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## Effects of Two New Inter-organisational Systems to settle Cross Border Euro Payments between Financial Institutions in Europe

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### Abstract

Previous research indicated that the performance of inter-organizational processes in electronic markets and hierarchies is influenced by eight factors: stakeholders, competition, information technology, market network (re)design, risk, process (re)design, information, and trust. This paper focuses on the inter-organizational processes related to the settlement (clearing) of cross border Euro payments. As of January 1999 the European Central Bank has intermediated the existing network of banking organizations by offering two new alternatives (TARGET and EBA). Two conclusions can be drawn from this case study. First, the process performance criteria critical mass, accurate price discovery and transparency which are important in Transaction Oriented Electronic Networks are less important in Processing Oriented Electronic Networks. Second, differences in stakeholder motives have led to problems for certain stakeholder groups, both in the development phase as well as after implementation of the two new systems.

### 1. Introduction

The financial sector has changed in many ways over the last decades. First, the numbers and volumes of transactions have grown tremendously, for instance, the total transaction volume of financial securities is currently well over US\$ 25,000 billion per year in the US alone [4]. Second, stakeholder interests of various financial institutions have changed because of increased competition, the developments in IT and the developments towards electronic markets. Third, globalization of the industry and increased competition have led to consolidation and diversification in the industry, differentiation in services offered, and increased importance of risk management. Fourth, developments in IT create opportunities for organizations to communicate electronically, thus improving the speed and quality of information exchange and enabling and supporting the globalization of the industry.

The goal in this paper is to identify relations between market network design and the performance of inter-organizational processes. In this paper we focus on the

effects of two new inter-organizational systems to support financial transactions in Euro (EUR) between banks. The European Central Bank (ECB) influences the financial market by managing and coordinating monetary policies related to the Euro. To support this the ECB has developed two new systems, a real time gross settlement system (TARGET) and a net settlement system (EBAS). As a result banking organizations now have several alternatives to settle cross border Euro payments. This paper provides insight into the development and implementation of the two new systems and gives an overview of the alternatives that banking organizations may use.

The case study method was used because it enables 'reality' to be captured in considerable greater detail than other methods and also allows the analysis of a considerable greater number of variables [16,43]. The Euro Settlements Case Study is based on the Internet sites of the European Central Bank, the site of the European Banking Association and interviews with industry experts that have worked on the development of the new system and with industry experts working at banking organizations that use the new systems.

This paper is structured as follows. Section 2 and 3 summarize theory on electronic markets and the research framework and propositions used in this study. The Euro Cross Border Payments Settlement Case study is described in section 4 and analyzed in section 5. In section 6 electronic market developments in the Euro case are compared with seven other case studies. In section 7 conclusions are drawn.

### 2. BPR and Electronic Markets theory

#### 2.1. Levels of Business Process Redesign

A well-known framework for analysis of the impact of IT on organizations is the model by Venkatraman [41,42]. In this model five levels of IT-induced business transformation are distinguished. The first two levels are regarded as evolutionary and the other three levels as revolutionary. The evolutionary levels take the existing situation as a point of reference and the revolutionary levels take the desired situation in a market network as a point of

reference. The revolutionary levels require radical changes in business practices [41,42]. To achieve the benefits of revolutionary levels fundamental knowledge is required of the entire business network. Toppen et al [39] argued that a Business Network Integration level should be added between the Business Process Redesign level and the Business Network Redesign level (figure 4), because an integrated network of (redesigned) business processes can exist without a redesign of the business network as a whole.

Clark & Stoddard [6] support the claim of Venkatraman that benefits will increase when IT is integrated with business processes. They propose a framework that focuses on the '...merging [of] technological and process innovations in order to achieve the potential to transform both organizations and inter-organizational processes and relationships'. Benjamin et al [2] argued that the benefits of Electronic Data Interchange, especially cost savings resulting from EDI projects, can only be realized when basic organizational structures and work processes are redesigned. Stoddard & Jarvenpaa [35] identified the need to assess risks and costs in deciding to either follow an evolutionary or revolutionary approach, as well as to review the possibilities embedded in the capabilities of the people in the organizations that are being confronted with these changes. Benjamin & Wigand [3] addressed the developments in value chain linkages based on IT and identified the bilateral links between buyers and suppliers by using EDI techniques. These database links and sharing databases between firms are described as electronic supply chain integration. This does not necessarily involve redesign of business processes.

## 2.2. Electronic Markets

Markets coordinate the flow of goods and services through supply and demand forces and external transactions between individuals and organizations. Hierarchies, on the other hand, co-ordinate the flow by controlling and directing it at a higher level in the managerial hierarchy [26]. IT affects both markets and hierarchies in the sense that more information can be communicated in the same or less amount of time and because the costs of communication decrease. Markets are believed to benefit more from IT than hierarchies because the unit costs of co-ordination is likely to decrease more because of IT [26].

Electronic markets might arise from either a non-electronic market or from an electronic hierarchy spanning organizational boundaries. However, it should be realized that different stakeholders have different interests in the development of electronic markets or hierarchies [20]. The success of an electronic market is depending on the shared interest of the different stakeholders involved. Malone et al. have addressed the fact that the development path towards electronic hierarchies should be step by step, first by linking

stand-alone databases and subsequently work towards shared databases [26].

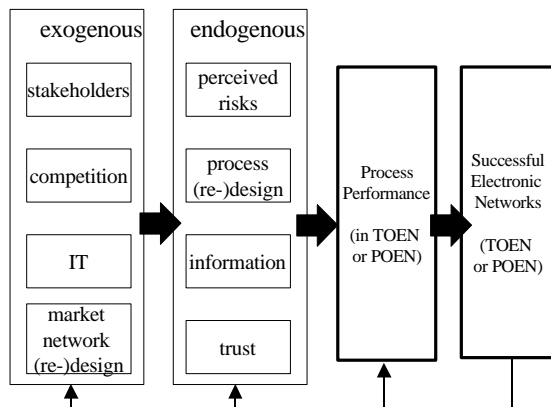
Electronic hierarchies, contrary to electronic markets, are characterized by privileged access to market data and are formed by small groups of vertically arranged companies that develop very close relationships between themselves, forming a virtual hierarchy [24]. Clemons et al. examined the impact of IT on the organization of production and presented the 'move to the middle' hypothesis, indicating a third market form 'networked organizations' [10].

A critical drawback of research related to electronic markets is the fact that markets are often defined and treated in abstract economic terms (i.e. markets co-ordinate economic activity through a price mechanism). In reality, different market structures exist, each organizing trading processes and related information processing activities in different ways [20]. Therefore research on electronic markets has moved into the description and analysis of cases. Examples of the case study approach of electronic market (the pricing and trading aspects) are CALM, AUCNET, Plants trading, CATS [7, 25, 39]. It was concluded that IT is a necessary factor but insufficient for reengineering to be successful. Additional factors such as management capabilities to overcome social and economic barriers, standard product quality ratings and inspections, quick achievement of critical mass, and preparation for resistance and retaliation are major critical success factors for the emergence of electronic markets.

## 3. Process performance in electronic networks

Figure 1 shows the framework presented by Toppen et al. [38,39] giving four exogenous and four endogenous factors, which influence the performance of intra-, and inter-organizational processes. The exogenous factors (Stakeholders, Competition, Information Technology and Market Network (Re)Design) have an impact on the organizations that operate in a business network. Schwartz [31] mentions market design characteristics that are applicable to securities markets (transaction oriented markets): competition, information flows, order types, order handling, rules of order execution, price improvement, use of electronic equipment, participant flexibility, price discovery mechanism and regulation.

The exogenous factors are beyond the scope of influence of an individual organization, but affect the endogenous factors, that are within the scope of influence of an individual organization. The four endogenous factors are Risks (perceived and real risks) [12], Process (Re-) Design [13,18,21,28,29,36,40], Information [5,14] and Trust [15,30]. These factors influence the performance of inter-organizational processes. Process performance can be related to intra-organizational as well as to inter-



**Figure 1. Research framework (Toppen et al., 1998)**

organizational processes, or to both [17,31,38,39]. The level of scope for process performance is determined by the degree of business transformation, indicated in the Venkatraman model [41,42].

With Clemons and Row [9] and Benjamin et al [2] we distinguish between transaction processing and process oriented markets. The primary characteristics of *Transaction Oriented Electronic Networks (TOENs)* are that buyers and suppliers do not need to know each other (because of intermediaries) and the important elements are price and quantity related to the transaction. *Processing Oriented Electronic Networks (POENs)* are characterized by direct and close relationships between organizations and that more elements are necessary in communication between the organizations [39]. With Bakos [1] we distinguish 'bilateral forms of integration' in situations where buyers and sellers already have established a relationship and 'multilateral situations' where the electronic market system is used to establish new buyer-seller relationships.

Process performance criteria for Transaction Oriented (Electronic) Networks are liquidity, transparency, accessibility, low transaction costs, accurate price discovery, and adequate information about product, recent transactions, and current prices [31, see also 39]. Toppen et al [39] give criteria for POENs: throughput time, reliability, quality, efficiency, costs, risks, controllability, flexibility, logistic performance.

Successful electronic networks provide market quality [8,11,27] that consists of better performance of one (electronic) market institution compared to traditional market institutions or to other electronic market institutions. Market quality refers to the quality, the goods/services traded, the price and transaction costs, and the market process itself of the entire market. The entire market consists of the market institution, the intermediaries and the buyers and sellers.

This paper presents the Euro Cross Border Payments Settlements Case and focuses on the effects of IT related market network redesign. The eight factors in the research framework and the following propositions were analyzed:

- Proposition 1: Convergent stakeholder motives contribute to process performance improvements resulting from Market Network Redesign and Process Redesign.
- Proposition 2: Competitive pressures force stakeholders to redesign their internal business processes to adapt to the changing business environment.
- Proposition 3: Adequate entry barriers contribute to the success of electronic market network redesign.
- Proposition 4: Process Performance criteria critical mass, accurate price discovery and transparency are more important in TOEN than in POEN.

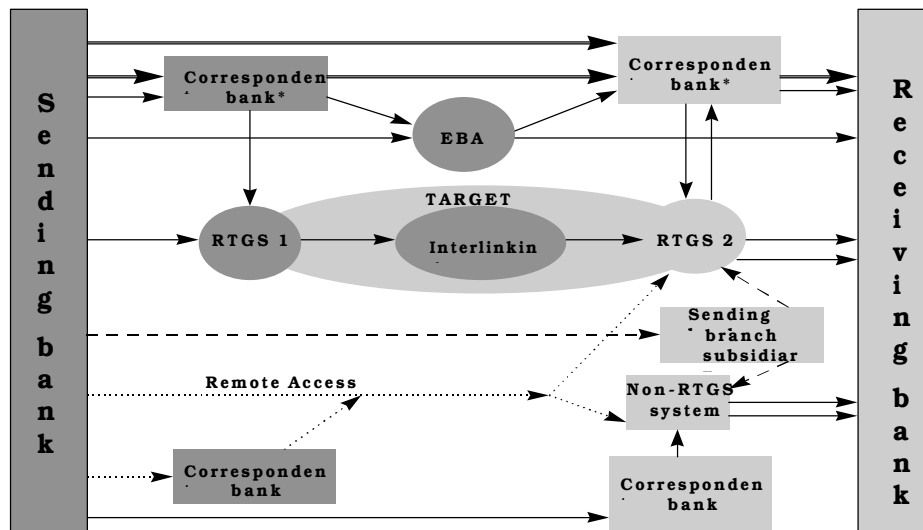
The Euro case is compared with seven other case studies derived from previous research.

#### 4. Euro Payments Settlements Case

As of January 1 1999 the Euro (EUR) has been implemented as the new currency for the 15 countries participating in the European Monetary Union (EMU). Although real physical money will be available and replacing current national currencies only as of January 1 2002, there was a need for cross border Euro settlement systems as of January 4 1999. Previously, cross border currency settlements took place through the Bank for International Settlement (BIS) in Basle using the European Currency Unit (XEU). Because of the European Central Bank's new responsibilities and the expected increase in volume of cross border Euro settlements after implementation, two new systems have been developed by the ESCB (European System of Clearing Banks) and the ECB (European Central Bank). These systems are called TARGET (Trans-European Automated Real-time Gross settlement Express Transfer) (paragraph 4.1) and EBAS Euro system (European Banking Association Euro System) (par. 4.2). In 4.3 an overview is given of the current alternatives to banking institutions for the settlement of cross border Euro payments.

##### 4.1. The Target System

TARGET is aimed to be used for high value payments (*wholesale payments*) and can be seen as an linking system between national Real Time Gross Settlement Systems (RTGS) that are operated by national central banks (NCBs). TARGET can be used by around 5000 participants from 15 countries and TARGET can reach almost any credit organization. The fees of cross border payments through TARGET are 1.75 EUR for each of the first 100 transactions per month, 1.00 EUR for each of the following 900 transactions per month and 0.80 EUR for each transaction above 1000 per month, to be paid by the paying bank. Billing will be carried out by the national central



**Figure 2. Various routes for cross-border euro payments (source HSBC through ECB)**

bank in the country of the paying bank. There is no fixed annual fee. The TARGET system is more expensive than a domestic RTGS payment, which costs around 22 Eurocents. The system enables cross border Euro payments to be processed within minutes or even seconds. Because the system is a gross settlement system, every payment is processed separately. The opening hours of TARGET are between 7 am and 6 pm Central European Time.

The difference between wholesale payments and commercial payments is illustrated by the following example. The Dutch TOP system is used to carry out around 16,000 payments per day with a total value of around 35 billion EUR per day. If one compares this with commercial payments volume of around 4 billion payments per day with a value of around 2 billion EUR per day, it can be seen that different process and system requirements apply (for instance related to risk management). Commercial payments are characterized by lower values per payment, but the volume of these payments is considerably higher than that of wholesale payments. In the Netherlands, cross border payments that need to be processed through TARGET can be delivered through the SWIFT or TOP network.

#### 4.2. The EBA system

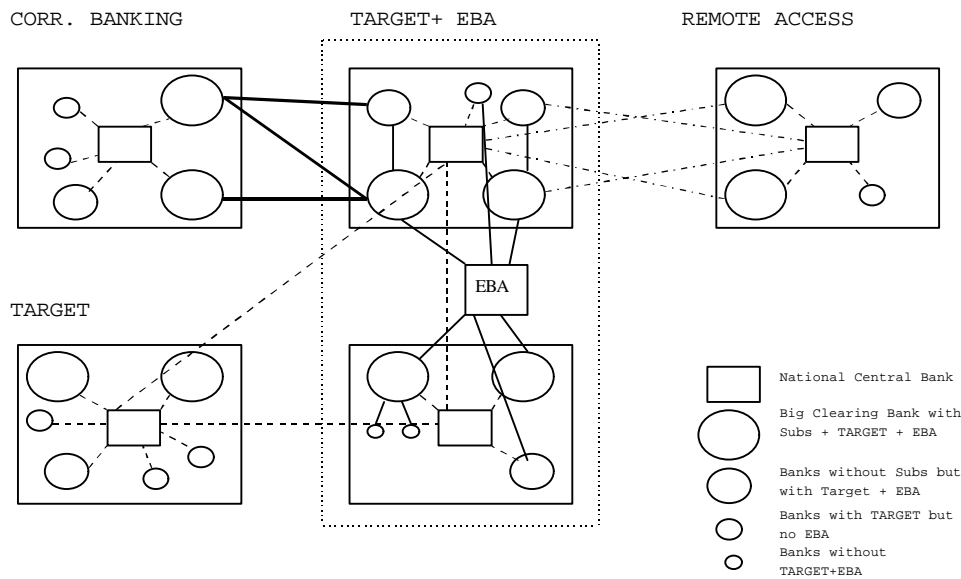
The EBA system is aimed to be used mainly for *commercial payments*. EBA is developed by the ESCB (European System of Central Banks) which has in total 112 members in Europe, Australia, Japan and the US. Sixty-five members have the status of clearing bank (based in Euro zone) and participate in the clearing system that will handle an average volume of around 50 billion EUR per day. The EBA system is a net system, which means that all payments will be held in a queue and settlement/clearing will take

place once at the end of each business day. The settlement/clearing payment by short banks has to be done by paying through TARGET to the European Central Bank (EPM) where EBA has a central settlements account. Therefore, the EBA system is dependent on TARGET. The payment transactions processed by EBA cost around 25 Eurocents (total costs) which is considerably lower than the costs of payments processed through TARGET. Besides transaction related payments which vary between 15 Eurocents or lower (volume more than 5,500 per day) and 20 Eurocents (volume less than 3,000 per day), depending on the number of payments, the fixed annual operating costs of about 9 million US\$ per year have to be paid by the participating clearing banks (25% shared equally and the remaining 75% according to transaction volume). The expected daily payment volume is around 200,000 payments per day with peak hour capacity in excess of 60,000 payments.

The EBA payment process is characterized by the following five major process phases:

- Processing of payments from 7.30 to 16.45
- End of day processing of balances at 16.45
- Short banks pay via TARGET into central settlement account at ECB before 17.15
- Solve balance problems in EBA before 17.45
- EBA end of day clearing

The EBA Euro Clearing System started of with around 65 clearing banks as of January 4, 1999. In April 1999, nine more clearing banks became a member of the EBA system. An EBA payment can be entered into the EBA system from 7.30 am until 16.45 pm. The paying bank sends a SWIFT message to the receiving bank with a copy to the EBA system. The EBA system checks the limits in



**Figure 3. Cross border payment systems network**

the EBA system and when this check is passed without problems, the receiving bank receives the SWIFT message and the payment is guaranteed. Each bank has to submit a credit and debit limit in the EBA system related to each of the other banks with an overall limit capped at 1 billion EUR. Whenever a payment exceeds the limit, the payment is held in a queue until the limits have been adapted or compensating payments have been submitted. The debit limit of a clearing bank is a combination of a 5 million Euro mandatory limit and a discretionary limit of up to 25 million Euro in case other clearing banks are willing to increase their exposure above the minimum of 5 million Euro. These limits cannot be changed once the system has been started for any business day.

At cut-off time (16.45), the EBA system determines the balances, which it reports to the clearing banks, the national central banks related to the clearing bank's country and the European Central Bank (ECB). Whenever a bank is short in EBA, it has to pay the short amount through a TARGET payment using the applicable RTGS system (for instance TOP in the Netherlands or ELLIPS in Belgium). A long bank might withdraw the long amount. If the short bank has not fulfilled its obligation to pay the short amount, the ECB contacts the national central bank to investigate the problem. To enable the clearing process to be carried out without the receipt of the short amount by the short bank, the ECB can make use of the liquidity pool of 1 billion EUR. The liquidity pool has to be deposited by each of the clearing bank participants (about 17 million EUR each with 65 participating banks). For clearing banks, depositing only around 17 million EUR to be able to process payments up to a cap of 1 billion EUR is an

advantage to processing payments through a TARGET system, because RTGS payments will only be cleared up to the deposit amount. This means that when a member bank has a deposit of 5 billion EUR, it can only process payments up to this amount. Therefore, the costs related to deposits favor the EBA system.

When the total short amount exceeds the liquidity pool, a crisis situation needs to be addressed. A short bank that does not fulfill its obligation will be fined the highest of 20,000 Euro or 2.5% (annualized) of the total shortage value. Each time this occurs the minimum fine will be increased by 20,000 Euro. At the end of each day, the total balances are cleared by the EBA system using the central settlement account of the EBA system at the European Central Bank.

Both TARGET and EBAS are operated by SWIFT and use SWIFT network and message standards. BIC codes (Bank Identifier Codes) are used for identification of banking organizations and branches.

#### 4.3. Current alternatives for Euro settlement

Figure 2 shows the various cross border Euro settlement routes and systems. Note that the EBA and TARGET systems can be used for cross border payment settlements resulting from treasury, commercial and securities transactions. Figure 2 shows that a sending (paying) bank has four alternatives for cross border Euro payments: (i) correspondent banking, (ii) EBA, (iii) TARGET, and (iv) remote access to a RTGS operated by a National Clearing Bank. Figure 3 shows the network, the alternatives, and the banks that have access to one or more of these alternatives. It is expected that cross border wholesale Euro payments

will be executed through TARGET whereas commercial payments will be executed through the EBA Euro system. This is more or less similar to the US situation in which the dollar leg of foreign exchange payments is settled in the Clearing House Interbank Payments Systems (New York) (CHIPS) netting system (which is similar to the EBA), whilst securities and money market transactions are more commonly settled in Fedwire (the nationwide RTGS system comparable to TARGET). In this respect, the ECB has advocated that large value payments should be cleared through TARGET to minimize system risks.

The total expected number of cross border payments is expected to exceed 400,000 payments per day in 1999 increasing to around 550,000 payments per day in 2004. It is expected that the market share of TARGET, EBA, corresponding banking and others will be 19%, 32%, 23% and 26% respectively.

The UK RTGS operated by the Bank of England, CHAPS Euro, will serve both as a stand-alone RTGS system based in London with global reach and as CHAPS Euro members' access route to TARGET. CHAPS initially has around 20 direct members, of whom 5 are not currently direct members of CHAPS sterling, and some 400 indirect members including the world's major banks. A CHAPS Euro payment should not take any longer than a sterling RTGS payment used to take, i.e. under 1 minute. The CHAPS sterling system processes a daily average volume of around 60,000 payments per day with total value of around 150 billion GBP with peaks of around 135,000 transactions per day worth around 240 billion GBP. The initially expected CHAPS Euro service volume is around 15,000 transactions with substantial growth projected after 1999. Several factors influence banking institutions when choosing one of the available cross border payment routes:

- Banks located in the United Kingdom have limited access to TARGET because the United Kingdom has decided not to participate in the European Monetary Union. Therefore, UK banks would prefer to use the EBA system to execute all cross border Euro related payments, of both small and large value.
- The German EAF2 system is considered to be a competitive system to EBA, and France and Germany are using it. It is not clear yet in which situations EBA or EAF2 will be used. One of the advantages of the EBA system is the higher number of participating banks. One of the disadvantages is that the processing time of EBA takes longer than that of EAF2.
- It has been argued that using a value limit of 55 million for each EBA payment would greatly enhance the smooth working of the EBA system because it would minimise payment queues because of payments exceeding limits. If the value limit would have been implemented, higher value payments have to be executed using TARGET. Analysis show that limits would be too restrictive and such a

transaction limit would not be respected. Although some European banks, which have access to both TARGET and EBA, do not have a problem with this, other banks such as the UK banks with limited access to TARGET do not want such a limit to be implemented. Another important argument against using the value limit relates to the integration of the EBA system with internal systems at the various European banks. Some banks have argued that implementing a value limit would imply that they would have to distinguish between commercial payments above and below the value limit in their internal systems. Many banks do have the possibility to direct foreign exchange transactions to for instance EBA and money market transactions to TARGET, but they do not have the possibility to direct foreign exchange transactions above the value limit to TARGET instead of EBA. Taking into account that many banks still use different systems for each transaction category, this would imply important changes in their internal systems, which were unlikely to be accomplished before January 1, 1999.

- Whenever Bank A, a borrower of EBA, finds itself in the situation that it has used for instance 600 of the limit of 700 in EBA but has 300 in cash in the Central Bank account, and bank B, a lender of EBA, finds itself in the situation that it has used -200 of the limit of 400 (long bank) with 0 cash in the Central Bank Account, a swap could be arranged. Bank A would send for instance 300 in Central Bank money (through RTGS and possibly TARGET system) to a Nostro account held in the bank B. Then Bank A instructs Bank B to send back the 300 from the same Nostro account, but using EBA. This would result in the situation that Bank A has used 300 of its 700 limit in EBA with 0 cash in the Central Bank account and Bank B that has used 100 of its 400 limit with 300 in the Central Bank account. This is only possible when Bank B has sufficient credit (source: EBA, [www.abe.org](http://www.abe.org)).

#### 4.5. Situation after implementation

As of January 1, 1999, the EBA and TARGET systems have been used. Several observations can be made after the first few months of working with the new situation.

1. The EBA system works very well and volumes have increased well above expectations. In the first two weeks, EBA volume increased from 92 billion Euro on the first day to 182 billion Euro by the end of the first week, representing 34,000 daily payments. During the second week, the number of daily payments increased to over 50,000.
2. The national TARGET systems have experienced some stability problems leading to situations in which settlement of positions was not possible because the necessary RTGS system was out.
3. Many banking organisations have had to deal with problems reconciling (or tracing) payments, especially with

correspondent banking payments. This has to do with the fact that although most banks have successfully converted bank accounts from local currencies into Euro denominated bank accounts, new Euro bank accounts have been opened as well. This leads to situations in which payments are received on converted Euro bank accounts while they were expected on the new Euro bank account number. Before, French franc payments were expected in Paris and Deutschmark payments in Frankfurt, but after the conversion they could be in any of the participating countries. This causes many problems because automatic reconciliation fails and reconciliation needs to be done manually. Many banks had to hire personnel to deal with these problems. These problems were also caused by SWIFT messages that could not be used to mention both the local and Euro currency. Standardisation therefore led to inflexibility.

4. The cap of 1 billion Euro is known to be low, but the European Central Bank has refused to increase this amount because it would increase system risks. The EBA system works very well without the trigger amount of 55 million Euro, but only because clearing banks can execute system swaps between EBA and TARGET.

5. The EBA system is likely to beat the EAF2 system. At first, German banks were holding on to the EAF2 system, but were confronted with incoming payments via EBA while they had entered outgoing payments in the EAF2 system causing problems with limits. The German banks have chosen to use the EBA system because most of the European banks prefer EBA to EAF2.

6. Transactions by client banks concentrate around closing time of EBA (17.00). The clearing banks only have around half an hour to determine and organise their overnight positions, which is quite short.

7. The closing times of TARGET during the first month needed to be extended with one hour to deal with the settlement of cross border Euro payments. This measure was taken by the European Central Bank soon after the conversion of local currencies to Euro.

8. The links of the EBA system with internal applications has caused routing problems. Some banks have changed their internal applications to use a trigger amount for routing purposes. For instance, Rabobank uses an internal trigger amount of 200 million Euro in their Powerdealer treasury system to distinguish between payments to be settled through TARGET (above trigger amount) and payments to be settled through EBA. This depends of course on whether the counterparty is a clearing member of EBA or not.

9. Clearing member banks use different internal organisational structures to deal with system swaps. For instance, the mid-office of Rabobank monitors the positions in both systems and signals system swap trades to be executed by the treasury department, whereas the mid-

office at ING monitors both systems and is also entitled to execute system swaps. Most clearing banks use similar structures as the one that is being used by Rabobank because the system swaps implicate changes to counterparty risks and related limits and execution and monitoring of system swap transaction is divided between departments which enables better control and risk management.

## 5. Case analysis

Before 1999 European banks used a large variety and number of clearing banks for transactions in various currencies through complex intra- and inter-organizational processes. After 1999 this situation was changed rather quickly into more centralized procedures around two new ECB systems. This new situation is now analyzed by using the research framework as given in figure 1.

### 5.1. Factors in the research framework

*Stakeholders.* The primary stakeholders in the Euro Settlement case study have been clearing member banks, the European Central Bank and the National Central Banks in Euroland. The incentives of the clearing member banks to join the EBA system relate to the expected increase in cross border Euro payments after the introduction of the Euro as of January 1, 1999 and costs savings. The central banks needed a cross border Euro payment system to control the new Euro currency and monitor systemic risks.

*Competition.* The cross border payments sector has changed as of January 1, 1999. The European Central Bank has more or less intermediated the cross border Euro payments sector by offering the EBA system and the interlinking TARGET system. The German EAF2 system might be regarded competitive to EBA, but soon after the implementation of the EBA system, it is concluded that the EBA system is likely to beat EAF2. The necessary critical mass has been achieved by the EBA system and for many banks it is too complicated to work with both the EBA and EAF2 system. Executing a cross border Euro payment turns out to be cheaper via the EBA system than via TARGET or the corresponding banking alternatives.

*Information Technology.* The EBA system is based on existing information system networks and standards (SWIFT). The EBA system also depends on the TARGET system because end of day net settlement of the EBA positions is carried out via the TARGET system.

*Market Network (Re)Design.* The implementation of the EBA system can be seen as an example of business network integration. Implementation of EBAS and its links with existing banking systems caused problems for some banks because it was difficult to change existing systems to incorporate decisions as to which alternative to use for which payments and payments sizes.

*Risk.* The risks of the EBA system relate to the counterparty limits in the system and the size of the credit



pool (1 billion Euro) to cover the systemic risks of a certain bank not fulfilling its end-of-day net settlement obligations. The controls in the system by the national central banks and the European central bank seem to adequately cover the risks involved. The risks related to TARGET are lower because each payment is settled directly (Real Time Gross Settlement system). Therefore, large payments are settled through TARGET, even though the costs of using TARGET are higher.

*Process (Re)Design.* The EBA and TARGET systems have been developed to facilitate the cross border Euro payments settlement and are oriented on processing payment settlements. The coordination is centralized and carried out by the European Central Bank that provides the systems. The opportunity to swap between the EBA and TARGET system enhances the EBA system and adequately covers the disadvantage of not using a maximum payment size of 55 million Euro in the EBA system. Clearing member banks needed to adapt their internal systems to link them to the new systems in order to work efficiently.

*Information.* The information that is provided by the systems is crucial for banks to determine their positions in terms of market risk and in terms of counterparty risks. The end-of-day reports to clearing member banks, national central banks and the European Central Bank facilitate the control processes by the banking institutions, making sure the system works properly and enables monitoring whether banks comply with the rules.

*Trust.* The Euro Cross Border Payment Settlements case study resembles a situation of trust in the institution consisting of the banking organizations, the national central banks, the European Central Bank as well as the SWIFT network guaranteeing that any message that is accepted by the SWIFT network will be delivered to the addressee within a matter a seconds. In the situation before the year 1999, banks needed to use correspondent banking or remote access to national bank payment settlement systems. In correspondent banking, organization based trust was more important.

*Process Performance.* Improvements of the process performance are mainly based on cost savings depending on the volume of cross border Euro payments. Achieving critical mass in terms of number of clearing member banks using the EBA system has been important in deciding whether the EBA or the EAF2 system would be preferred. The number and size of cross border Euro payments has been less relevant for its success. Reliability and controllability have also improved. Because the new systems are integrated, throughput time has also decreased.

## 5.2. Propositions

With respect to the propositions the following observations can be made from the Euro Settlements case study.

**Proposition 1:** Convergent stakeholder motives contribute to process performance improvements resulting from Market Network Redesign and Process Redesign.

This proposition is supported even though differences between countries still exist. German and French banks preferred the EAF2 system to the EBA system, but critical mass in terms of number of participating organizations and volumes have been decisive in the outcome which of the two system would prevail. Convergent motives were not the only reason for the successful adoption of the EBA system. The fact that the ECB offers and controls the system as a dominant stakeholder is important.

**Proposition 2:** Competitive pressures force stakeholders to redesign their internal business processes to adapt to the changing business environment.

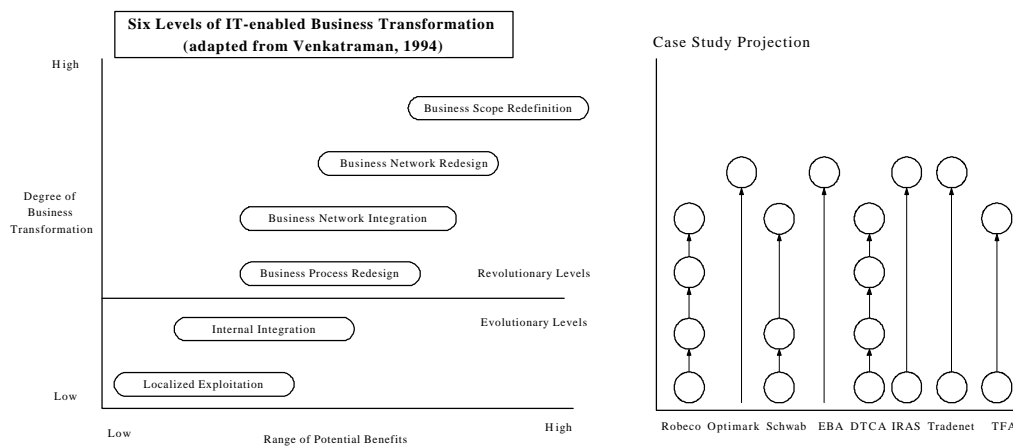
The proposition is supported because the changing regulations and guidelines for settling cross border Euro payments have forced organizations to adapt their internal processes and systems. The effect could have been larger if the value limit of 55 million Euro would have been implemented in the EBA system, because stakeholders would have had to make changes to their internal systems to work with such a limit. On the other hand, the possibility of swaps between EBA and TARGET enables dealing without the need for the value limit.

**Proposition 3:** Adequate entry barriers contribute to the success of electronic market network redesign.

The proposition is not supported as the successful adoption was not dependent on adequate entry barriers. The entry barriers were very low because every banking organization in Euroland could become a member. The fact that banking organizations outside Euroland were not allowed to become EBA members can be seen as an entry barrier, but they still have a choice of using TARGET or using another banking organization that is an EBA member.

**Proposition 4:** Process Performance criteria critical mass, accurate price discovery and transparency are more important in TOEN than in POEN.

The proposition is supported because costs, efficiency, reliability, risk management, and control have been the main aspects for process performance improvements in POEN. Critical mass in terms of the number of participating organizations was important for adopting the EBA or the EAF2 system. The number and size of cross border Euro payments were less important. Therefore, critical mass is an important process performance criterium in both TOEN and POEN.



**Figure 4. Phases and levels of IT enabled Business Transformation in 8 case studies**

## 6. Comparison with other case studies

The Euro Cross Border Payment Settlement case study can be seen as an example of Business Network Redesign, the fifth level in the adapted Venkatraman model (described in paragraph 2 and presented in figure 4). Most banks had to follow the business network changes rather suddenly, without a stepwise process of growth through the first four levels. In this paragraph we make a comparison of eight examples of IT-enabled business transformations, all derived from literature.

The following eight cases were used: Robeco Group [34, 38,39], Optimark [39], Schwab [39], EBA (this paper), Inland Revenue Authorities Singapore (IRAS) [33], Tradenet [37], TeleFlower Auction (TFA) [20], Dutch Tax & Customs Authority (DTCA) [39].

The business network integration stage can be seen as a necessary step to accomplish business network redesign. This is supported by the case studies Robeco Group, Schwab, DTCA and TFA, because in these case studies the business network integration has been achieved, but not (yet) the business network redesign stage.

Two observations must be made in this respect.

- The first observation deals with going through each of the stages. Organizations that have completed the business process redesign stage do not necessarily have to pursue towards business network redesign. It might very well be that the business process redesign has triggered new ideas causing another cycle of internal integration or business process redesign. It might also be that organizations that have completed the internal integration stage, pursue towards the business network integration stage without redesigning their processes (Schwab case study). The IRAS, Tradenet and TFA [20,33,37,39] case studies show that organizations have introduced a new electronic network system and achieved the business network redesign stage starting from the localized exploitation stage.

- The second observation deals with the starting point of the framework. Some organizations have decided to immediately focus on the business network redesign stage (Optimark, EBA) and then focus on embedding the proposed design in the industry sector. Optimark first introduced their new system and then focused on achieving critical mass by trying to convince different stakeholder groups to use the system and to migrate to the business network redesign stage by integrating and/or redesigning their processes.

## 7. Conclusion

In this paper the effects were analyzed of two new inter-organizational systems on payment settlement processes between various banking institutions in Europe. The implementation of the two systems EBAS and TARGET took place according to plan and without major problems, which can be regarded as an impressive result given the fact that many banking institutions and systems were involved in many countries. Now, a few months after implementation, the systems appears to be very useful by providing two new channels for the clearance of (large) financial transactions in Euro between banks. Many stakeholders (European Central Bank, 15 National Central Banks and 65 clearing member banks) have been involved in these financial transaction processes and the two systems have resulted in business network integration.

Factors that contribute to the success of this processing oriented electronic network (POEN) are 'convergent motives of stakeholders like the European Central Bank, the National Banks, and the local banks', 'availability of existing SWIFT standards and banking codes', 'opportunities to link the systems to other inter-organizational systems (e.g. RTGS) and internal systems in banks', 'availability of information to control market risks and counterparty risks', 'improved process performance', and 'trust in the central institutions involved'.

## REFERENCES

- [1] Bakos, J.Y.: "A Strategic Analysis of Electronic Marketplaces", MIS Quarterly, September 1991, p. 295-310.
- [2] Benjamin, R.I., D.W. de Long, M.S. Scott Morton, "Electronic Data Interchange: How much Competitive Advantage?", *Long Range Planning* (23), nr. 1, 29-40, 1990.
- [3] Benjamin, R. & R. Wigand, "Electronic Markets and Virtual Value Chains on the Information Superhighway", *Sloan Man Rev*, winter 1995, p.62-72.
- [4] Bernstein Research, "The Future of Money Management in America; Key issues facing the Mutual Fund Industry", 1998.
- [5] Cash, J., McFarlan, F., McKenney, J., 'Corporate Information Systems Management', Irwin, Boston, 1992.
- [6] Clark, T.H. & D.B. Stoddard, "Interorganizational Business Process Redesign: Merging Technological and Process Innovation", *Journal of MIS*, vol.13, nr. 2, 1996, p. 9-28.
- [7] Clark, T.H. & H.G. Lee, "Electronic Intermediaries: Trust Building and Market Differentiation", *Proceedings of HICSS*, 1999, Vol VI.
- [8] Clemons, E.K. & B.W. Weber, "London's Big Bang: A Case Study of Information Technology, Competitive Impact and Organizational Change", *J. of MIS*, vol. 6, 1990, p. 41-60.
- [9] Clemons, E.K., M.C. Row: "IT and Industrial Cooperation: The Changing Economics of Coordination and Ownership", *J. of MIS*, vol. 9, nr. 2. 1992, p. 9-28.
- [10] Clemons, E.K., S.P. Reddi, M.C. Row: "The Impact of Information Technology on the Organization of Economic Activity", *Journal of MIS*, vol. 10, nr. 2, 1993, p. 9-35.
- [11] Clemons, E.K., B.W. Weber: "Restructuring Institutional Block Trading: An Overview of the OptiMark System", *Proceedings of HICSS*, VI, pag 301-310, 1998.
- [12] Dale, R., "Risk and Regulation in Global Securities Markets", John Wiley & Sons, 1996.
- [13] Davenport, T.H. & J.E. Short, "The new Industrial Engineering: Information Technology and Business Process Redesign", *Sloan Man Rev*, (31) nr. 4, 11-27, 1990.
- [14] Davenport, T.H., M.C. Beers, "Managing Information about Processes", *Journal of MIS*, Summer (12) no.1, 57-80, 1995.
- [16] Galliers, R.D., 'Choosing Appropriate IS Approaches: A Revised Taxonomy', *Proceedings IFIP TC8/WG 8.2*, Copenhagen, 1990.
- [17] Guha, S., V. Grover, W.J. Kettinger & J.T.C. Teng, "Business Process Change and Organisational Performance: Exploring an Antecedent Model", *Journal of MIS*, Summer 1997, vol.14, nr. 1, p. 119-154.
- [18] Hammer, M. & J. Champy, "Reengineering the corporation - a manifesto for business revolution", Nicholas Brealey Publishing, London, 1993.
- [20] Heck, E. van, Eric van Damme, Jack Kleijnen, Piet Ribbers: "New Entrants and the Role of IT: Case-study: the Tele-Flower Action in the Netherlands", *Proceedings of HICSS*, 1997.
- [21] Heijden, H. v.d., "Towards Organisational Redesign in EDI Partnerships", Eburon, Delft, 1995.
- [22] Holland, C.P., A.G. Lockett & I.D. Blackman, 'Planning for EDI', *Strategic Man J* (13), 1992, p. 37-50.
- [23] Holland, C.P., G. Lockett, J.M. Richard, I. Blackman, "The Evolution of a Global Cash Management System", *Sloan Man Rev*, fall 1994, p. 37-47.
- [24] Holland, C.P., "Cooperative supply chain management: the impact of interorganisational information systems", *Journal of SIS* (4) 2, 117-133, 1995.
- [25] Lee, H.G, T.H. Clark, "Market Process Reengineering through Electronic Market Systems", *Journal of MIS*, winter 96-97, vol. 13, no.3, p. 113-136.
- [26] Malone, T.W., J. Yates & R.I. Benjamin, "Electronic Markets and Electronic Hierarchies", *Communications of ACM*, vol. 30, nr. 6, june 1987, pag 484-497.
- [27] Milgrom, P., "Auctions and bidding: a primer" *Journal of Economic Perspectives*, vol 3, nr. 3, 1989, p.3-22.
- [28] Mintzberg, H., "The Structuring of Organizations", Prentice Hall, Englewood Cliffs, NJ, 1979.
- [29] Nadler, D.A, M.L. Tushman: 'Strategic Organisational Design: concepts, tools & processes', Scott, Foresman & Co., Glenview, Illinois, 1988.
- [30] Sanner, L.: "Trust between entrepreneurs and external factors. Sensemaking in organising new business ventures", Uppsala University, Sweden, 1997.
- [31] Schwartz, R., "Information Technology and Market Technostructure", *Proceedings of HICSS* (VI) 300-310, 1998.
- [32] Short, J., N. Venkatraman: "Beyond Business Process Redesign: Redefining Baxter's Business Network", *Sloan Man Rev* (34) nr. 1, 7-21, Fall 1992.
- [33] Sia, S.K., B.S. Neo: "Reengineering Effectiveness and the Redesign of Organizational Control: A Case Study of the Inland Revenue Authority of Singapore", *Journal of MIS*, vol. 14, nr. 1, 1997, p. 69-92.
- [34] Smits, M.T., R. Toppen & P.M.A. Ribbers, "Improving Performance Of Financial Securities Transactions Processes", *Int. J. of Electronic Markets*, vol 8. no. 4, 1998, p.26-30.
- [35] Stoddard, D.B., S.L. Jarvenpaa, "Business Process Redesign: Tactics for Managing Radical Change", *Journal of MIS*, vol. 12, nr.1, 1995, p. 81-107.
- [36] Tenner, A.R., I.J. DeToro: 'Process Redesign: The Implementation Guide for Managers' Addison Wesley, 1997.
- [37] Teo, H.T., B.C.Y. Tan, K. Wei: "Organisational Transformation Using EDI: The Case of Tradenet in Singapore", *Journal of MIS*, spring, vol. 13, no.4, 1997, p. 139-165.
- [38] Toppen, R., M.T. Smits & P.M.A. Ribbers, "Financial Securities Transactions: A Study of Logistic Process Performance Improvements", *J of SIS*, vol 7, 1998, p.199-216.
- [39] Toppen R., M.T. Smits & P.M.A. Ribbers, "Improving Process Performance through Market Network Redesign: A Study of the Impact of Electronic Markets in the Financial Securities Sector", *Proceedings of HICSS*, 1999, Vol VI.
- [40] Tushman, M.L., D.A. Nadler, "Information Processing as an integrating concept in organisational design", *Ac. Man. Rev*, no. 3, 1978, p. 613-624.
- [41] Venkatraman, N., "IT-induced business reconfiguration", in M.S. Scott Morton, "The Corporation of the 1990s: IT and organisational transformation", Oxford University Press, 1991.
- [42] Venkatraman, N., "IT-enabled business transformation: from automation to business scope redefinition", *Sloan Management Review*, winter 1994, p. 73-87.
- [43] Yin, R.K., "Case Study Research: Design and Methods", Sage Publications, Beverly Hills, California, 1984.