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INTERNATIONAL BUSINESS ENTERPRISES

THE BACKGROUND OF EUROPEAN & DOMESTIC

ELECTRONIC PAYMENT SYSTEMS

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## **I. Introduction**

The essence of the payment systems is to manage our payments in traditional or in electronic way as well. I chose the investigation of the electronic payment systems, and I try to reveal their interdependencies and connections in the background. It seems that regional integration requires the standardisation of the process of our transactions. Today, the possibility is given for Europe to step forward on this field that is why I put the focus on the European region.

After my initial research about the subject of European and Hungarian electronic payment systems, I could see the on-going tendency well. Due to the fact that globalised world and integrated regions had to develop unified electronic payment systems, in order to serve their financial activities, the integration process seems to be permanent but there are many obstacles. As a result I formed my main question whether it is possible to integrate the European payment systems or not.

The thesis includes crucial components of payment infrastructures and special features of electronic payment systems. First of all, a terminology is included for the reader to provide information about the main terms of the topic. Afterwards, payment system related risks are mentioned in order to describe the threats which originate from the bank risks. The arrangements, actors and products of participants of the electronic payment infrastructure are explained in the aspect of their importance, role and services. As I am a Hungarian student I have included an outlook about the Hungarian payment infrastructure as well. These sections are fundamental issues for my research and conclusion. The thesis contains tables and charts in order to help the reader to understand and visualise in-depth knowledge about the main and sub-topics.

The thesis gathers sources from the main participants of the European payment infrastructure. Information about these systems is quite rare and I hope that my thesis may become a source of overlook.

## Terminology

First of all, I would like to provide a glossary of terms what are used in my thesis. They are definitions, abbreviations, and acronyms of essential components of guiding the reader into the topic of the European and domestic electronic payment systems.

ACH	“An electronic clearing system in which payment orders are exchanged among financial institutions, primarily via magnetic media or telecommunications networks, and handled by a data processing centre.” BIS (2003) <sup>1</sup>
bank risk	Major type of merging risk regarding the operation of banks and financial institutions.
BIC	Stands for: Business Identifier Code
clearing	“The process of transmitting, reconciling and, in some cases, confirming payment orders or security transfer instructions prior to settlement, possibly including the netting of instructions and the establishment of final positions for settlement.” BIS (2003) <sup>2</sup>
credit (verb)	To provide or to enable the access of funds for a partner.
crypto currency	It is a money-like instrument coded digitally by cryptography to secure the transactions and to control the issuance of it.
CSM	Stands for: Clearing and Settlement Mechanism
cut-off time	The limit of time till the payment system accepts messages on that banking day. It does not mean that the system will not operate afterwards on the same day.
debit	To deduct, withdrawn funds from the account of the client or partner.
EACHA	Stands for: European Automated Clearing House Association
EBA	Stands for: Euro Banking Association
electronic	The forwarding, processing and realisation of the message are executed in a standardised and automated way to ensure rapid and secure communication via phone wires or internet connection.

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1 BIS (2003) A glossary of terms used in payments and settlement systems

2 BIS (2003) A glossary of terms used in payments and settlement systems

EMV	Stands for the acronym of Europay, MasterCard, and Visa. It refers to the integrated circuit card.
EPC	Stands for: European Payment Council
Eurosystem	The expert monetary body of the Eurozone. The members are the representatives of the national banks who adopted the euro bilaterally.
Eurozone	Countries where the Euro is the official currency.
GIRO Zrt.	The automated clearing house of Hungary for retail payments.
IBAN	Stands for: International Bank Account Number
interbank	Transactions involving two different banks.
ISO	“International Organization for Standardization: an international body whose members are national standards bodies and which approves, develops and publishes international standards” BIS (2003) <sup>3</sup>
KELER	“KELER provides quasi wholesale services and infrastructure to the players and intermediaries of the Hungarian capital market.” KELER Homepage <sup>4</sup>
liquidity	It is the financial ability to purchase an asset or transfer funds covering obligations.
MIC	Stands for: Market Identifier Code
netting	“An agreed offsetting of positions or obligations by trading partners or participants. The netting reduces a large number of individual positions or obligations to a smaller number of obligations or positions. Netting may take several forms which have varying degrees of legal enforceability in the event of default of one of the parties. See also bilateral netting, multilateral netting, position netting, and substitution.” BIS (2003) <sup>5</sup>
Pan-European	Cross-border activities in Europe.
payment	“The payer’s transfer of a monetary claim on a party acceptable to the payee. Typically, claims take the form of banknotes or deposit balances held at a financial institution or at a central bank.” BIS (2003) <sup>6</sup>

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3 BIS (2003) A glossary of terms used in payments and settlement systems

4 KELER Homepage

5 BIS (2003) A glossary of terms used in payments and settlement systems

6 BIS (2003) A glossary of terms used in payments and settlement systems

payment system	“A payment system consists of a set of instruments, banking procedures and, typically, interbank funds transfer systems that ensure the circulation of money.” BIS (2003) <sup>7</sup>
payment system risk	Originates from bank risk. However it is defined regarding the operation and the different sources of threats
PKI	Stands for: Public Key Infrastructure
POS	“This term refers to the use of payment cards at a retail location (point of sale). The payment information is captured either by paper vouchers or by electronic terminals, which in some cases are designed also to transmit the information. Where this is so, the arrangement may be referred to as “electronic funds transfer at the point of sale.” BIS (2003) <sup>8</sup>
processing	The management of data within the system. Decoding and encryption is the fundament of the processing in case of payment systems, clearing and settlement.
retail payments	“This term describes all payments which are not included in the definition of large-value payments. Retail payments are mainly consumer payments of relatively low value and urgency. “ BIS (2003) <sup>9</sup>
RTGS	“The continuous (real-time) settlement of funds or securities transfers individually on an order by order basis (without netting).” BIS (2003) <sup>10</sup>
SCT	Stands for: SEPA Credit Transfer
SDD	Stands for: SEPA Direct Debit
SEPA	“Single EURO Payments Area: It is the next major step towards European financial integration. Within SEPA all participants of the payment process located anywhere in the euro area will be able to make non-cash euro payments using a single bank account and a single set of payment instrument. There will no longer be any differentiation between national and cross border payments within the euro area. The citizens and economic actors will be able to make payments inexpensively as in their own country.” SEPA Hungary <sup>11</sup>
SEPA zone	“Includes those countries who adopted the SEPA concept.

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7 BIS (2003) A glossary of terms used in payments and settlement systems

8 BIS (2003) A glossary of terms used in payments and settlement systems

9 BIS (2003) A glossary of terms used in payments and settlement systems

10 BIS (2003) A glossary of terms used in payments and settlement systems

11 SEPA Hungary

34 members (28 EU member states + Iceland, Liechtenstein, Norway, Switzerland + San Marino, Monaco)” EPC (2014)<sup>12</sup>

settlement	“An act that discharges obligations in respect of funds or securities transfers between two or more parties. See also final settlement, gross settlement system, net settlement, net settlement system.” <sup>13</sup>
SWIFT	“Society for Worldwide Interbank Financial Telecommunication: a cooperative organisation created and owned by banks that operates a network which facilitates the exchange of payment and other financial messages between financial institutions (including broker-dealers and securities companies) throughout the world. A SWIFT payment message is an instruction to transfer funds; the exchange of funds (settlement) subsequently takes place over a payment system or through correspondent banking relationships.” <sup>BIS (2003)<sup>14</sup></sup>
SWIFT code	Contains one additional character than the BIC. It identifies the channel of the transaction for the operator.
TARGET	“Trans-European Automated Real-time Gross settlement Express Transfer: the TARGET system is defined as a payment system composed of one RTGS system in each of the countries which participate in stage three of EMU and the European Central Bank (ECB) payment mechanism. RTGS systems of non-participating countries may also be connected, provided that they are able to process the euro alongside their national currency. The domestic RTGS systems and the ECB payment mechanism are interconnected according to common procedures (“interlinking”) to allow cross-border transfers throughout the European Union to move from one system to another system.” <sup>BIS (2003)<sup>15</sup></sup>
transfer	“Operationally, the sending (or movement) of funds or securities or of a right relating to funds or securities from one party to another party by (i) conveyance of physical instruments/money; (ii) accounting entries on the books of a financial intermediary; or (iii) accounting entries processed through a funds and/or securities transfer system. The act of transfer affects the legal rights of the transferor, transferee and possibly third parties in relation to the money balance, security or other financial instrument being transferred.” <sup>BIS (2003)<sup>16</sup></sup>
VIBER	It is the Hungarian RTGS system for high value payments run by the Hungarian Central Bank.

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12 EPC (2014)

13 BIS (2003) A glossary of terms used in payments and settlement systems

14 BIS (2003) A glossary of terms used in payments and settlement systems

15 BIS (2003) A glossary of terms used in payments and settlement systems

16 BIS (2003) A glossary of terms used in payments and settlement systems



## **II. Description of Payment System Risks**

In case of payment systems the risks are in connection with their method of operation and structure but the participants of the transmission procedure of payments have a significant role too. The type of emerging risks is in correlation with the type of the payment systems as we distinguish customer payment systems in which banks offer professional services for satisfying the transfers of the clients. On the other hand, interbank payment systems handle transmissions between the banks and make the calculation of the final positions.

Faulty instalment of a system can generate risks. When setting up a new payment system it is crucial to have time enough for the testing period, otherwise the system or its participants will operate in a faulty manner or they will not operate at all. Besides the selection of the operators is essential, in order to eliminate organizational risk. Another important feature of the interbank payment systems is the possible hazard of spreading systemic risk from country to country or even in global scale.

Nowadays' payment systems are designed to satisfy rapid and continuous settlements. In their operation there is a risk of transmission when a payment is irrevocably transferred to the proper payee. The worse situation occurs when the fund is sent to an unentitled payee. It may happen due to a minor problem during the decoding stage of the information linked to the payment. These systems operate continuously and have to deal with coding and decoding large amount of information.

In this section of my thesis I would like to describe the risks of the payment systems by examples and case studies to provide a broad overlook of the real threats, which can affect a payment system. I would like to make it tangible that building up a well functioning system we have to point out and investigate the possible emerging risks. That is the reason why I was keen on designing the types of sub-risks and possible sources of threats, along with the manner the operators can effectively eliminate them and this way ensure the creditability of the payment system. There are some risks for which, preparation is really difficult and keeping the system in working means a great challenge but high qualification and secure technology will always be welcomed features.

## **1. Settlement Risk- Herstatt Risk MNB (2001) <sup>17</sup>**

### **Bankhaus Herstatt**

The classical example of settlement risk is the case of the small German bank of Herstatt. That is why the settlement risk is often called as Herstatt risk in finance. The end for the Herstatt came on July 26, 1974, when The German Supervisory Board of Banks (Deutsche Bundesaufsichtsamt für das Kreditwesen) initiated a liquidation proceeding towards the German bank, at that banking day, but after the close down of the German interbank payment system. Although Herstatt was a small financial institution, it was a virulent participant of the foreign exchange market. On that day, several banks had sent irrevocable payments in Deutsche Mark, transferred in New York, by the correspondent bank of Herstatt, in exchange for US Dollar, before the closing of Herstatt the message went through the German payment system. The Supervisory board ordered the liquidation at 10:30 AM in the Central European Summer Time zone, while in New York it was 3:30 AM in the Eastern Daylight Time zone. The partners were waiting for the fulfilment of Herstatt's obligations, from its spot and forward deals, but the payment for the counterparties did not arrive. The correspondent bank stopped the payments from the Nostro account of Herstatt. This action caused liquidity risk and credit risk for the originators and partners. Those partners with whom Herstatt made a forward deal before the closing had to make substitution deals with other institutions which caused losses for the former partners of Herstatt.

The Herstatt's example shows that the settlement risk is a fear of interbank payment systems. A problem may occur when the initiated irrevocable payments and the obligations, which went through the system, are not in balance. As the payment is forwarded into the system, it will be coded as a message of exchange money. With one forwarded payment an equivalent obligation will be created.

There are many other cases which have importance in the development of payment systems. In my opinion the case of Herstatt was one of the most notable ones, as it clarified that the need for more rapid, reliable, and integrated payment systems. Herstatt's consequence was the invention of the Real Time Gross Settlement (RTGS) systems.

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17 MNB (2001) A devizaügyletek kiegyenlítési kockázatának kezelése Magyarországon

## 2. Credit Risk ECB (2010) <sup>18</sup>

Credit risk arises when a payer does not meet with its obligation, when the bank transferred a payment to the payee before receiving the full value, either when due or afterwards. BIS (2012) <sup>19</sup> Of course it has many default examples from the banking, financial, and capital sector. However, the focus goes on the probability of credit risk in payment systems. For instance, it often occurs in an interbank transaction that payment data is exchanged bilaterally before the settlement had been executed. For instance credit risk can emerge in case of asynchronous settlement of currency or securities transaction. In case of the securities a cash leg and a security leg is distinguished, while foreign exchange businesses involve two different kinds of currencies which makes up the legs of the transaction. These legs can be settled at different countries, via different systems, and maybe at different time. Due to this separation of the background of such transactions, it may occur that the realisation of the business will not be processed totally and imbalances will result in loss and damages.

Furthermore, the credit risk involves the sub-risks of counterparty risk and replacement cost risk. Firstly, the counterparty risk is the unfavourable situation when a part or all the value of the payment becomes lost. It rarely occurs in nowadays' electronic payment systems. Besides the counterparty risk, the phenomenon of replacement risk occurs when the transaction has to be initiated again, due to the failure of original one. The reset of the transactions may have additional consequences because of the delay. However, the RTGS systems mitigates these sources of credit risk as they use the funds of the central bank with immediate finality, and they count the payment order separately. Either the requirements of being a member of an electronic payment system are set up to filter those institutions that are not capable of the proper risk management.

Moreover, the credit risk in electronic payment systems can be reduced by the instalment of more intraday cycles. In addition, automated controlling decreases the probability of default clearing and settlement. From the side of the direct and indirect participants monitor should be implemented to record any defective case. The participants must agree on the source of the imperfection. They can apply the loss-sharing principle to divide to costs of the reset or damage.

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<sup>18</sup> ECB (2010): The Payment System 2010 p. 115-116

<sup>19</sup> BIS (2012) : Principles for Financial Market Infrastructures p. 36

### 3. Liquidity Risk-Drexel Burnham Lambert MNB (2001)<sup>20</sup>

In 1990 the Drexel Burnham Lambert Corporation collapsed because of severe liquidity problems. Even the Bank of England had to intervene in order to mitigate the loss of the clients of the Drexel Burnham Lambert Trading. This subsidiary of the DBL group was operating at the exchange and gold markets. As the participants at the market started to experience the difficulties of the DBL group, the partners of DBLT wanted to release their deposits in order to prevent bearing risks. In response the DBLT was not willing to pay so they suspended the fulfilment of their obligations after exchange market transactions. So the Bank of England had to give a hand to both sides. They offered a week for eased settlements, in order to establish the balance of payments. The partners of DBLT could pay their obligations for the correspondent bank of the Bank of England. When the Bank of England informed the DBLT that their money had been transferred, the DBLT sent the payment irrevocably towards its partners. So the DBLT made it possible for their clients to access their deposits.

Liquidity risk emerges when a participant's liquid assets are insufficient to cover its payment obligations. So the participant loses access to credit and who will be unable to satisfy its partners. Let's suppose that the troubled participant is a subsidiary of a financial institution, specialized for a given field of the financial market. In such a case the parent company can help, by capital aid. On the other hand if the institution is significant enough, meaning it is a major participant of the market and the economy, then central bank or even governmental aid is regular. We can see the example in the case of DBLT, where the Bank of England had to take part as a financial mediator. In the worst situation, the participant will need to face liquidation proceeding.

In connection with liquidity risk, we distinguish two types of sub-risks. In case the liquidity fluctuates, it may happen that some payments cannot be initiated, so the operators must postpone them. This is called variation risk. The other situation is, when the institution is committed towards a parent, or a hierarchically higher institution, which possess a portion of the troubled institution's liquidity. If these commitments significantly reduce the participant's liquid assets, it may happen that the irrevocably initiated payments will not be forwarded.

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20 MNB (2001) A devizaügyletek kiegyenlítési kockázatának kezelése Magyarországon

#### 4. Systemic Risk BIS (2012) <sup>21</sup>

Systemic risk occurs when the domestic or regional payments system, for which the population has an everyday need, has tie-up or even it stops functioning. As a result the national or regional economy and even their financial systems are going to be in a hazardous situation and their daily operations will not be able to flow through the payment system. It is very likely that depression will be seen at these markets.

The following cases which result in the failure of the system must be define. If there is a breakdown in a crucial part of the system, for example the information systems starts to operate in a faulty manner, it results in a whole system breakdown. So there is a technological risk. However these systems are maintained daily and operate trustworthily. There is a low chance of a wide-spread technological risk, but there is a need for daily maintenance and continuous control.

The second type of the systemic risk is linked to that major participant, which operates the payment system. It can be a financial closed corporation or a bank. If the domestic or regional operator collapses, any financial activity which requires payment transfer will not be able to be transmitted as the clearing system will not work either. In my opinion this type of systemic risk can be called as institutional risk.

The third source of systemic risk comes from the market or economy. Let's suppose that there is a severe shock in the market. Such an event could have an impact on the payment and clearing system, when it takes place in a rapid way and includes major participants with high number transactions. In that case, there will be an enormous amount of payments and money for which settlement will not be done and obligations will be created. The collapse of the major participant can be called as market based risk.

Sources of Systemic Risk

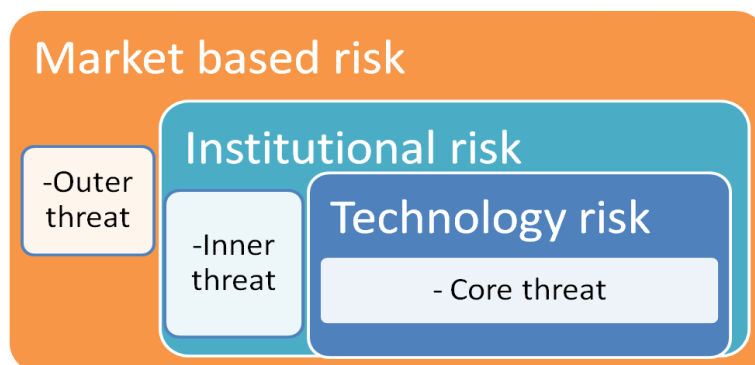


Figure 1: By the Author

21 BIS (2012)-Principles for Financial Market Infrastructures p. 18

## 5. Operational Risk

Barings Bank Crisis: Prmia Professional (2009)<sup>22</sup>

In 1995, the eldest English bank the Baring Brothers & Co. Ltd collapsed. As regards to aspects of risk factors, this example holds several types. This may suggest that there was not a single phenomenon, which led to the final accounting of Barings. The way the bankruptcy was handled led to a loop in the payment system.

First of all, there was a trader, called Nick Leeson, who was responsible for the back-office activities in the Singapore subsidiary of Barings. Leeson was accused of malpractice, because of speculating at Asiatic stock markets, especially on Nikkei 225. He tried to cover the losses of the Singapore office buy arbitraging. In 1994 Leeson had £208 million accumulative losses. The Singapore Futures Exchange notified the Barings about the imbalances in the accounting. The Singapore office, led by Leeson, was not able to meet its obligations, and final accounting was order in 1995.

The collapse of the Barings Bank reached Europe via the European Currency Unit (ECU) clearing system in 1995. One bank forwarded payment through the ECU clearing system towards the correspondent bank of Brings, on 24 February (Friday). On February 26, the final accounting was ordered against Barings, so the bank tried to withdraw the payment, but the regulations of the ECU did not allow this action. Even the accepting bank was not able to transfer back the payment. The originator bank became a net debtor at the end of the day in the clearing system and could only eliminate the imbalance by taking loan from a net creditor bank. So it became possible to balance the ECU clearing system by the end of the day, as well as its 45 participants.

The crisis of Barings shows us that the actions of the participants are interconnected in clearing and payment systems. This case proves operational risk in two aspects. The first is the incompetency of the staff the managerial risk, besides the lack of control from the London office. On the other hand, there was the originator bank which was unaware of the consequences of an unlikely event, and they did not even have the knowledge about the regulations and rules of the ECU clearing system. It is crucial to be update and not to create

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22 Prmia Professional (2009): Baring Brothers & Co. Ltd

risk towards an institute, which is in a default situation, and the participants must know the rules of the clearing and payment system in which they are operating. BIS (2012)<sup>23</sup>

## **6. Legal Risk BIS (2012)<sup>24</sup>**

Initially the Basel II accords defined legal risk as a criterion for the supervision of banks, in 2004. It is one of those bank risks which can be connected to payment systems with difficulty. In my opinion, this type of risk is interconnected with the legislative source of the environment risk.

However, the major difference that I can point to is the nature of the legislative variation. In case of legal risk there must be a significant change which affects the operation of the payment system directly and makes impossible to function. In this respect, legal risk has two sources. In case of a fluctuating legislative environment a collapse of a major participating bank can make the system blocked. The probability of this event is higher than in the second case.

Let's consider a case in which the legal shift is addressed to the payment system's operator supposing that the supervisors or the governmental legislative body would like to intervene and reform the operation of the payment system. In this case the proposal must be a well-prepared order. This event has a medium probability as it is a very unlikely situation that the supervisors or the legislative body would like to make its domestic or regional payment system collapsed. However this source exists since during the negotiation period there is a factor of uncertainty but due to the essential cooperation process between the attorneys of the payment system's operator and the representatives of the government or the supervisors the fluent operation of the system will be ensured.

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23 BIS (2012): Principles for Financial Market Infrastructures p.20

24 BIS (2012): Principles for Financial Market Infrastructures p.18

## **7. Custody and Investment Risk BIS (2012) <sup>25</sup>**

According to the Bank of International Settlements (BIS) the bank risk of custody and investment can also emerge at the operator of the payment and clearing system. The sources of these risks are the assets what they are responsible for whether they own the particular asset or they have disposal upon other participants' given asset. Custody risk includes the possibility of a default event due to improper administration, managerial failure, or fraud upon the assets for what the payment system's operator is responsible. Let's suppose that there is an item in the accounting of a bank which went wrong and it was already sent to the operator. Then the operator has to modify the item in a way to ensure the balance of the clearing system before sending the wrong information to a supervising (central) bank. In this case the bank bears the risk of custody as it has no direct control over its message or file.

In case of the operator of the payment or clearing system wants to invest its own or its participants' resources, it creates investment risk. The nature of an investment defines the probability of the insecurity in the business.

Both custody and investment risk have relevance in safety and reliability of a clearing or payment systems. If there is a threat of these types of risk the operator may install a risk-management system in order to eliminate further accumulated risk like credit risk, liquidity risk, and decline in reputation.

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<sup>25</sup> BIS (2012): Principles for Financial Market Infrastructures p. 18



## 8. **Environmental Risk** Bank of Finland (2003)<sup>26</sup>

Defining environmental risk it should be pointed out that it is a loss due to an external source coming from the surroundings. The question is how external factors affect the payment and clearing systems. Generally operators do not deal with these factors as often as daily financial related risks, technology risk, and settlement risk, but they can eliminate them by being update and prepared.

First of all, the payment and clearing system can be affected indirectly by changes in the legislative system. The frequency of these changes requires a factor of tolerance from the managerial culture of the system's major operator.

Furthermore, the operators must be in knowledge of the brand new technological developments. Due to the on-going rapid technological change, the system operators must shutdown outdated services, which are not competitive anymore. They also have to face up with, higher risk of hacking. They can easily be in the target of the IT criminals. Nowadays' IT criminals obtain more sophisticated tools than ever. They have access for higher performance hardware and software. In order to prevent unethical IT attacks, user rights, passwords, encryption, control and supervision must be installed and integrated into the institution's daily operation and the operator must upgrade the system frequently.

The final source of the environmental risk is an unforeseen catastrophe. This risk is one of the most hidden threats of an electronic clearing and payment system, because it is linked to natural forces or political changes, such as a civil war or riot. The deep technology of a clearing and payment system creates high vulnerability to natural catastrophes. However every country has its own specific natural threats which they are afraid of, therefore they are prepared to prevent them. The major operator can hire its staff among prepared domestic people; as a result they will integrate their preparation into the institution's culture.

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<sup>26</sup> Bank of Finland (2003) Regulation and control of payment system risks –a Finnish perspective

## 9. Cryptocurrency Risk thefinanser.co.uk (2014)<sup>27</sup>

During the investigation of the bank and payment system related risks, I have found an modern type of risk which leads the whole system of electronic payment infrastructure into uncertainty. Generally the banks are searching for a trusted third party in order to manage their interbank payments but a threat emerged in the recent years with the appearance of the cryptocurrencies.

First of all the definition of the cryptocurrencies is needed for the description of this risk. A cryptocurrency is a money-like instrument coded digitally by cryptography to secure the transactions and to control the issuance. The most significant cryptocurrency which entered into circulation was the Bitcoin in 2009; however we have a variety of choice among them now. The aim of the cryptocurrencies is to get rid of the trusted third parties to two ones in financial transactions so they established a peer to peer (P2P) scheme for money transfer. Let's take the case of the Bitcoin as it is the most important one. The key of the background operation of the Bitcoin is a not state-backed currency. Moreover its advantage that it can be digitally stored and sent worldwide so the Bitcoin is a substitute of traditional banking services and circumvents the actors of the payment infrastructure. There is potential in Bitcoin what is reflected by Jon Matonis, the Executive Director at Bitcoin Foundation, said: "banks are wondering whether to work with Bitcoin but, more importantly, Bitcoin companies are asking: 'should we let the banks work with us?'" In the view of Jon Matonis, payment infrastructure is facing the wind of change.

In my opinion, cryptocurrencies would have a dangerous affect on the banks and payment infrastructures. In case cryptocurrencies achieve enough market share, the banks and the actors of the payment infrastructures will become less powerful institutions. Furthermore banks will lose significant number of their clientele as ordinary transfers and the storage of money can be done on a personal device. However, the Bitcoin has many rivals and as such the diversity of the cryptocurrencies can flatten their way of success. In addition the security alerts of using cryptocurrencies are still high and the initial exchange rate from the domestic currency should be done even at domestic payments so I do not see the point in how different cryptocurrencies can be exchanged or transferred at peer to peer concept. The conclusion is that the banks and the payment infrastructure are threatened to lose their importance by

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<sup>27</sup>thefinanser.co.uk (2014): The importance of cryptocurrencies and the blockchain to banks

cryptocurrencies but the rivalry between the different digital currencies can be an obstacle of their success. The story can be continued when only one universal cryptocurrency is in circulation and can satisfy our ordinary payments for example at the restaurant or shops. A major step would be if the B2B transactions could be done by this universal cryptocurrency.

### **III. Institutions & Arrangements of Payment Systems**

#### **1. Introduction**

First of all, electronic payment systems have three pillars of ammunition. The first pillar includes those arrangements that are the usages in which the actors agreed upon the terms. This arrangement contains a specialised way of operation and enables prediction for the actors and the participants. They will be able to predict each other's behaviour during the transaction process and the operation of the system as well. Arrangements define the way and method how the payment system works. In my thesis I include the description of the SWIFT, RTGS, SEPA, STEP 1, and STEP 2 arrangements.

The second pillar is made up of the actors of the payment system. They are those financial institutions, banks and payment service providers who are managing the operation of the payment and clearing system. They are the credit card companies and the automatic clearing houses. The operation of the credit card companies is crucial in electronic payment systems as their bank and credit card owner initiate a vast amount of payment through the arrangement of the payment system. Credit card transactions must be visible by the operators of the clearing system. Their sum will be added up at each bank and finalised in net or gross method at the clearing system operator. That is how they are integrated actors of world-wide, regional and domestic economies.

The third pillar consists of the product of these arrangements and actors. They are in essential relation with the payment and clearing system and defined by their operator. Generally they are specialised for a given field of financial service. For example the SDD, (SEPA Direct Debit) is the service of the SEPA Clearing via the SEPA arrangement. In this section my focus will be on SDD, SCT (SEPA Credit Transfer), and the PSD (Payment Service Directive) and their cost and charges. In my opinion the PSD is the best example of the will of integration and the development of the infrastructure of financial systems like clearing and payment services. Their cost and charges are important factors as they are the source of revenue of the operators. It is interesting to investigate how the operators seek revenue, in order to satisfy their investors.

## **2. The Infocommunication Network: SWIFT**

### Features of an info-communication network

The SWIFT was founded in 1973 by investing financial institutions. Initially 239 bank from 15 countries took part in the instalment of the network. The SWIFT abbreviation stands for: Society for Worldwide Interbank Financial Telecommunication. It is an interbank communication network which enables financial transactions world-wide, in a way that all kind of insecurity and fraud can be excluded.

The motive of the establishment of the SWIFT relied on the need for a third party in the interbank transaction. The banks respect and obey the rules of the law, thereby needed a guaranty of trust and security. The way of fraud must have been abolished. Fortunately the SWIFT was able to become this third trustful party through which the banks could start communication in a secure and reliable way. In addition it also offers non-repudiation of the transactions It could eliminate the obstacles of the lacking trust between two banks. The SWIFT network can be used by its members who are investors so they can manage and suggest changes trough their committees. There are criteria for the membership, but they have the right to express their opinion about what the members can discuss in the committees. Later the council of the SWIFT will either approve it or not.

In my view, the SWIFT is more than a network. Generally, even in financial ambient, it is defined as the primary element of international banking transactions and payments. So far it has been true, but the importance of the system is not reflected in respect of electronic payment and clearing systems. The way I see it, the SWIFT system is the most wide spread arrangement which is integrated into the operation of the regional and domestic payment systems. Due to its highly defined standards which have an ISO code as well as regulations, the secure way of operation, the SWIFT can be called as an infocommunication network.

## a) Standards and regulations

The SWIFT network uses many standards in order to point out the way of acting in a deal to the parties and to inform them about how the system will react to their communication. A standard is a norm, usage or rule upon which the contacting parties have agreed and take responsibility to follow its instructions. The SWIFT members wanted to make secure their financial or business transactions. In case of such messages the SWIFT has been appointed as the specific institution for acting like a driver of these standards. The essence of these standards is to provide information for reading, processing and formatting messages in order to code and decode them to enable effective and secure communication. It is not a criterion to be a SWIFT member, but in world-wide operation the vast majority of the banks rely on these ISO standards. The cooperation between SWIFT and international organizations resulted not just in specifying ISO standards, but. SWIFT has gained the right to be the Registration authority (RA) for the following ISO standards defining messages of interbank payments' transaction(ISO Catalogue)<sup>28</sup>. There are standards that have many parts, so in that case I used a notice like: 1/8, which indicates the number of parts a standard has.

ISO 9362:2009 - This standard is for “banking telecommunication messages”(ISO Published Standards)<sup>29</sup> is called as the BIC (Business Identifier Code) which serves as the universal instrument for the identification of a bank or other financial institution, which is owned by a bank. To make it simple it acts like a zip code for banks. The code is developed for the operation of the SWIFT network and enables communication between the banks. Contrary to belief, the BIC does not equal the SWIFT code. The SWIFT code contains an additional letter for an extra technological identification and has significance in load balancing. It is an aid for the IT operators to define the channel of the message. The following chart contains the procedure of the breakdown BIC. I took the department of Intensa Sanpaolo

Breakdown of the BIC of Intensa Sanpaolo SPA Torino Security Settlement Department				
BIC	Bank code	Country code	Location code	Branch code
BCITITMMK70	BCIT	IT	MM	K70

2. Figure: Breakdown of the BIC Source: <http://www.theswiftcodes.com/>

28 ISO Catalogue

29 ISO Published standards

in Turin as an example.

The following chart shows some examples of the BICs both of European banks and Hungarian banks.

BIC of European Banks			BIC of Hungarian Banks	
EU	ECB	ECBFDEFF	Hungarian Central Bank	MANEHUHB
LUX	Banque de Luxembourg	BLUXLULL	Erste Bank Hungary	GIBAHUHB
ROU	OTP Bank Romania S.A.	OTPVROBU	Citibank Budapest	CITIHUHX
AUT	Adria Bank A.G.	ABAGATWW	Citibank Budapest Custody Department	CITIHUHCUS
MNE	Central Bank of Montenegro	CBCGMEB1	OTP Bank	OTPVHUHB

Figure3. EU & HUN BICs Source: <http://www.theswiftcodes.com/>

ISO 10383:2012 – This standard regulates and defines the MIC code, which stands for Market Identifier Code. It is a crucial identification code for financial institutions and financial markets in order to specify their field of activity such as securities and related financial operations. According to the ISO 10383 the MIC consists of four alpha characters. Besides MIC there is an Operating MIC. The MIC is activity oriented, while the “operating MIC identifies the entity operating an exchange, trading platform, regulated or non regulated market or a trade reporting facility in a specific country; it is the ‘parent’ MIC”. (ISO FAQ (2012))<sup>30</sup> For example, the Budapest Stock Exchange has a code: XBUD where X means exchange and BUD is the identifier of the city of Budapest, so the activity is defined. However a more interesting case is the code of Borsa Italiana Trading After Hours as its MIC and Operating MIC differs. The MIC code: MTAH stands for: Milano Trading After Hours, while the Operating MIC dedicates the parent platform the Milano Stock Exchange: XMIL (Borsa Italiana).

<sup>30</sup> ISO 15022 FAQ (2012)

Market Identifier Codes						
European MICs				Hungarian MICs		
Country	Name	MIC	Operating MIC	Name	MIC	Operating MIC
AUT	Wiener Boerse AG	XWBO	XWBO	Budapest Stock Exchange	XBUD	XBUD
GER	Autobahn FX	AUTO	DBOX	KELER CCP	KCCP	KCCP
ITA	Borsa Italiana Trading After Hours	MTAH	XMIL	Hungarian Power Exchange	HUPX	HUPX
NOR	Oslo Clearing ASA	OSLC	OSLC	Central Eastern		
CRO	Zagreb Stock Exchange	XZAG	XZAG	European Gas Exchange	XGAS	XGAS

Figure 4. List of MICs Source: [http://www.iso15022.org/MIC/ISO10383\\_MIC.pdf](http://www.iso15022.org/MIC/ISO10383_MIC.pdf)

ISO 13616-1/2-:2007 (ISO Catalogue)<sup>31</sup> – These standards are in the category of financial services. They contain the regulations of the IBAN, which stands for the international bank account number. Part 1 includes the restrictions for the structure of the IBAN, while part 2 defines the Role and responsibilities of the Registration Authority. The IBAN was introduced as a criterion of entering into the SEPA. This number ensures the possibility of integration of the channel of the payment method. Hungary became an IBAN user in 2003 so today the financial institutions are obliged to use the IBAN format bank-account numbers. In the integration of the European payments this was a crucial step as the IBAN number makes the transfer of funds identifiable and fluent in case of intra-European transactions.

ISO 15022-1/2:1999 (SWIFT Training)<sup>32</sup> – These standards regulate the securities' market. The first part defines the scheme for messages which is linked to the Data Field Dictionary, which is a method for decoding the information from the data of the system. The system designs the data according to this standard but it also provides guidelines. The second part of the standard specifies the method of the maintenance of the Data Field Dictionary and includes the Catalogue of Messages.

31 ISO Catalogue  
32 SWIFT Training



ISO 2022-1/8:2004 (ISO 2022 For Dummies)<sup>33</sup> – In case of this complex standard the SWIFT is committed to the definition of the element of ISO 2022. After the SWIFT got the right to maintain this standard in 2000, it became the Registration Authority (RA) for the ISO 2022 in 2004. Since then the SWIFT has been dealing with the publishing of the content of the standard and its parts, apart from maintenance. The Registration Authority must guarantee the integrity of the published standard and also responsible for developing the content. In addition the SWIFT has to provide support for the users and inform them about changes and updates.

By the application of the ISO 2022 the incorrect message transfer can be blocked and the risks of a default event can be reduced. Also at the level of the banks their operational costs can decrease as there will not be so many complaints. The complexity along with the advantages of the nature of the ISO 2022 is included in the chart of the Author



Figure 5. By the Author based on ISO 2022 For Dummies

#### b) **Operation** (Interviewee)<sup>34</sup>

Fundamentally communication between the banks must be done in a secure way which creates reliability towards the SWIFT network in a way that the participants of the communication can trust each other. Standards for messaging schemes and unique codes for example the BIC can enable the trustful operation of the SWIFT and the secure method of messaging and connectivity.

First of all there is a physical layer where we need a cable as a channel of the messaging. The SWIFT itself does not construct cables; instead they contract with four worldwide telecommunication service providers. After the establishment of this relationship these worldwide telecommunication service providers will cooperate with the local service providers. Essentially the domestic providers do not send messages to the SWIFT servers because it is the task of these four worldwide service providers. For example the Hungarian

<sup>33</sup> ISO 2022 For Dummies: provided by SEPA Hungary

<sup>34</sup> Interviewee: Zoltán Huszár GIRO Zrt.

Telecom establishes a rented wire between itself and the British Telecom. Later the British Telecom will send the message to the SWIFT servers.

The message running through the cable is investigated neither at the Hungarian Telecom nor at the British Telecom. It remains a secret for them as they have no right to see the information in the message. In order to ensure the secrecy and security of the messages they are enciphered at multiple levels. The first level is the encrypted Virtual Private Network (VPN). The encryption process is done at server rooms of the connecting actors of the infrastructure and it enters into the communication enciphered and encrypted. More precisely the multiple encryption has to be done every time a message comes in and out which takes 30-35 seconds. In addition to the controlling, storage and re-encryption in case both the forwarder and the receiver are in the same city.

Furthermore, the reliability of the messaging must be ensured. The first step is the digital signature by the initiator. Originally the SWIFT installed the Public Key Infrastructure (PKI) for fulfilling this function. The use of PKI reassures the receiver can be totally sure about the creditability of the forwarder. Fundamentally the PKI is based on impaired keys. An institution within the SWIFT network has 2 keys, one private and one public. Obviously the private key must be kept in secret, it can be known just by the authorised person of the given bank. On the contrary the public key can be known by everybody. In case a bank wants to send a message the process is the following: Firstly the digital signature is signed by the forwarder bank's private key, secondly the message is encrypted by the receiver bank's public key. So the receiver will be able to open the message with its private key and controlling of the digital signature can be done by the forwarder bank's public key. This is the process of the Bilateral Key Exchange concept.

However, the PKI has one major setback. As the public keys are known, every SWIFT member could bomb other partners with unsought messages. This phenomenon is called "flooding". In order to exclude this unpleasant possibility of the network the SWIFT has installed the Relationship Management Application which is an authorisation for accepting the messages from a given forwarder and vice versa and blocks unknown SWIFT members. This scheme was integrated into the PKI in 2009.

### c) **The SWIFT FIN Service** (SWIFT messaging services 2011)<sup>35</sup>

The SWIFT Fin service is the major instrument of the SWIFT network. It has crucial importance in the establishment of RTGS systems. The following chart explains the idea of the FIN.

The forwarder sends a message, which is signed and encrypted at multiple levels, travels through the infrastructure of the telecommunication service providers. After the SWIFT processes the message, decodes the VPN encryption in order to read the message. Later the SWIFT stores the message and validates it in the aspect of the nature of the forwarder and the receiver to see if they are capable of managing transactions. The SWIFT also checks that the message is standardised. As these steps are executed, the SWIFT sends an ACK to the forwarder to inform him about the validation of the message. Afterwards the message will be sent to the addressee and the addressee will send back an ACK to the SWIFT about the arrival of the message. It happens 15 million times a banking day.

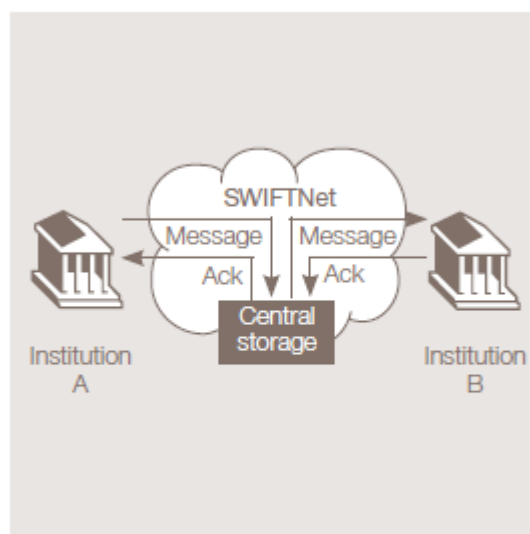


Figure6. SWIFT messaging services

### 3. **Real Time Gross Settlement (RTGS)** (Interviewee)<sup>36</sup>

The Real Time Gross Settlement arrangement is a method of operation and it has essential importance in the update payment systems. In my opinion RTGS systems are the product of a need and technological development because our banking activities must be able to satisfy the customers' needs of rapid transactions, transfers and exchanges. In the European Union the TARGET2 is the RTGS payment system and the domestic Hungarian one is the VIBER. Another core element of RTGS systems is that the transactions are managed according to the principle of gross settlement, which means that the transfers are not

<sup>35</sup>SWIFT messaging services (2011)

<sup>36</sup> Interviewee: Zoltán Huszár GIRO Zrt.

impaired so they are settled separately without netting. They function as payment systems for large value and low volume transactions.

Fundamentally the SWIFT enables the operation of a RTGS system by the SWIFT FIN service. Due to the fact that the Fin service is rapid the message goes through the system in a minute, for instance a payment order. Originally the banks created 2 or 3-days-deadline for the performance of the payment order in order to reduce risks. It means if the payment order arrives on a given day it will not be settled on the same day automatically. However billions of EUROS cannot stand halfway for days between the banks. That is why we need RTGS systems. On the other hand, it can be seen that there is no technical obstacle but the SWIFT is not enough. Every country is keen on to establish its own strategic RTGS system, with the central banks in the centre. The role of the central bank satisfies the need for trust and reliability of the commercial banks.

Besides the SWIFT FIN, the Y-COPY service of the SWIFT enables the operation of the RTGS systems. The following chart shows how Y-Copy works. The forwarder Bank A sends the SWIFT message of a payment order to Bank B. With the message a so-called:”flag” travels which is the sign that the order is an RTGS message. The SWIFT gets the message via FIN and stores and validates it. Then it sends back an ACK to the forwarder and makes a copy for the central bank. The central bank will

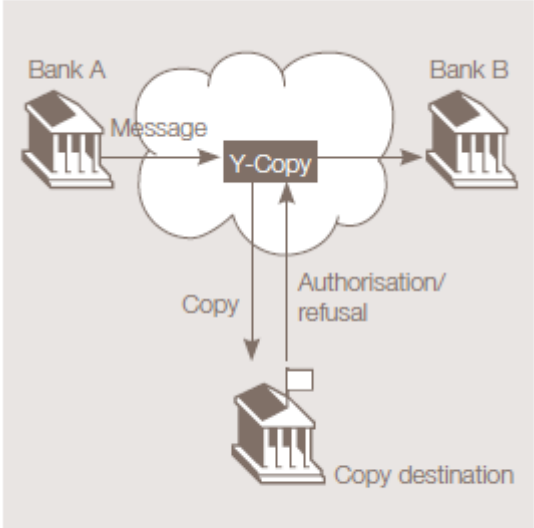


Figure 7. SWIFT messaging services

investigate the copy of the message. If there are no problems with the message and the forwarder bank has enough liquidity the payment will arrive to the beneficiary's (Bank B) account. The central bank responds to the SWIFT about the result of the messaging. In the majority of cases the response contains information about the favourable settlement of the payment. Then the SWIFT transmits the message to the addressee who knows that the payment has arrived to its account as well.

In practice the lead time of the system is circa 1.5 minute. That is why we can define and rely on these systems as RTGS. The SWIFT FIN-COPY services are based on the SWIFT Fin and they are available for the central banks, so the commercial banks are the user's level of the system.

#### 4. **TARGET2** (ECB Homepage/TARGET2)<sup>37</sup>

The TARGET2 is an RTGS payment system of the SEPA zone. It has crucial and unique importance in the settlement procedure. It is owned by the Eurosystem, besides this body is responsible for managing the operation of the TARGET2 in cooperation with the ECB. The members of the Eurosystem are the representatives of the National Central Banks, who have EURO circulating as official currency. There is no netting as the system is based upon the gross settlement principle. However due to the presence of the ECB essential additional features are provided. There is the possibility of immediate settlement of the payments backed by the liquidity of the ECB. Furthermore, the ECB service as acting the hub of the TARGET2 makes it utterly secure and reliable; the trust towards the institution and the system is high.

First of all, the forerunner of the TARGET2 was the TARGET which stands for Trans-European Automated Real-time Gross settlement Express Transfer system. It had a purpose of establishing the 15 EU member states through their own RTGS systems, so it had a decentralised characteristic. In order to satisfy the increasing needs towards different services in payment clearing and settlement the TARGET2 has a modular structure. This serves the Single Shared Platform (SSP) for managing the services for different activities. Furthermore, the communication is enabled via all the services, like FIN, InterAct, FileAct and Browse, and standards of the SWIFT. However from 2010, Internet based communication is available only for low-volume payments. The business continuity concept of the TARGET2 enables its secure and punctual operation. The concept is based upon the idea that there are two regions for processing the payments and accounting services operating besides each other, while each of them includes two different sites. In case of an unpleasant event the system is backed by the capability of the regions of substitute each other.

Moreover, the settled transactions do not affect only the liquidity of the ECB but they have an impact on the participating central banks' liquidity as well. The ECB is authorised to

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<sup>37</sup> ECB Homepage/TARGET2

monitor the liquidity of the national central banks and record their final positions. Due to this relationship there is no limit towards the payments value. At this point the connection with STEP 2 can be examined, as the STEP 2 what is the responsible Pan-European ACH for retail payments and its transactions are settled on the TARGET 2 platform. This relationship enables the lack of the lower limit. On the other hand, managing and monitoring its own and the participating central banks liquidity enables that there is no upper limit, in case there is no default event regarding the liquidity on the account of the communicating banks or any legal and operational obstacle which makes ECB block the transaction. According to the above mentioned relationship and feature, the ECB is entitled to manage the monetary policy of the European Union for which TARGET2 is an important tool for having insight to the Eurozone. The will for the most suitable monetary policy results in financial stability which creates a beneficial environment for banks and financial institutions in the whole SEPA zone. The structural background of this characteristic is that each central bank is a direct participant having their own account on the Single Shared Platform (SSP) of TARGET2 which enables real-time settlement using the ECB money.

As a result of using the central banks' money there is an opportunity of intraday credit, which is a quite beneficial product as there is no interest on it. Another interesting a notable possibility is that banks from different EU and EEA countries can form their group of interest for managing their treasury in EURO, by establishing joined RTGS accounts for this purpose. This may lead to more successful liquidity management, because these groups can address liquidation for their businesses. Furthermore, the participants of the TARGET2 have disposal of the accessibility to the Information and Control Module (ICM) what helps them to monitor their payments and balances.

In addition, the investigation of the traffic of the transactions settled of the recent years through TARGET2 is important, in order to understand the key role of the system. The amount of the transactions processed was 355,000 (ECB/Sibos (2013)TARGET2 )<sup>38</sup> in 2012, which results in 2.5 trillion EURO (ECB/Sibos (2013)TARGET2 )<sup>39</sup> as daily volume. There is a slight increase in the total amount compared to 2011, but it results in significant rise in the aspect of the total or daily value. In addition a representative data is that during 4 days of operation of the TARGET2 the equal amount of EURO to the GDP of the Eurozone is settled

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38 ECB/Sibos (2013)TARGET2

39 ECB/Sibos (2013)TARGET2

(ECB/Sibos (2013)TARGET2 )<sup>40</sup>. Another kind of data is that circa 57,000 (ECB/Sibos (2013)TARGET2 )<sup>41</sup> banks and their branches have their reachability through TARGET2.

Participants originate from 23 EU countries. Those who have not adopted the EURO yet have optional possibility for joining TARGET2. Even banks operating in the EEA have this opportunity with special supervisory requirements. This regulation enables the realisation of the SEPA concept as well. Not only central banks can be participants, also other financial institutions can take part but only under the control of their correspondent central bank. Obviously they will be indirect participants as the central banks are the direct participants in TARGET2. Indirect participants can be reached by their BIC and the payment will go through the RTGS account of their central bank. Regarding the fees and charges of the settlement, they follow a universal pricing scheme. This means that every participant is obliged to pay for the settlement service of TARGET2 irrespective to their nature. Other services have differentiated costs in connection with the nature of the participant as well.

In order to serve and satisfying the needs of the customers, the TARGET2 operates relatively longer than other RTGS systems. The opening time of the system is 7:00 (CET) and it closes at 18:00. The cut of time for customer payments is 5:00, which enables better liquidity management for the participants. Furthermore there is a cycle for the night-time from 19:30 to 6:45. However, the SSP needs maintenance between 22:00 and 1:00. The system is entirely closed on the weekends and on six days in a year which are universal non-settlement days for the transactions and exchange in Euro currency. ECB (2010)<sup>42</sup>

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40 ECB/Sibos (2013)TARGET2

41 ECB/Sibos (2013)TARGET2

42 ECB: The Payment System 2010 p. 179

## 5. **The Single EURO Payments Area (SEPA)** (Dávid 2008)<sup>43</sup>

First of all the most fundamental development in the European integration in the aspect of payment has been the introduction of the common EURO currency. Contrary to the belief of the 2000's, the foundation of the SEPA did not unify payment and clearing operations within the Eurozone or in the Union to 100%. It is crucial to mention that the integration had two ways and the unification of the large amount transactions succeeded the cooperation of the ECB and the Central Banks. This is the above mentioned TARGET2 RTGS payment system. On the other hand, the integration of the retail payment did not succeed. The SEPA member states try to imply the arrangements of SEPA but they will not form a centralised payment system due to different national interest, legislation and payment habits. The credit institutions did not unify or abolish their payment infrastructure services which covered each other in their functions but offered different quality and charges for their transactions. According to the agreement between the EPC and the European Parliament, the deadline of the finalisation of the SEPA provisions and guidelines was 1 February 2014 for Eurozone members, while non-Eurozone members have the deadline for 31 October 2016. In addition the migration into SEPA is compulsory for all EU member states. Furthermore, the acronym of SEPA has 3 different meanings in the terminology of the experts in European payments.

1. The first is the targeted aim in which the SEPA stands for the concept that in long run the users of the payment infrastructure will not experience any differences in their retail payments in case of asking for the services of the actors of the payment infrastructure in the European Union So expert may refer to the SEPA according to its concept.
2. Secondly the SEPA has a geographical explanation too. The 28 member states of the European Union and the 4 member states of the EFTA: Iceland, Norway, Liechtenstein, and Switzerland in addition with Principality of Monaco and San Marino make up the SEPA area, and with the future expansion of the EU, further integration will be possible. The enlargement towards the Balkan states of Albania, Macedonia, Montenegro, Serbia and Turkey will enable to install SEPA rules there.

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43 Dávid Sándor (2008): Az egységes euro pénzforgalmi térség, a SEPA



3. Finally the third way of how the experts use the SEPA acronym is related to the arrangements, rules and regulations which are determined by the European Payment Council. In this respect it is essential to mention that:

The SEPA (Single EURO Payments Area) is not a payment system regarding to its essence of the operation which enables multiple services, payment systems and mechanisms. However the integrated payment systems and services of the SEPA must adhere and act upon the arrangement, rules and regulations of the SEPA. (Dávid 2008)<sup>44</sup>

The actors of the SEPA vision can be classified in three dimensions.

1. The first is the legislative and regulatory field which the European Payment Council is responsible for. The Council modifies the arrangements of the services in order to integrate the payment infrastructure.
2. The banks and clearing systems are the other pillars of the classification of the actors. They apply the SEPA rules and regulations for their payment or clearing related activities. They apply the SEPA rules and regulations for their payment or clearing related activities.
3. Moreover in the third class there are the consumers of the services like individuals, enterprises, merchants and traders and the affected institutions of the payment infrastructure, who can be both consumers and the providers of the demand factor. The service providers need to take a strong commitment to the adaptation of the SEPA arrangements, but the consumers must adapt to the SEPA services as well, in order to exploit the advantages and enjoy the possibilities of the services. Investments are also required for the instalment of the SEPA rules.

The foundation of the SEPA is laid down on 3 core principles and tendency.

1. The first is the common obligatory usage of the EU is the Payment Service Directive, what the country of the SEPA zone must adopt, so it harmonises the payment and clearing infrastructure in its member states.
2. The second issue is the schedule defined by the authorities towards the banking public who must face high standards obligations and deadlines to ensure the cooperation of the banks.

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44 Dávid Sándor (2008): Az egységes euro pénzforgalmi térség, a SEPA

3. Finally the third element is the interest of the European Payment Council which results in the adaptation of the SEPA payment models and the creation and management of the standards impaired with them.

The directive implies unified legislative background for every member state and currency. The SEPA arrangement does not exclude states without euro as national currency. Furthermore the rules of the SEPA arrangement must be embedded into national legislation and regulatory background for harmonising the national payment infrastructure and services. As a result there are other choices for payment and clearing activities domestically than the SEPA model, but these systems must be built up or must satisfy the restrictions of the Single European Payment Area.

The relationship between the directive and the SEPA makes visible that the directive is not just concerned about the transactions of the SEPA models but it is responsible for vaster kind of payments, clearing and settlement related activities. On the other hand, the experts of the European Payment Council had to create the SEPA models in a way that they must fulfil the requirements of the Payment Service Directive. A crucial feature of the directive is that it contains no exact rules upon the charges of the transactions either on their amount or on their level. However, there are restrictions for the behaviour of the charges and there is an obligatory principle for the division between the obligee and the beneficiary. In this way the costs and charges are still the matter of negotiation between the consumers and the service providers. This is why that there will not be distortions in this market and the competition will be supported between the service providers.

The aim of the charges of the SEPA payments are influenced by such a competition where innovation implemented can reduce the costs and charges of a model and attract more consumers. Due to free competition on the market of financial services the charges will not be reduced or defined because of a regulation. This thought is the major issue included in the SEPA concept regarding the charges towards the consumers. The obligation of the European Central Bank is to ease and provide aid for the fluent operation of the integrated payment system, and enforce the financial stability so that the SEPA arrangement could be installed and act as a linking element on the behalf of the SEPA concept. In the SEPA concept it must publish guidelines for the national payment infrastructure operators. As a result the perfect execution of the processes of instalment can be regulated and directed for the quickest introduction of the SEPA system and make it possible for the consumers to enjoy and exploit

the benefits of the SEPA services and products. The European Payment Council as a self-regulatory board is not only responsible for designing payment models and guidelines, but it also has the permission to control and supervise their introduction into the national payment infrastructures for what the EPC has a liability.

There is a perspective to the parts of the inner core of the SEPA project. They are common integrated features in each model, service or product. First of all, the Euro based payment systems and models, the models of transfers and collections, the credit card payments, and the clearing and settlement mechanisms are all defined and regulated. Also there are common technical rules and there are same business or market models. The project would not function without unified legislative background and guiding contracts. Furthermore the competing operators of the national payment and clearing infrastructures who are able to handle the SEPA arrangement are also part of the project. Finally the factor of rivalry will provide innovation for the consumers.

The regulatory background is supported by the SEPA schemes and frameworks. In the case of the schemes, the Council used substitute strategy, while for the customisation of the existing domestically used systems principles were defined. The Rulebook contains the rules and regulations for the schemes. A scheme is a procedure for the transaction and the definition of the format of data sent through a payment method.

Within a scheme three levels of the activities are distinguished. (Dávid 2008)<sup>45</sup>

1. The first level is the field for the interaction of the banks and their clients. At this level the banks have the opportunity to serve their clients with their services in a competing environment. The banks can offer products from the variety of services based upon the schemes. The competition affects the charges and the quality of the ordinary services but the possibility is provided for appreciated products to be present in the market.
2. Secondly the level of the interbank segment is where the substitute strategy turns up. It means that the integrated procedures and standards totally satisfy and substitute the national or regional way of performance. The elements of this level are managed by the processing and supporting infrastructure of the independent clearing and settlement providers of the payment scheme. These providers have significance when we speak about payment infrastructure generally but precisely their role is in the payment schemes as

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45 Dávid Sándor (2008): Az egységes euro pénzforgalmi térség, a SEPA

reflected by the expression of Clearing and Settlement Mechanism (CSM). The schemes have rules for the CSM. During the CSM the clearing house must respect the standards applied in the transfer, so they calculate with the gross or net amount of the transfers but they do not have right to change the message sent through a scheme. For instance the data format of the file sent to the clearing house must remain the same at the end of the settlement.

3. The third level is for the infrastructure where we speak about the separation of the schemes according to the rules belonging to them. Within the infrastructure there are clearing houses responsible for the CSM initiated by the payment service providers. On this level the aim is the interoperability between the different infrastructures of the European Union and the SEPA project. In order to express the essence of interoperability, it covers the goal that in the SEPA members every kind of Euro payment should be executed through the assistance of any infrastructure for any beneficiary within the Euro zone.

#### **6. Arrangements of the Euro Banking Association (EBA)**

(ABE-EBA Homepage/About us)<sup>46</sup>

The EBA is the acronym of the Euro Banking Association which is a forum of the pan European financial industry. We can speak about the existence of the EBA from 1985, when the cooperation of 18 commercial banks and the European Investment Bank created this forum. Also the European Commission and the Bank for International Settlements helped to install the EBA as the driver of the European payment services. Initially the EBA's task was to supervise the operation of the ECU. Furthermore the Euro Banking Association gave a speed up to the development of the ECU and the ECU Clearing System. The path of the successful step ahead was based on the relationship between the ECU and its partners like the European Monetary Institute, central banks, the Bank for International Settlements and SWIFT. In addition the EBA started to serve as an expert forum for payment-industry practitioners to exchange their experience. The introduction of the Euro enabled many new instruments to fulfil the aims of the EBA. First of all the EURO1 payment system was introduced by the Association. In 1998 the EBA founded its department for clearing services called the EBA Clearing including the Euro 1 system. However the Euro 1 did not cover the

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<sup>46</sup> ABE-EBA Homepage/About us

whole market so the EBA founded the STEP1 (Straight Through Euro Payment System) dealing with low value transfers and in 2000 it was integrated into the EBA Clearing as well. Finally there was a need for the establishment of a pan-European clearing house for transnational and national mass payments in euro. The STEP2 system was introduced to fulfil this requirement and it was integrated into the EBA Clearing in 2003.

The structure of the EBA Clearing offers advantages to its members. Those institutions who participate in the EURO 1 have an advantage to enter into STEP1 with minimal additional arrangements and later the participation will be opened to the STEP2 Pan-European ACH.

**a) EURO1 (EBA Clearing Homepage/EURO1)**<sup>47</sup>

EURO1 is the European correspondent of the Hungarian VIBER. It is a large value payment system with a low volume for offering real-time like payments in EURO. It is crucial to say that it is not an RTGS. The different feature of the EURO1 from the VIBER is that the European payment system enables the arrival of the payment at the same day and it is responsible for executing it earlier. Furthermore it is open only for private sector transactions in the European Union. Similarly to the Hungarian VIBER the EURO1 meets the requirements to provide solution for urgent messages with high priority. It can be applied not only in Pan-European transactions but in national ones as well. The ECB supervises the settlement of the system. The fact is that circa 250,000 payments run through the system on a banking day and the total value of them is circa 210 billion euro in average. In Hungary the only participating institution is the OTP Bank. In the Western economies like Germany, France and Italy there are more participants.

The whole payment system is maintained by the SWIFT. Due to this feature of the EURO1, the messaging services of the SWIFT are available. Payments transactions can be executed through the SWIFT FIN, Net Browse, InterAct or the FileAct. Another feature of the operation of the EURO1 is the so-called Liquidity Bridge which enables the cooperative banks to block their liquidity. On the other hand it is possible to make injections into their EURO1 account; as a result the banks can manage their available liquidity and can provide information towards partners of the payment system. The Liquidity Bridge decreases the chance of liquidity and settlement risk.

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47 EBA Clearing Homepage/EURO1

Furthermore the EBA Clearing introduced the principle of the Sub-Participation status. This status is provided for branches and subsidiaries in EU and EEA countries as well. According to the regulation the parent bank must be a participant of the EURO1. In addition the Sub-Participation status is the feature of the STEP1. (In the next section I will describe the STEP1 system as well, with the same criteria.) By the status the branches or subsidiaries will be able to operate their transactions fluently but they will still remain under the flag of the parent institution.

Moreover, the EURO1 payment system, like the STEP1, enables connection between the participants of the system and third party banks and group of banks with higher worldwide significance. The EURO1 banks must be identified to reach the outer beneficiaries. In order to provide help, the directory of the EURO1 and STEP1 is responsible for managing the connectivity between the authorised originator and the beneficiary.

The process of the EURO1 satisfies the principle of a real time gross settlement system in which the cut off time is 16:00 at Central European Time (CET) till the banks and institutions can send their payment messages. Till the cut-off time every message is processed so the system will be able to inform the participants about their balance in the aspect of the processed payments of the given day. Moreover, the EURO1 provides information to the EBA Clearing, which will send the information to the ECB, about the final balances and the daily operation of the system. Furthermore a common technical feature of the EURO1 and the TARGET2 is the Ancillary System Interface and its 4<sup>th</sup> module (ASI 4). The source of the information is the EURO1 which EBA Clearing relies on and through TARGET 2 and ASI 4 informs the participating banks of how much money has been debited and credited on their RTGS accounts. The settlement is divided by the nature of the transactions whether debit or credit. In the first round the debit transactions are the subjects of the settlement and on the next step the credit transactions. There is a so-called Technical Account of the EURO1 system which helps the settlement of the debit and credit transactions and enables them to be treated separately. After the final list and balance of the daily settlement is processed the EBA Clearing will receive the information and an approval from the TARGET2 through the ASI 4. If everything goes well the settlement is executed within 5 minutes. After the EBA has the information about the final balances, it will automatically send the unique final positions to the participating banks.

**b) STEP1 (EBA Clearing Homepage/STEP1)**<sup>48</sup>

The STEP1 has the goal to serve participating EU banks to execute cross-border Euro payments. Initially the service was introduced in 2000 when the time and cost factor of service supporting EU cross-border payments became rational. In the case of the STEP 1 it is essential to mention that it is a payment service based upon the infrastructure and system of the EURO1 and not a payment system.

Due to the fact that the system is managed by the EBA, those banks which act in the European Union can apply the service and the participants of the EURO 1 as well. However joining the STEP1 does not apply the automatic implementation of the EURO1 and its criteria. Furthermore, the aim of the service is to provide a channel for cross-border commercial transactions in EURO. It also supports the implementation of the legislative guidelines for financial institutions. Above all, this aid is given to the participants to cover the demand of increasing corporate and retail customers. The number of the transactions is circa 20,000 daily with an average total value of 1 billion EURO.

The services and the systems of the EBA Clearing have a strong commitment towards each other. As a result the STEP 1 relies on the infrastructure of the EURO 1 in the aspect of technology, regulations and standardisation. There are few additional technical arrangements for the admission of the STEP 1. They are beneficial instruments in order to provide the fluent operation of connectivity at STEP1 and for providing the rational cost at a moderate level for participating banks.

The service is able to manage commercial transactions resulting from the activities of banks and their customers' actions and interbank transactions as well. Credit and debit transfers can be executed but only if the addressee gives authorisation for them. Due to the operation of the STEP 1 these kinds of transfers must not be sent later than 14:30 and the settlement is done not later than 16:00. However the essential factor of such transfers is the liquidity which must be checked in order to avoid the liquidity and credit risk. In aspect of security the STEP 1 is backed by the use of message formats and standards of the SWIFT. For the identification of STEP 1 messages there is a marker: "ERP" in the field 103 of the SWIFT message formula. The following SWIFT message formats are available in the operation of the STEP 1: MT 103, MT 202, MT 400, and MT 204.

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48 EBA Clearing Homepage/STEP1

The processing of the STEP 1 enables incoming payment messages from 7:30 (CET) and the messages of the previous 5 days. The cut off time of STEP 1 is 14:30 which means that orders can be sent till that time. An extra 10 minute is given for the system to check if the sending or receiving banks are capable of meeting their upcoming payment obligation. The operation must prevent systemic risk emerging during the process so it is checked that a participating bank must not have a negative balance resulting from the executed payment order. The messages will be processed between 7:30 and 16:00 when the balances must be equalised. The following chart contains the steps of STEP 1 process.

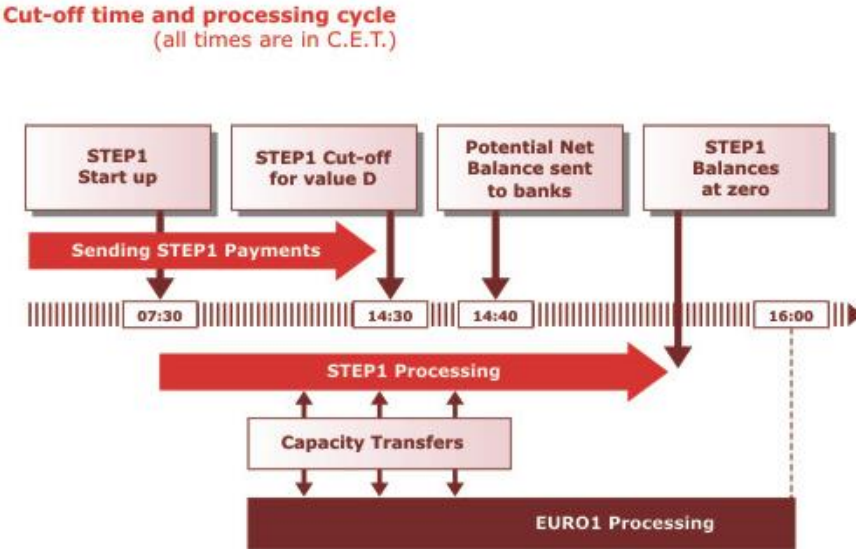


Figure 8. STEP1 Processing cycles Source: EBA Clearing



c) **STEP2** (EBA Clearing Homepage/STEP2)<sup>49</sup>

“STEP2 is a Pan-European Automated Clearing House (PE-ACH) for retail payments in EURO.” (EBA Clearing Homepage/Overview)<sup>50</sup> The STEP2 is the element of the linkage between the EBA Clearing and the SEPA. This linkage defines that the STEP2 is a platform for managing SEPA transactions. The participation is available for all EURO1 and STEP1 members or sub-participants. In 2003 the EBA Clearing introduced the service for offering a platform for retail payments. Since then time the service’s limit has been 50,000 EURO at a given transaction. Later, the limit was abolished.

The features of the concept of the STEP2 are based on the independency and flexibility of the service in order to enable the possibility of migration into the SEPA. In the introduction of the EBA Clearing I mentioned that the aim is to integrate the banks from EURO1 through STEP1 into STEP2. Due to the connection with the SEPA the settlement of the SEPA Credit Transfer (SCT) and the SEPA Direct Debit (SDD) is done by the STEP2 platform, the will of integration of European payments is visible. The STEP2 enables a channel for European banks through which they forward and receive their SCT and SDD transactions. Today, STEP2 offers maximal reachability of all banks in all the SEPA member countries. The criterion for migration, participation and accessibility is that the banks must have to sign the SCT and SDD Scheme Adherence Agreements, defined by the European Payments Council (EPC), in order to execute SCT and SDD transactions on the STEP2 platform.

The essence in the operation of the STEP 2 is that the SIA is the technical operator of the service and cooperates with the EBA Clearing. Furthermore the ISO 27001 is integrated into the STEP2 which ensures the security of the process. The principle of this standard is the Information Security Management System (ISMS). Without this standard the confidential information about transactions and the financial assets would not be backed by STEP2 and the communication between the participants and the SIA could be harmed. Moreover the STEP2 implies the STP validation for STEP2 processing includes the STP validation. STP is the

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49 EBA Clearing Homepage/STEP2

50 EBA Clearing Homepage/Overview

element of the security of the classification and validation of payments and their access to the beneficiary banks.

Participants can connect to core service of the STEP2 via the services of SIA Net, SWIFT Net and the Electronic Banking Internet Communication Standard (EBICS). This kind of multiple connectivity satisfies the principle of independency as there are many channels through which the communication can be managed. Via the connectivity participants are able to have excess towards their detailed transactions and final positions.

The processing of STEP2 is available 24 hours a day for SCT transactions with additional night time cycles on the days when the TARGET2 operates. STEP2 enables rapid and secure clearing and settlement. However the responsibility of the settlement is divided. In the settlement process the STEP2 ICT (Italian Credit Transfer) is responsible for the handling of EURO1 and STEP1 payments, while the settlement of SEPA SCT and SDD transactions, assisted by the TARGET2. The settlement is executed on a net basis. The cut-off time of the system is 16:00 CET on each operating day. The settlement cycle is 5 days and it creates the possibility of payment cancellation. The settlement timings are the following: (EBA Clearing STEP2/Services)<sup>51</sup>

- a) SCT: 21:30, 01:50, 07:15, 09:30, 12:00, 14:30, 16:15
- b) SDD Core: 11:45
- c) SDD B2B: 12:45

The advantages that the STEP 2 offers for its participating banks are mentioned in this paragraph. First of all the operation of the service requires low efforts from the end users as it is highly automated. However the EBA Clearing is keen to upgrade the clearing service with brand new technological developments. This way the STEP2 reduces operational cost and increases time-efficiency. The principle of reachability and participation is supported by the idea of the Sub-Participation, so banks can reach each other directly or indirectly. Among the banks bilateral agreements are signed in order to provide the STEP2 infrastructure for institutions which are not able to connect to the network directly.

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<sup>51</sup>EBA Clearing STEP2/Services

## Migration to SEPA (EBA Clearing Homepage/Overview)<sup>52</sup>

In the next paragraphs I would like to mention the migration process to the STEP2 and the integration of SEPA services onto the platform. My goal is to provide information about the connection between STEP2 and SEPA. For example the STEP2 XCT had been a service which was installed at the beginning of the process. Due to the more advanced technology and services of the SEPA the XCT service has not been available from 2011, while at the peak period of the XCT had 500,000 daily transactions.

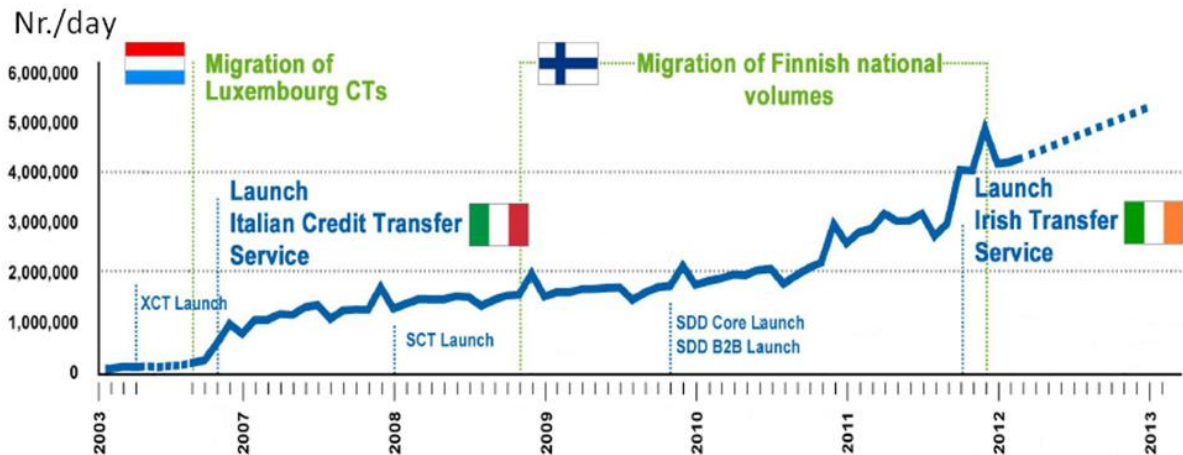
The key to success of the migration into SEPA and the use of its services on STEP2 platform, was the professional and careful testing period. Generally, during the realisation of process of a project or concept the designers do not spend enough time with testing. In case of financial infrastructures the trustworthiness of the services must be totally proven. As a result the cooperation between EBA Clearing and the SEPA concept made the existence of the SEPA Credit Transfer (SCT), the participation in STEP2, and the Pan-European ACH possible in January 2008. The other need for debit transactions was satisfied in 2009 when two types of this kind of service were introduced together: the STEP2 SEPA Core Direct Debit Service and the STEP2 SEPA B2B Direct Debit Service. Later I will write about these services in chapter V.

As the service started to operate with low volume but high potential, member states started to change their domestic ACH-s and rely on the Pan-European automatic clearing house. The first nation who made this development was Luxembourg in 2006. Afterwards positive effects could be seen at the banking market of Luxembourg. The former investing banks of the national payment infrastructure had no obligations of this kind anymore, as a result their investment and maintenance costs reduced. The next country which joined partially was Italy again in 2006. Initially 8 Italian banks took the advantage of the customised service of the SEPA Italian Credit Transfer (ICT). Regarding the fact that the finalisation of the migration to SEPA of the major Italian participants came to an end, the ICT service was shut down in September 2014. Later the Finns left behind their national infrastructure and their banks allocated their domestic credit transfers onto the STEP2 platform in 2011. The Irish banks joined the same year but the total integration to SEPA succeeded in July 2014, till that time they had a solution like the Italians had which was called the Irish Transfer Service (IET).

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<sup>52</sup> EBA Clearing Homepage/Overview

### Migration of national communities to STEP2



#### Legend:

Migration of national transactions to standard STEP2 SEPA Services

Migration of national transactions to dedicated STEP2 Services supporting national legacy formats

Figure 9. : STEP2 the PE SEPA Platform: John Broxis (2013)

In conclusion, the advantages of the migration into the Pan-European ACH (STEP 2) are the costs reductions of operation and maintenance due to the shutdown of national infrastructure. Furthermore, the banks will be able to provide Pan-European services. On regional level it is a prosperous and beneficial perspective.

## 7. Actors

### a) Card Networks

Let's take a situation from everyday life, in order to see how credit cards participate in electronic payment systems. If we would like to pay for our shopping by credit card, it requires a more complicated system than cash payments. Customers and service providers are connected with banks, clearing houses and credit card companies. Each of them has a special role within the process of the fulfilment of an electronic payment initiated by credit-card or debit-card.

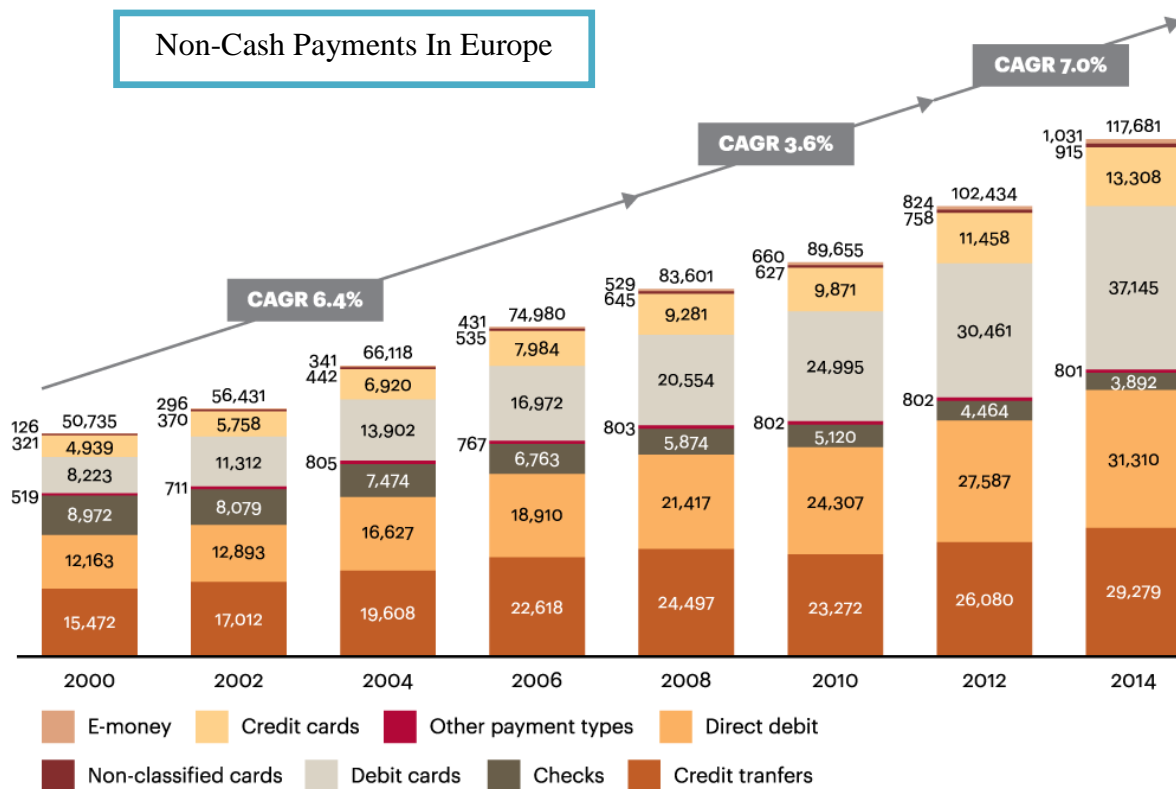
First of all, the customers have the opportunity to choose between these two major card types. The difference between them is that a credit-card's appropriation is sponsored by the bank but it asks for monthly repayments. If the customer is not able to repay its monthly obligation the bank puts its interest on the outstanding amount of money but a favourable repayment fills up the amount of credit available on the bank account of the customer. On the contrary the debit card enables payments, till an amount of money provided by the customer on his/her bank account i.e. as long as the balance on the account lasts. (MasterCard education)<sup>53</sup>

In order to show the importance of the European non-cash payments, in which the credit-cards and debit cards play an essential role, the following table is provided. In the aspect of the credit and debit cards the tendency can be seen that their use had a remarkable increase in the recent years. After there was a general moderation in the years of the recession these modes of payment stepped away from the others. As a result of the rising number of merchants whose acceptability to different types of cards is growing, there are more ways of cash elimination. Especially, low value transactions have reached high number of transactions due to new methods like Pay Pass which enables more convenient payment initiation for these transactions. In connection with the traditional payment methods the decrease in the volume of the cheques payments is visible. Nowadays, the merchants offer various types of credit and debit card payment services even on-line, so paper-based solutions have become more outdated. According to the research of the reliable and global management consulting company A.T. Kearney which was based on the statistics of the ECB, the Compound Annual Growth Rate (CAGR) has had a significant increase from 2012. Due to this projection by following the trend the total amount of transactions will be circa 118 billion yearly. (A.T. Kearney)<sup>54</sup>

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53 MasterCard Homepage/Education

54 A.T. Kearney: Finding the New Klondike in the Payments Business



**Figure 10. A.T. Kearney: Finding the New Klondike in the Payments Business**

In order to understand the credit card related transactions, a description of the participants of the process is needed. Of course the most obvious participants are the cardholders who will initiate the payment with the card issued by their bank and the merchants who installed the terminal in order to provide the possibility of card payments.

At the pole position there are the card networks. They are regulating the criteria of the usage of the cards labelled with their names. The Visa, MasterCard, American Express, and Discover are the four major worldwide networks, but in European aspect the Visa and the MasterCard are the market leaders. They are responsible for executing the electronic payments and deliver their value in a reliable and secure way through the network owned by each operator. On the other hand there is a common misconception about the additional tasks of the network operators. On the homepage of MasterCard we can get informed about what a card network operator is not responsible for: " We don't issue cards, set interest rates or establish annual fees. Those decisions are made by card issuers, such as banks. We don't set merchant discount rates either. Acquirers do that. And, of course, we don't make money from interchange fees."(MasterCard Homepage/Our company)<sup>55</sup>

<sup>55</sup> MasterCard Homepage/Our company

Secondly, there are the card issuers, who are contracted banks of a network. They provide the cards as a service towards the customers and they have the right to define the costs of the cards. A bank usually provides cards impaired to a contract of bank account operations. For example there are services for students with low cost or free of charge solutions. The card linked to this service has discount charges, while other charges of monthly use and activity based operations are defined by the market.

Thirdly, the acquirers are those institutions who manage the account of the merchants. They accept the payment with the fees and charges deducted from the payment processor. Afterwards they inform their clients about the position of their accounts.

The clearing and settlement process is the core topic of this section. In case of card payments the situation is different and requires even more security than an electronic transfer initiated from a bank office. When a cardholder pays with by card he/she gives permission for the digital transfer of the amount of the payment. Digital money transfer means that the system will deal with the payment as a package of information of available funds at the participants' bank account. Due to a higher need for security and operation of a card network, there are more participants than in an electronic payment transaction. It is crucial to mention that the PIN code of a card is not stored on the card. The PIN code is the key of access to the card and stored in the network.

Similarly to the SWIFT, RTGS or EBA arrangements in case of cards transactions the clearing and settlement is executed at that very moment when the cardholder initiates the forward of the payment because the issuing bank (cardholder's bank) and the acquiring bank (merchant's bank) exchange information digitally. In Europe the most wide-spread card networks are the VISA and MasterCard. In addition there are other card issuing corporations such as American Express and Discover. Their advantage is that their networks includes an own, internal clearing stage. However, their European presence is not significant.

There are two payment system schemes which are used by VISA and MasterCard. The MasterCard implies the Global Clearing Management System (GCMS) while the Visa installed the VisaNet for this task. The GCMS deals with the information carried by the message. It is also responsible for the calculation of the fees and charges that will be forwarded to the issuing bank. Then the clearing message will be forwarded to the issuing bank and the acquiring bank. The clearing message carries data of confirmation, but there is

no evidence of the realisation of the transaction. The finalisation of the payment will be done in the settlement stage. (Unibul Merchant Services)<sup>56</sup>

However the VisaNet is a more complex scheme and it is an integrated part of Visa's network. It relies on many elements rather than setting up a whole system with a standardised operation like MasterCard does. VisaNet is responsible for controlling authentication of the cardholder and the approval or the blocking Visa card transactions and the principle of the connectivity between Visa partners. The approval of the message is sent from the acquiring to the card issuer to enable information about the required modifications at the cardholder's account. The payment flows from the card issuer to the acquiring bank as required, so the payment will be credited on the account of the merchant. Clearing is executed in this way in VisaNet and the next step is the settlement process.

As they are different networks they use different methods of payment processing, authorisation, clearing and settlement. There are two payment system schemes which are used by both card networks. These systems are called dual-message and single-message systems. Originally, the dual message system was introduced for managing credit-card transactions, but nowadays debit-card are supported by this system too. The essence of the dual-message system is the fundamental authentication process including the cardholder's signature. The dual-message clearing is installed in the Visa and MasterCard networks in Europe and in the USA too, but in Europe that is the only scheme implemented. It was designed for the authentication of the customer by physical presence allowing signature-based credit and debit transactions. The response of the merchant is based on the "electronic draft capture" (EDC), which gathers the incoming messages and puts them into a batch. Usually batch processing originates from the merchants once a day but it can be done multiple times according to the amount of incoming payments. The process is called batch frequency. The merchants send confirmation of the incoming payments to their acquirer in batch mode and not in separate files. There are specific periods when the merchants can submit their batch files to their acquirers in order to honour the payments. After this the acquiring bank will forward the batch files to the clearing network. However, the issuing bank must confirm the payments too. As the clearing is done on another route it makes possible that the account of a cardholder will be opened for further transactions. It works on the same way on both MasterCard and Visa network. The increase in the amount of the EDCs requires continuous maintenance and

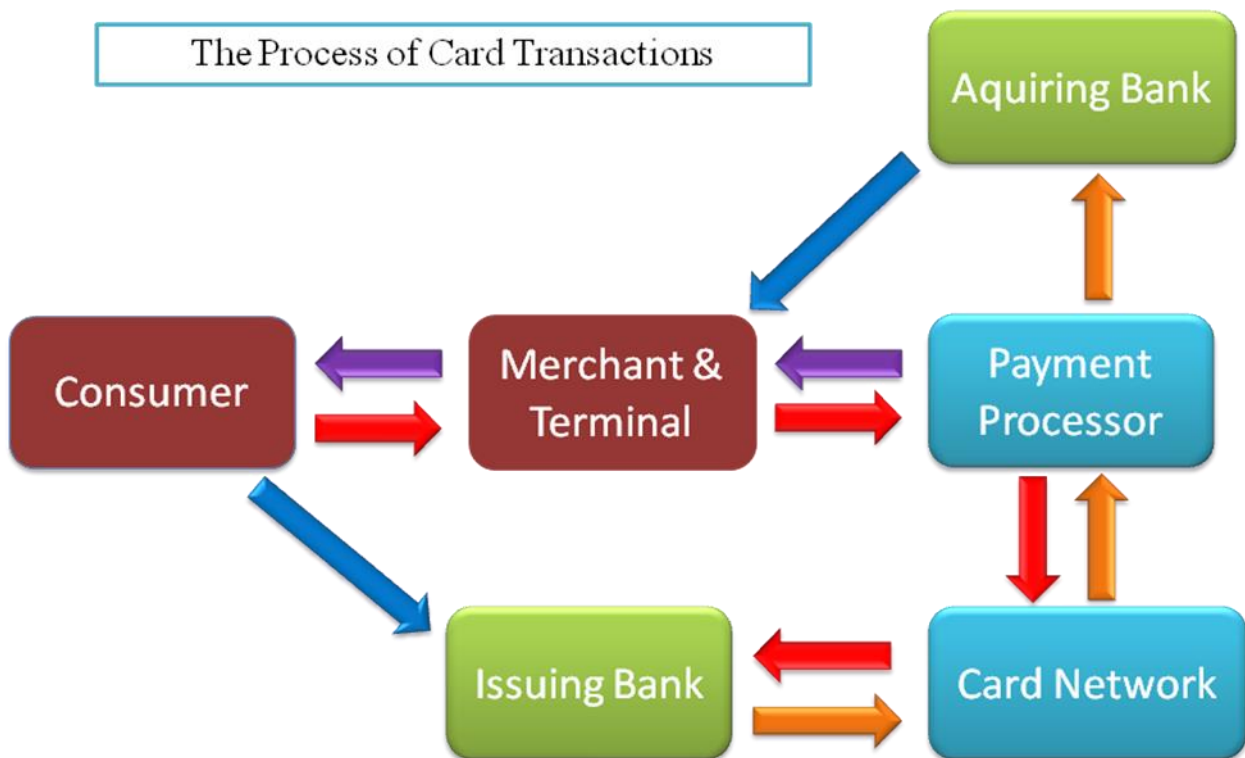
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56 Unibul Merchant Services



update of the networks. Furthermore the card network can summarise the volume and the value of the transactions from issuers to acquirers so they can provide data for clearing and settlement.

On the other hand, the single-message scheme enables the cardholders' ordinary payments. In case a cardholder would like to use an Automated Teller Machines (ATM) this payment scheme will be used. The authentication of the user is crucial again but the customer can initiate a payment by having access to his/her card via PIN. However new credit or pre-paid cards not requires this authentication of PIN till a certain limit of money. For example, in Hungary a Pay Pass credit card asks for a PIN code for a payment over 5000 HUF. The next final step in the payment systems is the stage for the settlement. In this stage the money transfer is realised between the issuing and the acquiring bank, so the information is given for each bank at its final position about the amount of funds available. The settlement of credit card transactions follows the netting principle so the transactions are not treated separately. This principle is in connection with the batch processing which is the technical solution to the netting principle. However, the nature of the payment system has no influence on the settlement process which is the same in dual and single message schemes too. Furthermore, the settlement stage has crucial importance in the aspect of collecting fees for the service. First of all the interchange fees will be credited to the issuing banks for all transactions which are collected from the acquiring banks. However, there is a different process in the case of cash advances, withdrawals, and returns, the issuers will pay interchange fees to the acquirers. The final position of the merchant is calculated with the daily settlement but the fees are deducted from bank account of the merchant. These deductions can be classified due to their nature. The merchant and the payment processor, who will ask for their charge to execute the payment, agree on the level of the fees. A cardholder or a merchant usually has 90 days to inform the payment processor about any default event regarding fees and charges.



Legend			
Initiation & Confirmation	Blue	Transaction Authorisation	Red
Flow of Payment & Charges	Orange	Authorisation of the Request	Purple

Figure 11. by the Author based on Business Insider Australia

The aim of this chart is to interpret the steps of processing card transactions. The level of the participants is also emphasised with different colours. At the first level there are the commercial actors the consumers and the merchants. The consumer initiates the transaction (blue arrow) and gives the permission to the issuing bank to make that amount of money available on its account for the payment. On the other hand he /she also authorises the transaction via the terminal of the merchant (red arrow). This transaction authorisation is later checked by the payment processor, the card network and finally by the issuing bank, in order to send the payment towards the card network (orange arrow) through the payment processor, till the acquiring bank. Together the card network and the payment processor build up the processing level. Then the acquiring bank sends conformation (blue arrow) to the merchant about the arrival of the payment which is credited on the merchant's account. However not the total amount is credited. Fees and charges are deducted from the total amount at the banking level by the issuing and by the acquiring bank as well. For example at a request of

100 Euros only 98 EUROS will be credited on the account of the merchant, as 1 EURO is the transaction fee collected by the issuing bank and 1 EURO is charged by the acquiring bank as merchant discount rate.

### **b) Automated Clearing Houses (ACH)**

An Automated Clearing House is a key actor of the national and regional financial infrastructure. It is responsible for the clearing of electronic transactions of a given payment system. They are installed world-wide but this thesis contains data about European clearing houses. Generally, their installation requires investors with severe presence and long-term commitment towards the regional or payment infrastructure. The detailed description of the services will be mentioned in section V. The aim of this part is to provide an insight into the role of the ACH in the payment infrastructure. My motivation to discuss this role earlier than other components of the ACHs was to focus on this particular feature and emphasise their role in the payment infrastructure as its actor.

Knowledge can be provided by the ACH if we investigate its acronym. Firstly, automated stands for the way of operation in which electronic, computer-based and IT solutions are installed to satisfy the continuous execution of electronic payments and ensure the trustworthiness and reliability of the institution. Nowadays, more and more systems use STP (Straight Through Processing) that means no human hand intervenes the process from initiating a transaction until is it credited to the beneficiary's account. Secondly, the definition of clearing must be provided. Clearing is the activity of the processing of the payment information and confirms that there are no obstacles against their realisation. Thirdly, house comes from the fact that they are the third parties between the banks and they are usually owned by those banks that use it.

The essential feature of the Automated Clearing Houses is their fundamental role of being the instructor of money exchange. In this case we must realise that there is no money exchange in the Clearing House, instead only information is managed. The money will be exchanged at the central bank accounts of the participating banks after the settlement. First of all, the ACH is responsible for processing the incoming payment messages and for the execution of clearing. The gathered information about the payments will be integrate into a file and sent to the central bank, either on regional and domestic level, at the end of each cycle. Then the clearing process enables the definition of the final position of the participating

banks. That final position is settled by the central bank. As a result the central bank is the place where money is exchanged. This is the way how the national and central banks can have daily insight to the balances of the participating banks. The ACHs have an important role in providing aid for their partner to control the financial market. However, they have a forum of control by the National Automated Clearing House Association (NACHA) in the USA and by the European Automated Clearing House Association (EACHA) in Europe. The list of the EACHA members and their country of operation are included in the following table.

<b>Name of ACH</b>	<b>Country of Operation</b>	<b>Name of ACH</b>	<b>Country of Operation</b>
Oesterreichische Nationalbank	AUT	ICBPI	ITA
GSA	AUT	Banca d'Italia	ITA
CEC	BEL	Latvijas Banka	LAT
BS	BUL	KIBS	MKD
FINA	CRO	Equens	NED/GER/ITA/FIN
Eurogiro	DEN	NETS Norway	NOR
NETS Denmark	DEN	KIR	POL
Iberpay	ESP	SIBS	POR
STET	FRA	TransFonD	ROU
Deutsche Bundesbank	GER	SIX Interbank Clearing	SUI
DIAS	GRE	Bankgirocentralen BGC AB	SWE
GIRO Zrt.	HUN	BACS Payment Schemes Ltd.	UK
SIA	ITA	VocaLink	UK

Figure 12. EACHA/Members Source: <http://www.eacha.org/members.php>

The EACHA is not a supervisory board for the European ACH-s. It is an association, rather a forum for exchange of experience and information about possible updates and developments about retail payments. There are 25 members ACH-s and they usually have meetings twice in a year. Due to its nature that it is a forum for open discussions the information sharing is possible. The meetings have an aim to establish and publish the guidelines for the updates of future operation. The EACHA has supervision and influence on the clearing and settlement procedures of the SEPA and manages the integrity of the Pan-European payment infrastructure by theoretical and technical suggestions. As a result the EACHA is an important actor of the development of European policies and schemes regarding payments.

In order to provide some understanding and a general overlook of the operation of the ACHs and their role in the financial infrastructure it is essential to study their topology. (SWIFT Solutions)<sup>57</sup> First of all the Low-Value Payments' (LVP) systems are investigated at this point. The charts are provided by a study of the SWIFT.

1. The Hub and Spoke is the fundament of other ACH networks. It represents the visible connection between the direct participants and their ACH. The core of the operation of this typology is that the ACH is the unique manager of the payment data so there is no share of responsibility or obligation towards another institution. This scheme is installed in the United Kingdom and the Netherlands as well.
2. The second typology includes the indirect participants. They do not have direct connection to the ACH and their data for clearing is processed by their parent institutions. They are usually affiliates or not really significant institutions and it is beneficial for them to contract a larger institution to deal with its clearing and settlement procedure. According to the publication of the SWIFT. Belgium, South Africa and the EBA use this typology. The clearing and settlement process is executed on the same basis even in Hungary.
3. The concept of the third model includes an advanced execution of the clearing and settlement. It divides the responsibility of the processing of the payment data and the accounting duties. The direct participants form sub-centres for which the indirect participants are linked. These sub-centres have the right to make the procession of payment data among each other, however accounting data must be provided for the accounting

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<sup>57</sup> SWIFT Solutions.pdf

centre. Generally it is the main ACH. The infrastructure of France and Spain work on this way.

4. The bilateral file exchange is the fourth typology which is the most complex one, though it looks simple. The requirements are the highest among the possible schemes, because the instalment requires advanced level of trust and security. In the aspect of security it is essential to mention that there is an increased level of systemic risk. The principle of this infrastructure is based on the fact that there has been an emerging need for managing the clearing and settlement processes without any centre for these activities. As a result large institutions, banks built up their own department and systems to deal with the management of payment and accounting data, so these banks exchange the information and conformation for clearing and settlement. This typology is typical in countries with significant regional independency. This scheme is used in Austria and Germany besides Ireland, who has already migrated to the STEP 2 so transferred its clearing to a Pan-European solution.

## LVP Business Models

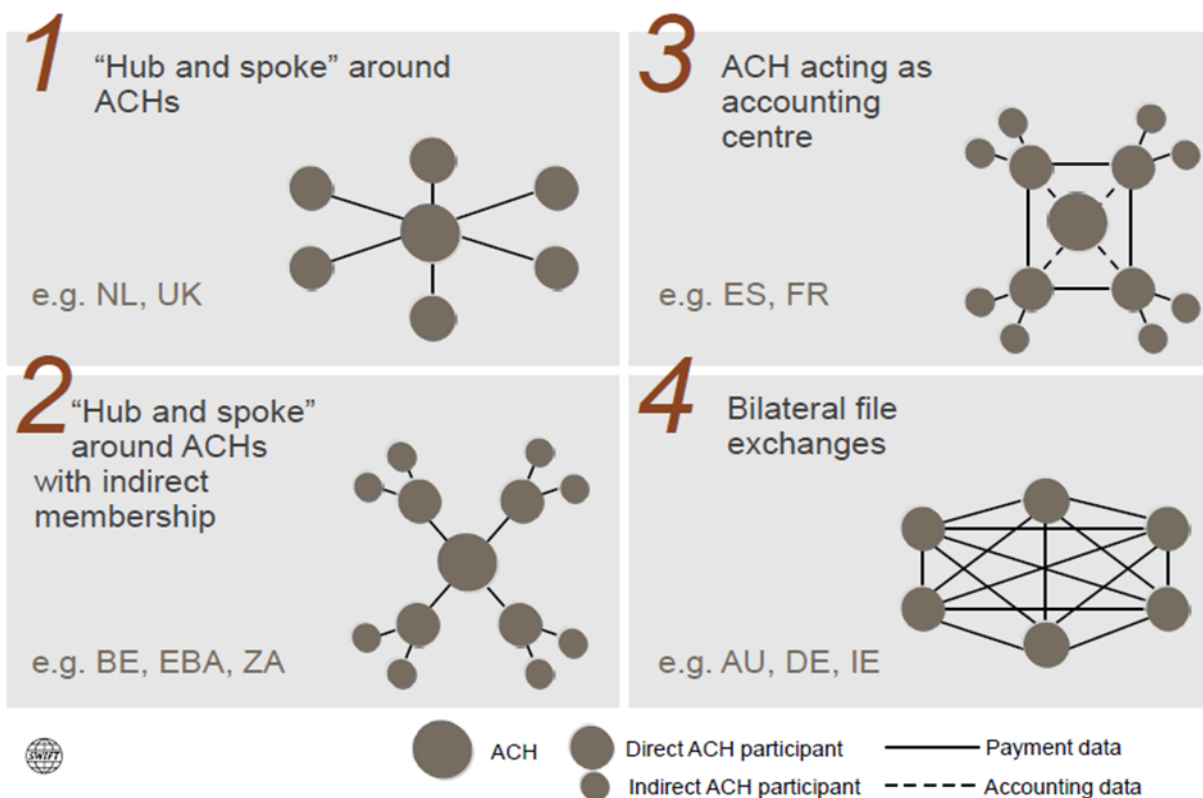


Figure 13 SWIFT Solutions

## 8. Products

Previously the possibility of an insight to the arrangements and actors was provided. In the first and second part of this section the fundamental concepts and participants were included. The third part of this section deals with the services of these arrangements, institutions and actors. However, the main services of the SWIFT have already been mentioned in order to describe the operation of the RTGS systems. The aim of this part is to investigate the Pan-European products of the services like the SEPA SCT, SDD Core, SDD B2B, and SEPA Cards.

### a) SEPA Credit Transfer (SCT) Dávid (2008)<sup>58</sup>

The SEPA Credit Transfer scheme is a payment method available in EURO currency. It defines a universal modus operandi which must be followed by all institutions who would like to benefit from the services of SEPA regardless the nature of the transaction whether it is a simple credit, direct debit or single, reoccurring transfer. The participants of the scheme are banks or financial intuitions who sign a multilateral contract with the European Payment Council, in which they undertake their obligations. However the possibility is given for the participants to choose between shared responsibility of a third party in order to manage the procedures of the scheme or they can do it on their own. The scheme provides the possibility of being a SEPA SCT provider.

If a SEPA transfer of payment is originated by the obligor, then he/she will be called an originator. Upon the request of the obligor the bank initiates the payment towards the bank of the beneficiary. The realisation requires the contribution of the selected CSM. From the bank of the originator two data will be to be processed. The first is the data for clearing and the other is the payment information for the settlement. At this stage the liquidity of the involved banks is checked. Later on the clearing house confirms the validity of the payment on behalf of the beneficiary's bank, while the accounting confirms the transaction at the settlement and informs the beneficiary's bank about its account.

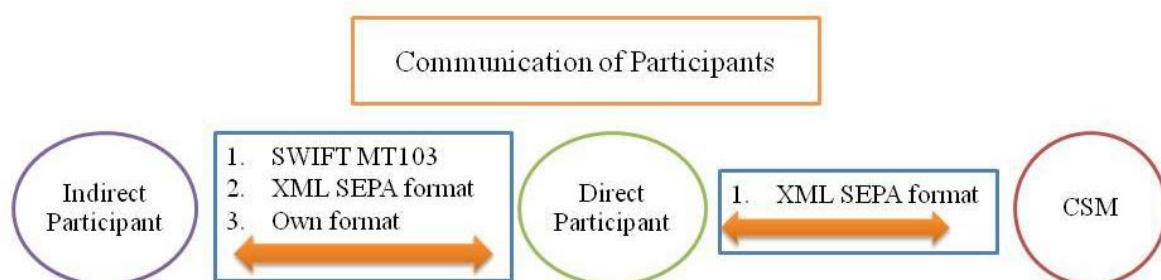
The SEPA Credit Transfer has numerous features. First of all, every originator can reach any beneficiary provided both have bank accounts in the SEPA zone. Furthermore, on

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58 Dávid Sándor (2008): Az egységes euro pénzforgalmi térség, a SEPA

the account of the beneficiary the total amount of the payment must be credited, so no transaction fees can be deducted either form the bank of the originator or the bank of the beneficiary. The charges are defined in the contracts between the banks and their clients. As a result, both the bank of the originator and the bank of the beneficiary, deduct their transaction fees according to the agreement with their costumer. What is more, the upper technical limit of the scheme is 999,999,999.99 Euro and the execution time of a transaction cannot extend the period of three banking days. Moreover the scheme does not define a universal institution for managing the CSM. The choice is given for the participants to process their clearing via any infrastructure which can deal with the SEPA transfers. However, both of the banks must be reachable by the SEPA. In order to ensure reachability the use of the IBAN and BIC is obligatory. Due to the fact that these codes are really varied at national level they had to be restructured within the SEPA for all members. Furthermore the new members can choose their mode of entry whether they would like to join in a direct or indirect way for managing SEPA transfer services.<sup>59</sup>

Technically the service relies on the ISO 20022 as the standard for messaging scheme. The choice was rather an adaptation, because a reliable and universal scheme had to be integrated, in order to enable the migration to the SEPA. The XML of the ISO 20022 is able to manage 140 additional characters for the identification of the payment. The communication flows between direct, indirect and the CSM operators in the following way.



**Figure 14 Communications of Participants: Dávid (2008)**

<sup>59</sup> SEPA Hungary (2009): Röviden a SEPA átutalási rendszerről



## b) SEPA Direct Debit Core (SDD Core)

The SEPA Direct Debit was installed into the services of SEPA in 2009. The process of installation and design was supervised by the European Payment Council. Furthermore the EPC is responsible for the establishment of the necessary regulations and publish them in the SDD Rulebooks. The essential feature of the SDD is that each participant must have an account at the same payment service provider to ensure SEPA reachability and both institutions must be situated in the SEPA zone. The payment service is available for accounts in euro or in other currencies circulating in the SEPA zone. The ratio of the SDD transactions was 3.7% within al EURO collections in 2013. (SEPA Hungary/Index)<sup>60</sup>

First of all, it is crucial to understand the need of the direct debit scheme. Generally, lots of service providers collect the payment for their services on this way, because it is more convenient to handle the payments of their clients at interbank level. The participants are the following: there is a debtor who uses the services of the creditor at the commercial level. The debtor's bank and the creditor's bank builds up the interbank level. The last participant is the clearing and settlement operator. The following chart shows the steps of the SDD Core.

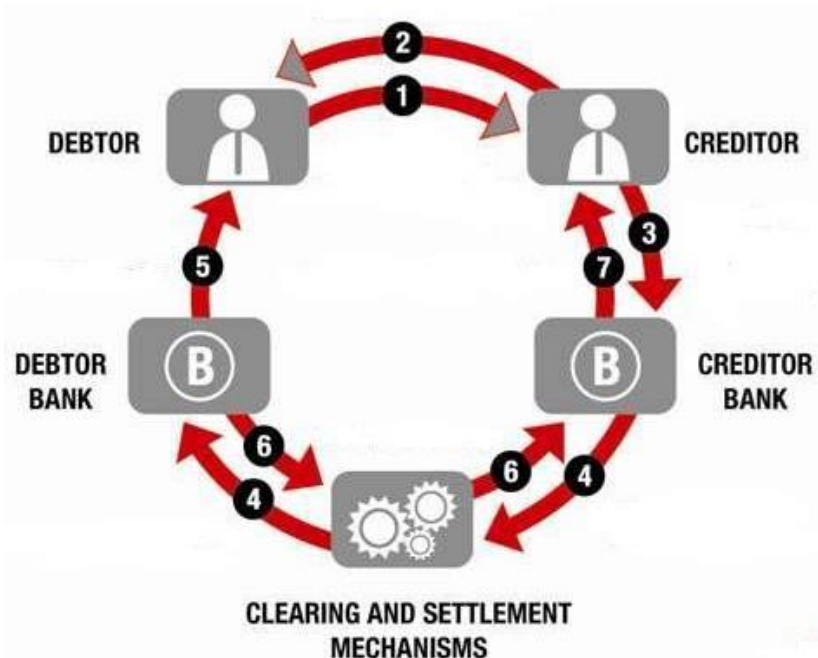


Figure 15. Steps of SDD Core: Unicredit Bank

60 SEPA Hungary/Index Source: <http://www.sepahungary.hu/index.php/sepa-hu/sepa-adatok.html>

Firstly, the debtor gives authorisation, what is called a mandate, for being the subject of the direct debit procedure of the creditor (1.). A debtor must be careful and sure about creating obligations towards a creditor as a mandate is valid for 3 years after the last collection. The paper or electronic format mandate must be at the disposal of the creditor for a minimum of 14 months after the last collection. On the other hand a debtor has the right for instructing its bank not to fulfil any SDD obligation. In case of the payment is due the creditor informs the debtor (2.). Due to the legal permission the creditor can claim payment from the debtor, but it will initiate the payment by an instruction for collection to the creditor's bank (3.). Afterwards the partner bank sends a message into the CSM to provide information about the instruction and prepare the CSM to the SDD procedure (4.). As the message reaches the debtor's bank it informs the debtor about the amount of payment deducted from its account (5.). Finally, the payment order does trough the CSM (6.) and will be credited on the creditor's bank account (7.).

**c) SEPA Direct Debit Business to Business (SDD B2B) (SEPA Hungary SDD)<sup>61</sup>**

The SDD B2B is a modified scheme of the SDD, in order to serve the European businesses in a more effective way, by enable them to maintain their payment. The service is based on the principle of automated payment processing. For participating in SDD B2B the institution needs a central account in order to create the possibility of clearing and settlement. The instalment of the SDD B2B can provide benefits for speed up the internationalisation of the European businesses, due to the centralised SEPA infrastructure. Like the SDD the B2B scheme is also opened for institutions within the SEPA zone. Similarly to the SCT and the SDD the SDD B2B relies on the standard of ISO 20022. The essence of this scheme is to reduce costs of operation and harmonise the collection of the businesses. Generally the problem occurs quite often when companies does not meet with their obligations on-time. The SDD B2B helps for creditors to collect their funds when a payment is due. In case the SDD B2B becomes wide-spread a wide-spread solution among the European businesses their cash flow will experience favourable effects. The whole economy will feel the well-being of the businesses as the European businesses are connected to each other through their supply chain. However to offer the SDD B2B scheme is not compulsory for the payment providers.

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61 SEPA Hungary SDD Source: [http://www.sepahungary.hu/uploads/shortcut\\_sdd.pdf](http://www.sepahungary.hu/uploads/shortcut_sdd.pdf)

Regarding the operation of the SDD B2B it is a modified and customised version of the SDD for the businesses. The following features of the SDD B2B are the differences between the two schemes. First of all, the most significant feature is that within the services based upon the scheme there cannot be private individuals as participants. In addition a debtor is not permitted to withdraw a refund after a valid request of payment. In order to eliminate a default case in the SDD B2B scheme it is necessary for the debtor's bank to control the validity of the mandate and investigate its strict compliance, because the debtor and its partner bank must approve the authorisation of the payment. Finally, the experts of SEPA were keen on to satisfy the needs of businesses by feaster processing and execution time.

The EPC frequently updates its guidance for SDD B2B participants. The last version was published in October 2014, in which essential information is included to show the correct manner of creating, signing and checking the mandates issued. For example, the identification of the permissions relies on the unique mandate reference. In practice it is more beneficial to issue separate mandates for each of the businesses with the same debtor. In case a debtor refuses one mandate it will block all of the other collections under the same mandate.

#### **d) SEPA Cards (EPC)<sup>62</sup>**

The SEPA Cards concept was published by the EPC and the Cards Stakeholders Group (CSG) in 2009. Besides the EPC the presence of the CSG in this concept is essential as it represents the participants of the card industry and the CSG is responsible for the standardisation process of the SEPA Card Framework. Their united will is to provide Pan-European conditions for card payments. This serves the convenience of the residents of the SEPA zone. Due to the convenient service, the EPC hopes that the cash supply of the euro currency can be reduced in the future. The concept includes more possibilities for cardholders and even merchants, as they can choose among the services, issuers and acquirers. As a result the European cardholders will be in a favourable situation. The wider choice between the services will lead to competition at the market. Observing the fact that the EPC wants to regulate the market of the card networks, it must show a long-term commitment in the competition between the participants of card payments. In order to provide guidelines and

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<sup>62</sup> EPC SEPA Vison for Cards Source: <http://www.europeanpaymentscouncil.eu/index.cfm/sepa-vision-for-cards/sepa-vision-for-cards/>

regulations of the concept, the EPC and the CSG issued the seventh version of the SEPA Card Framework in January 2014.in which the principles of the project are mentioned in a detailed way. Due to one of the regulations of the current framework the issuers and the acquirers must produce services based on the SEPA Card concept till January 2017.

In my opinion the key words of the SEPA Cards are the following: standardisation, harmonisation, and competition. The card networks and its participants must be ready for the implementation of different rules in accordance with the key features of the framework. The cooperation of the EPC and the discussions within the CSG ensures that the installation of the framework will apply the best regulatory environment and the most update technical requirements. In addition the CSG emphasises the development of cost-efficiency and more functionality of the cards. According to their view, these are the factors of a competition.

Furthermore, key importance is given for the EMV chips in the procession of SEPA Card payments. The EMV stands for the acronym of Europay, MasterCard, and Visa and it refers to the integrated circuit card. Both the traditional and the contactless cards are mostly based upon this standard. The choice for the EMV was obvious, as at the European market they are the most wide-spread solution in Europe. In the SEPA zone the use and acceptance of the EMW cards are recorded and it can be concluded that this standard rules the European market. The following chart mentions data about the acceptance as of 2011.

<b>Acceptance of EMV Cards in SEPA</b>	
<b>Card</b>	87.2 %
<b>Point of Sale</b>	94.2 %
<b>ATM</b>	96,7 %

**Figure 16. SEPA vision for Cards :EPC**

In connection with the success of the SPEA Cards the security and fraud elimination are essential principles. It is crucial to say that the EMV cards do not store the PIN on the cards, in their chip. Pin serves as a key of identification for the network to enable the management of the cardholder’s data. The EPC supports the programme of anti-fraud practices in order to establish the security of payments between the clients and the merchants. SEPA Cards can control the fraud against cards in case of the services are migrated and get integrated into the concept. With cooperation of the CSG they are constantly developing solutions for traditional, contactless EMV cards.

#### IV. **Services of ACH** (Interviewee)<sup>63</sup>

In this section I would like to mention the possible services offered by an ACH. The banks had major role in the establishment of ACHs and they had impact on the required services. The most essential principle is whether there is a need of an ACH. In case the obligor and the beneficiary have accounts at the same bank, so the value of the payment remains in the bank. Therefore, the intrabank transactions are not cleared by an ACH as the position of the bank does not change. While the interbank transactions must be cleared, settled, monitored and recorded because the payments between the banks will change their final positions. Nowadays, banks try to offer services on a large scale. I investigated them in order to provide a detailed overlook which one of them has to be managed by an ACH. The following services are interbank transactions.

1. **Simple Credit Transfer:** The simple credit transfer is an initiated transaction by a private person or an institution. It is the realisation of meeting their obligation by crediting the beneficiary's bank account. The majority of the European transactions will be cleared by a domestic ACH and settled by their respective central banks. The national ACHs have special agreements on the management and the charges of credit transfers.
2. **Collective Credit Transfer:** It is usually offered for companies and enterprises. For instance, these businesses usually transfer the wages of the employees via this service. Firstly, the company sends a request to its bank to credit the accounts of the workers. The bank sorts out the beneficiaries who are the clients of the initiating bank as well and credits their account immediately. For those employees who have bank account at different institutions an ACH manages the clearing upon the instruction of the initiating bank. The bank sends the necessary information for clearing to the ACH in a defined electronic format. The ACH separates the payment orders gathered in one file and sends the beneficiaries' bank. Finally, they will credit the amount on the employees' account.
3. **Simple Direct Debit:** The simple direct debit is the service when a beneficiary instructs its bank to collect payment from the obligor's bank account and credit it to its own account. There must be a mandate to ensure the possibility of the transaction. At simple direct debit there is no permanent need to manage this type of transaction. In the aspect of the

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<sup>63</sup> Zoltán Huszár- Interviewee

ACH it will see the instruction as a payment order and as the obligor's bank forwards the payment, it will be cleared and credited on the beneficiary's account.

4. Collective Direct Debit: the difference between the collective and the simple direct debit is that there is a need of permanent or periodically instructed transactions. It is usually applied by service providers to debit their clients (obligors) bank account upon the instruction of a service provider company (beneficiary). In order to manage this transaction the obligors must give permission (mandate) for the service provider which enables the legal background of the instruction. In the first round the instructions are handled as payment orders by the ACH who will address them to the obligors' banks. Secondly, the obligors' banks send the payments requested and the ACH will credit them on the beneficiary's account.
5. Security Transfers: Each of the regional and nation payment infrastructures has a specialised ACH for the clearing and the settlement of cross-border and national security transactions. In 2011, there were 25 operating security settlement systems (SSS) in the Eurozone. BIS (2012)<sup>64</sup> In Hungary the KELER executes the clearing and the Hungarian Central Bank is responsible for the settlement. The number of these transactions in Hungary is moderate. However they have higher values than retail payments do.
6. Prompt Collection: The prompt collection is an urgent instruction. For instance, it can be initiated by the National Tax and Customs Authority in Hungary. The subject of the collection can be a private person or any legal entities. The authority instructs the bank of the obligor to forward the payment to its own account. The ACH has a role to clear the payment. Prompt collection is usually requested in case of high priority and high value payments. The features defines that these kind of collection is executed in the high value payment systems. In Hungary it may be processed by the VIBER, so the Hungarian Central Bank will clear and settle the payment and credit it to the account of the authority. However, there must be enough funds on the subject's (obligor) account. Otherwise the authority is entitled to initiate a liquidation procedure.

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64 BIS (2012) Payment, clearing and settlement systems in the euro area

## **V. European Wholesaler**

### **Equens SE**

In my opinion Equens SE is a wholesaler institution in the payment infrastructure as it covers three fields of main activities within the payment industry.

1. First of all, it is an Automated Clearing House for with clearing and settlement services.
2. Secondly, it is a Pan-European payment processor for card payments.
3. Equens is a SEPA service processor as well.

Equens achieved a remarkable development and it became one of the most significant actors in the European integrated payment infrastructure. Originally, the Equens operated as a holding, in 2006. Afterwards, it transformed into a Societas Europaea (SE) in 2008, in order to offer a Pan-European solution for the members of the EU common market. The Societas Europaea is a legal form for a company which was established in the European Union. Due to notable unification with the Dutch Interpay Nederland B.V., and the German Transaktionsinstitut für Zahlungsverkehrsdienstleistungen AG, the Equens reached pole position among the payment processors in Europe. (Equens Homepage/History)<sup>65</sup> Today Equens, has offices in Utrecht (NED), Frankfurt am Main, Stuttgart (GER), Milan, Rome (ITA), London (UK), and Helsinki (FIN). However, Equens cooperates with multiple European partners within the European Union. The amount of the transactions processed by the payment processor service of the Equens is “10.6 billion payments and 4.7 billion POS and ATM transactions” (Equens Homepage/About us)<sup>66</sup> per year.

Equens is owned by banks, providing funds for further development. Due to the internationalisation of the firm and the potential of capital of the co-owners, the successful expansion of the corporation is guaranteed. In addition Equens owns four departments, with a specific goal and a defined regional competence. First of all, the PaySquare is an acquirer of international and European payment products. Moreover, it is also an issuer of MasterCard and Visa cards. The next is the InterEgi, what is responsible for the issuing of Chipknip. It is a pre-charged electronic wallet, used in the Netherlands. Thirdly, there is the DZ Service, what is a processor of traditional paper based transactions. It deals with domestic and Pan-European payments as well. Finally, Equens Italia S.p.A used to be a joint venture of Equens

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65 Equens Homepage/History

66 Equens Homepage/About us

and ICBPI (L'Assemblea dei Soci dell'Istituto Centrale delle Banche Popolari Italiane S.p.A). Now it is owned totally by Equens like the other subsidiaries. Eurofound (2011) <sup>67</sup> These subsidiaries enable effective and sufficient European market coverage. The following chart shows the possession of the shares of Equens.

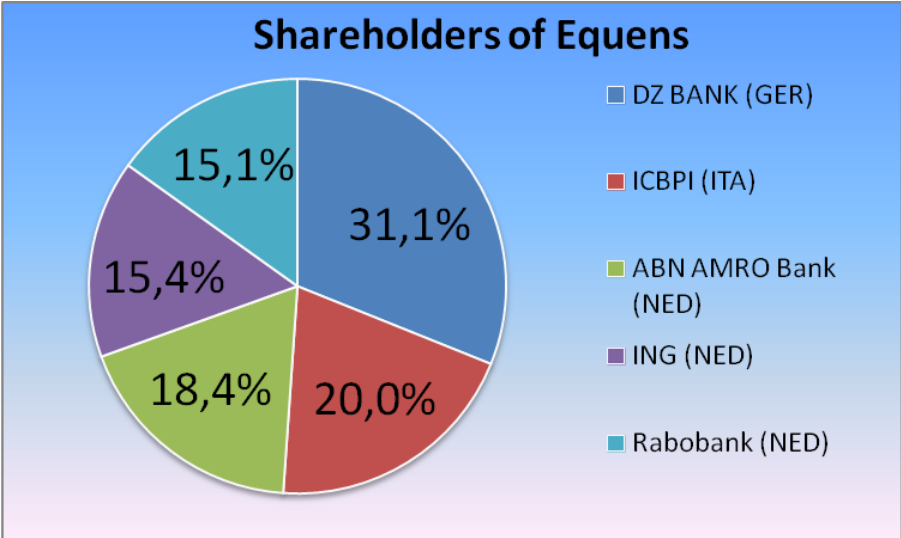


Figure 17. Equens Homepage/Governance

Furthermore I would like to investigate the activities and role of Equens as an ACH and SEPA service manager. Equens must meet with the highest requirements regarding security, speed and variety of services. Their ambition is to develop and gain more market share in the European market. In order to achieve their aims Equens is a constructive member of the EACHA. The EACHA provides its “interoperability framework”(Equens Homepage/ACH) <sup>68</sup>, which enables the operation of the Inter-CSM of Equens. In addition the further cooperation with the EBA network made Equens capable of manages SEPA transactions and ensures its market leader role as a CSM provider in Europe. So these are the fundamentals of their recent success.

Equens deals with three types of SEPA services as main activities. The SCT is crucial to satisfy the sector of retail payments, while the SDD and the SEPA Value Added Services are rather belong to the business sector. Firstly, the SCT is the instrument of having access to that remarkable market coverage, as it is the high-volume and low-cost tool cross-border transfers. Secondly, the SDD is the opportunity for financial institutions to initiate their collections. Thirdly, the SEPA Value Added Services are for those merchants and businesses

<sup>67</sup> Eurofound (2011) Employee involvement in companies under the European Company Statute  
<sup>68</sup> Equens Homepage/ACH



who are the subject of VAT reclaimable affairs. The breakthrough of the CSM of Equens is the 30 minute settlement cycle. From 7:00 (CET) to 17:00 the clearing and settlement is executed twenty times, so it provides lower liquidity risk and lower settlement account balances. According to Equens this rapid operation of its CSM reduce transaction costs and boosts SEPA services. (Equens Homepage/ACH)<sup>69</sup>

## VI. The Hungarian Clearing & Settlement Mechanism

In Hungary, the payment systems managing electronic transactions started to develop in the late 1980's and early 90's. In 2013, the market has 4 participants and 4 platforms as well. In my opinion the Hungarian payment infrastructure is a suitable model for a middle-sized country, because the processing of different kind of payments is executed by different institutions. First of all the, settlement is managed and monitored in the Hungarian Central Bank (Magyar Nemzeti Bank, MNB). The processing of clearing is differentiated by the nature of the payment. For the retail and business payments GIRO Zrt. is responsible. The term of Interbank Clearing System (ICS=Bankközi Klíring Rendszer, BKR) covers their activities as they operate 2 platforms among the 4. The high value transactions are processed via the VIBER system operated by the Hungarian Central Bank. Finally the securities are transferred by the system of KELER. The following chart includes data about the number and value of transactions within the platforms. An interesting data is the ratio of their value compared to the GDP of Hungary.

Monitored Systems by HCB		Number (thousand)		Value (thousand billion)		Value/GDP	
		2012	2013	2012	2013	2012	2013
<b>VIBER</b>		1 556	1 417	1 242	1 287	44	44.1
<b>ICS</b>	<b>InterGIRO1</b>	178 384	158 288	36.7	16	1.3	0.54
	<b>InterGIRO2</b>	76 500	155 323	28.4	59	1	2.03
<b>KELER/KELER CCP</b>		646	699	263.3	266	9.3	9.1

Figure 18. MNB Jelentés a fizetési rendszerről 2014

69 Equens Homepage/ACH

## 1. GIRO Zrt.

First of all, I would describe GIRO Zrt. (Private Company limited by shares), which started its operation in 1994. Initially, it handled only electronic transactions of credit transfer. Later, the system became able to manage direct debit transactions from 1997. This clearing scheme and system was an own development of Giro Zrt. and it was substituted by the InterGIRO 1 platform in 2009. Another essential step was the foundation of cooperation between GIRO Zrt. and SEPA Hungary (Magyar SEPA Egyesület, MSE), in which they agreed on the SEPA standardisation of the clearing segment of Hungarian payment infrastructure. As a result of the cooperation the Giro installed the InterGIRO2 platform, what enables the multiple daily clearing processing in a SEPA standard way in Hungarian Forint. (GIRO Zrt. Homepage/Chronology)<sup>70</sup> Originally, GIRO Zrt. was established by banks. In 2013, the Giro had 23 shareholder banks. Afterwards, the Hungarian Central Bank bought the majority of the shares and nationalised the corporation, in 2014. As a result the Central Bank became the sole (100%) owner of GIRO Zrt. the Hungarian automated clearing house. (GIRO Zrt. Homepage/History)<sup>71</sup>

Regarding the operation of the InterGIRO1 platform, it is crucial to say that the Hungarian Central Bank is responsible for the execution of the settlement. In case the payment is cleared today its settlement is done on the following day. The platform manages paper-based transfers, collections and items of the Hungarian State Treasury. The settlement will be realised based upon the standardised IBI Matrix (Bankszöv.)<sup>72</sup>, which is a term used in the InterGIRO1. It is a dataset containing the total debit and the total credit positions of the clearing members for that given banking day. The platform was designed for execute of simple payment and collective payment orders as well. Collective payment orders can be requested by those clearing members who are capable of handling them. GIRO Zrt. tests these institutions' capability and asks for a paper based conformation of their will. Obviously, the mandate has to be signed by the subject of a direct debit transaction as an authorisation for the collection. The mandates are forwarded in a standardised electronic way to the GIRO, upon which it will be able to execute the collection. In addition, the interbank payment orders forwarded by the direct participants of the GIRO will be executed on its platforms, while the intrabank payment orders will be transferred within the bank from one account o another one.

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70 GIRO Zrt. Homepage/ Chronology

71 GIRO Zrt. Homepage/ History

72 Bankszövetség Fogalomtár

The following collective payment orders can be managed by the platform(GIRO Homepage/Services)<sup>73</sup>:

1. Credit Transfer
2. Direct Debit
3. Postal Cash Payments

The function of the InterGIRO1 is the nighttime clearing. Firstly, the banks can send their transactions from 15:30 (CET). Afterwards, the platform asks for information about the balances of the accounts of the direct participants from the Central Bank till 20:45. The first cycle of the clearing is processed from 22:00, while the second cycle is from 01:00. Finally, GIRO Zrt. sends the results to the direct participants and the Hungarian Central Bank as well. In case of shortage of liquidity or late send-in there is an extra cycle. Legeza (2013)<sup>74</sup>

The other platform of the GIRO Zrt. is the InterGIRO2, which is responsible for the clearing of any electronic transfer regardless its nature, whether it is a single or collective credit transfer order. On this platform there is a possibility of refusal of the beneficiary's bank. In case of an event like the transaction will be directed back to its origin. On the other hand the transactions can be withdrawn which must be approved or refused by the beneficiary's bank. However the major difference between the InterGIRO1 and 2 is the time and number of cycles processed. The InterGIRO2 has a maximum limit of 4 hours for the execution of the clearing. Besides that, it has five cycles per day. The cut-off time of the cycles are the following: 8:30 (CET), 10:30, 12: 30, 14:40, and 16:30. Also the banks define their cut-off time customised for each cycle, without the interaction of GIRO Zrt.. It can be mentioned that the IG2 is an STP system, the results are sent for the Hungarian Central Banks and the direct participants at least 1hour 10 minutes later than the latest cut-off. Legeza(2013)<sup>75</sup>

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73 GIRO Homepage/Services

74 Legeza (2013) Pénz és elszámolásforgalom Magyarországon és az EU-ban.ppt-Legeza Péter 2013 Miskolc

75 Legeza (2013) Pénz és elszámolásforgalom Magyarországon és az EU-ban.ppt-Legeza Péter 2013 Miskolc

## 2. **VIBER** (MNB VIBER) <sup>76</sup>

The VIBER is the Hungarian domestic Real Time Gross Settlement System. In Hungarian it is called as: Valós Idejű Bruttó Elszámolási Rendszer. The system began its operation on 03/09/1999, and the Hungarian Central Bank is responsible for the management and maintenance. VIBER was designed for the settlement of high-value, low-volume, and priority payments. The platform is automated in order to ensure the real-time interbank transfers. After their realisation the payments are finalised and irrevocable. Afterwards, the participants get informed through the SWIFT network about the arrival of the claimed funds. The VIBER functions between 8:00 (CET) and 18:00 but the cut-off time is 17:00. It means that the CSM runs one an additional hour after to ensure the execution of clearing and settlement.

Besides the settlement of high priority payments the VIBER can process the Hungarian Forint (HUF) side of the Delivery Versus Payment (DVP) securities, and the transactions of the Hungarian Central Bank. Participants of the VIBER are the credit institutions, KELER group, the Hungarian State Treasury, the Hungarian Post, and of the Hungarian Central Bank. (MNB Kiadványok (1999))<sup>77</sup>

The payment will be executed in case of sufficient financial hedge of the given participant. However, the criterion is differentiated between financial transactions and securities' transfer. Therefore the restriction regarding financial transactions is the need of a positive balance of the RTGS account of the participant, while the hedge of security transfer is provided by the intraday credit limit of the Hungarian Central Bank. The amount of this credit limit can be modified daily and the HCB does not counts interest rate upon the use of its intraday credit.

There is an algorithm integrated into VIBER which analyses and prevents the phenomenon of circular debt. On the other hand by the effective liquidity management and central monitoring the operation of the algorithm can be supported. The participants pay 320 HUF for one transaction.

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<sup>76</sup> MNB VIBER

<sup>77</sup> MNB Kiadványok (1999)

### 3. **KELER** (KELER Homepage)<sup>78</sup>

The KELER was founded in 1993 by three major players with the purpose of offering clearing and services for the transfers of securities, stocks, bonds, and commodities, in order to satisfy the need of the major participants of the Hungarian stock market. Now the Hungarian Central Bank owns the 53.33% of the shares, while the Budapest Stock Exchange have 46.67% of them.

KELER has direct and indirect participants like any other clearing house. However, the transactions requested of its participants have more characteristics due to their nature. Their background is more complex so that is why the GIRO cannot handle such payments and a specialised clearing house had to be set up. In addition, the KELER's direct participants vary on a greater range. From the credit institutions, investment group, commodity providers, investment fund providers, exchange houses of the energy sector, to the security issuers are the direct participants of the Hungarian KELER who provides the platform of exchange and clearing for their transactions. On the other hand the settlement is executed by the Hungarian Central Bank upon the clearing information of the KELER.

According to the characteristics of the services of KELER, three classes can be determined. First of all, the KELER is responsible for the management of the Hungarian Central Treasury. In connection with this obligation the KELER issues, register, monitor, store, and withdrawn dematerialised securities. So the first group contains the services of the KELER linked to its treasury options like custodian and security account activities. (KELER CCP Rules)<sup>79</sup>

In the second group there are the services offered by the KELER CCP (Központi Szerződő Fél Zrt., KSZF) what is the specialised subsidiary of the KELER group. The KELER KSZF guarantees the legal background of clearing and backs the real time settlement of the security transactions by the Hungarian Central Bank. It relies on international standards to ensure security and trust. So the KELER is still obliged to realise the clearing and deal with the security accounts of the participants. The KELER KSZF has a special status within the Hungarian VIBER RTGS. It manages the clearing of the DVP and energy market businesses, provides guarantees and support for the security account for the clients.

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78 KELER Homepage

79 KELER CCP Rules

Thirdly, the KELER has services for the harmonisation of dividend payment, share and stock management and clearing of cross-border security transfers. Due to this feature the KELER is a service provider in a competitive environment as the European market has many institutions with the same service. There is a higher level of competition than at the market of the CSM providers.

## **VII. Research**

### **European Clearing & Settlement Network**

Besides the analysis of the risks, arrangements, actors and products of the European electronic payment systems I would like to investigate their impact on the integration of EU payments. This section is the essence of the final conclusion.

First of all, it has high priority to define the major participants of the European payment infrastructure. They are institutions who provide platforms for clearing and settlement of the transactions and enable the safe and trustworthy communication in case of interbank transactions. Moreover, they rely on each other's platform, technique, and standards. There is continuous and prosperous cooperation between them. In order to describe these interdependencies, a list is provided for the reader to gather the institutions with the brief description of their role.

1. SWIFT (La Hulpe, Belgium): The most essential institution in the aspect of the interbank communication. It ensures the secure and reliable information exchange which guarantees the fundamental communicational background of electronic payment systems at international, regional and national level as well. SWIFT serves as a trusted third party for the communicating banks as the principle of non-repudiation is satisfied. The SWIFT regulates the major standards of the financial market as it is the Registration Authority (RA) of them, enabled by ISO. As a result the SWIFT's standards act as the key components of European electronic payment systems. The participants of EBA Clearing's system, services and European ACHs rely on SWIFT services and communicate by its message formats.
2. EBA Clearing (Paris, France): It was founded by the Euro Banking Association (EBA) for the management of clearing activities. However it became the operator of EURO1, STEP1, and STEP2. The EURO1 is the RTGS payment system for large-value and low

number of transactions in EURO. While the infrastructure of EURO1 is maintained by SWIFT. The STEP1 payment service is for low value and large number of transactions in EURO which uses the infrastructure of EURO1. Meanwhile the STEP2 is the Pan-European ACH (PE-ACH) designed for the clearing cross-border payments in EURO. It is the PE-ACH what manages the SEPA transactions and provides possibility to migration into SEPA. Member states can use the STEP2 platform for clearing and leave behind their infrastructure. As a result they will reduce cost of operation and maintenance. However, a SEPA services manage transactions only in EURO currency.

3. European Central Bank (Frankfurt, Germany): The European Central Bank is the responsible authority of the monetary policy of the European financial market and it backs the financial stability of the Eurozone. Due to this feature the ECB controls the inflation of the EURO as well. Furthermore, it is the operator of the TARGET2 RTGS system which is owned by the Eurosystem. It has crucial importance regarding the settlement of the EURO transactions as the European Central Bank is able to provide unlimited liquidity to manage settlement. The system also serves the settlement of the SEPA transactions. Therefore, it is a key component of SEPA infrastructure and concept. In connection with TARGET2 the other major point is its linkage with the STEP2. The STEP 2 uses the platform of the TARGET2 for settlement of the retail payments cleared by the STEP2. Like that the ECB has continuous monitoring of the transactions managed by TARGET2 and STEP2

In order to summarise my research about the connections and interdependencies of the above mentioned institutions, systems, and services, I would like to include a chart about their relations and support for each other. The different colours show other type of characteristics. In green, there are the major institutions. The red arrow depicts the nature of the connection between the institutions and the systems and services. The light orange boxes emphasise the type of the systems and services. The blue arrow shows essential relationships for the SEPA infrastructure in order to show the background of the integration of the European electronic payments.

## Interdependence of European Electronic Payment Systems and Services

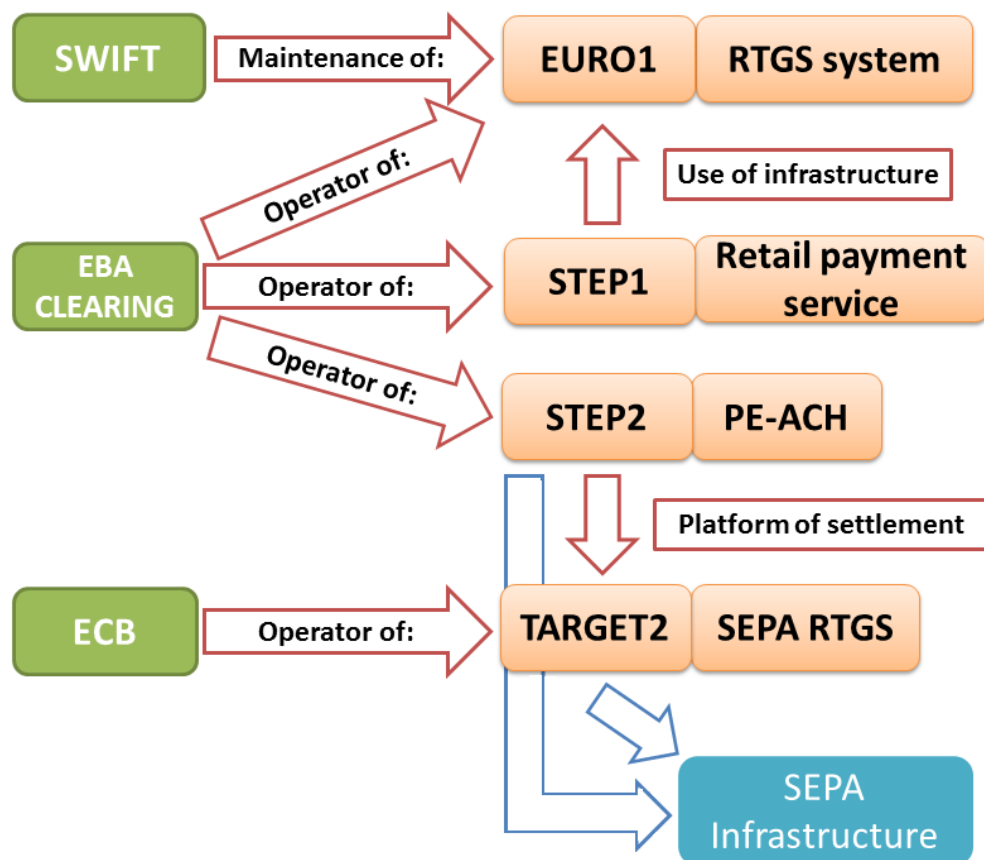


Figure 19. By the Author

### VIII. Conclusion of the Thesis

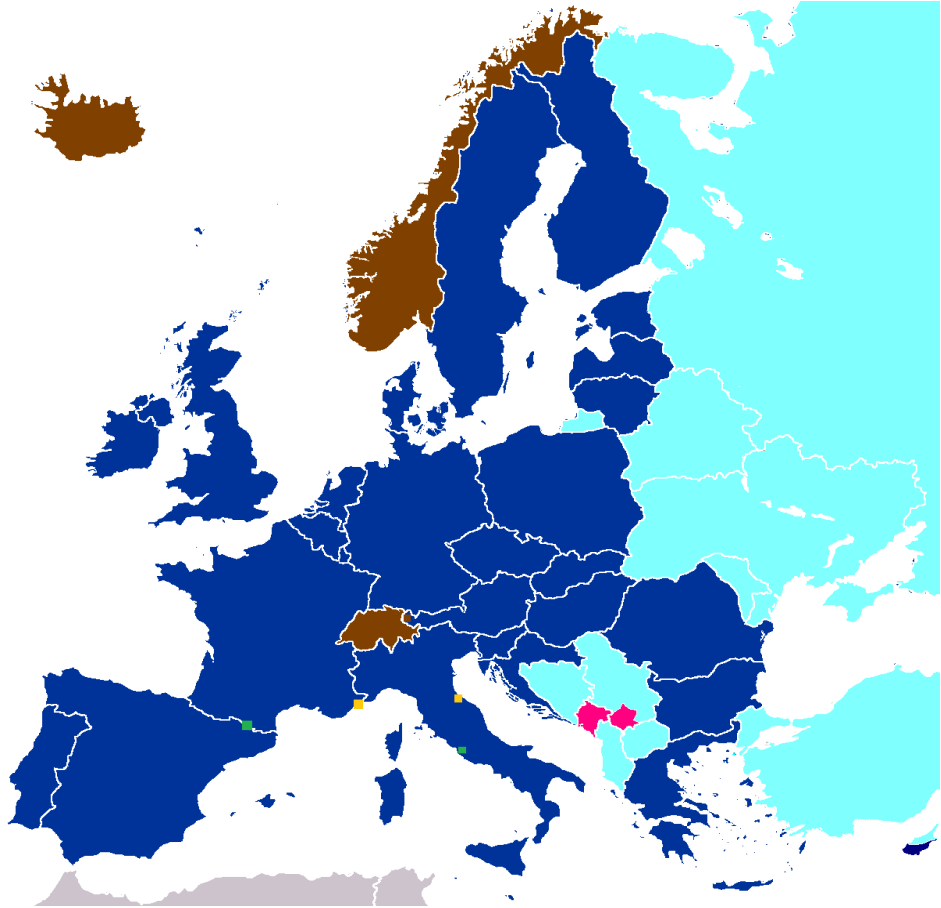
The previous chapters were essential to execute the research and back support my conclusion. When I started to investigate the topic I asked the question whether it is possible to integrate the European electronic payment systems. In my opinion, the Single EURO Payments Area (SEPA) concept is an efficient tool of the integration of the payment infrastructure of different member countries. As I mentioned before there are strict guidelines and standards and every candidate must meet with the requirements.

Furthermore, the European Commission created the legal background of SEPA which is called the Payment Service Directive (PSD). This directive contains the agreement between the European Payment Council (EPC) and the European Parliament, and defines a deadline for the instalment of the SEPA provisions and guidelines. It was 1 February 2014 for Eurozone members, while non-Eurozone members have the deadline for 31 October 2016. The migration into SEPA is compulsory for all EU member states, so they are all SEPA









member states. It shows a strong commitment towards the standardisation of the EURO payments. The map of the SEPA zone shows important information about the state of payment integration as of 2014.

Integration of Electronic Payments in Europe  
in 2014



170. Figure By the Author

Legend:

SEPA members	
Non SEPA members	
Additional SEPA members: EFTA countries	
Additional SEPA members: Non-EU or EFTA countries	
Use EURO officially, but not SEPA member	
Non EU and SEPA members, use EURO unofficially	

According to the map, the SEPA serves as the major link between the EU member states to standardise their EURO payments. As a result, the integration of the EURO payments started to appeal countries which are not the members of the European Union. In case of the EFTA countries it became essential to cooperate with the European Union because they have significant trans-and international trading activities with the EU member countries. Therefore, they benefit from the reachability of SEPA services and transactions in EURO. Monaco and San Marino joined as well. These countries have payment infrastructures at the highest standards, so their will to entry into SEPA was welcomed. On the contrary, those countries which have less developed payment infrastructure must provide a secure and reliable background suitable for SEAP services. In the case of Montenegro and Kosovo where the EURO was adopted unilaterally the SEPA services are not installed.

In my point of view, the integration of the European electronic payment systems and infrastructure can be realised at a higher level in the near future. Sharing same standards and platforms can offer cost reductions to the member states. The common currency is an essential component of the success as the EURO electronic transactions do not imply exchange rates and customers can experience less costs as well.

On the other hand, it seems that the EU and SEPA member countries will stick to their infrastructure and will not migrate in 100% to SEPA platforms. The national institutions of the payment infrastructures like ACHs want to maintain their key role within their county. As a result, there might be opposition towards migration. Moreover, competition can emerge between national institutions and trans- or international payment service providers.

I think that most of those European countries which are not EU members yet will be able to develop well-operating systems ready to adopt the SEPA rules and services into their infrastructure. However, the expansion of the SEPA zone must be a careful procedure and enough time and support should be given to the new members. In 2014 the size of the SEPA zone reached a vast area and integrates 34 countries. In my opinion, the expansion should not be the most important vision now. Well-functioning integrated payment infrastructure can operate better under higher control without unprepared participants.

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