DIGINNO
Digital Innovation Network

Republic of Estonia
Ministry of Economic Affairs and Communications

Feasibility Study

Showcase D: Borderless Real-Time Economy (RTE)

Spearhead: eReceipt

DIGINNO WP3

2019

Interreg
Baltic Sea Region

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

EUSBSR
EU STRATEGY FOR THE BALTIC SEA REGION

POLICY AREA 'INNOVATION'

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Executive summary

Variety of e-solutions developed during the last couple of decades has made Baltic Sea Region (BSR) the path leader in digital economy with one of the most developed digital societies in the world. Although today, digitalisation and automation are the key areas countries are dealing with all around the world, the collaboration between various parties and sectors is still weak or somewhat missing. Even today, entrepreneurs, government officials and citizens are still piled up with routine, time-consuming activities – it is still common to issue PDF invoices via email, visit state institutions on foot to manage paperwork and be busy with other completely unnecessary paperwork.

The goal of Real-Time Economy (RTE) is to show that the state, including companies and citizens, spend too much time and money on activities that could work in real time and in a secure and automatic manner. RTE is a concept that helps to simplify business processes in order to help companies to focus on their main activities and save resources on various maintenance and support activities. In the centre of such ecosystem is the data movement occurring in real time or with a minimal delay between various information systems, organizations, sectors and even countries in a digital, structured and standardized format. The idea behind RTE solutions is to fully automate data exchange processes and transfer it to a machine-to-machine communication without a human interrupting the process.

RTE is a cross-sectoral and borderless approach. Technology has made it possible to move forward and take the next steps to support the economy's competitiveness and growth. It is time for BSR countries to provide companies and people the necessary preconditions for a standardized and unified data exchange processes and identify the enablers that support this process.

Baltic Sea Region countries have already developed many successful RTE solutions, e.g. e-invoices and e-receipts. E-receipts are very similar to e-invoices and together these are seen as the basic enablers for the RTE concept. E-invoices have been in limited use already for decades, but the wider usage has increased over the last 10 years. Lack of common standards, cross-border networks and unified regulation has hampered and slowed down the uptake of cross-border e-invoices. To prevent similar lagging with e-receipts, there is a real

need to regulate the cross-border e-receipt service from the very beginning. E-invoicing experiences provide good examples of what not to do and good use cases to learn from.

Feasibility Study describes the activities and potential of the cross-border e-receipt service in six different thematic aspects - economic, technological, legal and financial aspects as well as service viability and implementation with schedule. The content of the thematic aspects is gathered from different international stakeholders from both public and private sector using three different methodologies - online and live meetings, focus group discussions and online interview.

1. Introduction

Feasibility study is conducted for the Borderless Real-Time Economy and eReceipt showcase under DIGINNO project work package 3. Showcase is describing borderless Real-Time Economy in Europe and evaluating the feasibility of cross-border e-receipt service in the Baltic Sea Region countries. Cross-border e-receipt service is foreseen to operate between different market players in different BSR countries - Business-to-Business (B2B), Business-to-Government (B2G), Government-to-Consumer (G2C) and Business-to-Consumer (B2C).

The aim of the eReceipt showcase is to describe the As-Is and To-Be models of e-receipt service in different BSR countries; evaluate the opportunities, obstacles, benefits and risks for the service and make recommendations for both private and public sector in Europe. Many BSR countries do not have any previous experiences with e-receipt services, only few have developed national standards and even less have launched live services.

E-receipts are very similar to e-invoices and together these are seen as the basic enablers for the Real-Time Economy concept. E-invoices have somewhat been in use already for decades, but the wider usage has increased over the last 10 years. Lack of common standards, cross-border networks and unified regulation has hampered and slowed down the uptake of cross-border e-invoices. To prevent similar lagging with e-receipts, there is a real need to regulate the cross-border e-receipt service from the very beginning. E-invoicing experiences provide good examples of what not to do and good use cases to learn from.

Real-Time Economy is a vision materialised through applications using the collection of interacting ecosystems needed to deliver data-based new services and increase productivity mostly in the financial administration area. Progress here will speed up the development for a data-driven and Artificial Intelligence (AI) supported cross-border e-services (e.g. e-receipt). The Payment Service Directive (PSD2) model and General Data Protection Regulation (GDPR) provide strong incentives for this development.

Real-Time Economy financial administration area is involving many different e-services, for example e-invoices, e-receipts, real-time payments, e-procurement, e-salary, e-address, e-ID

and e-signature, automated accounting, automated reporting, automated risk evaluation processes, real-time economy forecasting and many more.

1.1. Relevance

Real-Time Economy vision for the EU and national goals are gaining visibility, but too much of the actual work being done is either on a very high level or hidden in silos that do not benefit from each other's innovations or do not have open standardised interfaces.

To improve the situation, it is necessary to get a clearer and shared vision both in the Member States and the Commission, and based on this to decide for determined implementation by setting up local and central RTE bodies steering the development and furthering interconnection of both existing services and ongoing projects and pilots. For example, in Estonia and Finland there are already big RTE communities being led by governmental or public sector organisations to discuss and develop new RTE related e-services (incl. e-Receipt). If this is not done together in all EU Member States or at least Baltic Sea Region countries, national solutions will not aim at serving Europe, standards for interoperability will not materialize, double work will be done and the best ideas will not flow fast enough. The Single Market will stagnate on lower levels.

The Nordic-Baltic area has the capability to act as a "laboratory" for EU as many of the needed infrastructures, ecosystems and services are already in use, several programmes for the next phases are up and running and the countries are small enough to get the needed public and private sector stakeholders around the tables. Similarity in legislation, attitudes and understanding of innovation also makes cross-border interconnections easier to achieve.

According to the international studies and surveys, the Nordic countries (Sweden, Norway, Denmark, Finland) and Estonia hold leading positions at global level in the sphere of the implementation of e-invoices (more than 40 percent of invoices are sent electronically). E-invoices are very similar to e-receipts, both record transactions. Leading position in e-invoicing already shows good indication of the potential e-receipts may have in the Baltic Sea Region countries.

1.2. Expected outcomes

DIGINNO eReceipt showcase partners are focused on re-innovating European retail sector and making e-receipts a part of Europe's next digital success story. A long-term goal in this direction would be the abolishment of all wallets and plastic cards that people carry around. For these purposes, showcase partners have identified three most important outcomes. The first is the development of unified and commonly used EU e-receipt standard that gives different countries and market players same understanding of the document. The second outcome is developing or re-using any existing cross-border infrastructure for data exchange in order to move the e-receipts securely and reliably. The third outcome is the development of the addressing logic, especially on how to reach citizens in different BSR countries. These outcomes need to be supported by the legal framework and users to increase to use of service.

1.3. Showcase partners

DIGINNO Borderless Real-Time Economy and eReceipt showcase has international partners from five BSR countries - Finland, Estonia, Latvia, Lithuania and Denmark. Showcase partners have involved also Poland and Sweden in the discussions to gather as much input as possible from most of the BSR countries. Showcase partners and associated partners are outlined in Table 1.

Table 1. Showcase partners and associated partners

	Country	Organisation	Participants role
1	Finland	DIMECC Oy	Showcase lead
2	Finland	Technology Industries of Finland	Showcase member
3	Finland	Ministry of Finance	Showcase member
4	Estonia	Ministry of Economic Affairs and Communications	Showcase member
5	Estonia	Tallinn Science Park Tehnopol	DIGINNO project WP3 showcase coordinator
6	Latvia	Ministry of Environmental Protection and Regional Development	Showcase member

7	Latvia	LIKTA	Showcase member
8	Lithuania	Ministry of Economy	Showcase member
9	Lithuania	INFOBALT	Showcase member
10	Denmark	Aalborg University	Showcase member
11	Poland	Polish Chamber of Commerce of Electronics and Telecommunications	Associated member
12	Sweden	Findity	Associated member

eReceipt showcase has 12 international partners involved in international discussions on service development and implementation. The showcase lead is a Finnish company DIMECC Oy who has organised many online and face-to-face meetings from January 2019 to May 2019 to understand and discuss the As-Is models in each BSR country and to build up the cross-border view on the To-Be model for the cross-border e-receipt service.

Estonian Ministry of Economic Affairs and Communications is responsible for conducting the feasibility study for the e-receipt service. To describe the state-of-play in Estonia and give crucial input for the feasibility Study, the Ministry established a working group of national experts on February 2019 and have had 6 face-to-face meetings in Tallinn. Estonian eReceipt working group consists of 15 participants from 10 different public and private organisations (see Table 2).

Table 2. Estonian eReceipt working group members

	Organisation	**Public/Private**	**Type of Organisation**
1	Ministry of Economic Affairs and Communications	Public	Ministry
2	Ministry of Finance	Public	Ministry
3	Eesti Post AS	Private	E-invoice operator
4	Association of Estonian Accountants	Private	Association
5	Tax and Customs Board	Public	Tax Authority
6	Swedbank AS	Private	Bank

7	Telia AS	Private	Telecommunication
8	Tallinn Science Park Tehnopol	Public	Science Park
9	Cost Pocket	Private	E-receipt digitalising
10	Fitek AS	Private	E-invoice operator

1.4. Real-Time Economy background

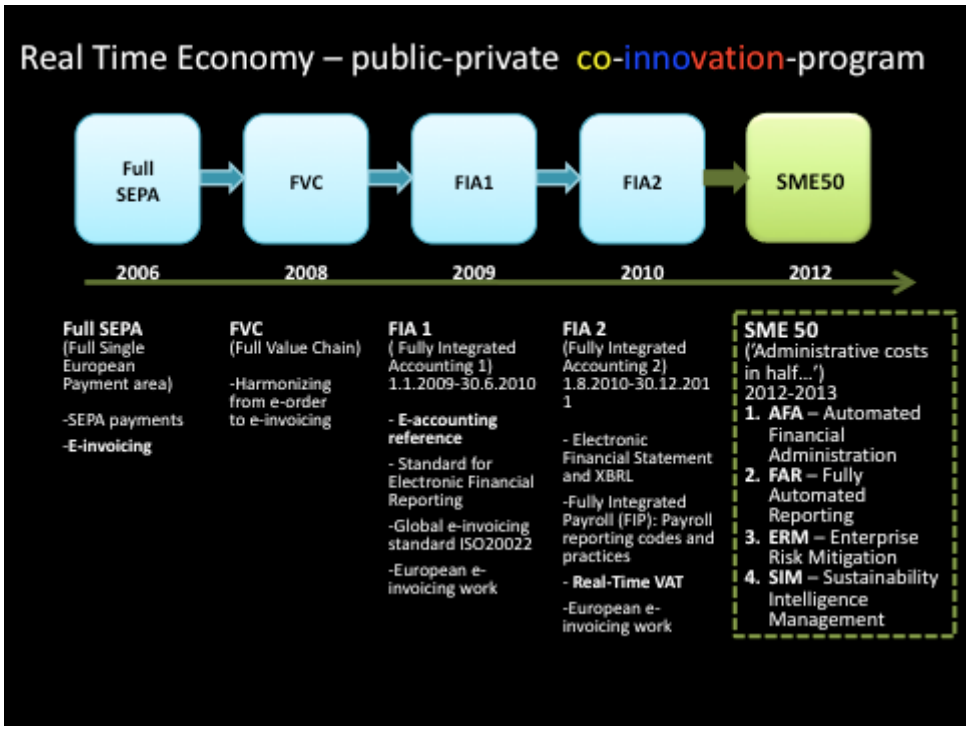
The Real-Time Economy (RTE) programme was first set up in Finland in 2006 by Tieto Plc and Aalto University. It was partly publicly funded and engaged a large number of both public and private sector entities.

The Real-Time Economy is an environment where financial and administrative transactions connecting citizens, business and public sector entities are:

(i) in structured standardized digital form
(ii) increasingly generated automatically, and
(iii) completed increasingly in real time without store-and-forward processes.

In the first phase (Figure 1) the focus was on driving Pan-European e-invoicing in parallel with SEPA. The importance of this was based on estimates by the Finnish State Treasury, the Confederation of Finnish Industries and the Association of Finnish Local and Regional Authorities that came up to an annual direct cost saving of 3.1 billion euros. In relative terms, this would exceed 200 billion euros a year in the EU.

Figure 1. Real-Time Economy first phase.



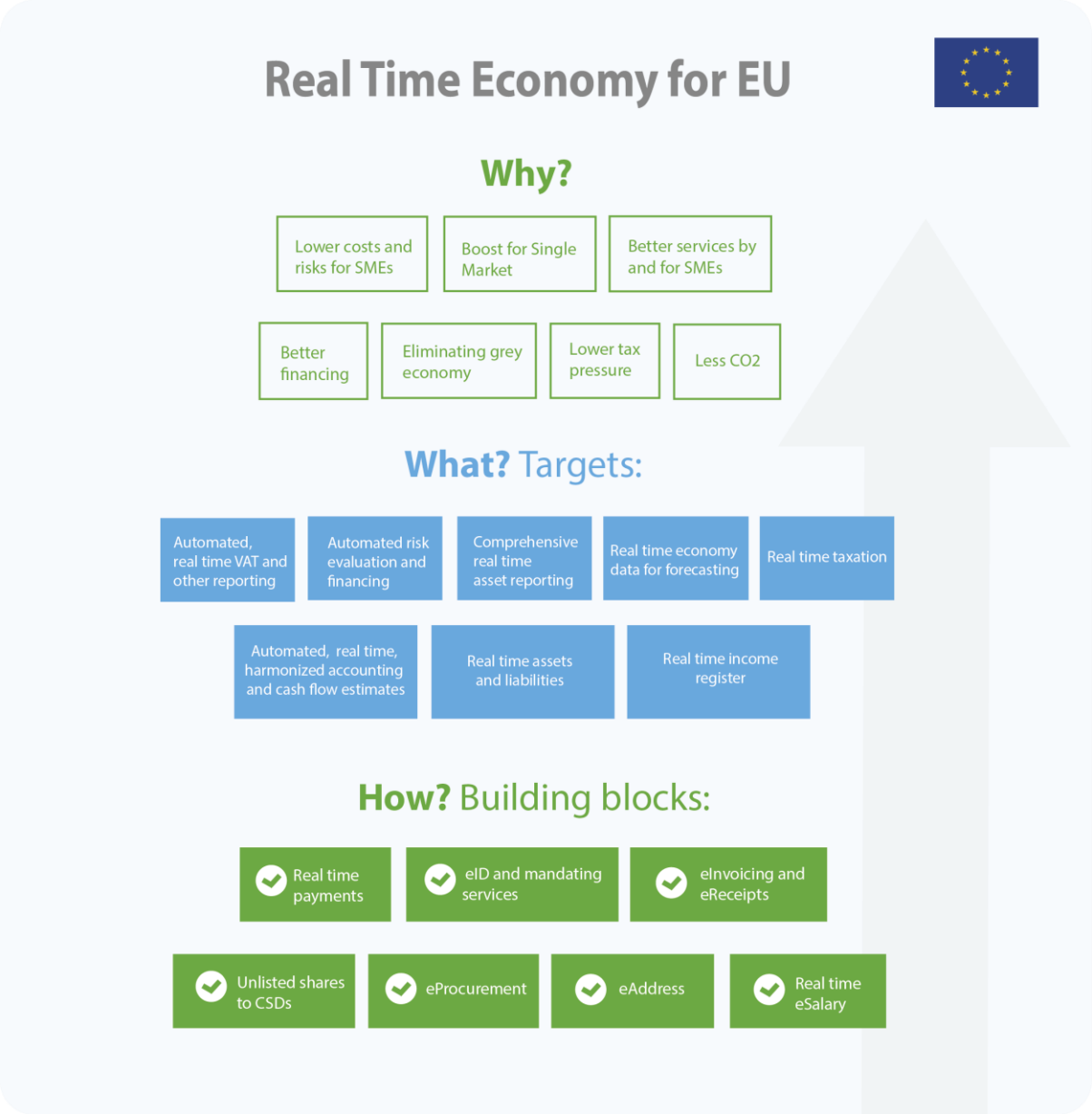
The scope of the Finnish RTE programme was later extended to automating real-time data access and processing in the financial administration area at large. Examples of this are e-receipts, automated accounting, income administration and tax reporting.

At present, the mission of the Real-Time Economy programme (incl. e-receipt service) for Europe is to - on a substantial scale:

1. Improve productivity through direct cost savings especially in SMEs and the public sector.
2. Make indirect productivity improvement and dynamic impact visible.
3. Increase utilization and verification of data to improve especially context specific services.
4. Enable new levels of harmonization in the EU Single Market.
5. Create processes that lower the CO2 emissions.
6. Promote transparency and create cost-efficient solutions against tax evasion.

The RTE mission and vision together with most important building blocks are better shown on Figure 2.

Figure 2. Real-Time Economy – Why? What? How?



The RTE program was followed by 1) TARU programme in 2013 (led by Tieto), 2) the Taltio programme in 2015 (led by the Association of Finnish Accounting Firms), and 3) the RTECO project (led by Technology Industries in Finland) in 2018. RTECO was the leader of eReceipt service creation and development in Finland. The project ended in June 2019. The Taltio project and the Association of Finnish Accounting firms estimated a cost-saving of €6 per receipt adding up to €800 million per year – €57 billion per year on EU-level.

Estonia is also taking its first steps towards RTE. Ministry of Economic Affairs and Communications together with Tallinn University of Technology (TalTech) has started the first RTE research study to evaluate the overall national impact with factual findings and differences with or without RTE impact in Estonia. The numbers will also help us to reflect and estimate the impact on EU in large. The research paper will be also a good base for future academic theses.

It is inevitable that Member States (MS) will make progress with their own timetables and that many solutions will initially be MS-specific. The aim of both DIGINNO project and RTE is rather to speed up what is going on and try to feed in ideas and practises from other MSs and from all sectors – than try to force all into one model. The concrete progress can only happen locally – where most of the direct benefits are found. But there are still areas where the European Council and the European Parliament should decide for stricter harmonization to achieve the goals much faster and in a unified way. The most important task is to support and interconnect development work and pilots (e.g. eReceipt showcase for cross-border prototyping) into intensive iteration – to improve the common roadmap.

2. Methodology

Feasibility study is conducted to evaluate the cross-border e-receipt service opportunities, obstacles, benefits and risks. Study will show the viability of the service in BSR countries and how the service can be implemented across borders. E-receipt service is evaluated in six different thematic aspects - economic, technological, legal and financial aspect as well as service viability and implementation with schedule. Information for these aspects is gathered using three different activities - online and live meetings, focus group discussions and online interview based on DIGINNO project template for the feasibility study. All three types of activities had participants from both international showcase partners and Estonian eReceipt working group members. Activities started in January 2019 and ended in June 2019.

The Real-Time Economy and e-receipt best case for cross-border service descriptions as well as the content for the state of play was gathered from BSR countries' field studies, vision documents, white papers, roadmaps and guidelines. More detailed view on the literature is found in the end of the study (p. 79).

2.1. Focus group discussion

Focus group discussion was carried out on the 26th of February 2019 during the 3rd Borderless Real-Time Economy Round Table event. There were 15 public and private sector experts participating from six different BSR countries - Estonia, Finland, Latvia, Lithuania, Sweden and Denmark. Focus group discussion was led by DIMECC Oy and was based on DIGINNO project showcase template questionnaire. The discussion in the focus group was directed to the cross-border e-receipt service To-Be model, but the discussions opened up the As-Is situations also.

2.2. Online and live meetings

Online and live meetings were used to discuss the service possibilities with national and international experts and to gather information on six above mentioned aspects. International showcase partners had two live meetings and two online meetings from January 2019 to May

2019. Estonian eReceipt working group had six live meetings from January 2019 to June 2019. Online and live meetings were focused on both As-Is and To-Be model discussions.

2.3. Online interview

Online interview was conducted and carried out during June 2019. Interview questions were based on DIGINNO project template and sent to all international showcase partners and associated members as well as to Estonian eReceipt working group members. Online interview was divided into the following sections:

- introduction of the partner;
- introduction of the showcase;
- economical aspects;
- technological aspects;
- legal aspects;
- financial aspects and schedule;
- implementation and
- viability.

Online interview introduction and questions are shown in Annex 1. Interview had 9 answers from all showcase partner countries (Estonia, Finland, Latvia, Lithuania and Denmark) and from both public and private sector representatives. Within the study all showcase partners, associated partners and Estonian working group members are all reflected as showcase partners.

3. Description of cross-border e-receipt service

3.1. E-receipt

E-receipt (also digital receipt and m-receipt) is a receipt in a structured, standardized and machine readable format. All data fields can be automatically processed without manual data entry of receipt information. Thus, paper receipts, receipt pictures or PDF receipts are not considered as e-receipts. The main idea of the e-receipt scheme is to generate purchase data in structured form on row level. Digitised purchase data is transferred in real-time. The payment transaction associated with the purchase is transmitted through its own channel. The e-receipt is not a payment transaction but a specification of the items purchased and paid. E-receipt (together with e-invoice) is seen as one crucial enabler for RTE.

In the EU, receipts are currently issued by using methods that are inefficient both financially and environmentally. Close to 100% of everyday receipts to prove transactions are still issued on paper. The storing and processing of paper receipts is inefficient and labour intensive (e.g. recording expenditures of companies by using the receipts). Information is not available to consumers due to the lack of electronic processing mechanisms.

The main challenge is related to fragmentation of players in the market, weak cooperation and lack of joint cross-border standard(s). In the private sector – at least as we look at retailers – everyone wants to have a database of its own, assuming that this will help to tie end users with the company concerned. In reality such a fractioned solution does not work in the longer run. A limited number of retail chain stores are developing their systems. This is why end users still prefer paper receipts, as insufficient functionality (photos of paper receipts) and fragmented data sets (one has to use different databases to obtain an overview of all purchases) will have little, if any, value for end users.

The data (e.g. e-receipts) needs to move across borders. Today's businesses work more and more across borders, especially in smaller countries (e.g. BSR countries), and they have to be able to interact with the governmental authorities in different countries. In the scope of the DIGINNO project, the aim of the eReceipt showcase is to describe and evaluate the use of the cross-border e-receipt service. Within the DIGINNO-Proto project the aim would be to

digitalise receipts by fine-tuning a mutual standard for digital receipts and exercising via cross-border piloting. The e-receipt standards are currently fragmented and need to be harmonised between countries for the real innovation push. Thus, there is a strong need for piloting within and between countries. For example, e-receipt flow from an Estonian seller's cash register through e-receipt operators to end up in a Finnish private person's smartphone screen. On a larger scale, this can be aligned with the promising revolution in the field of digital invoices to support the idea of one single standard in this area in the EU (similarly to the EU-wide e-invoicing standard).

E-receipts together with e-invoices are absolutely needed as basic building blocks to provide the RTE services in all B2B, G2B, B2C and G2C cases. Within the DIGINNO project, the To-Be scenario and description of the service sees G2B use case as the most important and with the biggest impact on the wider use of e-receipts where the government is showing good example for businesses. But within e-receipt cross-border prototyping under DIGINNO-Proto project, the showcase partners have discussed to prototype the B2B use case because of the highest maturity level on the market.

Cross-border e-receipt service must be build up using the most advanced, secure and transparent systems. Thus, cross-border e-receipt service must have basic principles to follow:

- Paper receipts, receipt pictures or PDF receipts are not considered as e-receipts.
- The buyer must have the right to select which receipt service company it uses.
- The merchants can choose the receipt service provider or they can also select a payment terminal service to forward the e-receipts.
- The form of the e-receipt should be standard.
- The operating model should be the four-corner model. Closed three-corner models are also possible, but these must be able to provide information outside the system or receive it from outside, if required. Three-corner model is not acceptable for cross-border services and prototyping.
- The operating model should be open to new e-receipt service providers who meet the criteria.
- The e-receipt should be viewable in the display application "quickly enough" after the payment.

- E-receipt processing must comply with the GDPR regulation and European Data Protection Board (EDPB) guidelines.

All showcase partners have agreed that cross-border e-receipt service must be in structured, standardised and machine-readable format and operated instantly in real time and in the four-corner model. Partners have highlighted that Member States must have agreements on the governing model and common standards used in the community. Also, the network and transfer standards between countries have to be agreed on in the international actions.

Four-corner model is a model for interoperability in which the seller and buyer are not using the same service provider. The service providers or a party providing a 'self-service', in turn inter-operate with each other, either based on bilateral agreements, or as part of a multilateral network[1]. The concept of the four-corner model originated in the banking sector. It is seen as a network usually based on open standards and provides connectivity and the facilities for the secure trusted exchange of invoices and/or other business documents. It helps to avoid an endless number of point-to-point integrations and agreements. Importance increases for cases of large international and cross-border merchants. For cross-border e-receipt service the four-corner model involves the Point-of-Sale (POS) system/seller, seller's receipt operator, payer's receipt operator and user's application for the buyer/user. eReceipt Guidelines document created under the RTECO project reflects the cross-border e-receipt service as shown in Figure 3.

Figure 3. The four-corner model for e-receipt service.

	POS System	**Seller's receipt operator**	**Payer's receipt operator**	**User's application**	**User**
1	Creates the eReceipt, adds the **payer's** receipt service operator's **eAddress** and **User ID**				
	Delivers the receipt to **the seller's receipt operator**				

[1] https://eespa.eu/glossary/four-corner-model/

2		**The seller's receipt operator** receives the receipt. Uses the eAddress to identify the receipt belonging to another receipt operator. Forwards **the receipt to the payer's receipt operator**			
3			**The payer's receipt operator** receives the receipt, forwards it to the user's application		
4				**The user's application** receives the receipt, adding it to the user's account based on the user ID. If necessary, the payers name and address (VAT requirement) and the purchaser's identification, e.g. employee ID number, can be added to the receipt	
5					The user sees the receipt in the **receipt data application**

The identification (e.g. eAddress and user ID) of the user's e-receipt service company are a central component of the e-receipt service. These aspects are further described in section 5.3.

In connection with e-receipt service, it is good to explain the m-wallet service. The m-wallet service makes it possible to receive a receipt into your mobile in real time against mobile payment, and receipts will be saved in the cash memory. The m-wallet gives the customer

freedom to explore receipts even in the absence of internet connection (on the plane etc.). Warranty documents are archived electronically making it easier to trace warranty period, return goods and approve repayments.

The service is easily applicable both in e-trade and conventional shops. Step by step, the need for paper receipts will disappear and the electronically handled e-receipts will become beneficial, in multiple ways, for private persons, companies and the state in general. Receipts will be automatically integrated with accounting software that enables real-time exchange of data (e.g. expense reports) between accounting systems.

Today, the proportion of e-receipts that would allow for electronic processing through all the stages of the process is practically non-existent in the Nordics, the EU and anywhere in the world. Solutions that focus on single shops and chain stores usually involve very little benefits for clients, the state and the environment in general. The integrated e-receipt and m-wallet service with different loyalty cards, payment methods and other integrations is comparable to the revolution in the field of e-invoicing.

3.2. E-receipt service process

E-receipt process can be shown in various use cases. Online interview with showcase partners has pointed out some crucial facts and most painful use cases that e-receipts can resolve. For example, for users it is most important that the e-receipt is delivered to the mobile application seamlessly and in real time. For companies, the most tedious accounting activities consists of purchases of minor goods and services where frequently an employee has made the purchase and later on asks for refund. E-receipts would make this transaction chain fluent by transferring the data from system to system after user/company confirmations. Showcase partners have also highlighted that there is a great need for high-level cooperation between the merchants for integration of e-receipt service and data sharing.

Within the feasibility study, the service has been described in three stages - registration, purchase transaction and data for financial management systems seen both in national and international use cases. Within the feasibility study only best case scenarios are seen as the

e-receipt service process use cases. Thus, the study is not describing the service use cases if the receipts are scanned, photographed or in PDF format.

For registration stage, there are two use cases described using PSP or mobile payment application. Using PSP (see Figure 4), the registration starts when the payer registers the information of the payment card or other payment instrument to the Payment Service Provider (PSP) via the receipt data application for the receipts to be delivered. The consumer gives consent to receipt delivery and the PSP sends the addressing information to the seller. In the second option registration is handled through the mobile payment application (see Figure 5).

Figure 4. The payment user is directed to register card information to the PSP.

	Payment instrument user	**User's application**	**PSP**
1	**The payment instrument user** chooses their **eReceipt service**		
2	**The eReceipt service** directs **the payment instrument user** to register the card details on the PSP's service		
3	**The payment instrument user** enters the card details (card number and expiry date) in the PSP's service		
4		**The payment instrument user's eReceipt service** delivers the eReceipt service company's **eAddress (EDI)** and generates a **user ID**. **The user ID** ensures that **the eReceipt** is directed to the payment instrument user. This information can be used to forward the eReceipt **from the store's receipt service company to the user's eReceipt service**	
5			**The PSP** files the data in its own registry (card details, eAddress, user ID)

Figure 5. Registering the mobile payment instrument via the mobile payment application.

	User	User's mobile application
1	**The payment instrument user** chooses their **eReceipt service**	
2	**The user** selects "Add mobile payment" in the **eReceipt service** application **The eReceipt service** creates a QR code containing information about the **eReceipt service company's eAddress (EDI)** and user ID, and displays it on screen.	
3	**The user** launches the mobile payment application and uses it to read the QR code	
4		**The mobile payment application** registers the information in its files (eAddress, user ID, phone number)

Next phase is the purchase transaction where the e-receipt is delivered to the buyer from the POS system via receipt operators creating a four-corner model (see Figure 6).

Figure 6. Purchase transaction process in four-corner model.

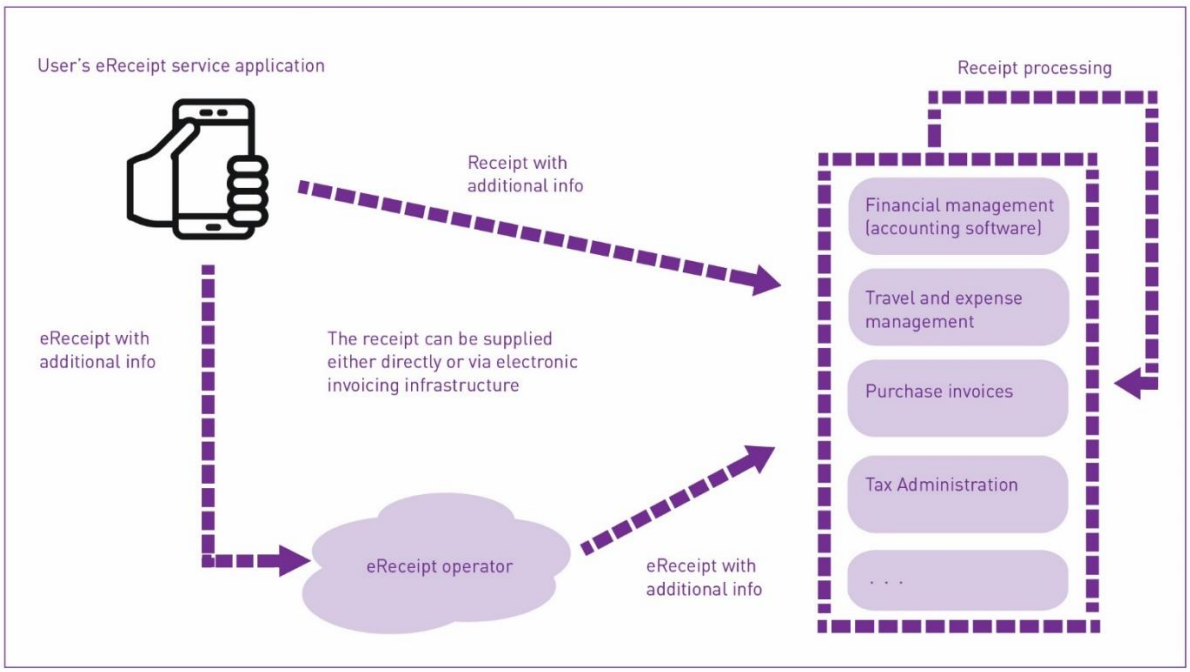
	User	User's application	PSP	POS system	Deliverer of receipt
1	The user pays with the registered card				
2			Transmitting payment and finding eAddress and user ID in PSP's own register		
3			Forwards the receipt operator's eAddress and user ID to the POS system		
4				Creates the eReceipt, adds the **payer's** receipt	

				service operator's **eAddress** and **User ID**	
5				Delivers the receipt to **the seller's receipt operator**	
6					Receives a receipt and passes it **to the receipt** operator of the payer's eReceipt service based on the eAddress
7		**The payer's eReceipt service** receives the receipt, adding it to the user's account based on the user ID. If necessary, the payers name and address (VAT requirement) and the purchaser's identification, e.g. employee ID number, can be added to the receipt			
8	The user sees the receipt in the **eReceipt service application**				
9		**The payer's eReceipt service's receipt operator** delivers the receipt to the services desired by the user (accounting application, travel and cost system, bank)			

After purchase transaction, receipts can be delivered to services chosen by the user, for example accounting applications, bank, travel and cost system, etc. Within the study, the

process is described for financial management systems where receipt processing can be automated with receipt data (the receipt with additional information). The transmission process of the receipt from the user's application to the financial management system is shown in Figure 7.

Figure 7. E-receipt transmission process from the user's application to the financial management system.



The receipt can be supplied either directly or via electronic invoicing infrastructure. In use cases, the receipt can be transmitted either as a structural e-receipt or as an image with additional information. Within the study only structural e-receipts are described. For example, a receipt that is delivered to a travel and cost management system can be supplemented with additional information in the receipt application. Afterwards, providing additional information in financial management systems should be limited to exceptional cases. In more detail, there are two use cases described with travel and cost management system. The first use case describes a situation where the user adds additional information to the e-receipts while the user's travel and cost management system directs the purchase transaction provided by the issuer to the travel and cost management system (see Figure 8).

Figure 8. Purchase transaction processing, the payer's travel and cost management system, the purchase transaction is attached to the e-receipt.

Payment instrument user	User's system (travel and cost management system)	Accounting	Purchase invoice processing system	Issuer	Purchase ledger
The user sees the eReceipt in the receipt data application					
1. The user fills in the necessary extra information in the receipt data application					
2. Alternatively, the eReceipt is automatically transmitted to the travel and cost management system, where the information is supplemented if necessary					
The user accepts the eReceipt for delivery to the travel and cost management system (if not transmitted automatically)					
	The system receives or retrieves the eReceipts from the payer's eReceipt operator				
	The system directs the eReceipt to the user, to be attached to a travel or cost invoice				

Payment instrument user	User's system (travel and cost management system)	Accounting	Purchase invoice processing system	Issuer	Purchase ledger
The user attaches the receipt to the travel or cost invoice					
The user fills in any necessary extra information for the eReceipt in the travel and cost management system					
The user routes the travel or cost invoice for a round of verification and approval					
	The system targets the travel or cost invoice to the verifier				
				Purchase transaction delivery to the travel and cost management system	
	The system combines the purchase transaction information provided by the issuer with the details on the eReceipt (archival ID or reference)				
	The system activates the travel or cost invoice for verifier handling				

Payment instrument user	User's system (travel and cost management system)	Accounting	Purchase invoice processing system	Issuer	Purchase ledger
	The verifier checks the travel or cost invoice (or sends it back to the user for processing) and routes it to the approver				
	The approver accepts (or rejects) the travel or cost invoice				
	The approved travel or cost invoice is transferred to accounting (and payment, if purchased on a personal card)				
		The data is read into the accounting system and archived, the required invoice matching is performed, (possible reimbursements to the user are made)			
				Billing the previous month's (or other agreed billing interval's) purchase transactions from the customer organisation	

Payment instrument user	User's system (travel and cost management system)	Accounting	Purchase invoice processing system	Issuer	Purchase ledger
			The invoice is imported to, or retrieved by the purchase invoice processing system		
			The invoice is pre-processed and posted, or the posting is checked (if triggered by posting code), and the invoice's transactions are matched with ones processed in the travel and cost management system		
			The invoice is routed, verified, and approved		
			The approved invoice is transferred to the purchase ledger and accounting		
		The data is read into the accounting system and archived			The data is read into the purchase ledger
					The invoice is paid by its due date

The second use case describes the situation where the e-receipt is attached to the user's travel and cost management system's purchase transaction after the issuer has delivered the purchase transaction data (see Figure 9).

Figure 9. Purchase transaction processing, the payer's travel and cost management system, the e-receipt is attached to the purchase transaction.

Payment instrument user	**User's system (travel and cost management system)**	**Accounting**	**Purchase invoice processing system**	**Issuer**	**Purchase ledger**
The user sees the eReceipt in the receipt data application					
1. The user fills in the necessary extra information in the receipt data application					
2. Alternatively, the eReceipt is automatically transmitted to the travel and cost management system, where the information is supplemented if necessary					
The user accepts the eReceipt for delivery to the travel and cost management system (if not transmitted automatically)					

Payment instrument user	User's system (travel and cost management system)	Accounting	Purchase invoice processing system	Issuer	Purchase ledger
	The system receives or retrieves the eReceipts from the payer's eReceipt operator				
				Purchase transaction delivery to the travel and cost management system	
	The system combines the purchase transaction information provided by the issuer with the details on the eReceipt (archival ID or reference)				
	The system directs the purchase transaction to the user				
The user attaches the purchase transaction to the travel or cost invoice					
The user fills in any necessary extra information for eReceipt in the travel and cost management system					

Payment instrument user	User's system (travel and cost management system)	Accounting	Purchase invoice processing system	Issuer	Purchase ledger
The user routes the travel or cost invoice for a round of verification and approval					
	The system targets the travel or cost invoice to the verifier				
	The verifier checks the travel or cost invoice (or sends it back to the user for processing) and routes it to the approver				
	The approver accepts (or rejects) the travel or cost invoice				
	The approved travel or cost invoice is transferred to accounting (and payment, if purchased on a personal card)				
		The data is read into the accounting system and archive, the required invoice matching is performed (possible reimbursements to the user are made)			

Payment instrument user	User's system (travel and cost management system)	Accounting	Purchase invoice processing system	Issuer	Purchase ledger
				Billing the previous month's (or other agreed billing interval's) purchase transactions from the customer organisation	
			The invoice is imported to, or retrieved by the purchase invoice processing system		
			The invoice is pre-processed and posted, or the posting is checked (if triggered by posting code), and the invoice's transactions are matched with transactions processed in the travel and cost management system		
			The invoice is routed, verified, and approved		

Payment instrument user	User's system (travel and cost management system)	Accounting	Purchase invoice processing system	Issuer	Purchase ledger
			The approved invoice is transferred to the purchase ledger and accounting		
		The data is read into the accounting system and archived			The data is read into the purchase ledger
					The invoice is paid by its due date

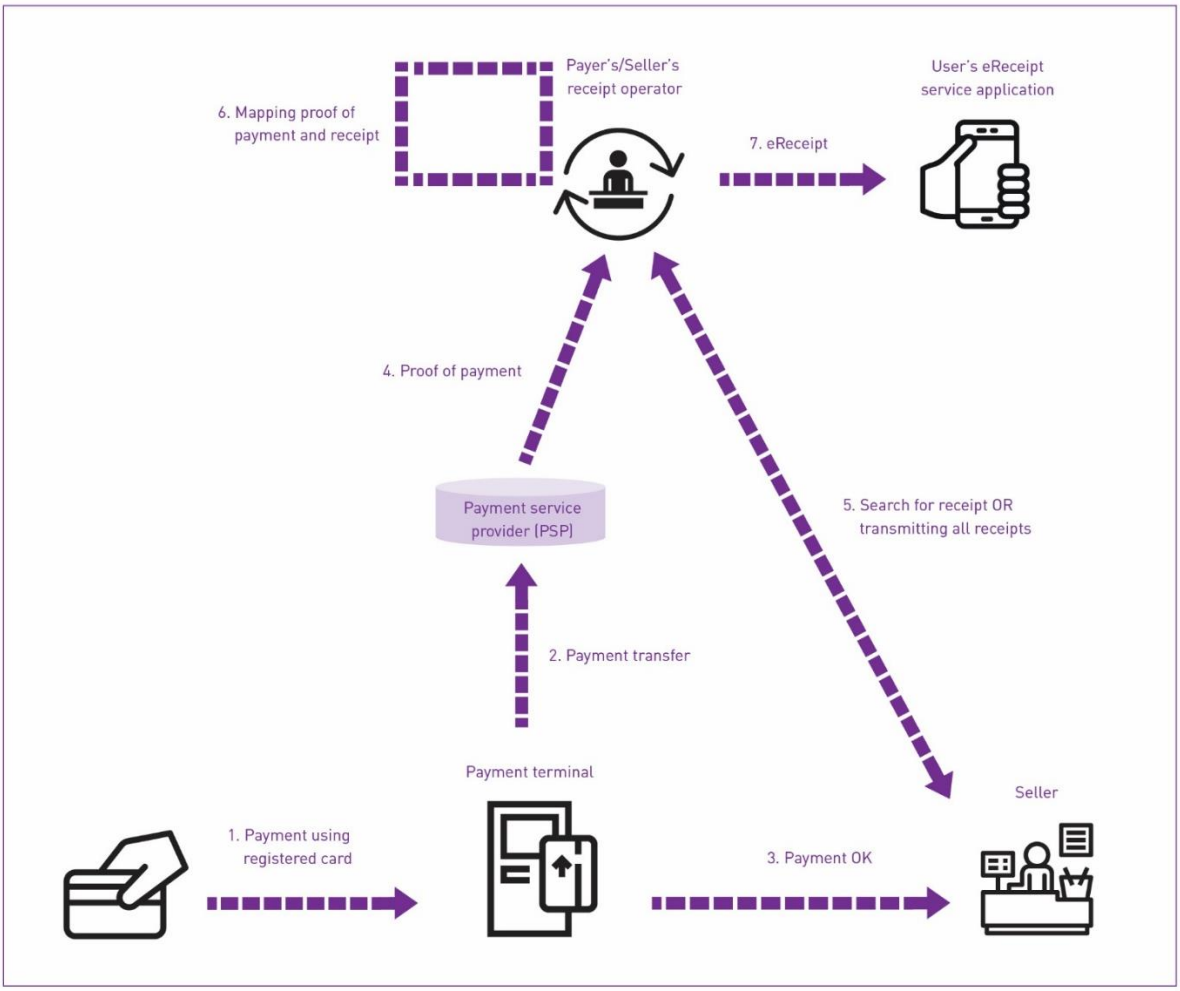
The described use cases highlight only a part of the e-receipt value chain. Before the development of the service, it is crucial to understand the current state-of-play in BSR countries regarding e-receipt service in order to avoid double work and use already existing infrastructures, standards and best practice activities.

3.3. E-receipt service state-of-play in BSR countries

According to the international studies and surveys, the Nordic countries (Sweden, Norway, Denmark, Finland and Estonia) hold leading positions at global level in the sphere of the implementation of e-invoices (more than 40 percent of invoices are sent electronically), which is a good indication of the implementation potential that the e-receipt may have.

E-receipt service is already being developed in some Nordic-Baltic countries. Lack of e-receipt operators, infrastructure management models and fragmented service technology increase the tendency to create three-corner models that cannot be considered as open approach for the business environment. Three-corner models should be regarded as possible temporary phases on the way to four-corner model implementations. Visualisation of the existing purchase situation in a three-corner model is given in Figure 10.

Figure 10. Purchase situation, e-receipt service in three-corner model.



To build up a valuable and most cost-effective cross-border e-receipt service, the state-of-play in BSR countries must be described. Feasibility study gives an overview of the situation of national e-receipt service in Finland, Estonia, Sweden, Latvia, Lithuania, Denmark and Poland.

3.3.1. Finland

Finland currently occupies the top position in real-time economy. Finland is the only country in the world where the essential definitions and use case descriptions have been made to transfer e-receipts from the seller's system to the buyer's system without manual work

(eReceipt Guidelines v. 2.0, 2019). The work with e-receipt in Finland has been going on for several years. Migration to structured e-receipt was a target already in the RTE/TARU project phase and gathered more weight when the Association of Finnish Accounting Firms was in charge of the RTE/Taltio project. The specification work for a four-corner model based ecosystem using the same standard (Finvoice) as for e-invoicing has been completed. The latest RTECO project's main focus was on activating more service providers, merchants and enterprises to join the e-receipt ecosystem. About 70 organisations, both from private companies and from the public sector, were involved in the e-receipt ecosystem. One important outcome of the RTECO project was the functional and technical guidelines published as an eReceipt Guidelines document. The document is meant to work as a rule book for a future operator network.

The Finvoice e-invoice format is the common format for electronic invoicing. It is also used as the e-receipt format, but with special features. The Finnish standardisation process was started under the TARU project in a broad collaboration with government representatives, POS providers, retailers, banks and accountants. An implementation guide has been created exclusively for it, specifically describing the unique characteristics of card purchase receipts. When using the industry-specific code (ImplementationCode) ECR1 (Electronic Card Receipt), the content message description in the card purchase receipt's implementation guide is adhered to. This does not contain all the information related to the receipt. A separate implementation guide has been created for this purpose.2

Finnish e-receipt standard and joint concept has been developed in close cooperation with Estonian colleagues. It is very important that the two concepts are digitally interoperable and harmonized.

However, the mainstreaming of e-receipt or even major pilots are lacking. This is mainly caused by the notorious chicken and egg problem. Finland is missing an operator trust network but especially some big e-receipt providers to show example and boost the market. In Finland, there are only two e-receipt service providers at the moment. One of them has grown a lot and

2 http://www.finanssiala.fi/finvoice/dokumentit/Transmitting_card_purchase_receipts_in_the_finvoice_format.pdf

been able to gather clientele, but still works in a three-corner model. This will be a hindrance in future growth and also a problem from a competition point of view. For example ReceiptHero3, which is providing an open digital e-receipt platform that sends digital receipts from point of sale (POS) systems to users banking and accounting applications, but currently working in a three-corner model.

On the public sector side, the State Treasury has included in their procurement documents a prerequisite for the seller to be able to provide e-receipts as soon as the e-receipt infrastructure is available. Considering e-invoices, The Ministry of Finance gave out the legislation in the spring 2019 on standardised e-invoices to enhance their use. The legislation was stricter than the Directive it was based on and gives a legal backbone for public sector and also companies to demand e-invoices from their procurers. There is no legislation at all concerning e-receipts, even though ideas for making structured digital invoices and receipts mandatory have been brought forward by several actors in the field.

Despite the fact that e-receipts have not mainstreamed yet, important development has happened in certain G2B services. In April, the Finnish Patent and Registration Office launched an API which companies (or their accountants) can use to send their digital financial statements. The solution uses iXBRL. Further development will include incorporating the auditor's report. In the future, the accountants work could be more efficient if e-receipts and e-invoices were in use and no manual entries would be needed in compiling the statement. There is also an API for the users of financial statement data, e.g. rating companies. Having the possibility to get the data in digital format, will greatly step up their business.

The Finnish Tax Authority is working on automatic VAT reporting. The Tax Authority would provide a company with an automatically formed VAT statement which the company could check and accept/decline. Preliminary study was completed in spring 2019 and the project phase will start in the autumn. However, it is clear that this process will only be efficient and remarkably lessen the work in companies if the e-receipts and e-invoices are in use. Digital receipt and invoice data will also be a tool for combating grey economy.

[3] https://getreceipthero.com/

3.3.2. Estonia

In Estonia, the first e-receipt project was launched in 2014. The project was led by Eesti Post AS (Omniva) together with project partners Telia Eesti AS, Trinidad Consulting OÜ, Authente AS, MTÜ IKT Demokeskus (ITL Digital Lab) together with Helesinine Konsultatsioonid OÜ and funded by Norway Grants. The aim of the project was to reduce the value and number of paper receipts in Estonian trade and service field by developing the E-Receipt Portal. It is a system that enables the end user to conveniently manage their receipts and related documents, such as warranty letters and product manuals, in one web centre. During the project, two solutions on the market were developed by the Estonian partners, Omniva's E-receipt service platform and Telia's m-Wallet Open Ecosystem.

Telia's m-Wallet Open Ecosystem is the main e-receipt driver in Estonia's market. Current service involves important market players like Kaubamaja, Selver, I.L.U, Estravel, Co-market, Okaidi, etc. The service is seen not only as e-receipt service, but as personal m-Wallet. Thus, the user can not only see their e-receipts, but also make payments and use different loyalty cards. These additional features already add value to the service which increases the number of users.

Omniva's E-receipt service platform is a new technological solution developed for e-receipt service under cooperation project. The platform and web have been up and running for approximately 3 years. It was recently put on hold because of lack of additional services, clients and financing from the project partners side. The project partners have evaluated the service very good and mature, but the market is not there yet. Lack of additional services did not bring the critical mass of users to the platform. The service did not become profitable and thus, it was put on hold until the interest in the market on e-receipt services increases.

Within the e-receipt project in Estonia, the national e-receipt standard was developed based on Estonian e-invoice format jointly with the government's e-invoice working group (Ministry of Finance; Ministry of Economics and Communications; Tallinn City); Association of Estonian Accountants; Estonian Traders Association and Estonian Banking Association.

In Estonia, there is no law relating to the use of e-receipts or digital receipts. The law only states that you are allowed to keep all your purchase documentation (incl. invoices and receipts) in digitised format, i.e. PDF or scanned copies. It is not mandatory to store the original paper documents. But the political will in the Ministry of Finance is very high to continue working with the legal framework for e-receipt service.

3.3.3. Sweden

In Sweden, there have been digital or e-receipts since 2010 when company named Findity [4]started its business. They emerged from the start-up that developed and sold the e-receipt solution to the Apple Inc. Their current solution has already issued over million digital receipts in Sweden and they have over 100 000 customers. As the years went by, in addition to Findity, more companies started offering digital receipts in various forms. In addition, all e-commerce also started offering digital receipts.

In 2012, a supplement to the law was made which stated that it was legal to replace paper receipts with digital receipts, provided the information was the same.

At a meeting of the Swedish Tax Agency with the Council for Cash and Payment Systems, a proposal was presented to develop a standard for digital receipts in Sweden. The final Swedish standard proposal was presented in February 2018 and at a meeting in June 2018 a machine-readable Swedish standard was adopted by a single reference group. The standard was named SDRS (Swedish Digital Receipt Standard)[5].

3.3.4. Denmark

Storebox[6] is the largest Nordic vendor of digital receipt solutions with offices in Copenhagen, Stockholm and Oslo. It is the largest Nordic digital receipt platform with the most developed ecosystem and over a million receipts delivered daily. Offered as a comprehensive service, it covers all elements of e-receipts, including recipient identification, line item data collection,

[4] https://findity.com/
[5] https://digitalreceipts.se/swedish-digital-receipt-standard/
[6] https://www.storebox.com/#/

receipt repository and presentation to the customer within an app. There are already more than 7,500 shops which have signed up for Storebox.

The customer is identified based on the payment card they have registered to the system. This solves the essential problem of e-receipts; how to know who to send the receipt to without spending time to ask for email addresses. Identification and delivery of the receipt is done seamlessly in the background without any involvement from the cashier. The customer receives the digital receipt in the mobile app in real time while still at the counter.

Storebox receipts are delivered either to the standard Storebox app or embedded to customer's own app, and can contain attachments such as warranty documents or user manuals of the products sold.

There is no standardisation process started for national e-receipt standard or law amendments to describe the use of e-receipts in Denmark.

3.3.5. Poland

Poland started the modernization of the fiscal cash register system in 2018. It will include all existing "first generation" fiscal cash registers. The main novelties on which the modernization is based are: e-receipts, online data transfer to the tax administration server, archiving of receipt data in digital form and unification of the protocol between the cash register and the payment terminal. Currently available on the Polish market, fiscal cash registers and fiscal printers are issuing original fiscal receipts only in paper form. New fiscal law insists on the digital form of receipt keeping. The new regulation is to eliminate the possibility of archiving fiscal documents in paper form. Copies of receipts will be saved only in electronic form. The e-receipt will be available to every consumer after entering the buyer's code – this also applies to people paying in cash. Since there are many taxpayers, the replacement will be organized in stages and will last for a few years.[7]

[7] http://www.salesdatacontroller.com/poland-fiscal-goes-line/

3.3.6. Latvia

According to the Cabinet of Ministers regulation in Latvia, there is an obligation to print receipts on paper. Although, the issuer is allowed to store the receipt additionally in digital format. From existing regulation point of view, it is not allowed to not print receipt on paper.

There are three kinds of cash register systems in Latvia:

- cash registers;
- cash registers with fiscal memory (hybrid cash registers);
- cash systems with fiscal memory.

Cash registers with fiscal memory and cash systems with fiscal memory are allowed to connect to computer and Internet. Thus, copy of receipt that is stored in cash register or cash system with fiscal memory is machine readable. Only the receipts printed for clients by these devices are not machine readable. It is not yet possible and allowed to connect the usual cash register to other systems via Internet, so it is not possible to send receipts by e-mail nor in a machine-readable way between usual cash register systems.

The discussions are ongoing with the State Revenue Service (SRS) of Latvia to change the regulation so that e-receipts are obligatory and online copy could be made available to SRS, but the consumer will always have the possibility to request the printed version. To achieve the described situation, changes in Cabinet of Ministers regulation in Latvia are required, but technically it is already possible.

Currently, SRS is more concentrated on the implementation of the new cash register regulation. Thus, the changes needed for the e-receipt are postponed for some time.

3.3.7. Lithuania

Lithuanian State Tax Inspectorate announced a project of e-receipts in June 2018 named i.EKA, which will be harmonized with existing Smart Tax Administration System i.MAS. The aim of the project is

- to replace existing fiscal cashier's paper receipts with e.receipts;

- to reduce administrative burden for businesses;
- to reduce shadow economy;
- to save time and money for operations;
- to enable Real-Time Economy;
- to support FinTech eco-system.

The end of project is planned by third quarter in 2020.

Moreover, e-receipt will be mandatory for all entities starting from the second quarter in 2021. In legal framework the e-receipt will be regulated together with e-invoices and thus, the need to change regulations is reduced. Machine-readable e-receipt will be eInvoicing EU Standard EN 16931-1:2017 compliant that meets all the needs of the stakeholders and would also work cross-border. The four-corner model and EU eDelivery infrastructure will be used for exchanging e-receipts. It will be mandatory to send all the e-receipts not only for the buyer, but also to the centralised Tax Authority database.

i.EKA project is planning to deploy existing EU building blocks for better infrastructure in Lithuania. In detail, there are two EU PEPPOL eDelivery Access Points that already work cross-border - one for the government and second for the business purposes.

Since 2015 the eInvoicing platform for eProcurement needs is up and running and was recently modernised to meet the EU eInvoicing Standard. In 2018 eInvoicing platform (eSaskaita) received e-invoices around 60% of all public procurement of Lithuania. eIDAS regulation is planned to deploy for addressing purposes in B2C e-receipt service.

4. Economical aspects

The main issue for Europe is to improve productivity and service levels in order to be competitive in a global market - in the face of its shrinking workforce. As resources and attention are in short supply it is necessary to prioritize projects. For prioritization it is important to evaluate the direct economic and separately the indirect economic and other impacts. To make the net impact transparent, it is necessary to divide the estimates for needed investments and benefits separately for enterprises, the public sector and the households (that eventually reap most of the benefits in the form of better and less costly services and lower taxes).

Citizens pay – often through many steps – eventually all the costs of enterprises and the public sector. The very large savings that can be achieved with ecosystems based RTE services (e.g. e-receipts) can in a competitive market quickly materialize as lower prices and as lower tax pressure.

When talking about RTE and e-receipt service, it is fairly important to stop also on the potential risks that are connected to data security, data breaches and privacy, but also in the shift in the market leaders' mind-set. BSR countries have a great potential to take the lead in the real-time economy building blocks development (e.g. e-receipts), demonstrating others there is far more to gain than to lose. It is the only way to change the mind-set of the entrepreneurs and citizens, and to create a fertile soil for the RTE solutions to grow.

For these purposes, under economical aspects the study will highlight the main stakeholders, users and beneficiaries together with the estimated impact on each group.

4.1. Key stakeholders, users and beneficiaries

Showcase partners have identified the following relevant stakeholders for engagement together with users and beneficiaries in the cross-border e-receipt service. The key stakeholders are POS service providers, retailers, merchants, payment service providers, e-receipt service providers, accounting service providers, accountants and legislators. Joint collaboration with a wide group of actors in Estonia, Finland, Sweden, Poland, Latvia,

Lithuania and Denmark continue developing the e-receipt service and network. In the DIGINNO e-receipt community there has already been successful collaboration with:

- legislators: Ministries of Finance and Economics in Estonia, Finland, Latvia and Lithuania and Tax Administrations;
- associations: associations of accountants and ICT;
- banks – Swedbank, SEB, Nordea;
- service providers: Telia, Fitek, Eesti Post (Omniva), Cost Pocket, Kuittilompakko, ReceiptHero, Nets.

DIGINNO e-receipt showcase still needs to establish direct contacts with relevant service providers (e.g. POS, banks, operators), retailers, merchants, consumer organisations, trade chambers, accounting software providers, state treasuries, national parliaments, governments and agencies in different BSR countries as well as relevant EU agencies and institutions (parliament, DGs, etc.).

The service users are everyone who are purchasing goods and services both nationally and internationally - in overall they are private persons representing themselves, business or public entity. Because of the digitalisation level of the service, the users in different ages might need different user journeys on how to receive and view the e-receipts. For example, most of the young and middle-aged people have better access for mobile applications, old-aged people might need access through other applications or services. It should always be an option for users to get the paper receipt, but the default receipt should be digital.

All customers and companies that receive paper receipts today (practically all people and companies in the EU), are the potential beneficiaries of the cross-border e-receipt service. But high level impact is also seen for service providers who are creating, transferring and processing the e-receipt and for the sellers. The service is highly beneficial for the public sector and mostly for the public authorities, e.g. Tax Authorities, Statistics and Ministry of Finance responsible for the state budget.

The roles of the stakeholders and partners are different in various fields. Partners developing the cross-border e-receipt service are overall responsible for the most cost-effective, secure and trustworthy e-receipt ecosystem. Stakeholders tasks are seen from two different perspectives - service supply and service demand stakeholders. From the service supply

perspective, the stakeholders are 1) service providers as the suppliers of the e-receipt infrastructure and service, and 2) governmental agencies for regulating the legal environment of the e-receipt service both nationally and internationally. From the service demand perspective, the stakeholders are 1) the users of the service and 2) both public (national and EU) agencies and businesses for procurement processes. One important task for the stakeholders is to provide the guarantee of the (big) data protection. Showcase partners evaluate public sector entities mainly as legal framework builders and responsible for the harmonization of the process, but they also see them as role models for the citizens and businesses to be the first drivers of the e-receipt take up, both technologically and in usage.

4.2. Impact

In order to prioritize RTE related projects, it is important to get at least rough estimates (best case/worst case) for the building blocks (incl. e-receipt). Many project-specific rough estimates have been made by trustworthy experts, but a smaller number has been officially documented. Results vary – but the usual reaction has been “big enough – let’s get going*. Impact studies for the full RTE are not at hand.

Connecting automated real-time transactions (payments, e-invoicing, **e-receipts**, e-salary, securities, e-id, e-signatures, etc.) to real-time databases for liquidity, assets and liabilities, spending analysis, taxation etc. will enable direct and indirect benefits on a very large but so far unquantified scale, for example:

- Time and money saved by all actors;
- Better and simpler management of personal economy based on real-time view of financial position and spending analysis;
- Lower financial risk with automated cash flow estimates and better predictability through real-time taxation;
- Less administrative work (time spent);
- Smaller information overflow (stress);
- Lower service costs (due to automation);
- Lower tax burden (due to automation);
- Faster (data available in real time) and cheaper financing (due to automation – and lower credit risks);

- Better corporate and public sector service based on automated data driven propositions;
- Lower fraud risks (fake invoices eliminated);
- Lower tax fraud (lower tax burden due to wider tax base and third party control);
- Statistical information is up to date and helps better prognoses the near future;
- Better possibilities to have real-time data on the economy as a whole, and make prognoses;
- Better services from open competition (4 corner models, PSD2) and wider app development;
- Better jobs (more interesting and better paid as routine work is replaced with more value and productivity creating tasks);
- Economy of repetition – learn once – use everywhere - when the familiar tools are the same in private, employee and citizen roles across all public and private services;
- Open up opportunities for RTE-start-ups and new services based on consumer's data (e.g. guarantees, home accounting, calories reading, etc.);
- Smaller carbon footprint;
- Significant boost for the Single Market;
- Improved transparency (beneficial ownership, financing and payment tracking);
- Fuller benefits of PSD2 and GDPR.

Further on, the e-receipt service offers a lot more and detailed potential benefits for companies, communities, public administrations and consumers. Study has gathered the answers from the online interviews together with the benefits listed in the white paper of Roadmap for Real-Time Economy and My Data for Europe by Bo Harald (2018).

Companies, communities and public administration

- Efficacy of work.
- Possibility to have real-time understanding of the financial situation of an individual or a company.
- High quality errorless data.
- Data for more accurate statistics and for macroeconomic use.
- Receipt information does not have to be saved manually to the financial systems, and the company can automate receipt processing.

- In terms of credit or debit card purchases, the savings from reduced data input work add up to appx. 900 million euros per year in Finland.
- The processing of cash purchase receipts generates cost savings, but estimating the extent has not been possible due to the unknown number of receipts from cash purchases.
- Financial systems get more extensive data from the row information in structured receipts.
- Broader receipt information enables superior, automated reporting of purchases and expenses.
- Receipt service companies will appear on the market to provide companies with more detailed client information.
- Gives possibility to develop new efficient public and private sector services (e.g. financial statements, automation of tax collection, new start-ups based on new data).
- Sellers of products can order a targeted product recall, as the receipt info indicates to whom a potentially faulty or hazardous product has been sold.
- Receipt provider organisations will save receipt printer and material costs.
- Reduced paper usage lessens the environmental impact.
- A structured receipt allows companies to automate VAT processing, as well as any other process or new service requiring an original purchase receipt (e.g. customs clearance).
- Tax accrued by sales revenue can be monitored to combat the grey economy.
- E-receipt service will make the economy more transparent and secure.
- The systems used to process e-receipts will be trustworthy and secure.
- Time and cost savings compared to dealing with paper receipts and scanned/photographed receipts.
- Gives better understanding of clients habits and better content for marketing.
- E-receipts are easily integrated with accounting software for automated and real-time data exchange.
- Saving the environment.

Consumers

- Saving the environment together with the vision of paperless future.

- Availability to monitor your costs and be more aware of your life decisions (food, exercise, etc.).
- Creates better control over purchases and optimises consumers' decisions.
- The consumer can receive a structured receipt in a mobile application or another application from the service provider, either for recording or forwarding.
- The consumer can also receive warranty receipts and user manuals electronically and/or in an image format. This makes it easy for consumers to save the receipts electronically and find them when required.
- New companies providing services to consumers will appear, e.g. receipt service companies for managing consumers' finances.
- Structured receipts can be used to produce receipt services tailored to the elderly, visually impaired, and special needs groups.
- New services for time-saving and simplifying everyday life will be created, e.g. for situations requiring a receipt or proof of purchase to access a service. Documents will not need to be delivered, stored, searched for, or processed when the information is automatically forwarded to the party requiring receipt information.
- All data will be stored in one place, always accessible and no data is lost.

Furthermore, we can look into a few simple examples of e-receipt impact. For the environment, if we assume that one paper receipt has an average weight of 0.5 grams, one ton of receipt paper will give us approximately 2,000,000 receipts. Even for a small country of Estonia (population 1.3 million), on average, 400 million paper receipts are issued in every year, this will add up to 20 tons of paper per year. Even a 10% decrease in the number of issued paper receipts would mean considerably reduced pollution of nature. Accompanied by the transfer of bank and loyalty cards into mobile phones (mobile wallet complemented with e-receipt application), some savings could also be achieved on account of plastic cards issued. If the e-receipt initiative can be extended to the EU, the described effect will be amplified by about 384 times. One ton of receipt paper will require, on average:

- 15 trees,
- more than 9 barrels of oil,
- 72 tons of water,
- generate 1 ton of waste.

New services and updates always bring new risks. It is mandatory to make risk analysis for every new service. Within this study, opinions have been collected from the showcase partners over the meetings and online interview. Following risks for cross-border e-receipt service have been outlined:

- low political will and unsupportive regulations/legislation;
- e-receipt is not accepted by critical mass of people
- e-receipt is not accepted by people with influence;
- lack of good cooperation and communication between e-receipt service partners (both public and private);
- low number of integrations and systems updates from the service providers;
- integration to retailer's databases is complicated and resource intensive;
- service providers not finding cost-effective business model;
- low uptake from the consumers;
- fake transactions and false data or data breaches;
- problems with sharing the data and being aligned with GDPR;
- disruptions caused by cyber-attacks;
- malware infestation of the e-receipt application;
- malfunctioning of the data exchange infrastructure.

Another aspect that can be taken as a risk for the service is the fact that there are still people who are not able to use the smartphones or other tools needed. Even if the need to enter data will be largely eliminated, it may still be necessary to provide human guidance via call centres and outlets for this sector. It is, however, clear that all enterprises have to use only digital administrative processes in the near future.

In conclusion, the most feared issues are weak data security, privacy and general vulnerability of a society where all processes are digital. This also means better standardisation, data quality, one-time input of data (TOOP) and decreasing technical data exchange issues. But more attention is needed for stricter adherence to rulebooks. Legislation should not be allowed to slow down the progress.

While it is relatively easy to spread ideas across borders, it is not self-evident that implementations and implementation timetables are similar or that projects become joint

projects. Member States have different attitudes, legislation, starting points, standards and legacy solutions already in place. It has become clear that yesterday's best technology may be close to redundant today and innovative leaders are needed to drive these kind of changes for the future.

5. Technological aspects

The main outcome of the e-receipt showcase is the To-Be vision which focuses on innovating European retail sector and making digital receipts a part of Europe's digital success story. This would include fine-tuning the interoperable cross-border e-receipt standard and using it in real-life cross-border pilot. The long-term goal in this direction would be the abolishment of all wallets/plastic cards that people carry around. An interoperable e-receipt standard would integrate all the existing and known e-receipt systems, welcoming companies currently not having e-receipts and also making information available (by means of electronic identification) to other service providers. Another important outcome based on the To-Be model could be a live-prototype demonstrating cross-border data exchange for e-receipts. In connection with the To-Be model and possible DIGINNO-Proto project, showcase partners have discussed different possibilities on how to make the cross-border e-receipt service technologically possible, cost-effective and efficient.

Technical and functional models enable ecosystem actors to transfers e-receipts in a structured form from the seller's system to the buyer's system. With common operating models and standardised e-receipt data model all actors can develop various services to the companies and consumers. Furthermore, these services will be interoperable without surplus integrations or data transformations.

The essential technical principles for the e-receipt ecosystem are:

- E-receipt is a standardised, structured and machine-readable data entity.
- There is a common standard addressing and identification method for transferring e-receipts.
- E-receipts are transferred in a four-corner model where the seller and the buyer can use different e-receipt operators and the actors can have only one agreement relationship.
- E-receipt and the payment methods are kept separate as well as the transfer of payment events. Thus, the e-receipt data transfers are immune to various or emerging payment methods.
- E-receipt enables automation and provides for considerable cost reductions in the data handling processes.

- E-receipt is a technical prerequisite for Real-Time Economy.

The study evaluates standards, infrastructure, identification and technical integrations within the technological aspects. Four-corner model is described in more detail in chapter 3.

5.1. Standard and infrastructure

Cross-border business requires harmonised data exchange protocols. The most cost-effective and fastest way is to use already existing and commonly used standards on the market. European Commission Directive is mandating the use of the European e-invoicing standard - EU Norm semantic model for e-invoicing, which is based on UBL2.1 or UN/CEFACT standard models. Since e-invoice and e-receipt data is very similar, showcase partners have suggested to use slightly modified e-invoicing standards and semantic model for cross-border e-receipts.

Another option is to duplicate the best practice from the e-invoicing situation before the EU Norm, when every country had their own national standard in place which was then mapped against other national standards in different Member States. This option is easier and faster to implement since some of the countries already have national standards for e-receipts in place and mapping between different national standards is evaluated as an easier task. In this case, it needs to be highlighted that every country must have strict regulation or law for one national e-receipt standard and semantics. It will decrease the chance of developing more than one national e-receipt standard for one country as has been seen happening in e-invoicing.

Third and also strongly supported initiative is to start using the XBRL GL standard for all transactional data exchange, including e-receipt data. XBRL GL[8] (eXtensible Business Reporting Language Global Ledger) provides a generic and system-independent way to record all of the details in any kind of ledger. Standard gives the user standardised way to store all of the operational data and data definitions contained in an accounting or ERP system. XBRL GL allows transactions to be aggregated or rolled up for a wide variety of reporting purposes, while retaining the ability to drill back down to the detail. Because the connections

[8] https://www.xbrl.org/the-standard/what/global-ledger/

between counter-parties and products can be retained, XBRL GL can also be used to manage eliminations between related accounts.

Nordic-Baltic countries are seen as the forerunners in the field of e-invoicing which has also initiated the creation and agreement on the e-receipt standards. Finland, Estonia and Sweden have developed national standards for digital receipts. This has been done jointly with government institutions, retail associations, ICT associations, financial services providers, POS integrators and accounting and software providers. These standards need to be harmonised with each other. A working data exchange protocol between the countries is a key for cross-border e-receipts.

Without any commonly used infrastructure it is not possible to exchange any standardised e-receipt across borders. For cross-border e-receipt exchange, PEPPOL[9] network is seen as the best case scenario for already existing e-receipt infrastructure. PEPPOL is used for cross-border data exchange in EU and for both B2G and B2B (e.g. e-invoices and e-documents) transactions. PEPPOL is evaluated as a good option for e-receipt data exchange as well, as many countries already have PEPPOL Access Points set up. One currently unsolved issue is that PEPPOL is not operating in real time and is not operating private person data exchange. Showcase partners have discussed that private person data can also be delivered through existing service providers who are already connected to PEPPOL.

Showcase partners have also evaluated that real-time data movement is easily achievable through technical updates in the network. Thus, if PEPPOL would allow and regulate the e-receipt data exchange through their network and would consider needed updates for real-time data movement, it would be the best existing network to use for cross-border e-receipt exchange.

Another option is to use the X-road service developed in Estonia and designed especially for the G2B and G2G cross-border services. X-road is developed by the international organisation called Nordic Institute for Interoperability Solutions[10] (NIIS) and driven by Finland and Estonia cooperation. Its mission is to ensure the development and strategic management of the X-

[9] https://peppol.eu/
[10] https://www.niis.org

Road and other cross-border components for eGovernment infrastructure. NIIS is both a network and cooperation platform, and executioner of IT developments in members' common interests. The institute focuses on practical collaboration, sharing of experience and promoting innovation.

Third option is to propose a new real-time, secure and trustworthy network taking into account the Nordic Smart Government 3[11] initiative, TALTIO[12] scenarios, PEPPOL network, distributed ledger technology and NIIS concepts using XBRL GL standard for the base of transactional data and Artificial Intelligence for building different services on the data. The idea would be in line and integrated with existing initiatives and best practices, but would build up a separate and large scale project developing another separate infrastructure. Showcase partners have discussed that this would definitely be the best infrastructure for all transactional data movement automatically and in real time, but having the PEPPOL network already in place, it is most cost-effective to improve the existing infrastructure for new services.

In conclusion, showcase partners have discussed and agreed that common standards and integrated infrastructure are the key elements for cross-border e-receipt service. They suggest to learn from e-invoicing and use the same standards and infrastructure, if possible. The best case scenario is when e-receipt service will be built upon one common cross-border standard and existing infrastructure, but it is also acceptable to map the national standards for cross-border e-receipt exchange and use new infrastructures for the e-receipt ecosystem.

5.2. Security and immutability

It has become clear that the most feared issues of cross-border (and national) digital data exchange are weak data security, privacy and general vulnerability. There are many ways to guarantee secure and trustworthy data exchange.

There are two possible authenticators that can be used for the e-receipt. One of the authenticators for receipt immutability can be single-way public encryption check character that can be used by any party handling the receipt to ensure the e-receipt contents have not

[11] https://nordicsmartgovernment.org/
[12] https://taltio.net/in-english

been inadvertently or intentionally altered. This is a non-threaded check character that has been calculated from the essential information on the receipt, such as seller information, VAT information, date, and total amount. The smaller the number of items the check character is based on, the easier it is to update the scheme. Another authenticator is meant for the authorities. It will be implemented in a blockchain-type mode, so that the check character on the previous receipt is an input to the next receipt. This check character is threaded and requires access to receipt continuums.

Encryption of the receipt is not needed, it is unnecessary and may even be harmful. Encryption would generate key management problems when receipts are handled by different parties. Outside the systems, the information on the receipt cannot be connected to the payer as is (i.e. the raw receipt data should be anonymous).

5.3. Identification

Identification needs to take into account the eIDAS regulation from EU and the GDPR regulation. There are already some existing solutions that are compliant with eIDAS and accepted by the EC (e.g. SmartID in Estonia). However, Swedish partner's recommendation for consumer's identification process is definitely not to use social ID number. All showcase partners have agreed that for businesses, unique number (e.g. registration or VAT related number) can be created for every company exchanging e-receipts in specific infrastructure or network. Most cost-effective is to use already existing solutions, e.g. PEPPOL addressing logic or the Finnish e-addressing concept.

The Finnish concept sees two crucial parts in the identification process - the eAddress and user ID of the user's e-receipt service company as the central component of the e-receipt. The eAddress is the Electronic Data Interchange (EDI) ID, used also by e-invoice operators. EDI is the computer-to-computer exchange of business documents in a standard electronic format between business partners. eAddress format is based on country code + VAT number + 5 chosen characters. In this way, an e-receipt can also be transmitted via electronic invoicing infrastructure if needed. The eAddress must be entered in the MessageReceiverDetails information of the receipt's MessageTransmissionDetails element along with an operator ID, if available.

- The receipt provider is required to fill in the information in the MessageTransmissionDetails element, at least for the eAddress.
- If the receipt is delivered via electronic invoicing infrastructure, the operator EDI is required; otherwise, the field value can be set to NONE.

User ID format could be in the form of YYYXXXXXX where

- YYY is the receipt service company's own combination of letters, e.g. RHO or KLO;
- XXXXXX is an alphanumeric string whose length can vary between 1 to 10 characters.

PEPPOL addressing logic is based on PEPPOL ID through which companies and governments can automatically identify each other. PEPPOL ID consists of a unique number which can be:

- A Chamber of Commerce number;
- A VAT number;
- The company's bank account number
- The government identification number of the relevant government agency.

Thanks to these unique identification numbers, there are no misunderstandings about the identity of senders and recipients of invoices. Thus, ghost invoices (or other e-documents) and typing errors are no longer possible in the ecosystem.[13]

Showcase partners have discussed that these two options are probably the best case scenarios in the market and one of them will be more likely used for the cross-border e-receipt service. Further evaluation and analysis will be made during real life implementations with the help of prototyping.

[13] https://www.storecove.com/blog/en/what-is-peppol/#alinea3

6. Legal aspects

It is obvious that RTE ecosystems stand out compared to other initiatives - not only for the direct and indirect economic impact - but also because investments needed are small and progress can be fast - if there is the political will.

On the RTE level, even if the mission and the vision are getting clearer, there is still a monumental task to:

1. Get the determined decisions in place both in Member States and EU.
2. Communicate the overall vision, the goals and the progress widely.
3. Create the needed EU-wide ecosystems.
4. Build the interacting services.
5. Replace legislation that slows down progress with change-driving programmes and regulation.

In order to succeed in larger scale and gain from the new environment it is obvious that Member States and the Commission need to:

- make the roadmap clear,
- take determined decisions,
- provide support for ecosystem and infrastructure work,
- act as a model user,
- provide incentives for enterprises and citizens to cross thresholds, and
- move faster to mandatory solutions especially for enterprises.

For the use of e-invoice EC has already put in place the eInvoicing Directive 2014/55/EU which states that it is mandatory for all EU Member States to start using e-invoicing in public procurement after 18 April 2019. Moreover, it states that cross-border e-invoicing must be in the EU Norm semantic model and use either UBL 2.1 or UN/CEFACT standards. Showcase partners and relevant stakeholders are already seeing that the usage of e-invoices have increased dramatically after these decisions. Partners have evaluated that similar acts with e-receipt service will bring the crucial mass of users and bring the service alive over the EU.

Many national laws already have their own description on the receipt in place. Few Member States have declared the electronic version a possibility as well. For example, Finnish law states that, traders must provide the purchaser of goods or services with a receipt of the payment if the payment is made in cash or in a way analogous to it. The receipt may also be provided electronically. By the Estonian law, the original document (invoice or receipt) can be archived electronically and the originals can be destroyed.

Most usually the receipt must contain the following data:
1) the name, contact details and business ID of the trader;
2) receipt issue date;
3) receipt ID number or other individualised data;
4) the number and type of goods sold and the type of services;
5) the payment made for goods or services and the number of value-added tax by tax rate or the grounds for value-added tax by tax rate.

Showcase partners have evaluated that there needs to be a regulation for the content of the receipt data along with the standard. There have also been discussions of having legal framework for both extended e-receipts and simple e-receipts. Extended e-receipt usually contains data that is important for B2B and G2B transactions and will be stored in accounting software. Simple e-receipt (also mobile receipt) is meant for everyday use and private persons. Simple e-receipt will be shown e.g. in a mobile app in seconds after every purchase, extended e-receipt will move automatically to accounting for confirmation.

Additionally, many discussions have taken place over e-receipts and whether they should or should not be mandatory by the national or EU law. All showcase partners have agreed that at least for now it is not reasonable to make e-receipts mandatory for all market players. E-receipts can be made mandatory for example for the retailers, so that a client would have the legal right to demand it. On the other hand, without the mandatory requirement, it might be more difficult to reach the critical amount of participating companies and people. It is crucial to have the public sector boosting and acting as a role model in starting using e-receipts and raising the awareness among companies and citizens.

Another question always raised is who is the owner of the e-receipt data. Showcase partners have discussed that the e-receipt data is a shared ownership between the seller, the buyer and the payment service provider. As far as it is personal data (consumer data), it is the consumer's right to say how it is used. To analyse data and create applications on a wider scale, it is necessary to combine anonymised data from different service providers, e.g. the merchant and the bank. E-receipt should be based on My Data concept which is further described in chapter 6.2.

6.1. Alignment to EU and national policies, strategies and activities

Real-time economy concept was officially supported by **the REFIT Platform** in 2018 Annual Burden Survey[14] about the follow-up by the Commission on the REFIT Platform opinions. The REFIT Platform was set up in May 2015 to advise the Commission on how to make EU regulation more efficient and effective reducing burden without undermining policy objectives. Furthermore, building on this REFIT opinion, the Commission has also started an internal reflection process on how these concepts can drive modernisation of the competitiveness and single market policy making process. A meeting with Member States experts was organised within the framework of the IMAC (Internal Market Advisory Committee) expert group. It provided a useful start to a conversation about more efficient use of available data sources, and potential provided by new data sources and artificial intelligence to better understand single market developments in real time. The internal reflection process will continue, together with the Member States and relevant Commission services.

Cross-border e-receipt service is well aligned with the **Digital Single Market**[15] strategy established in 2015. The e-invoicing is seen as key to maximise the growth potential of the European Digital Economy by enabling public authorities, businesses and citizens to carry out cross-border data exchange. Showcase partners have evaluated even bigger impact to the Digital Single Market from the use of e-receipts since the private persons are more involved and the volumes of the e-receipts are larger.

[14] https://ec.europa.eu/info/sites/info/files/refit-platform-opinions-v26november2018_en.pdf
[15] https://ec.europa.eu/commission/priorities/digital-single-market_en

For the transmission of electronic invoices and receipts, Finnish colleagues have suggested to create a market structure in which a supervisory organisation uses a **framework agreement** to devise and maintain the necessary requirements and procedures for invoice and receipt intermediaries to ensure the operator network's functionality. Any operator fulfilling the conditions and agreeing to comply with the intermediary network operating procedures may join the network. The aim is to create a competitive market for supplying electronic invoices and receipts, allowing both the seller and the buyer to freely switch between providers.

The network complements legal decisions on electronic invoicing by defining the technical practices of forwarding invoices and receipts, including the use of reception confirmation messages, along with the parties' responsibilities when transmitting invoices and receipts.

For example, in Finland any practice by traders intended to restrict or monitor production, markets, technological development, or investments is prohibited according to Article 5 of the Competition Act (948/2011). However, Article 6 of the Act allows a contract between traders or a procedure meant for optimising production or distribution of products or facilitating technological or economic development; leaves consumers a fair share of the resulting benefit; does not set restrictions on the traders concerned that are not essential for achieving the stated goals; and does not give these traders a chance to eliminate competition in terms of a substantial portion of the goods in question.

The framework arrangement will ensure free access to the network and, when desired, the possibility to leave the network. The requirements set by the network are essential to ensure the reliability and safety of its operations. These requirements are based on open, international standards and are freely accessible to all. The exit strategy requirement is justified by considering the importance of the transmitted information and the associated retention obligations. The rules of the network account for every member's equal and reasonable opportunity for influence.

The arrangement facilitates technological and economic development, does not impose restrictions on operators unless these restrictions are essential for securing functionality, safety, and customer trust and position. This arrangement leaves consumers with a fair portion

of the benefits and stops operators inside the network from eliminating competition to a significant degree.

PEPPOL is also seen as one framework arrangement together with network and infrastructure. PEPPOL eDelivery network is one of the most important core service platforms in CEF and the EU that is consistently being communicated as the best network for exchanging e-documents. Since most of the Member States have already established connections with PEPPOL over public or private entities and act as PEPPOL Access Points, it would be most reasonable to use the same framework arrangement for the e-receipt service as well.

If cross-border e-receipt service would be built upon XBRL GL standard, then the service would be aligned with Estonian public sector initiative - **Reporting 3.0**. Reporting 3.0 project is one of the latest innovative projects in Digital Public Services in Estonia where reporting documents are accepted by Estonian Statistics and Tax and Customs Board in XBRL GL format. E-receipts based on the same standard will make the service quicker and more automated for both public services as well as for the companies and citizens.

Furthermore, cross-border e-receipt service strongly supports two other initiatives/regulatory pushes in the EU. First of all, **the Once Only Principle (TOOP)**[16] where citizens and businesses provide diverse data only once in contact with public administrations, while public administration bodies take actions to internally share and reuse these data. Secondly, the **EU Regulation for the Free Flow of (non-personal) Data**[17] where every organisation should be able to store and process data anywhere in the European Union and public authorities will retain access to data, also when it is located in another Member State or when it is stored or processed in the cloud.

Last but not least, the study is highlighting the relation between the e-receipt service and the Estonian **Money Laundering and Terrorist Financing Prevention Act**[18]. Cross-border e-receipt service strongly supports achieving the goals set in the Act by providing a more detailed and comprehensive view on accounting transactions behind the figures in the reports.

[16] http://www.toop.eu/
[17] https://ec.europa.eu/digital-single-market/en/free-flow-non-personal-data
[18] https://www.riigiteataja.ee/en/eli/523122013005/consolide

Accountants play a significant role in detecting suspicious transactions and using standardised e-receipts leaves less opportunities to hide suspicious deals from the accountants.

6.2. Protection of Personal Data

Cross-Border e-receipt service will fully comply with the General Data Protection Regulation (GDPR). Showcase partners developing the cross-border e-receipt service will consider the implications in terms of respecting privacy, inclusiveness and autonomy.

7. Financial aspects and service viability

7.1. Financial aspects

Feasibility Study evaluates the financial aspects and cross-border e-receipt service viability as far as they were discussed during the meetings and based on the information gathered from the online interviews.

Cross-border e-receipt service is mostly seen as a private sector business model and thus, needs to be financed by the business owners and developers. But to prevent the creation of multiple standards and expensive infrastructures in different business cases, it is reasonable to cooperate when developing the business cases. Showcase partners have evaluated that e-receipt service is very innovative and needs significant changes of mind-set, meaning there is no current need realized yet from all market players. Very similar use case was the Estonian ID-card where no one realised the benefit in the beginning. After the ID-card was mandatory by the law and businesses started building their services upon the ID-card, people started using it and Estonians cannot imagine life without the ID-card today. Showcase partners see a similar possibility with e-receipts. People do not realise yet how enormous is the benefit of using e-receipts and what kind of services are possible to be built on it. Therefore, partners have discussed that for the common standard and infrastructure agreements development, it is crucial to involve public-private partnerships and funding from EU initiatives. There is no direct funding for the e-receipt yet, but it is possible to use different IT prototyping or piloting programmes.

DIGINNO-Proto project is currently the best funding possibility for making first steps towards cross-border e-receipt service to become a real-life scenario. The funding would help project partners to map existing standards (e.g. Estonian and Finnish e-receipt standard), communicate actively with infrastructure providers (e.g. PEPPOL) and build up the prototype service across borders. More detailed prototyping process will be developed for the DIGINNO-Proto project application.

Another option is to build up a Steering Committee for the standard and infrastructure development which would be led by the public sector entities and organised with their own budget. This case is possible only if there is a strong political will in different Member States.

The cost of one e-receipt has raised active discussions among showcase partners. Some say it should be free for the end users (e.g. consumers) from the beginning. Others have proposed to learn from e-invoicing case where the service has been charged by the service providers, but step by step it is showing the direction of becoming free for both consumers and companies, at least with small volumes. If one e-receipt would cost one to three cents for the end user until the e-receipt service have reached at least 10% of the market share, the service is expected to start generating income. It is seen as the break-even point for both value created and having a critical mass of users. Before the 10% is achieved, the income is expected to be very limited or none for the service providers. Thus, most of the showcase partners have proposed to charge for the e-receipt service, at least in the beginning, and, if possible, use public investments funding for service development (e.g. DIGINNO-Proto project). According to the Roger's model, the take-up rates are nonlinear: first 10% of take up can take the same time as going from 10% to 50%. Since the e-receipt service is mostly private sector business case (e.g. service providers and operators), it is in their own interest to achieve the break-even point as quickly as possible in order to become financially sustainable in the long run.

Omniva's E-receipt service platform example has shown that end users are not willing to pay for e-receipt service, if it does not bring them any additional new value. Thus, in the four-corner model the service should be provided to the user already with extra value (e.g. loyalty cards, warranties, manuals, statistical analysis data, integration with accounting systems) by one service provider (accounting software provider, m-wallet service providers, etc.) which uses the e-receipt operator to exchange the e-receipt data. The fee per e-receipt by the operator is then already included in the service providers fee together with additional value and the user is willing to pay for the service.

To understand the market share, according to the European Central Bank, there are approximately 50 billion card payments (=receipts) annually. For the EU population of 500 million, this makes 100 payments per person annually, which is rather a conservative estimation. If we combine population in Estonia and Finland, which could be the first prototype

for the cross-border e-receipt service, it is around 7 million people and assumed 700 million receipts annually. If one receipt can generate income of 1 cent for the service providers, then the estimated market size is EUR 7 million annually. For all BSR countries, the combined population is around 150 million and market for exchanging e-receipts even larger.

Additionally, following resources of income and interests to pay for the service are reflected for each market player in Table 3.

Table 3. Different market player's interest on paying for the e-receipt service.

End users/consumers	• End users representing businesses are ready to pay for the service, if receipts are machine readable and processed automatically between different systems. • Private users are willing to pay for the e-receipt service, if it brings new value: e-receipts as transaction proof - guarantee; manuals linked to e-receipts; e-receipts as payment insurance, etc.
Retailer	• Retailers are willing to pay to save on time and money as well as on paper and printing costs in order to increase the quality of service. • Retailers are willing to pay for aggregated data and digital loyalty systems to monitor their customer behaviour.
Government	• Tax Authority is willing to pay for increasing transparency in the areas of shadow economy. • Government is willing to pay for new services that help automate existing reporting and statistic services as well as help predict future activities more precisely, in other words reduce costs and direct the funds for other matters.
Service provider (e-receipt, payment, accounting software, etc.)	• Service provider is willing to pay for the development of the service if there is a real need seen on the market. • Service provider (e.g. payment) is willing to pay for the development of the service to reduce the costs of processing paper receipts and automate existing services.

7.2. Viability

Viability is the key word for every cross-border or national service and e-service. Viability stands for financial capability to build new services, mature technical and organisational developments and the real need from the market players. Based on previous chapters cross-border e-receipt service seems to have all of these crucial aspects available. The need from the market might be the biggest obstacle to overcome, since the users are used to old service models and the change of mind-sets might take longer. Once the need from the market starts to grow and once the critical amount of receipts is digitalised, changes in the field of retail services ecosystem (starting from 10%) are foreseen. For example:

- Retail vouchers could be tied with digital receipts (no need for paper vouchers);
- Retail advertisements could be more intelligent: instead of sending paper-based offers for everybody, this could be personalised, targeted and digitalised;
- New business model for retail statistics. Currently, market-based price statistics is collected manually by tens of thousands of market researchers visiting shops in person.
- New generation of business accounting: when receipts are digital and machine-readable, there will be no need to collect, store and forward paper to the accounting system physically.

In order to involve the critical mass of users and keep the service running and evolving, showcase partners have discussed over some possible options. It is clear that for international and bigger changes to be integrated all stakeholders and all EU countries must coordinate their efforts and activities to follow one unified action plan. Partners have outlined that cross-border e-receipt service is a good and sustainable business model, also valuable for the states, but it needs strong support from the legal framework and public sector in large to be viable. For example, the exchange of e-receipt data should be done over open platform using open APIs (e.g. supported by the states) in order to increase the number of users. It gives smaller companies the possibility to enter the service market without too expensive costs, making it possible to start developing new services based on e-receipt data.

Moreover, showcase partners were asked about the main triggers that might increase the uptake of the e-receipt service. There are three words that can cover all the answers - user-

friendly, valuable and mandatory. In more detail, most of the showcase partners have outlined that the strongest trigger would be the possibility to demand the e-receipts by the private person, state or other businesses from the merchants and retailers (at first), but the partners have also suggested to make the e-receipt mandatory in all accounting. These changes would clearly mean unified standardisation and open platforms/APIs for the service to be as cheap as possible, but still financially sustainable. The user-friendliness and the value came out from the need of new services based on the e-receipt data. The number of e-receipt users will increase significantly if the service for the consumer is valuable (e.g. automated accounting services for private persons) and user-friendly (e.g. mobile apps). The value is also outlined from the public sector side - e-receipt contains valuable data that to some extent can be used automatically by the state also.

For the cross-border e-receipt service to be viable most possible negative and positive outcomes must be foreseen as well as the biggest challenges and obstacles. Showcase partners have evaluated that expected positive outcomes will definitely outweigh the challenges and obstacles that might be encountered. Partners have discussed that the positive outcomes more likely to be achieved are better control of the purchases and data provided with the purchase information which in turn will optimise the consumer's behaviour. Clearly, time and money savings are foreseen for every market player using or providing the service. For example, for the EU Member States e-receipt service is expected to reduce the shadow economy and increase taxation rates. Most optimistic positive outcome is to see the service going live not only in few, but in all EU countries and beyond.

Showcase partners have also pointed out some negative outcomes that might accompany the e-receipt service and that must be considered already in the service analysis process to be preventable. Most highlighted negative outcomes were related to data breaches and misuse of data, e.g. security problems, increased government control over citizens, data sharing issues from merchants. But partners have also pointed out problems with technical implementation, e.g. too expensive or complex. These possible negative outcomes are only few outlined from the partners. More thorough analysis is needed before the development of the service.

For the positive outcomes to be achieved, possible challenges and obstacles must be mapped and evaluated as well. The service definitely needs thorough analysis (e.g. SWOT) from each market player before the development of the service, but within current study partners have outlined the first and biggest challenges and obstacles foreseen for now. The biggest challenge as well as an obstacle for the service to be in use comes from the retailers and merchants who are dealing with the biggest number of private persons (meaning big load of receipts) and whose purchase data is the biggest value for their business. Thus, retailers and merchants might resist to invest into updating their POS systems or to share their data with competitors.

For the whole market the biggest challenge is to change people's mind-set and increase the need for e-receipts and related services. Partners have discussed that if done right, the mind-set can be changed quickly, but it can also take years to be achieved. The key for the mind-set change is to make the service and its benefits and opportunities understandable for the user. The service might come with some costs in the beginning and this might be a deal-breaker for the businesses at first, but once the critical mass is achieved the benefits will quickly outweigh the costs occurred in the beginning.

On the other way around, the challenge might also come from quick uptake by the market. This might create challenges from technical aspects, e.g. increased customer pressure for e-receipt service and services related to e-receipt data. Technical implementation might also create obstacles, for example chosen addressing logic to reach the users might deliver problems in the beginning.

From larger view, it is definitely a challenge to deploy and harmonise the whole European infrastructure at the country and EU level. But starting from the BSR countries and showing the real value of the e-receipt service in real life can show the way for the whole EU.

In conclusion, all showcase partners have agreed that cross-border e-receipt service needs a lot of technical and organisational input and increased political will in all EU countries to become a viable cross-border e-service, but the service itself will be viable as soon as people start to realise the real benefits behind the service.

8. Implementation and Schedule

8.1. Implementation

Under the implementation chapter, the study describes mainly the idea of the e-service prototype whereas the schedule describes the full e-receipt service and list of actions. There is no documented action plan in place for the whole implementation of cross-border nor national e-receipt services. Thus, development of an implementation plan which outlines how the e-receipt infrastructure will be funded, developed and sustained, is needed in both national and EU level. Within the study, the service implementation model is based on showcase partner's discussions and the e-receipt service canvas model (see Annex 2). Thus, further analysis of the service implementation model is needed by different market players before starting to develop the service.

Overall implementation and first prototyping has been the main topic in all meetings for cross-border e-receipt showcase. Two main aspects relevant for exchanging e-receipts across borders are the standardisation and infrastructure. For these purposes, all showcase partners have agreed that the most cost-effective way is to use one unified EU e-receipt standard and possibly already existing infrastructures for cross-border exchange. But for the prototype, it is possible to start exchanging e-receipts across borders using national standards also. For example, Estonia and Finland already have their own national standard for e-receipts developed. If these countries would be included to the prototyping process, then only mapping between these two standards is needed for the information to be understandable for both countries in the same way.

There are many ways to send the e-receipts across borders. Showcase partners have discussed that the best-case scenario is to use already existing infrastructure for document exchange, for example PEPPOL. It is also possible to develop and create new infrastructure for e-receipt service, but this would definitely be costlier than updating already existing systems and will need new and extended development project. For prototyping, it is most reasonable to use already existing systems e.g. e-invoicing operators or other service providers and their existing APIs that can be integrated with each other and with partners in different countries. The prototype will be based on four-corner model where two service

providers (e.g. e-invoicing operators) in different countries (e.g. Estonia and Finland) exchange e-receipts from the seller to the buyer.

If the standard and infrastructure is in place, the so-called last mile activity is to integrate existing (but also new) software and service providers as well as public sector entities with the existing e-receipt ecosystem. Technically it means updating service and software providers or public sector software and systems to be able to exchange or process e-receipts and their data automatically in the unified format and using common infrastructure. Technical implementation should be possible to be financed by the EU funding mechanisms. The same case scenario was provided by Connecting Europe Facility Telecom: eInvoicing Programme for e-invoicing service providers to be compliant with EU e-invoicing standard.

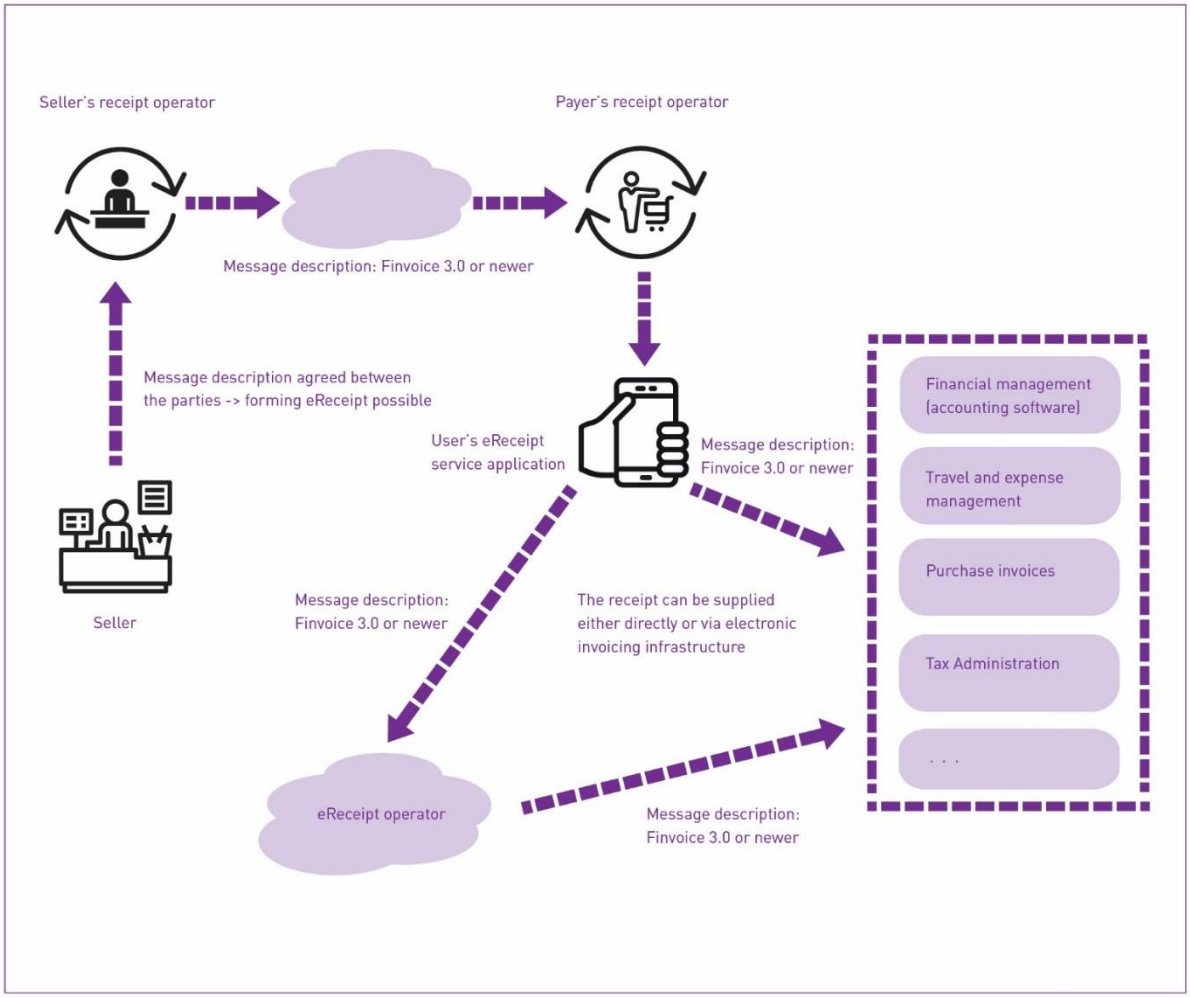
Implementation includes also mature international legal framework behind the cross-border e-receipt service. For these purposes, it is important to involve as much governmental institutions to the discussions as possible via multilateral meetings across borders or national stakeholder forums. But it is also clear that developing legal framework behind e-receipt service in both national and EU level takes time and needs strong political will. For prototyping it is not relevant to update any laws or regulations as long as they will not go against the e-receipt service as such. Thus, showcase partners have agreed to map all needed amendments in legal framework during prototyping, but the completion of these amendments should not be the main focus or specific objective. Within overall implementation and legal framework development it is important to evaluate the need for demanding the digital receipts and whether it should be mandatory for all market players or for some specific target groups (e.g. merchants, retailers). It is also an option to give citizens the right to demand the e-receipt which should be then supported by the law. This might be the biggest trigger or environmental pressure that will in turn increase the competitiveness in the market and increase the number of e-receipt issuers. It would lead the seller to reanalyse their business decisions and update their systems for providing e-receipts.

Showcase partners have suggested that the first will and strong push of developing and using e-receipt service should come from the public sector. For example, one public entity in every EU country should take the lead on supervising the development and the operator community with a clear governance model for four-corner model. Also rulebooks and guidelines must be

established in cooperation with public and private sector. Additionally, public sector has the possibility to work as a "test market" and start demanding e-receipts from the market players. But since the technological part comes from the private sector, it is important that private sector initiatives are supported by the public sector. For example, some big players should be encouraged to start issuing e-receipts, at least nationally. The ways to convey e-receipts across borders must be studied and piloted with the help of public sector initiatives, like seen in DIGINNO-Proto project.

For better overview on the cross-border and national e-receipt service, usual case of sending and receiving e-receipts as well as sending the receipts for further processing is shown on Figure 11. The figure depicts the movements of the e-receipt between different stages and different actors of the ecosystem. Each stage describes the message description that moves between two actors. Thus, the receiving party can identify inbound traffic from the interface. The implementation is easier and generic. Two actors may agree on their own message description, but care must be taken to ensure enough data is transmitted to allow forming a structured e-receipt. For prototyping it would be the best case scenario to show that the seller is able to send e-receipt across the border to the users e-receipt service application in the mobile phone. At first, the processing of the e-receipt by different systems and entities would be left out from the prototyping main scope.

Figure 11. Most usual case of sending, receiving and processing e-receipts.



8.2. Schedule

Showcase partners have suggested different timeframes for the service to come alive across borders. Most optimistic offers have been 1-2 years and most modest offers were 10 years for e-receipts to be mainstream. Showcase partners have agreed that once all EU countries or at least the Baltic Sea Region countries will start prototyping and working in cooperation towards cross-border e-receipt service, there might happen the so-called “snowball effect”. Strong political will together with important market players from private sector would definitely accelerate the implementation and uptake of the cross-border e-receipt service.

Thus, it is not reasonable to offer weak and uncertain schedule for the service to become mainstream in ten years' time. But it is good to list number of so far identified activities provided by the showcase partners and needed to be done in order to achieve the e-receipt service to be used widely.

1. Working groups and strong leads from public sector organisation in every EU or BSR country.
2. Development of the implementation plan together with private and public sector entities in both national and EU level.
3. Development of national and EU level rulebooks and guidelines for e-receipt service.
4. Development of national legal framework in cooperation with other EU countries.
5. Development of EU legal framework.
6. Agreements on unified standards on national and/or EU level.
7. Agreements on common infrastructure for exchanging e-receipts across borders, e.g. PEPPOL.
8. Involvement of strong market players (e.g. merchants, retailers, service providers, banks, etc.)
9. Updating (and providing possible funding for updating) existing technical systems for users (POS systems, accounting software providers, payment service providers, etc.).
10. Piloting and testing of the service both nationally and internationally (could be funded by EU or national initiatives).
11. Scaling up the live cross-border e-receipt service and developing new services.

9. Findings and Recommendations

Nordic-Baltic cooperation together with all BSR countries have the most mature capability to develop the potential of RTE solutions for the wellbeing of European economy and to become the trendsetter region in leading the way in the area. Current feasibility study has evaluated in more detail the cross-border e-receipt service as one basic enabler for the real-time economy based on different stakeholder's opinions and previous e-receipt vision documents. According to the information presented in the study, it is highly recommended to learn from the e-invoicing case and implement cross-border e-receipt service in large scale for better connectivity and interoperability as well as for more cost-effective and environmentally healthier community. The findings of this feasibility study show that e-receipt service will be highly beneficial for both private and public sector as well as for the citizens and has a high probability of success if public and private partnership is actively working in cooperation and internationally. Key findings and recommendations are as follows:

9.1. Technological aspects

Key findings:

- There is no nationally or internationally agreed e-receipt standard.
- Some Member States have created their own national standard(s).
- There is no standardised addressing logic or commonly used identification tools nationally or internationally for exchanging e-receipts.
- There is no commonly used infrastructure for exchanging e-receipts nationally or across borders.
- Due to lack of service providers e-receipts are exchanged using three-corner model.
- E-receipts are exchanged through point-to-point roaming channels.
- Most of the existing service providers do not have the capability to process e-receipts.

It is highly recommended to:

- agree on international e-receipt standard and semantic model;
- map existing e-receipt standards;
- create relevant language translations;

- agree on common addressing logic and identification tools;
- use already existing infrastructure for exchanging e-receipts nationally and internationally (e.g. PEPPOL);
- make sure that service providers compete using four-corner model;
- promote the update of existing service provider's system and software to process e-receipts.
- use e-receipts as communication channel for accompanying communication and documentation, e.g. warranties, manuals, service calls and recalls.

9.2. Legal aspects

Key findings:

- There is no national or EU law regulating the process or content/data of e-receipts.
- Some countries have made it possible to store the receipts digitally.
- The mind-set of many market players is old-fashioned regarding e-receipt service.

It is highly recommended to create:

- policies aimed at promoting the use of e-receipts by public and private agencies;
- policy strategies aimed at awareness creation on the need for e-receipts;
- policy strategies aimed at reducing the cost of producing one receipt for businesses;
- policies aimed at the facilitation of bottom up activities that will enable businesses to see the usefulness of e-receipt and adopt it;
- directives/laws on EU standards governing the presentation for e-receipt applications;
- directives/laws on EU standards on e-delivery infrastructure governing the nature of the data exchange infrastructure which will also cater for e-receipts delivery;
- directives/laws on the need to connect and adopt the e-receipt infrastructure by companies in the EU member state;
- directives/laws on the relevance of notified eIDAS eIDs as a tool for customer identification in the delivery of e-receipts;
- directives/laws stipulating the "rules of the game" on the service parameters for a harmonized cross-border e-receipt service delivery;
- create technology, data protection and movement principles;

- legal trust agencies or gateways;
- documentation on privacy issues;
- guidelines for data processing and reuse;
- national laws on the mandatory usage of e-receipts;
- national laws establishing relevant agencies or mandating existing agencies that will govern the delivery of e-receipts.

9.3. Financial aspects

Key findings:

- There are very few businesses providing the transfer and processing of e-receipts in the BSR countries.
- There is no funding or other kind of support provided for businesses from the national or international level.

It is highly recommended to:

- support businesses with funding opportunities to update their existing systems for e-receipts;
- support new businesses with funding opportunities to increase the e-receipt data usage in different services;
- promote the e-receipt service for businesses to be interested in building their new business model for the service.

Annex 1. Questionnaire

Online interview for eReceipt feasibility study

Please take some time and give your input for the eReceipt showcase and future vision.

First part of the interview is about your contact information (4 questions). Second part of the interview consists of discussion questions (19 questions) taken from the DIGINNO Feasibility study template. Interview might take around 1 hour to fill in, depending on how detailed are your answers.

When answering the questions, please keep describe both your national and overall international situation from your point of view. You can also reflect on the discussions we have had during Skype or live meetings from the last few months.

eReceipt feasibility study draft must be ready by the end of June. Therefore, please provide your answers the latest on 27.06.2019.

We appreciate your detailed answers on the topic.

Thank you for you input!
Sirli and co

* Mandatory

INTRO

Your name *
Your organisation *
Your email *
Which country are you representing? *

eReceipt Showcase model

eReceipt is a machine readable standardised automatically exchanged document confirming the purchase and payment of goods or services.

1. Please describe, how do you imagine the process of exchanging eReceipts both nationally and internationally? *
2. Who are the partners/stakeholders/users/beneficiaries of the eReceipt service? *
3. What are the roles and/or responsibilities of partners? Stakeholders? *
4. Which organisations need to be involved? *
5. What technology is needed for the eReceipt service (e.g. data exchange layers, e-addressing, identification, networks, standards)? *
6. If and what kind of changes are needed in the current state of play (e.g. policies, law, data movement, technology)? *
7. Who owns the eReceipt data? Would it be possible to combine different service provider's data? *
8. What are the benefits from the eReceipt service (e.g. saves time, money)? *
9. What value is provided to the customer/user? *
10. What pains are relieved? What "joys" are supported (e.g. new services/business models)? *
11. Who is funding the eReceipt service and how (e.g. EC funding programmes, service providers, stakeholders, member states)? *
12. What is needed to be done to keep the eReceipt service running and evolving? *
13. What are the major steps or milestones needed to be done to start using eReceipts nationally and across borders? *
14. What might be the main triggers to increase the uptake of eReceipt service? *
15. What might be the timeframe for the wide use of eReceipts? *
16. What might be the challenges and obstacles of the eReceipt service? *
17. If and what might be the risks with eReceipt service? *
18. If and what might be the positive and negative outcomes? *
19. Based on previous questions and answers, do you see the viability of the eReceipt service? Would You use the service? *
20. Please add any other additional information, if not covered above but relevant for eReceipt showcase development.

Annex 2. eReceipt service Canvas model

RTE/eReceipt Service Model Canvas

Name of Service

eReceipt Showcase:
Providing digital receipt to businesses in order to exchange
financial data and transactions automatically with public sector (and private sector), also cross-border.

Vision

eReceipt is one crucial part of Real-Time Economy, digital ecosystem that helps to simplify business processes (like eReceipt) in order to help companies to focus on their main activities and save resources on various maintenance and support activities. In the center of such ecosystem is the data movement in real time between various information systems, organizations, sectors and even countries in a:
- digital
- structured
- and standardized format.
The idea behind RTE solutions like eReceipt is to fully automate data exchange processes and transferring it to a machine-to-machine communication without human interrupting the process.

Owners and Builders

- e-invoicing/eReceipt operators
- banks
- ERPs
- cash register sw builders
- other service providers
- **public sector entities**

Partners & Enablers

- EU Member States
- Business associations
- eReceipt & eInvoice operators
- Private sector as end user
- Retailers as main e-receipt issuers

Key Activities

- State as the role model
- Needed law amendments
- Creating Rule books and governance models
- Forming operator trust networks – technical and regulational agreement document
- Creating cross-border working model and agreeing on standards and/or mappings
- Software system updates
- Economic pressure
- Retailers involvement and communication

Resources and Prerequisites

- Needs to be on the policy agenda of the governments
- Requires close PPP, human resources and financial resources
- We need to find incentives for all actors in the system
- Software system updates
- New business models
- Strong political will
- Big market players involvement

Value Proposition

Private sector
- Efficacy of work
- Possibility to have real-time understanding of the financial situation of an individual or company
- High quality errorless data
- Easiness to find e.g. warranty receipts
- Data for various applications serving citizens and companies
- Saving the environment
- Data for statistics and macroeconomical use
- Possibilities for new business
- Avoiding fraud and grey economy

Consumer
- Saving the environment (paperless future)
- monitor your costs
- monitor your life decisions (food, exercise, etc)

User journeys

- Individual: customer is offered the service by the seller
- Companies: Accounting firms and sellers recommend the service
- Public sector demands/ regulates the companies to use eReceipts

For example:
- Mobile apps
- Security code system using mobile phone
- Bank card
- ID card
- Loyalty card

Users & Customers

Consumers and private sector companies as users

Private sector companies (e.g retailers) as customers

Ways of Service

- 4-corner model
- Encrypted infomration exchange
- Limited view on personalised data
- Security and privacy is backed-up
- eReceipt companies offer services to customers based on their purchase data

Beneficiaries

- Every market player – public and private sector, consumers.

Elevator Pitch

eReceipt is a document of a paid purchase in digital, structured and standardized format. When mainstreamed along with eInvoices, it enables both the seller and the buyer to simply and efficiently have real-time data on all their transactions and their overall economic situation. Digital purchase data can further be used to digitalise other processes concerning financial data, e.g. company financial statements and VAT collection. The data also allows for new serves to be developed.

Costs

- Software and system update
- Cost of the cash register systems
- Adaptation and mapping to standards by eReceipt and eInvoice operators
- Mostly one-time investments, requiring only updating from time-to-time
- Providing eReceipts for consumers is free
- Using additional services based on eReceipt data will be charged

Benefits

- After initial costs for building, there is money and time saved by all actors
- Tax Auhtorities have third party control which decreases tax fraud
- Statistical information is up to date and helps better prognose the near future
- Better possibilities to have real-time data on the economy as a whole, and make prognoses
- New services based on consumers data (e.g guarantees, home accounting, calories reading, etc)

Literature

1. Harald, B., Roadmap for Real-Time Economy and My Data for Europe, 2018.
2. RTECO project. eReceipt Guidelines v.2.0, 2019.
3. Estonian Ministry of Economic Affairs and Communications. RTE vision document, 2019
4. Proposal for H2020: Digital Receipts, 2016. (not available for public use)

Web links:

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3. https://getreceipthero.com/
4. https://findity.com/
5. https://digitalreceipts.se/swedish-digital-receipt-standard/
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