**UNITED
NATIONS**

Economic and Social Council

Distr.
GENERAL

TRADE/CEFACT/2000/9
17 February 2000

ENGLISH ONLY

ECONOMIC COMMISSION FOR EUROPE

COMMITTEE FOR TRADE, INDUSTRY AND ENTERPRISE DEVELOPMENT
Centre for the Facilitation of Procedures and
Practices for Administration, Commerce and Transport
Sixth session, 27-30 March 2000
Item 4 of the provisional agenda

ELECTRONIC COMMERCE

AND

THE SIMPLIFICATION OF ADMINISTRATIVE CONSTRAINTS

***

Submitted by the secretariat *

This report is submitted to the Centre for discussion and noting.

GE.00-

Electronic commerce

and

the simplification of administrative constraints

CAVEAT

The views expressed in this document are based on the work of the United Nations Centre for the Facilitation of Procedures and Practices for Administration, Commerce and Transport (UN/CEFACT). Given the fast pace of development of the Information and Communication technology and the associated regulatory issues, some information might not be up to date. When possible, the addresses of related Web sites are listed in the annex of the document.

Foreword

Commerce is the marketing and exchange of goods and services between buyers and sellers over borders and distances. While the *macroeconomic* view of commerce focuses on the flow of trade between countries, the *microeconomic* view focuses on the transactions between those engaged in commerce; for example, the relationship between customer and merchant. As information and communication technologies continue to converge with business activities, the traditional business structure becomes less important. Work can be organised around business processes and the people who perform them. Consequently, the traditional view of the firm shifts from the organizational structure to how the work itself is to be organized, given the demand of today's markets and the power of the new technology. Firms and commerce will be built around the idea of reunifying the tasks into *coherent business processes*.

The experience gained over the last decade in implementing electronic data interchange (EDI) to support core business activities shows that the full benefit of these new technologies cannot be realised simply by replacing existing business processes with electronic ones. On the contrary, this may even complicate the processes and increase costs. Therefore, a fundamental step in implementing successful electronic commerce[1] solutions is in the analysis of the current business process, simplifying and harmonizing it, and an in-depth consideration of how to improve it using the information and communication technologies as an *enabler*.

In order to accelerate the growth and scope of world trade, the benefits that can be reaped from the use of information technology must converge with the reduction of procedural, juridical and physical constraints that may inhibit it. The convergence would be driven both by competitive factors (global, national and regional), and the increased opportunities provided by the integration of the various information technologies within business activities. Stripped of all the hype, electronic commerce (e-commerce) should be understood as the marriage of developments in commercial or business activities and information and communication technology. This will often require considerations of the culture, structure and operating methods of the organization.

Most international organizations are working on framework and regulatory issues related to electronic commerce, such as infrastructure, deregulation of telecommunications and consumer protection. Some international organizations are working on implementation and standardization. This document aims to explain how, in the view of UN/CEFACT[2], this convergence can be achieved.

Part 1 of the document describes, in its simplest form, what is meant by electronic commerce from the point of view of a firm. After an overview of electronic commerce, the document addresses the issue of the convergence of business requirements and technology and the work of the UN/CEFACT towards electronic business.

Part 2 of the document addresses the importance of the simplification of administrative constraints. After describing the importance of simpler procedures for electronic commerce, it provides examples of the use of electronic commerce to improve administration.

---

[1] **UN/CEFACT definition:** Within UN/CEFACT's activities, electronic commerce is defined as doing business electronically. This includes the sharing of standardized unstructured or structured business information by any electronic means such as electronic mail or messaging, World Wide Web technology, electronic data interchange.

[2] United Nations Centre for the Facilitation of Procedures and Practices for Administration, Commerce and Transport (UN/CEFACT)

Part 1 – **Electronic commerce or electronic business?**

# Part 2 – **Simplification of administrative constraints**

Part 1 **– Electronic commerce or electronic business?**

1. Electronic commerce – a technical outline

Information and communication technology has evolved rapidly over the last 25 years and is expected to continue at a near exponential rate. The enablers of electronic commerce are telecommunications networks and in particular the Internet - which can be seen as the "near universal connectivity". The tools include electronic mail or messaging, the World Wide Web (WEB), smart cards, electronic funds transfers, automated data capture and bar codes, and electronic data interchange (EDI).

In the popular view, electronic commerce is conceived of as buying and selling goods and services over the Internet. However, while accurate, such a definition hardly captures the spirit of electronic commerce, which in practice is far better viewed as commerce and new technologies coming together to revolutionize the way we do business.

The spread of the Internet has lead to a shift in viewpoint. It brings together business, consumer and administration, which potentially can communicate with each other: - the **Individual** (or the consumer), the **Business** (any legal person such as a firm and its staff), and the **Government** (any public authority and its civil servants) as shown in the figure below.
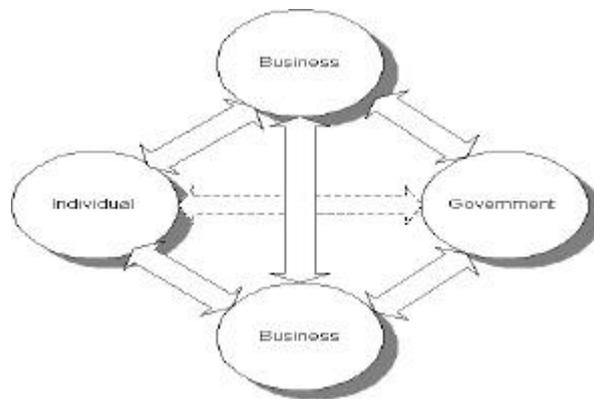
Furthermore, the Internet allows small and medium-sized enterprises (SMEs) to conduct business on-line. This allows businesses of all sizes to use the advantages of the Internet to lower the cost of doing commerce.

The synergy formed by the use of digital information, computerized business practices and the Internet provides the technical means for new ways of trading. It includes the tasks that support buying and selling and the interaction among these tasks.

As such, electronic commerce is at the intersection of institutions, processes and networks, using a single medium for all steps.
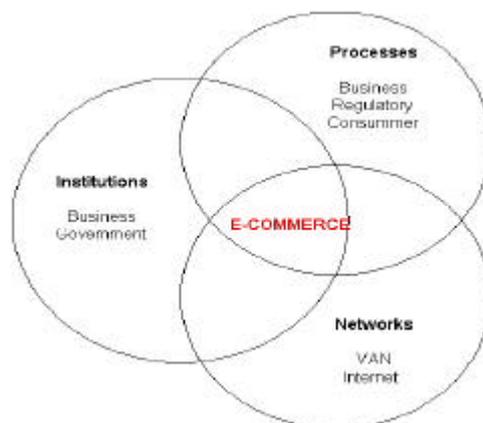
In its simplest form, the technology can be viewed as consisting of two layers: application and transport. The application layer handles the business applications and the way information is seen and processed by the user or the computer system, while the transport layer handles the transfer of information between partners.

1.1 Telecommunication networks

Some 30 years ago dial-up telephone lines were the only means for communication. Telecommunication was heavily regulated. Communication protocols were proprietary, supplied by the computer manufacturer. Operators at sending and receiving sites monitored the exchange of data files. The limited capabilities of yesterday's computers put serious restrictions on data content, structure and character sets that could be handled.

As a result of market pressure and changing perceptions of the economics and role of telecommunications, there has, since the late 1980s, been much more policy emphasis on the international telecommunications market. This has largely reflected the changing role of telecommunications in economic structures in which information has taken on a new role. At the technical level, the differences between the networks are more about topology than alternative economic models. Every communication channel has its advantages and disadvantages, and they have to be balanced when designing a solution for an electronic commerce community. The Internet is a network of networks. It is open and anyone can connect to it. Connection to the Internet normally goes through an Internet Service Provider, which competes and offers a range of services to suit the needs of both large and small enterprises. The Internet encompasses a complex diversity of networks, standards, services and tools - elements that can be employed in electronic commerce in various ways.
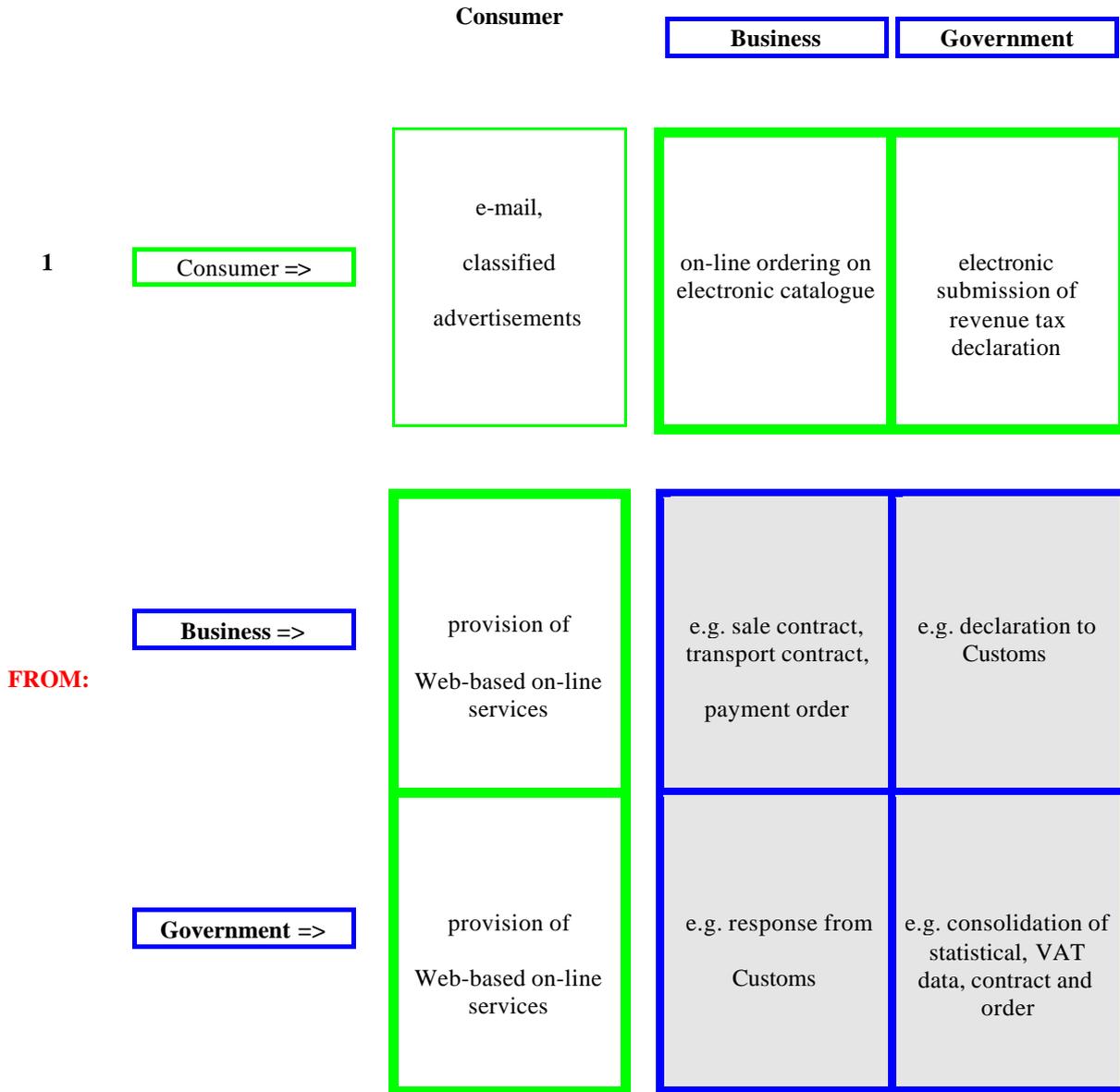
The network services on the Internet are based on two communication protocols that have become the de facto standards for heterogeneous computer networking: Transmission and Control Protocol (TCP) and Internet Protocol (IP). As they are used together, they are commonly referred to as TCP/IP. These standards are well established, with communications software for all common operating systems. The TCP/IP combination is powerful in that it works well for both local and global networks, avoiding conversions between network standards.

1.2 A framework for electronic commerce activities

The concept of electronic commerce can be structured either by type of business relations or by type of commercial activity. The following matrix structures the type of relations between the three categories of partners electronically sending and receiving data and information.

A

TO:

	Consumer	Business	Government
1 Consumer =>	e-mail, classified advertisements	on-line ordering on electronic catalogue	electronic submission of revenue tax declaration
Business =>	provision of Web-based on-line services	e.g. sale contract, transport contract, payment order	e.g. declaration to Customs
Government =>	provision of Web-based on-line services	e.g. response from Customs	e.g. consolidation of statistical, VAT data, contract and order

FROM:

The centre of the matrix (shaded) corresponds to the **business to business** and **business to government** communications. Large volumes of data characterize these communications. Data structures are used repeatedly and data is most of the time already existing within the sender's computer system. Therefore, messages can be automatically generated, and standardization will allow independent computers not only to communicate, but also to process out-going and in-coming information automatically. In this type of communications, the electronic interchange of structured information and automated data capture technologies are used for electronic commerce applications.

The border of the matrix (row 1 and column A) corresponds to the **business to consumer** and **government to consumer** communications. They are characterized by either data capture and transmission, without real processing of the information, using so called "electronic documents", or provide interfaces to the business and government processes, at lower cost and more effectively. In this type of communication, Web-based technologies are used.

The entire matrix relies on the provision of telecommunications services, offered by entities called Telecommunication operators, Value-Added Network Services providers or Internet Service Providers (ISP).

1.3 The need for standarized information

In order to ensure that all participants in electronic commerce interpret information in a uniform way, and can therefore communicate clearly and understand each other, much effort has been devoted to identifying and defining the elements that form the entire information transfer in international trade. The point is, this process *is made automatic* or, at least, requires minimal manual intervention.

In general, what is important from the user's point of view is that all the communications in which he or she is involved, are uncomplicated and inexpensive. When users communicate with only a small number of partners, they can communicate without any translation of data being involved. They agree on a format that suits them and have little interest in a broader standardizing of the information content. Clearly, in this case, we can imagine a situation in which a group of cooperating users share the same information content, while different groups of users have a very similar information content organized differently. If interactions are simple and localized, many types of information content preferences may exist simultaneously without confusion.

Users seeking trading partners from several such groups or government administrations may find themselves forced to translate between all these groups. There is no way for these users to improve their situation, without persuading large numbers of other users to switch to the same standard for communicating information content. The cost of these efforts is borne by a relatively small number of users and governments that initially supported these developments. This motivated the development of global standards for the transfer of information between parties in international trade, either on paper, such as the United Nations Layout Key, or electronically in the form of messages published in the United Nations Electronic Data Interchange for Administration Commerce and Transport (UN/EDIFACT).

Although not an issue in the early days of EDI when electronic transactions took place in the absence of open networks, the rapid development of ICT [3], changing business processes and the existence of the Internet have created the need for a global repository of universally accepted data semantics. This underscores the importance of a universal information content standard in order to expand the possibilities for business processes to communicate information on a routine basis.

1.3.1 Electronic data interchange (EDI)

Since the purpose of **business to business** or **business to government** communications is to enable computer systems to process and respond to messages, these messages have to follow certain formats. The message content must be expressed as identifiable and well-defined elements of information, and these elements have to be organized in a strict way according to a syntax. This means that the messages for EDI need to be *structured*.

EDI is defined as the exchange of **structured** data by **telecommunications** from one computer application to another, those being **independent** from each other, in a form that can be identified by the receiving computer and therefore processed **automatically**, without human intervention. For example, telefax and electronic mail are not EDI since the receiving computer cannot automatically process the data. Messages transmitted by telefax or E-mail can relay information in a fast way, but to the computer they are only a string of characters without any meaning.

The elaboration of messaging standards, including definitions of the elements of information, is a major infrastructure development for electronic commerce. By analogy with a language, UN/EDIFACT specifies the rules allowing "words" to be grouped into meaningful concepts which themselves can be grouped to build sentences according to "grammatical rules". The "words" are called data elements, the "sentences" are messages and the "grammatical rules" are defined by the syntax. Both the syntax and the data elements are published as standards [4] of the International Organization for Standardization (ISO).

1.3.2 Electronic data interchange usage by type of business communication

EDI standards currently serve three major types of business relationship. They can be characterized according to the parties involved and the nature of the transaction:

- *EDI transactions over closed networks between identified firms*. This is the most common and traditional type of configuration, involving interactions between two or more trading partners who have established a long-term,

---

[3] Information and Communication Technology (ICT)

[4] Electronic data interchange for administration, commerce and transport, ISO 9735 and Trade Data Elements Directory, Vol. I Standard data element, ISO 7372

contractual relationship and who have a long familiarity with each other. This can be called "one-to-one", or "bilateral", configuration.

- *Community EDI*, where firms can select transaction partners from a range of unspecified partners within a network. In this type, an intermediary (usually the network service provider) facilitates the establishment of contractual relationships between enterprises. Advance knowledge of potential trading partners and pre-set contractual norms exist due to the often sector-specific nature of such networks, but to a limited degree. Depending on the type of network, this can be called a "one-to-many" configuration.

- *Consumer transactions occurring within a network forming a market*, electronic mail. Here electronic transactions are derived from firm or individual interactions in a market environment. The transactions are of short-term duration, relationships and information about preferences are based on market prices, supply and demand, and pre-established contractual arrangements are almost non-existent. This is called a "many-to-many" configuration. It is in this type of transaction where XML and the Web combined with traditional EDI between the web server and the application are the most promising.

The use of EDI messages is increasing in many application areas, in particular in international trade. Today, UN/EDIFACT messages cover such application sectors as accounting, customs, health care, finance, social security, statistics, construction, insurance, production and logistics, tourism, transport, container movement and forwarding. The use of UN/EDIFACT messages in these sectors shows that UN/EDIFACT is used, not only in the traditional area of international trade, but also in other sectors of the society.

1.3.3 Automated data capture

EDI takes care of the information flow between the parties, but this flow has to link to the physical processes in trade: production, handling and storage, and transport. The requirements of modern logistics systems, quality control and others need smaller units to be identifiable and more information to be available about each unit. The most commonly used technology for automated data capture build on bar codes, but also optical character recognition (OCR), smart cards and radio frequency tags are finding their use. The basic application is *identification* (of an article, a package, a container, etc.) but with a higher level of sophistication, using two-dimensional bar codes, it is possible to represent complete EDI messages.

1.4 Electronic commerce and the Internet

While TCP/IP[5] provides the technical platform for linking computers on the Internet, additional standards are needed for the services users ask for when exchanging or searching for information. A number of standards for this purpose are available on the Internet, some of the most common ones are standards for World Wide Web (WWW), Electronic Mail, File Transfer Protocol and Telnet.

Several protocols are candidates for the support of electronic commerce, with various test implementations in existence. Through the development of new Internet applications, like channels/push technique, additional methods of data transfer become available. Standards for the structuring of information on the Internet, such as XML[6], Web-based EDI, give flexibility and low cost when used with the Web browser for the exchange of commercial data. In relation to consumers, an interactive, dialogue mode of working has advantages.

The Internet and the WEB, as opposed to EDI, are seen as requiring less financial investment and resources to start-up e-commerce applications. However, the integration of these tools within the organization's information systems and business processes implies new ways of doing business, which require due attention.

Concerning inter-company e-commerce, the potential of the WEB today is kept to its communication functions, and e-mail is an important tool. On-line negotiations and contracts are not yet a reality. For more than 10 years, the financial, automotive and big retail sectors have been investing in inter-company EDI. These exchanges amount to an estimate of 80 percent of the

---

[5] Transmission and Control Protocol (TCP) and Internet Protocol (IP)

[6] See the recent initiative on ebXML: United Nations and OASIS Join Forces to Produce Global XML Framework for Electronic Business; http://www.uncefact.org

total electronic commerce in the year 2000. Aware of the potential of Internet solutions, organizations now explore ways of using these tools and their function within the existing structures.

Internet solutions can also be used internally within an organization. This may provide for a more homogeneous way of working. For example, in web applications the internal databases may be expanded by additional external information in a seamless way. The use of web technology in this case can be arranged so that the relevant data are also captured and stored by the user's own system.

Internally, organizations use the Web for on-line promotion and sales and allow for direct transaction with the customer. Databases allow for better marketing and development of after-sale and technical assistance. The Web is then seen as a complementary solution that should not threaten the normal distribution network of these organizations.

The commercial Internet solutions are developing at a fast pace and will be operational if the logistic and transport companies offer adapted services supporting the total transaction chain, and if the currently open issues of security, harmonization of standards, privacy, law and intellectual property rights are resolved. However, organizations consider it important to be there and follow development keenly.

1.5 Opportunities and issues of the new technologies

New opportunities for commerce will emerge as a result of the rapid evolution of ICT. This rapid evolution makes it difficult to identify the opportunities and barriers. We will only hint at some of them.

Internet solutions have the potential to provide for the establishment of an open market where SMEs can actively participate. This electronic market can provide for new opportunities for information sharing, service and support, and payment. Transactions not only between businesses, but also between business and Governments, can be built for specific purposes, defined in time, as opposed to established and permanent business relationships. This open approach can provide for a virtual enterprise model.

The Web offers individuals and business new ways of handling financial transactions. Web-based financial transactions can be less expensive compared with using the private networks developed for EDI and bank transactions. Web-based EDI solutions can provide for Internet-compatible transactions, which secure understanding and interoperability of the information content.

The flexibility and low cost of the Internet tools open e-commerce to the participation of SMEs. Also Web-EDI solutions based on Internet technology will provide for low-cost electronic transmission between SMEs and larger companies, thereby integrating them into e-commerce.

The variations of practices and procedures between business sectors and countries, as well as the differences in administrative and financial practices, hinder the development of global e-commerce. As a consequence, e-commerce develops within closed user groups, also called captive e-commerce. While providing for fast return on investment and effective e-commerce between business partners, these developments generate barriers to the entrance of new companies. Multiple and often incompatible solutions of transport and information content further add to incompatibility in business and administrative practices. They hinder the development of open EDI systems, whereby independent computer systems exchange data on an equal footing, using harmonized procedures and standardized information content to secure mutual understanding and interoperability.

Issues such as security and legal aspects of e-commerce on the Internet impede the development of the extended enterprise and global e-commerce. Currently, electronic commerce deals only with the seller-buyer relationship. Lack of integration of the transportation and logistics functions into an e-commerce solution can lead to e-commerce practice being limited to concentrated sectors and geographical regions.

Neglecting the integration within the organizations and economies of information systems might lead e-commerce applications being developed for very specific business processes. This, in turn, can stand in the way of straightforward implementation of e-commerce across organizations and information systems.

2. Electronic commerce – a business view

Most decisions about employing computers over the last decade focused on automating internal applications. Today, the advent of the Internet, mixed with the near exponential growth rate of computing power, affects the way we view the traditional corporate boundaries and business processes within and between "economic actors".

However, when we consider a real world example, several features stand out. When considering the international supply chain of a company between Central America and the United Kingdom, there are more non-value adding activities than in home trade due to the additional number of authorities involved. Much of the time, no value is being added, but costs like storage, handling, inspection, and certification continue to rise. It is more difficult to analyse and improve the total trading process because of the number of stages and parties involved. Uncertainties in how long an activity is going to take are high.

In the example of a food export supply chain, there are as many as 27 processes between 40 different parties which take 12 weeks, as compared to 6 weeks in domestic trade. Can the new technologies provide opportunities to make the overall trading process more effective so that products reach the customers quickly, reliably and at competitive cost?

Connecting the computer systems of two or more independent organizations into a dependent relationship is not a decision to be based solely on the merits or the availability of the technology. It is rather a shift in business practice. *It is the convergence of the concept of facilitation of business processes and the opportunities offered by the information technologies, which provides for a paradigm shift in electronic commerce.* Applying the principles of trade facilitation to business processes will help derive maximum benefit from the convergence of technology and commerce.

To stress this paradigm shift, UN/CEFACT prefers to use the term electronic business (e-business) instead of electronic commerce. Electronic business[7] is a generic term covering information exchange within and between firms and countries, including customers, to achieve a given business objective using information technologies. This vision of UN/CEFACT - "simple, transparent and effective processes for global commerce" - can have a profound impact on future economic growth.

---
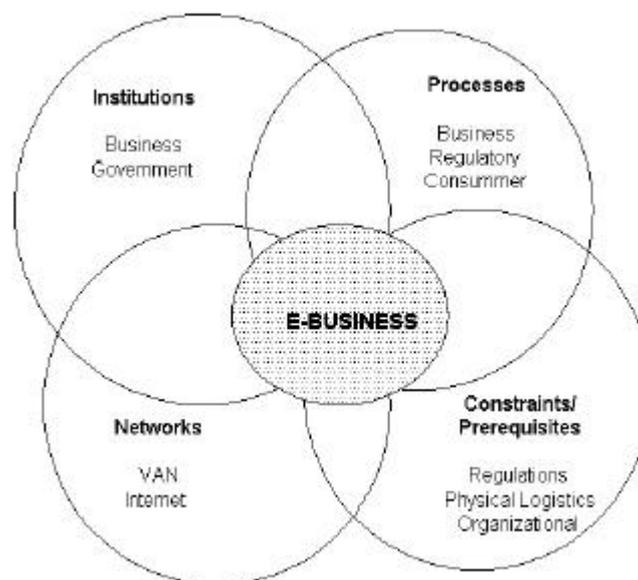
[7] Electronic business: A generic term covering information definition and exchange requirements within and between enterprises, including customers. (Memorandum of Understanding between IEC, IS and UN/ECE concerning standardization in the filed of electronic business; http://www.unece.org/cefcat, Moumg01a2b.pdf)

2.1 Thinking across all business processes and boundaries of the "firm"

Underlying the work of UN/CEFACT is the understanding that accelerating the growth and scope of world trade requires the reduction of procedural, juridical and physical constraints that may inhibit it.

The global trade/supply chain management is commonly thought of as one of the most complex business areas to understand. It has many facets, and depending on where you stand, it looks different. People are used to separating the macro from the micro view, and are thereby prevented from seeing the global picture. Furthermore, there is a tendency within the supply chain for parties only to be concerned with the one or two facets that involve them, ignoring the fact that an action taken by one party has effects on many parties. This phenomenon is to be found in both business and regulatory bodies to varying degrees.

2.1.1 Background

Removing the factors limiting the growth of world trade is a prerequisite for electronic business. It requires the implementation of trade facilitation concepts and techniques. Clearly, the correct and logical way towards facilitation would be by means of a comprehensive study of all informational, procedural and juridical requirements for the execution of trade and the negotiation of and agreement on international standards for this purpose.

However, this would be a task of the greatest complexity, offering few immediate benefits to the trading community. Nevertheless, the opportunities offered by new technologies provide an unprecedented chance to further tariff reductions, increase implementation of free trade principles and provide greater participation by developing countries and small and medium-sized enterprises (SMEs) through a substantial improvement in the efficiency of the business processes. It is in the analysis of the delays and uncertainties that great benefits can come from using ICT, both for business and regulatory authorities.

Those involved in international trade know how cumbersome and time-consuming it is to have to comply with all the required procedures, paperwork and formalities. Efforts to reduce and simplify the paperwork started in the mid 1950s. It was soon realized that solutions were best developed through a global approach taking into account both the administrative and the commercial aspects of trade. UN/CEFACT explored ways in which export documents could be simplified and standardized. By 1963, an agreement was reached on a plan - the UN Layout Key - to be used as the basis for designing a standard, aligned series of external trade documents. Most of the international trade documents used throughout the world today are designed in conformity with this layout.

While implementing simplified trade documents, the Centre realized that documents were only "the tip of the iceberg", and more substantial problems existed in the areas of commercial and administrative procedures. These procedures were, in turn, based upon the information requirements of each party to the trade transaction. Thus, techniques were developed to facilitate trade processes, information flows between parties in order to perform business, whether that "business" be an administrative transaction, the provision of goods or services or payment.

The experience gained by the work in the fields of procedures, documentation and EDI is now better understood, and business models and scenarios are being used as a basis for recommendations dealing with the different facets of the work.

2.1.2 The role of the "firm"

Although it is customary in economics to think that the economic system is coordinated by the price mechanism, that is only a partial description. The economic system is made up of subsystems, of which large corporations and SMEs are major actors. To understand new economic organizational structures and processes, it is necessary to analyze the economic organization from the point of view of the firm.

The neoclassical theory of markets regards the firm as a "rhetorical device adopted to facilitate discussion on the price system" [8]. But an analytically convenient theory of the firm for purposes of studying markets and equilibrium cannot be treated as an adequate theory of the firm for purposes of understanding new economic organizational structures and business processes.

---

[8] Coase, R.H. 1937, "*The Nature of the Firm*", 4 *Economica N.S.*

In order to perform a market transaction, a firm must explore the market and find out who they wish to do business with; negotiate contracts, payments and delivery; organize supply and manufacturing; maintain business processes and the automated management of the information. The expenses associated with these activities are called transaction costs.

According to R. H. Coase in his seminal article, "The Nature of the Firm", a firm has a role to play in the economic system if transactions can be organized within the firm at lower cost than if the same transactions were carried out through the market. A firm's size limit is reached when the costs of organizing additional transactions within the firm exceed the costs of carrying out the same transactions through the market.

In its simplest form, the price of a service or good is made up of the cost of production, the profit of the firm and the transaction cost. Customer demand and competition determine the highest price at which goods can be sold. If transaction costs are lowered, firms are more inclined to buy and sell products and services, and as a result, trade will increase. Furthermore, reducing transaction costs will open new markets and create new business opportunities, thereby generating new earnings.

The reduction of transaction costs is at the centre of the work of UN/CEFACT to improve global trade.

2.1.3 A simple model for global commerce

The international trade transaction model developed for facilitation purposes[9] can be used to describe the complex set of information related to global commerce. The model makes the information accessible and easy to understand and offers insights that cannot be obtained from simply examining the raw information. It consists of the association of two views: the transaction or horizontal view, and the "network of partners", or vertical view, as shown in the figure below.

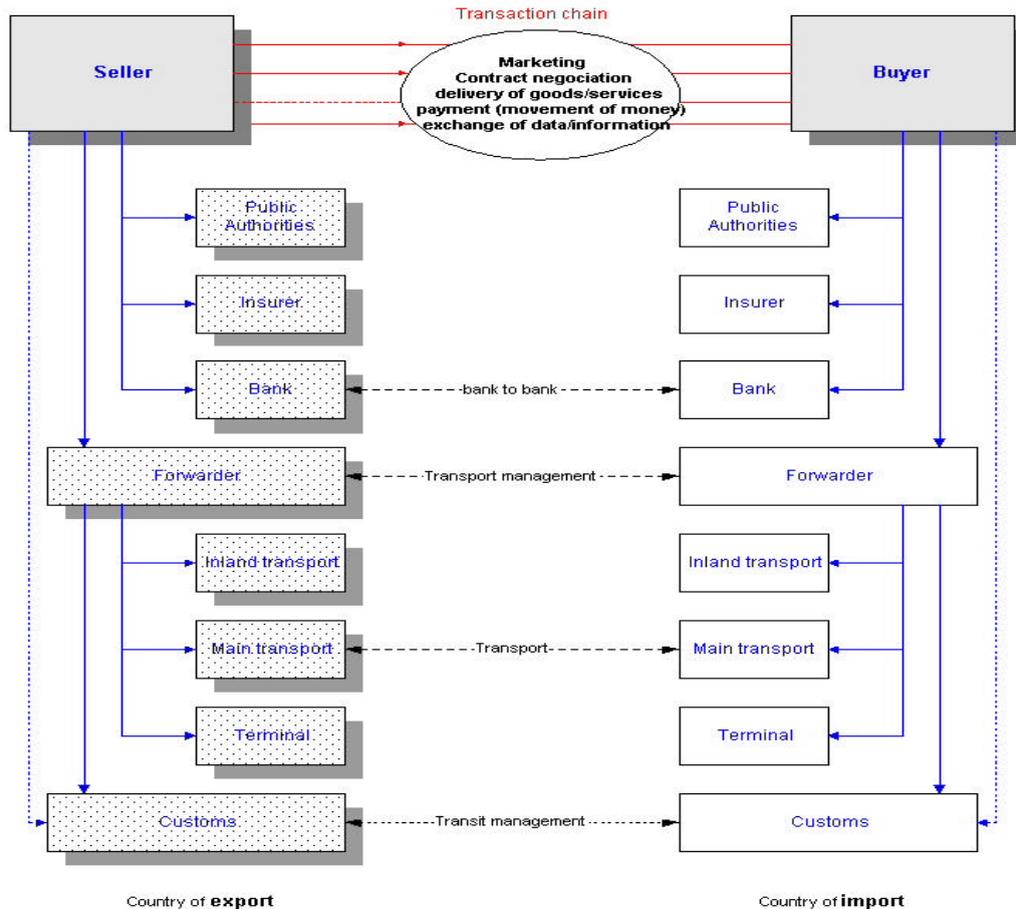[9] http://www.unece.org/trade/itt/itt_home.htm

Figure 1: A simple model for e-business

The *horizontal view* of the model describes the various business processes including quotation, contract, delivery and payment in the transaction chain, while the *vertical view* describes the various actors - the network of partners. A reason for the complexity of this type of transaction is the number of independent actors involved in the completion of the transaction. Furthermore, they have to know about each other's "way of doing business" before they can start exchanging information. Also, private business processes have to be able to interface with public and regulatory processes and to comply with international, regional and national regulations. The technological heterogeneity and technological knowledge of the partners further complicate this.

2.1.4 Thinking across all business processes

To view and analyse each of the processes in the "horizontal view" of the model provides tangible benefits in improving global trade. Furthermore this "horizontal" thinking can and should be applied to the business processes not only between all the partners in the transaction, but also within the firm itself in order to derive maximum benefit.

2.1.5 Building the network of partners

The key issue in communicating in an electronic environment is not technological in nature. It lies in that fact that the partners are outside the organizational network of the company. Understanding an organization's external environment, focusing on the management and optimization of the linkages between them and this external environment are fundamental. This requires changing how people think and how organizations interact with one another in order to establish the partnership of organizations striving towards a common business goal.

In an international business transaction, as many as 40 different organizations may be involved with an average of 50 documents being created. To better identify the potential of electronic communications, the organization must obtain an understanding of its relationship with entities that are affected by its decisions. Analyzing the important relationships between the organization and the components of its external environment, such as suppliers, banks and regulatory authorities, will

allow identification of the factors in the external environment that are important to the organization's objectives: assess possible future implications and identify opportunities in using electronic business.

Looking at the network of partners does not mean that every organizational issue can be understood only by looking at the entire transaction chain. Some issues are understood only by looking at how major business processes within the organization interact, while other issues must be considered in the dynamic of the entire network of partners.

The trading partners are part of a larger environment that is perceived only dimly. The "network of partners" view indicates how business processes interact, therefore showing more clearly the potential for commerce and improvements of the global transaction. To improve the total performance, an organization must redefine its scope of influence through the active cooperation of all the parties in the total transaction chain. For the organizations' own business process to succeed, the processes of the other partners must succeed as well.

2.2 The importance of effective business processes

Accelerating the growth and scope of world trade requires a focus on the business relevance of the use of the information and communication technology.

Today, the information carrier no longer often is the paper document but information is communicated by electronic means. In principle, there is no difference between using paper documents or electronic documents, as both create information flows that enable the communicating partners to perform their functions. For the last 15 years the electronic transfer of data in a structured format has received growing attention, and in 1987, the UN/EDIFACT standard (UN Electronic Data Interchange for Administration Commerce and Transport) was approved. Updated UN/EDIFACT directories are issued every year containing messages from different sectors[10].

2.2.1 Optimisation of information flow

Facilitation concepts have been evolving over the years to respond to changes in the international economic and technological environments, from rationalization of information flows to facilitating business processes. Characteristic of the organization of trade following the Second World War were non-harmonized procedures and regulations, inordinate information requirements and cumbersome and time-consuming formalities that generated a massive transfer of information along the transaction chain.

This inefficient way of working led to the development of norms and standards of structured data to facilitate the transactions, such as uniform layout for paper documents and EDI, which the economic actors use to streamline information flows. Predefined messages are developed to fulfil a specific business function between independent business partners.

The use of this structured approach reduces the sources of uncertainty in the information exchanged. Aided by electronic communications, it reduces the time, hence the transaction cost. The organization's in-house business process requirements do not change whether EDI is being use or not. This scheme focuses on the interchange between independent business partners.

2.2.2 Optimization of business processes

Traditionally, firms have tended to look into great detail at their own internal operations and have, perhaps, taken the external relationships with its customers and suppliers as relatively difficult to alter. However, in recent years, firms are seeking to exploit their competitive advantages throughout the transaction chain in a wide range of locations. This is due to the introduction of new information technology and transport technologies, the opening of increased portions of the world economy to trade and the pressure of competition.

Called "integrated international production", this is being done by the firms for both business processes and activities. As firms consider how they are to prosper in the modern world, much emphasis is being placed on the effectiveness of business processes by which they operate, in order to simplify and streamline these processes. This involves a thorough examination of what information is required for effective decision making at each stage of the supply chain. "Business process re-engineering", "managing the virtual enterprise" and "value chain management" are all concepts which have many features in common.

---

[10] http://www.unece.org/trade/untdid/welcome.htm

"Value chain management" is an even more all-embracing concept and aims at improving the profitability and efficiency of a firm by optimizing the speed and certainty, and maximising the net value added by all relevant business processes. As such, it can be used to cover business and governmental activities.

Taking into account this integration of the activities of the firms, facilitation concepts today are concerned with the simplification and harmonization of the business processes throughout the global transaction chain. An example of the effect of this horizontal thinking is the streamlining of the logistics flow, which results in massive inventory reductions.

By thinking across the total transaction chain, it is therefore possible to structure existing processes into well-defined areas of activities. Organizations can therefore analyse the requirements for global commerce in all the dimensions of their activities.

2.3 Organizational implications of the technology

Substantive benefits from implementing e-business can only be obtained by focusing on the business relevance of the use of information technology by the firm. The technology must be appropriately applied and integrated with overall strategic planning, organizational and systems management.

Firms deploy information technology in very different contexts and for very different purposes. Information technology applications can be found on plant floors, in R&D laboratories and on secretaries' desktops. Historically, information technology applications that relate to a firm core business attracted most interest, particularly if they hold a prospect for return on investments. Therefore, very specific business processes were most likely to be automated. This, in turn, stood in the way of a straightforward implementation of the technology across applications. It is here where long-standing traditions characterize the environment and where applications in support of business processes have been designed to optimally meet the demands of a specific environment.

Information technology applications may be categorized either as business or infrastructure relevant. For example, an accounting system is a representative of the former, whereas a secretary's e-mail represents the latter. Business relevant systems were very much shaped by the particular environment within which they were deployed. That is, an EDI system for invoice processing, for example, is implemented for use only within the accounting department of the organization, whereas the underlying communication e-mail system is put to use across the organization. A characteristic of infrastructure systems is the fact that they are not, or only to a very small extent, integrated into the business processes within most firms. Business relevant and infrastructure relevant information technology applications are typically separated and in most cases developed independently.
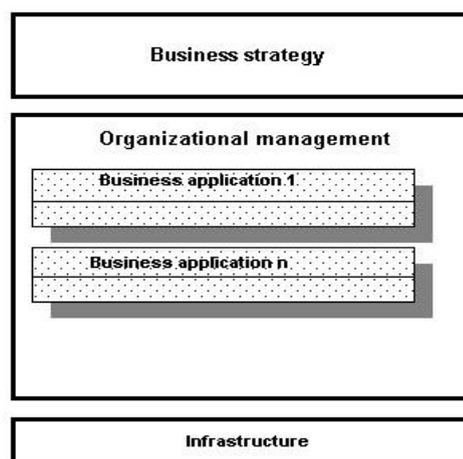

Figure 2: A simple model for the firm

The type of information technology implementation within the firm depends on the commitment and business strategy of the organization. Information technology implementation can be done either at the organizational level or integrated across the firm. However, realizing the full potential of e-business requires that the information technology be used by applying the concepts of horizontal thinking across the network of partners.

Fully integrating horizontal thinking across all business processes within the entire organization leads to new approaches to the automation of business activities. Information technology implementation evolves from the automation of independent business applications to the automation of all activities related to a given business process. The technology is used by the organization as a significant across-the-board contributor, and is used to pursue the fundamental business objectives of quality, service level and competitive cost.

2.4 Business relevance of the technology

Implementing ICT in support of e-business requires new approaches where the benefits are less immediate and obvious. E-business addresses more fundamental issues, applying the real drivers for e-business.

In a first step towards e-business, communication is seen as interfacing the firms autonomous systems. ICT technology is used to expand the automation of business processes beyond traditional corporate boundaries, using EDI as the tool. Firms engage in horizontal thinking in terms of business processes across the total transaction chain. An example of the effect of this horizontal thinking is the streamlining of the logistics flow, which results in massive inventory reductions. Modern firms have introduced a number of new business processes, such as "just in time" manufacturing, and "quick response" retailing, among others.

Virtually any activity that requires the exchange of information between disparate entities constitutes a potential market for this use of ICT. The common implementation links suppliers and customers and is centered on the procurement of payable functions, while new areas of activities include product detail, health care, insurance, and government reporting. This approach focuses on reducing cost, particularly non value-added overhead and administrative cost, and concentrates mainly on the outflow of money from the corporation.

Market benefits are obtained when ICT is tied to strategic efforts that alter, not mirror, previous practices. Trading partners commit to the e-business concept and explore ways of strengthening their relationships to mutual advantage. The new challenge for the firm resides in the implementation and use of ICT in support of their business strategy, activities, organizational management and ICT developments.

In this approach to e-business, the role and effect of ICT in support of all business processes is consistent with the organization's strategy. ICT solutions play a key role in promoting the partnership between the organization and its customers and add value to the overall business activities. The deployment of the technology supports the broader business organization and business process transformation and realizes the convergence of ICT enablers and real business drivers. E-business focuses on revenue enhancement. It is intended for increasing the flow of money as a result of new business, new customers, and new products. To achieve its full potential it requires that all of the stakeholders participate in an open communication across the organization. Changes in business processes are integrated with corresponding changes in the technology, organization structure and culture.

3.   The challenge of electronic business - major global trends[11]

General global trends recognized by UN/CEFACT as influencing the paradigm shift of electronic business are the globalization of markets and the fast pace of ICT developments, especially electronic business and the virtual enterprise. These trends form the background against which UN/CEFACT has developed its work programme, vision and startegy.

3.1 Globalization of markets

Globalization of the marketplace is happening rapidly, with companies sourcing components in one part of the world, assembling them in another part of the world and selling them in yet another. To compete in this new environment, successful companies have found it necessary to restructure themselves and the way they do business. In their organizations they have become leaner, flatter, more focused on their supply chains and customers and, in their operations, they have implemented modern and effective information systems and trade facilitation techniques.

---

[11] TRADE/CEFACT/1998/20, *The UN/CEFACT work programme and an introduction to the global trends influencing IT,* August 1998, United Nations Economic Commission for Europe; http://www.unece.org/cefact

The solution to achieving effective information flows across international markets lies in the use of common business processes, including best practices, based on the use of globally agreed ICT standards.

The building blocks range from defining data requirements, the application of relevant developments such as business scenarios and the implementation of efficient procedures for the physical movement of goods. By analysing and modelling the business processes and developing recommendations which simplify, harmonize or eliminate practices and procedures used in international trade, information content and business processes are emphasized.

3.2 Electronic business

In the popular press, "electronic commerce" means business on the Internet. The Web, being a human-to-machine interface where data are entered for one transaction, does not solve the problem of the machine-to-machine interchange of already existing data: that is done by EDI. The two technologies therefore complement each other. The consensus and business agreement between trading partners establishes UN/EDIFACT as the global repository for business transactions and is therefore at the core of electronic business, especially when this concept is expanded to include electronic management techniques used in production and the supply chain. This last aspect is intimately linked with international trade.

The increased use of telecommunications based technologies has resulted in the recent emergence of a new concept: the "virtual" enterprise. That is to say, enterprises that customers and suppliers "see" as one company, but which may, or may not, exist as a single physical entity. The "virtual" enterprise is based upon an invisible web of communications and relationships between many different computer systems and companies. This invisible economic web, to function effectively on a global scale, must be built upon a solid infrastructure of internationally recognized norms in business information and practices, and upon a clear legal structure. This foundation exists in concepts such as electronic business and a global legal framework, in standards such as UN/EDIFACT and the UN Layout Key used for electronic forms.

The integration into the "virtual global economy" of small and medium-sized enterprises as well as those companies operating in economies that currently lack the infrastructure to support virtual enterprises requires the development of bridges, both for communications and migration, between more traditional business operations and the virtual enterprise.

One example of such a bridge is the International Trade Transaction model which can serve both as a didactic tool for explaining procedural issues and, in its national form, as a planning tool for changing procedures and implementing new technologies. Other bridges include the creation of awareness campaigns to overcome cultural barriers to change and the development of simplified, recommended profiles for the implementation of simple commercial messages by SMEs and off-the-shelf software who serve the SME market.

3.3 The fast pace of developments in information technology

Tomorrow's technology represents an exciting challenge for today. Technological change management for the development of tools in support of e-business requires evaluating the applicability of new technologies like XML[12], "object oriented EDI" and data modelling. This is achieved by maintaining and developing the UN/EDIFACT standard accordingly, analyzing supporting requirements and, based upon scenarios/models, defining interchange profiles capable of meeting these needs through a sequence of messages.

Another critical aspect of technological change is to understand how an improved telecommunication infrastructure will affect access to data and the transmission of business information. The establishment of a truly Global Information Infrastructure (GII) is well under way with the new, improved satellite communications systems now being put in place. In particular, the technology offered by low orbiting satellites will soon remove the obstacles to anyone, anywhere, accessing the Internet or freely communicating business information to any part of the world. Nonetheless, these new technologies may also create cultural and political problems for some countries and special measures may need to be developed in order to facilitate their acceptance by those countries.

Facing the opportunities offered by new technology and the challenge of ensuring that developing economies, as well as small and medium-sized enterprises, are not left behind requires a better understanding of the worldwide use of electronic exchange of business information.

---

[12] XML: eXtensible Markup Language

3.4 Legal issues

All trade takes place within a legal framework or "environment", which has practical consequences on what can be done. Almost as importantly, in e-business, where the objective is often to eliminate unnecessary procedures, this legal environment also directly affects what can "**not** be done." For example, if one must archive signed paper copies of invoices for a period of 10 years in order to meet a legal requirement related to taxes, it is difficult to replace these same documents in customs clearance with electronic equivalents (or eliminate them all together).

Commerce is about the marketing and exchange of goods and services between buyers and sellers over borders and distances. It should only take place within an organized framework, according to established rules, custom and usage, adhered to by the key players - the traders. In order for a seller to find a buyer, for a sales contract to be signed (electronically or otherwise), for the goods to be shipped by the producer and received by the consumer, for the payment to be made within the contractual deadline, the many phases of the transaction have to take place within a pre-established system, on the basis of a functioning legal framework.

This framework can be structured into the macroeconomic level (country A to country B), the inter-governmental level (government of country A to government of country B) and the microeconomic level (a private company in country A to a private company in country B). While the macroeconomic view of commerce focuses on providing a legal framework for the flow of trade between countries, the microeconomic view focuses on the transactions between those engaged in commerce -. the trader-to-trader relationship. However it is appreciated within UN/CEFACT's expert groups that both of these are equally vital for the facilitation of electronic commerce on an international basis.

It is, however, at the microeconomic level that recommendations to address practical legal issues and to remove legal constraints to the electronic business transactions are required to ensure that the practical needs of users are taken into consideration.

Though the emerging legal framework of the global marketplace for electronic business, once completed, will contribute to the building of trust required for its further development, the use of electronic business still raises a number of issues which can be better addressed through a contractual process.

With the objective of contributing to the building of trust between business entities and taking advantage of the experience gained with the EDI Interchange Agreement (UN/ECE Recommendation No. 26), UN/CEFACT is proposing a model for a contractual approach of electronic commerce operations. This approach takes into consideration the need for a framework of basic provisions to be agreed by business entities combined with the flexibility required to conduct day-to-day commercial transactions.

The Electronic Commerce Agreement is intended to serve the commercial requirements of business-to-business electronic commerce partners. It provides a basic set of provisions which can ensure that one or more electronic commercial transactions may subsequently be concluded by commercial partners within a sound legal framework. The agreement aims at addressing all forms of electronic communications available.

3.5 Partnership and cooperation

It is clear that this paradigm shift will not achieve its growth potential unless it involves all countries and regions as participants. Consequently, no country or region will gain the full benefits from trade liberalization unless the benefits of e-business are extended to all of the other potential participants. For example, a failure to convince regions or countries of the importance of this convergence or the choice of different standards by a region or country can create procedural barriers to trade.

4. Examples

4.1 The electronic marketplace

In technical terms, the Internet offers a global presence to the actors in trade, and marketing has certainly been a first step towards electronic commerce for many organizations. In practice, however, the vast amount of information makes it difficult for sellers and buyers to find each other. One complicating factor is the low degree of organization of the information which, with the current state of standardization, implies essentially manual operations, for example, when searching for information.

Suppliers and trading companies commonly provide their product data bases electronically. While it is in the interest of the suppliers that the data bases be well maintained, disadvantages from a purchaser's point of view are that they may have to search many data bases and that the presentation is unstandardized. Large procurement organizations, wishing to guide their purchasers through a standardized interface, build their own data bases, according to their own preferences, populated with extracts from the supplier data bases. In established trade relations, suppliers increasingly offer their partners customized presentation profiles by, among other things, showing the contracted product range and prices.

Many value added service providers now try to establish electronic marketplaces, often offering bridges for web and EDI transactions and other intermediary services. In some areas, such as the food sector, intermediaries establish common data bases for products offered by a group of suppliers. As with all new services, time is needed to get the acceptance of a sufficiently large number of parties, and to drawing a price structure that all regard as fair.

In the absence of efficient search tools, globalisation effects are limited. The cost of manual search leads many buyers to return to electronic marketplaces and suppliers that they once have determined to be 'sufficiently' good. Other reasons are that users seek stable trade partner relations or due to facts like procurement policy, an existing distribution systems and incentives.

4.2 Procurement patterns

Much standardisation work is geared towards the development of trading models that do not require pre-arrangements before the parties can enter into trade transactions. With the help of certain infrastructure and security measures, parties, unknown to each other, can negotiate and trade electronically in a fair and trustful way. Many see the generic security solutions as very technical and complicated. Quite a different direction is seen today by many traders who engage in close partnership, systems integration and other far-reaching business relations. For participants of this kind, the trade is likely to involve products which are characterised by a 'consumption' pattern that is known, well analysed or planned, and a regular supply of often large quantities. The typical situation in the former case would be irregular, infrequent and low-volume acquisition.

It has been suggested that electronic commerce tools will secure the best buy on a global market. To some extent this can be realised through, for example, electronic auction models. However, in most cases acquisition involves more parameters than mere best price; for example, delivery time, quality, environment requirements, guarantees, distribution system, and so on. An interesting solution combining characteristics of the two antipodal procurement patterns can be a two-step approach, where the first one is a qualification step leading to the establishment of Potential Supplier Agreements with a handful qualified suppliers. The second step is a series of acquisition instances challenging the potential suppliers to compete for best current price and delivery time. It is an open question in which situation this pricing mechanism can compete with the discounting power of guaranteed deliveries under traditional contracts.

4.3 New business relationships

Competition and focus on customer value is the drive for improved or new ways of doing business. Efficiency of the organisation alone is not enough, as the overall efficiency of cooperating organisations determines how the end-user values a product or service. Companies now review and adapt their roles in relation to their supply and consumption patterns. The organisational division in functions may have to give way to process-oriented structures. Suppliers may be strategic partners providing complex sub-systems rather than simple components. Intermediaries find a way to serve the evolving industry and trade processes by offering new information brokerage or logistics solutions. Examples:

- *Efficient replenishment:* where the customer traditionally used to order goods as needed, the supplier takes responsibility for the replenishment based on sales statistics and consumption reports

- *Synchronised deliveries:* a prerequisite for close control of product delivery sequence is that production units as well as transport providers have the support of elaborate application systems. Synchronisation may require identification down to individual packages and, additionally, good tracking systems.

- *Cross docking/merge in transit*: a logistics service provider undertakes, on behalf of the customer, to compose the correct mix of products from the various suppliers before delivering them. Re-packaging and re-labelling may be related services.

The new ways of working require stable, long-term relations as substantial investments may be needed to develop the appropriate distribution systems and computer support. The new trading patterns have new requirements on the information flows, while much of the existing electronic commerce standards replicates information flows that were fine-tuned for paper document exchange decades ago.

4.4 Involvement of parties to support electronic commerce

Electronic commerce has taken off in trade with intangible commodities (music, software, insurance brokerage) or where existing physical distribution services are readily deployed (for the distribution of books and ticket services). For trade in general, the development or adaptation of the physical distribution systems is vital. While much of the development relates to physical infrastructure and distribution channels, some vital components link to information processing.

Freight forwarders and carriers have customers in many electronic commerce communities and, hence, face the problems of multiple messaging standards and versions of standards. In multi-modal transport, the historic differences in conventions, terminology and practice are reflected in disparate message subsets for information interchange. Although proposals for general unique references exist, only the airlines provide unique international transport document numbers, and this fact makes the tracing of goods in multi-modal transport difficult. Standardisation of goods labels become increasingly important in trimmed logistics systems and the Multi Industry Transport Label offers a starting point for such development, although it is not yet supported by all and, due to its flexibility, prone to grow implementation variants. Additionally, operators in international transport often have to recognise varied levels of the countries' implementation of electronic commerce as well as facing differing electronic procedures and routines introduced by authorities.

Electronic payment is one of the growth areas in electronic commerce. Many systems are competing but with limited penetration. Common payment methods today involve the use of invoice, credit card, and cash-on-delivery, with EFT/EDI used for inter-bank clearance and for transactions between banks and major traders. For electronic commerce, proposed systems include electronic cheques, stored value solutions (smart card or PC file) and electronic transactions, all using digital security measures to protect value. The methods typically involve a sponsor, such as a bank or the technology provider, with which the buyer and sometimes also the seller needs to register. Some payment systems, like the Virtual PIN system introduced by First Virtual Bank, even designates a value added intermediary through which the seller and buyer interact. SET (Secure Electronic Transactions) is a public specification developed by Visa and MasterCard for secure transactions over open networks, which has attractive features security-wise, but it has been slow to gain broader acceptance.

It is likely that a number of like-minded alternatives will exist to satisfy the various requirements for security levels, integrity, payment transaction cost, and so on. The diversity of electronic payment specifications highlights the importance of interoperability between electronic payment mechanisms.

4.5 Systems for standardised business processes

The software developers have been slow to adapt their standard applications for EDI. The box of tools provided in the early days has now evolved into add-on modules to the application systems, but essentially the electronic commerce support is on a 'per message type' basis. The administrative systems of a seller and a buyer need to support the complete business process covering sequences of information interchange. This implies that the use of individual, common message standards and specifications is not sufficient. Also open interfaces between solutions which integrate particular sets of standards and specifications are needed. In recent years there have been several initiatives to develop overall models for electronic commerce to address issues such as interoperability between systems, inter-working between standards, integration between the tools and services which implement standards, and compatibility between existing and emerging products. Some examples reflecting various approaches are

- *OBI:* Open Buying on the Internet (OBI), specified by the OBI Consortium, provides a standard framework defining a secure business-to-business procurement process for high-volume, low-value transactions between trading partners. Starting with a requisition from a supplier's catalogue via web browser, it integrates with EDI to complete the ordering and payment steps.

- *OTP:* Open Trading Protocol (OTP), proposed by the OTP Consortium, includes an architecture that describes the various roles of parties that are involved in trade and the different types of transactions that can occur between these parties. The OTP specification sets out the content, format and sequence of messages that pass among the trading parties with a particular emphasis on encapsulating any Internet payment method.

- *Semper:* Secure Electronic Market Place for Europe is an EU supported project that defines an open and system-independent architecture for electronic commerce. Key elements in the architecture are security measures that ensure predictability and fair exchange.

While the development of this type of comprehensive specification certainly is urgent, an open issue is which bodies and which players are the appropriate ones to lead the development of solutions that have far-reaching implications for the business practices.

5. Issues and barriers

The common denominator of a successful e-commerce implementation is not the application of technology per se, but a change in the business processes. In considering this change, there are opportunities, issues and barriers. This section discusses some of these with regard to

- policy making
- security
- standards
- confidentiality
- privacy
- law
- intellectual property rights.

5.1 Policy making

It is generally recognised that electronic commerce and re-engineering of business processes should evolve through market-driven initiatives. But as they bring us into new territory, certain elements of policy making, supporting rather than governing, appear justified to reach a balanced and fair use of the new technology. A question is to what extent this can be achieved, as electronic commerce and changing trading patterns challenge many vested interests of user groups and countries. The concern is accentuated by the differing priorities, tradition, culture and legal environment within which policy makers work.

Global acceptance and deployment of electronic commerce will need the concerted support and guidance of policy makers. While the new technology has attractive features in openness and global coverage, some countries are reluctant to open themselves to a totally free flow of information. To some extent this also affects commercial information. Another issue is the filtering technique some communities introduce to block out certain material on the Internet, leaving a grey area of interpretation between what is accepted and what is unwanted.

A more fundamental issue, though, is the global availability of basic and affordable communication infrastructure and the capability to use it. Although claimed to be truly global, electronic commerce is still beyond reach for a majority of the population in many developing countries. Ways to make countries and regions more equal in this respect are urgently needed.

On a micro-economic level, the impact on business and change management has to be considered for SMEs, in terms of qualities like resources, age, culture, language and heterogeneity of business partners.

Technology itself is afflicted with some complications of principal nature. For example, due to historic facts, the system for Internet domain registration was until recently financed by and under the control of the US Government, through the Internet Assigned Numbers Authority. The reorganisation raised a debate over issues like public versus private control, and the geographical balance in controlling a global asset. An other example, in the area of security, is the restrictions on the free use of strong encryption technology. The provision of export control has implications both with regards to the free availability of mass-produced software tools and on traders access to global markets on equal terms.

The practical application of free global trade through electronic commerce is putting Governments' intentions to test. Virtual market bridges distances, sellers and buyers find new ways to meet, and the role of borders is challenged when the commodities are dematerialised. The country's legitimate control of trade becomes more difficult to maintain.

The globalisation of markets also has an equalising effect on national price levels, taxes, and trade policies, among other things, of which we have only seen the beginning. For example, a country such as Sweden, which traditionally maintains a policy of high taxes on alcohol and tobacco, has had to reconsider its tax rates on these commodities and recently also amended a regulation so that Customs could inspect packages, mailed from abroad to private electronic shoppers, for taxable goods.

5.2 Security

The early way of doing EDI, within closed user communities and with recognised partners in long-term business relations, put a limited need for security. With a widened scope, open networks and open user groups, security issues have come high on the agenda. Four elements are central in making an electronic transaction truly secure:

- both communicating parties need to positively identify each other (authentication)

- modification of the transaction en route cannot be made without detection (integrity)

- no one apart from the communicating parties can read the details of the transaction (confidentiality)

- evidence that a specific transaction has taken place can be provided, so that neither party can deny it (non-repudiation).

The decision to use security services is a business decision. Security has a cost to it and it must be balanced against the risks for accidental or malicious corruption of a message. The measures and security levels need to be related to the type of message exchanged and the values and risks involved. For example, the security requirements on a message for Advice of dispatch of goods are certainly significantly different from those placed on a Payment instruction message.

Security considerations must be end to end, in its true meaning. It should be recognised that the interchanging applications need to provide compatible but also complementing security services, e.g. regarding availability, access and traceability. These secure the own operation and provide the basis for reliability and trust in the eyes of the partners.

Security is also affected by choice of network for electronic commerce. In the case of VANs, one services provider is in charge of running and maintaining the network and certain security services are often included in the package. With current-state Internet, due to its decentralised nature, there is a latent uncertainty with regard to predictability/ reliability and delivery notification services, which users may only partly balance by systems for traffic monitoring and increased use of response messages.

Technology issues

As the transactions are in electronic form, cryptographic measures are well suited for the purpose of providing security. The standard way is to apply a complex mathematical formula, incorporating a secret key (a very long number), to the message before sending it. The recipient can decode it either with the same key (symmetric encryption) or with a corresponding one (asymmetric encryption).

Symmetric algorithms use the same key for encryption and decryption. From a user's point of view this means that the communication parties have to agree and securely exchange the secret key in advance, on a bilateral level. In a multi-user environment, the number of keys may pose a serious management problem.

Asymmetric algorithms make use of a pair of keys, one for encoding and one for decoding. Each user can be provided with a pair of keys, where one is private (kept secret) and the other is made public (can be distributed widely). Authentication can be achieved by means of the senders private key; confidentiality by using the receivers public key. The total number of keys in a multi-user environment is reduced and the key management problem significantly simplified.

Implication on business models

The use of cryptographic methods within an electronic open information interchange environment would be assisted by a public key infrastructure. It has as the major component a trusted third party, called "certification authority", with which end users and their public keys are registered. The certification authority vouches for the identity (or some other attribute) of an encryption user by means of a certificate, like a proof of the link between an encryption key (pair) and the person or organisation possessing it and the period of validity. If a party then includes his certificate among the transaction data, the receiving partner can verify the identity with the certification authority. The scheme allows for an expanded structure of related certification authorities.

Factors such as user acceptability, public policy and vendor support will determine the future direction of certificate usage.

5.3 Standards

Standards determine the technology that will implement the emerging information society. They play an important role in cooperation and competition between companies, are a key element for the effectiveness of the market and are essential for the competitiveness of industry. The one who sets the standards, defines the basis for future products and services. As such, standardisation is given keen attention by national and regional policy makers.

International standards are important for effective electronic commerce as they hold many of the answers to complex trade barrier issues and can ensure that all participants in the business process interpret information in a uniform way and hence, can communicate and understand each other. Their widespread acceptance and use by the business and consumer community will maximise the benefits of electronic commerce. With networks of computers building on products and services from different manufacturers, conformance to standards is the basis for interoperability.

Traditionally, recognised international and national standards bodies have been charged with the task of developing standards through a formal consensus-building process involving all interested parties. The resulting standards are referred to as formal standards. But standardisation is a voluntary process that reflects the dynamics of the market, and for products with short life cycles and immediate economic profits, the market tends to adopt technical specifications in the framework of consortia and forums. When established in the market place, the specifications are sometimes known as de facto standards. If publicised, they are referred to as publicly available specifications (PAS). As standards follow the life-cycles of products or services, and as ICT product cycle times are increasingly becoming shorter, de facto standards development processes often prove to be more appropriate then the lengthy procedures involved in formal standardisation. Formal standards are still important where the technical specifications need to have long-term stability, global coverage and constitute a guarantee for large investments, for example in basic telecommunications infrastructure.

Standardisation is a commercial activity, and must be regarded as such. In all cases competition must remain possible and the specifications must be open with no restriction on their use by enterprises outside the group of original drafters.

Development of specifications in consortia outside the formal standardisation channels has to be built in a spirit of technical cooperation. This, in particular, calls for transparency concerning intellectual property rights, for example with regards to existence of patents in the chosen technologies, and conduct in the issuing of related licences.

Enhancement of the legal framework

Application of standards are generally voluntary, but in certain areas legal and policy instruments make compliance with standards compulsory. Examples are requirements of public interest, such as health and safety, or other public interest such as interoperability. Also, public procurement refers to standards as a means of achieving transparency and non-discrimination. In all these cases, the formal standards have an advantage to technical specifications of other sources, in that the former have been drawn up by a transparent consensus process involving all interested parties. A question arises as to how other publicly available specifications can be referenced in these cases, in particular if the formal standardisation mechanisms cannot deliver the appropriate specifications at the right time.

Technology development

Standardisation should never constitute a formal impediment to the introduction of new technologies. In appreciation of this, the ultimate selection of any 'parallel' or competing deliveries from various standardisation initiatives should be left to the market preferences.

Implication on business models

Participation in the specifications development process, preferably in a leading role, tend to become strategic. Because of the advantage that can be gained from the control of key specifications in a rapidly evolving technology environment, it is not unusual for dominant market players to attempt to reinforce, by means of technical specifications, their position in the market place. In developing of enhanced business scenarios, tapping the potential of new technical standards, end-users often found themselves competing with the providers of products and services. In the heterogeneous sphere of user interests, the needs of SMEs deserve special attention with regard to satisfying their special needs as well as to awareness.

5.4 Confidentiality

The major technique for achieving confidentiality in electronic commerce is encryption, for example, transforming the messages in plain text to ciphered text, by use of an encryption algorithm and a special key, so that an adversary who overhears the cipher text cannot determine the message sent. The economics behind encryption is to transform the problem of keeping hundreds of messages secret to the problem of keeping just the key secret.

One should note that confidentiality can be achieved also by other methods. Steganographic methods allow one to hide a message in other data (like images) in such a way that even the existence of a secret message cannot be detected. In spite of other methods, encryption is likely to remain the cornerstone for most confidentiality services on open networks.

The legal framework

In 1997, OECD issued a recommendation concerning guidelines for cryptography policy. While not binding for OECD member countries, they are intended to be taken into account in formulating policies at the national and international level. The guidelines expound on eight basic principles for cryptography policy, covering trust, choice of cryptographic methods, market driven development, use of standards, balance between privacy and lawful access, liabilities and international cooperation.

Export control

Concerns over foreign threats to national security have been the primary motive for export controls. With respect to encryption technology, they are designed to prevent international proliferation. The main international instrument dealing with export controls is the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies, supported by a group of 33 countries. It defines a set of guidelines covering both armaments and dual-use goods and technologies, including encryption goods and technologies. Participating States implement the Agreement at the national level through national law, regulation, policies and licensing authorities, but implementation details vary.

The participating states maintain effective export controls for the items on agreed lists, which are reviewed periodically to take into account technological developments and experience gained. With regard to encryption technology, the current list restricts its use essentially to applications of 'strong' encryption, while technology for authentication purposes, personal smart cards, and the like, are exempted from the list.

Domestic control

Most countries do not have regulations for domestic use or import of encryption technology. Law enforcement authorities and national security agencies are, however, concerned that widespread use of encrypted communication will hinder their efforts in fighting crime. They seek to regulate its use or alternatively bring supply and import of encryption products and services under authorisation schemes. One set of measures put forward relate to lawful access to encryption keys, either by key escrow or by providing information about the relevant keys so they can be recovered under exigent circumstances (key recovery). In most schemes, a third party is to be entrusted to withholding the information.

The issue of access to keys has led to animated national, regional and international debate on the need, technical solutions, effectiveness, cost, vulnerability and privacy implications of regulation.

For electronic commerce purposes, it is fundamental that keys used for authentication and digital signatures are excluded from a key recovery mechanism. It has been argued that key recovery techniques are needed also by users in case a key is lost or damaged, and while this argument carries for the storage of encrypted data, there is less user demand for key recovery with systems used only for encrypted transient communications. Further, without proper international co-ordination, restrictions imposed by national licensing schemes can become barriers to trade between countries. The acceptance of such a system remains to be seen, but the implied overheads cannot be regarded as an incentive to electronic commerce.

Technology issues

The strength of encryption is very much related to the length of the secret key, as each extra bit exponentially multiplies the number of alternatives that theoretically needs to be examined in code breaking by brute force. Longer keys will be needed as advances in computer technology continually reduce the security afforded by any given key length, so an important factor to consider is the required time period of confidentiality. Experience shows that other common sources of weaknesses in encryption are found in key management protocols and in implementation.

Implication on business models

Proposers of key escrow and key recovery mechanisms have suggested that legal authorities could license this function to trusted third parties, possibly as an added feature to the concept of certification authority. A superficial comparison with the functions of escrow and certification authorities indicate similarities in that both deal with registers of cryptographic keys and their owners, but a closer analysis reveal that the tasks of an escrow agent are significantly more difficult security-wise, in order not to compromise the end users' secrets.

5.5 Privacy

Information technologies allow for data to be collected, compiled and delivered around the world more efficiently and quicker than ever before. Moreover, technology makes it easier to compare and integrate data from several sources. Both consumers and companies benefit from the increased access to information and it helps them, for example, to make informed decisions or to reduce marketing costs. Much of this information is collected from the consumers directly: when commercial transactions are performed, when information are searched for or even when statements or declarations are made to authorities. At some stage the collection of information will begin to conflict with the consumers' desire for privacy.

Privacy issues become of particular concern in a global perspective. It is important to recognise the full range of personal information that is essential to business that routinely is processed and crosses borders. Multinational companies, for example, may need to transmit personal data for centralised payroll processing. Banking, research and tourism are examples of areas in which personal information may need to be exchanged in the performance of business. A free flow of information is essential to all these organisations. At the same time, it is in the interest of the individuals concerned that their personal information is used only for the intended purpose and disclosed only to those who have a legitimate need to see or process it.

The measures for privacy protection has to be balanced, as interfering with the free flow of information will also interfere with the ability to conduct business in a global economy. Due to the global environment they have to be flexible enough to accommodate for different privacy code implementations in various countries.

The legal framework

The OECD Guidelines on the Protection of Privacy and Transborder Flows of Personal Data, issued in 1980, embody international consensus on fair information practices with respect to privacy. Through a set of eight basic principles, the guidelines establish a foundation for data protection regimes and ensure the free flow of information between and among nations.

Privacy can be protected effectively in a variety of ways. While the OECD Guidelines have inspired almost all privacy legislation and codes of conduct that have been developed over the years, countries have adopted different approaches to their implementation. In simple terms, they can be categorised as comprehensive legislation and self regulation. The approach taken by different economies mirrors their history and traditions.

The comprehensive legislative approach to privacy generally involves broad, all encompassing legislation that applies to all industry sectors. An example is the European Union's Directive on Data Protection, adopted in 1995, to be implemented by the 15 EU Member States. The self-regulation is practised by, for example, the United States, Canada, Japan and Australia. Regardless of the approach they adopt, countries should recognise approaches to privacy protection different from those they adopt themselves.

Technology in support of privacy

Technology will offer solutions to many privacy concerns in the electronic environment, and will serve as an important tool to protect privacy. General encryption technology provides important privacy protection mechanisms, but various additional measures are being developed in response to the specific privacy concerns. Most of them evolve within the Internet community. While the key incentive for their development is concern regarding access and exposure to inappropriate material, the mechanisms may also find uses in electronic commerce.

One example is labelling systems. The purpose of a labelling system is to develop a unified way of classifying and rating documents. It requires a standard for labelling technique combined with a rating system with criteria to be applied. Documents may then be rated, either through self-rating or by a third party. Once in place, browsers can use the rating information in the labels to filter out documents with undesirable content. Labels can be combined with digital signatures to secure the rating information. Labelling applications to control access may be useful not only on the Internet but also on intranets.

Few websites have so far developed privacy policies and even fewer meet basic standards for privacy protection. Specifications are being developed, enabling web sites to declare their privacy polices and users to set their web browsers according to their individual privacy preferences. The browsers will then be able to automatically evaluate the web sites' privacy declarations. A further step is taken in the proposed Open Profiling Standard which allows the user to pre-package and control the release of registration information in a secure manner to third parties.

Implications for business models

Privacy in relation to electronic commerce is affected by the development of business models and new technology. One major issue with respect to privacy is the development of anonymous electronic money. The concept provides for the exchange of secured electronic objects, each representing an amount of money, without exposing the identity of the spender to the parties of the electronic monetary system.

When selling dematerialised products, in other words, products that are delivered electronically, the vendor requires less information for some aspects of the transaction, for example, information about the buyer and his location, compared to traditional trade. On the other hand, the ease of copying these types of products may call for more information, collected by sophisticated systems for usage tracking and monitoring, copyright management and so on, and the information about access patterns and preferences may be of sensitive nature.

Another source of conflict with the desire for privacy arises from the legitimate requirements of authorities to monitor trade, in particular regarding tax and revenue. The combination of unidentified buyers, untraceable money and inability to independently determine the number of copies sold, makes for a high potential of underreporting sales, intentional or unintentional, as these transactions from operational view require only minimal records to be maintained.

5.6 Law

Like traditional business, electronic business must be underpinned by legal formality. The concern today is that most of the current laws and regulations reflect a heritage from the traditional ways of working with paper documents. The electronic form and modern means of communication could not be envisaged at the time when the legal rules were established, and as it is still in its infancy few, if any, precedents exist. The uncertain situation is emphasised by the fact that electronic commerce is going increasingly global. The parties to a transaction and their providers of services may operate from different countries, thereby invoking different legal systems.

The expansion of traditional merchant trade during the last century allowed for international trading partners to elaborate on common rules for carriage of goods, and so self regulation evolved and agreed standards and definitions were adopted. The compressed time-frame, in which electronic commerce has been developed, has left little room for similar initiatives to produce results, with one exception: the general recommendation to use interchange agreements.

Interchange agreements

Until recently electronic commerce has typically taken place between trading partners with a pre-existing business relationship. The investment in the commercial relationship is likely to outweigh any potential gains from disputing over a single transaction. The use of closed networks or a common value-added network services provider helps to limit the risks in communication. In this environment an interchange or trading partner agreement can be an appropriate tool for sorting out contractual and commercial obligations between the parties. The interchange agreements commonly also takes care of many operational aspects by reference to technical specifications of relevance to the contractual arrangements, for example types of message to be interchanged, types of acknowledgement, security measures, communication parameters, and transaction log.

The first document to guide on the development of interchange agreements was the

UNCID Rules (Uniform Rules of Conduct for Interchange of Trade Data by Teletransmission) published by the International Chamber of Commerce in 1987. A number of national organisations, associations and public administration bodies have since developed interchange agreements based on these rules of conduct, adapted to their respective cultural and legal environments. While serving well within each user community, the situation turns unsatisfactory in trade relations with partners belonging to another user group, or in a another country, as they often invoke new interchange agreements. In response to requests for a model interchange agreement suitable for the international community of users, UN/ECE has developed Recommendation No. 26: the Commercial Use of Interchange Agreements for Electronic Data Interchange.

Much of the inertia in the start-up process for EDI relations can be attributed to the need to have the details of the interchange agreement sorted out and documented before the data interchange begins. With electronic commerce more varied, trading patterns emerge and a broader spectrum of partners is looked for. For electronic commerce it may be impractical or too costly to establish advanced interchange agreements. Where once only the relations of high transaction volume were seen feasible, relations with lower traffic volumes are now considered. In this environment, preserving relationships may no longer be a factor in dispute avoidance. Yet the transacting parties need security, and the vision is that all aspects of the interchange agreement should be settled automatically and as part of the (one-off) transaction. The prerequisites for this vision to become reality are elaborate standards, a public security infrastructure and a legal platform expressing society's acceptance of the new forms of trade.

An observation is that parties are in a better position to assess uncertainty and risk in relation to applicable legal systems when basing their information exchange on pre-established rules. Trade over open, borderless networks and without pre-established partnerships increases legal uncertainty as more legal rules are likely to be involved in the general case and as the parties may not be able to foresee which legal systems will apply and to what extent rules may potentially conflict. The conclusion from a legal point of view, therefore, is that whereas EDI is usually regulated by the use of an interchange agreement, electronic commerce via the Internet is virtually unregulated today.

Law reform

Many concerns arise from the fact that the current legal systems evolved at a time when paper documents provided the only safe and secure way to record and exchange information. As a result, laws build on many specific form requirements, typically expressed as requirements for documents to be 'written' and/or 'signed'. But also modern information technology has certain features that need to be addressed from a legal point of view. The volatile nature of computer records and electronic messages require measures to protect their evidential value. Other concerns arise from the use of computers as automated contracting agents and from the fact that electronic communication is without precedent with regard to contract formation. The issues get more complicated as common and civil law traditions differs.

The continued vitality of the emerging global electronic trading system depends on the progressive adaptation of international and domestic laws to the rapidly evolving networked infrastructure. The approach of adaptation has implications on the extent to which trade barriers can actually be removed: convergence and harmonisation need to start on the global level, as conflicting national legislation can effectively deter the development of a coherent global framework for electronic commerce.

As early as 1985, the United Nations Commission on International Trade Law (UNCITRAL) adopted the Recommendation on legal value of computer records, calling upon Governments and international organisations to take action to ensure legal security in the context of automated data processing in international trade. A report leading to the UNCITRAL recommendation concluded that the legal obstacles to the use of computers and computer-to-computer telecommunication originated mainly from requirements on documents to be signed or to be in paper form.

UNCITRAL has completed work on a Model Law on Electronic Commerce that supports the commercial use of international contracts in electronic commerce. This model law establishes rules and norms that validate and recognise contracts formed through electronic means, sets standards governing electronic contract performance, defines what constitutes a valid electronic writing and original document, provides for the acceptability of electronic signatures for legal and commercial purposes, and supports the admission of computer evidence in courts and arbitration proceedings. The method used in the model law is to emulate the corresponding paper-based legal requirements through a functional equivalence approach, although the choice of technical measures for achieving this equivalence is left open.

As a model law, it has no legal force of its own, its provisions will have legal enforcement only if they are enacted in national law. The challenge is now to encourage favourable consideration of the provisions in the Model Law by all states when they enact or revise their laws. In support of this, UNCITRAL has adopted a Guide to enactment of the Model Law.

Use of technology

While an international legal framework is needed to reduce uncertainty and unpredictability, it is not sufficient in itself. Further work is needed to define technical measures that satisfy the requirements for legal security for electronic information exchange. In electronic commerce, it is believed that digital signatures will have an important role to play. Several organisations have engaged themselves in developing guidelines for such digital signatures, like the American Bar Association, ICC, OECD and UNCITRAL. The State of Utah appears to have enacted the first legislation authorising the use of digital signatures.

Implication on business models

Most paper-based transactions are basically two-party transactions. When moving into an electronic environment, third parties services deserve further study, for example registry services. The services may range from an operator's electronic equivalent of registered mail to registries based on statutory regulation. Third-party registries and notification as such are legal techniques with long traditions. The new thing is that new services are needed for electronic commerce, the services rely on new techniques and that new parties are providing those services. These new services have no traditions, no established legal framework and the use of telecommunication makes it unimportant where the services are provided, for example, where the registry is located. What is really happening is that the commercial infrastructure is being reorganised.

The legal challenges does not come from technology as such, but from the changes in business, administration and monitoring made possible by new technology. The impact of the developments will vary from sector to sector. A couple of examples will illustrate the issues.

Public key infrastructure: In an open electronic commerce environment, public key cryptography is used to assure that the messages are secure and that other transacting parties are authenticated. Each party possesses two keys, one private key which is never shared with anybody, and one public key which is shared with everyone. The keys correspond to each other, so that whatever is encoded (made secret) with one key can only be decoded by the other. For the system to work, someone has to administrate the keys and be able to verify who is the holder of a certain public key. This is done by a trusted third party, or certification authority. Without the certification authority it is impossible for transaction parties to know for certain that the holder of the public key is not an impostor. In support of global trade, the challenge is to establish a public key infrastructure of cooperating certification authorities, supporting a consistent set of public key cryptography standards.

Negotiable instruments: An recent example of an electronic central registry is found in project Bolero, which involves some 60 organisations in 13 countries. The Bolero services are based on the exchange of secure EDI messages between the registry and users consisting of carriers, shippers, freight forwarders and banks over open networks. The central registry holds details of shipping documents contained as consignment records. Access to these details will validate and authenticate messages received, and automatically generate messages to other users in response to messages received. Among other things the system provides for trading of electronic equivalents to Bill of Lading, which is a document of title commonly used in sea transport.

A comprehensive analysis of applicable international legal systems has resulted in a legal foundation for the system, called the Bolero Rule Book[13], which defines a contractually binding set of rules which all its users shall adhere to.

5.7 Intellectual property rights

Intellectual property is an idea represented in a form that can be sold, transferred, or otherwise disposed of. It is intangible property and the rights to it are generally protected by patent, copyright, trademark or similar law. Examples include inventions, designs, works of authorship (such as short stories or music), and symbols representing companies or products. For authors and artists and others, including the many organisations they represent, it is one of the most valuable assets, particularly in the engineering, biotech, computer, academic and service sectors.

With information technology, new ways need to be sought to deal with intellectual property. There is a strong argument that protection should not alter the existing balance of rights and obligations between rights holders and users. In particular, protection should not aim to restrict access to the information, but rather to exploit the available technologies to maximise the openness and transparency of the information markets.

Many forms of intellectual property lend themselves well to representation in electronic form. This is the ideal merchandise for electronic commerce as the complete trade transaction, including the delivery of the product, can be carried out over network of computers. But this quality places electronic commerce as a subject of special concern with regard to intellectual property rights. Many owners of copyright and similar rights are becoming increasingly concerned with several aspects of intellectual property and digital networks. In particular, information in electronic form is easy to copy and manipulate by any user. It is impossible to monitor or police the copying and the digital copies are as perfect as the original. Further, there exists a certain "Internet culture" to re-use and adapt material regardless of rights.

Being a medium for electronic commerce, the Internet is itself affected by certain issues of intellectual property rights. Domain names are often designated to consist of, or include, a trade mark of the registrant, and disputes over "ownership" of domain

---

[13] Bolero: *Business requirements specification*, 1998; http://www.boleroltd.com/documents/BRS_2.1.pdf

names are becoming more common. The names are generally registered on a "first-come first-serve" basis, and regulation over entitlement to claim a name is still very much in its infancy.

Work to create a stable environment for intellectual property issues is undertaken in various areas, for example, through awareness and consultation initiatives, enhancement of the legal framework, technology development and development of new business models.

Awareness and consultation initiatives

The World Intellectual Property Organisation (WIPO), a specialized agency of the United Nations, is responsible for promotion of the protection of intellectual property throughout the world and for the administration of various multilateral treaties dealing with the legal and administrative aspects of intellectual property. A substantial part of the activities and the resources of WIPO is devoted to development of cooperation with developing countries. Another example of this kind is the EU IPR helpdesk that assisted in registering, protecting and exploiting European intellectual rights assets.

Enhancement of the legal framework

WIPO has taken an leading role in progressing this area and, in 1996, the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty were adopted. WIPO has also drafted recommendations concerning the intellectual property issues associated with Internet domain names. Further, WIPO organises committees to examine specific rights issues in relation to electronic commerce and Internet.

Technology development

For some key issues, technical solutions are investigated to give predictability to electronic commerce regarding intellectual property. Sample areas are

- ownership of property: development of data bases where ownership of intellectual property is registered; establishment of unique object identifier systems to identify intellectual property; watermarking, by means of which intellectual property is marked by a unique object number and the identity of the purchaser is imprinted into the document when buying it; registration of content identifiers;

- access to material: many of the traditional security mechanisms serves the purpose of licence handling or transfer of ownership, like through digital signature and signed acknowledgements, or to protect intellectual property through encryption;

- tacking and recording of document usage: license management systems is needed for the tracking of licensing transactions. Intellectual property may be incorporated within a new creation by the purchaser;

- manipulation and re-use: when documents exist in an electronic environment they are liable to a wide range of different transformations. General protection against illicit use of material is difficult. Procedures involving the registration of document content and the recipients may be the only way of ensuring control over its (re-)distribution and use. For total control, the environment into which the document is delivered (such as reader's television or workstation) may need to be constrained.

Implication on business models

New business models are emerging for electronic commerce involving intellectual property. The electronic format will significantly reduce production, publication and distribution costs. The question is how the creators can maintain their rights and obtain revenue from the sales in a controlled way. One idea is to set up electronic copyright management systems to track and record document usage, to control access to documents, to manage copyrights and charge the users. Still, the technical methods so far proposed for copyright control all appear to have serious drawbacks as they do not protect against deliberate infringement. At the same time, security measures carry costs. The design parameters of management systems are therefore likely to depend on the application area: commercial or academic material, high value or low value items, and so on. Common early approaches are to deliver excerpts or tables of content, rather than content, as a lure to attract orders. Subscription-based site licensing is emerging as a way for publishing material. Another approach is to produce customised information for the users, such as for educational material, thereby reducing the risk that the generic material is copied.

New intermediaries may find a role for themselves to support these models. Systems for unique object identification, copyright and licence management have already been mentioned. A new type of service to document intellectual property rights may

come out of the work by an Internet group on signature labels, proposing a standard format for making digitally signed machine-readable assertions about a particular information resource.

Part 2 - Simplification of administrative constraints

1. Information flows in trade

International trade transactions have many parties to them - some 20 parties to a transaction are not uncommon. Their interest in the transactions may be the products or services, payments arrangements or monitoring and control, but they all have in common the need for information for their decisions, their actions and for the synchronisation of these actions.

While the physical transport and handling of goods constitute a flow made up of a straightforward series of activities, the corresponding information flow shows a more varied and complex pattern. In addition, the information flow involves more parties than the actual physical flow.

The purpose of the information flow is to provide and manage smooth and efficient flows of goods and payments. To this end, the information in each step has to be accurate and reliable. It has to meet the needs of each receiver and be presented in an appropriate form and in a timely manner. Any inaccuracies and errors in the information flow may have immediate consequences for the receivers' ability to proceed with his/her part of the trade transaction.

When containers were introduced in transport, new requirements were put on the information flow. Handling and transport of goods became faster and this, in turn, called for faster processing and communication of related information. The documents had to reflect that containers were the handling units, in addition to describing the goods in them. The containerised transport systems attract high-value goods, and this puts even more emphasis on the information to be accurate, timely and reliable.

Intermodal transport systems added further qualities by offering door-to-door transport of containers, thereby avoiding much of the handling of the goods themselves. On the documentation side, the speed and efficiency of multimodal transport systems has been met through the introduction of multimodal transport documents. Proper implementation by all involved, plus quality of information in the documents, is necessary for the door-to-door concept to hold all the way from consignor to consignee.

Further enhancements in goods movement can be seen in the various ways modern integrated logistics chains are organised. These chains normally involve several parties, such as in the manufacturing, assembly or sales of commodities. Together they develop sophisticated goods flows to keep inventory and buffers in production low. Examples of such strategies are Just-in-time (JIT) manufacturing, Quick response (QR) retailing and Computer-aided acquisition and logistics support (CALS). These methods of working presuppose close partnership and, to a certain extent, integration of applications.

It should be appreciated that the value of the goods themselves in these "lean" logistics systems are far less than the value of the *predictable and reliable delivery* of goods. The right amount of goods, of right quality and with adequate marking, has to be delivered as scheduled, in time and at the right place - or the whole production process halts.

These logistics methods use carefully streamlined procedures for the exchange of information. Mechanisms to match the flows of goods and information are being developed, bar coding being merely one technique. Any disturbances or exceptional situations in production or transport have to be reported to the consignees promptly and automatically.

In procurement, not only are quality and price evaluated, but also the supplier's previous performance and how the product, including associated services, fit into the existing distribution system.

We see the focus of interest shifting, from the characteristics of products towards *total quality of products and services*. Good information systems provide or add value to these services. Accurate information becomes, relatively speaking, more important as sophisticated systems are developed in trade.

1.1 Formalities, procedures and document requirements

To make trade happen and to control services and movements of goods and money properly, the parties to trade need current and correct information. This applies to those who operate the trade transaction, as well as to parties who are set to monitor it.

The requirements for data are reflected in trade procedures. Trade procedures govern how trade data are collected, processed, communicated and presented. They can be analysed from three aspects that impact their complexity:

- *Formalities*, which are the official, commercial, institutional and operational requirements which the trade transaction has to comply with

- *Procedure steps*, which are the steps to be followed in order to comply with the formalities, or the way in which the required information reaches the party concerned

- *Documents*, whether electronic or on paper, which contain the information exchanged between the parties to the trade transaction.

One should recognise that trade procedures originate from the needs of both commercial and regulatory bodies and they exist within a framework of law, conventions, "good practice" and operations requirements. Whilst the ultimate destination of the collected information may be divided between the official and commercial sectors, during the transaction the data required by both sectors remain closely and inextricably linked.

The trade procedures are to give predictability and reliability to the trading process. Hence their nature is static. But this makes them a conserving factor when trading patterns need to evolve or when new information technology is being introduced.

There are costs attached to trade procedures: to gather and compile data, to prepare and present a document, to obtain a permit, among other functions. The activities demand accuracy in data and quality of performance and, normally, take place under time constrains. The great concern of any organisation in relation to trade procedures are the requirements originating from outside the organisation. The source of the procedural requirements therefore deserve attention:

- In a competitive environment, a private company has a commercial incentive to be cost effective. Its concern is that any procedural cost has to add a matching value to the company's products or services, or it should be eliminated. Commercial requirements are devised by the trading parties to meet their own needs and are therefore easily adaptable to comply with changing trade practices.

- Regulatory bodies and organisations in a non-competitive environment tend to see their procedures as a means of satisfying their data requirements without considering any costs, delays, etc. inherent in the procedure. Official requirements are enforced and controlled for purposes such as fiscal, protective, trade control and health requirements. This puts a special responsibility on those interests, such as governments and financial institutions, which are in a position to enforce their data requirements.

Trade procedures cover also the control of the physical flow at places of inspection, such as ports. Again, this poses requirements for the adequate information to be available at the right place and in the right time. Failure to meet with this has direct implications in terms of costs, through dead-freight, detention and delayed shipments.

1.2 The importance of simplified procedures

In the light of changing trading patterns and the increasing emphasis on efficient information flows to support them, there is a need to recurrently review and analyse the trade procedures to assess their cost-effectiveness. It is reported that in some developing countries the cost of trade logistics could be as much as 8 to 12 percent of the value of goods[14]. A much quoted, although now obsolete, study in the United States found that the total documentation costs represented 7.5 per cent of the value of the total US export and import shipments (Paperwork or profit in International Trade, NCITD & DOT, 1971). Even small savings through better trade practices and facilitation could improve competitiveness and increase trade. This is where trade facilitation comes in.

Trade facilitation is the systematic rationalisation of formalities, procedures and documentation for trade. It should be approached in three steps:

i. Assessment of the need for formalities. Traditionally, this has meant initiatives to remove formalities, such as the abolition of consular invoices and fees. Removal of formalities is still an important issue, but removal is not always possible. In fact, new technology and new ways of working may require *new formalities* to be introduced, an example of which might be provisions for the security of messages exchanged electronically. The challenge is then to assess how it is devised, to achieve the desired properties, with minimal negative impact;

ii. Simplify formalities that cannot be removed. Useful instruments in this respect are international and regional conventions, covering areas such as the various modes of transportation and customs, which often provide support in terms of procedure outlines, best practice and standard, aligned forms. Through them harmonised and transparent rules are put in place, often bringing the information requirements down to a minimum after balancing the interests of all

---

[14] de Castro, Trade and Transport Facilitation guidelines, World Bank, 1995, p.24

parties to trade. Also at national level much can be gained in cooperation on facilitation initiatives with participation from authorities, industry and trade. For example, instead of the prevailing practice of running Chinese customs and other authorities' inspections in sequence, a World Bank report recommends that a one-stop checking system is introduced in which Customs officials judge whether other inspections are at all needed (China: Framework for an Efficient Transport System, World Bank, 1996). Another example of national concern is the belief of Governments that more information can be requested as they now have automated systems to process it, ignoring the costs of enterprises of gathering that information;

iii.   Routine simplification, that is, to develop simpler, or smarter, ways to meet with the (simplified) formalities that remain. Measures of this kind are the one-run method used to produce sets of aligned paper documents and the introduction of EDI messages. Well-known examples are found in short-sea shipping, where faster vessels and rationalised handling in the container ports made the shipping lines pioneer electronic means for conveying their manifest information. A more recent example is given by the European Commission in public procurement: where electronic mail and the Internet are used (instead of paper/facsimile) to provide instant publication of procurement notices it intends to reduce the overall length of the process, (from 52 to 40 to 45 days in the so called open procedure) (Public Procurement in the European Union, European Commission, 1998).

Although facilitation work has been on the agenda for 40 years or so, certain countries maintain requirements that run contrary to these facilitation efforts, because of historic reasons, commercial inertia, difficulties in adjusting the methods of their control bodies, or sheer ignorance of solutions that have been developed elsewhere. UN/ECE, UNCTAD and other international bodies have the important task of bringing traditional facilitation initiatives to these countries to bring them on par with the rest of the world.

But trade formalities and procedures need to be reviewed also in industrialised countries. Trade patterns change and new transport logistics concepts are developed which pose new information requirements. The new information technology offers speedy supply of information necessary to support these evolving methods and may, in fact, for certain trade provide the actual means of delivery. Laws or regulatory procedures may hinder companies from taking full advantage of these new ways of working. New requirements for data may be introduced by authorities without a sufficient understanding of the trading process or the costs of gathering the required information. Small and medium-sized companies often do not enjoy the special treatment available to the big multinationals. Therefore the review of trade procedures must be seen as a continuous process, where the broadest possible approach is taken to balance the various interests.

Concerning the use of information technology as a tool for trade, it appears that a broad discussion is needed to secure the society's full acceptance and establish certain norms for its use. In that discussion, trade facilitation has a role to guide the parties to trade regarding the development of feasible solutions in their trade procedures.

It should be stressed that all the three steps above should be contemplated when systems for electronic trade transactions are prepared. Far too often only the third step - routine simplification - is looked at, resulting in mere substitution of paper documents by electronic messages. As mentioned above, the assessment of requests for new formalities in relation information technology and electronic commerce need to be studied seriously from a trade perspective.

1.3 Who will do the job?

Much of the investments in trade facilitation are done on the international level. By starting globally, trade facilitation results have the greatest impact but take longer time to achieve. The return of the efforts, on the other hand, is received at national and company levels when the measures are implemented.

The very nature of trade facilitation implies joint efforts and co-operation for results to be reached. What is, then, the best approach to make sure that the facilitation measures are put into practice? For one thing, people with the practical experience need to be involved together with the facilitation experts who know what can be done. Each initiative for facilitation work needs to fit into a broader strategy for development of trade and infrastructure to support it. To give sustainability to the efforts also need to be co-ordinated and organised appropriately.

- Many countries have set up permanently organised bodies, provided with the adequate competence and resources, to work with systematic awareness activities and implementation. These national trade facilitation bodies can be public, private or mixed.

    The advantage of this type of body is that it could be charged with four important related objectives on a national basis: to be a forum for national facilitation, to draft for governmental proposal transport and trade regulations and

practices, to make policy recommendations for investments and institutional development with regard to the facilitation of trade and, finally, to organise awareness and training within its area of competence.

- Another, more focused, approach is taken by sector or industry groups, acting on a commercial or voluntary basis to support development among their members. For example, the automotive industry in the United States of America (AIAG) and in Europe (ODETTE) set early examples in the development of EDI solutions. They have been followed by quite a few industries that have organised themselves as user groups to participate in the development of UN/EDIFACT.

  The organisation and tasks of groups by necessity have to be varied, but common objectives are to support and promote the development of new trading practices ("best practice") within its industry, providing analysis and advice regarding the information flows between the trading parties. For example, through business scenarios and message implementation guidelines, assisting in the implementation of new technology, such as the use of bar coding, encouraging the development of standard software tool and solutions, and organizing awareness and training activities for the members of these groups.

- Also industry groups, multinational corporations and some cutting-edge companies take similar initiatives but then with the purpose of linking closer to their partners and further their position in relation to competitors.

  These types of activity are customised to particular partnerships and focus on re-engineering and integration of processes for production, material supply and transport logistics, quality control, payment flows, and the like. New information technology is a prerequisite for handling the information flows for these advanced forms of trade. This type of facilitation reaches into a wide range of aspects (organisational, commercial, human resource), which are not further explored in this part of the training package. One should point out, though, that to be successful it needs a sufficiently "smooth" regulatory and institutional framework and, also the appropriate infrastructure.

While all such initiatives at the various levels should be welcomed and encouraged, they may, from a national and international trade perspective, give rise to concern in two respects:

- Do the various industry initiatives require coordination?

- How to assist those (often smaller companies) who cannot take part in industry activities?

Activities that have addressed these aspects show that, in the former case, there appear to exist commercial incentives to bridge potential gaps, whereas in the latter case special attention is needed to help small and medium-sized companies to activate themselves.

2. Approaching electronic commerce – a policy view

2.1 Information society strategies

During the 1990s, the "Information Society" moved from the research agenda into the political sphere. The far-reaching implications of the use of information technology and global networks have drawn the attention of Governments, and many countries are trying to develop suitable political strategies to handle this development and to take advantage of it.

On the European level, the Information Society issue was accelerated with the publication of the "Bangemann-Report" (The EC High-Level Group, 1994). This report is a formulation of a European Union strategy towards the information society and has become a cornerstone of the European Community initiatives. Its view is that the most important regulative means available to bring about the information society are the upheaval of national telecommunication monopolies and the establishment of a genuine free unregulated and competitive information market. In other words, the report speaks of a "market-driven revolution"; leaving to the Governments the task of safeguarding competitive forces and ensuring a strong and lasting political encouragement of the information society. More recent European Community documents have additionally given attention to societal aspects of the Information Society project.

In the United States, the same issues were raised politically under the label of "Information Super Highways", or more precisely, the US National Information Infrastructure Initiative (NII). The visions of the NII are no less powerful than the European. In the NII, which is eagerly pursued by the Clinton Administration, we find the same fundamental belief as in the

Bangemann-Report in the ability of the free-market forces to create the information society and that public regulation should primarily be concerned with promoting and protecting competition on the information markets.

Following these initiatives, many countries have released their development strategies for the Information Society. While the thematic areas chosen by Governments are often quite similar, countries are still addressing the overall question on the basis of their individual priorities and in accordance with their national and cultural identity. While recognising that such differences exist, Administrations can take the following roles in pursing their national strategies:

- *Regulatory/legislatory body:* creation of a legal framework for the new information and telecommunications services, measures to enhance competition and access to markets, protection of citizens (intellectual property, electronic commerce consumer protection), measures to ensure the security (data protection), and international co-ordination (compliance with international standards);

- *Promoter and stimulator:* education and vocational training, promotion of research and development in the information technology field, support of national projects (in EDI);

- *User:* government as the model user of information technology (for government reform, public procurement, government networks), or the key player in infrastructure projects.

The importance of each of these roles varies depending on national priorities and the degree of development of infrastructure, but the thematic areas are often the same and it is interesting to note that they are often the result of exchange of experiences between countries.

2.2 Policies and plans for Electronic Commerce

Within the framework of an overall information society strategy, some countries have proceeded to develop strategies and plans for specific areas, such as electronic commerce. Other countries leave it to the market forces and, notably, user groups to arrange for the development of electronic solutions. But the public sector has commercial actors, and sooner or later the implications of the new technology will reflect also on them. There is also growing pressure for increased efficiency in the Administrations' data collection and dissemination, which can only be met if new technology is introduced for their exchange and processing.

The necessary decisions on technology and standards are, however, only a technical prerequisite for the dissemination of electronic communications on a national level. The organisational, educational and legal challenges are equally important. Here, Governments need to take active part, along with commercial associations and user groups, to ensure that all organisations have the best possible conditions for taking advantage of the opportunities offered.

Three examples of policy development are presented below, addressing different aspects of electronic commerce. They are based on material published by the sources indicated.

2.3 Example: A national EDI action plan

Commerce in Denmark - a national EDI action was published by the Ministry of Research and Information Technology in November 1996. It was designated to generate dynamism and create growth by creating joint solutions for the public sector and a large number of commercial organisations regarding their exchange of information. The plan is ambitious in requiring ability for electronic communication in all significant areas by the end of 1998, and the widespread use throughout the Danish society by the year 2000. At the time of writing a number of activities are running, but no follow-up is yet available.

Over a three-year period the Danish Government grants DKK 18 million to the Council, plus further 6.6 million to subsidise standardisation work.

The plan consists of a number of initiatives. They are briefly outlined below. As can be seen the use of UN/EDIFACT standards is the central component.

Initiative 1. Establishment of EDI standards in all sectors

"No later than 1998, the EDIFACT standard must be established in all industries and sectors, for all commercial documents of significance, such as orders, invoices, payment messages, transport notes and registration of real property. The goal is to

ensure the availability of a vital prerequisite for companies' options to participate in the electronic marketplace, within trade, manufacturing, transport, and finance."

All types of commercial transaction shall be covered within the fields of trade, manufacturing, transport, banking, insurance, mortgage credit, as well as others. All standardisation work will be based on UN/EDIFACT. Guidelines for the use of EDIFACT will be developed per industry and the commercial associations are to ensure that time schedules and work plans are set for the work. The Danish EDI Council and the commercial associations will jointly carry out information activities to provide the necessary general knowledge of EDI and EDIFACT, as well as know-how on how to tackle the task.

The Danish EDI council will support the various industries' drafting of EDI guides, with a special concern for the cross-sectorial coordination.

Initiative 2. EDI for public procurement contracts

"Through forthcoming EU framework agreements, the public sector will include its suppliers' ability to participate in fully electronically-based document interchange as an integral part of its tendering conditions, no later than 1998."

The companies' ability to participate in electronically based document interchange will be a factor in the overall assessment of tenders received by leading Danish public procurers. The requested EDI capability ranges from catalogues of goods and products, through ordering and invoicing, to payment transfers, and is to be based on the EDIFACT standard. It will not prevent any suppliers from tendering, however, and special provisions are made for small companies.

The new criterion in public sector procurement requires preparations by the parties, which will be supported by common information campaigns on the use of EDI in procurement.

Initiative 3. Handling EDI in public-sector financial systems

"By the end of 1998, public-sector financial systems will be able to handle all relevant commercial documents in EDIFACT format."

The Ministry of Finance's Agency for Management and Administration of Financial Affairs and the National Procurement Limited Denmark will undertake initiatives for the development of software for procurement by means of EDI, and will promote their integration into State and municipal financial systems. From 1998 onwards, the DSB, the Copenhagen Hospital Cooperation, the Municipality of Copenhagen, the Palaces and Properties Agency and the Armed Forces will be able to exchange commercial documents in EDIFACT format.

In cooperation with EAN Denmark, the National Procurement Limited Denmark will establish a service by which all public organisations may be allocated EAN "location numbers" for identification purposes in EDI transactions.

Initiative 4. EDIFACT-based interchange of administrative information with the public sector

"In order to ease the administrative burden on companies, the opportunity must be created before the end of 1998 for companies operating in areas in which serviceable standards exist, to undertake EDIFACT-based electronic reporting to the public sector. And initiatives will be aimed at areas in which there is a need for new standards."

The Ministry of Business and Industry is currently investigating the possibility of simplifying companies' reporting of information to the public sector. The goal is for companies to report the same information only once and to make reporting procedures identical between the authorities. This is to be achieved through better coordination of the authorities' requirements on information, and the increased interchange of information between the authorities. Companies will be offered the option of reporting on conventional forms (paper), diskette, over the Internet and through EDI.

In collaboration with Statistics Denmark and the Danish Inland Revenue, the Danish Commerce and Companies Agency has started a project that will make possible EDIFACT-based reporting of accounting information, including annual accounts, tax returns and certain reports to Statistics Denmark. Some proprietary exchange techniques will be adapted to EDIFACT and electronic reporting will be expanded into new areas as feasible.

Initiative 5. Development of EDI software

"A number of initiatives are being aimed at software developers. These initiatives are intended to promote the development of a range of EDI software products destined for the market. The price and functionality of these products must satisfy the needs of all types of company, regardless of an individual company's level of ambition concerning the use of EDI."

Information activities and workshops will be arranged by the Danish EDI Council and the IT Trade Association to promote the development of the relevant range of EDI software by software suppliers. The goal is for all standard application systems to include integrated, flexible EDI modules. Various low-cost solutions are considered, including EDI capable stand-alone systems and Internet technology. They will also collect information on software that supports EDIFACT and disseminate it to all interested parties.

Initiative 6. Legislation on digital signatures and electronic documents

"New legislation on digital signatures will prepare the way for ensuring that the use of electronic communications is just as secure and clear-cut as the use of conventional communications on paper."

In order to remove major legal difficulties involved in the use of EDI, a new bill has been proposed. It addresses digital signatures and the legal status of electronic documents. Its purpose is to put electronic documents on an equal footing with paper documents by removing uncertainties on the validity of electronic documents and by recognising a means to ensure their security .

The Ministry for Research and Information Technology plays the key role under this initiative. It prepared the Bill and will issue guidelines of its practical implications. It is also to clarify any additional legal obstacles to EDI and to take initiatives to have them removed.

2.4 Example: Policy priorities in the European Community

A second example is taken from the area of procurement. In March 1998 the European Commission adopted a Communication, *Public Procurement in the European Union*, outlining priorities for public procurement policy. Its purpose is to make the legal framework simpler and more flexible, to improve their implementation and make access to procurement opportunities easier. Many of the proposed measures in the latter respect concern the introduction and use of Information and Communication Technologies (ICT).

The Commission has a well-defined role in the collection and dissemination of public procurement notices. In this area the Commission:

- Will provide the possibility to all contracting entities to electronically prepare and submit their notices for publication through procurement transparency system operated by the EU institutions. Several options, including electronic mail and the Internet, will be provided;

- Will consider incentives to encourage contracting entities to use these electronic means of submission. It will continue to publish notices without cost to the procuring entity only when it submits a notice which complies with the formal requirements of the Directives, includes a reference to the Common Procurement Vocabulary and follows standard forms or model notices. In other cases the costs of ensuring notices meet those requirements will be recovered from the contracting entity concerned;

- Has decided to discontinue the publication of the paper version of notices in the Supplement to the Official Journal from July 1998. It will be replaced by the CD-ROM version already being available. Moreover, the Tender Electronic Daily (TED) database will be made available to all users for free over the Internet;

- Will encourage the publication of all tender documents, in particular in open procedures, on the Internet. It invites contracting entities that already have a web site, or homepage, on the Internet to make tender documents available on a "purchaser profile" on their homepage. In order to promote the establishment of such purchaser profiles the Commission will make model software available.

For the development of electronic procurement systems in general the Commission sets the goal as follows:

"The Commission calls for the active participation of interested purchasers and suppliers, companies active in the ICT sector and others, including Euro Info Centres, in order to stimulate the development of a pan-European electronic procurement environment in which a substantial number, for example 25 percent, of all procurement transactions takes place electronically by the year 2003".

To achieve this goal the Commission will propose amendments to the Directives to put electronic means of exchanging information on an equal footing with other means. But before proposing major changes to the regime, pilot projects are encouraged to test specific electronic procurement procedures. These projects will, of course, need to respect the basic

principles of non-discrimination and transparency. Specific attention will be given to the use of electronic catalogues, virtual procurement networks and the promotion of best practice through procurement clubs.

The Commission will further seek commitment from the Member States to ensure mutual compatibility and interoperability of electronic procurement systems below the threshold values (where national rules apply). It will ensure that the requirements of electronic procurement are taken into account in any proposals for standards or legislation on digital signatures.

Electronic procurement needs to be seen in the context of globalisation and the opening-up of markets. To this end, the Commission will seek agreement with its international partners in the WTO in order to simplify and harmonise the exchange of information on both public procurement opportunities and statistics in the electronic procurement context.

2.5 Example: Recommendations for an Electronic Commerce framework

The United States Government, in 1997, prepared a strategy to help accelerate the growth of global commerce across the Internet, under the leadership of Vice President Gore, called *A Framework For Global Electronic Commerce.* It is an important element of the Administration's agenda on trade and technology, as it discusses the commercial implications of the Global Information Infrastructure (GII).

The paper makes nine recommendations for consideration both by lead US government agencies and by international forums. The recommendations are founded on the belief that the development of the Internet should be market driven and basically self-regulated. Generally, Governments should refrain from undue restrictions, such as unnecessary regulations, bureaucratic procedures or new taxes and tariffs, on electronic commerce. However, some areas need government intervention - regarding privacy, fraud prevention, intellectual property rights, and to ensure competition. As the Internet provides a global marketplace, electronic commerce needs to be facilitated on a global basis, which implies requirements on the legal framework to be consistent and predictable.

The paper covers nine areas where international agreements are needed to preserve the Internet as a non-regulatory medium.

Area 1. Tariffs and Taxation

The Internet should be declared a tariff-free environment whenever it is used to deliver products and services. All nations will benefit from barrier-free trade across it. No new taxes should be imposed on Internet commerce, existing taxes that are applied to electronic commerce should be consistent across national and subnational jurisdictions and should be simple to understand and administer.

Area 2. Electronic Payment Systems

The commercial and technological environment for electronic payments is changing rapidly, making it difficult to develop policy that is both timely and appropriate. In the near-term, case-by-case monitoring of electronic payment experiments is seen as preferable to regulation.

Area 3. Uniform Commercial Code for Electronic Commerce

The U.S. supports the development of an international uniform commercial code to facilitate electronic commerce. Elements in such a code are to

- encourage governmental recognition of electronic contracts;

- encourage consistent international rules for authentication and other security procedures;

- establish rules for liability, dispute resolution, and other matters in relation to electronic commerce, and;

- Streamline the use of electronic registries.

Area 4. Intellectual Property Protection

Clear and effective copyright, patent, and trademark protection is necessary to protect against piracy and fraud. The recently negotiated World Intellectual Property Organization (WIPO) treaties for copyright protection should be ratified. Issues of liability for infringement, application of the fair-use doctrine, and limitation of devices to defeat copyright protection mechanisms should be resolved in a balanced way, consistent with international obligations.

Area 5. Privacy

Data gatherers should tell consumers what information they are collecting and how they intend to use it and provide them with a way to limit the use and re-use of personal information. Redress should be available to consumers who are harmed by improper use or disclosure of personal information or if decisions are based on inaccurate, outdated, incomplete or irrelevant personal information. The Administration supports private sector efforts to implement self-regulatory privacy regimes but will also work for appropriate solutions to privacy concerns that may not be fully addressed by industry through self-regulation and technology.

Area 6. Security

The Global Information Infrastructure must be secure and reliable. The Administration, in partnership with industry, is taking steps to promote the development of a market driven public key infrastructure.

Area 7. Telecommunications Infrastructure and Information Technology

Electronic commerce depends upon modern, seamless, global networks but telecommunications policies are often hindering the development of advanced digital networks. The United States will work internationally to remove barriers to competition, customer choice, lower prices, and improved services.

Area 8. Content

The Administration encourages industry self-regulation, the adoption of competitive content rating systems, and the development of tools (filtering and blocking technologies) to empower parents, teachers, and others to block content that is inappropriate for children. The US Government will seek agreements with its trading partners to eliminate overly burdensome content regulations that create non-tariff trade barriers.

Area 9. Technical Standards

The marketplace, not Governments, should determine technical standards and other mechanisms for interoperability on the Internet.

3. The use of electronic commerce to improve administration - examples

3.1 Healthcare social administration

Major challenges which confront most countries with regard to health care are quality of care and access to care while maintaining cost control. Healthcare telematics offers new ways of using medical know-how, allowing access to specialists, enabling an optimal use of available resources. It allows for faster diffusion of best practices, brings order into healthcare documentation systems and reduces the number of redundant tests among other things. At the same time it could economise on healthcare management, and support the transfer of care away from hospitals and closer to the home. The challenge is to establish a coherent set of solutions that link the many disciplines: clinical practices and the many administrative and other support services required to deliver healthcare.

For many years there has been significant International collaboration between health-care organisations to develop communications standards. The emergence of EDI as an enabling technology to facilitate exchange of structured information has been well recognised within the healthcare community, and in many countries there are now practical implementations and advanced plans to utilise EDI in support of medical, administrative and logistic processes. It is now recognised as one of the most effective tools available to reduce the administrative expense of healthcare provision. Reduced errors, once-only keying of patient data and faster delivery of patient information are just some of the ways in which EDI can help both in improving the quality of care and in achieving cost savings in logistics operations as well as in the processing of medical and financial data.

One specific characteristic of healthcare is that it crosses many sector boundaries, including, for example, medical technology, manufacturing, logistics, general public administrations and a broad variety of special services, such as social services and many financial and insurance activities. To be manageable, electronic information interchange for healthcare therefore is divided into domains, each featuring homogeneous business requirements and a limited number of parties. A few primary ones will be briefly discussed below.

3.1.1 Electronic data flows in healthcare

Exchange of medical information

Medical data exchange deals with the communication between health professionals, including hospitals, pharmacists and general practitioners. It is usually patient oriented. One group of messages relates to admittance, referral and discharge of patients. Another group of a similar nature describes how administrative data about patents are exchanged to update patient records in the databases. An example showing two commonly involved parties can be illustrated as follows:
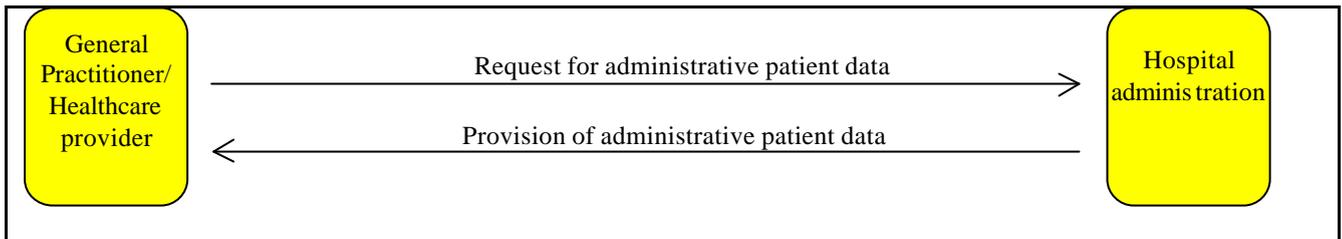
The exchange of patients' medical records is a significantly more complex issue. The complexity originates from:

- Security requirements: the information is highly sensitive with national legislation to protect it. For this reason strong security measures are required for all steps of data processing, including transmission

- Technical requirements: the information content poses requirements that goes beyond what can be handled by traditional EDI, into the area of multimedia technologies.

Standardisation work for the exchange of medical records is on its way, but so far only limited trials of practical exchange have been made.

Medical examination by a general practitioner (or dentist, veterinary) or hospital often requires the additional services of laboratories of various specialisation, such as clinical chemistry or microbiology. Messages requesting and reporting the results from such investigations can be modelled on the functional roles of Service Requester and Service Provider.
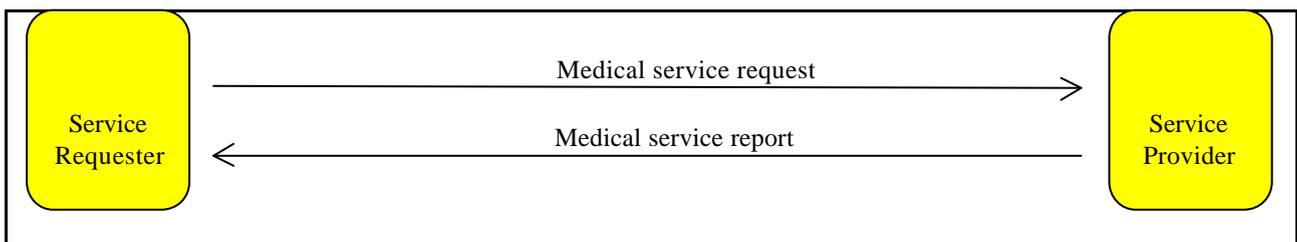
This scenario is common for EDI implementation in the medical area, with high traffic volumes reported. A similar scenario applies requesting and reporting diagnostic services.

Yet one common EDI relation in the domain of medical information exchange is found between the healthcare professional and the pharmacy regarding the prescription of pharmaceuticals. Again, this message requires strong authentication mechanisms.

An observation of a general nature is that information exchange requires a good structure for nomenclature, classification and coding of properties. Several initiatives exist to develop such structures, which have called for an activity to organise a generic support structure, which allows for the unambiguous use of the various existing, local code lists. Another initiative of basic development is to organise a register for the information objects specified for EDI in healthcare.

With an increase in the movement of people, within countries and across borders, there will be more and more situations where a patient is unknown to any hospital structure and does not have a family doctor. Several countries are experimenting with health data card pilots and some, notably Germany and France, already have major projects underway. The basic function

of a smart data card is to hold information and to carry identifiable personal data between systems which may have many different functions and capabilities, and which may be in different locations and even in different countries. The data card could, for example, hold a complete medical record, replacing that which may traditionally have been held by a general practitioner. Alternatively, the card could carry only minimal information which acts as a 'key' to the scattered elements of a patient's medical record on a distributed system or to give access to that record, whether it is available at one point or distributed on a network. There are, however, still many issues to be resolved before health data cards can become the handy portable medical files in every citizen's pocket.

To date, most applications of patient data cards in the healthcare sector have been for insurance purposes to establish identity, eligibility and coverage. Another category of health data card is the 'health professional card'. This permits the holder to access the information on a patient's card and also allows the holder to access specific professional information and/or services.

Exchange of financial information

Financial data exchange deals with the communication between healthcare providers and healthcare insurance companies. Examples range from entitlement and authorisation for care, to claims and reimbursement.
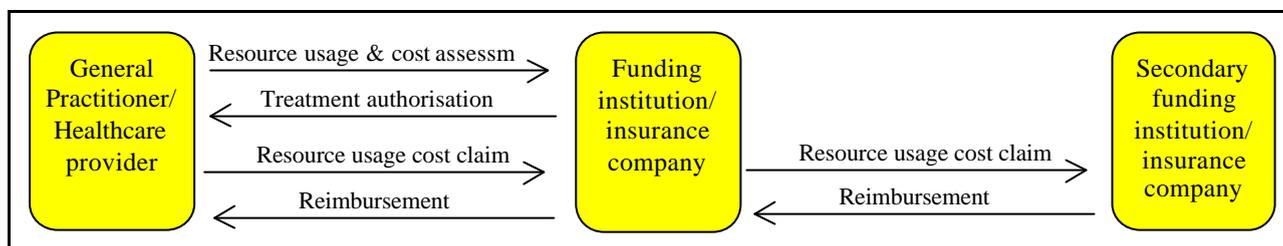
In this domain EDI mainly helps reduce administrative overheads and allows for improved resource management.

Exchange of purchasing and logistics information

Logistic data exchange deals with the purchasing of goods. Parties involved in the supply chain are suppliers (pharmaceutical industries, wholesalers and retailers of medical and non-medical goods), distributors and healthcare providers/hospitals, the latter often having both central and local stores. Within the last few years several changes regarding the purchasing policies within hospitals have taken place, - increased financial control, a more market-sensitive approach, reallocation of the responsibilities for purchasing supplies, cooperation between hospitals, and a closer relationship between hospitals and suppliers, for example.

The new attitude has inspired redesign of the logistics processes and administrative rationalisation, where electronic data interchange is used to replace paper documents ranging from orders, price catalogues and despatch advices to invoices and payments. For instance, it will make it possible to lower stock levels, not only in central stores but also throughout the entire hospital supply chain. The reductions in inventory have a far greater impact than the administrative savings, although the effects are synergetic.

As can be seen, this information domain of healthcare faces the same problems and challenges as 'trade' in private business and, in fact, the private electronic commerce solutions function well also for healthcare providers.

Security requirements

Security requirements on health-related information - for the professional or for the general public - cannot be compared with any other. There are several aspects to this: patents' privacy, integrity of medical records, safety, authorisation to access records and authentication of statements in patients' records, among others. It all calls for a high degree of security, quality, reliability and availability which, in turn, requires a stringent quality-based methodology when systems and solutions are developed. The nations' legal systems differ, but many countries have already amended their legislation to meet the needs of electronic exchange of data, through encryption and digital signature. Still, the infrastructure needs to be developed for the full-scale management of secret keys and certificates through trusted parties.

Early solutions use dedicated networks/servers or VANs with security services. X.400 solutions are common in healthcare communication.

Personal data cards are increasingly used for access and to carry data, as outlined above.

One initiative to secure system quality is taken in Sweden regarding the exchange of laboratory investigation requests and reports. The Medical Informatics standardisation body, in collaboration with the Swedish Board for Accreditation and Conformity Assessment has developed a specification defining the requirements for quality in information interchange (irrespective of technology used). When laboratories are accredited, their EDI applications are assessed against these criteria. The requirements are of two kinds:

- security in information interchange, covering availability, confidentiality, data integrity and traceability, including the linking of information to originator/issuer;

- A structured method of organising the work, which documented through EDI-agreement, description of technical solution, and documentation of message specifications/ implementation guides/profiles plus documented tests and validations the EDI system against the specifications.

3.1.2 Medical information exchange in the United States

Several initiatives exist for exchange of medical information in the United States. Usage of the different standards is specific to the relevant healthcare community, but cooperation between the various organisations is, however, increasing.

The most notable of the standards is Health Level Seven, or HL7, which is a protocol for application level communications among diverse health data acquisition, processing and handling systems. HL7 covers patient admissions/registration, discharge or transfer data, queries, orders, results, clinical observations, billing, medical records and automated instruments. The standard is widely used in US hospitals.

HL7 is also the name of the group developing the standards. It is accredited by American National Standards Institute, ANSI. Affiliate organisations also exist in Australia, New Zealand, Japan, and some European countries due to the fact that United States suppliers provide native HL7 compliant hospital systems to these countries.

In 1997, the HL7 community initiated a major review of its design process in order to separate the business models and messages from the syntax. An object-oriented, model-driven methodology is used. One of the models developed as part of the methodology is the Reference Information Model (RIM) that provides a coherent shared information model. In this model, the objects are things like Person, Patient, Encounter, Result, as well as objects to deal with messages and trigger events. HL7 expects to produce a standard specification that is more robust and internally consistent by reconciling differences in the conceptual, semantic and lexical understandings of the message contents prior to and separate from the message syntax specification. One of the issues in the current revision is the realisation that the number of messages that can be created and the variability in the message structure is creating a level of complexity which needs to be controlled. The Message Development Framework was created to formalise the development of messages from the RIM. The Message Development Framework is used to create messages specific to a trigger event which will be passed to another system. This permits the selection of affected classes and attributes from the data architecture to formulate a message. The approach opens up the use of a variety of syntaxes, and XML and Corba are often mentioned as candidates for the future.

Other areas of standardisation are

- American College of Radiology and National Electrical Manufacturers Association: standard for digital image transmission and communications in medicine;

- American Society for Testing and Materials Healthcare Informatics Standards: standards for the exchange of laboratory messages and waveforms;

- Institute of Electrical and Electronics Engineers (IEEE): Standards for moving data from medical devices to computers and vice versa along standardised hardware buses and interfaces.

All these are commonly implemented in the US, but also in other countries.

3.1.3 Medical information exchange in Europe

In Europe, the development of EDI messages for healthcare is divided between two groups, CEN TC 251 and EEG9, an expert group of the regional EDIFACT organisation. The division is such that the CEN group makes specifications of user requirements and scenarios, including messages at a general level, and from these the EDIFACT group develops the implementable message specifications adapted to the EDIFACT syntax. This practical arrangement originates from an early study by a TC 251 working group on the healthcare requirements for medical information exchange, concluding that EDIFACT, although satisfactory for some tasks, would not satisfy all requirements placed on transfer syntax in health care. Over the years the group has worked out a methodology for message development, which can be summarised as illustrated below. The approach is object oriented. So far implementable message specifications have been developed for EDIFACT, but XML is being considered for piloting.
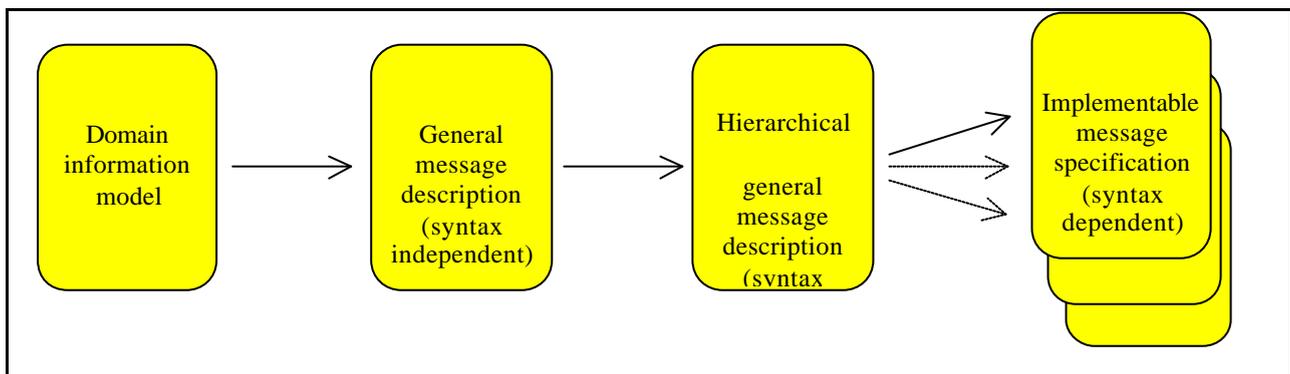
A recent survey of national strategies and level of implementation in Europe can be found on the EMEDI web site, www.emedi.com. One impression is that there is still a plethora of EDI standards in use. Some countries have set as a clear goal to use EDIFACT, others leave to the market to determine what standards should apply. The result is a mix of proprietary standards, different versions of EDIFACT standards, and also American (HL7) standards. One observation regarding EDIFACT messages is that the users are often eager to start, which is reflected in a number of implementations of "status 0" messages.

Of the messages developed so far, the laboratory investigation request and report appear to be the most successful ones in terms of implementation, reaching a significant volume in some of the European countries.

3.2 Statistics

Collection of statistics is an important instrument for the analysis, planning and monitoring of modern society. With regard to trade, major areas for study are export and import of goods, utilisation of the transportation systems and money flows. But the need for statistics include also many more areas, such as agricultural and industry indicators, price indices, population data, educational facts, health monitoring and environmental data.

The functional roles of the organisations involved in statistics can be summarised as:

- The Statistics Provider (e.g. customs, banks, port authorities,...);

- the Statistics Collector (e.g. a national statistics institute, or an intergovernmental or supranational body);

- And the Statistics User, which cover the widest range of receivers of statistical information, including governmental bodies and private organisations.

At an abstract level, the exchange of statistics information between these functional roles can be described as a combination of three scenarios: classification, collection and dissemination. A very limited set of messages can support the exchange of statistical information in these scenarios.

The situation for statistics collection with regard to EDI is unique in the sense that it to a certain extent depends on the success of electronic commerce in other sectors for the efficient capturing of raw data in suitable message formats. There is a high potential of facilitation for organisations working with statistical data in the harmonisation of metadata and classifications. In collection and dissemination of statistical information, the merit of EDI is to bring a standard format and a fast and accurate mechanism for the transfer of processable data.

3.2.1 Electronic data flows in statistics

*Exchange of classification systems*

Classification systems form the basis for the organisation of factual data. A coordinated or harmonised view of the classifications carry a meaningful interpretation across the process, from collection, via compilations to dissemination and presentation. For the provider of statistics the classification system will govern how statistics or raw data (non-aggregated data) are to be provided to the Statistics Collector. For the Statistics User the classification system may give information about what statistical material is available or how a particular batch of statistical data is to be interpreted.
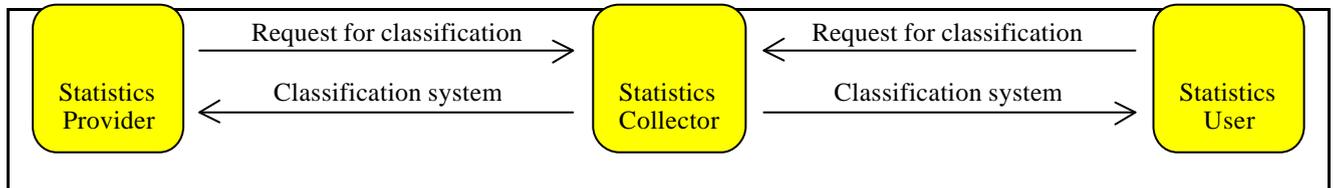
Current classification systems are exchanged by traditional means. If implemented electronically on a wider scale EDI will be an efficient means to maintain and disseminate classification systems, the application of which reaches beyond mere statistics. An EDI message has been developed for this purpose, but it is only tested in pilot with limited functionality. As available classifications in many cases are not known to Statistics Users, it appears that EDI transfer would need to be complemented by interactive solutions to search, select and down load classification systems, e.g. using the www on the Internet.

Statistical data collection

The request to collect statistics originates from a Statistics User. It often originates from a regulation for a statistics production unit which is to produce statistics of a permanent nature, but it may also be initiated by needs to follow-up or more deeply explore current issues in society. The request itself is normally documented on paper. It is not seen as a candidate for EDI, but it is important that the Statistics User takes the aspects of electronic data interchange into consideration when defining the requirements. Areas of importance are then, among other things, consistency of statistical concepts and code lists.
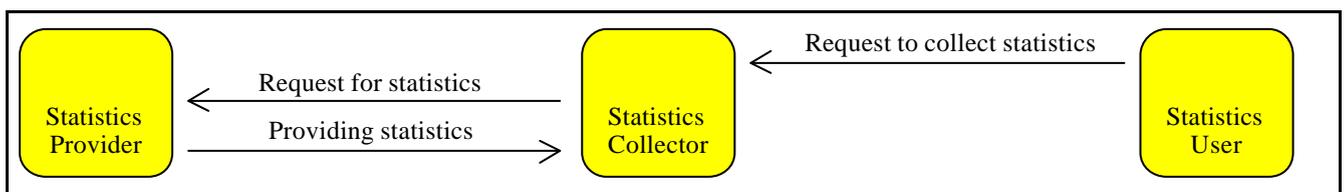
In requesting statistics the focus should be on making the work of the Statistics Provider as easy as possible. If this is achieved, the statistics will be supplied faster and with better quality. Currently a request for statistics is performed on paper with a set of

instructions. Potential future solutions may involve use of electronic forms/questionnaires and formal descriptive techniques to define metadata rules and requirements which would support semi-automated extraction or capture of data. The request also has to recognise the different options available for carrier of data when providing statistics. For example, if the EDIFACT Raw data reporting message is used the receiver can dictate how the data in it are to be organised.

There are two kinds of general-purpose EDIFACT messages developed for statistics collection: RDRMES, Raw Data reporting Message, for raw data and GESMES, Generic Statistical Message, for aggregated arrays of data. In addition there are industry-specific messages that may fit for collection of raw data: CUSDEC for export/import declarations, IFTM-series of messages for transport statistics, and the balance of payment subset of the generic Statistical Message. All the alternative messages are in use to greater or lesser extent, within their respective area of application.

As needed, the statistical data collection scenario is complemented with exchange of the necessary requests and responses regarding classification systems.

The main security requirements for data collection are:

- data integrity and sequence integrity, i.e. to ensure that data are complete and uncorrupted;

- authentication, i.e. to ensure the origination of data;

- confidentiality, when needed to protect data provided by individual companies or if otherwise required by regulations;

- in some situations, acknowledgement and non-repudiation measures may additionally apply.

Statistical data dissemination

To guide the statistics user appropriately, the dissemination phase may be combined with search/request for classification systems and related response message, as outlined above.

Today, traditional means of information exchange are used when requesting statistics. For electronic data interchange the Generic Statistical Message might well be used for the request function, that is if the Statistics User knows what statistics to ask for. Alternatively, an interactive search and down load demonstration could be considered, for example using the www on the Internet, to guide the Statistics User when requesting statistics.
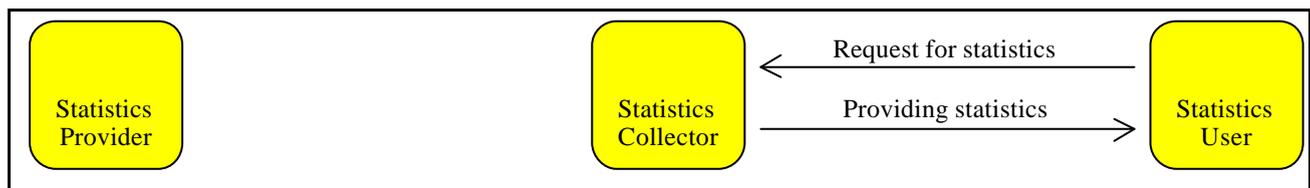
For the dissemination of statistics, proprietary electronic formats, such as Excel, are common. The Generic Statistical Message offers a neutral format, with a high potential representation functionality, but at the expense of complexity. The current challenge is to encourage the implementation of GESMES in commercial products to widen its use.

Security requirements in this phase are simple, focusing essentially on data integrity.

3.2.2 Eurostat's Distributed Statistical Information Services

The DSIS, Distributed Statistical Information Services, framework was created by the European Commission with the aim of improving the efficiency and cost effectiveness of the European statistical system, in particular in the activities of data collection, processing and dissemination of statistical information.

DSIS has five top priorities:

- Metadata and the European reference environment
  A European reference environment is being created by the DSIS framework standards (EDI messages) and the development of tools to exchange and structure statistical information and metadata. Metadata systems, reference and

dissemination environments will be expanded as more statistical domains become operational. Linked to the reference environment are issues of security and confidentiality.

- Dissemination environment
  Interoperability will be encouraged by a cooperative approach to dissemination activities, e.g. a 'data shop' network and electronic document repositories. The potential of emerging multimedia techniques and Internet technologies and their implications on the presentation of statistical information currently need to be followed closely.

- Design and integration of EDI messages:
  This involves the setting up an Open-EDI strategy, including the adaptation of current statistical messages, for the collection and dissemination of statistical data within Eurostat, national statistical administrations and their respondents. Tools and techniques for EDI design and integration will be selected, an initial set of EDI projects will be made operational, and efforts will be made to have the standardised statistical sector messages integrated into commercial software products.

- Raw data collection:
  This aims to extend the use of EDI messages for raw data collection by prototyping electronic questionnaires into administrative procedures. The strategy is to embed statistical requirements into operational messages, and to develop ad hoc declarative messages and electronic form filling techniques. A documentation tool-kit will be produced to support increased use of the raw data reporting message and implementation the standards by European software houses. A separate task is to examine the feasibility of linking between administrative and enterprise classifications.

- Integration with Trans-European telematic networks:
  This area covers pilots, and advice and technical support regarding the integration and use of commonly available telematic services which are necessary to give a desirable level of automation, inter-connectivity and inter-operability between administrations. Automation will be reached by the integration of information systems with the telecommunication layers in, for example, common application programming interfaces such as, STATEL, which was developed for exchange data with the Eurostat.

With the support of DSIS, EDIFACT messages have been developed to cater for the three scenarios previously discussed: CLASET for classification systems, RDRMES for raw data collection, and GESMES for both collection and dissemination of statistical data. In addition, some messages from other application areas are used for raw data collection.

RDRMES is a joint European and North American development. The other messages are currently used only in European projects and with CLASET only in trials so far.

GESMES was developed for the request and dissemination of aggregated multi-dimentional arrays and time series data. Being independent of statistical domain, it has provisions also for the metadata that are necessary to specify the meaning of the user tables in the message. It makes the message very flexible, but also very complex. This has resulted in implementations taking the form of specific profiles, rather than the complete message functionality, and difficulties in getting the message supported in commercial software. The use of CLASET may potentially take a similar direction.

These facts, in combination with the Open-EDI strategy of DSIS, resulted in a review of the principles for European statistical messages. The current three messages are based on data models, developed after an in-depth analysis of the statistics requirements. At the time, EDIFACT provided the only natural syntactic environment for the messages, but the emphasis is now being shifted from EDIFACT towards the models behind the messages.

In outlining a direction for the future, the statistics community wishes to protect the investments made, for example in EDIFACT. At the same time, they want to make the transition to emerging technology easier, and that implies a need for options when choosing transmission syntax. The effect is that the data modelling is put in focus, while the choice of syntax becomes a secondary issue.
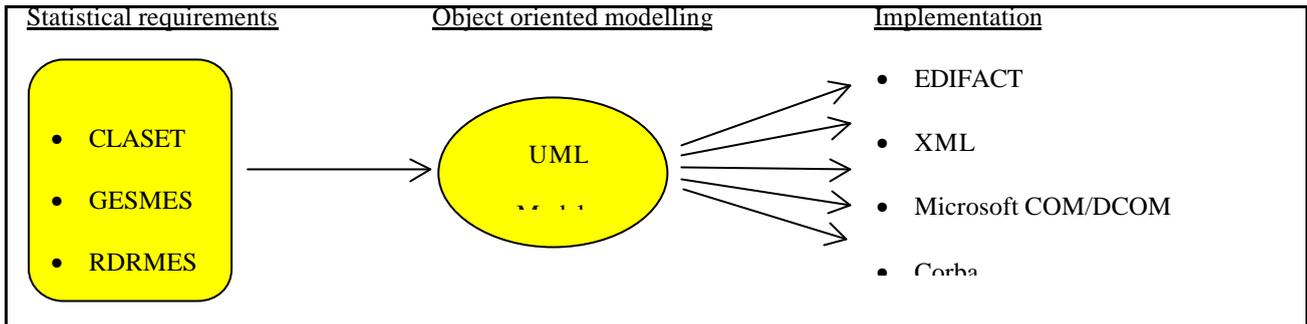
The current thinking is that the statistical requirements and data models for the messages will be specified in UML, Unified Modelling Language. The messages (objects) of the UML models can than be exported into the format of a suitable tool that supports the syntax of the technology of choice. The tools that will be considered for the future are expected to be commercial off-the-shelf products with application programming interfaces for the manipulation of statistical messages.

3.3 Public procurement

For public procurement, there are generally strict procedures to be followed, both by the buyer and by the tender/seller. With policies that aim to open up national public procurement markets, free competition and pressure for cost reduction, the procurement process has to be transparent and non-discriminating. Large amounts of money are spent by public buyers; for example in the European Union, they represent more than 720 billion ECU and in the United States 200 USD per year.

The procedures to follow are regulated through Acts or Directives, specifying measures to be taken, time limits to be observed, and so on. To be operational, they also state threshold values, below which more relaxed acquisition formalities apply. There are often different procedures for the various areas of procurement, but the following outlines may serve as an illustration of the main phases for procurement above the threshold values. The phases are divided into phases for notification, tendering, contract conclusion and the commercial transactions.

3.3.1 Electronic data flows in public procurement

Notification phase

Procurement above the threshold value has to be publicly announced, and traditionally, this has been made by sending paper or fax to a central body that daily publishes notices in a journal or in a central database. Interested suppliers monitors the notices published, either themselves or by having an agent check notices against their profile of interest and to forward the ones that match.
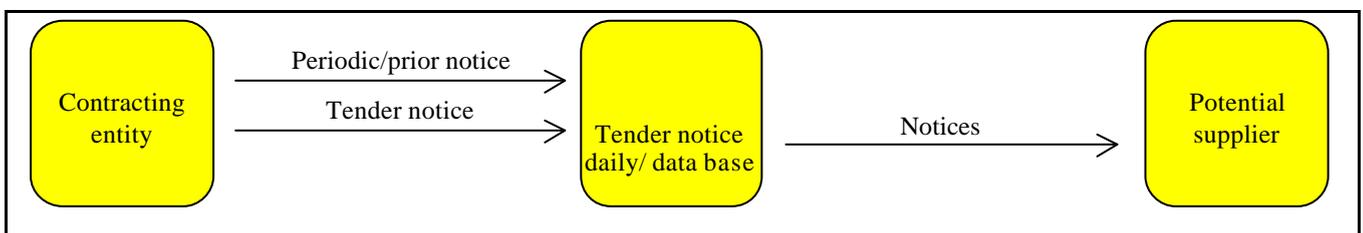

The information in the notices lends itself to standardisation, and emerging solutions are now that the contracting entity either registers the notices in electronic forms or send them by EDI to the publication centre. The publication centre, in turn, can use web technologies to make the notices widely available on electronic boards. By means of procurement profiles, data entry can be minimised, and search tools help the suppliers to identify suitable contract opportunities within their area of interest.

Tendering phase

Invitation to tender and the supporting documentation, such as tendering instructions, contract conditions, object specification, tendering forms to be used and evidential documentation requirements, may constitute complex and varied sets of information. In public procurement the buyer stipulates all requirements in great detail and traditionally tender documentation is

comprehensive and rich in unstructured text. Of course the further requirements depend on the product area. While adherence to standards is often requested in the procurement, standardisation has yet not reached to the tendering documents themselves, so the formats vary from contracting entity to contracting entity. This, of course, poses problems when moving to electronic tendering in general.
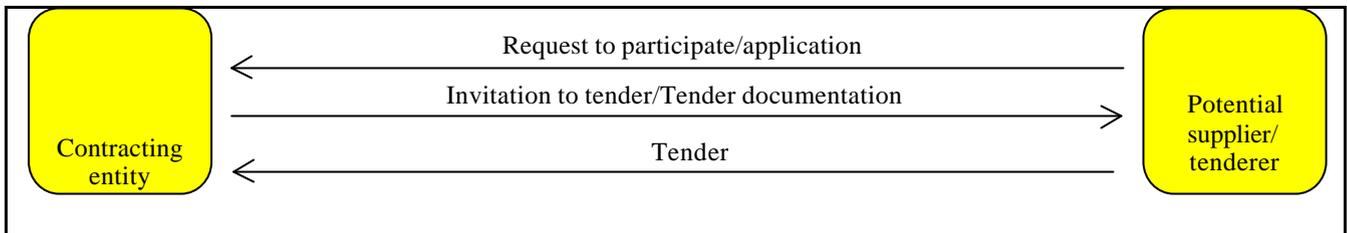

Contracting entities often provide electronic forms in their proprietary format, such as an Excel sheet on diskette, for the reporting of quantity and price information. Such information is transformed into standardised electronic messages. Other categories of information, such as standard contract conditions, may be invoked by reference only if publicly available on the web or by similar means. With this approach, "simple" (in the meaning of information requirements) procurement can be handled by, for example, EDIFACT messages, but syntax tools such as XML appear more potent for procurement in general. Using web technique for the notices, links can be included for obtaining the tender documentation, either direct via Internet, by means of EDI or on paper.

Traditional procurement laws and regulations, as a principal rule, state that communication between contracting entities and suppliers during the procurement proceedings must be in a form that provides *a record* of the content of the procurement. It means that the communication must be in writing in many countries, or at least always confirmed in writing. Tenders shall often be submitted in sealed envelopes and signed by authorised persons to guarantee the authenticity of the documents. There may also be specific provisions for the tender opening procedure. The important thing is that tenders must be stored under secure and safe conditions prior to and after the tender opening meeting, up to the conclusion of contract, and that only authorised persons may have access to the tender documentation records. For electronic messaging this has implications such as electronic signature and confidentiality measures during data transfer, and on security provisions in the systems where they are stored and processed. A practical way to have security arrangements established is to organise the electronic relations between interested contracting entities and suppliers through an advance registration or pre-qualification process.

An issue of specific importance in public tendering documents is the requirement to use generic product descriptions and codes; - products shall be identified and described in a supplier-neutral way. Several projects have developed such generic product codes but with limited scope or for specific application areas. To provide for automatic mapping of the products to supplier-specific ones in electronic tendering, the development of generally applicable code systems needs specific attention.

Contracting phase
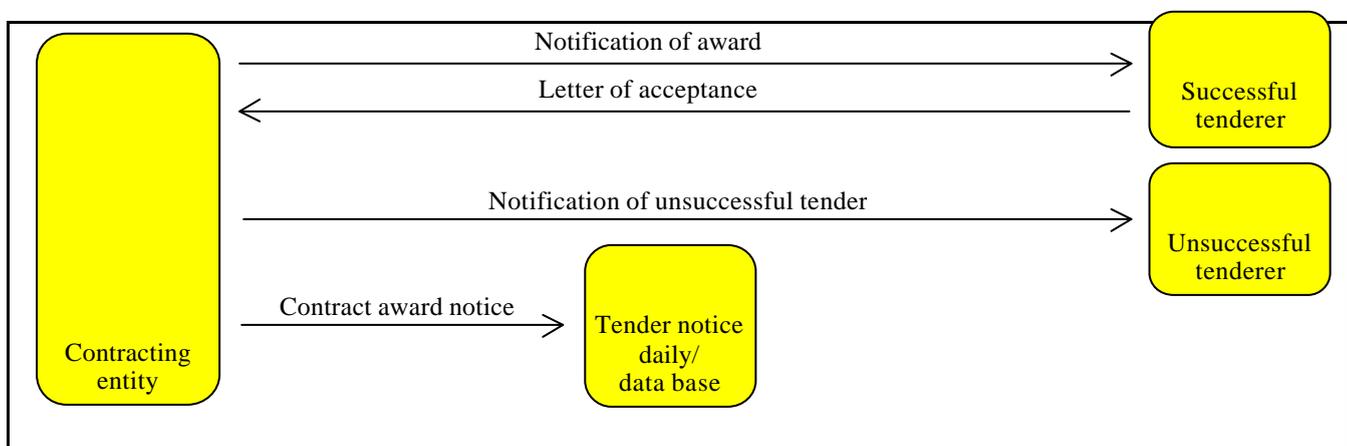
After due evaluation of tenders, the contracting entity notifies the successful tenderer. It may take the form of a contract, including all conditions and specifications, which both parties sign. In an electronic environment it may be in the form of a message with reference to previous exchanges of messages, possibly with some complementary operational information,

which is then responded to by the successful tenderer. The nature of these messages may require security measures such as authentication and non-repudiation of origin and receipt.

The notices sent to unsuccessful tenderers and to the central notice database are fairly simple. The notices to the latter are to supply information for the monitoring and analysis of the market.

Phases to conclude the commercial transaction

After the contract phase, the buyer(s) identified by the contracting entity may procure products and services from the contracted supplier by reference to the contract. Depending on type of contract, a one-off order follows or, if the contract is a framework agreement, a call-off is made. At the time of delivery, messages may be exchanged to document the transport arrangements, to advise on despatch and to follow up transport and delivery, and these combine well with bar codes and similar technology for the identification of packages and articles. At the phase of economic settlement, an invoice may be used, but the invoice information may also be derived from quantities received and the contract's price list. Via payment instruction to the buyer's bank the correct amount is transferred to the bank and account of the seller.

For all these phases, electronic commerce for public procurement functions in just the same way as private business-to-business trade, and the same specifications for the information flow apply. For example, a Danish and Swedish electronic commerce project for public procurement has chosen to use the implementation guidelines of EAN International, channelled through its national bodies EAN Denmark and EAN Sweden, with the intention of harmonising a "single face" for public procurement with private sector business. However, as this implies also the obligatory use of the EAN coding systems, some other countries have expressed concern about such an approach for their public sectors.

3.3.2 Federal procurement in the United States

In the United States the expansion of electronic commerce in the federal administration was accelerated by the National Performance Review project, where a study concluded that electronic commerce had the potential for significant cost reductions and, at the same time, would help to establish it in the private sector as well. The introduction was underpinned by means of two acts, the Federal Acquisition Streamlining Act of 1994 and Federal Acquisition Reform Act of 1995. A more recent attitude to electronic commerce is that government should provide leadership, e.g. by promotion of uniform implementation and agency compliance, and avoiding unnecessary regulations.

The Federal Acquisition Computer Network (FACNET) was set up to provide notice, issue solicitations, receive proposals and make awards electronically. It turned out effective for some agencies, particular for procurement generating a large transaction volume and with larger suppliers, but the success was limited as it was found difficult to use EDI in a one-to-many mode in processes where business relations are not already established.

Federal procurement is now in a period of transition towards web technologies, which are seen to be easier, cheaper and to offer more ways of doing electronic commerce. They may also provide simpler interfaces to traditional EDI solutions, e.g. through electronic forms. Through web solutions more suppliers can be reached, notably the smaller ones.

One component on the web is Commerce Business Daily Online, or CBDNet, is the synopsis of bidding opportunities which is the official, free on-line listing of federal government contracting opportunities. It contains notices of contract opportunities over USD 25,000. The posting of actual notices is via www.eps.gov. It features real time posting of notices, verification of transmission, minimised data entry and has improved search options. It also allows potential bidders to receive electronic mail notifications whenever there is a posting that meets their areas of interest. For formal reasons a printed version of Commerce Business Daily is still published, but the plan is to have it discontinued.

The electronic tendering process between tenderer and contracting entity essentially follows the description outlined in the previous section.

Web technology is also becoming increasingly used for electronic catalogues, or electronic malls. Electronic catalogues form marketplaces where users can identify and order goods and services through contract infrastructure. They give the buyer a means to compare items' performance, price and delivery. Malls are often initiated by a major federal authority or targeting a certain product area, but available for use by more than a single agency and linking big as well as small suppliers. One example of electronic catalogue is GSA Advantage. It is provided exclusively for authorised federal government users. Users must have a government commercial credit card or an GSA account and password. The system supports standard requisitioning procedures and has simplified order forms, which requires minimal input.

As a further step a pilot has been launched to ensure that government catalogues can work together. The pilot is to demonstrate new technology based on CommerceNet and XML and will allow government buyers at each agency to conduct parametric searches with end-to-end security and locate items in catalogues at other agencies, or even on vendor sites.

For purchase below USD 500 000[15] purchase cards are used. Users can then buy without involving their purchasing office. It is reported that 2.9 billion were spent in 7.3 million transactions in 1996[16], with a saving of USD 30 per transaction. Currently magnetic cards are used, but the next generation of purchase cards is expected to be hybrid (magnetic/smart cards) which will expand their use, e.g. to support secure access to the Internet.

For more complex procurement, such as defence systems, aircraft, vessels, CALS methods are used. This type of procurement has special requirements for technical, economical, etc. documentation, to be available and maintained during the full lifecycle of the object.

A tentative follow-up of the economical objectives for the development of economical commerce can be summarised as

- cost reduction: experience so far indicates 8-10% procurement value

- shortened procurement time; experience indicates that reduction by a factor 10 is possible for "simple" procurement

- reduction of paper work/administration; estimate USD 30-70 per order (infrequent products)

- increased participation by small suppliers: depends on availability of cheap and simple solutions

- different procurement strategies, reduction of warehouse levels, logistics improvements, etc: electronic commerce is mere one components but the savings can be significant

- Simplified procedures.

---

[15] As per 1999

[16] In 1999, USD 10.2 billion were spent in 20 million transactions

Annex

References

American Bar Association: *Digital Signature Guidelines*; http://www.abanet.org/scitech/ec/isc/dsg.html

Bolero: *Business requirements specification*, 1998; http://www.boleroltd.com/documents/BRS_2.1.pdf

Coase, R.H. 1937, "*The Nature of the Firm*", 4 *Economica N.S.*

EFTA *Trader's ABC – A Trade Facilitation manual* CD-Rom ISBN: 90-803476-3-9

European Commission: *Open Information Interchange (OII)*; http://www2.echo.lu/oii/

European Commission: *Directive on Data Protection* (Directive 95/46/EC), 1995; http://www2.echo.lu/legal/en/dataprot/directiv/directiv.html

European Commission: *IPR helpdesk*; http://www.cordis.lu/ipr-helpdesk/

Firefly Network, Netscape, Verisign: *Proposal for an Open Profiling Standard*, 1997; http://developer.netscape.com/ops/proposal.html

ICC: *General Usage for International Digitally Ensured Commerce (GUIDEC)*, 1997; http://www.iccwbo.org/guidec2.htm

McGuffog T., *Managing the UK virtual enterprise – The virtuous combination of Supply Chain Management and the Electronic Revolution,* Lecture of the Institute for the Management of Information Systems, 28th February 1997.

OBI Consortium: *The OBI Standard*, http://www.openbuy.org/obi/specs/

OECD: *Guidelines on the Protection of Privacy and Transborder Flows of Personal Data*, 1980; http://www.oecd.org//dsti/sti/it/secur/prod/PRIV-EN.HTM

OECD: Guidelines for Cryptography policy, 1997; http://www.oecd.org//dsti/sti/it/secur/act/

OTP Consortium: *public area specifications*, http://www.otp.org

Secure Electronic Market Place for Europe: *public project reports*, http://www.semper.org/info/index.html

TRADE/CEFACT/1998/20, *The UN/CEFACT work programme and an introduction to the global trends influencing IT,* August 1998, United Nations Economic Commission for Europe; http://www.unece.org/cefact

TRADE/WP.6/1998/11/Add.4, *Standards, norms and regulations in International Trade, with special reference to their impact on countries in transition*, 29 May 1998, United Nations Economic Commission for Europe; http://www.unece.org/cefact

TRADE/R.605, *Introduction to Trade Facilitation and UN/EDIFACT*, December 1993, United Nations Economic Commission for Europe; http://www.unece.org/cefact

TRADE/R.606, *Impact of Trade Facilitation on Trade – a discussion paper*, December 1993, United Nations Economic Commission for Europe; http://www.unece.org/cefact

TRADE/WP.4/INF.104, *Uniform rules of conduct for interchange of trade data by teletransmission (UNCID)*, January 1988, United Nations Economic Commission for Europe; http://www.unece.org/cefact

TRADE/WP.4/INF.105, *Introduction to the United Nations Rules for Electronic Data Interchange for Administration, Commerce and Transpor*t, July 1988, United Nations Economic Commission for Europe; http://www.unece.org/cefact

Wassenaar Arrangement Secretariat: The Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies; and the WA-LIST (98) 1; http://www.wassenaar.org/docs/index1.html

WIPO: *Copyright Treaty*, 1996, http://www.wipo.int/eng/general/copyrght/wct.htm

WIPO: *Performances and Phonograms Treaty*, 1996; http://www.wipo.int/eng/general/copyrght/wppt.htm

WTO secretariat: *Electronic Commerce and the Role of the WTO*, 1998; http://www.wto.org/wto/ecom/ecom.htm

UNCITRAL: *Recommendations on the Legal Value of Computer Records*, 1985; http://www.uncitral.org/english/texts/electcom/legval.htm

UNCITRAL: *Model Law on Electronic Commerce with Guide to Enactment*, 1996; http://www.uncitral.org/english/texts/electcom/ml-ec.htm

UNECE Working Party on Facilitation of Trade Procedures: *The Commercial Use of Interchange Agreements for Electronic Data Interchange*, Recommendation No. 26, 1995; http://www.unece.org/trade/rec/rec26en.htm

US Department of the Treasury of Tax Policy: *Selected Tax Policy Implications of Global Electronic Commerce*, 1996; http://www.fedworld.gov/pub/tel/internet.txt

US Government Electronic Commerce status; http://www.ec.fed.gov

US Government posting system for bidding opportunities; http://www.eps.gov

US Government GSA Advantage; http://www.fss.gsa.gov

—————————————