EUROPEAN PAYMENT MESSAGE STANDARD LIKE A BASE
FOR DEVELOPMENT OF CREDIT TRANSFERS SYSTEM

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Abstract - *In European Union, from 28.01.2008., Single Euro Payment Area financial messages based on ISO20022 format, started processing, which applying is possible in global financial community. For central banks, clearing houses, banks, other financial institutions, companies and person's reliance and usage Single Euro Payment Area messages system, like a part of European financial standard, is ideal chance to join global modern trend in payments domain. Paper is describing one possible way in system developing for credit transfers at all institutional levels. The paper is dedicated, before all, to analysts and experts which focus is financial institutions and payment systems developing, as well as all others which implement and use financial standards.*

Key words - *Financial message, ISO20022, payment, Single Euro Payment Area, Extensible Markup Language, transport, processing*

1. INTRODUCTION

Nowadays, standardization has reached such a considerable volume and the consequences are visible on every step. Just take any product bought today, and you shall see that it has a GS1 (GS1 – www.gs1.org) bar code which identifies the product globally and uniquely. It makes it easier to handle the commercial unit in the whole commercial chain of supply. The European Payment Council (EPC) in European Union (EU) has made a decision concerning the standardization in the domain of payment systems, known as the initiative to form a single European payment area (SEPA – Single European Payment Area). There, the payment instruments will be equipped with message formats which will carry transaction information in the unique way in the whole Europe. Thus, the execution and the price of transactions will be optimum, and easier, in a similar way as the bar code makes it easier to handle the product information. One of the payment instruments standardized by the regulations of European Payment Council is Credit Transfer (CT). ISO20022 standard for message financing is used as a base in standardization, making thus the European standard applicable in global frames.

2. EUROPEAN CLEARING HOUSE

In order to create conditions for concrete realization of the initiative, the European Payment Council has defined the surrounding for realization of its defined payment concept: the surrounding for development of settlement and payment to be effected in the Single Euro Payment Area including the pan European concept of an automatic clearing house [1] known as PE-ACH/CSM (Pan European – Automated Clearing House/Clearing and Settlement Mechanism) Framework. It represents the base for determination of its vision, subject and leading principles.

The basic principles are: a.) To promote an optimum balance between the cooperation and competition on the payment transactions market; b.) To focus on support of harmony between the participants and PE-ACH concept; c.) To make the schemes available, and only upon that effect the consolidation of the infrastructure.

Promoting the principles, while taking care of the interests of all the participants without insisting on the instant application, the European Payment Council effects the standardization in the domain of payment transactions in a natural way, leaving to all the participants, to win their position and their share within the payment transactions market, through free and fair competition. It is important here, to see the fact that the standardization of electronic payment transactions market is in the domain of financial technological structures and that the electronic payment transactions market itself, in its essence, is an informatics' polygon.

3. STANDARDS

The previous two chapters have shown that the standardization of the payment transaction system has been done in all domains of importance for payment systems. The most obvious is the standardization of the payment message format. This paper will discuss only payment messages, referring to the instrument called the payment order.

3.1. ISO20022 STANDARD FOR CREDIT TRANSFER

The international standards organization, called ISO, .is a federation of national bodies for standardization. The universal standard for financial industrial schemes of the messages, called UNIFI, has prepared, for the needs of financial industry, the standard messages with XML syntax using: a.) modeling methodology based on UML to provide description of financial business areas, business transactions and the relevant message flows; b.) a group of XML regulations to convert the messages described in UML syntax into the relevant XML schemes.

Business projects, used in financial communication, the resulting models and performs messages are stored in the central financial repository shown on the web site (http://www.iso20022.org/index.cfm?item_id=43441).

Such a flexible surrounding is available to the organizations in charge of definition of technological and technical operation rules in accordance with internationally agreed approach to enable the use of XML syntax.

The catalogue of UNIFI messages, which are necessary to provide the use of the instrument payment order on ISO20022 site, is from the business co domain Payment Initiation, Payment Clearing and Settlement and the documentation Cash Management – to provide reports, notification, exception and browsing. One of the messages which will be used in the coming chapters is a Request to Cancel Payment, which is given on ISO20022 with its scheme (camt.008.002.01), examples of instances, description and model (Rose model - IBM Rational Rose version 2003.06.15.734.000 and diagrams in the shape of digital pictures).

3.2. EUROPEAN REGULATIONS FOR PAYMENT ORDERS

The latest book of regulations for payment order [2], was approved by European Payment Council on 19.06.2007., as a version 2.3. The scope of the regulations is to provide the unification of information to be exchanged, standards according to which this is to be done, as well as the other aspects connected with the processing of payment order as the main instrument. In order to unify the implementation of its rules, the European Payment Council has approved the guide for implementation of the payment order instrument [3]. For the implementation of payment instrument payment order, together with the relevant regulations and the implementation guide, the European Payment Council has approved the data model as well [4].

The obligatory interbank messages defined by the rules are as follows: FI to FI Customer Credit Transfer or payment order of financial institutions (scheme: pacs.008.001.01), Payment Return (scheme: pacs.004.001.01), Payment Status Report (scheme: pacs.002.001.02). The European Payment Council did its best to determine the rules, messages and data for data exchange, between financial institutions. As for the messages for information exchange between the bank and the client, the only recommended message is: Customer Credit Transfer Initiation or payment order of the client of financial

institutions (scheme: pain.001.001.02). The latest version of the above mentioned schemes can be found on the European Payment Council site

http://www.europeanpaymentscouncil.eu)

4. DESCRIPTION OF THE SYSTEM REALIZATION

The short description of the possible realization of the payment order clearing system is given in the project request which will be described in the paragraph 4.1. and in the solution of the project request in paragraph 4.2.

4.1. PROJECT REQUEST

The project request for elaboration of order clearing system can be given as follows: *"To specify and make a payment system for order clearing on the level of central bank, clearing house, business bank and company "*.

4.2. SOLUTION

Through the standard message transfer system one can solve the problem of distributed systems concatenation. The problem which needs solving because of the introduction of data transport system is shown on Fig. 19. So, the class of system for which the solution should be found has been isolated.
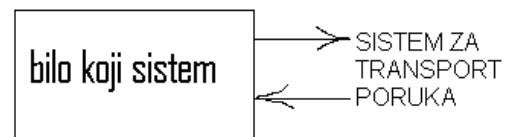

Fig 1. Successfully isolated class of problems to be realized

4.2.1. PAYMENT ORDER PROBLEM SPECIFICATION

The system consists of standard application components: a.) separator, b.) loader, c.) processor, d.) extractor and e.) integrator connected as shown on Fig. 2. and as define in the further text.

a.) Separator
Its role is to effect the separation of messages with relation to whether the message is permitted, to the sort of processing they are directed to, and what kind of system and similar. The separation is done on the basis of the information in the title of the message and the predefined knowledge the system has on addressable locations.

b.) Loader
Its task is to connect the subassembly of the system in relation to the location of the assembly in the system, the structure of the necessary input – output data and their necessary adaptation.

c.) Processor
It does the basic processing the system is designed for. Further, up to the extractor specification, the examples of

processors separated according to their level, i.e. location in the financial vertical, are given:

1. "Retail" level
    1.1. Legal and natural person level
    1.2. Bank level
2. "Net" level
    2.1. Bank level
    2.2. Processor house level
3. "Gross" level
    3.1. Processor house level
    3.2. Central bank level

d.) Extractor

Its task is to connect the subassemblies of the system with regards to the location of the assembly in the system, the structure of the necessary input- output data and their necessary adaptation. Its only difference from the loader is the direction of assemblies' adaptation. It is not possible to change them with adapters at this level of abstraction, because the adapter would be far more complex from the whole system, due to the solution of a potential danger from semantic connection of output and input and the paradigm by way of mobile (if such an adapter was connected with itself it should have adapt itself to its self).

e.) Integrator

Its task is to unite, in a given way, a group of messages necessary for the transport level.

Fig. 2. *Generalized* *specification of system subassemblies*

4.3. TRANSPORT

In computer science, the medium layer consists of software agents which operate between different application components. The message transport mechanisms represent a sort of medium layer. The main reason for the existence of message transport systems is to make the connection between application systems less complex.

Each financial system consists of the following participants: a.) super system – superior center, b.) processor system which is under jurisdiction of the supersystem, c.) network structure of subordinate systems – "traffic" participants.

Each participant has electronic documents single instances which took part or will take part in business processes. One of the business processes is electronic message transfer, i.e. electronic documents, from one participant to the other with help of applicative medium layer. The owners of electronic documents are the supersystem (administration center data and data of subordinate system message processing), processing system (processing system data and subordinate system message

processing data) and subordinate system data. The above mentioned data groups represent a unique entity. The given time periods should be kept. In case of lack of an electronic document (or a group of electronic documents) at any level a serious disturbance of financial system elements will occur which will be balanced by legal and penal regulations. Lack of electronic documents, their destruction or negligent manipulation; in the majority of cases represent a serious criminal act. There are many different ways to transfer a message from one location to another. One of them is the use of SWIFT service network which is designed for such a type of business. Earlier generation payment systems had their own transport ways, which were of poor performances, and hardly met the message transfer requirements.

4.4. PROCESSING

One of the ways for technological message processing is shown on Table 1.

item	Process	Description
1.	Procurement and check of administrative privileges for input data approach	Processing system checks if there is processing material available. If so, it checks if it is entitled to use them and are they available for processing.
2.	Input information storage	Input data are taken over; they are given the relevant context and are stored.
3.	Application of technological procedure for processing	UML (written technology for the use of technological procedure of processing)
3.1.	Operation 1	
3.2.	Operation 2	
3.n.	Operation n	
4.	Output information storage	Upon processing procedure the choice of the way in which output information will be stored is done based on information context
5.	Allocation of administrative privileges for output data access	In order to make them accessible to other processes, administrative privileges for access are given to data after storage. It is usual to allocate corresponding status to data groups.

Table 1. *Procedure for message processing*

The above mentioned process has been treated as any other technological process, taking an example from mechanical industry. The existence of XSD schemes (XML Schema Definition or abbreviated XSD is a XML based language used to describe and control the content of XML document) determines input data storage, determining thus system elements as well (classes and relations among them) and this can be used to write the operation sequences of the

technology, shown on Table 1., which are necessary to make processing modules.

5. REALIZATION OF ORDER CLEARING SYSTEM

The realization of the system described in the chapter 4. can be done with tools as well. In the following chapters we are going to discuss industrial surroundings where system elements can be realized, the industrial tools which can help the realization of the tools manufactured for a specific design. The usual warning "do not try to do this at home" does not apply here. It is recommendable to experiment with a large number of tools in order to realize the problems of components manufacture as thoroughly as possible.

5.1. TRANSPORT SYSTEM

The surrounding that can create a suitable base for the exchange of financial and other messages is Windows Communication Framework (WCF). We are going to present here Saga SEP Transport System based on the above.

Service orientated architecture of Saga SEP transport system is, in fact, a group of services communicating with each other. It can include a simple data receipt/transmission, but it can also include several connected services to affect a certain activity. The service user sends a request to the service supplier. Upon the request, the service supplier returns a relevant answer to the service user. The request and the relevant answer are realized through a connection which is determined in a way and which both parties can understand. It is interesting that the service supplier can be a service user as well.

Saga SEP Transport system is designed to provide safe, accessible and effective messages exchange, based on any industrial standard, between the system participants. The system is implemented by the Bank Association of Serbia – a clearing bank institution (UBS – KIB) and OTP Bank Serbia.

The system is modulated, accessible, stable, and scalable, with a corresponding safety mechanism and with high performances. It is based on Microsoft technologies and they minimize the used technologies operation risk since all the other systems in the class are realized with other technologies not based on Microsoft products.

The system is requested to meet the requirements referring to its wider use, such as: a.) the possibility of transparent use regardless to geopolitical or any other user configuration, b.) not limited to financial industry domains only, c.) the possibility to connect similar processes supported by an acceptable standard for message specification, d.) the possibility to support all other systems based on communication and standard exchange of messages containing information on receiver address, and the business process to be executed on the receipt location.

Saga SEP Transport System provides: a.) a wide range of freedom in defining access channels, b.) different kinds of processing, c.) addition of optional program libraries of general and particular design, d.) the possibility to define the

architecture which is at a high place according to theoretical standards, e.) involvement of a very wide range of configuration parameters to define the system in order to achieve a very strong recoil effect with a possible changeable system surrounding, f.) freedom to define communication with demanding external systems via receipt/transmission of services, g.) definition of optional workflow mechanism, h.) the possibility of reaction on impulses from either inside or outside of the system by planned event from a source

5.2. XSD2DB

XSD2DB is a tool, written in C# program language, started from the control line. After the start, the tool reads Microsoft ADONET compatible DataSet Schema file (XSD scheme) generating from there the elements of data base. Some of the parameters that can be used when generating base elements are shown on Table 2.

Parameter	Parameter Description
-h	**help** – help when using parameter
-l	**location** – data base server name
-n	**name** – data base name
-s	**schema** - XSD file containing scheme
-t	**type** – base type [*Jet* | *Sql* | *OleDb*]
-p	**tableprefix** – prefix the tables will carry
-o	**dbowner** – prefix table will have

Table 2. Parameters for use of XSD2DB tools

If we take from ISO20022 site the XSD scheme "Request to Cancel Payment" mentioned in chapter 3.1. under the name of camt.008.002.01.xsd and apply it to the scheme the following command in DOS Command Prompt with which data base scheme was generated shown on the figure 4.: ***xsd2db -o babics -l crypton -n db -s camt00800201.xsd -t Sql***
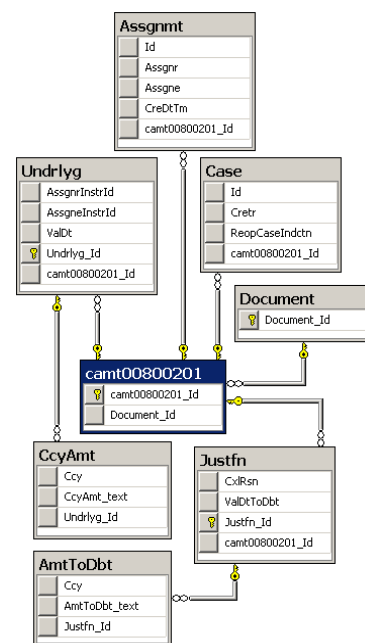

Fig. 4.Data basis generalized scheme

5.3. MAPFORCE

Alto MapForce® 2008 is a tool for mapping, conversion and integration. The mapping can be done between any two combinations of XML, base, flat files, EDI file, and/or Web service (Figure 5.). After mapping it is possible to generate the application for data integration or execution of the relevant conversion

After the data base has been created, as shown in chapter 5.2., the mapping of generated data base with relevant XSD scheme can be affected. Upon mapping, one can generate the corresponding original code which will enter instances above XSD scheme (in our case those instances are concrete messages for „Request to Cancel Payment") into generated data base. It is important to point out that the generated elements should be without hidden errors, i.e. that the execution is guaranteed.
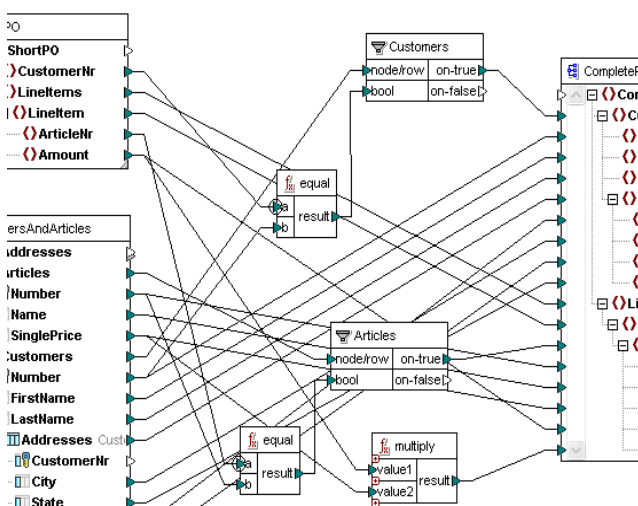

Fig 5. *A part of object mapping procedure*

5.4. TRANSACT SQL FOR PROCESSING SYSTEM

Transact-SQL (http://technet.microsoft.com/en-us/library/ms189826.aspx) is, according to the statement of Microsoft employees, the central point for use of SQL Server. All the applicative systems that communicate with the instance of SQL Server are doing it by sending Transact-SQL statements to the server, connected with the users application interface.

This is the list of application types which can generate Transact SQL statements: a.) Applications that use graphic user interfaces (GUI) which enables the users to select tables and columns to extract the data from; b.) Applications which use general statements specific for some programme languages for data choice the user wants to see; c.) Connected business applications for data storage in SQL server base; these applications can be made with their own resources or bought on the market; d.) Transact-SQL scripts can be started by the use of auxiliary tools such as **sqlcmd;** e.) Application systems created by the use of development systems such as Microsoft Visual C++, Microsoft Visual Basic, or Microsoft Visual J++ which use application program interfaces such as ADO, OLE DB and ODBC; f.) Web pages which extract data form SQL server data base; g.) Data base distributed systems which help SQL server to replicate in different basis or distributed inquires; h.) Data warehouse systems which had the data extracted by the use of OLTP.

No matter which application approach to the data base you have chosen, effective data modification can be done in the processing procedure, described in chapter 4.2. The choice of application approach itself can depend on many factors: speed of processing, speed of processing module production, consumption of resources necessary for production in relation to the execution of the process and other similar conditions determined by real systems.

6. MESSAGE STORY

Nowadays, the systems of central banks, banks, and other financial organizations mainly use messages defined by SWIFT (http://www.swift.org) organization. Those are so called MT (**m**essage **t**ransfer) messages for which the SWIFT organization has issued tables how to copy into adequate ISO20022 messages and vice versa. Thus, central bank, business banks and other financial organizations can keep their existing systems and communicate with systems using ISO20022 messages.

If the messages for payment order are generated in ISO20022 format, even in case of legal and natural persons (for example, using e-Banking system or, maybe in future, using PayPad – a Notepad analogue) through bank system and other financial institutions, there is a possibility to press the central banks which are not members of Single Euro Payment Area to insist with European Central Bank be accepted in the Single Euro Payment Area. In this way all the benefits of Single Euro Payment Area can be utilized.

7. CONCLUSION

We showed the determination of financial systems with XML standard messages of Single Euro Payment Area, for the instruments payment order, and the way how to make a corresponding system on all levels. It is a fact on all levels that systems differ in processing procedure, not according to informatics but according to normative-formal rules.

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