



Research study on the integration of e-payments into the online transaction process

**Study commissioned by the Institute for Prospective
Technological Studies as a part of the
ePayments Systems Observatory Project**

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Summary

In the investigation of integration of e-payments in the online payment process, this paper takes 3 major thrusts: modelling of the online transaction process (Chapter 2), an examination of the practice of integrating e-payments in the B2C-shopping and B2B-purchasing process (Chapter 3) and an exposition of payment related standards, architectures and models (Chapter 4). The paper closes with a discussion of policy options implications and proposals for future standardisation (Chapter 5).

This research study is based on a combination of desk research and interviews. Representatives from different communities (banking sector, retailers, payment server providers, standardisation and specification community, academics) have been interviewed in order to obtain a diverse perspective on the subject. The main goal of the study was to provide a qualitative overview on the topic of integration of e-payments; a separate effort would be required to determine the extent to which the findings are representative.

Integration of e-payments in practice

A variety of products and solutions is currently being used to integrate e-payments into the on-line transaction process. In terms of pricing and complexity, the solutions in the B2C segment cover the low-end and the high-end of the market. Simple webhosting and internet cash registers are available, as well as complete e-commerce software suites. The products and solutions in the B2B segment appear to be primarily focused on the larger companies.

There is a significant difference between the characteristics and problems in the B2B and B2C domain. In the B2C segment the main barrier to e-commerce is still trust and security. In principle, there is also the problem that a wide variety of payment mechanisms exists, but this can be solved with solutions such as an Internet cash register or the use of a payment service provider. In the B2B domain the main issue is how to optimise procurement practices and especially catalogue management, given the framework of the existing organisational policies.

Three specific issues with respect to payment integration in the B2C segment are:

- a payment service provider may honour a charge-back too easily and leave the remaining operational problems to the merchant,
- the different electronic banking output formats of banks may stand in the way of fully automating the matching between orders and payments,
- the level of ICT-expertise can be a problem for smaller companies.

Standards, models and architectures

Essential to this study is that series of enabling standards and specifications allow and facilitate the flexible sending, formatting and translation of data over open networks. This increases the possibility to define and build bridging services and protocols between different systems. More specifically the availability of the XML and XML translation specifications are instrumental in enabling a flexible integration of the payment process into the whole transaction process.

No standardisation of shopping protocols has occurred, except for the data elements and formats needed in shopping carts (ECML). The user thus faces as problem of going

through different shopping and payment procedures at different websites. The de facto solution to this problem is a wallet, which can be provided by banks or any other organisation (Microsoft, SUN Liberty Alliance).

A number of protocols for payment over the web (SET, SPA, 3D-secure) have been developed by the financial industry. So far, none of those have gained market acceptance. Both the ease of the current procedures as well as the different legal and liability rules may have been the cause. The result is a fragmented range of payment protocols.

The Internet Open Trading Protocol (IOTP) tries to solve both the issue of fragmented payment protocols and the user experience, by serving as an umbrella protocol, which encompasses all kinds of shopping sequences and payment instruments. It is unclear however, if IOTP will be supported enough by players in the market to become a real standard. Its direct competitor seems to be the de facto consumer wallet solution, which can be the Passport solution or an integrated home-banking/internet banking solution of the customer's bank.

The application of XML-based standards is often industry specific and dependent on the power structure between organisations in the industry. In the B2B procurement segment some successful usage of specifications (Rosettanet, CIDX, OBI) occurs but these remain industry specific. Yet, given that organisations start to optimise and further automate the message and document flows with other organisations, the importance of modelling and architectural design is increasing.

A wide number of models and architectures exist, each with their own focus. Some models remain conceptual, whereas other frameworks (such as the .Net approach of Microsoft) span the architectural, business, protocol and technical domain. Although this may lead to some kind of incompatibility between information systems, enabling technologies (such as XML and XSLT specifications) and architectural efforts (E-Commerce Integration Meta-Framework) may mitigate this problem.

Policy implications and possible future standardisation

Observing the available solutions and future developments, most experts concluded that additional policy initiatives to standardize e-payments in order to further promote e-commerce were not necessary. The experts' suggestions aimed at stimulating the market, providing a harmonised legal basis and further research and education. A first comparison of these suggestions with the eEurope action plan and the current institutional framework showed that most suggestions were already being addressed.

Current ICT-practices and developments will reduce the need for all-inclusive standardisation efforts and will require a reconsideration of 'standardisation' as a primary policy tool. A policy approach that considers this trend focuses primarily towards dissemination of available information on standards and specifications, rather than proactive formulation of proposals for standards.

Three issues were identified for which standardisation might be useful in order to improve the e-payments process and promote e-commerce:

- the specification of minimum output requirements to be adopted by banks; this would facilitate the aggregation of payment information and the automated matching of orders and payments,
- the specification of requirements for a lightweight authentication method to be used for payments; the 'digital signature approach' with a combination of legislation and technical requirements could be followed to establish common liability rules for payments made using method that fulfil the requirements,
- the specification of minimum security requirements for identity service providers. These requirements should become part of the institutional data protection framework and safeguard a minimum protection of personal data.

Preface

IPTS, the Institute for Prospective Technological Studies, of the European Commission's DG Joint Research Centre has set up an electronic Payment Systems Observatory (ePSO). The primary ePSO project objective is to enhance the information exchange in the field of e-payment systems. The ePSO project is part of the European efforts to leverage payment systems innovation in the move towards promoting e-commerce in Europe.

This research study is the final version of the study that provided input for a workshop on the integration of e-payments in the transaction process. The workshop has been held on November 9, 2001 in Seville and its results will be used as the basis for an ePSO-background paper.

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Chapter 1: Introduction

In general, the integration of the payments process appears to be an undervalued topic for both businesses and regulators. A lot of attention is paid to visible topics such as the level of direct bank fees and the negotiation of these fees. Meanwhile a considerable amount of money might be saved by focussing on improving the link between the payments process and the other business processes such as ordering and customer service. So any business, whether it uses the advantages of the internet network or not, benefits by aligning or integrating the payment processes with business procedures.

One of the starting points of this study is that business problems with respect to the payments process will not fundamentally change because of the introduction of new techniques or distribution channels. New techniques do pose specific challenges, but the essential prerequisites for a successful payments process will remain the same:

- the payment process must be positioned and designed in accordance with the specific shopping or buying behaviour that precedes the actual payment,
- the payment process should facilitate an efficient throughput of payment data to support the efficient organisation of other business processes such as reconciliation, delivery and customer services.

Although the integration of payment processes is an important topic, it is not yet clear by which technical solutions and standards the integration of e-payments for online shopping or buying processes is currently realised in practice. Are companies developing and using bank services for this purpose or have they built company-specific solutions? Which specifications and standards are used to establish this integration and what is the nature of these standards? To what degree do informal or formal standardisation efforts play a role? What is the content and relevance of standards such as ebXML, OTP, OBI, ECML and architectures/frameworks such as SEMPER, Biztalk, etc?

This report provides an indicative answer to the above questions with the objective to determine the relevant policy implications. If for example this study would conclude that there is a lack of standards, the policy implication might be to consider a scenario in which standardisation on specific issues is further stimulated. If the report would conclude that there is no specific lack of standards but that other barriers prevent a further development of e-commerce, this would lead to a different policy discussion.

This study is based on a combination of desk research and interviews and has taken place between September 1 and November 1, 2001. The detailed research questions that were the basis for both desk research and interviews are listed in Annex A. Among the experts are representatives from the banking sector, retailers, payment server providers, standardisation groups and the academic domain (see Annex B). This resulted in a diverse perspective on the subject. Due to the variety of subjects covered, the limited timeframe for execution of the research and the bias with respect to interviewed experts (mainly Dutch), this study must be seen as a first qualitative overview on the topic of integration of e-payments. It aims specifically at identifying the relevant issues and direction for further research.

Chapter 2: Payments as a part of the online transaction process

2.1 Model of the online transaction process

In this study, we will use functional decomposition as the means to analyse e-commerce and the online transaction process. The essence of this approach is to view the activity to be modelled as a function that transforms an input state to an output state. If we use the sales process of a merchant to demonstrate this technique, we can define the input state as the merchant that has specific sales goals and a customer that has certain needs. The output state is that the merchant has agreed to a specific purchase with the customer. Figure 1 shows that the sales process can be viewed as the function that has transformed the input state to the output state.

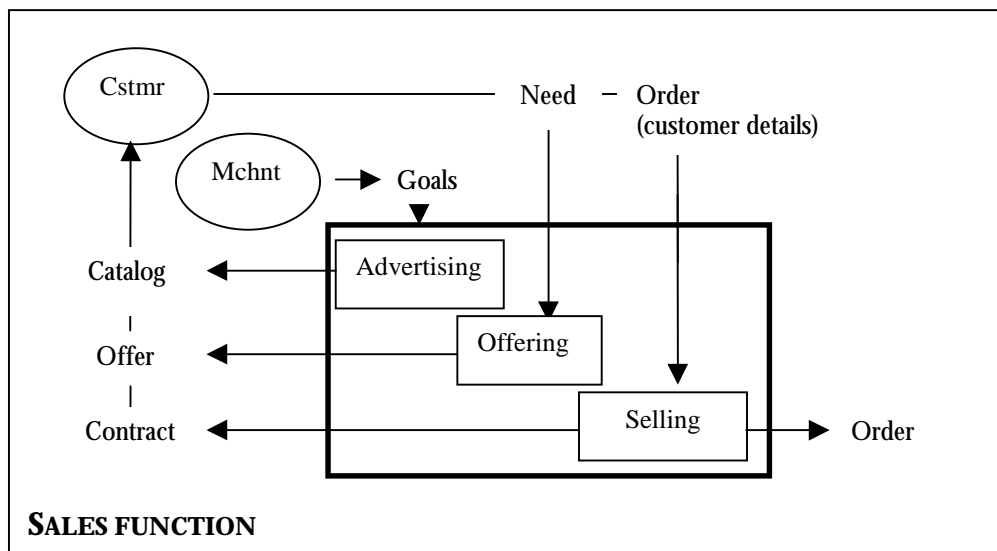


Diagram 1: The sales process described as a function

This modelling techniques allows for a further decomposition of functions. In this case we have decomposed into three sub functions:

- **advertising**: the company communicates its products and services (catalogue),
- **offering**: the company offers specific goods and services,
- **selling**: the company agrees with the customer on the content of a specific order.

By applying the above technique, we can model the on-line e-commerce transaction process. The input state of the on-line transaction process can be described as two actors, of which at least one is a company, that are willing and able to buy (C) and sell (B) goods or services. The output state is the two same two actors having exchanged a specified value against specified goods/services. In the transaction, it is assumed that the exchange of monetary value requires an intermediary (financial) institution (F).

As the on-line e-commerce transaction involves more than just a financial transaction, it is also called the 'whole transaction process'. Figure 2 shows that the online e-commerce transaction is composed of three main functions: sales, payment and delivery.

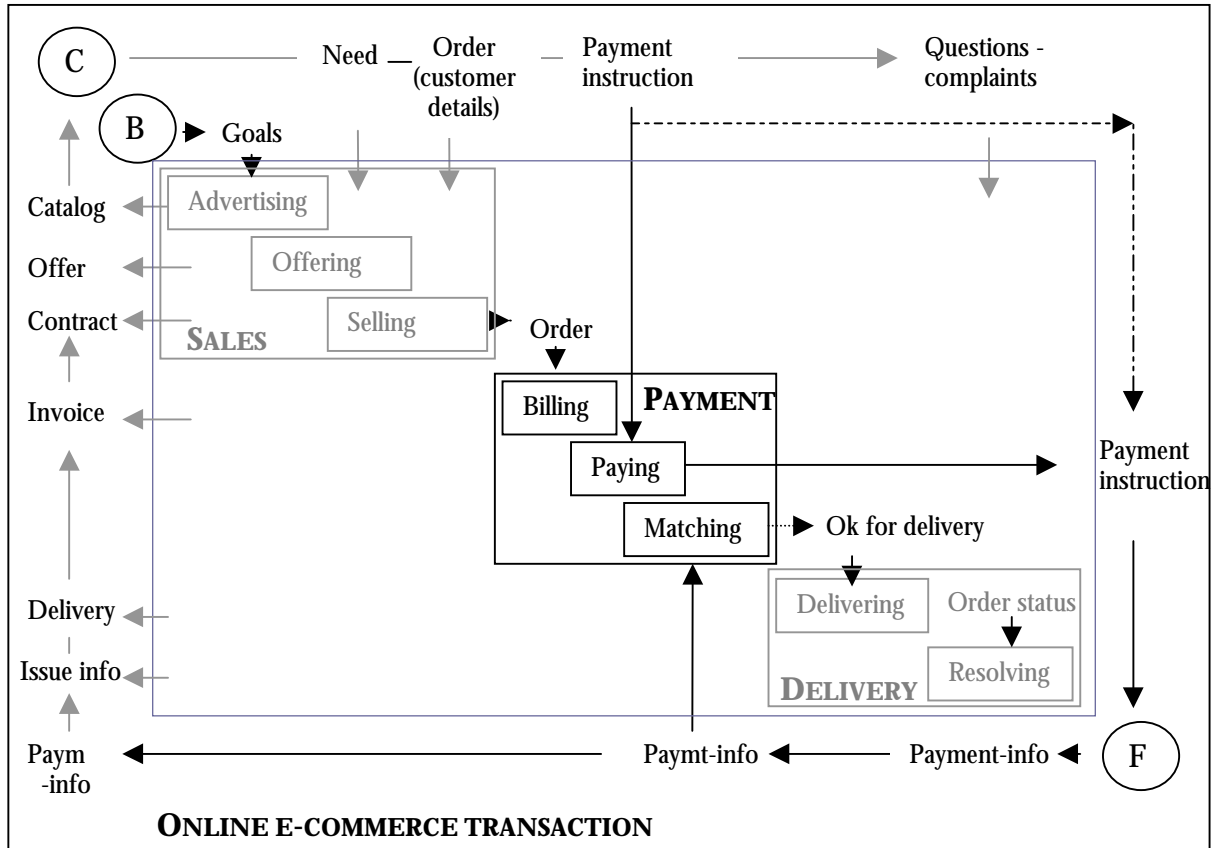


Diagram 2: Functional model of the online e-commerce transaction

We distinguish the following subfunctions:

- **advertising:** the company communicates its products and services (catalogue),
- **offering:** the company offers specific goods and services,
- **selling:** the company agrees with the customer on the content of a specific order,
- **billing:** the company produces the invoice,
- **paying:** the buyer pays the seller by giving a payment instruction,
- **matching:** the seller matches the payment information (the authorisation results and the actual crediting of account) with the orders and feeds the result into the back-office,
- **delivering:** the seller delivers to the buyer
- **resolving:** the seller and buyer try to resolve delivery or payment issues related to the purchase.

In this diagram, the payment is viewed as a part of an on-line transaction. However, in some cases the payment can also be a separate off-line transaction or a transaction via a financial intermediary (depicted by the dotted line). The different payment constellations are further elaborated in paragraph 2.3.

2.2 Sales constellations

In the B2C segment, the primary sales constellation is the e-shop, which can be a part of a shopping mall or a portal. The seller presents a catalogue of products and services and chooses a sales mechanism. The standard mechanism is the shopping cart, where the customer buys a specific good or service for a specific price. Another mechanism, more often used between consumers than in the B2B segment, is the auction mechanism where the consumer may bid for the goods and the final price is the outcome of the bidding procedure.

In the B2B segment on-line transactions occur as a part of the procurement process. The procurement can cover the direct inputs for the primary process of a business (raw materials, components for manufacturing or service provision) or the indirect inputs. These indirect inputs are also called MRO inputs (Maintenance, Repair and Operation). The market for procurement of direct inputs is often specific to the industry; the MRO market is more horizontal in nature. In line with this distinction the selection process before a procurement can be very specific, involving a one-time formal selection procedure and choice. It is also possible that the procurement department preselects (sourcing) a number of suppliers and sets up a catalogue to be used by employees for ordering. The focus in this report will be on the latter procurement process (for indirect products).

A distinction can be made on the basis of the type of relationship between the companies:

- a direct buyer-seller relationship,
- a buyer-seller relationship based on the membership of a private network of companies,
- a buyer-seller relationship based on the membership of an open marketplace.

Marketplaces on the web often have a specific background. They are software based, consortium based or independent. Of these three, the independent marketplace has not gained a lot of momentum. Software vendor hosted platforms have been set up to further leverage and demonstrate the services of these vendors. Examples are:

- the Ariba Commerce Services Network,
- the Oracle Exchange,
- SAP/ Commerce One Global Trading Net,
- Perergine's Get2connect.net,
- I2's Trade Matrix Open Commerce Network.
- Microsofts Biztalk Community.

The consortium based marketplaces are often industry-based. Examples are:

- Covisint (automotive)
- WWRE, Transora (food, retail).
- Chematch, Chemconnect, Chemica (Chemical).

2.3 Payment constellations

In the model of the on-line transaction, the payment function is depicted with both a black and a dotted line. This has been done to mark the difference in payment constellations. For the purpose of this study, both the routing of the payment and the integration in the on-line transaction process are relevant factors.

As for the routing, a difference exists between a payment that is primarily channelled via the financial institution and a payment that is channelled via the sellers website. If a sale involves the agreement to pay before delivery by means of a credit-transfer, the payment will be sent by the buyer to his bank. If it is agreed that the payment occurs by means of a direct debit, the buyer will send the authorisation to debit his account to the seller.

The other factor is whether the payment transaction occurs as a part of the online transaction. In that case the result of the authorisation and/or payment process is received immediately and can be further processed. If the payment transaction is not a part of the online transaction, the further processing of the order requires a separate action (matching the incoming payments), which cannot take place during the on-line transaction process.

Using the two above criteria, it is possible to categorize the payment constellations for E-commerce. Table 1 shows that on-line authorisation is a prerequisite for payments to become part of the on-line transaction process. The payment methods that support on-line authorisation are mostly routed via the Merchant to the financial institution. It is also possible to use online credit-transfers for this purpose. The product Rabo Direct Betalen for example allow the customer to use generic authentication tools (chipcard and token) to generate an on-line credit-transfer.

The distinction in the routing of the payment instruction can also be made for the payments that occur separate from the on-line transaction. If a direct debit is used, the buyer authorises the seller to debit his or her bank account. In most other cases, the buyer pays the seller via a payment to the financial institution or intermediary.

	Payment instruction via seller to the financial intermediary	Payment instruction via the financial intermediary (to seller)
Payment instruction as a part of the on-line transaction	On-line e-money, creditcard- and debit-card payments. On-line direct debit	On-line credit transfers
Payment instruction separate from the on-line transaction	Direct debit Cheque	Cash on delivery Credit transfer Bill payment

Table 1: E-commerce payment methods and constellations

2.4 Which functions are performed on-line?

If all the functions in the model take place on the web, we can speak of a fully on-line e-commerce transaction. In practice this will by definition involve the delivery of digital content. If the products/services are physical, the transaction process will be partly off-line. An example is the regular B2C e-commerce transaction for physical goods with a shopping cart mechanism on a website. Often, but not always, these transactions involve an on-line payment mechanism. In a typical B2B procurement transaction for physical goods, generally the sales function occurs on-line. In this case, payment often occurs after delivery and by means of regular bill payments procedures (credit-transfers and cheques).

The typical constellations of the whole transaction process are depicted in the diagram below. This does not exclude the possibility that the sale of digital content takes place via a physical channel. Nor does it exclude an e-procurement that utilizes a procurement card and an on-line payment transaction.

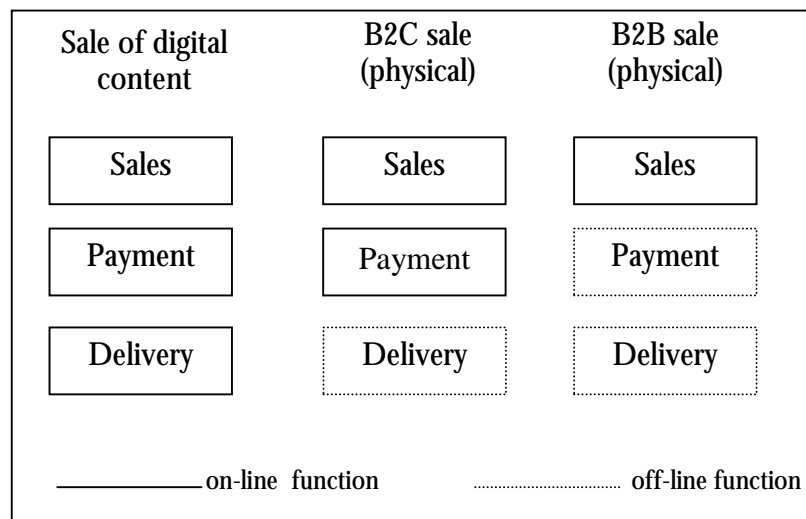


Diagram 3: Typical constellations of the e-commerce transaction

2.5 Outsourcing the different functions

Companies may choose to execute all the functions in the on-line transaction process in-house or decide to outsource a part of the functions. Outsourcing of the sales function is also known as shophosting or webhosting in case a more generic e-commerce application is being hosted by a third party. Important factors that influence the choice to outsource are the size of the company and the availability of expertise. Research also indicates that there are country differences with respect to outsourcing.¹

¹ [Tarifica Survey](http://www.tarifica.com/press/view_release.asp?pressid=46): "In Sweden for example, where over half of the respondents have had an operational website for 5 years or more, only 30% of companies outsource their webhosting. The reverse is true in Ireland where over 60% outsource and just 17% of organisations have had a website for five years plus." (http://www.tarifica.com/press/view_release.asp?pressid=46)

The entities to which the payment function can be outsourced are called Payment Service Providers (PSP's). This term should not be confused with Procurement Service Providers, to whom procurement services can be outsourced. Payment Service Providers may be banks or non-banks. In the whole transaction process model, the circle with F represents either the financial intermediary or the financial institution that specifically processes and collects the payments resulting from on-line transactions.

Finally, also the delivery function may be outsourced, but this subject will not be further covered in this report.

Chapter 3: Integration of e-payments in practice

In this chapter the model of the on-line transaction process is used to determine which products and solutions exist to support the execution of e-payments and the integration of e-payment in the online transaction process. Then the problems with integration of e-payments, as viewed by the experts are discussed. The focus of this chapter is on the B2C segment; the discussion of B2B issues serves to complement the B2C overview, but is less detailed. As stated earlier, the overviews do not provide a representative picture of the market and of expert opinions, but serve to identify the issues for further discussion and research.

3.1 B2C Segment

3.1.1. Products and solutions in the B2C segment

A considerable number of products and solutions are available to realise the payment part of an on-line transaction (see Annex C for more detail). The functionality of these products and solutions ranges from facilitating the payment process only to supporting the complete web presence (including e-payments). We distinguish the following types of solutions:

- the virtual cash register,
- the payment service provider (PSP),
- the standard software solution for shophosting (including payment),
- the complete E-commerce solution,
- bank output integration software,
- escrow schemes,
- digital content schemes.

The scope of these solutions in terms of the model of the online transaction process is depicted in diagram 4.

The *Internet cash register* can be viewed as a software application that performs a specified transaction protocol to realise the online payment function. The application requires the basic order information and includes interaction with the customer to obtain payment details. The application can be bought or built on the basis of the specification of the company that offers the payment service. This can be a bank or a payment service provider.

The range of payment methods accepted depends on the nature of the provider. Internet cash registers that are operated by PSP's generally support a wide (national and international) range of payment methods, including off-line payment methods. Cash registers that are provided by banks facilitate a more limited range of payment methods. In most cases, the payment information format can be chosen to be compatible with regularly used administrative software.

The *payment service provider* (PSP) is an organisation that operates a payment collection system, which includes a virtual cash register. It processes payments on behalf of the merchant/business and has set up all necessary links to the financial system for the settlement of payments. Its operations may be limited to specific subfunctions of the

payment function (payment authorisation and collection) or it may also provide billing and matching services.

Although PSPs initially started out to support on-line payment processes, their business has expanded to the support of call-centre based payments. As a result, a distinction exists between a 'consumer link'-interface and a 'merchant-link' interface. The consumer link interface is based on the conception that an on-line redirect takes place to the PSP's Internet cash register. The merchant link interface is an interface that allows batch submission of payment information to be further processed and settled by the PSP. PSP's increasingly use and stimulate the use of XML messages for these interfaces. For this purpose the data elements in the XML message are specified in a so-called Document Type Definition (DTD).

The output report that the PSP delivers to the company (for matching purposes) can be delivered in a wide range of formats such as HTML, XML, comma-separated files. etcetera. If a customer expresses a need for a specific output format, translation techniques are available to deliver the output in this format. PSP's support the resolving function by offering on-line enquiry facilities so that companies may review the status of a specific payment.

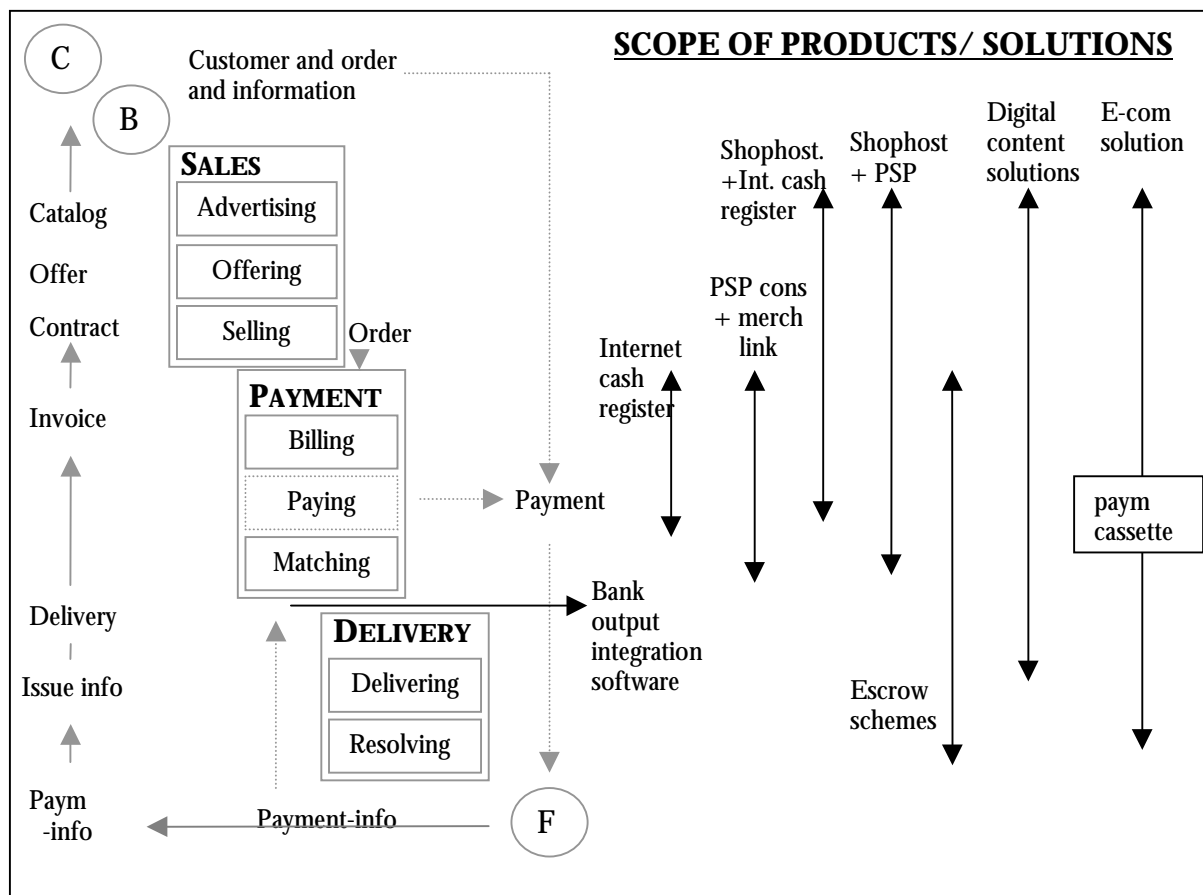


Diagram 4: Scope of products and solutions in the B2C market

Standard software solutions for webhosting are used by webhosting companies to help small companies establish a web presence. The companies can determine the look and content of the website. Often the import of the companies catalogues is supported. The software packages also include payment options, which are either provided by the webhosting company itself or by PSP's.

Complete E-commerce solutions are software suites that allow the design and operation of a web store in all its business aspects. The solutions cover shop-settings as well as auctions. In the commercial domain, the success of campaigns or e-mail actions can be monitored and personalisation is supported. Generally, the software will use parameters to allow multiple languages, currencies and tax regimes. The software suites can include a number of payment protocols and allows for the use of payment cassettes. These modularised interfaces can be used for specific payment protocols or for the interaction with PSP's.

Bank output integration software packages transform bank specific payment information into a format that can be used in the company specific systems. At least one supplier in the Netherlands provides software packages that are capable of transforming most electronic banking output formats of Dutch and Belgian banks. A separate module allows for automated throughput of the in internal systems and ledgers.

Escrow schemes are schemes that support a trusted payment and delivery. The buyer pays to the escrow agent, who notifies the seller of payment. The seller then delivers the goods to the buyer. After inspection, the buyer notifies the escrow agent that the goods are according to specification. The escrow agent then transfers the payment to the seller. Some of these schemes are available in the market.

Digital content solutions are solutions that allow an integrated sale and payment for digital content. The schemes cover the sales, payment and delivery function of the on-line transaction process. Variations exist as to billing mechanisms and the level (transport level, application level) at which the application achieves protection and delivery of digital content occurs. The application that is probably most often used, although precise data is lacking, is the use of a plug-in to dial up a phone number that charges a fee per minute.

3.1.2. Shop development and payment integration problems

The focus in the empirical part of this research has been to investigate the problems of retailers that also have a physical presence. The issue of payment for digital content is therefore only discussed in box 1 on the next page.

Retailer perspective

The retailers interviewed sketched that the implementation process of web shopping and payment were influenced by the 'Internet-hype' at that time (1998-1999), the role of top management and regular business considerations. The Internet-hype made the retailers establish a web-presence, mostly for defensive reasons. This would take the form of limited product offerings on the web. Payments instruments that were accepted were the credit card, the credit-transfer and the one-time direct debit. As a business rule payment needed to be made before delivery.

Paying for digital content

The interviews with experts on payment models for digital content reveal a difference of opinions as to the question whether or not this is still a problem area. While some point out that technically and legally a number of hurdles must still be overcome, others indicate that the issue of digital content is mostly a discussion of business models. The fact that online digital content delivery and billing systems exist and are not being used widely would demonstrate this.

In this study, no interviews were held with digital content providers. The PSP's involved did indicate however that for some content providers the operational cost of setting up specific combined billing and delivery systems were too high. Business models in which 'traditional' payment methods are used for pre-payment of a large payment (as compared to micro payments) were also favoured as such models generate the revenue-stream before actual usage of services takes place.

The logical assumption that digital content ideally should be paid digitally may be the source of the different opinions on whether or not payment for digital content is a problem area. If all types of payment instruments are included, the on-line delivery of digital content can be viewed as an industry that is well established and in which subscription-based models are predominant. Numbers on the size of the industry, which includes information services by Reuters, large publishers as well as provision of gaming, gambling and adult content on the web are however not readily available.

Box 1: Paying for digital content: a technical or a business issue?

In one case, it was stated that the involvement of top-management slowed down the decision and implementation process for the web-shop. In another case top-management involvement and expertise resulted in a quick and pro-active choice to outsource the web-shopping process.

The retailers interviewed have now migrated to a redesigned solution for the web-presence. The solutions are hosted by a third party and based on a market leader solution because of the consideration to choose only platforms for which sufficient support is available. The payment services are outsourced, as these require specific expertise. This is confirmed by an interview with a representative of ING who noted that the process of setting up and operating a PSP has even for them not been easy, despite having all the in-house expertise with respect to clearing and settlement protocols available.

The decision to outsource and the subsequent price and interface negotiations with PSP's requires quite some attention for retailers. Apart from the price-negotiations, one of the requirements was that the statement on the customer bank account should not show the name of the PSP but the name of the merchant. The technical issues with respect to the flexibility of interfaces (output information to be further processed in internal systems) have in one case also been important in choosing the PSP. In general, solutions could be developed for interfacing the payment information with company applications.

When asked to rank the most important problems as a merchant on the web, one retailer noted that the existing brand in the market requires the company to achieve a certain level of fulfilment. In practice, the products therefore need to be available and the logistics need to be in order. Content management (having a consistent and accurate catalogue on the web) was mentioned by another retailer. A discrepancy between the web-info and info through other channels could demotivate buyers. Concerns with respect to payment were not at the top of the list of the merchant.

Consumer research invariably shows the importance of a safe shopping experience and the use of 'pay-later'-instruments. As the pay-later mechanism would create a credit risk, the interviewed merchants were not willing to allow this. Introduction of the off-line one time direct debit as well as the use of cash on delivery-mechanisms helped in creating a safer payment experience.

The fact that payment or payment integration issues are not on the top list does not imply that no problems exist. Payment issues do come up every now and then and require the use of the merchant interface to determine the status of the payment. One of the major issues with the use of PSP is that it may choose to accept a chargeback and charge this to the retailer. This delegation puts the merchant in a troublesome position. If a retailer would operate its own credit-card authorisation services and be confronted with a charge back, the first thing to do would be to find out the specifics of the customer and the order. Based on that information the charge back could be granted or proof could be supplied in the dispute. Thus, if the PSP quickly accepts the charge-back on behalf of the merchant, this can lead to a considerable fraud. In one case, a large electronics store in the Netherlands has had an open dispute with a PSP on this issue.

The PSP perspective

The problems encountered during web-shop development and arranging the payment services are:

- the integration of the output with the merchants accounts receivable administration,
- the ICT-expertise of the merchant,
- the long discussion over price.

In one case also the length and complexity of the merchant decision procedure was mentioned.

In principle the integration issue for PSP's and merchants centers around the format of the payment information required to match orders and payments. In practice, PSP's develop customer specific interfaces to facilitate the matching function or offer matching services. There is less flexibility with respect to the incoming merchant interface. This interface describes the order/payment information needed to be able to process on-line and/or off-line transactions. Merchants need to comply with this data format.

All PSP's mentioned size and available ICT-expertise of the merchant as an important factor during the development of payment applications. For this purpose, some have set up reseller arrangements, so that the reseller takes care of the implementation issues and client contacts for the smaller customers. The PSP can thus focus its major development and implementation efforts on the needs of the larger clients.

The PSP's acknowledged that their existence was based on the inability of banks to agree on a joint standard format for payments. The different approaches of banks are also reflected in the content and completeness of the transaction information that banks deliver. Incomplete payment information for example is a practical problem that prevents a fully automated matching of orders and payments.

Although this report focuses on the online transaction process, the integration with the off-line transaction process is at least as important. Some PSP's have started as providers of on-line cash registers and shifted their business to also facilitate payment instructions generated by call centres or at the point of sale. A recent example of this is the choice of Brother to implement Trintech's enterprise ePayment solution (PayWare ERP) to automate all its web-based and call centre payment transactions. One of the considerations of Brother was that the Trintech solution integrates easily with the SAP R/3 system. The solution sends and receives credit card authorizations during order entry, which allows Brother to notify its web- or call centre-customers immediately when orders are accepted or rejected. The solution also provides a migration path to new distribution channels, such as m-Commerce and t-Commerce.²

The financial industry perspective

Experts in the financial industry did generally not comment on the merchant specific problems with development of shop-hosting and payment service providers. They did comment on the development of the Secure Electronic Transaction protocol. It was noted that this was too heavy a solution, possibly inspired by the security-issues that carried a lot of weight at the time of development of SET. One expert remarked that SET as a financial protocol in a way overstepped its boundaries as the financial institution would also be responsible for signing the content of the customer order, whereas it generally limits itself to payment data and processing only. The future developments with respect to payment protocols (SPA and 3D-secure) were welcomed as a more lightweight approach to solve the authentication issue.

It was noted that the authentication philosophy of Dutch banks with respect to new payment methods diverged. Rabo and ABN AMRO have developed modular authentication extensions that use the chipcard and a 'dumb' token. These means allow for authentication of on-line payment as well as off-line (call-centre) authorisations. Postbank appears to have chosen for the mobile phone as the device to be used for the same purpose. The diverging nature these authentication methods increases the number of payment methods and perhaps the confusion to the consumer.

The academic perspective

There is currently little scientific research available that investigates how the characteristics of a website (including the available payment instruments) influence the shopping behaviour. The research available does provide some indications with respect to relevant issues and trends.

² Source: http://www.trintech.com/pressroom/pr_17_10_01.html

As for the importance of payment instruments, the lack of transaction possibilities has a definite negative impact on the sales potential of a web site. As soon as payment possibilities are available, the sales potential is no longer determined by the specific instruments offered, but by the power of the commercial offer. This is in line with the concept of payments as a dissatisfier. A disfunctioning payment mechanisms has a negative impact on buyers, a functioning mechanisms does not attract more buyers or generate more sales.

A major issue for customers is the security of payments. Research indicates that trust is the core concept underlying their behaviour.³ Even without 'safe' payment mechanisms companies may increase trust through a number of measures and so increase sales. It was pointed out that one of the better trust generators is the consistent delivery and fulfilment towards the customer base. As soon as payment methods had been chosen, the focus of merchants should thus be on the commercial quality of the website.

3.1.3. Conclusions

The integration of e-payments in the on-line transaction process in the B2C segment can be achieved by a large number of payment mechanisms or solutions. The application of these solutions is however not a technical decision but a decision that takes place in a business and industry context. In this segment of the market, this context has been influenced by the discussions on the security of payments over the web. Achieving trust in on-line transactions therefore is a top issue for retailers.

In practice, this is achieved by allowing other payment mechanisms than the credit-card payment. What specific type of payment mechanism this is depends on the country as well as on the regular business practices. Apart from accepting credit-cards, cash on delivery appears to be a method that is often used.

A specific challenge for digital content providers is the determination of the business rules/models that apply to their transactions. A number of systems and solutions is available and in use. Generally, the subscription based model, allowing off-line payment appears to be the successful model. Still there is quite some debate as to the question if the delivery of digital content over the Internet is hampered by the unavailability of on-line payment mechanisms.

The issue and importance of payments integration is often dealt with in the context of an outsourcing discussion. It appears that both merchants and the payment industry have climbed up the learning curve to discover that both shop-hosting and payment service delivery (the sales and payment functions in the on-line transaction model) require specific expertise. A considerable market now exists of webhosters and PSP's.

³ Abrazhevich, D. [A Survey of User Attitudes towards Electronic Payment Systems](#) (presentation for IHM-HCI-2001), IPO, Center for User-System Interaction, Technical University of Eindhoven (TUE), downloaded: 10-10-2001.

Once the strategic decision with respect to outsourcing has been taken, the retailer's main problems are in the domain of content management and fulfilment/logistics. The processing of payments and the prevention of fraud are issues that do require attention, but are not on the top list of problems/priorities. A problem can exist however because of the delegation of the charge-back decision to the PSP.

The current payment instruments for use on the web have different characteristics in terms of risk and security. Payments with SET for example will not be reversed and require less preventive risk measures than payments via SSL. The acceptance of different payment instruments thus raises the question if a web retailer should develop its own security/fraud controls separate from the payment process or if the retailer should rely on the mechanisms that are available in the payment instruments or as a part of the service package of the Payment Service Provider.

The retailers interviewed for this study were pragmatic in their approach towards prevention of fraud. The characteristics of their business process would generally lead to the choice of requiring payment before delivery. On-line payments would be done through accepting credit-card payment, off-line payments by using a cash on delivery mechanism. Actual frauds lead the retailers to take a number of preventive measures, which boil down to a know your customer approach (mandatory e-mail address, credit-check on the basis of customer info and/or physical address). The preventive measures are not a part of the payment but of the ordering process. The measures taken are based on the characteristics of the weakest payment mechanism (credit-card) and thus are too heavy for more secure or irreversible payments.

As a part of the effort to reduce the number of chargebacks, some PSP's increasingly stimulate e-merchants to take preventive measures themselves or to use additional fraud-prevention services of the PSP (in which plausibility and integrity of an order is checked on the basis of the combination of order and customer information, IP-address etcetera). In some cases, the use of these fraud prevention packages is even mandatory.

It is not unlikely that the future proliferation of on-line payment methods (spa/ucaf, verified by visa, pseudo card numbers) will create a further incentive for retailers to outsource the payment function to PSP's. It is however unclear how soon these new mechanism will gain a significant customer base. In addition, the further development of consumer wallets (Microsoft or Sun, inclusion of some or all of these new payment mechanisms) is hard to predict. Assuming however that the newer payment methods will be an improvement over the old ones, e-merchants are not likely to face a need for additional fraud prevention or credit-risk measures in the ordering process beyond the ones that are currently in place.

Box 2: Security, fraud and credit risk management of different payment instruments and their effect on integration

Specific payment integration issues are related to the interfaces from the PSP to the merchant: the interface (with authorisations/transactions) from merchant towards the PSP is often fixed. The information from the PSP to the merchant can for the larger merchants be adapted to company specifications. Smaller companies can solve these problems by buying specific software for bank output integration or by using standard internal applications. Most PSP's and providers of Internet cash registers offer interfaces to software applications with a large market share.

3.2 B2B Segment

3.2.1. Products and solutions in the B2B Markets

In the B2B segment organisations generally have a previous relationship and pay through invoices and the payment procedures that are common in that specific business context. In the so-called 'giro-countries' these payment procedures will be based on credit-transfers, whereas in cheque-countries, the cheque or the procurement card plays a bigger role. The primary issue in this segment is to optimise administrative procedures.

As the products for e-procurement do not always cover payments, the list of examples below also involves solutions that facilitate trade. The solutions can be classified as:

- club solution,
- procurement card,
- payment service provider,
- procurement service provider,
- e-procurement solutions,
- bank output integration software,
- trusted payment solutions.

Club solutions

An example of a solution in which a trusted exchange occurs is Bolero.net. Companies can sign up with Bolero.net and improve the current administrative procedures, especially the handling of the Bill of Lading, by complying with the Bolero.net rules and procedures. The effect is that the administrative procedures for the exchange of goods occur in a digital form. In a technical sense, the solution is based on standardised message exchange, using proven technology and components. Information exchange takes place based on Bolero-XML. In the Bolero.net solution the sales and delivery function are on-line but the payment function itself is taking place through the traditional banking channel.

In this study, also vendor-hosted marketplaces will be viewed as club solutions.

Procurement card

Procurement cards are credit-cards that are used for procurement purposes. The cards are often used during the procurement process for indirect supplies and to allow payment by employees for corporate travel. Procurement cards are a regular payment/procurement tool in the US and rather new to Europe (highest usage in the UK). The cards can be positioned as a tool in the payment function.

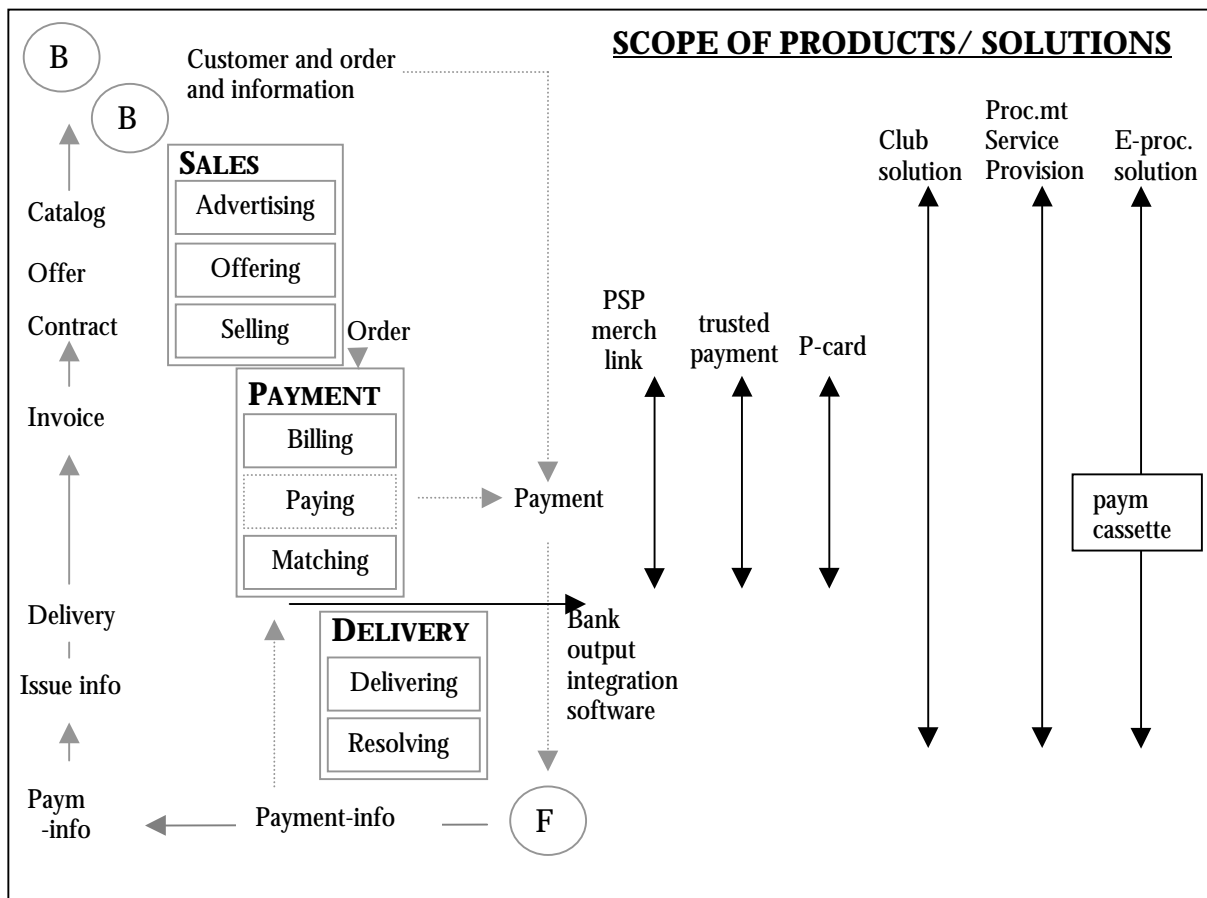


Diagram 4: Scope of products and solutions in the B2B market

Payment Service Providers (for B2B)

PSP's are active in the provision of e-payments for the B2B segment as a part of their regular services. An example of a PSP that has specifically focused on this segment is [TradeCard](#). TradeCard offers a platform with a secure, online workspace for buyers, sellers and essential trade service providers to initiate, conduct and settle the financial portion of their trade transactions, whether they are domestic or cross-border. In this workspace, there are sets of transaction workflow applications that enable all parties to a transaction to create, share data, make, and receive payment in a collaborative environment.

The web browser is one of many methods that can be utilized to access the system. All non-browser access is achieved by messaging. Messages are delivered in a variety of mediums and formats including SMTP, FTP, EDI, and custom formats. A specific messaging infrastructure converts the messages to TradeCard XML formats.

Procurement Service Providers

The use of the Application Service Provision model in the domain of procurement makes it possible to outsource parts of the complete procurement process. A German company that operates on this model is [Onventys](#).

E-procurement solutions

As in the B2C market, a number of e-procurement solutions are available from the large vendors.⁴ These products support the whole on-line transaction process. Support for the payment functions requires a separate module or cassette as well as agreements with a financial intermediary or bank. Often the vendors also host a market on the web and create buyer/seller communities.

Bank output integration software

These packages transform bank specific payment information into a format that can be used in the company specific systems. ICT-providers have for example developed interfaces between the ABN AMRO Global Gateway product (which manages international payments) and provider specific modules for payment. Topconsults GlobalGateway Connection Box for example provides the integration between Oracle and the ABN AMRO application.

Trusted payment (credit-management)

A solution in which an intermediary guarantees payment is [e.Credible](#). In this solution, buyers and seller have to register with [e.credible.com](#) in order to be able to do trusted business. Having passed a credit-check, buyers may obtain a credit-certificate. E.credible now guarantees payments made by buyers with a credit-certificate. Additionally E.credible performs a number of credit management services (the core business of NCM, its mother organisation).

Technically eCredible does not require the companies to adapt their message interfaces. E.Credible has based its communications on XML and has developed a number of proprietary interfaces to be able to accept a number of different formats and to communicate directly with ERP systems and web front-end systems. User may also choose to use standard input screens and interfaces as defined by eCredible.

3.2.2. Developments with respect to payment integration

Most experts noted that the B2B and B2C segment were generally quite different. In the B2B segment organisations generally have a relationship and pay through invoices or established trade procedures. The main integration problems of e-commerce are related to the orientation function in the whole transaction process and have to do with the best way to develop or use procurement catalogues. In addition, the different legal and fiscal regimes were mentioned as practical issues, which must be solved to further develop e-procurement.⁵

It was noted that the problem of merging catalogues from different suppliers is not only a technical issue, but a market issue as well. Only larger organisations have the power to develop integrated catalogues for internal use and to 'dictate' format requirements to their suppliers. Suppliers have a sort of natural reluctance to give up their current practices in

⁴ Amongst others: Ariba's Buyer/Sourcing, iPlanet's BuyerXpert, Clarus' Clarus eProcurement, Peregrine's Get-Resources, i2 (righworks), Oracle (i procurement 11), SAP/Commerce One's Enterprise Buyer 2.

⁵ One expert stipulated that the (payment) practices of smaller companies would resemble the practices in the B2C market. Consequently the solutions for the B2C market might also be useful to this segment of the B2B market.

order to protect their market position. This may have an impact on the payment function as well.

In the B2B segment, the payments function relates to the procurement responsibility, the financial responsibility and the responsibility to operate and maintain the ICT-infrastructure. Organisational policies will exist in all these domains, as a result of which the changes in the current operating procedures will often be evolutionary. Improvements in the procurement process may therefore be limited to certain types of procurement, without affecting the payment methods. If the procedures are to be changed beyond the existing organisational responsibilities, clear benefits need to exist for the organisational functions involved. The introduction of a procurement card, which simplifies procedures and reduces payment periods as well, is an example of a cross-organisational change with a clear benefit.

In the ICT-domain an important issue is to design an architecture that allows legacy systems to operate via a number of channels. This is more challenge than before, as companies increasingly start to develop automated inter-organisational processes. Apart from the e-procurement solutions, a variety of enterprise application integration solutions is therefore also part of the picture. ICT-departments need to consider whether to focus on best applications for specific purposes and integrate these themselves or whether to choose an integrated solution platform. Decisions and policies in this domain have their bearing on the choice of application services providers and payment service providers.

Generally, the development of e-payment facilities for the B2B has been slow to take off. Yet, an increasing number of marketplaces, suppliers and solutions start including facilities to get payment authorisation and to send transmit payment orders. Peregrine has developed Rosetta.net enablers, Surepay is facilitating the payment function for the Chematch portal and Sun's I-planet solution will be compliant with Identrus-Eleanor (the payment mechanisms for Identrus).

3.2.3. Conclusions

The main conclusion with respect to the integration of e-payments in the online transaction process for the B2B segment is that it has not been the first priority for the players in the market. The attention has been mainly focused on improving business practices and procedures. Now that a wide range of e-procurement solutions has been developed, the attention is shifting towards further using the applications to streamline the payments process. A considerable number of products and solutions appear to be available for this purpose.

3.3 Conclusion

A variety of solutions and standards is currently being used to integrate e-payments into the on-line transaction process. In terms of pricing and complexity, the solutions in the B2C segment cover the low-end and the high-end of the market. The solutions in the B2B segment appear to be primarily focused on the larger companies.

There is a significant difference between the characteristics and problems in the B2B and B2C domain. In the B2C segment the main barrier to e-commerce is still trust and security.

In principle, there is also the problem that a wide variety of payment mechanisms exists, but this can be solved with solutions such as an Internet cash register or the use of a payment service provider. In the B2B domain the main issue is how to optimise procurement practices and especially catalogue management within the framework of the existing organisational policies.

In the B2C segment the e-payments issues of merchants appear to be less important than the commercial issues (content management of website, logistics), once the decision to accept on-line payments (and possibly outsource these) has been taken. In the B2B segment, solutions that have their origins in the B2C domain (card-payments, payment service providers, payments cassettes for software suites) are increasingly being used.

Three specific issues with respect to payment integration in the B2C segment are:

- a payment service provider may honour a charge-back too easily and leave the remaining operational problems to the merchant,
- the different electronic banking output formats of banks may stand in the way of fully automating the matching between orders and payments
- the level of ICT-expertise can be a problem for smaller companies.

Chapter 4: Standards, architectures and models

This chapter provides in paragraph 4.1 an overview of the standards, architectures and models that are relevant for the e-payments and the on-line transaction process.⁶ A further structuring of this information will occur in paragraph 4.2. It will become clear that the models and standards that are most relevant to the B2C domain are the financial transaction protocols and message formats, further discussed paragraph 4.3. Some tentative conclusions will be drawn in paragraph 4.4.

4.1 Overview of standards, architectures and models

Table 2 provides an overview of the standards, models and architectures that are related to the issue of integrating e-payments in the on-line process. The overview is structured by distinguishing the nature of the efforts and the 'communities' from which they originated.

The nature of the efforts can be:

- metamodelling and semantic efforts,
- frameworks and architectures,
- business procedures,
- financial transaction protocols and message formats,
- enabling technology standards/specifications.

The 'communities' identified are:

- the financial sector,
- the (international) trade community,
- the ICT-vendors,
- the web-community,
- the formal standardisation community,
- the research community.

4.1.1 Enabling technology standards/specifications

With respect to enabling standards/specifications we distinguish:

- enabling webtechnology,
- chipcards and chipcard readers.

The specifications listed under the heading webcommunity range from transport protocols (TCP, IP), encryption protocols (SSL), presentation specifications (HTML) to data format (XML) and XML translation standards (XSLT). A recent specification that is also listed in this box is SOAP. SOAP is a lightweight protocol for exchange of information in a decentralized, distributed environment. It can potentially be used in combination with a variety of other protocols.

⁶ The main sources for this chapter were the [Diffuse website](#), the research work as done in the Gigaport projects on [Transaction, Accounting and Billing](#) at the Telematics Institute and the documentation of the [CEN/ISSS workshop on Electronic Commerce](#). Detailed information can be found on the separately provided CD (see also Annex D).

Specifications and standards on chipcards and chipcard readers has been done in the formal standardisation committees, by the ict-industry and by the financial sector itself.

	Financial sector	Trade community	Ict-vendors	Web comm.	Formal stand. org	Research commun.
Metamodels and modelling		EAN/UCC	UML WSFL UDDI- WSDL	BPML	BSR	NEML
Architectures and Frameworks		EDIFACT X.12 ebXML	Biztalk, MS .net, eCO framework XrML	AAA SAML	MPEG-21	Interprocs SEMPER
Business Procedures		BmeCat OBI EP.NL Rosetta CIDX Odette	xCBL cXML UBL XAML BTP		(ISO-TC 68, ISO-IEC JTC1)	
Financial Transaction Protocols and Message Formats	C-SET SET, PCN 3-Dsecure SPA, E-M commerce, Visa XML Invoice		XML Pay OFX IFX Jalda ECML	IOTP, W3std micro- payments,		
Enabling Technology Standards and Specifications	FINREAD, Open Plafom		JavaCard, Wind. for Smartcards	SOAP, XML, XSLT, HTML, SSL, TCP, IP	ISO-IEC JTC1-SC17	

Table 2 : Selection of standards, models and architectures

The abbreviation ISO-IEC JTC1-SC17 stands for Subcommittee 17 of the Joint Technical Committee 1 of the International Organisation for Standardisation and the International Electrotechnical Commission. This Subcommittee has drafted [standards](#) for identification cards and related devices. These describe the technical and lower level specifications of the cards, which are the basis for many smart-card deployments.

Two large vendors, Microsoft and SUN have developed respectively [Smartcard for Windows](#) and [Javacard](#). These smart-card specifications allow the addition of data or applications on the card after it has been issued.

A standardisation activity from the financial industry is FINREAD, which defines the rules under which a chipcard card reader and application can operate securely in the home-environment. With this specification, the banks can take advantage of the additional security offered by smart cards by ensuring a compatible secure infrastructure available for home devices. One of the motivations behind the project was to prevent de facto ICT-standards from defining the characteristics (and security-level) of the card-reader interface.

Visa International has also played an active role in the development of specification for IC-cards and IC-card readers and terminals. The focus was to develop specifications that would allow other applications to be resident on IC-cards. The specifications have been the starting point for the Global Platform consortium. This is a consortium that has the goal to further define and promote the specifications and infrastructure ('the Open Platform') for multi-application smart cards.

4.1.2 Transaction protocols and message formats

We can see that the financial sector has focused its efforts on the development of SET. This is a financial transaction protocol that performs the complete payment function. The protocol has been extended to allow the use of chipcard and a token for authentication. This is called C-SET. Both SET and C-SET have seen complicated implementation processes, which have hampered its successful adoption.

The abbreviation PCN stands for Pseudo Card Number and indicates that a number of protocols have been developed that use a 16digit pseudo card number for authorisation of cad payments over the web. Apart from the PCN-solutions, three authentication protocols are being developed and deployed. These are the Secure Payment Application by Mastercard, the 3D Secure application of Visa and the e-M commerce protocol of Maestro.

The Visa Extensible Markup Language (XML) Invoice Specification provides a cross-industry, interoperable message format to enable processing of enhanced data across regions and industry sectors.⁷ It can be used in combination with an agreement for 'enhanced data services'; under such an agreement, companies get more detailed information on the purchases made. This information serves to improve the matching and internal bookkeeping processes. The focus of the specification is on B2B procurement processes.

A standard developed by the ICT-vendors is OFX, which stands for Open Financial Exchange and is essentially a common data format to be used for communication between banks and homebanking applications for customers. It has its roots in the USA and Canada.

Interactive Financial Exchange (IFX) is a message specification for exchanging financial data and instructions among customers, their Customer Service Providers (CSP's), and financial service providers. It can be viewed as OFX for the Internet-environment. IFX defines the request and response messages used by each financial service as well as the common framework and infrastructure to support the communication of those messages.

⁷ See: <http://www.visa.com/ut/dnld/spec.ghtml>

The IFX initiative is the product of a joint effort between teams that include representatives of Integrion Financial Network's GOLD, developed by IBM and Integrion, and representatives of OFX, developed by CheckFree, Intuit and Microsoft. Together with a number of banks, the parties have been engaged in a collaborative effort to facilitate the creation of a single open IFX specification. IFX is now further being developed by the IFX Forum, which is a consortium of industry leading financial institutions, service providers and software vendors.

The IFX specification does not describe any specific product implementation, this is left to the individual institutions. Recently it was announced that Bank of America and SAP will use the IFX v1.2 specification to enable the transmission of financial information, such as statements to be used for cash management and account reconciliation, delivering information between SAP™ mySAP.com™ solutions and Bank of America systems.⁸

XMLPay is a standard proposed/developed by Ariba and Verisign. It defines an XML syntax for payment transaction requests, responses and receipts in a payment processing network. The intended users are Internet merchants and merchant aggregators who need to deal with multiple electronic payment mechanisms (credit/debit card, purchase card, electronic cheque and automated clearing house payment). The supported operations include funds authorization and capture, sales and repeat sales, and voiding of transactions.⁹

Jalda is an open specification developed by Ericsson and Hewlett Packard. This object-oriented specification allows vendors to build a payment mechanism that works with the Ericsson/HP Safetrader payment server. It is deployed by the Netgiro payment service provider.

Electronic Commerce Modelling Language ([ECML](#)) is a specification that describes the format for data fields that need to be included when moving from the shopping card to the payment function in an on-line transaction. The proposed version 2.0 describes these fields in an XML syntax.

The W3 standard on micro payments has originated from IBM's standardisation efforts. It covers the payment function for payment of digital goods. It is implemented in the products of Netactuals (Cartio) and Newgenpay.

The Internet Open Trading Protocol (IOTP) specification effort aims at being the umbrella under which all e-commerce shopping protocols may work. Its objectives are to:

- enable development of interoperable products to support electronic commerce (any IOTP enabled consumer can "trade" with any IOTP enabled merchant),
- provide a "universal shopping experience" (a consistent interface for all trading steps, irrespective of the identity of the trading parties).
- encapsulate any Internet payment method ("complements" but does not replace available and emerging payment methods).

⁸ Source: <http://www.ifxforum.org/ifxforum.org/prdoc.cfm?Name=666>

⁹ See also: <http://www.verisign.com/resources/wp/payment/overview/paymentServices.pdf>

4.1.3 Business procedures

On the level of business procedures Bmecat is a catalogue standard, developed by the e-business committee of the German national procurement organisation.

The objective of the Open Buying on the Internet framework is to provide a standard framework for secure and interoperable business-to-business Internet commerce with an initial focus on automating high-volume, low-dollar transactions between trading partners. As it reflects the US way of doing business a separate implementation of this standard has been developed in the Netherlands. This is the Electronic Procurement NL standard.

The ODETTE specifications are industry specific guidelines with respect to using the EDIFACT standard in the automotive industry. Similarly Rosettanet (electronics) and cidx (chemicals) are industry oriented. These two efforts are however have the character of a more elaborate framework. This comprises:

- the "Partner Interface Process" : PIPs that define the B2B processes agreed upon by all the Trading Partners
- the "RosettaNet Implementation Framework,
- the Business and Technical Dictionaries.

The following specifications to support business procedures originate(d) in webcommunity:

- Commerce XML (cXML) is designed to provide a simple XML-based protocol between entities engaged in Business-to-Business eCommerce transactions over the Internet.
- xCBL is a XML specifications for cross-industry exchange of business documents such as product descriptions, orders, invoices, and shipping schedules.
- Universal Business Language (UBL) is a recently started specification effort to deliver a coordinated set of XML grammatical components that will allow trading partners to unambiguously identify the business documents to be exchanged in a particular business context.
- The transaction Authority Markup Language (XAML) is a vendor-neutral standard that enables the coordination and processing of online transactions for XML web services
- The Business Transaction Protocol (BTP) is a specification which is intended to enable complex XML message exchanges to be tracked and managed as loosely coupled "conversations" between businesses.

Finally it is noted that standardisation with respect to banking procedures also has taken place in the context of the ISO.

4.1.4 Frameworks and architectures

The standards EDIFACT and ANSI X.12 are different versions of the Electronic Data Interchange standard, which aims at facilitating intercompany business transaction processes by establishing message formats. With the advent of XML adaptations have taken place to include these developments. This has resulted in the definition of the ebXML Technical Architecture. The aim of the ebXML Initiative is to provide an open XML-based infrastructure enabling the global use of electronic business information in an interoperable, secure and consistent manner by all parties. The Unified Modelling Language is used for the modelling aspect.

Biztalk is the name for the Microsoft product that allows application integration and supports the use of XML. Also from Microsoft is the .NET framework, which consists of a series of tools that covers both the technical, protocol, business and architecture domain.

The eCO framework is the name for a conceptual framework, which classifies the hierarchy within which e-commerce business occurs. This hierarchy is:

- networks (contain)
- markets (where)
- businesses (provide and use)
- services (which conduct)
- interactions (that exchange)
- documents (containing)
- information items.

XrML is a specification that aims to use XML to transport and protect information, which has to be protected for copyright reasons (digital content). It is still in development.

Authentication, authorization, and accounting (AAA) is the term for a framework for intelligently controlling access to computer resources, enforcing policies, auditing usage, and providing the information necessary to bill for services. The standards that have been drafted in the IETF are for information purpose.

Security Assertion Markup Language (SAML), pronounced "sam-l", is the first industry standard for enabling secure e-commerce transactions through the eXtensible Markup Language (XML). SAML was developed to provide a common language for the sharing of security services between companies engaged in B2B and B2C business transactions. SAML combines two prior efforts, S2ML and AuthXML. SAML allows companies to securely exchange authentication, authorization, and profile information between their customers, partners, or suppliers regardless of the security systems or e-commerce platforms that they have in place today. As a result SAML promotes the interoperability between disparate security systems, providing the framework for secure e-business transactions across company boundaries.

The Multimedia framework (MPEG-21) is an ISO -based effort in which seven architectural components are defined which are used to define gaps in current standardisation efforts with respect to multimedia standards and to structure future standardisation.

Interprocs is a development methodology designed as a part of the EURIDIS research programme in Rotterdam. It aims to define business processes and allow transformation of data formats.

Secure Electronic Market Place for Europe (SEMPER) was produced by a EU supported project under the ACTS programme, undertaken by a 20-partner consortium led by IBM. It is a definition of an open and system independent architecture for Electronic Commerce. The project was concluded in 1999. Based on access via a browser, the architecture specifies common functions to be supported by applications which include Exchange of

certificates, Exchange of signed offer/order, Fair contract signing, Fair payment for receipt, and Provision of delivery information. It takes a layered approach and specifies layers for 'Supporting services', 'Transfer & fair exchanges', 'Commerce', and 'Business applications'. The SEMPER architecture also includes standard buyer/seller scenarios.

As a part of the SEMPER work, a design has been made for an object based payment architecture. Some of the concepts of this work have been use by IBM as part of its development of the Websphere manager.

4.1.5 Metamodelling and semantic efforts

The metamodelling and semantic initiatives focus on establishing a general language or modelling methodology. Included in the listing is the EAN UCC system for product coding, which is relevant to facilitating business processes in the retail sector.

The Unified Modeling Language (UML) is a standard language for specifying, visualizing, constructing, and documenting the artifacts of software systems.

The Web Services Flow Language is an IBM-design method to be used with the development of Web Services.

The Web Services Description Language (WSDL) is an XML-based language used to describe the services a business offers and to provide a way for individuals and other businesses to access those services electronically.

The Universal Description, Discovery, and Integration (UDDI) specification defines an XML-based registry for businesses worldwide to list themselves on the Internet. Its ultimate goal is to streamline online transactions by enabling companies to find one another on the Web and make their systems interoperable for e-commerce.

The business process modelling language (BPML) will enable the standards-based management of e-Business processes with forthcoming Business Process Management Systems (BPMS).

The purpose of the Business Semantic Register (BSR), an official ISO data register, is to provide an internationally agreed register of multilingual data concepts, semantic units (SU), with its technical infrastructure. This will provide storage, maintenance and distribution facilities for reference data about semantic units and their links (bridges) with operational directories. The semantic units will be built from semantic components, which can be considered as building blocks.

The Networked Enterprise Modelling Language (NEML) is a modelling technique developed by the Telematics Institute. It aims at modelling the interorganisational processes.

4.2 Positioning the standards architectures and models

The listing in the previous paragraph reflects that many players are active in the standardization landscape. Apart from the standard developing organizations (SDO's), consortia of market players, in total more than 100 actors, play an active role. The most relevant developments in this domain are:

- a decreasing role for formal standardization organizations and an increasing role for industry consortia in the standards setting process,
- the convergence of previously separately standardized technologies (telecommunications, computers, web), reflected in cross-industry consortia,
- the use of new standardization and specification procedures (ISO-fast track, IETF-procedures, CEN-ISSS Workshop model) to allow more open and responsive standardization.

This study will not discuss the separate modes of standardization, their origins and benefits and costs. Readers that would like to understand why there are so many organizations involved, what their motivations are and how the process is experienced in practice, are referred to the papers by Boyd, Cargill and Jakobs et.al. (see References). These papers discuss the role of consortia vs SDO's, the Workshop Agreement format of CEN-ISSS and the functioning of working groups of ISO, ITU and IETF.

In table 3, we distinguish and position four groups of initiatives that are relevant to this study. The standards with respect to B2C-transactions are further discussed in paragraph 4.3, the other standards and models are further discussed below.

	Financial	Trade	Ict-	Web	Formal stand. org	Research commun.
	B2C - transaction standards					
Metamodels - modelling	B2B trade & procurement standards		Models & Architectures			
Architecture Frameworks						
Business Processes						
Fin. Trans. Protocols Mess. Formats						
Enabling Standards	Generic enabling standards					

Table 3 : Positioning the standards, models and architectures

4.2.1. Generic enabling standards and technology

Essential to this study is that the enabling standards and specifications allow and facilitate the flexible sending, formatting and translation of data over open networks. It increases the possibility to define bridging services and protocols between different systems. More specifically the availability of the XML and XML translation specifications are important in enabling a flexible integration of the payment process into the whole transaction process (see also 4.3).

In practice, many companies take a pragmatic approach when it comes to decisions on using enabling standards/specifications. If a business case exists and a sufficient support base for the standard/product exists, the decision will be taken to implement. Both a retailer and a PSP noted that with the further migration towards XML-based communication, interoperability problems remained limited to the development of translation software.

As stated above, the actual application and introduction of enabling standards or specifications is determined by the specific business case. In some cases this business case may also be forced by a dominant organisation in the customer base or supply chain of a company. Whether or not a company- or industry specific XML-based message format will gain wider use is thus often dependent on the power structure in that industry.

4.2.2. B2B trade and procurement standards

A specific issue in the B2B segment is the use of sector specific standards to streamline procurement procedures. A number of standards are available to this end. An important conclusion is that successful standardisation seems to occur often within industries and less so across industries. Already trying to harmonize the product catalogue within an industry appears to be a quite cumbersome and difficult task. It may thus be the case that the specific characteristics of different industries (chemical industry, electronics) do not allow further standardisation. Then again, the question is if there would be a business case for such cross-industry standardisation.

The fact that the subject domain does not allow further harmonisation does not imply that it is impossible to use the underlying standardisation concepts. The chemical industry for example has succeeded in adapting the Rosettanet specifications (Chemical e-standards; see also the CD in the directory CIDX). Also a generic framework (ebXML) is developed which would allow integration and automation of interorganisational procedures. This framework competes with the .NET approach taken by Microsoft (which tools covers the technical, protocol, business and architecture domain).

4.2.3. Models and architectures

The importance of modelling and using architectures is increasing, now that organisations start to optimise and further automate the message and document flows with other

organisations. Consequently, a large number of architectures and models are available on the market.¹⁰ These are mostly relevant to the B2B segment of the market.

For further information on the different models and standards, we refer to the work of the CEN/ISSS working group that is investigating this issue. In a draft version of their report they conclude:

“It seems to be the case that there are few products that actually implement any of these Frameworks, Architectures, and Models (apart from those of the vendor(s) who generated it). On the other hand, many electronic commerce systems in operation today are not covered by one of these formally documented Frameworks, Architectures, or Models. Thus it seems that there are de facto, undocumented models emerging but with consequences in terms of lack of interoperability, and even business reluctance to adopt e-commerce because of a lack of a generally accepted approach.

It is recognised that implementation is a complex issue. For example, vendor implementation of a particular Framework, Architecture, or Model in products and services does not necessarily entail implementation in the sense of actual adoption by (potential) users. There are also different degrees of and approaches to implementation of the same Framework, Architecture, or Model, which do not necessarily guarantee interoperability at the product/service level, and/or at the system level. Compliance therefore is not a straightforward matter. Moreover, the purposes of the Frameworks, Architectures, or Models often do differ from one another; it may not be appropriate to directly compare between them in simplistic terms such as implementation statistics. On the other hand, the ad hoc development and adoption of electronic commerce architectures by user organisations, some of which are loosely “based” on the formally documented Frameworks, Architectures, or Models, remains an important concern for interoperability..“

A specific CEN/ISSS standardisation effort¹¹ is now focused on the development of an E-Commerce Integration Meta-Framework (ECIMF): The main purpose of this meta-framework is to facilitate interoperability by mapping the concepts and contexts between different existing e-commerce frameworks, across multiple architectural layers. This effort is more relevant to the B2B segment than to the B2C segment.

4.3 Financial transaction protocols and message formats

The investigation of shopping and transaction protocols in B2C e-commerce shows that no standards exist with respect to the shopping protocol on the web. In the IETF domain, one draft standard specified a Protocol for Shopping over the Internet.¹² This protocol essentially describes a search/comparison mechanism followed by a transaction. Other than that, no standards or specifications have been proposed with respect to the e-shopping process.

¹⁰ See: Frameworks, Architectures and Models for Electronic Commerce Group, CEN/ISSS Electronic Commerce Workshop , Draft Revision 1.a (for version 2), October 2001.

¹¹ CEN/ISSS Electronic Commerce Workshop, [E-Commerce Integration Meta-Framework](http://www.ecimf.org/) (ECIMF) Project (<http://www.ecimf.org/>).

¹² [Protocol for shopping over the Internet](#), R. Reddy, December 01, 1997

With respect to the shopping protocols on the web, the available solutions have the form of a proprietary shopping card or auction mechanism.¹³ The only standardisation that has taken place in this respect is related to the field names and contents of the shopping card. This information is contained in the ECML-specification.

There is no information on the shopping card solution that is most often used and should therefore be viewed as the de facto standard. A general trend towards one-click shopping can be observed (Amazon.com is a well known developer of this concept).

Because of the variety of shopping protocols and web-interfaces, users are faced with a number of shopping procedures. If these procedures also require a sign-on or log-in, the result is that users need to manage a wide range of user-id's, nicknames or passwords. In this domain standardisation efforts are absent, although de facto standardisation takes place. Microsoft has developed a Passport-concept, which stores all user information and can be used to use a single sign-on with multiple retailers. A counter-initiative is being developed by an industry consortium (the Liberty Alliance). These initiatives show that a lack of standardisation currently exists on the user side.

Although standardisation with respect to the whole shopping process has not occurred, it has occurred with respect to the payment function on the web. The most significant effort is the development of the SET-protocol, followed by a number of light-weight specifications (3D-secure, SPA, PCN Numbers etc). A fundamental problem with all of these developments is the ease of the existing payment procedures. Additionally, the different liability and consumer protection arrangements for credit-cards in different countries create a situation in which the consumer or merchant benefits for applying these new payments methods can be limited. Consequently, the market for development and adoption of these techniques has remained fragmented. The applications of these payment protocols therefore seem to be bound to remain limited to specific target groups and countries.

The Internet Open Trading Protocol (IOTP, see also diagram 5) tries to solve both the issue of fragmented payment protocols and the user experience, by serving as an umbrella protocol which encompasses all kinds of shopping sequences and payment instruments.¹⁴ The standard (RFC 2801) defines trading roles and the interactions between those trading roles through a number of IOTP-transactions. It is designed to allow the actual shopping process to be any combination of interactions (including rounds in which consumers and merchants negotiate).

The IOTP standard defines the following trading roles:

- the Consumer. The person or organisation which is to receive and pay for the goods or services,
- the Merchant. The person or organisation from whom the purchase is being made and who is legally responsible for providing the goods or services and receives the benefit of the payment made,

¹³ See for a list of shopping cart solutions on the CD: 1-practices-products/cartsolutions/list.html

¹⁴ This section of the study is based on the text of RFC 2801, available on the CD in the subdirectory 2-standards-specs\iotp.

- the Payment Handler. The entity that physically receives the payment from the Consumer on behalf of the Merchant,
- the Delivery Handler. The entity that physically delivers the goods or services to the Consumer on behalf of the Merchant,
- the Merchant Customer Care Provider. The entity that is involved with customer dispute negotiation and resolution on behalf of the Merchant.

Four types of interactions (called exchanges) can take place between these entities:

- the Offer. The Offer Exchange results in the Merchant providing the Consumer with the reason why the trade is taking place. It is called an Offer since the Consumer must accept the Offer if a trade is to continue
- the Payment. The Payment Exchange results in a payment of some kind between the Consumer and the Payment Handler. This may occur in either direction
- the Delivery. The Delivery Exchange transmits either the on-line goods, or delivery information about physical goods from the Delivery Handler to the Consumer, and
- the Authentication. The Authentication Exchange can be used by any Trading Role to authenticate another Trading Role to check that they are who they appear to be.

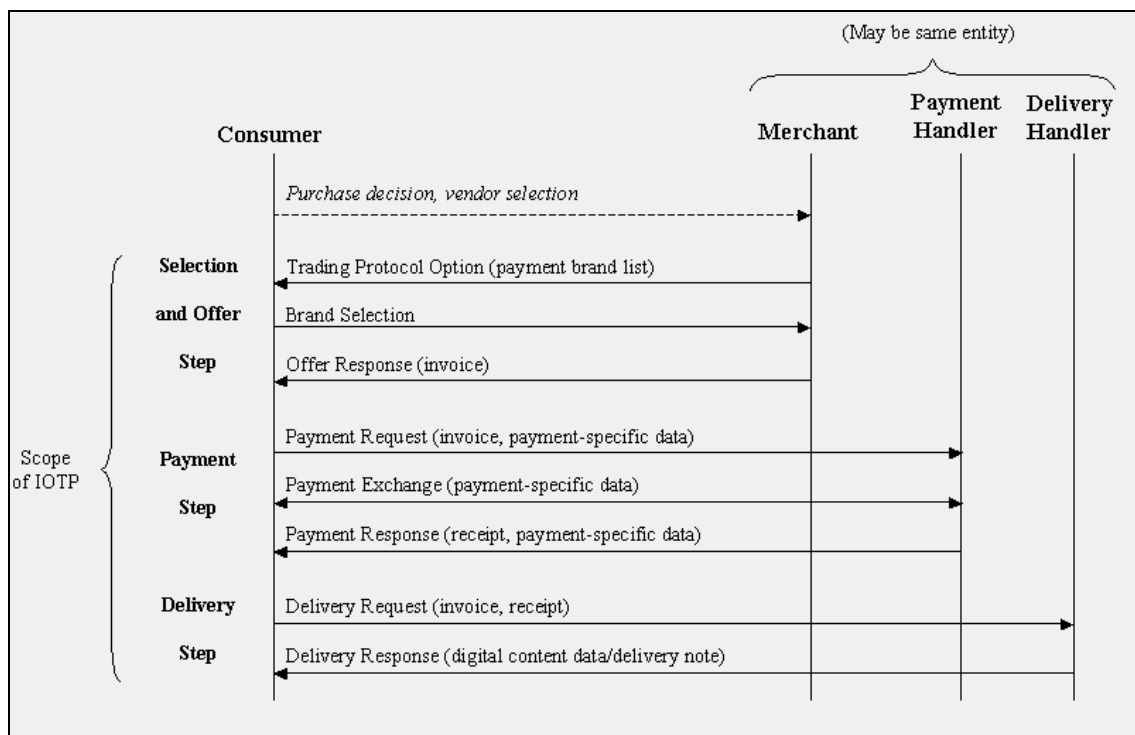


Diagram 5: The scope of IOTP

Source: Kessler and Pritsky, August 2000

IOTP Transactions are composed of various combinations of these Trading Exchanges. For example, an IOTP Purchase transaction includes Offer, Payment, and Delivery

Trading Exchanges. As another example, an IOTP Value Exchange transaction is composed of an Offer Trading Exchange and two Payment Trading Exchanges.

By combining the Exchanges, the following transactions are defined:

- Purchase. This supports a purchase involving an offer, a payment and optionally a delivery
- Refund. This supports the refund of a payment as a result of, typically, an earlier purchase
- Value Exchange. This involves two payments which result in the exchange of value from one combination of currency and payment method to another
- Authentication. This supports one organisation or individual to check that another organisation or individual are who they appear to be.
- Withdrawal. This supports the withdrawal of electronic cash from a financial institution
- Deposit. This supports the deposit of electronic cash at a financial institution.
- Inquiry. This supports inquiries on the status of an IOTP transaction which is either in progress or is complete,
- Ping. This supports a simple query which enables one IOTP aware application to determine whether another IOTP application running elsewhere is working or not.

It should be noted that version 1 of IOTP has been implemented by Hitachi, Royal Bank of Canada and Brokat Technologies as a part of their payment systems development. Where the first version of IOTP focused on supporting the regular shopping process on the web, the second version aims at supporting server based wallets and allowing an arbitrary sequence of transaction steps.

It is unclear if IOTP will be supported enough by players in the market to become a real standard. Its direct competitor seems to be the de facto consumer wallet solution, which can be the Passport solution or an integrated home-banking/internet banking solution of the customer's bank.

A last series of standards/specifications are message format standards. Specifically in the US-market the OFX- and the IFX standard are widely used standards that facilitate message exchanges between customers, banks and customer or merchant service providers. It is interesting to note that similar standards have not developed in Europe, perhaps as a result of the fragmented local banking markets.

4.4 Conclusion

Essential to this study is that the enabling standards and specifications allow and facilitate the flexible sending, formatting and translation of data over open networks. It increases the possibility to define bridging services and protocols between different systems. More specifically the availability of the XML and XML translation specifications are important in enabling a flexible integration of the payment process into the whole transaction process

This study showed that no standardisation of shopping protocols has occurred, except for the data elements and formats needed in shopping carts (ECML). The user thus faces as problem of going through different shopping and payment procedures at different websites. The de facto solution to this problem is a wallet, which can be provided by banks or any other organisation (Microsoft, SUN Liberty Alliance).

A number of protocols for payment over the web (SET, SPA, 3D-secure) has been developed by the financial industry. So far, none of those have gained market acceptance. Both the ease of the current procedures as well as the different legal and liability rules may have been the cause. The result is a fragmented picture.

The Internet Open Trading Protocol (IOTP) tries to solve both the issue of fragmented payment protocols and the user experience, by serving as an umbrella protocol, which encompasses all kinds of shopping sequences and payment instruments. It is unclear however, if IOTP will be supported enough by players in the market to become a real standard. Its direct competitor seems to be the de facto consumer wallet solution, which can be the Passport solution or an integrated home-banking/internet banking solution of the customers' bank.

Application of XML-based standards is often industry specific and dependent on power structure between organisation and in the industry. In the B2B procurement segment some successful usage of specifications (Rosettanet, CIDX, OBI) but these remain industry specific. Yet, given that organisations start to optimise and further automate the message and document flows with other organisations, the importance of modelling and architectural design is increasing.

A large number of models and architectures exist, each with their own focus. Some models remain conceptual, whereas other frameworks (such as the .Net approach of Microsoft) span the architectural, business, protocol and technical domain. Although this may lead to some kind of incompatibility between information systems, enabling technologies (such as XML and XSLT specifications) and architectural efforts (E- Commerce Integration Meta-Framework) may mitigate this problem.

Chapter 5: Policy suggestions and policy implications

As a part of the interviews, experts have been asked about future developments and their views on the policy suggestions that would help stimulate e-commerce in Europe. These views will then be used to determine the policy implications and discuss the question if targeted intervention or consensus fostering would be required.

5.1 Future developments and policy suggestions

Observing the available solutions and future developments, most experts concluded that additional policy initiatives to standardize e-payments were not necessary. Some barriers to e-commerce were observed in the domain of setting up integrated catalogues for B2B use and in purchasing digital content. It was not clear however if standardisation would solve these problems.

The emergence of a large number of consortia and market based specifications (as opposed to the standards as drawn up by standardisation organisations) show that the standardisation dynamics are changing. A number of experts remarked that the maturing of the ICT-sector requires a new way of thinking about standards. A general trend in software development is that user interface, business logic, data and process information can and should be separately addressed. In addition, the use of techniques that are as platform independent as possible further reduces the connectivity problems that used to exist because of different de facto supplier standards. In general, it may therefore be expected that the need for specific extra standards to solve connectivity or interoperability issues will diminish over time.

One expert explicitly pointed out that the three-domain model for credit-card transactions could be viewed as a sign of the changing ICT and standardisation landscape. In the 3D-model, the issuing and acquiring bank need to comply with interoperability requirements but may choose their own (non standardised) authentication methods. This flexibility is considered a step forward in comparison to the older standardisation routine, which required both issuing and acquiring bank to comply with detailed specifications of components of their system (cards, terminals).

Another remark was that the payment authorisation and authentication would become separated. Customers from two large Dutch banks for example, are now able to perform all kinds of transactions on their current account, by using bank provided tokens and chipcards. This is a shift away from focusing on the online payment process, as the technique also allows the provision of other banking services such as saving, buying securities etc. It was not expected that these bank authentication solutions would go beyond the single bank domain, especially not now that the 3D-rules allow issuing and acquiring banks to choose their own authentication methods. Yet, this development does increase the number of online payment and authentication possibilities.

As e-commerce grows, both enterprises and banks will use company specific solutions to establish trusted on-line relationships. Banks will use their authentication techniques that are probably a part of the generic bank ICT-architecture. Companies will continue to require customer specific information as a part of the sales process. This may involve

further registration (and log in) of the consumers. In addition, governments are investigating and developing infrastructures to safely communicate with citizens. A number of identification services will come available, with which the consumer will be confronted. As a result, a number of initiatives are now underway which focus at facilitating the identification process (Microsoft's Passport is the most visible of these initiatives). It is not clear how these private and public initiatives will further develop.

As for the scenario of on-line identification methods and the usage of PKI, a number of experts doubted the commercial and financial viability of cross-industry efforts to set up new infrastructures. A warning was given that PKI would in the short-term end up like SET. Even the Identrus initiative was viewed as an ambitious effort, which would perhaps solve problems in the B2B domain, but otherwise was deemed too expensive and cumbersome. Some experts remarked that policy makers would too easily assume that digital signatures and PKI would economically solve current problems.

Table three below, provides an overview of the policy suggestions of interviewed experts. These focus on the possible options for the European Commission.

Stimulate market	Provide legal basis	Educate and research
<ul style="list-style-type: none"> - spend a significant amount of effort to create a competitive environment for companies and stimulate benchmarking efforts - support the consumer position in the market with education efforts, sponsoring of consumer organisation, ombudsman and alternative dispute resolution procedures - stimulate the use of broadband to increase e-commerce - stimulate competition between telecommunication providers to ensure cheaper and available web-access - governments could shape the market through procurement policies 	<ul style="list-style-type: none"> - ensure that harmonised rules exist for B2B and B2C commerce - eliminate fiscal and legal barriers (B2B segment) - develop a European Electronics Funds Transfer Act that establishes harmonised rules with respect to liability 	<ul style="list-style-type: none"> - research the barriers to e-commerce - educate companies to perform a proper risk analysis when using e-commerce or e-procurement solutions - educate the consumer that under which conditions the use of credit-cards or other payment mechanisms is safe

Table 3: Policy suggestions of the interviewed experts

5.2 Policy implications

Given that this research study provides a qualitative and non-representative overview, care should be exercised with the formulation of policy implications. These implications must be based on both the research and a stock taking of the current institutional framework and policies. The comparison of observed barriers to e-commerce with these policies would then provide a basis for firm policy conclusions. A first comparison suggests that most of the policy suggestions are already being addressed as a part of the action lines from the eEurope initiative (see also Annex E).

If we investigate the policy implications that arise from this study, one of the conclusions could be that the market in a technical sense sufficiently provides the solutions to facilitate integrated e-payments in the B2C and B2B segment. The implication is that to promote e-commerce, proper education and facilitation of smaller enterprises and consumers would be the way forward. This information effort should be combined with a harmonisation effort for those markets or segment where fiscal or legal rules are still different.

The results of the study indicate that the standardisation and specification efforts in the ICT-sector may require a different approach to policies with respect to standardisation. Where standardisation would in the past solve specific business and connectivity problems, it may not do so in the future, due to the standardised building blocks that are available. So, the ability to determine whether a business problem is also a technical problem becomes more important for policy makers. A cautious approach would be to focus policies towards dissemination of available information on standards and specifications, rather than proactive formulation of proposals for standards. Both the Diffuse and the ePSO project appear to be examples of such an approach.

As a part of a cautious approach, further research may be called for, to gain insight in the dynamics of the e-procurement and e-shopping process. This would help to determine the complexities and problems that occur with the further integration of catalogues in the e-procurement domain and with the payment for digital goods in the e-business domain. It might also help to determine the degree to which the actual design of websites may facilitate the establishment of trust and thereby aid e-commerce.

The payment industry has paid a high price to discover that PKI-based solutions (such as the SET-protocol) may be too heavy for practical and economically viable use. Still, many European policies appear to be implicitly based on the assumption that PKI and digital signatures are the way forward. This assumption may turn out to be a very costly one. It might therefore be worthwhile to:

- review all policies that are implicitly based on PKI-solutions with the questions: ‘what if this PKI-solution will not be the most effective/practical solution?’
- systematically allow and stimulate the development of alternative technical solutions (not being digital signatures based on PKI) that may also serve to properly authenticate and sign documents.

5.3 Targeted intervention or consensus fostering?

The answer to the question if in the area of e-commerce a targeted standardisation intervention is preferred to a consensus fostering approach is often determined by underlying normative positions as to the ability of markets or governments to solve certain problems. Given these rather stable normative positions a repetition of arguments pro and contra may not be the right approach to discuss this issue. Instead we will try to pinpoint the areas for which a targeted intervention could be useful.

Minimum specification for payment information sent by the bank

The payment information that banks send to customers has a variety of formats. A common format, with minimum specifications as to the content, would help to solve the matching problem in the merchant domain. Generally, a common format would help to consolidate and aggregate payment or banking information from different banks. Thus, a common format could be beneficial to a wide range of customers and companies.

In the US and Canada a standard format has developed over time as a result of the effort of large home banking software developers. In Europe this development does not seem to take place, apart from a number of products that serve niche markets. As the common format effectively allows customers to switch banks more easily, it would help competition in the market and serve to establish a European marketplace.

Specification of (light-weight) authentication methods for e-payments

As a result of the directive for digital signatures, the technical requirements are being specified for digital signatures that must be accepted as proof in court. These requirements may be too generic as a result of which implementation of the requirements in the payments domain will economically not be viable. It might be worthwhile to investigate if a similar but more focused legislative/technical approach can be taken to harmonise e-payments in Europe. By focusing the effort, it may be possible to allow lightweight solutions that are cost-effective.

An example where this approach would be beneficiary is in the domain of direct debits. Currently there are different rules for sending a direct debit over the web. Some countries and banks allow electronic messages as the basis for a direct debit, others require a signed document (fax or letter). Similar discrepancies may exist for other payment instruments. A European directive that describes the technical requirements for authentication methods for payments and their legal consequences might be worth considering.

Minimum security specifications for identification service providers

As the number of identification methods grows it might be useful to establish minimum security specifications that must be met by the providers of these services, regardless of their nature (public or private). These specifications could be elaborated within the institutional data protection framework and would serve to ensure fair competition and a harmonised minimum level of data protection. The work for these specifications could be executed as part of the initiative for Privacy Standardisation in Europe.¹⁵

¹⁵ See: <http://www.cenorm.be/iss/Projects/DataProtection/dp.default.htm>

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Annex A: Research questions

1- Current practices with respect to building on-line shopping processes

A list of the problems that e-merchants (for both tangible and intangible products) face on developing an online shopping process will be delivered.

A list of integration problems that the merchant have (with his legacy system, connecting to payment service provider, bank, choosing shopping software, payment system etc.)?

A list of market available products and who offers these? (international product suppliers)

2- Available standards of the shopping process

Available transaction process standards (OTP, OBI, ECML etc) will be identified and compared. Are standards for parts of the transaction process in use?

To which degree are the standards and architectures relevant for real-life e-commerce?

Standards used will be recorded and further standardisation needs will be identified

Standards are but one way of achieving interoperability; are there bridging services available ensuring interoperability between various standard platforms? What type of interoperability measures may be required?

3- Modelling of the on-line shopping process including payments

An analytical model of the basic online-shopping process (shopping cart, checkout, payment, delivery) and of the complex (including offer, negotiation, optional repudiation etc) will be developed.

An overview and a comparison of existing models and architectures that incorporate the whole transaction process including payment such as the SEMPER-architecture will be developed

Which of these models and architectures can be found in real products and who the major players and actors categories are, will be identified

An effort will be done to classify shopping processes accordingly and to determine whether the models available for B2B environment can or cannot be used in the B2C domain.

4- Which policy options should policy makers consider?

Policy options and implications will be developed, given the wide range of activities available on the market as well as the large number of processes involved and the number of players who offer services under different regulatory and legislative regimes

The open question of whether a targeted intervention and development of standards is preferable to consensus fostering and suitable market-led development will be discussed

Annex B: List of interviewed experts

Drs. T. Verhagen, Doctoral Candidate E-Commerce, Free University of Amsterdam (research)

C. Eli, Manager Marketing Communications, Global Collect (payments service provider)

dr. W. Duinker, Senior Manager E-business, Global E-business Centre, ING Group (financial institution)

R. van Vuure, Head of Support, Bibit BV (payment service provider)

R. Kraal, Project Manager Development, Bibit BV (payment service provider)

J.A.M. Gigengack, Senior Advisor Technology Innovation (involved in chipcard specification and mobile commerce authentication), Postbank New Business Technology (financial institution)

J. Schouten, Infrastructure Specialist, 4GL E-commerce, Vendex KBB IT Services BV (retailer)

L. Most, Product Manager, Brokat (specialised solutions provider)

Dr. S. Hille, coordinator research Accounting, Billing and Payments, Telematics Institute (research institute)

Dr. ir. M. Steen, Telematics Institute, member of UN/CEFACT (research institute, member of Dutch procurement specification initiative EP.NL, ebXML specification group and the UN/BPAWG specification group)

ing. R. van Wolferen, business consultant, Interpay Nederland, involved in specification process for FINREAD and GTA (Global Trust Authority)

B. Gommans de Bruijn, architecture consultant, Interpay Nederland (service provider for financial institutions).

Prof dr M. Creemers, Professor Information Systems, Faculty of Economic Sciences, Business Administration and Econometrics, Free University of Amsterdam,

A. Goddrie, marketeer, Dixons.nl (on-line retailer)

Annex C: Products and solutions in the B2C segment

INTERNET CASH REGISTERS

Internet cash registers are offered by [Rabobank](#) and [Interpay Nederland](#). The price for the Rabo Internet Cash register is Euro 85 per month and Euro 0,3 + transaction commission. Interfaces with regularly used administrative software are available.

PAYMENT SERVICE PROVIDERS (PSP'S)

In the Netherlands a series of PSP's is active to deliver integrated payment solutions to web merchants. Among these are: [Bibit](#), [Global Collect](#), [Triple-Deal](#), [Intro-web](#), [Multipay](#), [Multicards](#), [F-z.nl](#), [Netgiro](#), [NetActuals](#). An [international listing of PSP's](#) shows that there are many more similar companies. The pricing structure of PSP's generally includes a setup fee, monthly fees (100- 200), transaction fees (average 0,50) and the regular commissions that financial institutions charge.

SHOPHOSTING IN COMBINATION WITH VIRTUAL CASH REGISTER

Shop in a box is a software package, provided by [Magnashop](#) that guides a web retailer through the process of building a web shop including payment facilities. The payment facilities include credit card payment, Rabo direct banking payment, single direct debit, cash on delivery, credit-transfer and payment by invoice. The software allows interfaces with MS Office applications to import/export product information and availability.

The price of the software is 224 Euro and a minimum monthly fee of 22,62 Euro per month and 5 % per payment transaction (the hosting organisation has the contract with all financial service providers). Web shops have the option to have independent contracts with the card organisations. In this case the per transaction commission percentage is lower and additional monthly fee is levied for the connectivity to the financial infrastructure.

SHOPHOSTING IN COMBINATION WITH PSP SERVICES

Pay-it now is an Internet cash register, offered by the web hosting company [E.trade](#). The payment facilities offered are in fact outsourced to [Bibit](#), a Dutch Payment Service Provider (PSP). There a number of service levels and prices, ranging from a simple virtual cash register that accepts a limited number of payment mechanisms (mostly credit-cards) and does not include reconciliation to a more complete virtual cash register and services. The price for the simple cash register is 80 Euro per month and per transaction fee of Euro 0,9 + the regular transaction commission fees.

E-COMMERCE SOLUTIONS

Large software vendors offer integrated e-commerce solutions or suites. These solutions may be used by web retailers to establish their shopping-presence on the web. Examples of suppliers/products are: IBM's WebSphere Commerce Suite Pro, Intershop's Enfinity, Microsoft's Commerce Server 2000, BroadVision's Business Commerce 6.0, ATG's Dynamo 5 Commerce Suite, Blue Martini's 4. The actual operation of these solutions can be outsourced to a web hosting company.

BANK OUTPUT INTEGRATION

[KSI Software BV](#) provides Electronic Banking Coupling and EB Plus; both software packages that accept most electronic banking output formats of Dutch and Belgian banks. Usage of this software allows for automated throughput of the payment information in internal systems and ledgers. Bank output integration is also available as a multi-bank option in some banking software applications (such as ING Banks Euronavigator).

ESCROW SCHEMES

The Dutch company [Triple-deal](#) has started out its operations as a PSP that offered an escrow function. As customers grew more experienced with e-commerce, the disadvantage of a complicated and lengthy payment and delivery procedure led to a shift towards existing on-line payment methods such as credit-cards as well as off-line bill payments. It is unclear if the advantage of a safe shopping/delivery/payment experience will in the long run be sufficient to outweigh the burdens of the complicated procedure. Escrow schemes may become obsolete if new and safe payment methods are becoming a commodity on the web. Other escrow schemes are [Tradenable](#) and [Safedoor](#).

DIGITAL CONTENT SOLUTIONS

A large number of digital content solutions has been developed. Variations exist as to billing mechanisms and the level (transport level, application level) at which the protection of digital content occurs. The application that is probably most often used, although specific data is lacking, is the use of a plug-in to dial up a phone number that charges a fee per minute. Entertainment merchants may develop such plug-ins and infrastructures themselves or buy them. A Dutch example is the product [Switchpoint](#). Other applications require the use of specific software by the consumer, (web-hoster) and content provider to order and monitor digital content. Suppliers: [clickshare](#), [click&buy](#), [enition](#), [millicent](#), [ntsys](#), [newgenpay](#), [micropayments](#), [pay2see](#), [trivnet](#), [ultimus](#), [wave systems](#), [perimele](#), [Magex](#).

Annex D: Brief overview of CD with background information

This annex describes/outlines the most relevant pieces of information on the separately provided CD with further background information. The CD is subdivided into the self-explanatory subdirectories:

- 1- practices and products;
 - 2- standards and specifications;
 - 3- architectures and models;
 - 4- policy;
 - 5- research;
- Text.

1-Practices & products

Some demo-programs are available on the CD. These tend to be commercially biased but do provide a flavour of integration solutions.

Integration demo Iona: \iona\iona.swf

Integration demo Peregrine: \peregrine\demo\tranieseriesdemo[1].swf

Microsofts E-commerce solution: \microsoftnet\CS2Kdemo.exe

E-procurement demo Clarus: \clarus\eprocurement.swf

Information on solutions of providers:

Oracle: \oracle\ds_iPayment.html

IBM: \ibm\IBM WebSphere Commerce Suite Payment.htm and \ibm\WSBI.pdf

I-planet: \iplanet\buyerxpert_wp.pdf

Ariba: \arriba: a number of pdf files contain case descriptions for procurement

Microsoft Biztalk: \biztalk\BizTalkFramework20.doc

Microsoftnet: \microsoftnet\Building with _NET Realizing the Next Generation Internet White Paper on Microsoft Business.htm

Iona integration solutions: \iona\B2Bintegrator.pdf

Surepay payment: \surepay\ds_surepayadministrator.pdf and \surepay
\s_surepayb2bccprocessing.pdf

E-procurement information :

\ecpelprocurement\Handbook.pdf

\orbian\prop_doc.pdf

A good explanation on web services can be found in:

\hp-espeaketc\techoverview.pdf

2. Standards & Specifications

In principle the standards names and directories speak for itself. Good information on the different standardisation organisations can be found in the XLS-file: \obi\ec_org.xls or in the file: \diffuse\fora.htm.

The Internet Open Trading Protocol Standard is \iotp\rfc2801.txt

See for related standards: 2-standards-specs\iotp

3. Models and architectures

The subdirectories provide the indication of their content. The overview of models and architectures can be found in: `cenissarchitecturesenmodels\Cwarch1a.doc`. A further description of the E-Commerce Integration Meta-Framework project is available as: `\Ecintegrametaframework\2001_032.doc`. More information on ebXML is available in `\ebxml\bpOVER_print.doc`

4. Policy

The subdirectory BEUC contains an agreement on trustmarks (part of the e-confidence project) between the European Consumers Organisation and the Union of Industrial and Employers' Confederation of Europe. This is related to the policy issue of trust.

The subdirectory COPOLCO contains information of the International Standardisation Organisation (ISO). It contains a draft business plan of TC 68 (Banking and Financial Industry) and information on the Consumer Policy Committee (COPOLCO). The file `copolco2001.pdf` contains a description of the ISO and the role of COPOLCO (<http://www.iso.ch/iso/en/prods-services/otherpubs/pdf/copolco2001.pdf>).

The directory `Ecstandaardis` contains EC-documents on standardisation (see also references). The directory `OECD` contains a document that discusses the policy implications of e-commerce. The general policy directory also contains the OECD consumer guidelines for e-commerce.

The directory `tnopec` contains documents related to the joint work of TNO and the Telematics Institute on the impact of e-commerce. Some sectorstudies are available; the banking sector is discussed in `NL_Banking_Final.pdf`.

The major objective of the new Workshop which is called eBES (e-business Board for European Standardization) is to create within Europe a central point focusing on the latest technologies used for the exchange of electronic business data

5. Research

The commercial research organisation are: Aberdeen, Amrresearch, EbizQnet, eCFO, forrester, Gartner, IDC, Infoweek, Jupiter, Metagroup, Stencil Group. More scientifically oriented research can be found in the subdirectories: `e3model` (VU Amsterdam), `Euridis` (Rotterdam University), `eWallet`, `Gigaport`, `Telematica Institute` and `vuinfo`. Specifically the `Gigaport` subdirectory contains quite a number of useful state of the art documents and overviews.

Text

Contains the text of the draft version of this report (November 6, 2001).

Annex E: eEurope and related standardisation activities

The main framework to use to determine the policy implications of this study is the eEurope action plan. "eEurope 2002 – An Information Society For All" is the political initiative aimed at ensuring that Europe can reap the benefits of the Information Society in a cohesive and non-divisive way. Its ultimate objective is to bring everyone in Europe - every citizen, every school, and every company - online as quickly as possible.

The original list of eEurope objectives, proposed in December 1999 at the launch of the Initiative, was further developed on proposals of Member States and the European Parliament, and refined at the March 2000 Lisbon Extraordinary Summit. An Action Plan was approved at the European Council in Feira, Portugal, 19-20 June 2000. The Action Plan clusters the individual action lines around three key objectives:

1-A cheaper, faster and secure Internet

- a) Cheaper and faster Internet access
- b) Faster Internet for researchers and students
- c) Secure networks and smart cards

2-Investing in people and skills

- a) European youth into the digital age
- b) Working in the knowledge-based economy
- c) Participation for all in the knowledge-based economy

3-Stimulate the use of the Internet

- a) Accelerating e-commerce
- b) Government online: electronic access to public services
- c) Health online
- d) European digital content for global networks
- e) Intelligent transport systems

Below is presented an edited excerpt from a document by the CEN Management Centre, CENELEC Secretariat and ETSI Secretariat.¹⁶ This describes the current progress with respect to some of the action lines.

1c) Secure networks and smart cards

European Standards Organisations (ESOs) are participating as actively as possible in the Smart Card Charter Initiative, which is setting industry-driven requirements for standardization and other activities. They will seek to inform the Initiative participants of existing standards and consortia specifications, and of work under way, in order to avoid duplication of efforts.

¹⁶ [The contribution of European standardization to the eEurope Initiative: A rolling Action Plan](http://www.cenorm.be/iss/Major_Activities/eEurope/apfinal4.doc), Final Version 4, July 2001, http://www.cenorm.be/iss/Major_Activities/eEurope/apfinal4.doc

In particular, the ESOs are providing the Secretariat to the Smart Card Charter Steering Committee, including a Secretary, e-mail excluders for the "Trailblazer" Working Groups, and the Charter web-site (<http://eeurope-smartcards.org/>)

Smart cards:

·CEN TC224 – Machine-readable cards, related device interfaces and operations
(<http://forum.afnor.fr/afnor/WORK/AFNOR/GPN2/Z15Y/indexen.htm> - TC224)

The aim of the TC is the organisation, the co-ordination and the monitoring of the development of inter-industry standards with a special emphasis on integrated circuit cards systems. For certain sectors such as healthcare, transport...CEN/TC224 has established specific WGs and has developed sector oriented standards:

·WG10 Banking: Electronic Purse;

·WG11 Surface transport applications: standards for Driver license, Electronic fee collection, Interoperable public transport application, Electronic tachograph;

·WG12 Health applications: logical data structure, concept and organisation for the different cards of this sector.

·CEN/ISSS WS FINREAD - specifications for a secure IC card reader for bankcard payments and remote banking services delivered over the Internet and open networks
<http://www.cenorm.be/iss/Workshop/finread/Default.htm>.

·CEN/ISSS Workshop URI - This workshop aims to extend the work carried out in CWA 13987:2000 Smart Card Systems: Interoperable Citizen Services: User Related Information (based on DISTINCT) from the standard smart card conforming to ISO 7816-4 to the newer program loadable multi-application smart cards such as JavaCard and MULTOS and to their putative management systems such as the Global Card Platform. Since there are no standards covering these cards management systems which are all mutually incompatible, part of the activity will be technical and part political to bring the parties together. In this task the workshop will work closely with the eEurope Smart Card Charter Trailblazer 7 – Multi-application Smart Cards which is seeking specifically to harmonise these differing systems.

·CEN/ISSS Workshop FASTEST

The FASTEST Workshop will

1. produce guidelines and workshop agreements that support Citizens' ease of use of ICT services by developing a Consistency of User Experience in the use of the smart card as an access token in European public transport and across other "associated" economic sectors such as parking, road user charging, leisure, sports and culture.

2. assist Public Transport authorities and companies in adopting the concept of interoperability between smart card based products and systems in support of seamless travel by producing guidelines and workbooks.

This work is in close collaboration with TrailBlazer 9 of the Smart Card Charter Initiative.

·CEN TC251, CEN TC278 – work on use of smart cards in applications for healthcare and road transport telematics (<http://www.cen251.org> ; <http://www.nni.nl/cen278/>)

·CENELEC TC206 – consumer equipment for entertainment and information and related sub-systems: the use of smart cards for video on demand and similar applications

·ETSI Project Smart Card Platform (SCP) - This new ETSI Project (EP), based on the re-organization of existing activities, will produce multi-application framework specifications, to support multiple access technology applications on the common platform and a core toolkit specification to enhance security to support mobile commerce. This EP is the custodian of the Subscriber Identity Module for SIM card, which is the most widely deployed smart card ever. The EP draws upon a wealth of experience from its industry members who have already drafted a complete set of specifications for a smart card (the SIM) terminal (mobile) and their interface, breaking new ground both technologically and commercially.

The new EP will provide the core specification and common platform for all “next – generation” smart cards. Enhanced versions of the specifications for December 2000 will be critical to the successful implementation of the eEurope Smart Card Charter. The work of this EP is supported at an international level by a large number of standards bodies and initiatives from all around the world.

Ongoing and future work to provide a core specification to include enhanced security to support mobile commerce, set up a multi-application framework to support multiple access technology on the common platform, specify a core Smart Card Applications Toolkit (SCAT) and to ensure harmonized interoperability through improved Administrative commands will be vital. This work is to be completed by the end of 2001.

·ETSI SAGE works in the field of cryptographic algorithms and protocols specific to fraud avoidance/unauthorized access to public/private telecommunications networks and user data privacy. The output may be open or confidential. Work completed has included algorithms for DECT, GSM, TETRA, audiovisual services, GPRS and UPT.

Electronic signatures:

The European Electronic Signature Standardization Initiative (EESSI) – the results will be presented to the Article 9 Committee established under Directive 1999/93/EC. The ESOs will consider the requirements for any subsequent additional work required by the market, including, but not exclusively, the medium-priority items already identified, and prepare further standardization proposals accordingly. Technical work is performed in CEN/ISSS WS E-SIGN and ETSI SEC/ESI.

ETSI SEC is focused on ensuring the authenticity of transactions and providing interoperability for PKIs as well as assisting in the prevention of fraud. It is the Technical Body within ETSI carrying the main responsibility for security infrastructures and services in the telecommunications environment. The Electronic Signature and Infrastructure (ESI) (<http://www.etsi.org/technicalactiv/ElectronicSignatures.htm>) and Lawful Interception (LI) Working Groups are the bodies dealing with ETSI activities related to the EESSI Work Programme. However, another Working Group to deal specifically with the eEurope initiative is being created in and a work programme is to be considered and established if necessary.

CEN/ISSS WS/E-SIGN was formed to carry out the aspects of the EESSI work programme dealing with quality and functional standards for signature creation and

verification products, as well as quality and functional standards for Certificate Service Providers (CSPs) (<http://www.cenorm.be/iss/Workshop/e-sign/Default.htm>).

Key meetings of CEN/ISSS WS/E-SIGN and ETSI SEC/ESI are co-located to maximise collaboration. The EESSI Steering Committee is co-ordinating further activities, including major programmes of seminars on different aspects, and the follow-up to the recent submission of the initial EESSI deliverables for consideration by the Article 9 Committee established under the Directive (<http://www.ict.etsi.fr/eessi/EESSI-homepage.htm>).

Personal data protection/privacy-enhancing technologies:

The ESOs will complete their consideration of the possibilities for market-driven standardization activity in support of personal data protection and privacy, in support of Directive 95/46/EC. Subject to public consultation, additional standardization activities will be started and brought to a conclusion as appropriate. CEN/ISSS current activity, in response to a mandate from the Commission and EFTA. CEN/ISSS has current proposals (the Initiative for Privacy Standardization in Europe) for this assessment to be carried out, in response to a mandate from the Commission and EFTA. This work has now started, and a first draft report is now on the web for public consultation (<http://www.cenorm.be/iss/Projects/DataProtection/dp.default.htm>).

Stimulate the use of the internet for business, CEN/ISSS and its Electronic Commerce Workshop are active in developing and promoting e-business solutions - particularly for SMEs. The ECOM-IS programme has developed solutions in a number of sectors and, in each case, the link to pilot projects is providing actual working examples of e-business applications. Seven CEN/ISSS Workshops have been started in individual sectors; the content varies, but in general standardization will provide a set of best practices for aspects of electronic trading by the sectors concerned. The CEN/ISSS e-commerce help desk (http://www.cenorm.be/iss/News/help_desk.htm) has provided information to SMEs on state of the art solutions, along with a web site that contains basic information of a neutral character aimed at helping SMEs to introduce e-business. This has been translated into a number of key European languages – welcomed by SMEs as the bulk of existing material is in English only. . The help desk function will be contained within a wider e-Europe held desk.

· The CEN/ISSS Electronic Commerce Workshop has a number of voluntary project activities that promote the acceleration of e-commerce. The project on Architectures, Frameworks and Models for Electronic Commerce (Architectures) has already produced an extensive and neutral analysis. This document, which is being published as a CWA, has been well received by the different communities who need to implement e-commerce products and services. The project on Defining and Managing Semantics and Data types for European Electronic Commerce (DAMSAD) has produced a CWA, which provides specific recommendations on data types to be used for electronic data interchange, in alignment with the W3C XML Schema recommendations. The project on Electronic Commerce Integration Meta-Framework (ECIMF), which started in May 2001, is expected to provide a practical, business-oriented approach to interoperability by mapping the concepts and contexts between different existing e-commerce frameworks across multiple

architectural layers. The project will develop a modelling methodology, a modelling language and proof-of-concept open source software that are expected to benefit in particular SMEs, system integrators and vendor companies. A fourth current project is on eWallet: This project started in May 2001 to investigate the interoperability and portability of electronic wallets, taking into account existing and emerging solutions in the market. This project aims to provide recommendations, including technical specifications, to facilitate interoperability and guidance material for solution providers, content providers/merchants and end users. This activity has the support of the W3C Micropayments Markup Working Group as well as a number of existing eWallet providers.

In addition, the Electronic Commerce Workshop is reviewing project proposals on the provisioning of practical guidance material on electronic signatures, targeting specifically at SMEs, standardization requirements for interoperable Directory services for e-commerce, the requirements for a multilingual upper-level ontology for e-commerce, as well as the development of enabling open source software and methodologies for supply chains, taking into account in particular the emerging requirements of dynamic enterprises and smart organisations. The Workshop's project proposal on consumer facing requirements for e-commerce is intended to provide guidance material from the standardization perspective that will help increase consumer trust and confidence in e-commerce services. It will also serve as an input to the ISO Consumer Policy Committee activity with which the Workshop has established contact.

Collectively, the existing and proposed projects of the Electronic Commerce Workshop constitute a coherent programme of work that addresses some of the key interoperability aspects of e-commerce systems and services, including the inter-relationships between architectures, enterprise modelling and tools, and ontologies for a consistent semantic framework.

The ETSI m-commerce initiative (ETSI Project e-Pay) and the ETSI 3GPP initiative will feed into the development of, and further stimulate, electronic commerce for mobile and including the interface with "fixed" e-commerce. Encryption aspects will be included.

Any required work on algorithms can be performed by ETSI SAGE (Security Algorithms Group of Experts), an ETSI Technical Body that has already performed a good deal of work in the area of GSM for example. The work of ETSI TIPHON also has an impact as their items dealing with security, Quality of Service, validation and certification, addressing and naming and service capabilities will all encourage the growth and use of the Internet and e-commerce. A voice call over the Internet and their related new services are forms of e-commerce. It is recognised that strong liaison will be required between a number of ETSI Technical Bodies to ensure coherent and interoperable solutions (ETSI M-Commerce, ETSI 3GPP, ETSI SEC, ETSI TIPHON, ETSI SPAN, ETSI TM, ETSI SAGE and ECMA TC32).