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E-business Innovation and
Customs Renovation for Secure
Supply Chain Management

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Abstract

Information technologies (ITs) and supply chain management (SCM) are increasingly considered as indispensable tools of competitiveness especially for companies facing excessive global competition, although these companies have not necessarily succeeded in taking full advantage of such cutting-edge technologies and management systems. Their use, especially of international SCMs, is limited to a small number of purchaser-suppliers groups that are formed primarily by transnational corporations (TNCs). The factors impeding a proliferation of SCMs at a global scale include the difficulties that companies face in establishing flexible electronic data interchange (EDI) systems with their business partners, the high costs involved in building seamless and real-time information sharing systems where long-term business partnerships do not exist, and uncertainty on and high costs involved in international trade such as trade finance and customs procedures. In addition, the terrorist attacks on September 11, 2001 in New York magnified national security concerns, which seem to have a negative effect on global SCMs. On the other hand, new technological innovations in web services and tracking/tracing are emerging from the efforts to overcome these hurdles.

This paper examines the late efforts on e-commerce, customs modernization, and trade facilitation, in response to the recent dynamic progress in information and web technologies. In the first chapter, we study some cases of SCMs emphasizing the importance of the state of the art information systems as an important instrument of trade facilitation. The second chapter reviews the recent efforts by the international community for trade facilitation, as well as new

technologies and services based on eXtensible Mark-up Language (XML) and radio frequency identification (RFID) that have a great potential to change the online business environment dramatically. The third chapter consists of case studies on renovations of customs and trade information systems in Asia, Europe and North America while the fourth chapter reviews the present situations and efforts in Latin America. Based on these chapters, policy implications will be derived in the last chapter.

Introduction

Technological innovation in information technologies (ITs) has drastically changed the industrial organization structure and inter-company relationships. These revolutionary changes were accelerated by the diffusion of the Internet in the 1990s, and are in progress. Companies that have advanced in the usage of ITs have introduced information systems for managing procurement of materials and parts, production processes, sales and marketing, and other routine office works. Many have succeeded in improving their productivity by introducing state of the art IT systems. These benefits and effects of IT innovation were diffused to developing countries in the late 1990s. Not only foreign affiliates of transnational corporations (TNCs) but also national firms in these countries successfully introduced computerized systems in order to improve their competitive edge (Ueki, 2003a). Dramatic cost reductions in introducing these systems, which were made possible by the development of web-based systems, enabled these national firms to transform themselves into IT-equipped international businesses. Equally, the Internet is likely to increase business opportunities for small- and medium-sized enterprises (SMEs) in developing countries with foreign companies, while electronic commerce (e-commerce) will facilitate international trade by SMEs.

Although a greater number of SMEs in developing countries are introducing ITs, the most sophisticated IT users are TNCs who have a long history of computerization in their businesses. In many cases, such systems have been developed independently by different divisions and affiliates of a company, often in a non-harmonized manner among them, and been introduced step by step in accordance

with their priorities, constraints of resources for IT investment, and technical environment. These experiences have shown limited investment benefits in establishing an information system that is isolated from other existing systems. Based on these past experiences, large firms began to: i) share information on demand for and inventory of products and to collaborate with their suppliers and clients in order to optimize inventory controls throughout a product's supply chain (supply chain management: SCM); and ii) integrate separate information systems in each division and affiliate of a firm in order to optimize entire business processes at an individual firm's level. TNCs are implementing these challenges on a global scale, or global SCMs. On the other hand, there remain a few hurdles to be solved before realizing such expected benefits of ITs. Some experiences of TNCs point to some of these hurdles, mainly in the areas of global SCMs such as ITs, logistics, and customs procedures.¹

¹ Ueki (2003b) studied the present situation of IT usage by SMEs and e-commerce in Argentina, Brazil, Chile and Mexico, in comparison with East Asia, EU and the United States. It also discussed the concept supply chain management and several cases involving mainly developed countries and trade facilitation efforts.

I. Global Supply Chain Management

Just-in-time (JIT) delivery system, which can be improved by making use of ITs, is one of the indispensable capabilities for companies in many industrial sectors. Generally speaking, large companies have implemented this system as a manufacturing base and a sales chain tool within a relatively small industrial and urban area, or a country at best. In many cases, a JIT system in an area has not necessarily been operated in close coordination with such systems in other areas. On the other hand, transnational companies (TNCs) have been pursuing the benefits of agglomeration economies, networking of global production bases, and outsourcing. Presently, information systems enable TNCs to generate synergy among their operations. As a result, the IT strategy and the flexibility to meet technological changes are key factors that determine the competitive advantage of TNCs.

Innovations in ITs applicable to JIT are diminishing the geographical restriction of TNC's operation. The current JIT systems for delivery can monitor the individual item on a display shelf. The same monitoring systems can be found along a production line. Depending on information collected through such systems, it is possible for transportation companies to deliver final products from warehouses to store fronts, and for parts suppliers to provide their products with assemblers without generating excess inventory and shortage. Demand forecasts estimated from such information can be shared by all of the entities participating in the transactions throughout the supply chains. The monitoring systems for production processes enable assemblers to know the conditions of their plants in real time. Global SCMs undertake such operations on a global scale.

As a result, TNCs are in the process of restructuring production bases and distribution networks, as well as of integrating information systems for managing manufacturing, sales, and administrations. For these purposes, TNCs are often outsourcing various services, including information, Supply Chain Management (SCM) and logistics services from third-party logistics (3PL) service providers. Resulting global SCMs are ideal for TNCs to harmonize and optimize their manufacturing and sales activities on a global scale, though TNCs often find on-line and off-line impediments to get over corporate and national borders.

The configuration of global SCMs has a close relation with TNCs' strategies of sites' selection for manufacturing, which depends on economic conditions such as economies of scale, bilateral and regional availability of skilled labors, materials and parts, and their suppliers, and necessity of skills and knowledge specific to a product and a company. Roughly speaking, there are two extreme cases as strategies for site selection to produce a good: concentration of production process in a single center, or dispersion of production bases.

In the former case, the global logistics to connect between a single production base and market across to the world are crucial. In the latter case, coordinated operations among bases worldwide for manufacturing a product are indispensable, although each production base should serve to mainly a market or to a region. In order for a firm to provide a product with a market from a factory that is not a main production base where excess capacity exists, the firm should guarantee the same level of product quality independently from factories' locations. As a result, the more factories are there, the more complex the procurements of parts and materials and quality managements should be.

A. JIT and SCM by Japanese Companies

Toyota is a pioneer of JIT and SCM. The two examples below illustrate how the recent SCM can be operable and why the information technologies are indispensable in intra- and inter- regional JIT operations. Following Olympus's case will provide a more concrete image of SCM information system.

1. Toyota's IMV Project

Toyota plans to establish a global network for supplying pickup trucks, multipurpose vehicles and major vehicle components. The new network, named "IMV Project" and scheduled to begin its operation in 2004, aims at enhancing the firm's competitiveness by optimizing its worldwide development, procurement, and production activities through tie-ups among production bases outside of Japan.

Toyota will supply vehicles and major components such as engines from and/or between its factories in ASEAN and India, and will expand vehicle production and export activities in South Africa to supply to Europe and Africa. In Latin America, Argentina, where its factory manufactured 11,173 units of Hilux in 2002, will become a supply base for both pickups and multipurpose vehicles to Central and South America. Its capacity will be expanded to 60,000 units a year, 45,000 of which will be exported to Brazil and other countries in the region (Toyota's press release, September 19, 2002).

In order to manage its global operation, Toyota will invest 200 billion yen (about US\$ 1.7 billion) in information systems to integrate the information on development, procurement and production, which can be gathered through and linked with its "Kamban" system operated in its each production base (Nihon Keizai Shimbun, June 10, 2003). It also established the Global Production Center in Japan to promote the development of personnel responsible for global

production activities and the pursuit of greater efficiency in production and manufacturing preparations (Toyota's press release, June 26, 2003). In other words, the firm thinks that it is necessary to transfer its "Kamban" system and "Kaizen" activity to foreign bases in order to optimize its production network on a global basis.

2. Paperless Kamban System: Toyota Motor Kyushu and Nippon Steel Yawata Works

Global SCM should be based on the combination of intra- and inter-regional logistics networks. Toyota's "Kamban system" is one of the prototypes of modern JIT delivery and SCMs within a region. The Kamban system has used signboards, which are called "Kamban" in Japanese. Suppliers deliver pallets filled with parts attached to a Kamban to Toyota's sites and bring back the Kamban detached from pallets, which functions as a purchase order. In the traditional Kamban system, signboards move between Toyota and suppliers. Present cost competition does not allow time to deliver a Kamban.

In case of Toyota Motor Kyushu, the firm developed in 2001 SCM in cooperation with its steel coil supplier Nippon Steel Yawata Works, in order to reduce investment in storage space for coils necessary for increased production of a new model car. The solution for Toyota was to halve the lead-time and double the frequency of coil delivery from 4 per day to 8. To achieve this goal, the two firms introduced an electronic Kamban, a handy terminal with barcode reader, simulation and forecasting system to optimize coil production, inventory and delivery, and e-mailing system to mobile phones. They interconnected their information system in order to share information necessary for the SCM and to make the data processing more efficient. In parallel to such computerization efforts, a Nippon Steel's transportation subsidiary made efforts in educating truck drivers and obtained ISO9000 certification (Japan IBM, 2002).

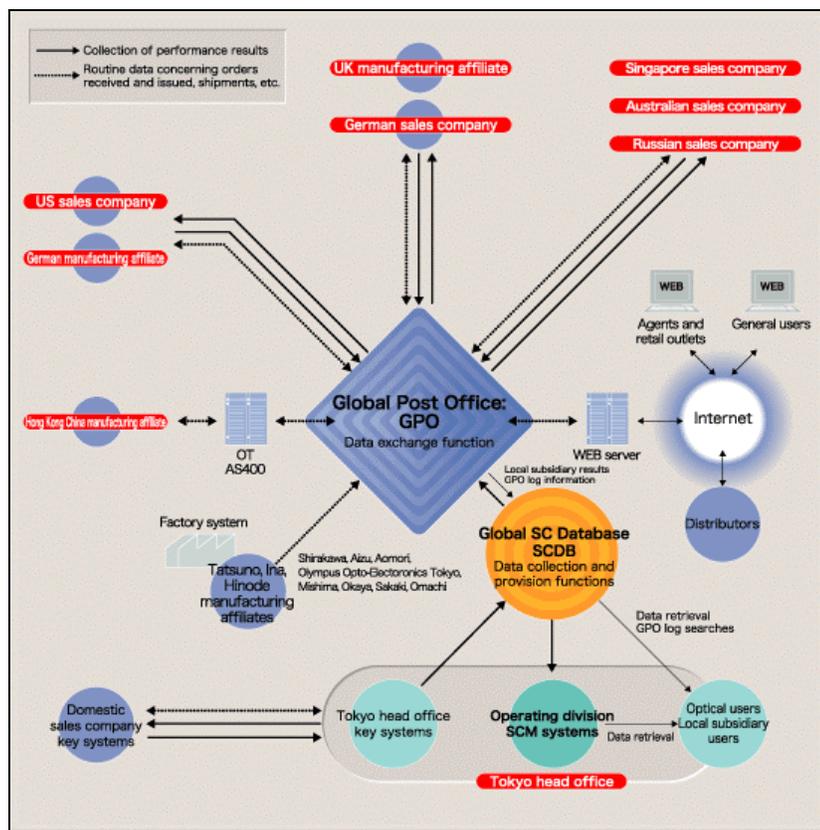
3. SCM System of Olympus

A Japanese optics company, Olympus, launched in 1999 "Total Lead Time (TLT) 50" to reduce inventories of all merchandise and to cut down total lead-time by 50%. The ultimate goal of the efforts is to reduce costs in its total supply chain. The firm introduced an information system "NetWORKS" in its optical equipment sector in April 2001. The system is composed of two key systems. One is Global Post Office (GPO), which is a system for data interchange to which its entire group can access. The other is Global Supply Chain Data Base (G-SCDB), which aims at sharing of information on SCM. Olympus applied a ready-made system developed by Kawatetsu Systems, Inc., to establish GPO, and introduced EDIFACT as syntax to facilitate data interchange with foreign firms. The characteristics of GPO are real-time data exchange, and data transmission and reception. The system serves around the clock. As a result, when its U.S. affiliate company places orders, the information can be transmitted across the company in real time. After the implementation of G-SCDB, Olympus began to register data on past results of sales and production, and data on orders received. G-SCDB has enabled the firm to confirm inventory level that each foreign affiliate carries daily. Before its introduction, it took two weeks for the firm to compile the same data. As a result, the availability of the collected data for inventory management increased dramatically. The firm evaluated that the 300 million yen investment in the systems generates roughly a 100 million yen return annually.

Olympus's SCM system was developed based on GPO and G-SCDB. The system "MAPS" also started running in the end of May 2002. Full-scale operation of MAPS enables the firm to make plans for production, sales and inventory of its products, which cover domestic bases and overseas subsidiaries. Before its operation, the company had implemented the planning managements for production, sales and inventory (PSI) monthly by using systems installed in each

base that controlled inventories. MAPS integrates these systems to implement the PSI planning weekly, and feedback the information to productions in factories. To realize these facilities, NetWORKS Master Planning was installed in MAPS. NetWORKS Master Planning imports data from G-SCDB to prepare the PSI plan. In this new system, the firm has only to manage sales plan in the sales affiliates. This information is automatically reflected on procurement plans in foreign affiliates and production plans in the factories. In addition, these procurement plans and production plans are revised weekly by feed-backing the information on the difference between the sales plan and its results, and the new sales plans proposed by sales affiliates. The company expects 50% reduction of the inventory level compared with that of 2000. In the future, Olympus will extend this system to suppliers of factories and sales dealers.

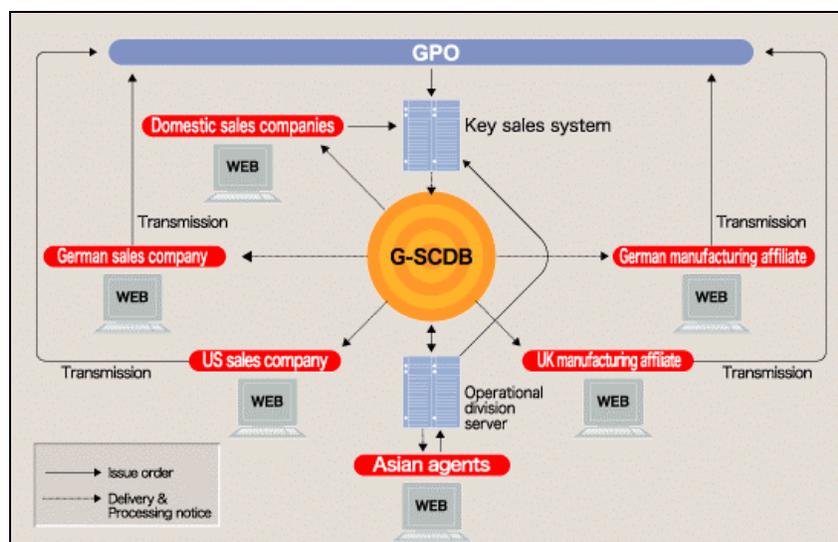
Graphic 1
OLYMPUS: CONCEPT IMAGE OF THE GLOBAL POST OFFICE



Source: Olympus (http://www.olympus.co.jp/en/magazine/TecZone/Vol51_e/zoom3.html)

Olympus also introduced another information system in the factory, “MAPDIS.” This system makes it possible to monitor manufacturing processes real time. It collects data from installed PCs to control and monitor plants and equipments and to inspect products. The users who manage manufacturing processes can access the collected data via a web browser to monitor the processes even from remote areas and respond to troubles in the factories as soon as possible. As a result, the firm reduced defective products. As of November 2002, MAPDIS was already introduced in five factories in Japan, three factories in foreign countries, three Japanese parts suppliers, four *keiretsu* fabricators and one foreign parts supplier.

Graphic 2
OLYMPUS: THE ENTIRE SUPPLY CHAIN, INVENTORIES,
SALES AND ORDERS COLLECTED FROM KEY
LOCATIONS AROUND THE WORLD



Source: Olympus (http://www.olympus.co.jp/en/magazine/TecZone/Vol51_e/zoom5.html).

B. 3PL Services in the Global SCMs

This section reviews the distribution network of optical equipment organized by using 3PL services. The manufacturing of optical equipment is geographically less dispersed than the automobile industry. As products of the optical equipment sector are relatively small in size and of high-price and a shorter product life cycle, the experts of the sector expect significant contribution of 3PL services to improve its efficiency throughout their supply chains, establishing a JIT system for assembling the products.

1. Distribution Network of Optical Equipment Sector

Nikon

The rapidly growing demand for digital cameras often results in short supply, which in turn stems from the short supply of key components. It is necessary for Nikon's distributors to predict precisely how much merchandise is available and when it can be distributed. On the other hand, the product cycle of digital cameras is very short. It is too risky for Nikon and its dealers to carry excess inventories. In order to address these issues, the company was forced to establish efficient information and distribution systems. Previously, the firm handled its product distribution "in-house," but later it established the supply chain network to provide the U.S. dealers with its products by adopting outsourcing distribution solutions served by United Parcel Service (UPS).

UPS transports Nikon's products made in its manufacturing centers in the Republic of Korea (hereafter, Korea), Japan and Indonesia to Louisville, Kentucky, the United States. Louisville is not only the hub for UPS's global operation but also is home to the UPS Supply Chain Solutions Logistic Center. Here, merchandise can either be "kitted" with accessories such as batteries and chargers, or repackaged to in-store display specifications. Finally, the packages are distributed to

thousands of retailers in the United States, or shipped for export to Latin American and Caribbean retail outlets and distributors, by UPS's worldwide transportation services. The UPS's IT system can provide the information on movements of Nikon's merchandises with a high visibility. UPS also provides Nikon with advance shipment notifications throughout the United States, Latin American and Caribbean markets. As a result, products shipped from Nikon's manufacturing facilities in Asia can be on a U.S. retailer's shelf in as few as two days. While products are in route, Nikon can keep retailers informed of delivery times and adjust them as needed, so that no retailer needs to miss sales opportunities due to lack of product availability (source: UPS's homepage).

Pentax

Pentax, another Japanese multinational operating in the optics sector, established jointly with FedEx a distribution network similar to that of Nikon's to distribute about 100 types of its products of digital cameras, still cameras and binocular telescopes to the U.S. market. They are produced in the factories in Hong Kong (China), Japan, the Philippines, Taiwan Province of China (Taiwan) and Vietnam. Before its introduction, the firm had shipped these products from the factories in five countries mentioned above to Pentax USA Inc. in Colorado, the United States. Its camera bodies, lenses and accessories were kitted by its U.S. affiliate company and were delivered to the dealers and outlet stores across the United States.

From May 1, 2003, its digital cameras, still cameras and binocular telescopes produced in the five countries are transported to the free trade zone in Subic Bay, the Philippines where FedEx's hub airport in the Asian region is located. The products transported are stored temporarily in the FedEx's distribution center located at the airport. The information on orders offered from the U.S. dealers is sent online to the system installed in the distribution center in Subic Bay. In accordance with the order information, the staffs in the distribution center prepare the kits, pack them, and prepare export documents. Then FedEx transports the processed products by its airplanes from Subic Bay to the United States and distribute them directly to the U.S. dealers. The distribution center also controls its inventories. The same number of the shipped products is refilled by the five factories in Asia to keep its inventory at the optimal level.

Pentax expects that the total lead-time, which includes the inventory time between its production bases in Asia and the U.S. dealers, should be shortened. The inventory turnover rate will be improved from 5 to 10. This efficient inventory management enables Pentax to respond to the changes in conditions of digital camera market, maximize its sales opportunity and minimize the deterioration of its products' value (Pentax's press release, on April 28, 2003).

2. The Role of 3PL in Global SCMs

As observed in the cases above, logistics providers are becoming important partners of large firms for establishing global SCMs. Logistics providers themselves are changing their business to improve their services. ITs are considered as a key to provide higher value-added services and to be integrated into customers' operation. According to a survey on 3PL customers (Langley, et al., 2002), the activities most frequently outsourced to 3PLs are outbound transportation, warehousing, inbound transportation, freight bill auditing/payment, customs brokerage, freight forwarding, and customs clearance (Table 1). The survey also asked IT-based services that are provided currently by their 3PLs, and that are among their future requirements (Table 2). Most 3PLs in North America and Western Europe are able to and require to be served IT-based services such as warehouse/distribution center management, web-enabled communications (that imply requirement for real-time information such as inventory visibility and order status updates), transportation management, shipping tracking/tracing/event management, and export/import/freight forwarding/customs clearance. The services that are not served yet but evaluated for future availability are product vertical electronic markets such as B2B exchange, and

SCM-related systems. Together with other areas for improvement with 3PLs, the survey concluded the major changes that are likely for the future include customer requirements for technology-based and strategic supply chain services, advanced technology offerings around strategy, planning, collaboration, supplier management, data management, decision support, and integration, and a need for 3PL providers or system integrators to assume a “Lead Logistics Manager (LLM)” role to more strategically serve their clients.²

Table 1
OUTSOURCED LOGISTICS SERVICES
(Percentages)

Logistics Activity	North	Western	Logistics Activity	North	Western
	America	Europe		America	Europe
Outbound Transportation	68	86	Information Technology	17	19
Warehousing	65	70	Procurement of Logistics	15	19
Inbound Transportation	52	70	Carrier Selection	14	22
Freight Bill Auditing/Payment	48	11	Rate Negotiation	14	19
Customs Brokerage	44	33	Inventory Management	12	22
Freight Forwarding	43	41	Product Assembly/Installation	11	15
Customs Clearance	41	33	Fleet Management	11	11
Cross-Docking	31	41	Distribution Control	6	19
Shipment Consolidation/Distribution	30	41	Supply Chain Manager/Integrator	5	4
Selected Manufacturing Activities	24	11	Lead Logistics Provider	5	19
Product Marking/Labeling	24	37	Customs Service	4	0
Consulting Services	24	19	Order Entry/Order Processing	2	15
Order Fulfillment	23	7	Factoring (Trade Financing)	1	4
Product Returns and Repair	17	22			

Source: Langley, et al., 2002.

Table 2
SUMMARY OF CURRENT AVAILABILITY AND FUTURE REQUIREMENTS OF IT-BASED SERVICES
(Percentages)

Service Category	North America		Western Europe	
	Currently	Future	Currently	Future
	Available	Requirement	Available	Requirement
Warehouse/Distribution Center Management	77%	11%	50%	41%
Web-enabled Communications	64	29	27	59
Transportation Management	64	18	86	18
Shipment Tracking/Tracing/Event Management	62	26	32	68
Export/Import/Freight Forwarding/Customs Clearance	61	14	59	32
Transportation/Logistics Electronic Markets	21	37	18	50
Customer Order Management	19	27	23	27
Product Vertical Electronic Markets	11	38	5	46
Supplier Management Systems	6	36	0	59
Supply Chain Planning Systems	6	32	5	41

Source: Langley, et al., 2002.

² The recipients of the survey (Langley, et al., 2002) were asked to think of a 3PL as one that provides multiple services for its clients and customers. The survey report also mentioned a definition of LLM as a firm that “designs, builds, and manages supply chain assets, process, people, and technology.”

II. Trade Facilitation: Its Backgrounds and New Possibilities

The foregoing cases illustrate the fundamental components of SCMs. A computer system should be thought of a set of information infrastructures that integrate back-end systems for managing production, procurement (e-procurement), logistics, sales (e-commerce, sales force automation), and back-office as well as databases. The latter are shared not only by the company but also by its partner companies. Such systems should be built based on more standardized and open technologies in order to realize interconnections with more information systems established by external firms. In addition, it is necessary to stress the importance of customs processes and procedures as a part of global supply chains to facilitate the establishment of seam-less global SCMs. This means that customs authorities should become more service-oriented: customs authorities are pressured from the private sector to enhance their IT capabilities and to adapt the customs procedures to be more compatible with prevalent ITs in order to realize full benefits of the investments in ITs by the private sector.

There have been mainly two approaches to respond to the issues of trade facilitation faced by both the private sector and the governmental organizations: the institutional approach and technical approach. Based on these two approaches, some intergovernmental and international organizations have been making efforts to facilitate intra- and inter-regional trade. Such activities are also increasingly incorporating the recent revolutionary change in ITs and private initiatives for trade facilitation by applying cutting edge technologies.

In order for customs authorities to overcome the hurdles caused by border cargo procedures for international SCMs and at the same time to meet satisfactorily their mission to collect tariff revenues as well as to prevent inflows of illegal goods, it is indispensable for them to introduce information systems that are inter-connectable with computers owned by private firms in order to bring about government-private partnerships for trade facilitation.

A. International Initiatives for Trade Facilitation

1. Institutional Issues

The concept of “trade facilitation” covers broad elements to promote international trade, including tariff reduction through bilateral and multilateral trade negotiations, physical infrastructure, and elimination of non-tariff barriers (NTBs). The international efforts to improve trade environments resulted in distinctly high administrative compliance costs for customs procedures, which are estimated about 10% of the value of goods traded. The causes identified are the following: out-of-date customs procedures; inadequate legislation; a misunderstanding that computerization is the answer to all problems; little attention to the organization and staffing needs of a modern administration; and a lack of understanding of the need for coordination and cooperation between tax and customs administrations (Staples, 1998). Prescriptions for these problems include, among others: the introduction of the paperless processing system; putting greater reliance on the post-release audit; a closer relationship between customs and tax department; customs’ service-oriented attitude and good relations with the trade community; and customs administration with professionalism and a high level of integrity (Staples, 1998). Required streamlined and modernized customs procedures, and their renovations responding to the technological progresses, are based on harmonization achieved through inter-governmental negotiations and international organizations.

In consequence, trade facilitation initiatives are encouraged by multiple organizations and intra- and inter-regional groups as well as business communities, as a gradual step in accordance with each goal, achievement and implementation. The World Trade Organization (WTO) plays a key role in harmonizing regulations and rules comprehensively. International organizations and associations, such as Inter-American Development Bank, UNCTAD, United Nations Economic Commission for Europe (UNECE), World Bank, World Customs Organization (WCO), complement and/or ensure the effectiveness of the implementation of the targeted trade facilitation by submitting opinion briefs, providing technical standards and technical assistances, and by implementing experimental projects. The International Chamber of Commerce (ICC) and the International Organization for Standardization (ISO) support and cooperate with initiatives by such international organizations. Some countries organize bilateral, and intra- and inter-regional economic cooperative groups, such as APEC, ASEAN, Group of Seven/Eight (G7/G8), FTAA and NAFTA to make harmonized trade environments among their participants in advance of the conclusion of the multinational treaties of WTO.

This section will discuss those initiatives/activities that have been undertaken by the international organizations and associations as well as the technological innovations which are at present influencing the general trend of the customs renovation. Following this, some implementation issues and experiments for upgrading the customs systems will be presented in the next chapter.

2. Efforts for Trade Facilitation led by International Society

World Customs Organization (WCO)

The mission of the WCO is to enhance the effectiveness and efficiency of customs administrations. In order to fulfill its mission, the WCO has established international instruments and programs for the harmonization and uniform application of simplified customs systems and procedures, as well as the harmonized commodity description and coding system. One of such instruments for utilizing the modern technologies for the purpose of the simplified and harmonized customs procedures is the so-called revised Kyoto Convention (The International Convention on the Simplification and Harmonization of Customs Procedures), which originally entered in force in 1974 and was adapted in 1999. The general and specific annexes of the revised convention are the comprehensive guidelines for trade facilitation through the use of effective control techniques and automation (WCO's website on the Revised Kyoto Convention).

In order to ensure the progress on the revised Kyoto Convention, the WCO Customs Data Model provides a maximum framework of the “single standard” and “globally harmonized” data sets and the “uniform” electronic messages (Cargo and Goods declarations for import and export) for the routine exchange of information between customs and the traders to accomplish formalities for the arrival, departure, transit and clearance of ordinary goods in international cross border trade. The WCO Customs Data Model originates from the G7 Customs Initiative. The G7 Heads of Government, in meetings at Lyon (1996) and Denver (1997), and the G7 Finance Ministers at the Birmingham (1998) and Okinawa-Kyushu (2000) Summits, agreed to standardize and simplify customs data requirements of the G7 countries and to standardize the format in which data are to be reported electronically in order to facilitate international trade, reduce costs for businesses and governments and promote economic growth. According to Takahashi (2001), the import data sets had decreased from more than 800 data elements in 1996 in the aggregate of the G7 to 115 in the end of 2000 as a result of the G7 Initiative.³ In June 2001, the WCO accepted a request from the G7 to take over the maintenance and management of the G7 Initiative from January 2002 to advance the work into a global customs standard in the form of the WCO Customs Data Model. Some countries of the G7 have agreed to implement the Data Model by 2005 where possible.

Technologically, the standard message for the Customs Data Model is based on the United Nations Electronic Data Interchange for Administration, Commerce and Transport (UN/EDIFACT), including its Customs Declaration Message (CUSDEC) and Customs Cargo Report Message (CUSCAR). The Data Model also includes data requirements for enabling a single window environment. In addition, the WCO is working for introducing new web technologies and standards for electronic data interchange (EDI) such as eXtensible Mark-up Language (XML) and electronic business (using/with) eXtensible Mark-up Language (ebXML) in order to facilitate interoperability and integration among all parties in the supply chain (for more details on XML and ebXML, see the next section).

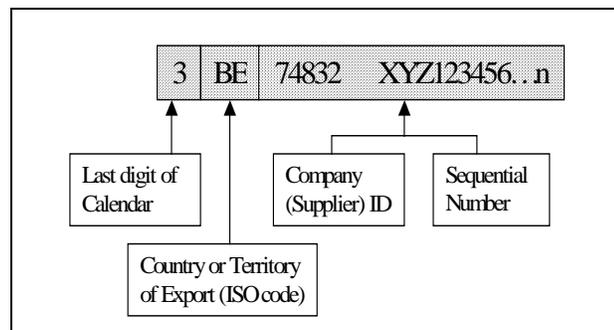
Another instrument of the WCO for trade facilitation is the Unique Consignment Reference number (UCR). The UCR is a reference number essentially for customs use that should be: i) used only as an “access key” for audit, consignment tracking and information, reconciliation purposes; and ii) unique at the both national and international levels and applied at the consignment level.⁴

³ According to the WCO FACT SHEET, THE WCO CUSTOMS MODEL and Jost (2002), WCO Customs Model version 1.0 (to be updated to the version 1.1 by June 2003) provides 161 data elements. 113 data elements are used for one-step import, and 84 data elements for the first step (for release) and 100 for the second step (for duty collection and statistics) in case of two-step import. Export data sets are composed of 100 data elements for one-step export and 47 and 72 data elements for two-step export. The cargo report for the goods declaration prepares 81 data elements for import and 64 elements for export.

⁴ EAN International (2002a) defines “Tracking” as the retrieval of the actual status of a shipment, a package etc, and “Tracing” as the retrieval of information to reconstruct the history of a shipment, a package etc.

The WCO Customs Data Model has already incorporated the UCR. The format of the UCR is composed of 35 characters at the maximum, including a maximum of the 32 characters for giving uniqueness to the consignment reference locally to company level, of which sequential number is ideally assigned by the supplier, seller or manufacturer at export by using, for example, its purchase order or invoice number (Graphic 3). The UCR, using in conjunction with existing “transportation references” (such as air waybill number, bill of lading number, load hauler’s carriage note number, rail company’s carriage note number), provides customs authorities with a comprehensive “end-to-end” audit trail, and traders with a tracking capability for their consignments. In order to maintain the audit trail and tracking capability, the relationship between UCR and transportation references has to be maintained historically. For customs audit purposes, the URL (Internet Uniform Resource Locator) of the importing/exporting trader and the UCR are necessary. The URL is to be used to access to the trader’s system, whilst the UCR should become a “key” to access to underlying data in respect of the goods and associated data (e.g. description, origin, supplier, and customer) (<http://www.wcoomd.org/>).

Graphic 3
THE UCR STRUCTURE



Source: WCO.

The UCR is expected to bring about benefits of, for example: i) promoting safe and secure border; ii) assisting co-operating export and import customs to offer authorized traders end-to-end premium procedures and simple integrated treatment of the total transaction; iii) enabling the processing of pre-arrival data prior to the assignment of a goods declaration number; iv) contributing to rapid release; and v) helping in the management of the logistical chain and enhancing JIT operations. The Canadian Society of Customs Brokers (CSCB) have been urging the Canadian government to implement the reference system like UCR since 1998, and encouraged global development of an UCR system through the WCO (CSCB, 2002). On the other hand, the International Federation of Freight Forwarders Associations (FIATA) has expressed concerns about the feasibility of the WCO’s scenario on the above mentioned UCR, for example: i) the assignment of the UCR by sellers, which makes it difficult for forwarders to reflect the minor unpredictable modification to the UCR; and ii) the limited capability of SMEs to assign the UCR (FIATA, 2002). Nonetheless, to address the present high-concerns for terrorism, some reference systems and risk assessment are indispensable tools. The WCO considers its procedures including the revised Kyoto Convention, the Customs Data Model and the UCR as anti-terrorism requirements (Speech by Rainer Mellwig, Deputy Director Compliance WCO, 11 March 2003).

International Maritime Organization (IMO)

From the perspective of whole transportation systems, the involvement of some organizations representing transportation societies is vital to ensure the effectiveness of the efforts for trade facilitation. For example, at the International Maritime Organization (IMO), the Convention on Facilitation of International Maritime Traffic (FAL Convention) was adopted in

1965 in order to prevent unnecessary delays in maritime traffic, to aid co-operation between governments, and to secure the highest practicable degree of uniformity in formalities and other procedures. The IMO procedure uses the following IMO Standardized Forms (FAL 1-7): IMO general declaration; cargo declaration; ship's stores declaration; crew's effects declaration; crew list, passenger list; and dangerous goods. The IMO has also developed eight standardized forms covering arrival and departure of persons and goods and is promoting the global use of electronic data interchange (EDI), which was included in the FAL 1999 amendments, to relay these forms between ports and ships. Presently, its Facilitation Committee (FAL) is considering the "single window concept" for concerning pre-arrival information for ships, whereby making it possible for the ships and the agents to submit all the information required by Public Authorities through one point of entry, as well as by avoiding to retype duplicated information (<http://www.imo.org>).

International Air Transport Association (IATA)

The airport industry is taking the most proactive approach to information technologies in order to provide their customers with on-time and quick delivery services. The International Air Transport Association (IATA) is promoting paperless transportation, made possible by amending the Warsaw Convention, signed in 1929 to enforce the use of the paper air waybill (AWB). The Montreal Protocol 4 (MP4) ratified in 1998 allows replacing the paper AWB with an information record. Present attempts by the IATA to make use of ITs for the airline-related business are too comprehensive to describe all of them in this paper (<http://www.iata.org>).

As far as cargo procedures and automation are concerned, IATA's cargo services have been empowered to apply the automation technologies such as: i) paperless transportation of cargo; ii) development of electronic messaging standards and procedures for the exchange of information between airlines and brokers, forwarders, customs and postal administrations; iii) simplification and harmonization of customs systems and procedures; iv) cargo accounts settlement systems (CASS) for simplifying and expediting the processing of cargo sales and settling of accounts between cargo intermediaries and carriers; v) unit load device (ULD) tracking standards using radio frequency identification (RFID), bar code, and GPS identification technologies; and vi) XML for cargo data exchange (concerning RFID, see the next section).

The IATA has also implemented projects to improve its cargo processing. For example, the "Cargo 2000" is an IATA interest group organized by major airlines and freight forwarders. Its purpose is to re-engineer the transportation process from shippers to consignees through a "Master Operating Plan," an industry-wide process control and reporting system to create a unique "route map" for individual shipment that is to be monitored and measured throughout the life cycle of the shipment. Once a booking is made, a route map/plan is automatically created with a series of checkpoints containing events and scheduled times for events against which the movement is managed and measured. The tracking and tracing system alerts the group members to any exception to the plan, allowing them to proactively respond to fulfill customer expectations. The global CASS data is also utilized for processing the air cargo statistics. The cargo paperless transportation project (CPTP) is another project to take advantage of the MP4. The CPTP is the cross-industry project with the participation of airlines, freight forwarders, Cargo 2000 and IT partners, aiming at the seamless transportation of air cargo shipments within a paperless environment. It will be also closely coordinated with WCO's Kyoto Convention and various automation programs promoted by customs authorities in Canada, United Kingdom, the United States and other countries (<http://www.iata.org/cargo.htm>).⁵

⁵ IATA's Cargo Procedures Conference Steering Group, Cargo Executive Committee agreed that the CPTP is low priority in the current economic environment, and therefore agreed to place the project on "hold" at this time (IATA Cargo Newsletter, July 2003).

U.N. Economic Commission for Europe (UNECE)

The UNECE is one of the most important organizations that have been contributing to the processes for standardizing EDIs for international trade.⁶ It started working for simplification and standardization of external trade documents in 1960. It had taken an initiative to develop the United Nations Electronic Data Interchange for Administration, Commerce and Transport (UN/EDIFACT) syntax rules, which was agreed in 1986 by a joint European/North American ad hoc Group, known as UN-JEDI. Presently, the EDIFACT is the most popular as a data interchange method or system for international trade.⁷ The efforts for the standardization were succeeded by the United Nations Center for Trade Facilitation and Electronic Business (UN/CEFACT) in 1996 under the UNECE. Its establishment enabled experts from outside the UNECE region to contribute officially to standardization processes. The UN/CEFACT is making use of resources from the following: numerous industrial sectors and key trade associations such as the international electronics industry, the International Chamber of Shipping (ICS), the IATA, and the International Article Numbering Association (EAN); banks who are members of the Society for Worldwide Interbank Financial Telecommunications (S.W.I.F.T.), for transactions between themselves and other organizations; over 50 national administrations in a variety of different areas; and national statistical administrations and central banks throughout the world. As a result of their contribution, more than 30 recommendations, which cover not only technological aspects but also legal issues, had been adapted (see websites of UNECE, UN/EDIFACT and UN/CEFACT).⁸

From a perspective of the whole process for establishing legally enforceable and technologically practicable EDI transactions, trade partners need to conclude four agreements as follows: i) a basic business trading agreement (on-line transaction agreement); ii) a business operation agreement (system operation agreement); iii) data expression rules (business protocol); and iv) data transmission rules (communication protocol) (ECOM, no date, 2003a). The data transmission rules define a common communication protocol such as TCP/IP in case of Internet, which is indispensable to realize data transmission among trade partners' computers. The representative data expression rules are ANSI X12 in the United States and EDIFACT. Under these two agreements, trade partners can exchange trade data via their EDI systems. In addition to technical issues, legal and operational matters are to be solved in order to provide EDI message with a legal binding effect across different national legal systems. The business operation agreement specifies the details on the ways to operate the EDI transactions including system operating time, data retention time, security measures, etc. The basic business trading agreement can provide EDI messages, which are only sequences of digital data, with legal effects.⁹ The

⁶ The International Organization for Standardization (ISO) is one of the most prestigious organizations for standardization. As mentioned below, some recommendations issued by UNECE have been endorsed by the ISO and issued as International Standards. The International Electrotechnical Commission (IEC) and established the ISO/IEC Joint Technical Committee 1 (JIT 1: <http://www.jtc1.org/>) for the purpose of standardization in the field of Information Technology, which includes the specification, design and development of systems and tools dealing with the capture, representation, processing, security, transfer, interchange, presentation, management, organization, storage and retrieval of information.

⁷ According to the definition of the UN/EDIFACT—which is a set of internationally agreed standards, directories and guidelines for the electronic interchange of structured data, and in particular that related to trade in goods and services between independent, computerized information systems—the EDIFACT is composed of the contents of the United Nations Trade Data Interchange Directory (UNTDID), in which the approved rules are maintained. UNTDID includes UN/EDIFACT Application Level Syntax Rules (ISO 9735); UN/EDIFACT Message Design Guidelines (MDG); UN/EDIFACT Syntax Implementation Guidelines (SIG); UN/EDIFACT Data Element Directory, EDED (a subset of UNTDED); UN/EDIFACT Code List, EDCL; UN/EDIFACT Composite Data Element Directory, EDCD; UN/EDIFACT Segment Directory, EDSD; UN/EDIFACT United Nations Standard Message Directory (UNSM), EDMD; Uniform Rules of Conduct for the Interchange of Trade Data by Teletransmission (UNCID); and Explanatory material.

⁸ The Recommendations can be downloaded at the website of UN/CEFACT (<http://www.unece.org/cefact/>).

⁹ The Recommendation No.26 indicates the requirements of agreement with trade partners on at least the following issues: a) selection of EDI message, message standards and methods of communication; b) responsibilities for ensuring that the equipment, software and services are operated and maintained effectively; c) procedures for making any systems changes which may impair the ability of the trading partners to communicate; d) security procedures and services; e) the points at which EDI messages have legal effect; f) the roles and contracts of any third party service providers; g) procedures for dealing with technical errors; h) the needs (if any) for

Recommendation N° 26 “Commercial Use of Interchange Agreements for Electronic Data Interchange” adopted in March 1995, was produced to be used by commercial parties using EDI in connection with international commercial transactions as a model agreement for dealing with legal issues related with the basic business trading agreement and the business operation agreement (Recommendation No.26, and POLISA, 1998).

B. Innovations for E-commerce and E-customs Facilitation

The efforts for trade facilitation measures mentioned above, especially EDIFACT, have had great impacts on the standardization and diffusion of EDIs for international trade. However, much lesser participation of SMEs in EDI environments implies greater difficulties to establish EDI-based procedures and partnerships for SMEs.

1. Bottlenecks of the Existing Information Systems

Although the introduction of information systems in the international trade processes have been implemented with the activities of the international organizations and transportation policies as well as with the initiatives for systems development led by the transportation, commerce and financial sectors, there are still some problems to be cleared before such systems across the trade community prevail and full benefits from them are reaped. The main issues are as follows:

A high cost to introduce EDI systems is the first one. Historically, EDIs had been developed to be used on the value-added networks (VANs) by each company, business association and governmental organization independently. Companies that intend to access to VANs have to prepare hardware and software dedicated to each system and developed by an entity and to incur communication costs at the same time. This resulted in high costs especially for SMEs to introduce them. The Internet technologies and migration of VAN-based EDIs to web-based ones had dramatically decreased not only system development costs but also their initial and maintenance costs. Nonetheless, the web-based systems’ users have to familiarize themselves with each “screen” designed by developer and administrator of its system, including application service providers (ASPs).

Interconnection among independently developed systems for trade procedures is the second. There are some systems for international trade, which, in many cases, had been developed independently and step-by-step. As a result, so far as trade procedures are concerned, one can find information systems for the following uses: i) customs procedures as well as animal/plant/food quarantine, export/import admission, and immigration control; ii) port management; physical distribution management; and iii) trade finance. Even if each system were well operative, the paperless trade would not be materialized without seamless information flows between such computer systems. Presently, some countries are integrating some systems, especially for administrative procedures, into a “single window.”

Interconnection among the information system for trade, e-commerce systems provided by ASPs and internal systems of a user company is the third. From the perspective of SCMs, it is indispensable to introduce full-fledged applications based on seamless data flows that cover not only of the trade-related transactions but also of the whole value chains. Although web-based EDIs are improving the inter-operability issue for system owners, it still requires re-typings, for example, by suppliers in case of web-EDI led by an outsourcer. When the converters are used to load EDI

confidentiality; i) liabilities in the event of any delay or failure to meet agreed EDI communications requirements; j) the laws governing the interchange of EDI messages and the arrangements of the parties; and k) methods for resolving any possible disputes.

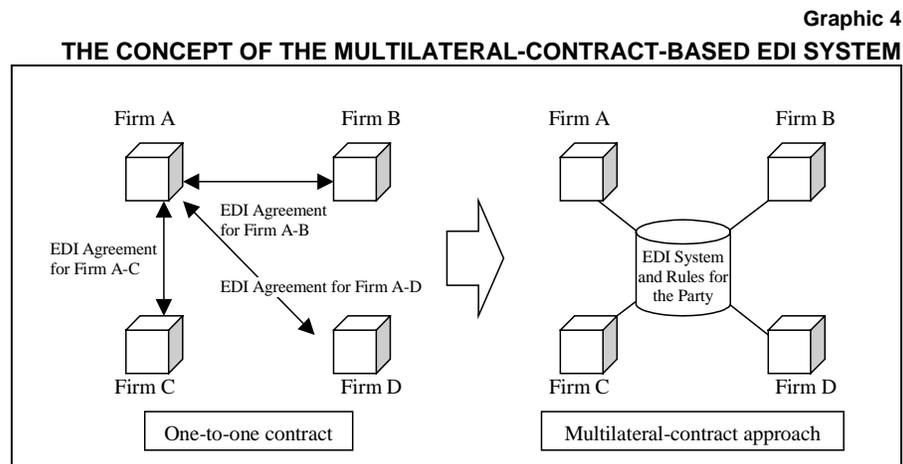
data into a backend system, it is necessary for a company to develop a lot of converters for different formats.¹⁰

The fourth is that one-to-one contract-based EDI trading makes transaction cost higher. As mentioned in ECOM (no date), SMEs often find it difficult to incorporate EDI because terms and conditions of the agreements vary significantly from partner to partner. Some SMEs have not enough transaction volumes required to obtain the financial benefits anticipated, which is obstructing the adoption of EDI in the business communities as a whole.

2. Multilateral-contract-based EDI services

As a solution to the problems of traditional EDI systems mentioned above, there exist two approaches for establishing and implementing EDI-based transactions: the ruled-based or multilateral-contract approach; and process automation. The existing initiatives such as bolero.net and RosettaNet originate from the former, while ebXML belongs to the latter, both of which are detailed below. The common characteristic of the two is a process-chain-oriented approach to provide methods to complete a chain of contracting and trading processes on-line as well as electronic signature. Technologically, the two approaches share advanced web technologies related with XML and Web-service.

In case of the multilateral-contract approach, a service provider prepares a kind of a “rule book” to be shared by the parties in the EDI process. As pictured in Graphic 4, both communication network and “network of EDI contracts” can be streamlined by transforming from one-to-one contract approach to multilateral-contract approach. The bolero.net (<http://www.bolero.net>), a well known trade finance EDI, and the RosettaNet (<http://www.rosettanet.org>), a non-profit consortium IT companies working to create open e-business process standard, can be classified into this category.



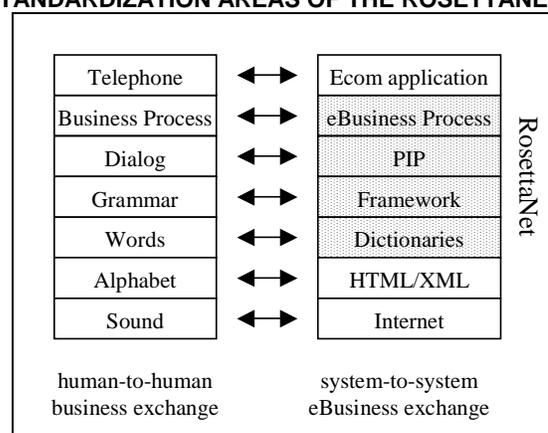
Source: derived by the author from ECOM Summary of Business Process Guideline

The RosettaNet was founded in February 1998 by 40 IT companies and was joined by a collection of electronic components companies in mid-1999 and semiconductor manufacturing companies in October 2000. By focusing on the IT industry, the RosettaNet became one of the most successful consortiums for standardization of e-business processes, with more than 500 partner

¹⁰ The electronic data interchange (EDI), a prerequisite of SCMs, does not necessarily function well between information systems developed independently. For example, a Chilean mining company Escondida experienced technological compatibility problems with a B2B platform of Quadrem, business to business (B2B) market place for the mining sector after introducing a new platform (Business News Americas, <http://www.bnamericas.com/>, June 10, 2003).

companies. Presently, the RosettaNet is a subsidiary of the Uniform Code Council, Inc. (UCC), an U.S. non-profit standards organization. The basic design of the RosettaNet can be seen in the Graphic 5. In order to migrate off-line business transactions to online ones, each layer of business transactions should be standardized. For this purpose, the RosettaNet acts to standardize mainly the following: i) the RosettaNet dictionaries, which is composed of “RosettaNet Business Dictionary” and “RosettaNet Technical Dictionary,” providing an uniquely defined terminology as a common platform for conducting business; ii) the RosettaNet Implementation Framework (RNIF), which specifies information exchange between trading-partner servers using XML, covering the transport, routing and packaging; iii) security; iv) signals; v) trading partner agreement; and vi) the RosettaNet Partner Interface Processes (PIPs), which are specialized system-to-system XML-based dialogs that define business processes between trading partners and a business document with the vocabulary.

Graphic 5
STANDARDIZATION AREAS OF THE ROSETTANET

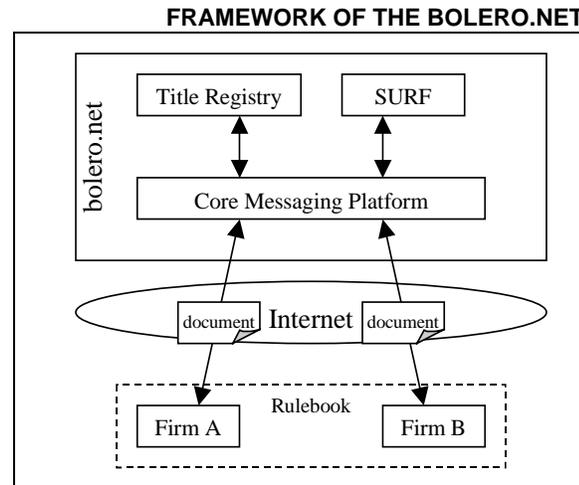


Source: RosettaNet (<http://www.rosettanet.org>).

In the case of bolero.net, for instance, all users of the bolero.net service are required to sign the “Bolero Rule Book,” a multi-lateral contract which ensures that every user agrees to be governed by a common set of rules enshrining the key elements of its service, and provides the basic legal support necessary for conducting electronic transactions.¹¹ Trade documents are exchanged through “Core Messaging Platform,” a hub of the bolero.net, which enable its users to: i) send messages securely by using advanced digital signatures and encryption techniques; ii) guarantee data delivery by a unique messaging protocol; iii) ensure document originality by maintaining the “hash values,” or unique fingerprints, of the original documents in the central system; iv) maintain interoperability between different computer systems of the users by creating a common business model of the trade process and the release of a series of “boleroXML” document definitions that describe the structure and content of electronic trade documents using XML; and v) maintain full logs of all messages sent and received to be used in the event of dispute. Based on the Core Messaging Platform, bolero.net provides value added services such as: “Title Registry,” an application for recording and transferring the rights and obligations contained in a Bill of Lading; and SURF (Settlement Utility for managing Risk and Finance), a fully automated documentary settlement system (Graphic 6).

¹¹ In order to become a user of the Bolero.net, the prospective user has to submit two application forms with “ink-signs.” One is for Bolero Association Limited (BAL) that was formed in 1995, and includes the Bolero Rulebook and the BAL Service Contract in order to become the member of the Bolero Association. The BAL provides a forum in which all users may participate, processes development of the Bolero Rulebook, and disciplines users who fail to follow it. The other is for Bolero International Limited (BIL) that was created in April 1998 and operates the EDI system, and includes the Operational Service Contract (OSC).

Graphic 6



Source: bolero.net., and Horimai et al. (2002)

3. XML and Web Service¹²

The past successful efforts for standardizing e-business “process” and “technology” have been industry-specific or process-focused as is the case with the bolero.net and the RosettaNet. These prepared a rule to be shared by their members, making such communities relatively closed ones. In addition to this closed nature of the ruled-based EDI, the lack of flexibility sometimes causes some inconvenience to trade communities composed by heterogeneous traders. As an ideal standard of e-commerce, they should automate a sequence of business processes without dual data entry in various business scenarios, such as: searching trade partners, bidding and offer, negotiation with multiple offers, conclusion of a buyer-seller contract, conclusion of EDI agreement, establishment of interoperability between seller’s and buyer’s backend system, and electronic signature and online payment. One of the most important initiatives to make an open e-business standard more viable is e-business XML (ebXML). Technologically, XML, which has already mentioned several times in this paper, is a fundamental component. The technologies related with the so-called “Web service” will also become one of the key aspects for automatic-processing of a series of jobs for business transactions by interconnecting automatically between independent information systems.

eXtensible Markup Language (XML)

The Recommendation of the World Wide Web Consortium (W3C) on eXtensible Markup Language (XML) 1.0 (second edition) released on October 6, 2000 describes XML in its introduction in the following way: Extensible Markup Language, abbreviated XML, describes a class of data objects called XML documents and partially describes the behavior of computer programs which process them. XML is an application profile or restricted form of SGML, the Standard Generalized Markup Language [ISO 8879].¹³ By construction, XML documents are in essence SGML documents. XML documents are made up of storage units called entities, which contain either parsed or unparsed data. Parsed data are made up of characters, some of which form character data, while others form markup. Markup encodes a description of the document’s storage layout and logical structure. XML provides a mechanism to impose constraints on the storage layout and logical structure (<http://www.w3.org/TR/2000/REC-xml-20001006#sec-intro>).

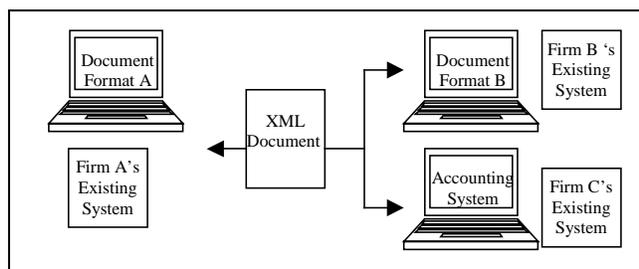
¹² It is recommendable to refer to the recommendations of the World Wide Web Consortium (W3C) at its website (<http://www.w3.org/>).

¹³ Concerning the SGML, please see the following website: <http://www.sgmlsource.com/>.

In short, the “XML is a markup language for documents containing structured information” (Walsh, N., 1998). A markup language is a mechanism to identify structures in a document. The XML specification defines a standard way to add markup to documents. The XML specifies neither semantics nor a tag set, which is a different point from the HyperText Markup Language (HTML), which is the SMGL-based the *lingua franca* for publishing hypertext on the World Wide Web, of which tag semantics and tag set are fixed. In fact the XML is a meta-language for describing markup languages. In other words, the XML provides a facility to define tags and the structural relationships between them. Since there's no predefined tag set, there is no any preconceived semantics. All of the semantics of an XML document will either be defined by the applications that process them or by “stylesheets” (Walsh, N., 1998).¹⁴

The characteristics of the XML, such as being (i) a markup language in which tags can be defined by users, (ii) independent from applications, and (iii) a human-readable format, makes it convenient for companies, for example, to process XML EDI data received from their traders despite their own customized systems, to create business documents based on their own sheet formats (Graphic 7). The XML can be a common data format for an organization to establish its “enterprise portal.” It enables an organization to integrate diverse data sources accumulated in different backend systems in order to provide customized and personalized information to its employees in different departments, and to its partner companies via various medias such as personal computer (PC) and handy phone (Koike and Tanaka, 2001).

Graphic 7
XML DOCUMENT SHARING AMONG TRADE PARTNERS



Source:

A case of the boleroXML, used for Otto U.K., the U.K. subsidiary of Germany's OttoVersand—a large mail-order company and online retailer—, offers a glimpse of the potential of the standardized XML application to international trade. The company introduced the bolero.net as a platform allowing it to integrate its existing back office systems and exchange over 80 types of trade documentation in boleroXML format with its suppliers and trading partners. Bolero.net enabled Otto U.K. to do the following without re-keying, hard-copy documentation and couriers:

- i) **Procedures for finance;** an Otto's staff in France pays suppliers based on delivery of goods or documents. Bolero.net inherits data from the Purchase Order (PO) through to billing and payment systems allowing easy reconciliation with invoices;
- ii) **Logistics;** bolero.net seamlessly passes data between trading parties and trade facilitators;

¹⁴ Document Type Definition (DTD), which was supplied in the XML 1.0, and XML Schema provide a means for defining the structure, content and semantics of XML documents. XML Schema was approved as a W3C Recommendation on May 2, 2001. Extensible Stylesheet Language Family (XSL) is a family of recommendations for defining XML document transformation and presentation, which includes XSL Transformations (XSLT), a language for transforming XML. The XSLT 1.0 was endorsed as W3C Recommendation on November 16, 1999 (see, <http://www.w3.org/>).

- iii) **Government/regulation;** bolero.net and Otto U.K. are working with U.K. Customs to allow presentation of electronic Certificates of Origin, ensuring that all required documentation is in place before the Customs-cleared goods are required;
- iv) **Internal procedures;** POs issued by the Buying and Merchandising department electronically feed data to Imports and Finance systems; and
- v) **Suppliers relationship management;** the standardized electronic links to its suppliers developed a more collaborative working relationship with visibility across the trade chain (BIL, 2002).^{15,16}

Web Service

The World Wide Web is more and more used for application to application communication. The programmatic interfaces made available are referred to as Web services (W3C's Web Services Activity, <http://www.w3.org/2002/ws/>).

The Web service is another promised technology to allow innovations in e-commerce and trade EDI in combination with the XML. It is defined in the W3C Working Draft on August 8, 2003 as follows: a Web service is a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine-processable format (specifically WSDL). Other systems interact with the Web service in a manner prescribed by its description using SOAP-messages, typically conveyed using HTTP with an XML serialization in conjunction with other Web-related standards (<http://www.w3.org/TR/2003/WD-ws-arch-20030808/>).

As in these descriptions, the Web service is an application based on the XML designed for system-to-system collaboration and is composed of an interface plus its peripheral systems. To understand it and its application areas better, one can perceive it as a device process that provides the search for the required service, confirmation of the procedures necessary for consumption of the service, and the utilization of such service. Using the Web service, the same steps should be processed with less human interventions, because the web technologies correspond to each step as follows: Universal Description, Discovery and Integration (UDDI) for discovering of the required Web service; Web Services Description Language (WSDL) for confirming the rules to use the Web service; and Simple Object Access Protocol (SOAP) for utilizing the Web service.¹⁷ These main Web service technologies are all instances of XML applications.

¹⁵ Otto U.K.'s Asian suppliers produce paperless invoices, packing lists and ocean (P&O Nedlloyd) B/L, with a minimum of data input, by using the boleroXML. Through a linkage between Otto U.K.'s and its suppliers Enterprise Resource Planning (ERP) systems, boleroXML enables these documents to be created automatically using data from Otto U.K.'s purchase orders, and printed remotely. The boleroXML achieves this by providing a set of common standards ("e-Customs Takes Shape," Langdon Systems, reproduced from Containerisation International, http://www.langdonsystems.com/customs_blueprint.asp). The company became one of the first U.K. companies to go live on the Customs Freight Simplified Procedures (CFSP), the UK Customs electronic bonded warehousing system in 1999.

¹⁶ As e-payments services target domestic and international B2B e-commerce, S.W.I.F.T (<http://www.swift.com/>) provides e-paymentPlus and Identrus (<http://www.identrus.com/>) serves Eleanor. Both are XML-based systems that realize the cooperation with existing back-end systems (ERPs) of their users, avoid legal risks by introducing rules common to users, and make use of banking system.

¹⁷ The explanation of the Web service and its-related technologies were derived from the following website of Nihon Unitech Co., Ltd. written in Japanese (<http://www.utj.co.jp/xml/dev/index.html>).

Box 1

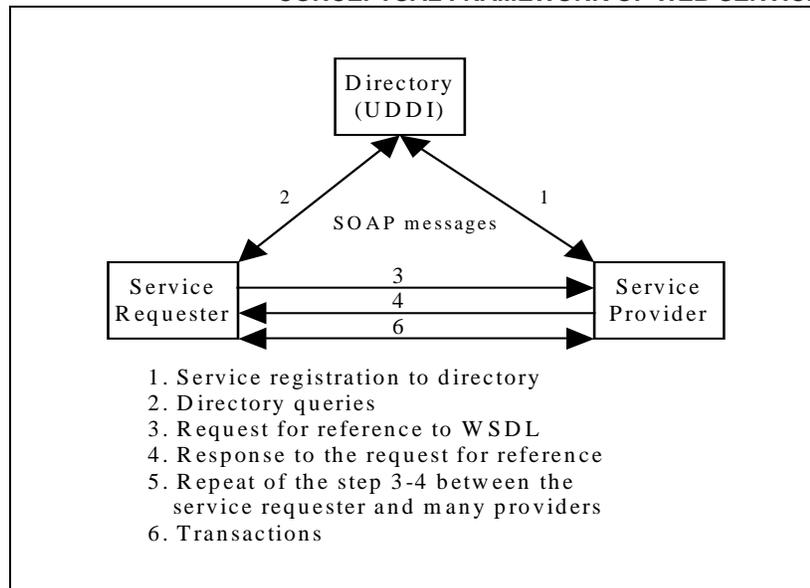
FRAMEWORK OF WEB SERVICE

Graphic 8 shows the conceptual framework of Web service and the stack of Web service technologies. This conceptual “publish-find-interact cyclical” model, including UDDI, helps to understand the process for potential web service user to start sactions with service providers.^a

The idea and service of **UDDI** is similar to a phone book. It has business names, business mailing addresses, contact names, contact phone numbers, Web services offered by businesses, addresses of Web services, meta-data describing the “interfaces” of Web services, etc. A large amount of data stored in the UDDI registry is useful for fully automated computing endpoints that want to find other endpoints that are offering Web services and then run those services (UDDI.org, 2001).^b The UDDI Business Registry, a public (completely open) online database that companies worldwide can use to develop business by registering their services and search for business partners’ services in a unified format in multiple languages, is promoted by UDDI.org (<http://www.uddi.org/>) and several companies such as IBM, Microsoft, SAP, and NTT Com operate it.

Graphic 8

CONCEPTUAL FRAMEWORK OF WEB SERVICE



WSDL provides a model written in an XML format for describing network services as collections of communication endpoints capable of exchanging messages. WSDL service definitions provide documentation for distributed systems and serve as a recipe for automating the details involved in applications communication by publishing Web service interfaces to parties interested in communicating across heterogeneous platforms. Using WSDL, Web services can be enabled to access and invoke remote applications and databases.^c

SOAP is a XML-based information, which can be used for exchanging structured and typed information between peers in a decentralized, distributed environment. SOAP is fundamentally a one-way message exchange paradigm, but applications can create more complex interaction patterns (e.g., request/response, request/multiple responses, etc.). One of the most requested features of SOAP is its remote procedure call (RPC) functionality using the extensibility and flexibility of XML. One example of the SOAP RPC application is payment procedures for the trip using a credit card. Here, it is assumed that the payment happens only when the travel and the lodging are both confirmed. The travel reservation application provides credit card information and the successful completion of the different activities results in the card being charged and a reservation code returned. This reserve-and-charge interaction between the travel reservation application and the travel service application can be modeled as a SOAP RPC (SOAP Version 1.2 Part 0, 1 and 2, W3C Recommendation, June 24, 2003 <http://www.w3.org/TR/2003/REC-soap12-part0-20030624/#L1161>).

Source:

- a The recent Web Service Architecture drafted by the W3C (August 8, 2003) pointed out that such tree-part diagram is not enough to convey the multiple dimensions of the Web services standards “space” and cannot easily be exted to handle new standards, for example, for security, management, and choreography (<http://www.w3.org/TR/2003/WD-ws-arch-20030808/>)
- b W3C Working Draft of WSDL Version 1.2, June 11, 2003 describes several related terms in the following way: “A collection of operations is called an *interface*. An interface is bound to a concrete protocol and message format via one or more *bindings*. A binding, and therefore an interface, is accessible via one or more *endpoint*, each endpoint having its own URI (Uniform Resource Identifier, added by author). A service is a collection of *endpoints* bound to the same interface.”
- c The information on WSDL was referred to the following websites: W3C “WSDL 1.1 W3C Note March 15, 2001”; Cover pages hosted by OASIS “Web Services Description Language (WSDL),” (<http://xml.coverpages.org/wSDL.html>); and Tom Clements Overview of SOAP,” By, August 17, 2001 (http://developers.sun.com/sw/building/tech_articles/overview_soap.html).

4. ebXML

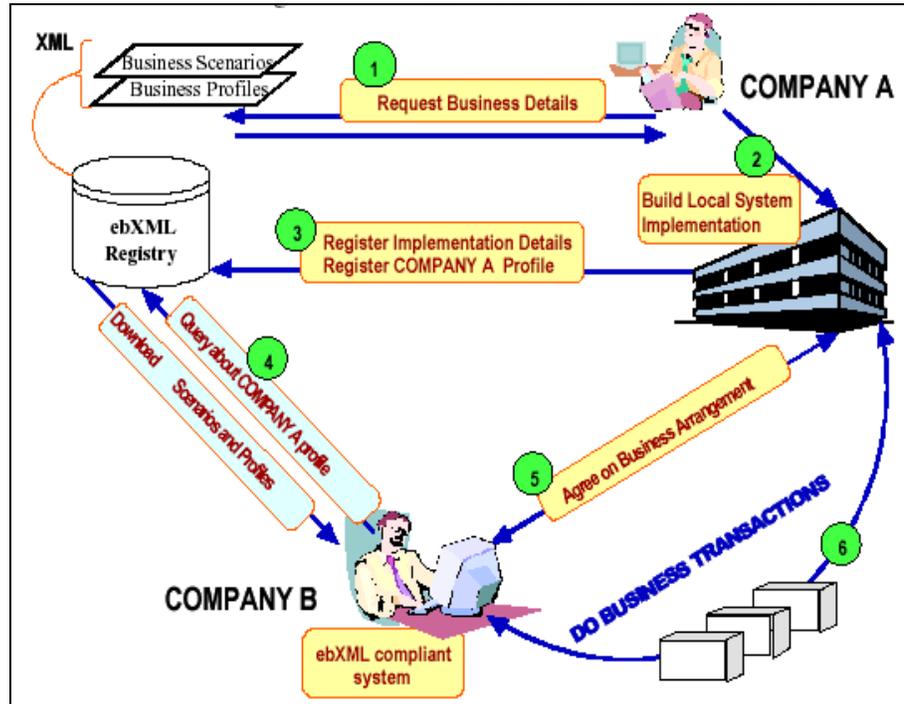
The ebXML (Electronic Business using eXtensible Markup Language), jointly sponsored by UN/CEFACT and OASIS, is a modular suite of specifications that enables enterprises of any size in any geographical location to conduct business over the Internet. Using ebXML, companies now have a standard method to exchange business messages, conduct trading relationships, communicate data in common terms and define and register business processes (<http://www.ebxml.org/geninfo.htm>). The Organization for the Advancement of Structured Information Standards (OASIS) is a non-profit, global consortium in the United States that drives the development, convergence and adoption of e-business standards, especially the XML.¹⁸ The ebXML initiative (<http://www.ebxml.org/>) began as an 18-month project in November 1999 to deliver its first specification in May 2001. Following the first phase of the project, the latest completed versions of ebXML specifications were endorsed by the 2003 Plenary session of UN/CEFACT meeting in Geneva.¹⁹

The ebXML specifications are designed to provide a framework in accordance with the assumed scenario for starting online transactions between two trading partners as pictured in Graphic 9: (step 1) Company A has become aware of an ebXML Registry that is accessible on the Internet; (2) Company A, after reviewing the contents of the ebXML Registry, decides to build and deploy its own ebXML compliant application; (3) Company A submits its own Business Profile information, which describes the company's ebXML capabilities and constraints as well as its supported business scenario, to the ebXML Registry; (4) Company B discovers the business scenario supported by Company A in the ebXML Registry; (5) Company B sends a request to Company A stating that they would like to engage in a business scenario using the ebXML; and (6) Company A accepts the business arrangement, and the two companies are ready to engage in e-business using the ebXML (ebXML, 2001a).

¹⁸ OASIS was founded in 1993 under the name SGML Open as a consortium of vendors and users devoted to developing guidelines for interoperability among products that support the Standard Generalized Markup Language (SGML). OASIS changed its name in 1998 to reflect an expanded scope of technical work, including the Extensible Markup Language (XML) and other related standards (<http://www.oasis-open.org/who/>). The UDDI is included as one of the networks of OASIS. OASIS's sponsor members include Boeing Commercial Airplanes, The Federal Reserve System, and U.S. Defense Information Systems Agency as well as IT companies.

¹⁹ UN/CEFACT announced the completion of ebXML technical standards work program with OASIS on August 21, 2003 (press release).

Graphic 9
OVERVIEW OF THE INTERACTION OF TWO COMPANIES
CONDUCTING E-BUSINESS USING EBXML



Source: ebXML (2001a).

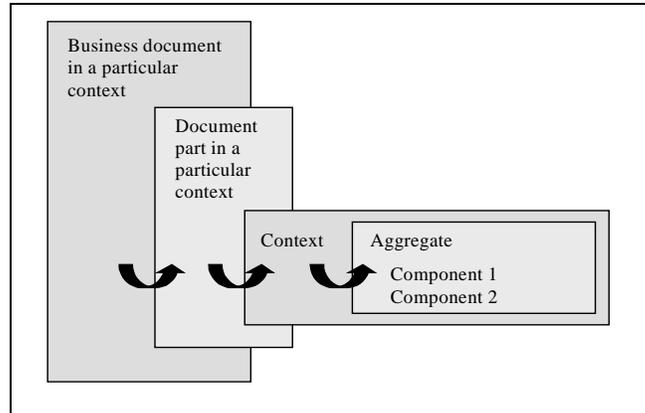
The ebXML technical architecture is composed of five components: Business Process and Information Meta Model; Trading Partner Information (Collaboration Protocol Profile (CPP) and Collaboration Protocol Agreement (CPA)); Core Component (CC); Registry and Repository (R&R); and Messaging Service.

FIVE COMPONENTS OF EBXML

Core components are those that appear in many different circumstances of business information and in many different areas of business. These parts can then be sewn together into business documents. A core component is a common or “general” building block that basically can be used across several business sectors. It is therefore context free. Components can be built together into aggregates. Aggregated components can be common components. These are generic and can be used across several business sectors. Aggregates and components can be gathered into “document parts.” These are useful assemblies which can individually satisfy a business process requirement for information, or which may be ‘sewn together’ in a structured way to achieve the same (ebXML, 2001b).^a Graphic 10 illustrates how core components can be constructed into document parts in the context of particular business information requirements.

Graphic 10

CONCEPTUAL PICTURE OF CORE COMPONENTS



Source: ebXML, 2001b.

Business Process and Information Meta Model: it is a mechanism that allows trading partners to capture the details for a specific business scenario derived from a consistent modeling methodology.^b A Business Process describes in detail how Trade Partners take on roles, relationships and responsibilities to facilitate interaction with other trading partners in shared collaborations. The interaction between roles takes place as a choreographed set of business transactions. Each business transaction is expressed as an exchange of electronic Business Documents. A business process shall be expressible in XML syntax. Business Documents are composed of re-usable Business Information Object (ebXML, 2001a), or Business Information Entity (BIE) that is “a piece of business data or a group of pieces of business data with a unique business semantic function” and that is defined “when a Core Component is used as a real business situation (ebXML, 2002).”^c

CPP and CPA: To facilitate the process of conducting e-Business, potential Trading Partners need a mechanism to publish information about the Business Processes they support along with specific technology implication details about their capabilities for exchanging business information. This is accomplished through the use of a CPP. The CPP is a document which allows a Trading Partner to express his supported Business Processes and Business Service Interface requirements in a manner where they can be universally understood by other ebXML compliant Trade Partners. It also includes security and other implementation specific details as well as contact information and industry classification. A CPA is derived from the intersection of two or more CPP's. The CPA serves as a formal handshake between two or more Trading Partners wishing to conduct business transactions using ebXML (ebXML, 2001a).^d

Registry and Repository (R&R): “The ebXML Registry Service services as the storage facility for the Business Process and Information Meta Models, Core Components (CC), and Collaboration Protocol Profile (CPP) (ebXML, 2001a).”^e The ebXML Registry provides a set of services that enable sharing of information between interested parties for the purpose of enabling business process integration between such parties based on the ebXML specifications.^f The shared information is maintained as objects in a Repository and managed by the ebXML Registry Services. All access to the Registry content is exposed via the interfaces defined for the Registry Services. The Registry is capable of supporting ISO/IEC 10646 (Unicode) for character set with the purpose of multilingualization (OASIS, 2002a).

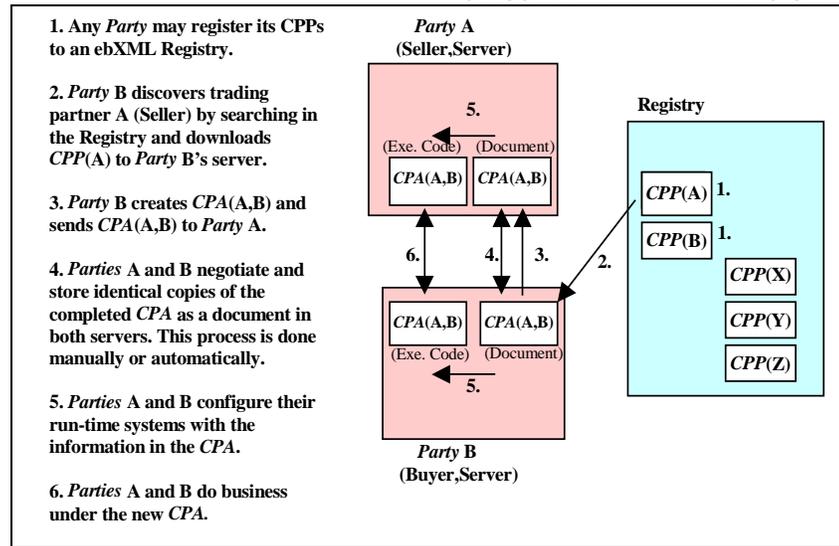
Messaging Service: The ebXML Message Service (ebMS) provides the standard message packaging, routing and transport facilities for the ebXML infrastructure. The prime objective of ebMS is to facilitate the exchange of electronic business messages within an XML framework. Business messages, identified as the “payload” of the ebXML messages, are not necessarily expressed in XML-based messages, as well as traditional EDI formats are transported by the ebMS. The ebMS is defined as a set of extensions to the base SOAP and SOAP Messages with Attachments specifications. The ebMS contains security and reliability features necessary to support international e-business, which are not provided in the SOAP specifications (OASIS, 2002c).

- a ECE (UN/CEFACT, 2002) defines the core components “a semantic building block that is used as a bases to construct all electronic business messages”. Or it is defined as “a building block for the creation of a semantically correct and meaningful information exchange ‘parcel..’ It contains only the information pieces necessary to describe a specific concept.”
- b A business process should be modeled using a standard approach, the UN/CEFACT Modeling Methodology (UMM). This model is based on the Open-edition Reference Model (ISO/IEC 14662 (ebXML, 2001).
- c Core components that have no business meaning on their own are Core Component Types (CCT). When they are reused in a business context, they become Basic Information Entities. For example, quantity on its own has no business meaning, whereas the quantity shipped does have business meaning. Core Component Types consist of one component that carries the actual value (value component) plus others that give extra definition to the value (supplementary component(s)). For example, the value component 12 has no meaning on its own, but 12 kilometers or 12 Euros do have meaning (ebXML, 2001c).
- d The CPP describes the capabilities of an individual party. A CPA describes the capabilities that two parties have agreed to use to perform particular Business Collaboration. These CPAs define the “information technology terms and conditions” that enable Business documents to be electronically interchanged between parties. These CPAs are electronic documents that can be processed by computers at the parties’ sites in order to set up and then execute the desired Business information exchange. The “legal” terms and conditions of a Business agreement are not include in the CPP and CPA (OASIS, 2003d).
- e In the R&R, ebXML specifications, business process scenario and CC and CPP are stored (ECOM, 2003b).
- f An enterprise may choose to represent itself as multiple parties, for example, it might represent a central office supply procurement organization and a manufacturing supplies procurement organization as separate parties. The enterprise may then construct a CPP that includes all of its units that are represented as separate parties. In the CPP, each of those units would be represented by a separate PartyInfo element (OASIS, 2003d).

By using these technical components, the interaction between two parties in two companies depicted in Graphic 9 can be processed as follows. At first, a party may describe itself in a single CPP. A party may create multiple CPPs that describe, for example, different Business Collaborations that it supports, its operations in different regions of the world, or different parts of its organization. To enable Parties wishing to do Business to find other Parties that are suitable Business Partners, CPPs may be stored in a repository such as is provided by the ebXML Registry. Using a discovery process provided as part of the specifications of a R&R, a party, for example Party B, may then use the facilities of a R&R to find Business Partners (Graphic 11). If Party A were picked out, then Party A and Party B use their CPPs to jointly construct a single copy of a CPA by calculating the interaction of the information in their CPPs. The resulting CPA defines how the two Parties will behave in performing their Business Collaboration. In order to create such CPA, a CPA Template might be usable (OASIS, 2002d).

Graphic 11

OVERVIEW OF WORKING ARCHITECTURE OF CPP/CPA WITH EBXML REGISTRY



Source: OASIS, 2002d.

OASIS expects that XML-based EDI will become the essential technology for e-business in 2010 (ebXML, 2003). The ebXML initiative is gaining industry-wide and worldwide supports. The United States and European EDI standardization organizations such as Data Interchange Standards Association (DISA), EAN International, European and Committee for Standardization (CEN), Uniform Code Council (UCC)/RosettaNet have committed to utilizing ebXML with their existing vocabularies and standards.

In the industrial sector, following key industry groups, which are mainly from the United States, have committed to utilizing ebXML with their existing vocabularies and standards: Automotive Industry Action Group (AIAG), Covisint (automobile sector), Global Commerce Initiative (GCI) (manufacturing and retailing), Petroleum Industry Data Exchange (PIDX), Open Travel Alliance (OTA), papi-Net (paper and forestry sector), Utility Industry Group (UIG), S.W.I.F.T. (financial sector). The aforementioned Bolero is contributing to the ebXML development process, especially through committing to submit the boleroXML standards to UN/CEFACT as input into their Core Components work. Along with the private sector, the United States and the Canadian Governments are adopting ebXML, through testing project of mainly Messaging Service and Registry, while Governments in Europe and the EU are supporting the ebXML development and projects such as Single European Electronic Market (SEEM). The ebXML (2003) compiles more than 50 ongoing ebXML-related projects. IT suppliers are experimenting with IT equipment developed in accordance with the ebXML architecture.

5. Traceability

While substantial progress in web technologies for e-business is being made as discussed above, the logistics sector is making efforts to level up their services and efficiencies by introducing both software and cutting-edge hardware technologies for tracking and tracing of inputs, products, and inventories, as well as cargo, air ferry, freight train, truck and vessel. The factors contributing to such innovative activities by the logistics providers are the very changes in market needs. Firstly, there are strong demands from their consignees and consigners for services to realize one-to-one marketing, rationalization and efficiency in distribution and inventory control,

JIT delivery and SCM. The second is the increasing demands from consumers for information to guarantee safety and credibility of products and services, which was triggered in turn by the outbreak of bovine spongiform encephalopathy (BSE) and the concern on genetically-modified organisms (GMOs).²⁰ Information on inputs is also useful to make efficient environmental management and product recycling, as well as countermeasures against piracy and theft. The third is an urgent need for national security measures, which is one of the most important issues for the trade community, especially trade with the United States, after September 11, 2001.

The foundation for satisfying such purposes simultaneously is real time and seamless information on cargos in transit and inventories in warehouses and shops, which might be acquired through tracking technologies, as well as historical information on products and their inputs for tracing purpose, which can be retrieved from databases by using IDs and tags assigned to individual items “uniquely.” That is to say, the technologies for traceability are composed basically of databases for data storage, updating, retrieval, and usage; and bar code format, and bar code reading systems. For the purpose of real time tracking, alternatives of bar code labels such as electronic tag and related information systems, and wireless information systems for acquiring positioning information such as Global Positioning System (GPS) and Intelligent Transport Systems (ITS) are available. Electronic seal (e-seal) and sensors are also available to monitor conditions of container and cargo real time.

One of the technological breakthroughs is the development of Radio Frequency Identification (RFID), a tag embedded a microchip with an antenna, and RFID devices, and smart card tags having computing power like CPUs and cryptography processors, both of which engage in contactless communication. Such multiple small ID tags store more information than traditional bar code can transfer information in a single transmission to terminals for communication with such ID tags. Presently there are two large initiatives to promote the diffusion of RFID standard. One is the Ubiquitous ID Center (<http://www.uidcenter.org/>) and T-Engine Forum (<http://www.t-engine.org/>) in Japan, which are led by Prof. Ken Sakamura, University of Tokyo and were derived from the TRON (The Real-time Operating system Nucleus) Project (<http://www.tron.org/>). These efforts aim at offering an open, real-time standardized development environment to achieve a ubiquitous computing environment where everything has a computer incorporated in it and is connected to a network.²¹ The other is the Auto-ID Center (<http://www.autoidcenter.org/>), which is led by the Massachusetts Institute of Technology (MIT) in the United States eliciting participation of 100 companies and four research universities in Australia, Japan, Switzerland and the United Kingdom.

Among the many expected applications of RFID, one of the most promising areas is supply chain management covering from the production lines to exits of retail stores. By putting RFID on the individual products, the producers, logistics providers, wholesalers and retailers can track and trace their products by individual item, gaining valuable information for marketing, shelf control and overall supply chain planning including inventory management in warehouses and retail stores, production planning, and transportation management. For example, it is not necessary for a supermarket’s consumers to go to cash registers for payments. Their invoices information can be

²⁰ The EU’s regulations on genetically-modified products is a point in dispute at WTO between EU and the U.S. and other countries exporting such products.

²¹ Prof. Sakamura conceived the TRON in 1984, drawing on the concept of a “computing everywhere.” The most important characteristic of the TRON Project is its “openness”. This means that its results are made available as open specification. It is said that the TRON has now become the world’s No.1 adopted standard in the field of embedded systems. The TRON Project is taking the initiative in the embedded systems field to establish a hardware platform (T-Engine) and an operating system for T-Engine (T-Kernel) for the next generation of real time systems. The Ubiquitous ID Center was established in March 2003 in the T-Engine Forum, a forum for building a ubiquitous computing environment using T-Engine. Microsoft became a member of T-Engine Forum in order to cooperate with the Forum to enable Windows CE.Net to operate on the T-Engine platform. Concerning the TRON Project, see Kagami (2003) and TRON-related websites.

transmitted at exits equipped with RFID receiver to a database of the supermarket, which information can be shared by credit card companies to pay the invoices. Such information can be utilized for one-to-one marketing, while increasing concerns for protecting private information.²²

While more companies are expected to develop abilities to track and trace their products as the costs of RFID tags become cheaper, requirements of consumers for secure products and regulations imposed by governments on suppliers and sellers may also affect the introduction of tracking and tracing facilities. Particularly, the European Union is supporting the pro-traceability policy to increase the confidence of the food industry and the public authorities to ensure that food is safe. A successful food policy is increasingly depending on the traceability of feed, food and their ingredients. This policy is being implemented in accordance with the obligation of feed and food businesses to ensure adequate procedures for traceability so that the source of a problem can be identified (Commission of the European Communities, 2000).

The introduction of regulations to obligate traceability forced food exporting countries, including the Latin American region, to develop ID numbering and bar coding systems. For example, the production of the third edition of “Traceability of Beef Guidelines” (EAN International, 2002a) published by EAN International was assisted by EAN in Argentina, Brazil, and other organizations in order to respond to Regulation (EC) 1760/2000 (called the “Beef Labeling Regulation”), which became effective from January 2001. The regulation aims to ensure a link between, on the one hand, the identification of the carcass, quarter or pieces of beef, and on the other hand, the individual animal or the group of animals from which they are derived. The production of the “Fresh Produce Traceability Guidelines” (EAN International, 2001) was also supported by EAN Argentina and Chile, and organizations from Uruguay and other countries. In Europe, the traceability is becoming an indispensable capability to access the EU market, as the Regulation (EC) No 178/2002 (Commission of the European Communities, 2002) lays down the application of traceability of food, feed, and food-producing animals and any other substance intended to be, or expected to be, incorporated into a food or feed at all stages of production, processing and distribution from January 2005.

The tracing and tracking technologies are becoming important as a tool for trade facilitation and security. Its driving force is the demands of consignors for secure SCMs against terror attacks. As discussed in the next chapter, public-private partnerships for trade facilitation, typically at the U.S. border, presume the existence of the infrastructure for traceability including e-seal. E-seals, created by combining RFID with mechanical seal for container, can provide information about who, what, where, when, and how the freight container was shipped and whether it has opened or breached illicitly (<http://www.transcore.com/>). In case of the system of Lorantech Systems, Inc. (<http://www.lorantech.com>), a cargo traceability, or the so called “in-transit (Dock-to-Dock) visibility”, is enabled by its system configured by digital satellite packet-based technologies, locking technologies, GPS, and XML, EDI and web-based interfaces. The system first obtains information about the location of a shipment anywhere in the world using GPS. The satellite system provides information to transportation providers and their partners. The system is automated and continually monitors the locations and physical characteristics of containers. Some sensors monitor temperature, shock, angular orientation (tipping), and chemical and radiation levels of cargos.

These combinations of technologies also proactively notify transportation providers of abnormalities, such as: i) the shipment strays from its original schedule; when the container is

²² Gillette, consumer products company of shaver and razor blade packets, is one of the most enthusiastic companies to introduce RFID systems. However, it has simultaneously faced intensive protests by consumer groups such as the Consumers Against Supermarket Privacy Invasion and Numbering (CASPIAN) (<http://www.nocards.org>, [Boycott Gillette, http://www.boycottgillette.org](http://www.boycottgillette.org)).

opened, whether by Customs, a trusted party, or someone unauthorized; ii) the container has been jolted, tilted or dropped beyond specified tolerance levels; iii) radiation or chemical agents have contaminated the container; iv) the container has been contaminated by water; and v) the temperature inside the container rises above an acceptable level. The complete history of a particular shipment, including a log of any exceptions that occurred during shipment can be provided for an audit trail, and enable transportation providers, consignors and consignees to make available simplified customs procedures at national borders under programs of public-private partnership.²³

For their application to international trade, the data for tracking and tracing handled through RFID and bar codes, and GPS can be dealt in a XML format. The ISO is coordinating activities to standardize such logistics technologies.²⁴ It means that all of the data for traceability can be combined with other commercial data to be shared among trade-related entities. On the other hand, there are hurdles to be cleared before RFID logistics systems are fully diffused. For example, high costs of RFID tag, accuracy of data exchange between RFID tags and readers, allocation of radio frequencies, and competition among the candidates of its standards. In addition, ID number management, which should be more sophisticated than a bar code system, is indispensable for a computer to distinguish “items.” For this purpose, a unique number (ID) has to be provided to every “item.” The Ubiquitous ID Center in Japan is constructing an ID system attached to “items” (uID: ubiquitous ID), and establishing core technologies. EAN International and Uniform Code Council (UCC) launched a joint venture named “EPCglobal, Inc.” to promote the adoption of Electronic Product Code (EPC) technology. It is a system that is based on a unique identification number called the electronic product code (EPC), developed by the Auto-ID Center (EAN International, September 15, 2003). Considering these progresses made in the RFID diffusion, some experts expect a takeoff of the RFID after 2005.

6. Prospects of XML as an E-government Standard

As observed in the preceding sections, commerce and trade-related data and information systems are converging with XML-based ones facilitating information sharing and collaboration between individual parties. From the point of view of a SCM, collaboration between the private and public sectors seems to be as an essential element to build an end-to-end international SCM. Meanwhile, such partnership can make e-government projects more effective. In the field of e-government application, more organizations have introduced XML, ebXML and other XML standards.

For example, the U.K. government promotes a well-harmonized e-government policy, which intends to introduce standardized XML specifications, aiming at information exchange and interactions among the U.K. government and its organizations, and between U.K. government and citizens, businesses worldwide, and other governments. Its e-Government Interoperability Framework (e-GIF) sets out the U.K. government’s technical policies and specifications for achieving interoperability and IT systems coherence across the public sector. It includes the definition and central provision of XML schemas²⁵ and e-Government Metadata Standard (e-GMS) for use throughout the public sector. It also examines the available XML specifications developed

²³ Lorantec Systems, Inc. “White Paper--LoranTrack: Complete In-Transit Visibility--,” September 2003 (<http://www.lorantec.com/>), Malone, Roberto “Cargo Gets Smart,” Supply Chain Technology March 2003, [inboundlogistics.com](http://www.inboundlogistics.com/articles/supplychain/sct0303.shtml) (<http://www.inboundlogistics.com/articles/supplychain/sct0303.shtml>).

²⁴ For example, ISO Technical Committee (TC): JTC 1 (Information Technology), TC 104 (Freight containers), TC 122 (Packaging), TC 204 (Intelligent transport systems), TC 211 (Geographic information/Geomatics) (<http://www.iso.org/>)

²⁵ “The purpose of a schema is to define a class of XML documents” (XML Schema Part 0: Primer, W3C Recommendation, 2 May 2001). “The W3C XML Schema Definition Language is an XML language for describing and constraining the content of XML documents” (Eric van der Vlist, “Using W3C XML Schema,” October 17, 2001, <http://www.xml.com/pub/a/2000/11/29/schemas/part1.html>). XML Schema defines a structure for XML documents that overcomes the limitations of the DTD. XML Schema was approved as a W3C Recommendation on 2 May 2001.

by various standard groups to make recommendation as to their applicability and inclusion into future version of the e-GIF. For example, the draft of e-GIF version 5.1 adopted eXtensible Business Reporting Language (XBRL) and GML (Geography Markup Language) for official use, while ebXML specifications have not been adopted yet (e-Envoy, 2003c).²⁶ In terms of the technical policies for interconnection, the e-GIF supposes that future web based services are to be based on SOAP, UDDI and WSDL.

Among e-government applications of XML and XML-based standards such as ebXML and XBRL, statistics reporting and data exchange systems are seen as one of the promising areas. In Europe, Statistics Austria developed e-Quest, a XML-based multi-questionnaire system (Kunzler, 2002a, b). Many governmental organizations look trade-related procedures as one of the most important areas to promote trade facilitation, in cooperation with the private sector agents such as customs brokers and port operators. In practice, XML-based customs automation systems may become common, as the Automated System for Customs Data (ASYCUDA), which was developed by UNCTAD and is installed in more than 80 countries, was upgraded to the XML-based "AsycudaWorld."²⁷

²⁶ The XBRL (eXtensible Business Reporting Language) is the XML-based standard for identifying and better communicating the complex financial information in corporate business reports. XBRL makes easier and more reliable the analysis and exchange of corporate financial information, which can be processed by all members of the financial information supply chain, public and private companies, the accounting profession, regulators, analysts, the investment community, capital markets and lenders (XBRL International, <http://www.xbrl.org>). XBRL has been adopted by the U.K. Inland Revenue for XML based forms and corporation tax taxonomy (e-Envoy, 2003c).

²⁷ For details on the ASYCUDA system, see UNCTAD's press release "UNCTAD Launches New E-Customs System," TAD/INF/PR/40 March 26, 2002, and Asycuda's website (<http://www.asycuda.org/>). In case of Estonia, the country considered whether its ASYCUDA information system should be replaced by a new system, or upgraded to AsycudaWorld in order to build the integrated customs information system (ICIS) (Estonian Customs "Annual Book 2002," (<http://www.customs.ee/>)).

III. Renovation of Trade and Customs Systems in the North

Although technological innovations are expanding the possibility of IT and web services to be applied to international trade, they do not necessarily mean their feasibilities. To realize their potential, not only efforts made by each trader or country but also cooperation among its trade partners are indispensable. In addition, it may be important for officials in charge of trade policy to foresee how such innovations can complement their objectives, most of which should be fulfilled through information sharing and collaboration with trading partners and the private sector. From these standpoints, this chapter will introduce practical actions and experimental efforts implemented mainly in the Northern Hemisphere, for the purpose of promoting bilateral, multilateral and intra-regional trade as well as responding to national security concerns.

A. The United States and North America

The terrorists' attacks to the U.S. on September 11, 2001 have changed the concerns of national security dramatically. The U.S. government tightened surveillance of passengers and cargo to the country. These also have strong impacts on whole passengers and trade partners of the United States as well as exporters worldwide. While such strict border security is essential, there are strong demands from the private sector to facilitate trade procedures in order to establish secure supply chain management. In order to satisfy these conflicting requirements, the U.S. government introduced three programs

–Container Security Initiative (CSI), Customs Trade Partnership Against Terrorism (C-TPAT), and 24-Hour Rule– and Free and Safe Trade (FAST) for US-Canada and US-Mexico borders. The new IT platform for customs management, the Automated Commercial Environment (ACE), is expected to become a platform for the operation of these programs.

1. Border Security Initiatives

The 24-hour rule, which requires an advanced cargo declaration from carriers and/or authorized non-vessel operating common carriers (NVOCCs), became effective on December 2, 2002. The U.S. Customs and Border Protection (CBP) uses the cargo information to identify and eliminate potential terrorist threats before a vessel sails from a foreign port to U.S. seaports. Since the enforcement of the rule began on February 2, 2003, a containerized cargo with vague cargo terms such as “freight of all kinds,” “consolidated cargo,” and “general merchandise,” is issued a “Do Not Load” message while still in the port out of the United States. If such “invalidly” described cargo were loaded without prior approval by CPB, the container would be denied permit to unlade at all U.S. ports (U.S. Department of Homeland Security, Bureau of Customs and Border Protection, “CBP Expands Enforcement of the 24-Hour Rule,” May 1, 2003).

CSI and C-TPAT, developed and initiated by January 2002 by the United States Customs, was transferred to the new Department of Homeland Security on March 1, 2003 to be re-organized into the Bureau of Customs and Broader Protection, in response to the terrorist attacks of September 11. The aim of their introduction was to prevent terrorists from smuggling weapons of mass destruction (WMD) in cargo containers from overseas locations to attack the United States and disrupt international trade, to enhance the security of the global supply chain, and facilitate the smooth passage of commerce across U.S. borders. CSI will enable Customs to screen for high-risk containers in key ports overseas, while C-TPAT will improve global supply chain security in the private sector (GAO, 2003b).

CSI was launched by the U.S. Customs in January 2002, to help prevent global containerized cargo from being exploited by terrorists. As the idea of CSI is based on the extended security zone outward so that American borders are the last line of defense, not the first. CSI consists of four core elements: i) establish security criteria for identifying high-risk containers based on advance information; ii) pre-screen containers at the earliest possible point; iii) use technology to quickly pre-screen high-risk containers; and iv) develop secure and “smart” containers. In order to implement CSI, CBP deploys its teams overseas to work with host nation’s customs officials to identify and examine high-risk containers prior to their arrival at U.S. ports.

At the first phase of CSI, the U.S. government focused on 20 major ports, which ship approximately two thirds of the volume of containers to the United States. CSI will be expanded to other ports based on volume, location and strategic concerns.²⁸ As CSI is planned as a reciprocal program, CSI offers its participant countries the opportunity to send their customs officers to major U.S. ports to target ocean-going, containerized cargo to be exported to their countries. CBP shares information on a bilateral basis with its CSI partners. Among the CSI participant countries, Japan and Canada currently station their customs personnel in U.S. ports as part of the CSI program.²⁹ As

²⁸ CSI is currently operational in the following port locations: (Western Hemisphere) Montreal, Vancouver & Halifax in Canada; (Europe) Rotterdam in The Netherlands, Bremerhaven & Hamburg in Germany, Antwerp in Belgium, Le Havre in France, Göteborg in Sweden, La Spezia and Genoa in Italy, Felixstowe, United Kingdom; and (Asia and the East) Singapore, Yokohama in Japan, Hong Kong, Busan in South Korea. Ports that are coming to CSI soon include: (Europe) Algeciras in Spain; (Asia and the East) Tokyo, Nagoya, Kobe and Osaka in Japan, Shanghai & Shenzhen in China, Laem Chabang in Thailand, Port Kelang and Tanjung Pelepas in Malaysia, Colombo in Sri Lanka; and (Africa) Durban in South Africa (http://www.customs.gov/ImageCache/cgov/content/import/cargo_5fcontrol/csi/ports_2dcsi_2dlandscape_2edoc/v5/ports_2dcsi_2dlandscape.doc, downloaded on September 3, 2003).

²⁹ Japanese customs personnel are stationed at the port of Los Angeles/Long Beach. Canadian Customs personnel are stationed at Newark and Seattle.

a cargo shipped from CSI ports have already been jointly examined by the U.S. and host country's customs officials, it is highly unlikely that shipment will be re-screened or re-examined at a U.S. port once the risk has been mitigated.

C-TPAT, initiated in November 2001, is a voluntary partnership program between U.S. Customs and private industry such as importers, brokers, manufactures, warehouses, air, land and sea carriers, other logistics service providers, to share information that will improve the security of containers as they move through the global supply chain. Under C-TPAT, Customs officials work in partnership with private industry, reviewing supply chain security plans and recommending improvements. For this purpose, the Security Profile of C-TPAT participants should be validated: customs has developed a validation process to ensure that C-TPAT participants have implemented the security measures outlined in their Security Profile and in any supplemental information provided to Customs. The validation process will also provide Customs and the C-TPAT participants with opportunities to discuss security issues and to share best practices for securing the international supply chain. The participants' Security Profile will be reviewed in consideration of the C-TPAT Security Recommendations, although they are not mandatory. In return, C-TPAT certified participants receive the benefits of a reduced likelihood that containers traveling along their supply chains will be inspected for WMDs (CBP "C-TPAT Validation Process Guidelines" January 23, 2003).

2. Automated Commercial Environment (ACE): Customs Modernization

ACE is the customs system modernization project, which began in 2001 to fulfill the Modernization Act enacted in 1993.³⁰ The primary objective of Modernization is to improve the effectiveness of Customs, all concerned agencies, and the trade and travel business communities by designing and implementing enhanced operational processes supported by automated systems that get the right information, to the right people, at the right time and place. ACE will support the major business functions such as: Portal; Accounting Management; Cargo Processing and Electronic Release (e-Release); and Border Security and Enforcement. ACE will be released in seventh phases from December 2002 to September 2007. According to newsletters of the CBP in July and September 2003, CBP's employees and 41 importers participate in ACE's pilot tests.

The ACE Portal will put in place a "single window" to provide a universal dashboard for data, tools, and information—a work tool that can be customized by each particular user, while legacy Customs system forces a Customs officer to retrieve and analyze information in different systems, including Automated Commercial System (ACS), Automated Export System (AES), and Treasury Enforcement Communications System (TECS). Not only Customs officers but also business community and government agency officials are permitted to access the information, while the access to the information is controlled depending on the authorization of each user's status and authorization. Through a single, user-friendly computer screen, users with the requisite authorization may have access to the following information: i) all transaction data for importers, exporters, carriers, shippers, etc.; ii) enforcement and targeting systems, including TECS; iii) analytical and data mining tools to search the ACE data warehouse; Office of Regulations &

³⁰ Title VI of the North American Free Trade Agreement Implementation Act [P.L. 103-182, 107 Stat. 2057] -Subtitle B- The National Customs Automation Program (NCAP) became law on December 8, 1993. This Title has often been referred to informally as the "Customs Modernization Act" or "Mod Act". This legislation is the primary business driver and legal foundation for Customs Modernization efforts. The Mod Act emphasized electronic processing as the preferred way to handle commercial importations and directed Customs to pursue automation-related programs. It also provided the foundation for Customs to redesign the trade compliance process. A critical component to accomplishing full implementation of the Mod Act is a modern automation system. The development of ACE will fulfill the requirements of the Mod Act for electronic processing and provide the automation and infrastructure necessary to support redesigned trade processes (U.S. Customs Service, 2002).

Rulings (OR&R) rulings and information; multi-agency information databases; and iv) information sources on the Customs network and the Internet.

ACE's Account Management will move Customs operations from a port-by-port, shipment-by-shipment, entry-by-entry process to a consolidated operational approach that tracks import and export activity in a single comprehensive, account-based system. Cross-border transactions and activities of importers, exporters and their service providers will be consolidated and managed in a single screen. All of the parties involved in international trade (importers, exporters, brokers, carriers, shippers, etc.) will eventually be eligible to be classified as an account. Through account management, ACE will process periodic payment of duties. The ultimate ACE revenue process will be similar to a commercial credit card payment process, with debits, credits, and a net assessment on a periodic basis.

Its Cargo Processing functions help Customs Inspectors and other relevant government officers to make faster, better, and earlier decisions for processing imports. This does not mean "pre-clearance," but advance information on shipments, pre-arrival risk assessment, intelligence analysis, and staged enforcement. This is because an authorized user can access information for clearance decision through ACE such as data files submitted by importers electronically in advance of a shipment's arrival at the border, which can be processed by an integrated risk management and targeting system. ACE will also provide tools and the technology necessary to ensure secure SCM through the following means: advanced manifesting systems for truck, ocean, rail and air; tracking of inter-modal shipment movements and cargo moving in transit (e.g., in-bond, warehouse, Foreign Trade Zone); and enhanced conveyance and transit cargo tracking for shipments from origin to destination, regardless of transportation modes.

The Border Security is a critical element of all ACE applications. ACE will provide the capability to access data in the international supply chain needed by Customs and other agencies to anticipate, identify, track, and intercept high-risk shipments. ACE's first e-release process will provide an electronic truck manifest system, filling a void in current enforcement capabilities. Through ACE, Customs officers will retrieve advance data on shipments crossing Canadian and Mexican borders for use in prescreening and advanced targeting. Existing enforcement data, coupled with registration systems for carrier and driver and expanded manifest data, will provide a consolidated view of shipment risk in near-real-time at the primary inspection booth. ACE will also implement links with biometric identification systems. These functions of ACE can support border security programs such as CSI and C-TPAT.³¹

3. Free and Safe Trade (FAST): Programs for US-Mexico and US-Canada Border

The FAST is a bilateral initiative between the United States and Canada, and between the United States and Mexico, designed to ensure border security while keeping the efficiency of cargo flows by permitting expedited release of legitimate shipments. In case of the U.S./Mexico FAST Program, it will begin in September 2003 at the Port of El Paso, Texas in the United States (at Ciudad Juarez, Chihuahua in Mexico), with additional six locations to be operated by January 2004. FAST will bring U.S./Mexico carriers benefits from, for example: i) dedicated lanes (where available) for greater speed and efficiency in the clearance of FAST transborder shipments; ii) reduced number of examinations for continued compliance with Customs FAST requirements; and

³¹ Concerning ACE, see U.S. Customs Service (2002) (2003), "Quarterly ACE Status Reports" (http://www.customs.gov/xp/cgov/toolbox/about/modernization/quarterly_reports/) and "ACE & Modernization: Overview of Key Features For the Trade," (http://www.customs.gov/ImageCache/cgov/content/import/modernization/ace/finalaceoverviewofkeyfeaturesfortrade012903_2edoc/v1/finalaceoverviewofkeyfeaturesfortrade012903.doc).

iii) a head start for the upcoming modifications to FAST that will expand eligible electronic cargo release methods.³² On the other hand, the private sector is required to meet conditions for registration. For example:

- **Manufacturer:** C-TPAT certification and C-TPAT importer's security profile. High security mechanical seals to be used on all loaded containers or trailers destined for the United States, which must follow ISO/PSA standard 17712, and meet the U.S./Mexico Border C-TPAT/FAST Seal Requirements;

- **Carrier:** Completion of the FAST U.S./Mexico Border Highway Carrier Application Process requirements that include corporate information, a security profile, and a written U.S./Mexico Border Highway Carrier Agreement,³³ through which carriers will meet all aspects of C-TPAT. Possession by carrier's drivers of valid FAST Commercial Driver Identification Cards or other identifications issued only by CBP. Loaded containers or trailers locked by high security mechanical seals;

- **Driver:** Completion of a single FAST U.S./Mexico Border Commercial Driver Application for the U.S. and Mexico. Applicants identified as low risk by CBP will report to an enrollment center where they will be interviewed, have their original identification and citizenship documents reviewed, fingerprinted and have a digital photo taken. Low-risk applicants will then be issued a FAST – Commercial Driver Identification Card.³⁴

4. Private Initiative for Container Security and Tracking

The implementation of U.S. Border Security programs depends basically on the information registered in a database, ID systems including RFID tags at the border to confirm the register information, e-seal, and other cargo inspection facilities such as X-ray and gamma-ray imaging systems for scanning cargos. There are some agents providing solutions necessary for the private sector to meet regulations (for example, TransCore, <http://www.transcore.com>). It is necessary for the private sector to invest in such facilities. In case of C-TPAT program, even foreign traders outside NAFTA member states have to bear compliance costs.

The Smart and Secure Tradelanes (SST) initiative, designed to secure ports, containers, and shipping facilities against security breaches, was commenced by the Strategic Council on Security Technology (SCST).³⁵ The SST was announced in July 2002, and its solution and IT infrastructure became operational initially at major U.S. ports as well as Singapore, Hong Kong, and Rotterdam, where three of the world's large port operators and SCST members –Hutchinson-Whampoa (Hong Kong), PSA Corporation (Singapore) and P&O Ports (Australia)–are operating. These three ports

³² The Pre Arrival Processing System (PAPS) will commence at locations along the U.S./Mexico border. The PAPS is a CBP' border cargo release mechanism that utilizes barcode technology to expedite the release of commercial shipments while still processing each shipment through Border Cargo Selectivity (BCS) and the Automated Targeting System. In case of U.S./Canada trades, each PAPS shipment requires a unique barcode label, which the carrier attaches to the invoice and the truck manifest while the merchandise is still in Canada. This information is then faxed ahead to the Customs broker in the U.S. who prepares a BCS entry in ACS. Upon the truck's arrival at the border, the Customs Inspector scans the barcode, which automatically retrieves the entry information from ACS. If no examination is required, the Inspector then releases the truck. (CBP "Pre Arrival Processing System (PAPS), http://www.customs.gov/ImageCache/cgov/content/import/commercial_5fenforcement/ctpat/fast/paps_2epdf/v2/paps.pdf).

³³ The U.S./Mexico Broader Highway Carrier Agreement is made between a Carrier and the U.S. Customs and Border Protection (CBP) to achieve a more efficient and compliant transportation process. The carrier agrees, for example, to provide the CBP with an outline of the process elements of the security procedures, which at a minimum addresses the security elements such as physical security, personnel security, and service provider requirements (U.S. Customs and Border Protection).

³⁴ Customs and Border Protection U.S. Department of Homeland Security "U.S./Mexico FAST Program," http://www.customs.gov/ImageCache/cgov/content/import/commercial_5fenforcement/ctpat/fast/mexico/mexico_5ffast_2edoc/v2/mexico_5ffast.doc.

³⁵ The Strategic Council on Security Technology is an international assembly of top executives from port operators (Hutchison, PSA, P&O), logistics technology providers, former public officials and so on. Its member list as well as some information on the SST can be found at its website (<http://www.scst.info/>).

operators' networks include not only Asia, Europe and the United States but also Latin America: Hutchison in Argentina (Buenos Aires), Bahamas (Freeport), Mexico (Ensenada, Lazaro Cardenas, Manzanillo, Veracruz), Panama (Balboa and Cristobal); and P&O in Argentina (Buenos Aires).³⁶

The SST is focused on the container security and tracking. The SST deploys baseline infrastructure, hardware (including e-seals, sensor devices and scanners), and web-based software to secure and track containers in real time to provide a range of services including: i) tamper-resistant e-seals attached on containers which contain information on the containers origin, planned routing, actual location, personnel involved in packing, inspecting, and moving the container, and the contents of the container; ii) such e-seals record time and place of any intrusions, major ports equipped with readers of the e-seals to transmit to Customs and other agencies all information about the container status (origin, location, contents and security); and iii) monitoring of containers all activity and routes of loading until final destination and seal opening in the United States.

Technologies introduced by SST initiative are based on battle-tested, real-time response information technology pioneered by the U.S. Department of Defense, called the Total Asset Visibility (TAV) network. TAV was designed and deployed to track all military shipments from weapons to boots to foodstuffs through truck, train and ship transportation from the manufacturer to the battlefield. The TAV network is built on existing U.S. and international standards and on the Universal Data Appliance Protocol (UDAP), which allows open "plug and play" integration of automatic data collection devices, such as RFID and GPS, along with sensors, scanning, and biometric systems.³⁷

Port operators and logistics providers can combine the SST with their legacy solutions to provide higher value added services. For example, PSA Logistics, a subsidiary of the PSA Corp., launched a complementary service of the SST, named N2N Solutions. These solutions are composed of four service components and are linked with PORTNET, an Internet-based port community system in Singapore. "N2N Connect" links manufactures, distributors and logistics providers to establish information sharing and processing through a central web-based system, and to deliver transportation and cargo planning tools. "N2N Secure" provides access to a global tracking infrastructure, which enables its users to comply with container security requirements, and to take a pro-active approach to managing exceptions that might happen in the operation of SCMs. "N2N Hub" transforms containers into mobile warehouses, which can be stored in PSA's yards close to its users' markets to hold their buffer inventory. "N2N Book", powered by PORTNET, is an online cargo reservations system. It also allows its users to view vessel schedules, submit booking, receive booking confirmation, submit the draft Bill of Lading (BL) and print electronic BL in real-time and electronically (PSA Logistics's press release on December 19, 2002 and "SMART CONTAINER SOLUTIONS").

B. Europe and European Union

As in the areas of transportation and IT, the issues that the European customs are facing are those of policy prescriptions common to EU Member States and the candidate countries regarding the question of how to maximize the effect of unified market formation not only for the Union as a

³⁶ According to SCST announcement on January 9, 2003, the first 100 of these "smart and secure" containers have been shipped between the ports of Hong Kong, Singapore, Seattle and Los Angeles and Long Beach in a period of six weeks. Its press release on April 22, 2003 stated that SST IT infrastructure has been installed at European ports of Rotterdam, Antwerp, and Felixstowe (U.K.) by Hutchison Port Holdings (HPH) and PSA Group.

³⁷ Savi Technology (<http://www.savi.com>) is one of the solution providers involved in the SST initiative. The company helped build and operates the TAV network.

whole but also for individual countries. This section summarizes customs system policies for the EU level and some individual countries.³⁸

1. The Concept of Customs Reengineering and Electronic Customs³⁹

The European Union is renovating customs systems to develop a simple and paperless environment for customs and trade. For this purpose, a number of communications on a simple and paperless environment for Customs and Trade, and other proposals and documents have been issued. One of the proposals is action plans included in the amendment of the Community Customs Code (Council Regulation (EEC) No 2913/92). The EU faces a series of challenges of: i) developing common electronic customs systems in response to increased volume of trade and JIT delivery; ii) meeting the urgent need to find solutions for security concerns and trade facilitation in the aftermath of September 11, 2001;⁴⁰ iii) harmonizing risk-analysis and risk-assessment techniques among EU Member States; iv) harmonizing customs policy with EU's IT strategy, "eEurope 2005" initiative;⁴¹ v) harmonizing customs reengineering strategy among Member States where individual countries have already developed their own strategies to avoid digital barriers and the obsolescence of present customs procedures.

There are basically two objectives regarding new customs procedures. One is to radically modernize legislation and procedures, and the other is to ensure interoperability through a convergent IT framework. To achieve these objectives, some actions have been proposed. Many proposals consider that electronic customs procedures, harmonized legal system and criteria and operation are the fundamental infrastructure. Such proposals for establishing e-customs will be translated into practice during the course of the Customs 2007 program (from January 2003 to December 2007).

One of the proposed actions is the adoption of the centralized clearance concept across the EU, which enables a trader to submit a declaration with the required documents at the place where the trader is established. So far, this concept has been introduced in some EU Member States through the Single European Authorizations (SEA) initiative. Under this initiative, companies, for example Philips and Toyota, are dealing with a single Customs authority for the payment of duties and clearance for imports to several European countries. In case of Toyota U.K., it imports cars from Japan into its warehouses in Belgium, Finland, France and the United Kingdom as well as containerized car parts into several European countries. Apart from the logistics on transportation involved, as an "authorized trader", it can centralize its operation in Belgium and to deal more efficiently with the Belgian Customs. Although audits are undertaken in each country, Belgian Customs takes overall responsibility.

The formal introduction of the concept of an "authorized trader" and an "authorized freight forwarder" is expected to reduce burdens of both on traders and customs administrations. Electronic declarations of goods for import before their arrival and for export before their departure can be made by authorized traders. These traders should be granted different levels of

³⁸ For example, we can find a white paper "European Transport Policy for 2010: Time to Decide," as transportation policy and eEurope as IT policy.

³⁹ Concerning the concept, see COM (2003) 452 final, 2003/0167 (COD), July 24, 2003, Brussels.

⁴⁰ In the EU, threats to security are classified into the following categories: criminal or terrorist threats; health and safety risks to consumers, which include bio-safety threat from genetically modified organisms (GMOs); and environmental and health risks (COM (2003) 452 final).

⁴¹ The main objectives to be achieved by 2005 in the framework of eEurope 2005 are: modern online public services (e-government, e-learning services, e-health services); a dynamic e-business environment; a secure information infrastructure; widespread availability of broadband access at competitive prices; benchmarking and the dissemination of good practice.

simplification according to the type of traded goods, the volume of trade, the reliability and transparency of their accounting system and his compliance. At the same time authorized freight forwarders can take over some of the obligations which would be those of authorized traders. Swedish “Stairway” is a model system that provides traders with five simplification levels of customs processes in accordance with their compliance level, among which Step 3 is developed especially for the needs of SMEs (Swedish Customs Administration, 2002a).⁴²

It is anticipated that the roles of frontier and inland customs offices might be changed as a result of introduction of the concept of centralized clearance and of authorized trader and freight forwarder. The promotion of these concepts enable frontier customs offices to focus on security checks, while inland customs offices are enabled to carry out at the trader’s premises audits and on spot checks based on commonly developed and applied risk criteria.

To ensure interoperability and legitimacy, several issues have been identified as crucial: i) the common methodology and criteria for risk management; common accreditation standards for the granting of facilitations; ii) the “single window approach”; and iii) electronic signature; and standardized and harmonized information requirement. It is also proposed that business processes will be rationalized by establishing interlinked customs offices via IT and the access to such network by SMEs. Secure Internet payment systems and information provision via the Internet in a language widely understood in the EU are also considered as important transparent customs procedures.⁴³

2. New Computerized Transit System (NCTS)

As the European Community (2001) has stated, Customs transit is one of the cornerstones of European integration because it enables to move goods and services, and people more freely. The European Community, the European Free Trade Association (EFTA: Iceland, Liechtenstein, Norway, Switzerland), and the four Visegrad (V4) countries (Hungary, Poland, Czech Republic, Slovakia) have been cooperating in building a management system for Common and Community Transit which includes temporal suspension of duties and taxes, and an information system for electronic declarations and processing. Common Transit is based on an agreement, providing a mutual system for customs transportation between the EU Community, the EFTA countries and the V4 countries. Community Transit is the movement of goods between the EU member states, based on the Community customs code.

The Common and Community Transit systems, which had been in operation since the late 1960s, began showing deficiencies in the early 1990s. The paper-based system turned out not to be fraud-proof, incapable of dealing with specific situations, and incapable of complying with the regulations in force as administrative communications and cooperation between Customs Authorities were insufficient. The transit system reforms are designed to cope with transit fraud caused by these deficiencies.

⁴² Swedish Customs is establishing one of the most advanced e-customs, and is giving special consideration to IT conditions of SMEs. It considers that XML and Internet are a crucial factor in order to offer SMEs cost efficient solutions for submitting electronic Customs declarations and benefits of the simplifications offered through the Stairway. Its “Tullverkets Internetdeklaration (TID)” offers SMEs an Internet-based service accessible via the website of the Customs, where SMEs can lodge customs declarations free of charge and around the clock. This XML-based system won the XML application Reward in Munich as the best application of an XML-based computer program in 2002. Its virtual customs office “e.tu” offers 24-hour x 7-day accesses to customs processes. Swedish Customs targets 100% of electronic customs declarations will be submitted electronically and 90% of them will be cleared automatically. For more information including “COMPACT” and “EMPACT,” see Swedish Customs Administration (2001a, b, 2002a, b) and Swedish Customs home page (<http://www.tullverket.se/>).

⁴³ Concerning security issues, there is a proposal to establish a tracking system using European satellite navigation systems, GNSS (Global Navigation Satellite System) and GALILEO (“Possible Application of GALILEO for Customs,” TAXUD/750/2002-EN, May 8, 2002, Brussels).

The key tool of new rules is the New Computerized Transit System (NCTS). The NCTS was launched on May 2000, with support from four countries (Germany, Italy, Spain, and Switzerland). This system is planned to be progressively extended to all customs offices in all countries by June 2003. Authorized traders also must be connected electronically to the NCTS by March 2004. In addition, the implementation of the NCTS is one of the prerequisites for the candidate countries.⁴⁴ The NCTS is considered as the backbone for all e-customs projects.

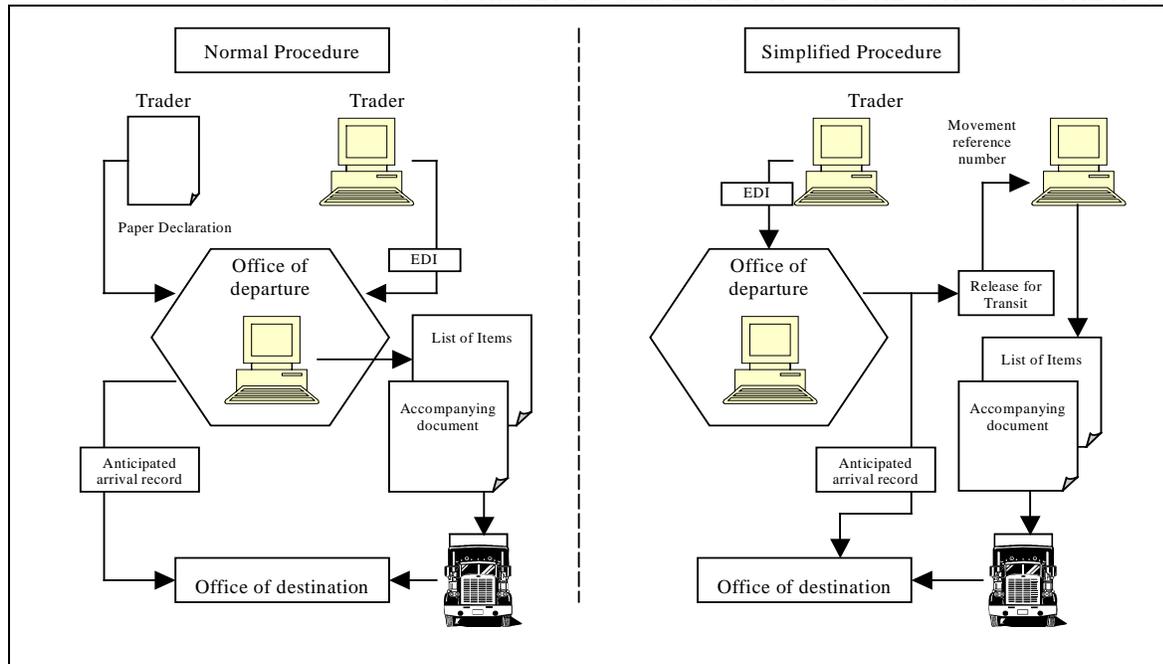
NCTS permits traders connected with customs via EDI to follow both normal and simplified procedures for customs declaration. In case of the normal procedure, a trader makes a transit declaration electronically at the customs office of departure or from the trader's own premises. The system provides the declaration with a unique registration number, the movement reference number. After finishing inspections, the system prints the transit accompanying documents and the list of items either at the office of departure or at the authorized consignor's premises. Simultaneously, the office of departure sends an anticipated arrival record to the declared office of destination, and office of transit if the declared goods have to pass there, to enable customs offices to check information on the goods before their arrival. At the office of destination, the goods are presented, together with the attached documents. The Customs of destination enter the movement reference number into the system. The corresponding anticipated arrival record located automatically by the system can be used as a basis for any action or control. The office of destination also sends an arrival advice message, and control results to the office of departure via the system. The same automation procedures are operable at the office of transit, from which a notification of crossing the frontier is sent to the office of departure. If there is a change in office of transit or destination, the actual office can send a message to the office of departure to receive the anticipated transit (arrival) record. Also, the system will automatically process the messages that were not used as a result of the change.

Authorized consignor and authorized consignee can utilize simplified procedures. The NCTS allows authorized consignors to: i) create the transit declaration in their own computer system; ii) send the corresponding declaration message electronically to the office of departure without the goods having to be physically presented there; and iii) send and receive by electronic means subsequent messages, including requests for correction of the declaration, notification of its acceptance and notification of the release of the goods. Authorized consignors are allowed to: receive the goods and the accompanying documents directly at their own premises, send the arrival notification message to the relevant office of destination electronically, and receive and send subsequent messages concerning permission to unload goods and the notification of the results of the unloading to customs electronically (European Communities, 2001, Langdon Systems, 2003).⁴⁵

⁴⁴ It was assessed that the situation and plan of connections to the NCTS by customs offices for Greece, Austria, and Luxembourg, as of January 2003, would be too rigid to achieve them. Among the candidate countries, some problems were found in the development processes in Poland and Latvia.

⁴⁵ The history of efforts for establishing transit system is very long in Europe. In 1949, the first TIR agreement was drawn up between a number of European countries, which provided for a guarantee system, which would cover the duties and other charges at risk on goods moving in Europe, in the course of international trade. In 1959, the TIR Convention was created. According to recent schedule, NCTS is to be implemented across the EC in the end of June 2003. Authorized traders must be connected electronically to the NCTS by the end of March 2004 (Langdon Systems "Langdon Trade Winds," Newsletter, Issue 1, Summer 2003).

Graphic 12

NORMAL AND SIMPLIFIED PROCEDURES THROUGH THE NCTS

Source: European Communities, 2001.

C. Asia and Pacific

Activities for harmonizing e-commerce in East and South East Asia are characterized by their strengths in both inter-government partnership and government-private partnership. Concerning the intra-regional cooperation in the field of customs procedures, the EU and North America are promoting it within the framework of free trade agreements (FTAs). Similarly, Asian governments have intensified efforts through the framework of ASEAN+East Asian partnership in collaboration with the private sector, in parallel to a FTA strategy within ASEAN. The region has also strengthened the ties with Latin America, North America, Pacific and Oceania through cooperation at APEC, while with Europe through AEAN-Europe Meeting (ASEM). At APEC, its member countries have committed themselves, through the 1998 APEC Blueprint for Action on Electronic Commerce, to a goal of achieving paperless trading, where possible, by 2005 for developed economies and 2010 for developing economies.

Under new developments on intra-and inter-regional FTA policies in East Asia, Asian countries are showing a strong political will to follow the same pass of North America and Europe. In order to harmonize e-commerce, customs systems, and trade facilitation, several important cooperation schemes and alliances have been already established. Most significant cases are examined below.

1. AFACT

The Asia Pacific Council for Trade Facilitation and Electronic Business (AFACT) was formally commenced in 1999. Its predecessor is the Asia EDIFACT Board (ASEB) established in 1990 as a mechanism to disseminate EDIFACT policies and activities in the Asia-Pacific region. Its 16 Asian country members are: Australia, Taiwan, India, Indonesia, Iran, Japan, Korea, Malaysia, Mongolia, PRC, Pakistan, the Philippines, Singapore, Sri Lanka, Thailand, and Vietnam, with the ebXML Asia Committee as associate member.

2. PAA

The Pan-Asian E-Commerce Alliance (PAA) is the regional e-commerce alliance in Asia established in July 2000, aiming to promote and provide secure and reliable IT infrastructure and facilities for efficient global trade and logistics. Its members are trade automation service providers, many of which are (semi) governmental organizations or have originated from national/regional projects. Its members are CrimsonLogic (Singapore), Korea Trade Network (KTNET), TEDI Club (Japan), Tradelink Electronic Commerce (Hong Kong), Trade-Van Information Service (Taiwan), China International Electronic Commerce Center (CIECC), TEDI Club, Dagang Net (Malaysia) and TEDMEV (Macau).

The major projects that have been implemented by the PAA are: i) cross-border transaction services, including test for secure document exchanges, such as, ebXML interoperability test, based on agreed cross-border transaction test plan; ii) mutual recognition of public key infrastructure (PKI) in partnership with certification authorities (CAs); iii) establishment of a Pan-Asian Portal (<http://www.paa.net>); iv) cargo tracking service, which was developed by KTNET under the PAA initiative; and v) financial facilitation.

The interoperability of trade-related services brings profits to customers. For example, Hyundai Motors has estimated that by using the PAA services will save over US\$1 million in setting up its own e-platform and another US\$6 million per year in inventory costs alone by reducing the lead time required for ordering (PAA homepage and press on August 28, 2003).

3. RosettaNet

RosettaNet, a consortium for e-business standards specialized in the IT industry, is not from Asia. However, it has rooted itself in Asia through cooperation with the government and industrial organizations closely tied with the government of Korea, Malaysia, the Philippines, Singapore and Taiwan (Ueki, 2003b). Asia has consistently demonstrated strong support for RosettaNet XML-based standards, including combined government funding in excess of US\$ 51 million through 2003. It formed a strategic alliance with China's Ministry of Science and Technology (MOST) in order to promote the adoption and implementation of RosettaNet standards within China's high technology industry and multinational companies (RosettaNet Press Release, September 17, 2003).

The service area of RosettaNet itself is expanding through the partnership with the Asian governments and organizations that have close relations with local governments. It is seeking closer relationship with the organizations in the field of e-customs declaration. In Malaysia, earlier 2003, Penang's Chief Minister sought to automate the customs clearance process in an effort to reduce shipment time, thereby facilitating the rapid movement of goods in and out of Penang. RosettaNet member companies Intel and Dell, working in collaboration with Royal Malaysian Customs, Exel, FedEx and the Penang Freight Forwarders Association, entered into a pilot phase to help drive the program implementation. This industry collaboration, supported by Malaysia's National IT Council (NITC), led to successful automation of the declaration process by using RosettaNet's production-proven standards. As Dagang Net introduced a B2B integration platform based on the RosettaNet's standard for transportation and declaration,⁴⁶ Dagang Net allows straight-through processing, resulting in a faster and more simplified customs clearance cycle, by having the manufacturers and 3PL companies submit the electronic shipping documentation in the specified RosettaNet formats (RosettaNet press release, September 24, 2003).

⁴⁶ PIP 3B18 (Notify of Shipment Documentation Partner Interface Process), was designed to enable the communication of shipping documentation information from a manufacturer or distributor with outsourced logistics operations to its 3PL logistics provider (RosettaNet home page).

4. ebXML Asia Committee

The ebXML Asia Committee is a regional committee, launched in December 2000 jointly by the Korea Institute for Electronic commerce (KIEC) of Korea, the Electronic Commerce Promotion Council of Japan (ECOM) of Japan and the Taipei Computer Association of Taiwan Province of China. Presently, its members consist of 24 organizational members from 11 regions of Asia Pacific (Australia, China, Taiwan Province of China, Hong Kong (China), Indonesia, Japan, Korea, Malaysia, Pakistan, Singapore, and Thailand) including ICT/e-ASEAN Unit, ASEAN.⁴⁷ The Committee deals with ebXML issues through the cooperation among Asian countries and facilitates e-commerce in that region. Its main activities include: holding of joint seminars and conferences; launching of joint projects; joint work on the promotion of interoperability among ebXML solutions;⁴⁸ establishment of ebXML Registry & Repository (R&R) for Asian region and Each Asian country; joint study on multi-linguistic support of ebXML; and reflection of Asian culture and business practices in the ebXML business processes (BP) and core components (CC).

The committee has already completed the second round interoperability test on the ebXML Message Service specification V2.0 and is calling for Registration for interoperability test as of September 2003. In August 2003, the committee started the ebXML interoperability certification program and issued the ebXML interoperability certification on ebXML Message Service specification 2.0 for 12 companies and organizations passed the interoperability test.⁴⁹ The purpose of the certification is to promote ebXML through the certification of interoperability among ebXML Asia Committee members' products. The certificate includes such information as "Class" which specifies the ebXML specification to be covered and "Level" which specifies the test categories. The ebXML Asia Committee interoperability test is performed by the Interoperability Task Group (ITG) and the interoperability certification is issued by ebXML ASIA committee (www.ebxmlasia.org).

The Asian region is one of the most pro-ebXML regions. Some ebXML deployment cases in Asia (except Japan) are listed in Table 3. As shown in the table, the main application areas of ebXML are trade, transportation, and payment, and the establishment of R&R, a kind of public goods for facilitating e-commerce.

In Hong Kong (China), the Center for E-Commerce Infrastructure Development (CECID) (<http://www.cecid.hku.hk/>) was established at the University of Hong Kong to develop e-commerce enabling technologies, to support local e-commerce standardization, to participate in international e-commerce initiatives, and to transfer e-commerce technology, knowledge and skills to the community. Funded by the Government's Innovation and Technology Commission (HK\$9.54 million (US\$ 1.2 million)) with an additional HK\$1.2 million by industrial sponsorships, Project Phoenix was established in January 2002 to develop e-commerce software infrastructure and carry

⁴⁷ Japan (ECOM (Electronic Commerce Promotion Council of Japan), Fujitsu, NEC, JASTPRO (Japan Association for Simplification of International Trade Procedures); Korea (KIEC (Korea Institute for Electronic Commerce), Innidigital, Posdata, KTNET); Taiwan (TCA (Taipei Computer Association), III (Institute for Information Industry), NII (National Information Infrastructure Enterprise Promotion Association)); Malaysia (Dagang Net, Royal Malaysian Customs); Thailand (NECTEC (National Electronics and Computer Technology Center)); China and Hong Kong (CECID (Center for E-Commerce Infrastructure Development) of Hong Kong, SKLSE (State Key Laboratory of Software Engineering), Wuhan University, etc.); Singapore (CrimsonLogic, IDA (InfoComm Development Authority of Singapore)); Pakistan (Pakistan Revenue Automation (PVT)), Australia (Portcomm, National Office for the Information Economy) (<http://www.ebxmlasia.org>).

⁴⁸ Interoperability tests on the ebXML Message Service specification V2.0 have been conducted in North America and Europe. In North America they were led by Drummond Group Inc, and in Europe by CEN (European Standardization Committee), ISSS (Information Society Standard System), eBES (e-business Board for European Standardization) (ECOM, press release (in Japanese), August 14, 2003).

⁴⁹ The ebXML Asia Committee certifies the following 12 organizations: CECID, The University of Hong Kong (Hong Kong), CrimsonLogic Pte Ltd (Singapore), Fujitsu Limited (Japan), GCOM Information Service Co., Ltd (Chinese Taipei), Hitachi Ltd. (Japan), Institute for Innovative IT, Kasetsart University (Thailand), Innidigital Co., Ltd. (Korea), KTNET (Korea), NEC Corporation (Japan), POSDATA (Korea), Samsung SDS (Korea), SKLSE (State Key Laboratory of Software Engineering), Wuhan University (China).

out pilot projects in Hong Kong, using the international ebXML standard. The project will be finished in March 2004. The targeted services are initially B2B and B2G services.

One of the pilot projects related to Project Phoenix is a development of ebXML application software for e-procurement between MTR Corporation Ltd and Saggio Company Ltd. Another service is Dangerous Goods (DG) Manifest Submission (XMLDG Project), which enables firms to directly generate DG Manifests and send them to Marine Dept. by using ebXML MS protocol. For this purpose, the project will define business process flow and XML-format document, and develop ebMS gateway and application to handle ebXML message. Among these efforts, the ebMS gateway “Hermes” has been created at the website of freebXML (<http://www.freebxml.org/pr.htm>) in 2002. The freebXML Initiative conducts some projects including open source ebXML projects for ebXML Registry/Repository, Hermes Message Service Handler, and ebMail.

Korean KTNET is developing ebXML-based services: eXtensible ENterprise Integration (XENI) (<http://www.xeni.co.kr/>) and GXMLHub. XENI provides XENI Registry V2.0, which is based on the standard of OASIS ebXML Registry/Repository Specification V2.0 and stores the data related to e-commerce, like business documents, business process, CPP/CPA, business services, and more. XENI CPP & CPA Editor was developed based on the ebXML Collaboration Protocol Profile and Agreement spec. v1.07 [ebCPPA] and enables users to edit complex-structured CPP documents. Its users also take advantage of ebXML MS by using XENI MSH. GXML Hub is KTNET’s next-generation messaging platform for global e-Trade. The infrastructure is based on the ebXML framework, with transparent seamless VAS (Value Added Service) for EDI users as well as new XML users. Combining these products lines, the company establishes and provides XENI Global e-Trade Partner (e-TP) solution. The trade partners using XENI can communicate via GXML Hub. They can also interlink these solutions with their back-end systems and databases. XENI DB Adapter processes inbound XML to database records and outbound XML from database records. XENI DB Adapter provides mapping between XML file and database structure.

Table 3

EBXML DEPLOYMENT CASES IN ASIA

System Name (Company)	Description	Notes
Pan Asian E-commerce Alliance (PAA) Activities of the Korean Institute for Electronic Commerce (KIEC)	<ul style="list-style-type: none"> Trade-Van and KTNET have completed their pilot "cargo tracing service" offered to international trade companies. Trade-Van and Tradelink developed a pilot trade document exchange system. Commercial business operation has started since July 2002. The organization has developed the National R&R named "REMKO" (Repository of ebXML Korea). The content consists of profiles for 12,000 companies, KEDIFACT library, Business Semantic Registry (BSR) and business process scenario. For domain R&R, the Trade industry R&R (KTNET), the Steel industry R&R (POSDATA) have been developed. ebXML interoperability tests were conducted for ebXML MS V2.0 and CPPA V2.0 in October 2002. B2B message (business document) development guidelines were developed based on ebXML specifications. 	<ul style="list-style-type: none"> MS, R&R and Collaboration Protocol Profile and Agreement (CPPA) specifications are being adopted for the first implementation of ebXML. KTNET, Innodigital, Samsung SDS, Hanmaek Info-tech, and eSum Technologies participated in the ebXML interoperability test. B2B message development guidelines are currently in the process of industry standard development based on the guidelines, with KIEC selecting approximately 30 model businesses in the steel, automobile, and other industries. Project start: July 2002. Project complete: December 2004.
Trade Facilitation Project (Taiwan)	<ul style="list-style-type: none"> This project is aimed at development of trade-related functions such as trade management, customs declaration, freight shipment, and international settlement of accounts. Development will start after one year of feasibility study. 	<ul style="list-style-type: none"> Project period: from January 2002 to December 2003.
Global Logistics Management Project (Taiwan)	<ul style="list-style-type: none"> This project began in January 2002 with government support. A large system consisting of Plan A through Plan E is to be development. Plan C focuses on processing electronically of payments to multiple numbers of banks and utilizes ebXML MS specification and XML Signature in messaging and communication function. 	
Payment 2004 Project (Thailand)	<ul style="list-style-type: none"> Project to develop industrial-sector payment function between banks and non-banking payment organizations. ITMX (Inter-bank Transaction Management and eXchange) to be developed. Thailand Payments Association was established. Members are Bank of Thailand, NECTEC, and Thai Bankers' Association. 	<ul style="list-style-type: none"> IFX V1.3 is adopted as standard message (business document). ebXML MS V2.0 adopted as messaging specification. Project period: from fiscal 2002 to fiscal 2004.
Activities of the CECID (Hong Kong)	<ul style="list-style-type: none"> Testing site for R&R based on ebXML Registry V2.0 specification (April 2002). Message Service Handler named "Hermes" based on ebXML MS V2.0 was developed and distributed free of royalties (September 2002). Software compliant with ebXML R&R V2.0 specification named "ebxmlr" was developed and distributed free of royalties. "ebMail," software product for e-business, is under developing. Three pilot projects based on ebXML specifications are under way. Example: Electronic sales system at Saggio Corporation. 	<ul style="list-style-type: none"> CECID (Center for E-Commerce Infrastructure Development) is the Development Center set up inside the University of Hong Kong and is subsidized by the Hong Kong government and the university. Project Phoenix is underway for a limited period from January 2002 to December 2003.

Source: ECOM, 2003a.

IV. Attempts for E-customs and Trade Facilitation in Latin America

The above-observed experiences in the Northern Hemisphere and the Asia-Pacific indicate that the concept of trade facilitation includes the efficient management of trade procedures, well-managed coordination between private activities such as production, transportation, finance and public services such as customs and port operation as well as national and transport security. In Latin America, most of the countries have already introduced electronic customs systems. In addition, some countries have established “single window” systems, especially for the purpose of export promotion. Presently, some countries are in process of integrating some modules for customs-related systems to build electronic “single window” systems. On a regional level, comprehensive cooperation in trade facilitation, based on the frameworks for integration of intra-regional economies, is being carried out, in order to enhance regional integration.

A. Information Systems

Latin American countries have already introduced some kind of IT-based customs procedures that attend their special needs. This development had been often supported by international organizations such as Inter-American Development Bank (IDB). Widespread in the region is the ASYCUDA of UNCTAD, which had been installed in the middle of 1990s in many Caribbean countries as well as in Latin America such as Bolivia, Colombia, El Salvador, Guatemala, Honduras,

Nicaragua, Panama, and Venezuela. At the same time, efforts are being made to correct administrative inefficiencies. At present, such information systems are being upgraded to “single window systems.” In the Central America, “transit” systems are also important in order to enhance effects of regional integration.

Table 4

CUSTOMS INFORMATION SYSTEMS IN LATIN AMERICA	
Country	Customs Information System
Argentina	MARIA
Bolivia	SIDUNEA++ (ASYCUDA)
Brazil	SISCOMEX (Sistema Integrado de Comercio Exterior)
Chile	ISIDORA (Integración de Sistemas Internet para el Desarrollo de las Operaciones y Regulaciones Aduaneras)
Colombia	SIDUNEA 2.62, 2.63 (ASYCUDA)
Costa Rica	Sistema Informático de Gestión Aduanera (SYGA) SIVUCE (Sistema de Trámites Electrónicos de Exportación)
Cuba	TRANSITA SADEM
Ecuador	SICE (Sistema Interactivo de Comercio Exterior)
Jamaica	CASE (Customs Automated Services)
Mexico	SOIA (Sistema de Operación Integral Aduanera) SAAI (Sistema Automatizado Aduanero Integral)
Nicaragua	SIDUNEA++ (ASYCUDA)
Panama	SICE (Sistema Integrado de Comercio Exterior)
Paraguay	SOFIA
Peru	SIGAD (Sistema de Gestión Aduanera)
Uruguay	LUCIA
Venezuela	SIDUNEA++ (ASYCUDA)

Source:

1. Brazil

The Brazilian Customs introduced in 1994 and 1997 an electronic customs system, SISCOMEX (Sistema Integrado de Comércio Exterior) for exports and imports, respectively. This is one of the oldest systems that integrated the customs controls of seaports, airports, and land frontiers, allowing the automatic collection of taxes and eliminating paper documents. Exporters and importers need to register with SECEX (Foreign Trade Secretariat) in order to make use of the SISCOMEX.

One of the characteristics of the system is that it is equipped with a risk management model, through which four different levels of inspection requirement are derived, based on available parameters such as tariff classification, countries of origin and identification code of the importer. The automated selection processes will be completed with the adoption of random selection. Based on this selection system, it derives four customs clearance channels. On the “green channel,” goods are automatically cleared. The “yellow channel” determines the examination of the documentation only. The “red channel” demands the customs officer to check the documentations and the goods. “Grey channel” means that customs value must also be examined (IDB, 2001a).

This system can be applied for export control of goods in cooperation with the Brazilian governmental institutions. For example, exporters of “dual-use chemicals” send their license applications to the Department of Nuclear Affairs and Sensitive Assets at the Ministry of Science and Technology (DNASA) electronically through SISCOMEX. The system contains comprehensive profiles of all Brazilian exporters and importers. Each firm is assigned a code number. When an exporter of controlled goods enters a license application into the system, the system’s software identifies the goods subject to export control by codes and forwards the application to DNASA, which is part of the SISCOMEX network (Zaborsky, 2003).

2. Chile

Trade facilitation and customs modernization was encouraged in Chile in the 1990s by mainly two factors. One was the implementation of the government modernization program initiated in the 1990s. The promulgation of the modernization law (No. 19,479) in 1996 required the National Customs Service (Servicio Nacional de Aduanas: SNA) to submit to the Ministry of Finance every year a program for improvement on service management, with specific targets of improvement on institutional efficiencies and service quality to the users (IDB, 2001b). The other was the increased trade flow as a result of the promotion of FTAs. During 1990 to 1998, the country's trade expanded 142 percent in real terms (WTO, 2000). These two factors contributed to the introduction of EDI. The UN-EDIFACT-based EDI system was developed in cooperation with the National Customs Service, EDI-Chile, the Customs Chamber of Chile and value-added networks providers.

In the first stage, only import declarations were transmitted by the system. The system was installed at customs posts nationwide in 1997 (Ueki, 2003). The EDI system brought about various effects. For example, the users were enabled to transmit their customs declarations from 8 a.m. to 6 p.m., and receive authorization to withdraw goods in a maximum of 1 hour and 50 minutes; previously, they could submit their declarations only between 8:30 and 9:30 a.m. and receive replies the following day; about 98 percent of declarations of entry for goods, or 54 percent of the total number of customs documents, were processed by the EDI. The number of data inputting errors fell from 14 percent to 2 percent, while a single form was introduced for the entry of goods. In addition, redesigned administrative functions made it possible to release a number of the officials for reassignment to other duties, especially inspection-related-tasks (WTO, 2000).

In 2001, National Customs Service (SNA) developed a system called “Unique Document for Exportation” (Documento Único de Salida: DUS), which permits customs agents to transfer to the Customs electronic files for a declaration for departure of goods. For this system to be viable, improvements on several fronts involving the shipping order message, document legalization, description of goods, control of goods, and filtering system for inspection were necessary.

The automation of these processes was presumably composed of systems such as Internet, on-line system, off-line system for customs agents who did not have their own software, product codes listed on the website of the Customs in advance, DUS selection through risk filter, and life-cycle control of a DUS. In addition, two schemes were prepared, one, web-based for occasional users and the other, for massive users. The introduction of the system has simplified the processes for goods departure and made them paperless. Before the project, exporters sent a shipping order to the Customs in a paper format. After carrying goods in the primary zone where physical inspections were conducted based on a result of one digit daily selection. Then, paper-based declarations for export, temporal departure, or for re-export, depending on the type of departure, were submitted. In contrast, the new system made it possible to send only one document, DUS, which is sent to the Customs in an electronic format in two stages. One is sent before bringing goods in the primary zone. After that, the other is sent to complete data for declaration or for legalization of DUS. In parallel, the inspection selection is conducted by using a system based on risk filter (Intec, 2002e).

Presently, SNA is implementing a project “Integración de Sistemas Internet para el Desarrollo de las Operaciones y Regulaciones Aduaneras (ISIDORA)” to modernize the customs information systems. The system will integrate all of the SNA's systems, improve inspection processes and simplify and standardize processes. As a result, it will become possible to transmit to the SNA all of the electronic data related with export, import and transit of goods, as well as to pay taxes. The SNA has uploaded or is preparing specifications of manifests for air, maritime and land transportation, and courier, as well as of declarations for international transit, entry, and departure. Technologically speaking, the SNA introduced the concept of “web service”. The message format

is based on XML, and transmitted through the Internet by using the SOAP communication protocol. The technological requirement is that the users need to possess computers installed web browsers, and to access to the Internet under contract with Internet Service Providers (ISPs), or from public facilities. Users can access directly to the Customs website to generate documents in accordance with the specifications. In addition, they can send documents via the Internet. In this case, it is necessary for the users to install in their computers the software that can process and emit specified documents and messages. As such software, the users can develop their own software, or install from the website of the SNA a software "MIDAS," which is a document management system for ISIDORA to send and receive messages from the SNA. MIDAS can operate not only on Windows operating systems but also on Linux. As solutions for security concerns, users passwords permit the access to the ISIDORA, and the electronic signature is applied to data transmission (SNA, 2003, and <http://www.aduana.cl/>).

Another ongoing project, "Administración de Reds para la Excelencia del Servicio (ARIES)" provides an internal platform of the National Customs Service while ISIDORA operates as a kind of hub for trade procedures. The objectives of the project are to modernize the computer environment in Customs offices while improving system management and cost-performance of IT investment based on Total Cost Ownership (TCO) model.⁵⁰ The reason for this adoption was that the networking environment was not thought satisfactory in meeting the needs of regional Customs offices to deal with information efficiently and securely. It was also thought desirable to process customs procedures at fields by using wireless equipments, although about 800 personal computers (PCs) had already installed in the Customs offices. In general, both e-mails and all of the files both for personal and customs use were saved in client computers that were assigned to individual officers. In this condition, there was not adequate data backup policy. In addition, there were also serious problems in administration and support system. In most cases, hardware and system troubles were solved by a basic support system, while receiving support from the technical support unit in the Valparaiso Customs office via telephone. Periodically, the engineers in the unit had to travel to regional customs offices. The ARIES project will invest to build Linux-based client-server networks in regional Customs offices, which are to be connected with the Customs network. The Customs Service has acquired more than 1,000 computers and about 100 laser printers, and modernized a networking environment. In addition, it will introduce wireless handsets. The project brings to the Customs' system administrator significant benefits such as improvement of security, centralized control of the platform, and lower costs of operation and software licenses, while giving the clients benefits such as higher PC stability, centralized support and remote administration (DNA, 2003).

While the Customs Service is implementing modernization projects, Chilean commercial and transportation sector has also developed IT systems. For example, Agencia de Aduana Edmundo Browne y Cía, one of the large customs agents, implemented a project from 1998 to 2002 to replace its earlier DOS-based system with a Windows-based one, with a relational database capability, a client-server system, and an Internet Protocol (IP) network that connects its headquarters and subsidiaries. As a result, its subsidiaries can obtain necessary information by accessing the database, instead of asking someone in the headquarters to send it by e-mail. The database can provide updated data related to a business event, which can be shared among its employees and clients. In addition, it is now possible for the agent to communicate with the Customs Service to implement export process through Internet, as well as EDI that had been utilized for import procedures. Export procedures had been done in paper format until March 2001 (Intec, 2002a).

⁵⁰ TCO takes into consideration costs such as: marginal cost, hardware and software acquisition cost, hardware and software upgrade cost, maintenance cost, support cost, informal service cost, and opportunity cost (DNA, 2003).

Empresa Portuaria Valparaíso (EPV) is an autonomous state company, which administers and develops the Port of Valparaiso, one of the representative container ports in Chile. The company implemented a project named “Sistemas de Información de Logística Portuaria Primera Etapa” (SILOGPORT I). The main objective of this project was to handle a seasonal variation of the number of cargos. About 35% of annual total of the cargos concentrate between February and April in the fresh fruit harvesting season. This caused congestion in the port, and the city, which is located at the foot of a mountain chain along the coast. Such circumstances required EPV to improve the processes for carrying in and out cargos, to coordinate port operation, and to integrate transportation companies in the port logistics chain. Responding to such a challenge, EPV developed various systems not only for cargo entry to the port and capturing cargo information, but also for management of cargos brought in the port, while introducing advanced communication systems such as optical fiber to capture information from remote places. At the same time, EPV developed partnerships with Servicio Agrícola Ganadero (SAG), Asociación de Exportadores (ASOEX), Terminal Pacífico Sur (TPS), Servicio Nacional de Aduana and private companies such as Rutacert that certifies movements of vehicles by monitoring them based on GPS. Such communications infrastructure enabled the clients of EPV to access to an Internet portal to login a system where the clients can trace cargos in the port. In addition, the logistics providers were enabled to make plans to dispatch trucks to the port. As a result, the waiting time of tracks in the port diminished from 18 hours in 1999 to 11 hours in 2002, while traffic jams in the city were substantially reduced (Intec, 2002d).

1. Costa Rica

The Government of Costa Rica decided to launch in 1989 the Customs Modernization Project, which included the development of a computer information system to simplify and expedite customs operation, training activities and studies on amending customs legislation. In the early 1990s it launched a comprehensive project that focused on organizational restructuring which involved inspection and automation, simplification of customs procedures and legislation. Through the modernization, the country succeeded in decrease the average time for goods clearance from six days before 1994 to four hours as from 1996. In 2000, with the application of selective and random checks (red and green customs channels), which was introduced during this project, clearance procedures not involving either physical or documentary inspection took an average of 12 minutes and those requiring physical inspection an average of 115 minutes. In addition to training of customs professional staffs and establishment of bodies for public-private partnership, new procedures methods already introduced or to be introduced in the future are as follows:

- Risk assessment and control techniques using selective and random criteria.
- Pre-arrival or advance goods clearance for export and import.
- In-works and commercial clearance introduced in 1996. In-works clearance allows companies specializing in industrial processes to receive goods directly in their own warehouses. Commercial clearance has the same characteristics as in-works clearance, though it is applied to regular importers engaged in commercial activities.
- A variety of components and modules were developed to make up the Customs Information System, which can be used by customs officials and private-sector users to perform and follow up customs procedures for goods entering or leaving the country. The system also enables customs offices to control goods in “transit” that are under customs authority, and to communicate timely between them.
- Single Window for External Trade (Ventanilla Única de Comercio Exterior: VUCE) is a mechanism that has simplified export transactions. It provides users with a

unified process including all the steps involved in goods export procedures. This has also centralized procedures for obtaining permits and prior authorization for importing goods that are subject to phytosanitary and zoosanitary requirements. In the Foreign Trade Promotion Agency (PROCOMER), an Executive Board, which made up of private and public sector officials, was organized to improve the system constantly. The facilities offered by these mechanisms include centralization of the officials of a range of institutions in charge of issuing prior and export licenses, such as Ministry of Health, Ministry of Agriculture and Livestock and Council for Textile Quotas. As a result of centralization, response time per formality is 30 minutes or less.

- The Integrated System of Single Window for External Trade (Sistema Integrado de Ventanilla Única de Comercio Exterior: SIVUCE) automates the VUCE and carries out customs procedures automatically. It was introduced several months before May 2001 to render the VUCE more adaptable to business export logistics. It allows the export sector to carry out customs procedures 24 hours a day and 365 days a year by means of “pre-stamped” customs declaration. The PROCOMER furnishes exporters with both pre-stamped declarations and the software for completing and sending them. (WTO, 2001b).

In addition to these mechanisms and information systems, “Transita,” which initially had been named Sistema de Control de Tránsitos (SICONTRA), was developed and introduced from 2002. The system can be utilized at designated places that are connected via the Customs information network.

4. Cuba

The customs modernization in Cuba made progress in the 1990s, though it started in the 1980s. From 1990, the Cuban Customs began to revise and adjust the customs norms to the present conditions of the trade and the transport in the world, learning from the experiences of other countries and the context of the Kyoto Convention. In November 1993, it began to automate customs procedures, experimentally using in the Customs of the port of Havana the UNCTAD’s SIDUNEA (Spanish abbreviation of ASYCUDA) version 2.51. As its usage expanding, 90% of the customs clearance was done in automated form in 1995. In the following year, version 2.6 of the SIDUNEA was introduced and practically all the customs clearance was made online.

Nevertheless, the SIDUNEA did not adjust completely to the Cuban needs. For this reason, the Customs decided to design an automated system more apt to the characteristics of the Cuban foreign trade. This new system, Sistema Automatizado de Despacho Mercantil (SADEM) began to operate in 2000. Starting this year, the Customs began the digital interconnection among the customs offices and with the central node. The Customs Digital Network for Data Transmission already unites the main customs units of the country (<http://www.aduana.islagrande.cu/>). The SADEM consists of 14 modules such as goods declaration, administration, control lists, trade statistics, cargo manifesto. The introduction of the SADEM had large impacts on the proceeding time. In the Containers Terminal of Havana, which deals with 80 percent of the foreign trade of the country, the customs processing time decreased from 3 days to 3-4 hours. In the Jose Martí international airport and Berroa Free Zone, the time is in the order of the 10 minutes, against 72 hours before applying this system (Diario Granma, March 31, 2002, <http://www.granma.cubaweb.cu/2002/03/31/nacional/articulo03.html>).

5. Guatemala

The recent modernization of trade procedures in customs operation was the establishment in 1998 of the Superintendent of Tax Administration (Superintendente de Administración Tributaria: SAT). Soon after its establishment, the SAT started evaluation of the customs system, finding obsolete procedures that permitted corruption, delayed procedures, failure of goods control, as well as various deficiencies in inadequate infrastructure, and information systems. In order to decentralize customs systems and simplify and facilitate trade procedures while avoiding fraud and contraband and increasing tariff revenues, the government of Guatemala prepared “Customs System Development Program (Programa de Fortalecimiento del Sistema de Aduana).” This customs modernization program included restructuring activities in some areas related with administration, norm, organization, operational processes, human resource, as well as information systems that would permit the SAT to interconnect with non-governmental institutions. The program was implemented with the financial support of the IDB and other international organizations.

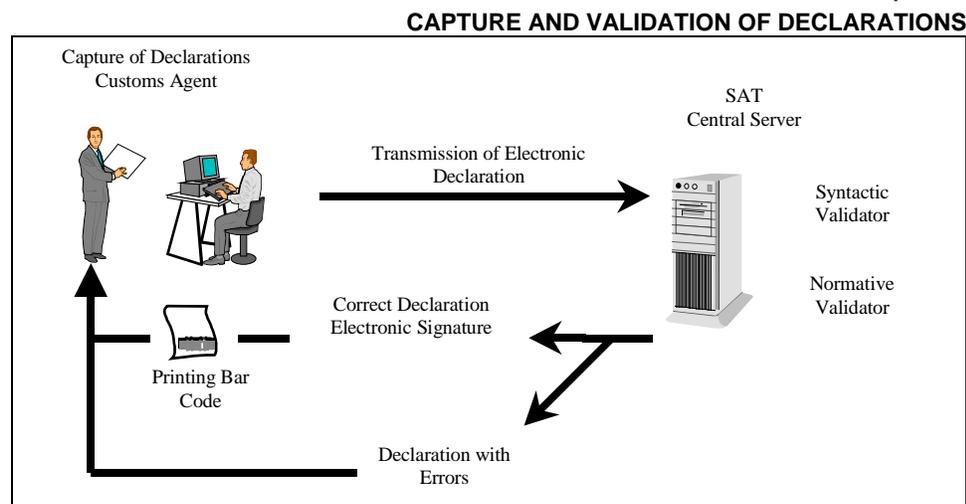
One of the most important results of the program was the development of electronic contract (póliza electrónica) system, which was introduced in Port Quetzal Customs in July 2000. This system enabled customs agents and other institutions to send data necessary for trade-related procedures from their offices in a secure manner, which resulted in saving time and resources of traders as well as SAT’s tax collectors. The system is equipped with systems for keeping high security and confidence enough to realize online verification, including personalized access key, electronic signatures, and public key cryptosystem. The validation by the system includes the verification of tariff calculation and exchange rate and other tariff requirements, as well as non-tariff requirements demanded by other governmental institutions related with health and agriculture.

The validation processes through the system, based on voluntary notification by taxpayers, go as follows. When there is no inconsistency or error in submitted applications, the central validation system generates and returns the correspondent electronic signature to the applicant who could now print a two dimensional bar code to make the following processes more agile.

Import duties payments can be made by online register on the database of the SAT through the network interconnected with banking institutions.⁵¹ The Customs authorizes the Customs clearance of applied goods by using the bar code, which processes are similar to traffic control, giving the application “green” to permit goods to pass through a customs house, and “red” to require revisions. All of the clearing processes are implemented electronically, which does not permit any opportunities for Customs officers to manipulate. The SAT’s database stores data on the date and the time of a process started and finished, as well as on results of each process. This system is interconnected with the SAT, the Guatemala Non Traditional Products Exporters’ Association (Asociación Gremial de Exportadores de Productos no Tradicionales: AGEXPRONT), Ministry of Agriculture, and Ministry of Economy, which makes it possible to process non-tariff requirements online, and to transmit information on customs declaration before presentation of goods at customs offices (IDB, 2001c).

⁵¹ Guatemala initiated BancaSAT, an online tax filing and payment system in August 2001, supported by the World Bank and managed by the SAT. Following the initial versions of BancaSAT 1 launched in August 2001 and BancaSAT 2, BancaSAT 3 incorporated customs’ declaration and payment. The development of the system served to modernize the Customs (<http://www1.worldbank.org/publicsector/egov/guatcase.htm>).

Graphic 13



Source: SAT

6. Jamaica

The Government of Jamaica had decided to develop software for the Jamaica Customs Department, after reviewing and rejecting the ASYCUDA in consideration of the negative experience of other countries in the region. The Ministry of Finance and Planning (MoFP) carried out at first a study of existing procedures to identify new requirements and strategies for a customs modernization and to prioritize the process that would have the greatest impact on efficiency through the modernization. As a result, it was decided to develop import entry lodgment system that permits importers/customs brokers to capture, validate, and submit C78 customs entries in an electronic form via the Internet, diskette or have paper entries keyed in the system at the lodgment.

The newly developed C78 Electronic Entry Lodgment System was designed to: capture import entry data, calculate duties and other taxes, and validate the entry; lodge the import entry electronically by connecting seamlessly to the Customs Automated Services (CASE) website, and initiating the file transfer; receive lodgment confirmation or lodgment rejection with detailed error analysis; and print C78 and other related forms and reports. The system enabled lodgments 24 hours and 7 days a week, decreased processing time of the entry from 2-3 days to 3-4 hours. In addition, governmental agencies and trade organization became able to make effective decisions by the improvement in the process to gather and distribute trade statistics. In addition to C78 entry lodgment, the online Internet based system CASE can provide services such as: Information and Query Services that provide various information related to Customs as well as the ability to query the status of any entries and transactions; and EDI Services that enables shipping agents to upload the Electronic Cargo Manifest in ANSIX12, CAMIR (US Government Format) and EDIFACT format. Presently, 98% of entries are submitted electronically, and 95% of the brokers are connected with the system.⁵²

On July 9, 2003, Jamaica Customs launched its e-payment system. All importers and customs brokers can access to making payments of import duties on-line up to a maximum of five million Jamaican dollars by using Visa, MasterCard, Discover or American Express credit card (Inter-American Center of Tax Administrations (CIAT), Headline, July 25, 2003, <http://www.ciat.org/>). The system was piloted from January 7, 2003 to April 15, participated by 15

⁵² "E-government in Jamaica The Customs Automation Services," 3rd High-Level Forum on City Computerization in the Asia-Pacific Region, June 2002, and "Jamaica Customs Automated Services Online," World Bank (http://www1.worldbank.org/publicsector/egov/jamaica_customs.htm).

customs brokers who submit C78 Customs Entry Forms with an error rate of less than 5%. The pilot succeeded in reducing the time to complete payments from 2-3 days to 1-2 hours. In addition to credit card payments, banking transfer payments will be introduced by the end of 2003. It is expected that the system will widen the tax base, improve the efficiency of tax administration, and affect large numbers of SMEs (U.S. Agency for International Development (USAID), “Jamaica Customs Launches ePayment System,” August 12, 2003).

These systems were developed by a government-owned IT company Fiscal Services Limited (FSL), in cooperation with the Jamaica Customs, and international aid agencies and organizations such as USAID, IDB, and World Bank. The company provides customs brokers and importers with support services and training, adding to software developments.

B. Bilateral and Intra-regional Initiatives

International trade can be facilitated fully in cooperation with other countries, generating synergy with efforts made by each country as described above. There may be two types of framework for international cooperation among the Americas: a Free Trade Agreement (FTA) and cooperation focused mainly on trade facilitation, both of which include articles or projects related to trade facilitation, customs administration and e-commerce.

Recently FTAs are increasing their importance as a strategic tool for trade facilitation, especially since the United States has changed its foreign trade policy. The most ambitious negotiation is a creation of the Free Trade Area of the Americas (FTAA) by 2005 led by 34 countries. The already established FTA networks organized by Latin American and the Caribbean countries themselves as well as the FTAs with North American countries are becoming increasingly influential in the trade policies of Latin American countries. Five Central American Countries –Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua– have already launched negotiations with the United States –Central American Free Trade Agreement (CAFTA), seeking to complete the negotiations by December 2003. Some Latin American countries also expressed interests in FTAs with the United States.

In that context, the U.S.-Chile FTA indicates the future direction of policies toward trade facilitation. In its Chapter 5 on customs administration, the text contemplates actions to expedite customs procedures by using IT based on international standards (Article 5.3). It also contemplates that shippers will be allowed to submit a single manifest covering all goods contained in a shipment transported by the “express shipment service,” through, if possible, electronic means. In addition, the FTA includes a chapter (Chapter 15) on electronic commerce. The Article 15.5 prescribes the importance of cooperation to: i) overcome obstacles encountered by SMEs in the use of e-commerce; ii) share information and experiences on regulations, laws and programs in the sphere of e-commerce; iii) maintain cross-border information flows; and iv) encourage the development by the private sector of methods of self-regulation, and actively participate in international fora. The FTA assumes that e-commerce will be a key measure to facilitate service trades, and the chapter on e-commerce has a relation with articles in other chapters.^{53, 54}

⁵³ “The Parties recognize that the supply of a service using electronic means falls within the scope of the obligations contained in the relevant provisions of Chapter Eleven (Cross-Border Trade in Services) and Chapter Five (Financial Services), ...” (Article 15.2 in Chapter Fifteen).

⁵⁴ In case of CAFTA, the U.S. Government is supporting national action plans for trade capacity building identified by each five countries, in parallel with negotiations for CAFTA. The donors are the U.S. Government, international institutions such as the IDB, corporations and non-governmental organizations. The proposed projects include some areas such as: food safety and animal health inspection; SMEs’ development; trade-related information systems and regulatory practices (United States Trade Representative (USTR), <http://www.ustr.gov/new/fta/cafta.htm>).

As intra-regional initiatives for trade facilitation in Latin America, the IDB, cooperating with other international and intra-regional institutions, is supporting two projects: Regional Infrastructure Integration in South America (Integración de la Infraestructura Regional Suramericana: IIRSA) and Plan Puebla-Panama (PPP). The IIRSA was launched by South American Presidents Summit held in Brazil in 2000, involving 12 countries in South America. This initiative aims at modernizing and developing regional physical infrastructure, including legal and regulatory aspects, in order to improve the competitiveness of South America in the age of globalization. From this perspective, its key issues are the integration of transportation networks in neighboring areas in the region, and the competitiveness and sustainability of the logistics chains based on selected hubs, while improvement and integration of energy markets and telecommunications are also recognized as important sectors for physical integration of South America. The hubs are multinational geographical areas that are characterized by high current and potential trade flows. The IIRSA will establish a minimum common standard of quality in infrastructure services with the purpose of supporting the formation of supply chains, and stimulating economic and social development in the region.⁵⁵ According to the IIRSA's website, presently considered are 12 hubs: Mercosur hub (Sao Paulo-Montevideo-Buenos Aires-Santiago); Andean hub (Bolivia-Colombia-Ecuador-Peru-Venezuela); Brazil-Bolivia-Paraguay-Chile-Peru; Venezuela-Suriname-Guyana-Suriname; Orinoco-Amazon-Plata multimodal hub; Amazon multimodal hub; Atlantic maritime hub; Pacific maritime hub; Neuquén-Concepción; Port Alegre-Jujuy-Antofagasta; Bolivia-Paraguay-Brazil; Peru – Brazil (<http://www.iirsa.org/>).

The Plan Puebla-Panama (PPP) was launched in 2001 by the leaders of State of Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama. The objective of the PPP is to strengthen the human and ecological wealth of the Mesoamerican Region, within a frame of sustainable development that respects the cultural and ethnic diversity. For that reason, the Plan outlined an integral strategy for the region that includes a set of Mesoamerican initiatives and projects. The identified initiatives are eight areas as follows: Sustainable Development; Human Development; Prevention and Mitigation of Natural Disaster; Tourism Promotion; Trade Facilitation; Road Integration; Energy Interconnection; Integration of Telecommunications Services (BCIE-BID-CEPAL, 2001).

The objective of the trade facilitation initiative is to stimulate trade in the region through actions to reduce intra-regional trade costs, especially those of logistics and finance, while promoting participations by SMEs in the process of regionalization and their access to international markets. In addition, it will open a discussion on financial integration. This initiative will complement infrastructure-related initiatives such as roads, energy, and telecommunications, which are also intended to increase competitiveness of Mesoamerica through regional actions that facilitate trade of goods. For these objectives, this initiative is consisted of four projects as follows: Customs and Boarder Crossing Modernization; Harmonization of Phytosanitary and Zoonosanitary Standard; Promotion of (Export-oriented) SMEs; and Technical Cooperation in Financial Sector.

The specific objective of Customs and Boarder Crossing Modernization project is to create a computerized standard procedure for the international transit of goods. By introducing a single declaration that compiles all of the data on goods, vehicles and people required by the agencies that participate in border control (customs, health, transport, migration. etc.), as well as a common procedure for the borders of eight countries, it will be possible to reduce procedures, processing time, and trading cost. The project will be carried out through three components as follows: coordination and disclosure; preparation and design of international transit procedure; and computerization and implantation of the procedure. The project has a complementary relation with initiatives that some donors, especially EU, have supported to create the Central American Customs Union (IDB, 2003, <http://www.iadb.org/ppp/index.asp>).

⁵⁵ "Initiative for Regional Infrastructure Integration in South America IIRSA," (power point) IDB Business Seminar: Energy, Transportation and Urban Development, October 25, 2002.

V. Conclusion and Policy Implications for Latin America

A. Global Trend of E-commerce and Trade

The observations in this paper suggest that IT systems are becoming indispensable tools for international trade in the following ways:

The first is IT as an instrument to optimize business processes. Transnational companies continue to implement SCMs in order to optimize inventory management and logistics systems. Many of them have already established information systems and databases, connecting with their domestic and overseas bases, while extending their information networks to suppliers and service providers. Based on these IT infrastructures, these companies can monitor individual products throughout their supply chains. Logistics service providers are finding business opportunities to establish closer ties with their clients and to enhance service qualities with higher value-added by providing IT-based services.

The second is IT as a solution for security concerns, while insuring higher management efficiencies. More and more consumers in developed countries are demanding information to guarantee safety and credibility of products and services. Tighter environmental regulations also require companies to file track records on products and their inputs. In addition, the terrorist attack in the United States on September 11, 2001 revealed needs for national security measures. The foundation for satisfying such purposes simultaneously is real

time and seamless information on cargos in transit and inventories in warehouses and shops, as well as IT equipments for border control.

The third is a tool for increasing integration effects of a regional economy. Recently more and more countries are promoting policies for bilateral trade agreements and regional economic integration. While the tariff reduction/elimination implemented by such agreements decreases the cost of import of goods from partner countries, the entangled networks of agreements will result in the so called “spaghetti bowl” problem, or higher transaction costs of “free” trade generated from a variety of tariff schedules based on origin and rules of origin (Bhagwati, 2003). The costs of trade procedures are by nature very high, equivalent to 5-10 % of the total trade, which can be higher than tariff rates in case of low tariff products such as IT and in countries with lower tariff schedules. The introduction of IT, involving an institutional reform to simplify trade procedures, will decrease the increasing costs caused by the tangled bilateral FTA networks.

These factors have increased the demands to connect systems that are designed by different companies in order to share information and link their back-end systems. Though there are technical and institutional barriers to interconnect them, XML-based systems, including ebXML and Web Service, serve to overcome technical barriers. In addition, some e-commerce private initiatives, which are also based on XML, are exploring complementation possibilities with electronic government systems such as e-customs in order to optimize total value chain of a variety of businesses. Presently, some governmental information systems are being upgraded to the XML-based ones. As efforts are made for standardizing XML, e-commerce systems will converge with XML-based ones.

The innovation in telecommunications technologies and logistics-related services is also being incorporated into trade logistics. It is expected that the technologies for tracing and tracking, such as e-seal, GPS, bar code and RFID, would be widely introduced as the initial costs come down. The company with capability of better information management and trade procedures may be able to reap the benefits of simplified trade procedures. The customs-related IT system is also considered as a key infrastructure to promote intra-regional trade. In Europe, the E.U. is building a system for “transit” of goods. In case of Asia, countries and private companies are cooperating in establishing standardized information systems that are interoperable among systems in individual countries in order to promote intra-regional trade.

B. Present Condition and Issues for Latin America

The changes in trade conditions observed in the Northern Hemisphere point to the importance of the efficient management of global transportation networks including customs-related processes. As observed in Chapter IV, Latin American countries have already introduced e-customs systems and succeeded in reducing the time of customs procedures dramatically. In some countries, e-customs systems are interconnected with banking systems to improve tariff collection. The computerization of such procedures resulted in improving transparency, increasing tariff revenue while decreasing corruption.

One of the characteristics of the attempts for trade facilitation and e-customs projects in Latin America is that tariff collection and anti-corruption were important incentives for the governments to promote such initiatives. In the case of advanced countries in Asia, in contrast, they were encouraged by the demands for efficient transportation systems from the private sector as well as by the competition among ports and airports in the region. In addition, export promotion efforts motivated some countries to implement institutional reform or invest in IT to establish “single window” systems. Another consideration behind the strong IT push in Asian countries is the

interest of governments and the private sector in promoting efficient intra-regional division of labor.

The difference in the approach to e-customs seems to have resulted in the remaining bottlenecks for Latin America in achieving efficient logistics. According to the data of International Exhibition Logistics Associates, average days for customs clearance in East Asian countries⁵⁶ were 3.7 while it was 7 in Argentina, 10 in Brazil and 4 in Mexico in case of air cargo. In case of Sea Full Container Load (Sea FCL) cargo, the Asian average was 4.6 while Argentina was 12, Brazil 10 and Mexico 4 (Krumm and Kharas, 2003). According to PA Consulting (2002), in 1999 the countries participating in the FTAA process developed a series of eight customs-related business facilitation measures to reduce the costs of international trade, including: temporary importation/temporary admission of certain goods related to business travelers; express shipment; simplified procedures for low-value shipments; compatible EDI systems and common data elements; harmonized commodity descriptions and coding system; customs information dissemination/hemispheric guide on customs processes; codes of conduct for customs officials; and risk analysis/targeting methodology. In 2000, 83 % of the measures had been either completely or partially implemented by the FTAA members, while the figure for EDI was only 68%. In addition, the report pointed out the lack of qualified personnel working on customs clearance as customs-related impediments to air express services in some Latin American and Caribbean countries. The more SCM-oriented management of the private sector is conducive to e-customs clearance. According to Cysco Systems (2003), 48 % surveyed companies in Argentina, Brazil, Chile, Colombia, Mexico, and Peru possess some type of Internet systems to manage their supply chains, while 29 % of sample firms that didn't have them were less inclined to acquire them in the next few years.

C. Policy Implications and Remaining Issues for Latin America

Trade facilitation is recognized as an important area as tariff rates have been reduced through the multinational negotiations at GATT/WTO and other regional, plurilateral and bilateral agreements. The APEC member countries identified, at the Ministerial Meeting in 2002, concrete actions and measures to implement the APEC Trade Facilitation Principles by 2006, in close partnership with the private sector. The objective is to realize a significant reduction in the transaction costs by 5% across the APEC region over the next 5 years. The APEC Trade Facilitation Action Plan elaborates on policy issues related to IT.

The Latin American region might be able to approach this issue by setting numerical targets for transaction costs, or the required time for customs procedures. Regardless of the approach chosen, the region has to deal with various issues simultaneously to enhance the capabilities of the private and public sectors to enter into the international market and to manage their supply chains efficiently. Based on the observations in this paper, it is possible to classify the policy issues into two aspects: general trade policy and technological policy.

1. Trade Policy

Facing global competition and IT revolution, the countries in Latin America are under pressure to reconsider trade and regional integration policies.

⁵⁶ Sample East Asian countries were China, Hong Kong, Indonesia, Malaysia, Philippines, Taiwan, Thailand, and Vietnam.

Maximization of the benefits of regional integration

Greater world competition and efforts to maximize the benefits of regional integration force a country/region/city to reassess the increasing importance of both the intra-regional and inter-regional division of labor: a country should build capacities in trade facilitation within the context of trade policy. Well-coordinated trade policies to facilitate not only exports but also imports and transits, which depend on the comparative advantage of the country, will result in the maximization of the benefits of regional integration. Electronic customs systems should be an integral part of this maximization process. In general, the import procedures are more complicated than export procedures, because the former includes procedures such as tariff collection, strict inspection, and animal/plant/food quarantine. Thus, policy coordination is indispensable among different ministries that have jurisdiction over such procedures. In addition, it is necessary for the countries in the region to harmonize customs procedures and to interconnect customs information systems in each country.

“Single Window” information system covering wider logistics chain

Several current “single window systems” cover only customs related systems such as customs declarations and tariff collection. This is mainly because the Ministry of Finance and Customs authorities have encouraged the establishment of such systems for the purpose of customs collection. On the other hand, the customs procedures are only a part of the trade procedures for the private sector, which is pursuing the optimization of overall supply chains. In order to satisfy the demands from the private sector, the single windows systems can interchange data with all of the trade-related systems including systems for ports, trade finance and traders’ backend systems, permitting users to access all of the information on trade procedures and regulations. The resulting modernized single window information system has the same function as portal sites such as “Yahoo” and “Google.”

Re-definition of the role of Customs Authority

The private sector calls on customs authorities to facilitate trade procedures. On the other hand, the increasing interest in national security requires the customs authorities to input more resources in the inspection processes. These seemingly incompatible requirements imply that customs authorities will be more service-oriented, while enhancing the capability to respond to security requirements. The public-private partnership will be necessary to satisfy these goals. As customs IT systems become more logistics-oriented, and increasingly based on widely accepted standards such as the WCO’s data model and XML-based ones, the private IT service providers will be able to develop and manage the customs information systems.

Multi-channel trade facilitation system targeting SMEs

All of the companies, including SMEs, should be able to take advantage of the opportunities that e-customs and trade facilitation offer. For this purpose, customs authorities should prepare a “menu” of simplified trade procedures, from which companies can select a process for trade in accordance with their management ability and frequency of international trade.

2. Information Technology

In addition to the changes in the international trade environment, technological innovations force the governments in Latin America to update IT and transportation strategies. The adoption of the new technologies will bring benefits to SMEs.

Upgrading e-customs systems

The recent technological trend shows that XML and Web Service will be fundamental in the future information society. In addition, the new technologies have a potential to realize efficient

data sharing among various governmental organizations and private companies. Such information infrastructure will dramatically improve documentation processes. E-customs systems, which constitute a part of e-government systems, will be able to catalyze the diffusion of the advanced technologies.

Participation in the activities for standardizing e-commerce technology

Recent activities for e-commerce standardization include attempts to standardize the business process. The business communities in the Northern Hemisphere are making efforts to introduce their business practices into new standards such as ebXML. In general, Latin American companies have introduced the IT systems that are well standardized and widely utilized by the United States and European firms. Although this standardization strategy is rational when they introduce new technologies, the adaptation costs to introduce business processes different from their own business culture will be expensive, especially for non-export-oriented SMEs.

Building common e-commerce and e-logistics infrastructure

Registry & Repository or UDDI will be a public facility of the future web-based e-commerce. Companies that wish to enter the global market on the Internet will not be able to gain full benefits of the e-commerce without these systems. Companies and governments in Latin America can cooperate to build these information infrastructures on a country level as well as on a regional level.

By nature, logistics and transportation can function well only when they are networked correctly. This implies that the emerging e-logistics systems will encourage Latin American countries to coordinate policies of logistics and transportation information systems. The areas to be coordinated include ID management and frequency allocation for trace and tracking of cargos and products.

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