto University School of Business. After implementing their change suggestions, the questionnaire was published.

5 Case Studies

Four large Finnish companies with cross-border transactions were chosen as candidates for interviews. The purpose of the interviews were to determine the interviewing companies' attitude towards the RF creditor reference standard, as well as well as studying the possible diffusion of RF in their organization with the Diffusion of Innovations theory.

The questions in the interview were developed in cooperation with the developers of RF, Olli Kähkönen and Markku Ranta. Assistant Professor Esko Penttinen and Markus Hautala of Tieto also provided insight into the questionnaire. The questions were formulated with the DOI theory in mind, directly addressing issues that were included in the theory. The main focus of the questions was in the perceived attributes of the diffusion of RF, but all other parts of the theory were also covered. The interview question sheet also included background questions on the company, aimed to determine their volume and nature of cross-border transactions.

The selection process on interviewees was based on two factors:

1. Selecting companies with differing natures of cross-border transactions (i.e. manufacturing companies with accounts receivable vs. financial institutions)
2. Appropriate contacts of Kähkönen, Ranta, Hautala and Penttinen (Judgemental based sampling)

Requests for interviews were sent to four Finnish companies. The recipient of the interview invitation was selected to be an employee with thorough knowledge of cross-border transactions, for example heads of the company's treasury department. Interviews were scheduled for the months of May and June of 2009. The interviews were conducted in Finnish and lasted between one and two hours. The interviews were transcribed within one week of the interview.

5.1 Nordea Finance

Nordea Finance is a subsidiary of Nordea Bank, specialised in both corporate and private financing. It is specialised in leasing, hire purchasing, receivables financing, as well as private and corporate credit. Nordea Finance is a Finnish company, but acts internationally. As many of its customers deal internationally, cross-border transactions are an important service offered by Nordea Finance. It has a unit specifically responsible for the collection and reconciliation of cross-border payments. Manual reconciliation is an additional service, and Nordea Finance charges its customers an additional fee for not using a creditor reference number. Product Manager Juha Hardén was interviewed.

5.1.1 Payment reconciliation process

The majority of incoming payments to Nordea Finance are from customers that have been offered financial services, such as loans. The ledgers team is in charge of reconciling payments that do not use creditor reference numbers and those payments that use creditor reference numbers are reconciled automatically. All reconciliation is conducted in a single unit in Espoo, Finland, within five information systems, of which the largest handles 3,700,000 payments, roughly 50% of all payments. Customers are instructed to direct their payments to Nordea Finance's accounts in Finland, but the company also has 16 bank accounts abroad.

Nordea Finance uses only the Finnish creditor reference standard for automated reconciliation. However, each ledger used has an individual reference number convention. Approximately 120,000 payments do not use any creditor reference standard annually. These account for 1,5% of all payments and require manual reconciliation. Hardén estimates that payments which do not use creditor reference numbers require two man years of work annually, which is twice the work that payments using creditor reference numbers require. Hence, 1,5% of payments account to 67% of the labour needed by the payment processing unit. The key problem with manual reconciliation is the time it requires. Hardén notes that in some cases it is difficult to match the payment to the correct ledger entry.

As Nordea Finance is closely affiliated to Nordea Bank, Hardén was already familiar with RF Creditor Reference in May 2009, receiving information on the standard through internal channels, seminars and articles. Nordea Finance has already decided to adopt the standard, but had not set a definite schedule for it.

The decision to adopt RF at Nordea Finance is the responsibility of the executive board. Specialists at the company would prepare a presentation with supporting documentation and present it to the executive board. In addition to the specialists at Nordea Finance, Nordea Bank and other financial institutions can affect the decision to adopt RF Creditor Reference. The backing of the banking community and information system providers is also seen as crucial for the success of RF adoption.

5.1.2 Perceived attributes of RF

As the main *relative advantages* of RF Hardén views process automation and reduction of manual work and errors. Hardén estimates that through RF use annual savings would amount to 50,000-100,000€ with payments not using a creditor reference, and up to 50,000€ with payments currently using a creditor reference number. The former are attributed to reduction of man hours and overlapping systems, as well as reduced errors in reconciliation. Currently cross-border payments are reconciled manually, which can lead to reconciliation errors, unlike an automated process. Naturally process automation replaces manual works, which is the cause of reduced man hours.

The latter savings would be due to the harmonisation of the different information systems and ledger principles in use. Hence the adoption of RF at Nordea Finance would have a relative advantage through cost savings over an existent creditor reference standard. Manual work and errors will not be entirely eradicated, since RF will not be adopted by all clients, especially by those from outside the European Union. Even after RF adoption all payments that are not using a creditor reference standard have to be manually reconciled.

In terms of *compatibility*, the adoption of RF would need IS updates and employee training. Hardén does not expect IS update costs to be large, as RF is similar in logic to the Finnish creditor reference standard. Training would be focused on employees working in the payment

reconciliation unit. As reconciliation is centralised into a single unit at Nordea Finance, training would be quite efficient.

Similarity to the Finnish creditor reference standard would most likely make IS updates simple. The only issue therefore would be that all the payment handling systems at Nordea Finance would have to be updated to handle RF. Full adoption can only be achieved when all systems can handle the standard.

The *complexity* of RF adoption also goes hand-in-hand with the same issues that have to do with compatibility. The payment reconciliation unit at Nordea Finance is already skilled in payment reconciliation through the use of the Finnish creditor reference standard, and therefore Hardén believes that their employees would not need training to the same degree as employees that have never used a creditor reference standard before. Employees of the unit are also accustomed to cross-border payments and the various payment handling methods within the different countries through which Nordea Finance receives payments. Hence Hardén believes *complexity* is not a hindering factor towards RF adoption.

Juha Hardén sees a conjoint pilot trial with a customer as a good way to test RF use. Hardén believes arranging such a trial would be simple. A customer with regular cross-border payments would be selected, and RF adoption as well as its use and effect on costs would be monitored. *Trialability* itself is not as important as a perceived attribute as *relative advantage*, but as all major business decisions, RF adoption would also have to be tested,

Currently Nordea Finance does not have existing systems regarding the *observability* of payment reconciliation. This is due to the payment handling systems not having the ability to observe for example reconciliation times and automation rates. The amount of “problem cases” and their resolution times are also not monitored. Therefore Hardén believes that it is difficult to access the *observability* of RF adoption, leading Nordea Finance to disregard this perceived attribute in its decision making process. However, if RF would be adopted, the number of payments using RF could be observed if necessary. Also the cost savings caused by RF adoption could be observed by monitoring the costs relating to payment reconciliation before and after adoption.

5.2 FTS Financial Services

FTS Financial Services is a subsidiary of Finnair, the largest Finnish airline. FTS Financial Services deals with financing Finnair's services, for example their air fleet, cargo, logistics and trans-airline transactions through IATA, the airlines clearing house. IATA collects together all trans-airline transactions, which are then sent to FTS's SAP system once a week. On average, a small airline like Finnair has circa one thousand payments to other airlines per month. Manager of Credit Administration Sari Virtanen was interviewed.

Virtanen highlights the responsibility and effect of RF promotion and support from banks on a European, or even global scale. If banks would offer their clients cost benefits from RF adoption, trans-European RF adoption and use would be more rapid. If the discounts would come from banks, the responsibility of RF promotion would not fall so heavily on individual organisations.

Within FTS, Sari Virtanen feels that she is a change agent who can affect the adoption of RF within the organisation by promoting its use and benefits to different units. Not all units and payment systems are vital for RF adoption, since only a majority handle significant cross-border payments. Hence promotion needs to be initially directed to those units that benefit the most from RF.

5.2.1 Payment reconciliation process

At FTS cross-border payments are handled manually with Analyst, a program that connects payments with bank accounts. After this, payments are handled with SAP, a large ERP system. Most incoming cross-border payments handled by FTS are for Finnair, but also NorthPoint Handling and Finnair Cargo receive payments from abroad. Most payments are reconciled in Finland, but the 27 Finnair offices abroad collect some payments as well.

99% of domestic payments are reconciled automatically, but all cross-border payments have to be handled manually. Manual reconciliation takes under a minute in problem-free cases, i.e. ones where the invoice number is mentioned in the message field of the payment. Under

1% of cases have problems that need further investigation, for example where name of the payer and invoice receiver are different.

5.2.2 Perceived attributes of RF

According to Virtanen, the main *relative advantage* of RF use within FTS would be the reduction of manual reconciliation. This means that both sales and credit company invoices would be automated, at least within European cross-border payments. There are no precise calculations on possible savings through automated, but Sari Virtanen would estimate them to be ca. 2 man years annually. Proven *relative advantage* over FTS's reconciliation processes, i.e. cost and time savings, would strongly favour the adoption of RF. Virtanen is certain that through proven cost savings, any company that has cross-border payments would surely adopt RF. FTS does not currently charge for manual reconciliation, but it is a possibility that if RF would be adopted, there would be an additional charge per manually reconciled payment.

Sari Virtanen does not see any major drawback, or *relative disadvantage*, in the adoption of RF. Only increased IT-costs through systems updated would affect the adoption decision negatively. Sari Virtanen suspects that major ERP companies like SAP would include RF support in their regular system updates, as many of their major clients would at some point request RF support. If FTS proceeds to adopt RF, they will heavily recommend its use to their clients. This can be done by offering discounts for RF payments, as all clients are naturally querying for cost reductions. These discounts would therefore act as a *relative advantage* for RF adoption for FTS's clients.

In order for the RF Creditor Reference to be successfully integrated within the airline industry, it needs to be supported by the IATA clearing house. It's support is however quite unlikely, since it includes airlines from all over the world, not just Europe. Hence each airline has to make the decision to use RF as individuals.

From the information systems point of view, RF needs to be supported by SAP as well as Analyst and other smaller banking applications. Hence the *compatibility* of RF needs to span multiple information systems. Virtanen perceives RF to become compatible with larger

systems with a large, international customer base, such as SAP. However, the pressure set by customer (such as FTS) demands, would lead to most payment systems towards supporting RF, especially in Finland, where the national creditor reference number is already supported.

The system owners within the Finnair corporation, as well as the business controllers in various units need to be support RF and accelerate its adoption. *Compatibility* therefore needs to be understood not only as a technological attribute, but also in relation to the organisation itself. Because the Finnish creditor reference standard is used at FTS, organisational *compatibility* of RF is perceived to be high.

In the case of FTS, the same perceptions regarding *compatibility* are also extended to *complexity*. In their case this pertains to how complex is getting FTS's information systems to support RF, and how the support of the payment handling employees can be ensured. Due to the existing support of the Finnish creditor reference standard, Virtanen does not perceive RF adoption as complex.

FTS arranges internal trials for all IS projects, regardless of their cost or magnitude. Therefore a rudimentary level of *trialability* is demanded from all innovations. Virtanen also believes that a joint creditor-payer trial would be the easiest and most effective trial method. As FTS shares many payments within the Finnair parent company, a trial could be arranged in between two sister companies. Also the various partners in Finnair's airline alliance are potential candidates for a joint trial.

FTS has neither existing methodology nor means for the observation of cost and time effects of payment handling. Therefore there is no existing way to observe the effects of RF adoption, and *observability* is not perceived as meaningful towards adoption. After adoption, cost savings will be visible in the company bottom-line. If these savings are meaningful, they could act as evidence of *relative advantage* over manual cross-border payment reconciliation among the airline industry. Hence the *observability* of the cost benefits of RF adoption at FTS could become important perceived attributes to other adopters in the industry.

5.3 Wärtsilä

Wärtsilä is a large global manufacturing company based in Finland. It manufactures diesel and gas engines for marine vehicles and power plants. Though Wärtsilä's sales amount to six figure sums, a main component of its revenues come from service. Since Wärtsilä operates truly internationally (as opposed to mainly within the EU), most of its transactions are cross-border in nature. Wärtsilä has units in 130 countries, but most of these are network companies that handle support work. Only 37% of revenues come from Europe, the remainder coming from these global network companies.

5.3.1 Payment reconciliation process

Wärtsilä deals with purchase invoices, asset accounting and payment handling in service centres around the world. The actual payments are centralized into Finland. Nurmi views that Wärtsilä can never be able to use just a single bank account, that has been suggested by SEPA advocates, as their payments come from multiple countries and business processes, and therefore cannot be centralized to one account.

For example if a ship motor needs to be repaired in Brazil, the engineers might be flown from Finland, and the spare parts from the Netherlands. The payment for the services could be in one single bulk invoice that can be addressed to Wärtsilä Finland, Netherlands or Brazil, or properly for each country unit. Therefore Wärtsilä needs payment handling professionals that can allocate the payments into the correct invoices. According to Nurmi, this kind of competence cannot be substituted by automated, electronic processes and systems.

Wärtsilä includes an invoice number in each invoice, and their ERP system can automatically reconcile these invoices if the payer name matches the invoice, and the invoice number is mentioned in the payment. Otherwise the invoice needs to be manually reconciled. Finnish and Norwegian invoices can be automatically reconciled based on the domestic creditor reference numbers if they are using it. Payment methods that are considered difficult, i.e. those that cannot be dealt with a degree of automation, like checks, constitute around 1-2% of revenues.

Around 30% of invoices for Wärtsilä Finland are reconciled automatically, a vast majority of these being foreign payments with the invoice number, invoice number and payer being correct. In addition to these, Wärtsilä's ERP can make manual reconciliation faster by suggesting an invoice to the payment handler that could be correct. For example if there is no invoice number mentioned, but the name and payment amount match an open invoice in the system, this invoice is suggested.

5.3.2 Perceived attributes of RF

Nurmi does not view the *relative advantage* of RF to be high for Wärtsilä. This is because it would not increase the automation of payment reconciliation within the company. Their current systems can reconcile payments based on the invoice number and payer name. Therefore the only *relative advantage* would be the adoption of an internationally accepted standard, but the point where RF would be internationally accepted is in Nurmi's opinion years away.

Nurmi also viewed that RF would not be able to be adopted outside Europe in the near future due to the relative underdevelopment of payment processes and systems in Asia and the Americas. He bases this opinion on his experience with international transactions and payments.

For the aforementioned IS related reasons, RF is not perceived to be *compatible* with Wärtsilä's current systems and processes. Their ERP system that handles payment reconciliation has been customized Wärtsilä's needs, and therefore is treated as a major investment. Substituting this customized solution with a new system with a different payment reconciliation methodology would be difficult, unless the current system would be discarded.

As the majority of Wärtsilä's clients are located outside the SEPA area, RF adoption and use is not seen as very *compatible* to the payment practices and processes of both the payers and the global offices of Wärtsilä. These practices and processes are not very developed in Asia, Africa, the Americas etc. according to Nurmi, so a direct transfer to an automated process utilising RF would need extensive employee training and process and IS development in locations where this is extremely difficult at the current moment, and in the near future.

Therefore RF is *not compatible* with either the information systems, nor the payment processes that Wärtsilä deals with.

Nurmi views that there has to be a perfect chain between the creditor and payer for a creditor reference standard like RF to work. This means that the payer must be able to electronically send the creditor reference number to his own, local bank. After this, the local bank must be able to send the number to the creditors account statement. Finally the creditor must be able to process the information on their systems. This chain resembles the SWIFT credit transfer process shown in Figure 2 earlier in this study.

Nurmi also sees RF adoption as *complex*. This is due to the same reasons explained earlier with *compatibility*. Training all members of the credit transfer chain will be difficult because in many cases the payer is from a location that uses underdeveloped banking and payment handling processes when compared to European countries, especially those that have started to follow SEPA practices. From the IS point of view, payers often have very basic payment handling systems, if any at all. This would demand substantial investments, IS consultancy and employee training for the payer.

The ERP system used at Wärtsilä already allows for quite a high level of *observability* of payment reconciliation, invoices etc, which is also a differing reply compared to the other respondents in the case interviews. Automatically reconciled payments can be counted and followed, for example. If RF would be adopted and used in Wärtsilä's systems, its use could also be *observable*. Therefore despite being against RF adoption, Nurmi perceives *observability* as an important attribute. This is highly linked to the information and/or payment handling system used.

Nurmi states that all IS investments at Wärtsilä need to be submitted to trial under company policy. Therefore if RF would be adopted, it would also be tested, most likely under one of the country units. A joint creditor-payer trial could be a possibility according to Nurmi, but each IS investment trial is treated as their separately.

5.4 Pretax

Pretax is the largest financial management in the Nordic countries, offering its services to corporate clients of all sizes. Pretax's services include handling the accounting, payroll and international financial management of its clients. Pretax was a natural choice to be included in the interviews, as its core competence is transaction handling, a significant portion of it being cross-border by nature. Pretax is also a forerunner in the field of electronic financial services in Finland. Due to their business being in the field of financial transfer handling, their payment reconciliation process is described with more detail than with the other three case companies. Service manager Kati Tuppuru was the subject of the interview.

5.4.1 Payment reconciliation process

Pretax handles its incoming payment depending on the service they offer to their customers. For sales ledgers, Pretax receives creditor information from banks daily. The banks construe the creditor information within the payments, since a single payment might hold dozens of individual invoices. Reconciliation is handled decentralized among different units. At the time of the interview, Pretax has 27 offices in Finland, which all reconcile payments. Only payroll service units do not reconcile payments, since they do not deal with invoices. Also at the time of the interview, Pretax has four accounting systems (Tikon, Aditro Wintime, Jeeves and Microsoft Dynamics AX), but they can also use the client's own systems. These systems naturally depend on the client.

97% of domestic payments are reconciled automatically, but all cross-border payments have to be reconciled manually. Most international payments come from Western Europe, Northern. Manual reconciliation at Pretax is done if a creditor reference number is not used in the payment or if there is a problem with any of the information of the payment. Manual reconciliation is done with the aid of bank statements, but not all clients allow their bank statements to be delivered to Pretax daily. Automatic reconciliation takes on average 15 minutes per week, while manual reconciliation takes five minutes per payment.

If a creditor reference number is not used, the invoice number is usually found in the message field of the payment. In Sweden, the Pretax information systems can automatically pick the invoice number from the message field of a payment. The nature of Pretax's functions however difference between Finland and Sweden; in Sweden Pretax mostly handles ledgers, when the Finnish branch offers a more holistic financial service palette to its customers.

In so called problem cases, where the payment cannot be directly reconciled (either automatically nor manually) attribute to approximately 2-3% of all payments according to Tuppuru. In problem cases Pretax contacts the client, and the time required for solving the problem depends on the case. Tuppuru acknowledges that training their clients in payments processing is important for decreasing the number of problem cases as well as the time needed for manual reconciliation.

Sometimes payments come in the form of cheque, especially if the payer is located in the United States. In these cases Pretax forwards the cheque to the client, who takes the cheque to their Finnish bank. Only after this reconciliation is possible. Another problem arises when Pretax handles payment reminders for its clients. If a payment is not properly reconciled, Pretax can send an unwarranted payment to the client's own customers. This can then adversely affect the client's own customer relationships. Especially with clients having thousands of customers, it is impossible to manually check each payment.

5.4.2 Perceived attributes of RF

Relative advantage is viewed as the most important perceived attribute for RF adoption at Pretax. Tuppuru identifies savings in costs and reconciliation time as the most important examples of RF having a relative advantage over the current non-automated payment reconciliation processes. As manual reconciliation takes on average five minutes per payment, manual reconciliation with the RF Creditor Reference would bring considerable savings in time, and consequently costs. The large number the accounts receivable is for the client, the more they will benefit from automated payment reconciliation. Therefore the adoption of RF would be beneficial for both Pretax, and its clients.

Relating to the cases where reconciliation errors can lead to unwarranted payments being sent to the client's customers, payment automation will cause improvements in customer service, and decrease the need for Pretax to contact its clients in problem cases. Another issue with manual reconciliation is the amount of errors that are due to incorrect information and human processing mistakes. Naturally these kinds of errors increase when the amount of manually reconciled payments is larger. Automation would therefore also affect the amount of processing errors in payment reconciliation. As payments can come in different currencies, automation would handle these conversions and decrease the time needed to reconcile payments where the currency is different to the one used in the invoice.

Tuppuri highlights information systems investments, i.e. *IS compatibility* as the major drawback for RF adoption. Adoption of RF would most likely be conducted on an IS-basis, and not depending on particular business units or clients.

Tuppuri reminds that in addition to Pretax, all of their clients and their customers must also adopt RF support to their systems. As RF adoption would improve Pretax's service offering, they could get their clients to pressure their customers towards RF adoption. If all major ERP and accounting systems begin to support RF, the transition to its adoption will be much simpler. Tuppuri also believes that the countries with existing creditor reference standards will adopt RF faster. She finds it very unlikely that Asian or American countries will use RF in the near future regardless of its adoption success in Europe. On the other hand, pressure to adopt RF could also come from the client side. As Pretax is a financial services company, customer needs (i.e. to use RF) would force Pretax to accelerate adoption.

The adoption of RF creditor reference would also demand employee training, i.e. informing that foreign payments should not be manually reconciled if they carry the RF creditor reference. Tuppuri believes the training process would be quite simple for Finnish companies, since the understanding and use of the domestic creditor reference number is so widespread. Therefore *complexity* is not perceived as being a substantially meaningful attribute to RF adoption. Other case companies have not made clear distinctions between *compatibility* and *complexity* of RF adoption, but with Pretax *compatibility* is a perceived to effect adoption more than *complexity* due to the large amounts of different information and payment handling systems that need to support the standard.

All IS updates are dealt as individual projects at Pretax. The decision to adopt RF into Pretax's four accounting systems would have to be approved at the Pretax forum, a committee of the company's high level management. If the pressure to adopt RF would come from the client side before an internal adoption decision, the project would be classified as a customer relationship project. These projects need to be planned and documented before being taken to the forum.

Kati Tuppuru sees a piloting process with a client as an ideal way to test RF use. The process would involve finding a client with information systems that support RF and then testing how RF use would affect costs, reconciliation times and customer service. *Trialability* is not seen as important as *relative advantage* as a perceived attribute of innovation, but all IS updates need to be testable in order to be approved by the Pretax forum, a process which was described above. The piloting process for Pretax would also involve a third party, the customer who pays the invoices sent by Pretax's client. Being able to secure these customers to the pilot project would probably need considerable effort.

Like Sari Virtanen of FTS, Kati Tuppuru also believes that RF adoption would be more successful if it would be promoted by European banks, as occurred with other SEPA projects. If all banks support RF, it is easier for companies that use their ledger information like Pretax to adopt the standard. When the information systems at Pretax support RF, Pretax would communicate to its customers of the possibility to use RF.

6 Survey on Creditor Reference Diffusion

An international survey set to study the perceived attributes of RF adoption was constructed and published in September 2009. The main purpose of the survey was to collect data on the respondents' perceptions of RF adoption. The survey aimed to provide quantitative data concerning the perceived attributes of RF adoption, as well as the adopting creditors. The questions in the survey were created with the help of the previously held case interviews, as well as assistance from Olli Kähkönen, Markku Ranta, Markus Hautala and Esko Penttinen. The survey was sent to treasury and payments specialists and executives, as well being promoted on the GT News website as a part of an article about RF written by Juha Keskinisula and Olli Kähkönen. The survey was distributed worldwide, as for example, the SWIFT community operates globally, and is not restricted to Europe like SEPA.

The survey was divided into three sections. The first one gathered background information on the respondent's organization. The second section was used to determine the nature and scale of the respondent's organization's payment handling and reconciliation process. The third section addressed the perceived attributes of RF innovation. These were measured by 26 statements on which the respondent stated how much they agree on the seven point Likert scale, where "1" stands for Totally disagree and "7" stands for Totally agree. Hence an average over 4 denotes agreement to the statement.

The survey yielded only 23 results despite attempts to promote the survey for several months, as well as actively seeking potential new respondents. The survey was viewed, i.e. the link sent was clicked and opened, by 170 people. Results into finding a reason for the low answer rate were also inconclusive. Based on peer discussions and the "free word" section of the survey, potential respondents could have withheld from answering because they did not have the means/rights to answer some of the questions (particularly the background questions), they did not have enough information on RF in general (as the RF guide was not published yet) and because the survey was quite long (18 questions and 26 statements). The survey could possibly have yielded more results if done at a later time when information on RF and its adoption by *innovators* or *early adopters* were more readily available, and if it was constricted to include only basic background questions in addition to the statements section.

The low number of responses means that the survey can only be used as a secondary source of empirical data, backing up the case interviews. Despite the low response rate, the results of the survey support both previous academic research on innovation diffusion and the results of the case interviews. Thus it is still a valuable addition to this study, and by the very minimum provides a survey and statement framework form further RF adoption study.

6.1 Profile of respondents

The target population for respondents was international payment handling professionals representing the creditor side of payment reconciliation. The survey was made available for respondents by both direct contact via e-mail, as well as publishing a link to the survey through Global Treasury News, a global knowledge resource for over 60,000 treasury, finance, payments and cash management professionals. The link was published alongside an article about RF written by Juha Keski-Nisula and Olli Kähkönen.

The positions of the aforementioned persons vary greatly depending on the size and structure of their respective organisation, but as a generalisation, the target population covers treasury managers, account managers, financial officers and payment service managers. As proven by the case interviews, the centralization or decentralization of payment reconciliation of the organizations has an effect on the role of the person in charge of international payments.

A clear majority of the 23 respondents, 87%, were based in Finland at the time of response, and 70% were from Finnish companies. Manufacturing was the most common industry amongst the respondents, representing 61%. Regarding company size, 39% had between 255 and 999 million € of annual revenue, and 30% having over a billion. 52% of the respondents also came from companies that between 1,000 and 9,999 employees.

Regarding payment collection, 43% of the respondents' companies handled it centrally, 30% decentralized among parent organization subsidiaries, 22% among countries and 4% among business units.

Only a respondent from Australia stated that their financial systems can not automatically reconcile domestic payments. In addition to Finland, respondents from Croatia and the United Kingdom stated that automatic reconciliation of domestic payments is possible. Five respondents, representing 22% of the sample stated that their systems could automatically reconcile payments based on the invoice number and payer name. This corresponds to the case interviews, where Wärtsilä was the only respondent with such capabilities.

6.2 Perceived attributes of RF

Data on the respondents perceptions of RF adoption was collected with 26 statements using the 7-point Likert-scale. The statements were phrased so that agreement would have a positive connotation towards RF adoption. Likewise, not agreeing with the statements would denote a negative connotation towards RD adoption. In this way the average score for each attribute, as well as for the survey would give a general indication on RF diffusion perceptions. The first 6 statements were tied to *Relative Advantage*. The following 5 statements were tied to *Compatibility*. The next 6 statements were tied to *Complexity*. Finally, *Observability* and *Trialability* both were tied to 5 statements each. Appendix 10.3 displays a summary of the results of the statements, including means and standard deviations for all the individual statements, as well all together and divided amongst their respective attributes.

Like in academic literature and in the case interviews, *relative advantage* proved to be the most important perceived attribute of RF adoption. The average score for *relative advantage* was 5.28 on the Likert scale. This was the only attribute that had an average score of over 5, or *Somewhat agree*. Hence it can be deducted, that on average, international respondents perceive that RF has a *relative advantage* over existing cross-border payment handling methodologies. Respondents agreed to RF raising the automation level and accuracy of payment handling in their organisation, as well as leading to error reductions and cost savings.

Statement	Perceived attribute	Mean	St.Dev
Using RF will increase automation in payment reconciliation in our organization.	Relative advantage	5.65	1.07
Using RF will increase the accuracy of payment reconciliation.	Relative advantage	5.48	1.08
Learning to use RF would be easy for me.	Complexity	5.35	1.15
Using RF will decrease the number of mistakes in payment reconciliation in our organization.	Relative advantage	5.30	1.15
RF will simplify my job.	Relative advantage	5.26	1.36
Using RF is compatible with my organization's payment reconciliation process.	Compatibility	5.22	1.31
Using RF will lead to cost savings in our organization.	Relative advantage	5.22	1.35
It would be easy for me to explain why using RF may or may not be beneficial.	Observability	5.04	1.11
Using RF is compatible with all aspects of my work.	Compatibility	5.04	1.19
Using RF would be similar to using any other creditor reference number.	Complexity	5.04	1.36

Table 5 RF Statements (RF Survey)

Table 5 displays all the statements that have an average score above five, half of them denoting relative advantage. The main purposes of RF as envisioned by its developers – increased automation and reconciliation accuracy and the reduction of mistakes – were all amongst the statements that respondents agreed upon the most.

Compatibility had two of five statements above *somewhat agree*, but slight disagreement towards IS compatibility brought the average down and standard deviation up for the attribute. The respondents tended to agree that RF was compatible with their processes and personal work, but not with information systems.

The perceived attribute of *complexity* also had two statements that respondents could be considered to agree upon. “Learning RF would be easy for me” received the third highest average rating. The statement regarding IS migration simplicity received a rating of 3.87, denoting disagreement amongst some respondents. All together, *complexity* had the second highest total average after *relative advantage*.

Trialability had the lowest average score of all the perceived attributes, 4.41. Most of the statements denoting the *trialability* of RF received scores just mildly above *neither agree, nor disagree*, apart from the statement claiming that a joint creditor-payer trial would be a good way to test RF use, which was almost up to *somewhat agree* with a score of 4.96.

Observability was covered in five statements, from which three were just above *neither agree, nor disagree*. The statements denoting understanding and communicating RF to others received a score extremely close to 5, *somewhat agree*. The only statement to receive a score higher than five, 5.04, was “It would be easy for me to explain why using RF may or may not be beneficial.”

7 Analysis

The results of the empirical data of this study are analyzed in this section according to the perceived attributes of innovation. This section is divided into a summary of the primary empirical evidence, i.e. the case interviews, the secondary empirical evidence, i.e. the survey and a summary of the perceived attributes of innovation in relation to this study.

7.1 Summary of case interviews

The four interviewed case companies all represented different industries, as well as different needs for the RF Creditor Reference. Hence this study can produce a wide overview of the perceived attributes of the adoption of RF with relatively few interviews. It must be noted, however, that all the interviewed companies are from Finland, which already has a domestic creditor reference number in use. Studying the adoption of RF on a European or even global level would need a much wider interview base. On the other hand, all the interviewees could give educated answers and hypotheses on the adoption on RF at their company despite not being familiar with RF because of their previous knowledge on creditor reference numbers and their effects. The interviewees could also accurately compare the effects of using and not using a creditor reference number, as well as automatic and manual reconciliation. It was therefore logical and natural to begin the study of RF adoption in a country and with organisations that are familiar with creditor reference numbers.

Nordea Finance represented the financial institution in this study. Payments are its business, and cross-border transactions are treated as one service they offer. Unlike the other case companies, Nordea Finance charged for manual reconciliation, i.e. having a set price for each cross-border payment it manually reconciles. The price for manual reconciliation has been calculated by determining the costs of the process, hence Nordea Finance was able to quote the savings gained from RF adoption with the highest accuracy amongst all the interviewed case companies. Nordea Finance was also the most enthusiastic in arranging a co-pilot trial with a customer, but on the other hand, they had the most knowledge of RF, and hence could proceed to the trial phase of adoption faster than the other case companies.

FTS also viewed *relative advantage* as the most important perceived attribute of RF adoption. FTS estimated that cost savings would amount to two man-years. Reduction of reconciliation errors was also stated to be an important *relative advantage* of RF. Both the *compatibility* and *complexity* of RF adoption were related to IS upgrades by FTS. The company uses SAP, which has stated that it will support RF in the future, making RF adoption for FTS most likely relative easy and inexpensive.

Wärtsilä differed from the other case companies because it did not consider RF adoption to be *relatively advantageous*. This is because it had a custom modified ERP system that already automatically reconciled payments based on their invoice number. Also its cross-border payments come from all over the world, whilst the other case companies mostly deal with payments from SEPA countries, which have relatively advanced banking practices. They were also the only case company that already monitors the effects of cross-border (automated and manual) payments. Despite not planning to adopt RF, Wärtsilä proved to be an excellent case company, as it gave evidence of an alternative automated reconciliation method.

As a financial service company Pretax was valuable to the study because handling financial transactions is its core competence. Payment reconciliation is a service it provides to many of its customers, and automating this process would be *relatively advantageous* through cost savings, error amount reductions and the general increase of service quality. The only issue with *compatibility* and *complexity* that Pretax held in comparison to the other case companies was that it has multiple international subsidiaries that use different information and financial systems than the parent company. Ensuring RF support throughout the organisation is therefore critical. Like the other case companies, Pretax also favours a joint creditor-payer trial to test the effects of RF adoption.

One of the key opportunities and issues of FTS's RF adoption was its position as a subsidiary to an airline company. This positions the company in a large, international conglomerate with subsidiaries handling cargo, catering, and other diverse business areas, as well as a member of an international alliance of other airlines. These connections increase the *complexity* of adopting any IS related innovation, but on the other hand increase the network of organisations that can adopt the innovation in FTS's wake.

7.2 Summary of the survey

The results of the survey clearly show, that the most important perceived attribute of innovation is relative advantage as denoted in the survey by the 5.27 score on the Likert scale. The highest scoring statements were “Using RF will increase automation in payment reconciliation in our organization” and “Using RF will increase the accuracy of payment reconciliation”. Also the statements concerning RF leading to cost savings, mistake amount reductions and job simplification received scores over 5, or “Somewhat agree”.

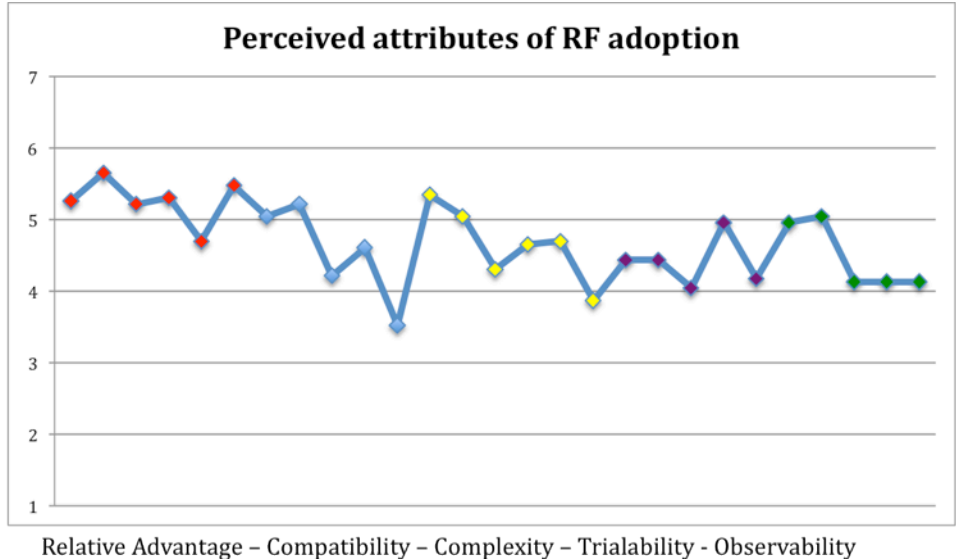


Figure 6 Survey results on perceived attributes of RF

Figure 5 denotes average perceptions to statements in the survey. The statements all represent different perceived attributes of RF, and these attributes are displayed with different colours. The graph clearly shows that respondents had a positive perception of RF, as respondents *somewhat agreed* on average to ten statements, and only two statements were on average below *neither agree nor disagree*. Figure 5 also clearly shows that *Relative advantage* is the most important perceived attribute of RF, as five out of six statements were *somewhat agreed* upon.

Complexity was the second most important perceived attribute of RF, measuring 4.65 on the Likert scale. Again, Finnish respondents viewed RF as less complex as an innovation and investment as non-Finnish respondents. Survey respondents particularly agreed to the

statements “Learning to use RF would be easy for me” and “Using RF would be similar to any other creditor reference standard”. The main issue with complexity was with the statement “Upgrading my organization’s information systems to handle RF would not be a significant business risk”.

The attributes of trialability and observability received milder levels of respondent agreement. Most respondents agreed to the statement that a joint creditor-customer trial would be a good way to test RF use. This statement was added to the survey based on the case interviews, and represents an excellent and promotable method for companies planning RF adoption to test its effects on their payment handling processes. Survey respondents also agreed that they could effortlessly communicate the advantages and disadvantages of RF adoption, and explain why RF adoption would be beneficial for their company. This suggests that RF and its effects are easily understandable and promotable on an international scale.

7.3 Perceived attributes of innovation diffusion

This study aims to determine which are the most important perceived attributes of innovation for the adoption of the RF creditor reference standard. Using case studies and an international survey, the most important perceived attribute was *relative advantage*. Below all of the five perceived attributes of innovation (Rogers, 2003) are covered in relation to RF adoption, and divided according to the four case companies.

Case Company	Relative Advantage
Nordea Finance	Considerable cost savings, estimated two be ca. 100,000€ annually. Considerable decrease of errors in reconciliation
FTS	Estimated costs savings are two man years
Wärtsilä	The advantage through cost savings and decrease of errors is seen to be too small in comparison to the risks involved. Current SAP-systems can automatically reconcile a substantial number of payments.
Pretax	Cost savings and higher quality customer service, as financial management is Pretax’s main industry.

Table 6 Relative advantage of RF (Case study)

Relative advantage was determined to be the most important perceived attribute, and in this study it was related to cost savings (through decreased man hours) in the reconciliation process and the reduction of errors in reconciliation which occur through the automation of cross-border payment reconciliation. In addition to these *relative advantages* mentioned by all but one case company, the increase of the level of customer service quality was also mentioned as a *relative advantage* of RF. *Relative advantage* was the only attribute that on average exceeded *somewhat agree* (5 on the Likert scale) in the survey.

Case Company	Compatibility
Nordea Finance	Highly skilled team will be able to handle RF. System upgrades will be necessary to handle the reference number
FTS	Information systems need to be made compatible.
Wärtsilä	ERP-systems need to be made compatible with RF through system upgrades. Because systems are large and complex, each system upgrade is a business risk.
Pretax	Transaction handling systems need to be upgraded

Table 7 Compatibility of RF (Case study)

All respondents connected *compatibility* to information and payments systems being able to support the standard. *Compatibility* was not perceived to affect adoption greatly, as systems in Finland already had the ability to handle the national creditor reference standard. Interviews of systems providers indicated that RF support would be offered in regular updates. The compatibility of systems and organisations in countries that do not have an existing creditor reference standard was seen as a critical issue by case companies. In these cases RF adoption is perceived to take longer and be more costly due to the lack of an existing support of a national standard.

Case Company	Complexity
Nordea Finance	Four separate financial IS's need upgrading. Employee training and getting large customers to adopt RF are also challenges
FTS	Systems upgrades might be complex in nature
Wärtsilä	Upgrading systems and promoting RF use to non-European customers is complex and resource consuming
Pretax	Updating various information systems is complex. International subsidiaries all use different transaction handling systems

Table 8 Complexity of RF (Case study)

Perceptions of *complexity* were closely linked to those of *compatibility* in the study. The complexity of adoption in relation to information and payment handling systems was determined to be the major issue of this perceived attribute. *Complexity* was perceived to rise along with the number of systems used by the company in handling cross-border payments, as the costs and potential issues of system updates would multiply by the amount of systems used. *Complexity* also was perceived to increase if the company had subsidiaries major customers overseas, as their systems would also have to support RF. Employee training was also seen as complex under the aforementioned circumstances.

Case Company	Trialability
Nordea Finance	Would arrange a co-pilot with a customer.
FTS	Internal trials are conducted for all IS projects.
Wärtsilä	Internal trials for all system upgrades.
Pretax	Co-pilot trials with customers are preferable.

Table 9 Trialability of RF (Case study)

Trialability was perceived as a vital attribute for RF by respondents due to organisational practices, and not the innovation itself. Many organisations demand testing of all adopted innovations, especially in the case of information systems. The case interviews presented the joint creditor-payer trial as the optimal way to test RF use. This can be either conducted with a customer, an industry alliance member or a subsidiary company. The importance of a creditor-payer trial lies in the fact that for RF advantages realising, both parties must use the standard in their payments. By a joint trial, also the payer side can test and adopt the standard.

Case Company	Observability
Nordea Finance	No existing systems for observation, but the number of RF payments and cost savings can be monitored
FTS	No existing methodology or means for observation.
Wärtsilä	Automatically reconciled payments can already be monitored.
Pretax	No systems for observation.

Table 10 Observability of RF (Case study)

Observability was not perceived universally to be an important attribute for the adoption of RF. This is not because of the importance of observability, but rather because most respondents did not have any systems or methodologies that observe payment reconciliation times, costs, error amounts et cetera. If these systems and methods would exist, the perceptions of the respondents could differ significantly. The cost effects of RF adoption could be determined from financial data after the adoption (due to decreasing costs and man hours), which could serve for proof of the relative advantage of RF later on to the adopting company, as well as other organisations considering RF adoption.

8 Conclusions

This study aims to determine the perceived attributes of RF adoption and their estimated significance according to the creditor side in payment reconciliation. By using the Theory of Innovation Diffusion it was possible to determine the most important perceived attributes of RF adoption, as well as its advantages and disadvantages to creditors handling cross-border payments. The Theory of Innovation Diffusion was used to construct case interviews, as well as a survey, that provided solid results on the most significant attributes and effects of RF and its adoption from a creditors point of view. These results were in line with previous academic research concerning innovation diffusion, and particularly with innovations in the field of information systems and services.

8.1 Theoretical conclusions

Relative advantage was found to be the most important perceived attribute of RF innovation. This coincides with previous academic research regarding innovation diffusion. Based on the case interviews and survey results, the main advantages of RF adoption are cost savings, reductions in reconciliation mistakes and the automation of payment handling processes. This is consistent with the objectives of RF stated in the official documentation of the standard.

Finnish companies who had previous knowledge of RF and creditor reference numbers in general perceived RF to have a significant *Relative advantage* over existing payment reconciliation process as they could reflect their experience with the domestic creditor reference number when assessing the effects of RF. Finnish companies also viewed RF adoption a less complex process needing less employee training and being less risky in comparison to the perceptions of non-Finnish respondents.

Information system compatibility and complexity was viewed as the largest risk and cost factor in RF adoption, but based on payment system vendors interviews, these fears are mitigated by the inclusion of RF support in general payment system upgrades. Payment system vendors stated that they will begin to support RF starting from 2010, and they will include it in their yearly upgrades, meaning that adopting RF will not accrue additional costs

to creditors. This is connected to several survey statements relating to RF adoption compatibility and complexity, and is mitigating by nature. The risks of RF adoption can be reduced by universal and active support from payment system vendors and the banking sector.

Countries with existing creditor reference standard view the adoption process as less complex and risky as countries without a history of creditor reference numbers, which means that special attention must be paid in RF promotion to those countries who cannot subjectively assess the effects of RF adoption.

8.2 Managerial conclusions

The results of this study strongly support the notion that real-time automated processes lead to cost savings through the reduction of man-hours and mistakes within processes. These are the *relative advantages* of the RF creditor reference standard over both manual payment reconciliation methodologies as well as existing national creditor reference standards. The ability to automatically reconcile cross-border payments makes international transactions both faster and less costly to handle.

Unlike many other innovations, RF will be included in payment handling system updates, meaning it will be made available for a significant number of organisations through the IS provider. With IS compatibility and complexity issues potentially solved by annual updates, the major issues with RF adoption are mitigated to training and payer promotion. If IS providers also include and enable features that can measure the number of payments that use RF, the *observability* of the standard will also increase. These kinds of features are already present in some ERP and payment handling systems. The ability of information and payment handling systems to collect and analyse payment data would benefit the broader goal of SEPA to introduce a fully automated banking infrastructure.

The descriptions of joint creditor-payer pilot projects presented in the case interviews also provide a useful blueprint for managers to follow when planning *trialability* testing within their respective organisations. Often creditors impose substantial influence over the parties that owe them money, i.e. the payers, and this influence can be used in order to gain

prospective partners for joint trials. Payers can also be influenced to use RF by either a monetary carrot, or a monetary stick. The former will, for example, be in the form of offering a discount on the price or terms of payment. Such incentive programs have been found to accelerate adoption at least in the case of internet banking (Yiu et al., 2007) . Since automated reconciliation leads to cost savings in the reconciliation process, a discount amount comparable to the cost savings rising from RF adoption would be mutually beneficial in the creditor-payer relationship. The latter can then be a sanction for not adopting RF, for example in the form of an additional fee for each invoice that is manually reconciled. This practice is already in use in one of the case companies. It must be noted, however, that financial institutions must adhere to SEPA regulations which can constrain the pricing of financial services.

8.3 Limitations

Although the study produced results in line with academic literature as well as the goals of the RF Creditor Reference, the source of the empirical evidence supporting the results are strongly represented by companies operating in countries with existing creditor reference standards. This is reflected in the case companies' perceptions on the *compatibility* and *complexity* of RF. With existing systems and employees that are capable of handling a domestic creditor reference standard, the adoption of an international standard is relatively easier than with a company without any prior experience on creditor reference standards. This is supported by the results of the international survey. Prior experience in creditor reference numbers does not, however have a significant effect on the perceived *relative advantage*, of RF. *Relative advantage* was universally viewed as the most important perceived attribute of RF, and the relative advantage of RF compared to any current payment handling methodology was clearly understood and acknowledged by all respondents of the case interviews and the survey.

A related limitation of this study is the geographical focus on Finland. To truly be an international study, data needs to be collected from different countries, at least within the SEPA. As the payment reconciliation methods vary greatly within SEPA, it would be difficult to formulate a comprehensive study on an international level at this time, as was suggested by the low answer rates of the survey. As stated by multiple case study respondents, global

adoption of RF will be difficult and take many years, as the payment handling methods outside Europe are often at extremely rudimentary levels.

Further study is needed to determine the perceived attributes of RF on a wider, international level. A suggestible time for this kind of study would be the point when RF has already been successfully adopted in Finland, and data has been collected on the effects of RF adoption. Specifically the effects of RF on reconciliation times, costs and error amounts are valuable, as they were perceived to be the most important relative advantages of RF in this study. A study concerning adoption resistance could also be valuable, especially in countries where no national creditor reference standard exists.

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10 Appendices

10.1 Case study survey (Finnish)

Haastattelukysymykset kansainvälisen maksuviitestandardin käyttöönotosta

I. Yrityksen nykyiset maksujen keruu- ja kohdentamisprosessit

1. Kuvaus yrityksenne nykyisestä saapuvien maksujen käsittelystä?
2. Kuinka monen pankin ja maan kautta yrityksenne vastaanottaa maksuja?
3. Miten yrityksenne suorittaa maksujen keräämisen?
4. Missä määrin saapuvien maksujen kohdentaminen on keskitetty?
 - a. Kuinka useassa yksikössä maksuja kohdistetaan?
 - b. Kuinka monessa eri järjestelmässä maksuja kohdistetaan?
 - c. Millä tavoin maksuvolyymit (kpl & eur) jakautuvat näiden eri yksiköiden ja järjestelmien välillä?
5. Missä standardeissa vastaanotatte tiliraportointia?
6. Kuinka suuressa osassa saapuvista maksuista käytetään maksuviitettä?
 - a. Kokonaisvolyymi (eur)
 - b. Transaktiomäärä (kpl)
7. Kuinka montaa erilaista maksuviitestandardia yrityksenne käsittelee tällä hetkellä?
8. Millä tavoin eri maksuviitestandardien käyttö jakautuu?
 - a. Kokonaisvolyymi (eur/standardi)
 - b. Transaktiomäärä (kpl/standardi)
9. Kuinka suuressa osassa saapuvia maksuja ei käytetä mitään maksuviitestandardia?
 - a. Kokonaisvolyymi (eur)
 - b. Transaktiomäärä (kpl)
10. Millä tavoin yrityksenne suorittaa maksujen kohdentamisen?
 - a. Viitteelliset maksut
 - b. Viitteettömät maksut
11. Mitkä ovat keskeiset ongelmat yrityksellenne maksujen kohdentamisessa?

II. Maksuviitestandardin käyttöönoton vaikutukset yrityksen toimintaan

1. Millainen vaikutus kansainvälisen maksuviitestandardin käyttöönotolla olisi yrityksenne maksujen kohdentamisprosessiin?
 - a. Minkälaisia hyötyjä kansainvälisellä maksuviitestandardilla olisi nykyisiin käytäntöihin verrattuna?
 - b. Minkälaisia haittoja kansainvälisellä maksuviitestandardilla olisi nykyisiin käytäntöihin verrattuna?
2. Kuinka paljon resursseja arvioisitte käytettävän maksujen kohdentamiseen?
 - a. Henkilötyövuotta?
 - b. Kustannus?
3. Kuinka paljon enemmän resursseja viitteettömän maksun kohdentaminen vie verrattuna viitteellisen maksuun?
 - a. Henkilötyövuotta?
 - b. Kustannus?
4. Kuinka paljon vähemmän resursseja maksujen käsittely vaatisi kansainvälisen maksuviitestandardin käyttöönoton jälkeen?
 - a. Kuinka paljon arvioisitte säästävänne mikäli viitteellisissä maksuissa siirryttäisiin käyttämään yhtä kansainvälistä standardia?
 - i. Henkilötyövuotta
 - ii. Kustannus
 - b. Kuinka paljon arvioisitte säästävänne mikäli viitteettömissä maksuissa siirryttäisiin käyttämään yhtä kansainvälistä standardia?
 - i. Henkilötyövuotta
 - ii. Kustannus

III. Kansainvälisen maksuviitestandardin käyttöönotto

1. Olitteko ennen yhteydenottoani tietoisia kansainvälisen maksuviitestandardin olemassa olosta?
 - a. Mistä lähteistä olitte saaneet tästä standardista tietoa?
2. Onko aikeissanne ryhtyä tukemaan kansainvälistä maksuviitestandardia?
 - a. Millä aikataululla uskotte ryhtyvänne tukemaan kansainvälistä maksuviitestandardia?
 - i. Otetaanko maksuviitestandardi käyttöön kaikissa yksiköissä?
3. Mitkä tekijät vaikuttavat / vaikuttivat hyväksymispäätöksen tekoon?
 - a. Käyttöönottoa puoltavat tekijät?
 - i. Millaisia hyötyjä uskotte maksuviitestandardin käyttöönotosta saavanne?
 1. Kuinka merkittäviä nämä hyödyt ovat käyttöönoton kannalta?
 - b. Tekijät, jotka eivät puoltaneet käyttöönottoa?
 - i. Millaisia esteitä uskotte maksuviitestandardin käyttöönottoon liittyvän?
 1. Kuinka merkittäviä nämä esteet ovat käyttöönoton kannalta?
 2. Miten nämä esteet olisi mahdollista poistaa?
4. Millaisia resursseja arvioisitte kansainvälisen maksuviitestandardin käyttöönoton vaativan?
 - a. Koulutustarpeet, uudet kompetenssit
 - b. Laitteet ja ohjelmistot uudistaminen
 - c. Prosessien (taloushallinto & IT) uudistaminen
5. Kuinka paljon hyötyä kansainvälisestä maksuviitestandardista olisi, jos saapuvien maksujen käsittely olisi keskitetty?
 - a. Onko standardin käyttöönotolla vaikutuksia maksujen käsittelyn keskittämiseen?
 - b. Onko kansainvälisen maksuviitteen puuttumisella ollut vaikutusta keskittämiseen?
6. Kuinka tärkeää pilotointi olisi käyttöönottoa ajatellen?
7. Suostuisiko yrityksenne pilotointiprojektiin?
8. Millä tavoin uskotte voivanne seurata yrityksessänne maksuviitteen käytön yleisyyttä?
9. Aiotteko suositella maksuviitestandardin käyttöönottoa kauppakumppaneillenne?

IV. Maksuviitestandardin hyväksymisen päätösprosessi

1. Minkälaista päätösprosessia kansainvälisen maksuviitestandardin hyväksyminen vaatisi yrityksessänne?
2. Millaiset yrityksenne sisäiset tekijät ja tahot vaikuttavat maksuviitteen käyttöönottoon?
 - a. Ketkä päättävät mahdollisesta kansainvälisen maksuviitteen käyttöönotosta yrityksessänne?
 - b. Ketkä ovat muutosagentteja käyttöönoton suhteen?.
 - c. Millä tavoin uskotte voivanne edesauttaa muutosagenttien toimintaa?
 - d. Millä yrityksenne sisäisillä tekijöillä ja tahoilla on suurin merkitys käyttöönoton kannalta?
3. Millaiset yrityksenne ulkopuoliset tekijät ja tahot vaikuttavat maksuviitteen käyttöönottoon?
 - a. Ketkä ovat muutosagentteja käyttöönoton suhteen? (Mitkä ulkoiset tekijät ja osapuolet (esim. pankit, asiakkaat, ERP-toimittajat) voivat vaikeuttaa tai edesauttaa maksustandardin käyttöönottoa yrityksessänne?)
 - b. Millä tavoin uskotte voivanne edesauttaa muutosagenttien toimintaa?
 - c. Millä ulkoisilla tekijöillä ja tahoilla on suurin merkitys käyttöönoton kannalta?
4. Minkä ulkopuolisten tahojen kanssa haluaisitte tiivistää yhteistyötä projektin läpiviennin onnistumiseksi?

10.2 Online survey questions (English)

Survey on the Adoption of the International Creditor Reference Standard

The RF Creditor Reference

RF Creditor Reference is a new standard (ISO 11649). It provides a means to convey customer payment details in a machine-readable form. The standard also makes provision for validation of the RF Creditor Reference by making use of a computational check digit.

A creditor reference is a proprietary identifier assigned by the creditor that uniquely and unambiguously identifies a business document e.g. an invoice.

The RF Creditor Reference consists of three parts; (1) identifier “RF”, (2) two check digits, and (3) reference unique identifier of e.g. an invoice, with a maximum number of 21 characters. RF Creditor Reference may be used nationally and internationally.

In this survey, the RF Creditor Reference is referred to henceforth as “RF”.

Background questions:

- 1) In what industry is your organization operating?
- 2) What is the country of origin of your organization’s headquarters?
- 3) What is the country of origin of your current office?
- 4) What is your position in your organisation?
- 5) What is approximately the turnover of your organization?
- 6) What is the number of personnel in your organization?

Payment handling questions:

- 7) From how many countries does your organization collect payments?
- 8) In how many countries does your organization have a payment collection bank account?
- 9) How is payment collection conducted in your organization?
- 10) Can your organization's information systems reconcile payments automatically if only the invoice number and the customer's name is remitted in the payment?
- 11) Can your organization’s information systems reconcile payments automatically based on a national creditor reference number?
- 11) Can your organization’s information systems reconcile payments automatically based on a national creditor reference number?
- 12) How many information systems for handling payments does your organization have?
- 13) How much of the domestic payments received by your organization are reconciled automatically?
- 14) How much of the international payments received by your organization are reconciled automatically?
- 15) On average, how long does it take to manually reconcile a payment in your organization?
- 16) On average, what are the costs incurred of manually reconciling one payment in your organization?

17) How familiar are you with RF?

18) What is your organization's stance on RF?

19) Perceived attributes of the adoption of the RF Creditor Reference

Please select the most appropriate alternative that reflects your opinion.

RF will simplify my job.

Using RF will increase automation in payment reconciliation in our organization.

Using RF will lead to cost savings in our organization.

Using RF will decrease the number of mistakes in payment reconciliation in our organization.

Using RF will increase the quality of service offered to customers.

Using RF will increase the accuracy of payment reconciliation.

Using RF is compatible with all aspects of my work.

Using RF is compatible with my organization's payment reconciliation process.

Using RF is compatible with my organization's information systems.

I think that implementing RF can be done with regular information systems upgrades.

I think that RF implementation would not demand assistance from external consultants.

Learning to use RF would be easy for me.

Using RF would be similar to using any other creditor reference number.

I think that the migration from previous creditor reference standards to RF would be easy.

Implementing RF would not demand extensive employee training.

Upgrading my organization's information systems to handle RF would not be a significant business risk.

Upgrading my organization's information systems to handle RF would be a simple procedure.

Before deciding whether to implement RF, my organization will need to try its use.

I think that RF use can be effortlessly tested within my organization.

Arranging a joint creditor-biller trial with a customer would be simple.

Arranging a joint creditor-biller trial would be a good method in testing RF use.

I think that a trial use of RF would not incur considerable costs.

I believe I could communicate to others the pros and cons of using RF.

It would be easy for me to explain why using RF may or may not be beneficial.

I think that my organization's current information systems can produce reports on RF use.

I think that the projected cost effects of RF use are necessary to determine its efficiency.

I think that the cost effects of RF use in my organization will be clearly visible.

20) Additional comments regarding RF Creditor Reference:

10.3 Summarized survey results on perceived attributes of RF

	Average	STDEV
Relative advantage	5.27	0.32
Compatability	4.52	0.68
Complexity	4.65	0.52
Trialability	4.41	0.35
Observability	4.57	0.50
Total	4.71	0.55
Relative advantage		
RF will simplify my job.	5.26	1.36
Using RF will increase automation in payment reconciliation in our organization.	5.65	1.07
Using RF will lead to cost savings in our organization.	5.22	1.35
Using RF will decrease the number of mistakes in payment reconciliation in our organization.	5.30	1.15
Using RF will increase the quality of service offered to customers.	4.70	1.22
Using RF will increase the accuracy of payment reconciliation.	5.48	1.08
Compatibility		
Using RF is compatible with all aspects of my work.	5.04	1.19
Using RF is compatible with my organization's payment reconciliation process.	5.22	1.31
Using RF is compatible with my organization's information systems.	4.22	0.85
I think that implementing RF can be done with regular information systems upgrades.	4.61	1.20
I think that RF implementation would not demand assistance from external consultants.	3.52	1.38
Complexity		
Learning to use RF would be easy for me.	5.35	1.15
Using RF would be similar to using any other creditor reference number.	5.04	1.36
I think that the migration from previous creditor reference standards to	4.30	1.26

RF would be easy.		
Implementing RF would not demand extensive employee training.	4.65	1.27
Upgrading my organization's information systems to handle RF would not be a significant business risk.	4.70	1.02
Upgrading my organization's information systems to handle RF would be a simple procedure.	3.87	1.10
Trialability		
Before deciding whether to implement RF, my organization will need to try its use.	4.43	1.27
I think that RF use can be effortlessly tested within my organization.	4.43	1.50
Arranging a joint creditorbiller trial with a customer would be simple.	4.04	1.15
Arranging a joint creditorbiller trial would be a good method in testing RF use.	4.96	1.02
I think that a trial use of RF would not incur considerable costs.	4.17	1.11
Observability		
I believe I could communicate to others the pros and cons of using RF.	4.96	1.49
It would be easy for me to explain why using RF may or may not be beneficial.	5.04	1.11
I think that my organization's current information systems can produce reports on RF use.	4.13	1.18
I think that the projected cost effects of RF use are necessary to determine its efficiency.	4.13	1.06
I think that the cost effects of RF use in my organization will be clearly visible.	4.13	1.22