

Standard Model of Logistics Information Systems

(adopted at the third session of the Ministerial Conference on Transport, 5-9 December 2016, Moscow)

Introduction

The evolution of Information and Communications Technology (ICT) has provided immense opportunities to improve the efficiency and effectiveness and ensure the continuous development of the logistics sector at both national and transnational level through the establishment of Logistics Information Systems. However, the establishment and utilization of such systems involve considerably technical complexity. The Standard Model of Logistics Information Systems should be considered by referring to technical details listed in the “Regional Study: The use of Logistics Information Systems for increased efficiency and effectiveness” report available for download from UNESCAP website: <http://www.unescap.org/resources/regional-study-use-logistics-information-systems-increased-efficiency-and-effectiveness>.

The main elements and technical recommendations for consideration when establishing new logistics information systems or developing existing ones are listed below.

Main elements to be considered prior to establishing Logistics Information Systems

- Characteristics of the systems e.g.:
 - National and/or transnational;
 - Single Window or information platform;
- Responsibilities/functions/roles (including development, operation, lead agency of the systems) of participating public authorities/agencies as well as relevant private stakeholders.
- Data harmonization for systems interoperability:
 - Setting data types, i.e. business-government; public/private data including data security;
 - Setting data/information standards by adopting international standards and codes (e.g. UN/CEFACT Recommendations, ISO, UBL, ebXML etc.);
 - Design national codes to supplement only when necessary.

General recommendations

The development of logistics information systems as public platforms (a service provided by the public sector), at national and transnational level, is one feasible solution to facilitate cross-border transport and improve the seamlessness of international supply chains, with positive impact on trade. The use of such systems allows for harmonization and simplification of the information exchanged between and among relevant Government agencies and private stakeholders respectively.

However, establishing such systems is a complex endeavour and their effectiveness and efficiency depend on many factors. The present guidelines and recommendations have been prepared by experts who represent national Governments and private sector, for the use of public and private parties interested in establishing or developing logistics information systems. The aim is to help those parties understand the real issues and key challenges, as well as to provide strategies and methods of avoiding unnecessary costs during the implementation and operation. The following general recommendations should be considered by countries with extensive demand for logistics services, when envisaging to develop logistics information systems:

- To utilize logistics information technology systems or other ICT resources related to logistics services, in order to establish logistics information systems as public platforms providing effective and efficient national information services as well as future transnational interchange.
- To establish a regional mechanism promoting cooperation among countries in the development of national logistics information systems; ideally include therein the coordination of standards and the development of cooperation through a legal framework.
- To consider Government investment or public-private partnerships to fund the development of logistics information systems.
- To adopt the **Standard Model of Logistics Information Systems** in the development of national system.

1. Standard Model of Logistics Information Systems

1.1 Introduction

A large volume of information is transmitted between Government agencies and business companies prior, during and after logistics operations. Regulatory and information requirements from Governments in combination with extensive documents and data exchanges among different trade partners may cause tremendous administrative burden on both public and private stakeholders and increase the possibility of data errors. Big companies may cope with the administration through sufficient human resources and internal information systems but most SMEs operate with minimal human resources and do not have the financial capabilities to implement complex information systems.

Single point architecture is a low-cost solution to provide single access point to all logistics services, particularly for SMEs. It enhances the accessibility and handling of information, expedites and simplifies information flows, resulting in greater data sharing between companies and Government.

It is strongly recommended that national information systems are established with due consideration of compatible common standards of other countries in the region. This will facilitate the subsequent interconnection of systems.

Political will of the relevant governmental authorities and full support and participation of the business community are the most important prerequisites for the successful implementation of a single access point facility. Equally important is the basic legal framework, which should include regulations on security of data exchange and data protection/privacy.

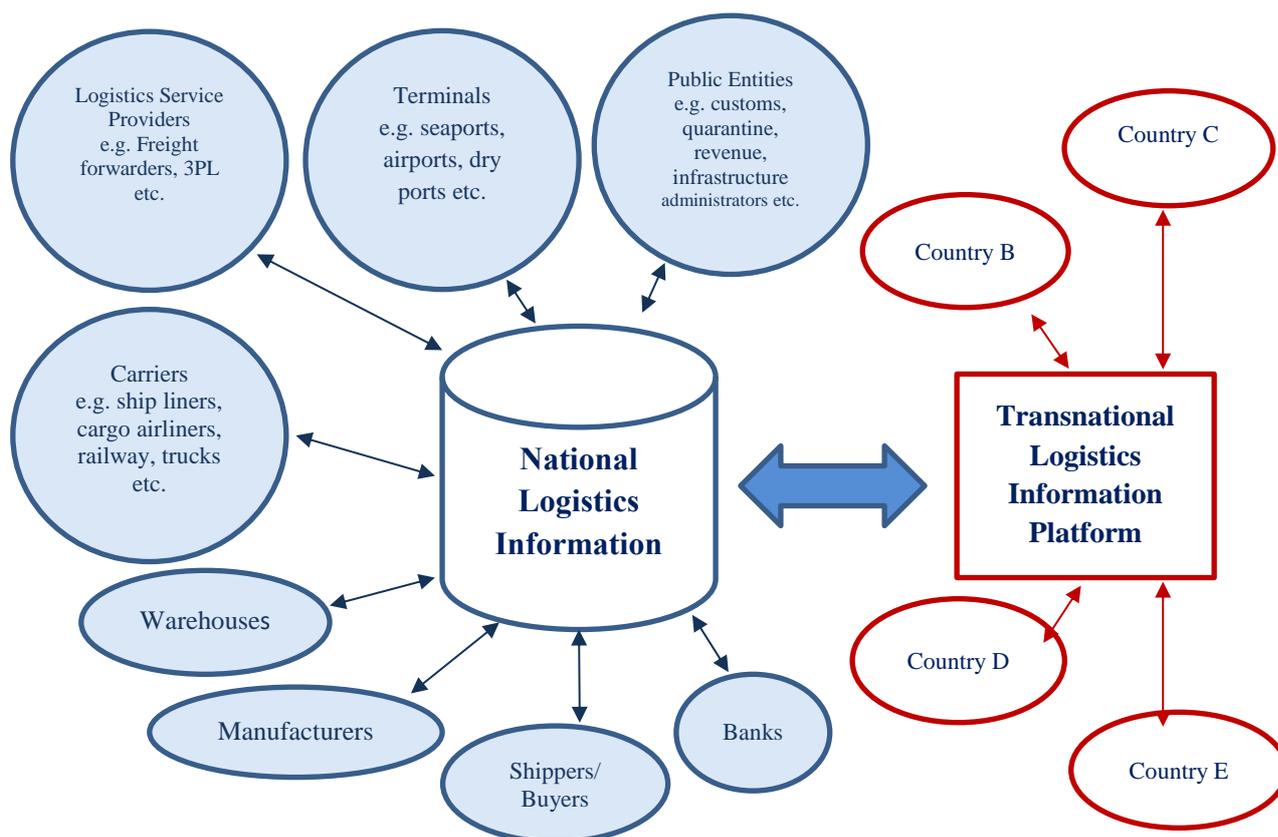
1.2 Overall architecture

National logistics information systems have to be built as operational infrastructures to fulfil the functions and services that are recommended hereafter, so that these national systems can communicate with each other using unified standards and interfaces based on a common agreement defining the information sharing mechanism.

The single access point facility provides end-to-end solutions to allow business partners transmit trade and transport documents to streamline their business process. Single Window is an example of a single entry point facility that allows parties involved in trade and transport to submit their trade related information and documents only once to Government authorities in order to fulfil import, export and transit-related regulatory requirements. National logistics information systems can provide channels for business parties to be able to connect to Single Window by means of internet links or interfaces, allowing parties not just to communicate more efficiently with their partners but also to fulfil easier the cross border procedures required by authorities.

From system architecture point of view, national logistics information systems should be designed having in mind to accommodate the requirements of potential future transnational level of information sharing mechanism. Data should also be harmonized and standardized between both national and transnational systems.

Figure 1
Illustrative diagram of the overall architecture of a logistics information system



Source: UNESCAP.

Functions

Logistics information systems should be able to perform the recommended core functions presented hereafter, in order to provide the necessary services to their users, including importers/exporters, shippers, Customs brokers, freight forwarders, warehouse operators, carriers and terminal operators.

The system should implement all types of data exchange (B2B, B2G, and G2G), and ought to cover all modes of transport (maritime, road, railway, aviation and inland waterway) to provide multi-modes services. To this end the following main functions are recommended to be built within the system:

- User management

Ensuring data security and confidentiality are paramount for any business process. Thus, user management function should include user and service registration and authentication; and various levels of authority or access to data and services.

- Data interchange

All documents should be transmitted in electronic way. Data exchange network and route are necessary for users to interchange their business data.

- Information queries

The system allows users to access service resources from various service providers through internet by performing web-search or system service call. Information resources directories should be built based on standards, and maintained on regular basis, as these directories allow users to easily access the standardized information across networks.

- Information service

The system provides users with all relevant information related to regulations and laws, administrative services, statistical data etc. through the national platform portal.

- Standardization

Data exchange standards, especially semantic standards should be developed, including data elements, code sets, business documents, business process models. It is strongly recommended to adopt widely used international standards including data harmonization specifications. The maintenance of standards is also necessary.

- Data integrity, security, and confidentiality

The systems should apply adequate information technology and operations management for the guarantee of data integrity, security, and confidentiality. Data owners should take their own responsibilities for data quality and authenticity outside the scope of the systems.

Implementers of logistics information systems should consider the existing information security technologies in order to ensure systems' security; they also need to adopt methods such as electronic signatures to ensure the safety and confidentiality of exchanges and transactions. They should refer to UN/CEFACT recommendations as presented in Table 1.

Table 1
Recommendations on electronic commerce safety

UN/CEFACT Recommendations

Rec.14 Authentication of Trade Documents by means other than signature

Rec.31 Electronic Commerce Agreement

Rec.32 e-Commerce Self-Regulatory Instruments (Codes of Conduct)

Rec.26 Commercial Use of Interchange Agreements for Electronic Data Interchange (EDI)

Universal Business Language Version 2.1, OASIS

These core functions support business partners and Government authorities to share and exchange business documents and regulation information between and among them. The systems can be based on EDI architecture or web service systems, depending on infrastructure's capabilities and financial resources. However, if the burden of legacy infrastructures is not too big and can be overcome, web-based architecture could be a better option for new system implementation. In this case, it is recommended that implementers either develop the systems using existing XML standards such as UBL 2.1 and IATA Cargo-XML, or develop their own XML standards adopting UN/CEFACT Modelling Methodology and UN/CCL and related standards and specifications.

Table 2

Recommended implementation of UN/EDIFACT

UN/CEFACT Recommendations

- Rec.14 Authentication of Trade Documents by means other than signature
- Rec.25 Use of the United Nations Electronic Data Interchange for Administration, Commerce and Transport (UN/EDIFACT)
- Rec.26 Commercial Use of Interchange Agreements for Electronic Data Interchange (EDI)
- Rec.31 Electronic Commerce Agreement
- Rec.32 e-Commerce Self-Regulatory Instruments (Codes of Conduct)

Recommended technical specifications

UN/CEFACT technical specifications

- Core Components Data Type Catalogue
- Core Component Technical Specification
- Core Components Business Document Assembly
- UML Profile for Core Components
- UN/CEFACT Modelling Methodology (UMM)
- XML Naming and Design Rules

W3C Recommendations

- Extensible Markup Language (XML) 1.0 (Second Edition), W3C Recommendation 6 October 2000
- XML Schema Part 1: Structures. Second Edition
- XML Schema Part 2: Data types. Second Edition
- XML-Signature Syntax and Processing

Unified Modelling Language Version 1.5

Recommended standards

ISO standards

- ISO 9735 Electronic data interchange for administration, commerce and transport (EDIFACT) -- Application level syntax rules (Syntax version number: 4, Syntax release number: 1) Part 1- 10
- ISO/IEC 19757-2, Information technology -- Document Schema Definition Language (DSDL) — Part 2: Regular-grammar-based validation -- RELAX NG, Information technology -- Document Schema Definition Language (DSDL) -- Part 2: Regular-grammar-based validation -- RELAX NG AMENDMENT 1: Compact Syntax
- ISO/IEC 11179-1:1999 Information technology - Specification and standardization of data elements - Part 1: Framework for the specification and standardization of data elements

UN/CEFACT standards

- United Nations Trade Data Interchange Directory (UNTDID)
- Core Components Library (UN/CCL)
- Business Requirement Specifications(BRS)
- Requirements Specification Mappings (RSM)
- XML Schemas

Universal Business Language Version 2.1, OASIS

Logistics information systems may not include all the functions needed by the users. However, the system can make these functions available by providing internet links to other relevant systems, or by automatic connection through system interfaces.

Import/export clearances

The system allows users to query for clearances status and submit declaration documents (cargo manifest, passenger list, crew list) to Government authorities, e.g. foreign trade, Customs, quarantine etc. through internet link or system connection.

Depending on the country, Government authorities involved in import/export regulation may have their own systems or may have Single Window facilities. In these cases, users may be requested to use UN/EDIFACT standard messages or XML schemas, depending on whether these systems are EDI architecture or web service systems.

Implementers of logistics information systems should build up the import/export clearance function referring to the UN/CEFACT recommendations, international conventions, and formalities listed in Table 3.

Table 3

Recommendations relevant for establishing import/export clearance function

Recommended procedures, international conventions, formalities

UN/CEFACT Recommendations

- Rec. 1, UN Layout Key for Trade Documents
- Rec.12 Measures to Facilitate Maritime Transport Documents Procedures
- Rec.13 Facilitation of Identified Legal Problems in Import Clearance Procedures
- Rec.18 Facilitation Measures Related to International Trade Procedures
- Rec.27 Pre-shipment Inspection
- Rec.33 Recommendation and Guidelines on establishing a Single Window
- Rec.34 Data Simplification and Standardization for International Trade
- Rec.35 Establishing a Legal Framework for an International Trade Single Window

WCO

- The International Convention on the Simplification and Harmonization of Customs Procedures (revised Kyoto Convention)
- Single Window Compendium
- Customs SAFE Framework of Standards
- Customs Guidelines on Integrated Supply Chain Management

UN/ESCAP

- Business Process Analysis Guide to Simplify Trade Procedures
- Data Harmonization and Modelling Guide for Single Window Environment

Recommended data elements standards

UNTDDED (ISO7372)

UN/CCL (Core Components Library)

WCO data model

UBL Common Library, OASIS

UN/ CEFACT Recommended codes

Rec.3 ISO Country Code: Code for Representation of Names of Countries

Rec.5 Abbreviations of INCOTERMS: Alphabetic Code for INCOTERMS 2000

Rec.7 Numerical Representation of Dates, Time and Periods of Time

Rec.8 Unique Identification Code Methodology-UNIC

Rec.9 Alphabetic Code for the Representation of Currencies

Rec.16 UN/LOCODE: Code for Trade and Transport Locations

Rec.17 PAYTERMS: Abbreviations for Terms of Payment

Rec.19 Codes for Modes of Transport

Rec.20 Codes for Units of Measure Used in International Trade

Rec.21 Codes for Types of Cargo, Packages and Packaging Materials

World Customs Organization HS code

Table 4

Example of an import/export clearance process and recommended documents and standards

Business process		Data and documents	Recommendations standards
Import	Registration User: - Shipper, forwarder, importer/exporter - Government authority	Submit: <ul style="list-style-type: none"> • Application Form for business registration numbers (foreign trade, Customs, quarantine, and taxation) • Identification certificate • Other relevant documents or records Obtain: <ul style="list-style-type: none"> • Business registration numbers 	UN/EDIFACT standard messages: <ul style="list-style-type: none"> - REGENT Registration of enterprise message - PARTIN Party information message - MEDPID Person identification message
	Obtain Import Licenses/Permits User: - Importer/exporter - Government authority	Submit: <ul style="list-style-type: none"> • Import permit application form • Sales contracts • Proforma invoice • Other relevant documents or records Obtain: <ul style="list-style-type: none"> • Import licenses/permits 	UN/EDIFACT standard messages: <ul style="list-style-type: none"> - SANCRT International movement of goods governmental regulatory message - ORDERS Purchase order message - ORDRSP Purchase order response message - INVOIC Invoice message XML schemas: <ul style="list-style-type: none"> - UN/CEFACT XML Schema CrossIndustryInvoice_10p1.xsd - UBL 2.1 schemas: Contract notice, invoice - IATA XML invoice
	Enter seaport/airport	See “seaport/airport clearance”	See “seaport/airport clearance”
	Transfer to import storage facility/bonded warehouse/CY	See “seaport/airport clearance”	See “seaport/airport clearance”
	Provide import declaration User: - Shipper, forwarder, importer/exporter -Government authority	Submit: <ul style="list-style-type: none"> • Import licenses/Permits • Import declaration certificate • Bill of lading or delivery order/airway bill • Packing lists • Commercial invoice • Price declaration certificate • Quarantine certificate • Phytosanitary certificate • Certificate of origin 	UN/EDIFACT standard messages: <ul style="list-style-type: none"> - CUSDEC (Customs declaration message) - CUSREP (Customs conveyance report message) - CUSCAR (Customs cargo report message) - GOVCBR (Government cross border regulatory message) - IFTMCS Instruction contract status message - DESADV Dispatch advice message - INVOIC Invoice message - PRIHIS Pricing history message - SANCRT International movement of goods governmental regulatory message

		<ul style="list-style-type: none"> Other relevant documents or records 	XML schemas: <ul style="list-style-type: none"> UBL 2.1 schemas: Bill of lading, waybill, packing list, invoice, certificate of origin IATA XML waybill (XFWB), XML house waybill (XFZB) IATA XML packing list (XPCL) IATA XML invoice (XINV) IATA XML certificate of origin (XCOO) IATA XML Customs status notification (XCSN)
	Clear goods through Customs	Activities in Customs clearance, check the submitted documents and inspect cargo in the field	The International Convention on the Simplification and Harmonization of Customs Procedures (Kyoto), WCO
	Arrange for pick up	See “seaport/airport clearance”	See “seaport/airport clearance”
Export	Registration User: <ul style="list-style-type: none"> Shipper, forwarder, importer/exporter Government authority 	Submit: <ul style="list-style-type: none"> Application form for business registration numbers (foreign trade, Customs, quarantine, and taxation) Identification certificate Resident registration certificate Cooperation registration certificate (office copy) Other relevant documents or records Obtain: <ul style="list-style-type: none"> Export licenses/permits 	UN/EDIFACT standard messages: <ul style="list-style-type: none"> REGENT Registration of enterprise message PARTIN Party information message MEDPID Person identification message
	Obtain Export Licenses/Permits User: <ul style="list-style-type: none"> Importer/exporter Government authority 	Submit: <ul style="list-style-type: none"> Export permit application Form Sales report Purchase order/sales contracts Other relevant documents or records Obtain: <ul style="list-style-type: none"> Business registration numbers 	UN/EDIFACT standard messages: <ul style="list-style-type: none"> SANCRT International movement of goods governmental regulatory message SLSRPT Sales data report message ORDERS Purchase order message ORDRSP Purchase order response message XML schemas: <ul style="list-style-type: none"> UBL 2.1 schemas: Contract notice, invoice
	Arrange transport	See “seaport/airport clearance”	See “seaport/airport clearance”

	<p>Obtain cargo insurance User: - Importer/exporter, Shipper, forwarder - Insurance agency</p>	<p>Submit:</p> <ul style="list-style-type: none"> • Cargo insurance application form • Business registration certificate • Letter of credit • Commercial invoice • Packing list • Draft bill of lading <p>Obtain:</p> <ul style="list-style-type: none"> • Insurance policy 	<p>UN/EDIFACT standard messages:</p> <ul style="list-style-type: none"> - PARTIN Party information message - DOCADV Documentary credit advice message - INVOIC Invoice message - DESADV Dispatch advice message (or IFTMCA) - IFTMCS Instruction contract status message - IPPOAD Insurance policy administration message <p>XML schemas:</p> <ul style="list-style-type: none"> - UBL 2.1 schemas: invoice, packing list, bill of lading - IATA XML Invoice (XINV) - IATA XML Packing list (XPCL)
	<p>Provide customs declaration User: - Shipper, forwarder, importer/exporter - Government authority</p>	<p>Submit:</p> <ul style="list-style-type: none"> • Export declaration certificate • Export quota • Commercial invoice • Bill of lading or delivery order/airway bill • Packing list • Certificate of origin • Inspection and quarantine certificate • Phytosanitary certificate • Export licenses/permits • Other relevant documents or records 	<p>UN/EDIFACT standard messages:</p> <p>CUSCAR (Customs cargo report message) CUSDEC (Customs declaration message) CUSREP (Customs conveyance report message) QUOTES Quote message INVOIC Invoice message IFTMCS Instruction contract status message DESADV Despatch advice message SANCRT International movement of goods governmental regulatory message</p> <p>XML schemas:</p> <ul style="list-style-type: none"> - UBL 2.1 schemas: invoice, bill of lading, waybill, packing list, certificate of origin - IATA XML waybill (XFWB), XML house waybill (XFZB) - IATA XML Packing list (XPCL) - IATA XML Invoice (XINV) - IATA XML Certificate of origin (XCOO) - IATA XML Customs Status Notification (XCSN)
Transport to export storage facility/bonded warehouse/CY		See “seaport/airport clearance”	See “seaport/airport clearance”
Transfer to seaport/airport for departure		See “seaport/airport clearance”	See “seaport/airport clearance”

	Clear goods through Customs	Activities in Customs clearance, check the submitted documents and inspect cargo in the field	The International Convention on the Simplification and Harmonization of Customs Procedures (revised Kyoto), WCO
	Handle cargo and stow on vessel/aircraft	See “seaport/airport clearance”	See “seaport/airport clearance”
	Prepare documents for importer Actor: - Exporter, import - Government authority	Submit: <ul style="list-style-type: none"> • Phytosanitary certificate application form • Certificate of origin application form • Bill of lading • Commercial invoice • Letter of credit • Draft certificate of origin • Other relevant documents or records Obtain: <ul style="list-style-type: none"> • Phytosanitary certificate • Certificate of origin) 	UN/EDIFACT standard messages: <ul style="list-style-type: none"> - SANCRT International movement of goods governmental regulatory message - IFTMCS Instruction contract status message - INVOIC Invoice message - DOCADV Documentary credit advice message XML schemas: <ul style="list-style-type: none"> - UBL 2.1 schemas: certificate of origin, bill of lading, invoice - IATA XML Invoice (XINV) - IATA XML Certificate of origin (XCOO)

Seaport/airport clearance

The system allows users to submit documents such as cargo manifest, passenger list, crew list, and ship stowage plan to port authorities through internet link or system connection.

Most seaport/airport authorities have their own systems or may be part of Single Window facilities; users of those systems may be requested to use UN/EDIFACT standard messages or XML schemas, depending on whether these systems are EDI architecture or web service systems.

Implementers of logistics information systems should build up this function referring to the UN/CEFACT recommendations, international conventions, and formalities listed in Table 5.

Table 5

Recommendations relevant for establishing seaport/airport function

Recommended procedures, international conventions, formalities

UN/CEFACT Recommendations

- Rec. 1, UN Layout Key for Trade Documents
- Rec.12 Measures to Facilitate Maritime Transport Documents Procedures
- Rec.15 Simpler Shipping Marks
- Rec.27 Pre-shipment Inspection
- Rec.33 Recommendation and Guidelines on establishing a Single Window
- Rec.34 Data Simplification and Standardization for International Trade
- Rec.35 Establishing a Legal Framework for an International Trade Single Window

Revised IMO compendium on facilitation of electronic business, IMO

IATA

Cargo Interchange Message Procedures

Conversion Guidelines between Cargo-XML and CARGO-IMP

UN/ESCAP

- Business Process Analysis Guide to Simplify Trade Procedures
- Data Harmonization and Modelling Guide for Single Window Environment

Recommended data elements standards

UNTDDED (ISO7372)

UN/CCL (Core Components Library)

WCO data model

UBL Common Library, OASIS

UN/CEFACT Recommendations codes

- Rec.3 ISO Country Code: Code for Representation of Names of Countries
- Rec.7 Numerical Representation of Dates, Time and Periods of Time
- Rec.8 Unique Identification Code Methodology-UNIC

- Rec.9 Alphabetic Code for the Representation of Currencies
 - Rec.10 Codes for the Identification of Ships
 - Rec.16 UN/LOCODE: Code for Trade and Transport Locations
 - Rec.17 PAYTERMS: Abbreviations for Terms of Payment
 - Rec.20 Codes for Units of Measure Used in International Trade
 - Rec.21 Codes for Types of Cargo, Packages and Packaging Materials
 - Rec.23 Freight Cost Code-FCC; Harmonization of the Description of Freight Costs and other Charges
 - Rec.24 Trade and Transport Status Codes
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Table 6
Example of a seaport/airport clearance process and recommended standards and codes

Business process		Data and documents	Recommended standards and codes
Arrival	Enter seaport/airport User: - Shipping company - Port authority, terminal operator	Submit: <ul style="list-style-type: none"> • Arrival notification • General declaration • cargo manifest • passenger list • crew list • ship stowage plan • Dangerous goods notification • Certificate of insurance • IMO Certificate of fitness for LNG/LPG • Other relevant documents or records 	UN/EDIFACT standard messages: <ul style="list-style-type: none"> - CALINF Vessel call information message - CUSREP Customs conveyance report message - CUSCAR Customs cargo report message - PAXLST Passenger list message - BAPLIE Bayplan/stowage plan occupied and empty locations message - IFTDGN Dangerous goods notification message - IPOAD Insurance policy administration message - IMO FAL Form 1-7 XML schemas: <ul style="list-style-type: none"> - IATA XML House manifest (XFHL), XML Flight manifest (XFFM) - IATA XML Shippers declaration for dangerous goods (XSDG)
	Transport to import storage facility / CY /bonded warehouse User: - Warehouse, CY operator - Forwarder, Consignor/consignee,	Unloading from vessel: <ul style="list-style-type: none"> • Discharge instruction • Stowage instruction • Container stack information 	UN/EDIFACT standard messages: <ul style="list-style-type: none"> - COPRAR Container discharge/loading order message - MOVINS Stowage instruction message - COEDOR Transport equipment stock and profile report message
	Customs declaration	See "Import/Export clearance"	See "Import/Export clearance"
	Arrange for pick up User: - Warehouse, CY operator - Forwarder, Consignor/consignee, inland haulage	<ul style="list-style-type: none"> • delivery order, D/O • Container load plan • Equipment interchange receipt 	UN/EDIFACT standard messages: <ul style="list-style-type: none"> - IFTMCS Instruction contract status message - COSTCO Container stuffing/stripping confirmation message - CODECO Container gate-in/gate-out report message

			XML schemas: - UBL 2.1 schemas: bill of lading, packing list - IATA XML waybill (XFWB) - IATA XML packing list (XPCL)
Departure	Arrange transport User: - Shipping company - Shipper, forwarder	<ul style="list-style-type: none"> • Booking request • a delivery of empty container • Booking • Booking confirmation 	UN/EDIFACT standard messages: - IFTMBP Provisional booking message - COREOR Container release order message - IFTMBF Firm booking message - IFTMBC Booking confirmation message XML schemas: - IATA XML Booking message (XFFR) - IATA XML Freight booked list (XFBL)
	Customs declaration	See “import/export clearance”	See “Import/Export clearance”
	Transport to export storage facility /bonded warehouse /CY User: - Warehouse, CY operator - Forwarder, consignor/consignee	<ul style="list-style-type: none"> • Dock Receipt, D/R • Container load plan • Equipment interchange receipt • Discharge and loading details • Container stack information 	UN/EDIFACT standard messages: - COPARN Container announcement message - COSTCO Container stuffing/stripping confirmation message - CODECO Container gate-in/gate-out report message - COEDOR Transport equipment stock and profile report message XML schemas: - UBL 2.1 schemas Bill of lading, packing list - IATA XML Shippers Letter of Instruction (XSLI)
Transfer to seaport/airport for departure User: - Warehouse, CY operator - Port authority, terminal operator	Stow on vessel:	UN/EDIFACT standard messages:	

		<ul style="list-style-type: none"> • Stowage instruction • Stowage report • Submit to port authority: • General declaration • cargo manifest • passenger list • crew list • ship stowage plan • Dangerous goods notification • Certificate of insurance • IMO Certificate of fitness for LNG/LPG • Departure notification • Other relevant documents or records 	<ul style="list-style-type: none"> - COPRAR Container discharge/loading order message - MOVINS Stowage instruction message - COARRI Container discharge/loading report message - TANSTA Tank status report message - BAPLIE Bayplan/stowage plan occupied and empty locations message - PAXLST Passenger list message - IFTDGN Dangerous goods notification message - IPPOAD Insurance policy administration message - IMO FAL Form 1-7 XML schemas: - IATA XML Shippers declaration for dangerous goods (XSDG)
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Payment

The system should allow importers/exporters to perform electronic payment of duties, taxes and other transport related charges to Customs, tax bureau and port authorities etc. through internet link or system connection. Implementers of logistics information systems should build up this function referring to the UN/CEFACT recommendations, international conventions, and formalities listed in Table 7.

Table 7

Recommendations relevant for establishing payment function

Recommended procedures, international conventions, formalities

UN/CEFACT Recommendations

- UN Rec. 1, UN Layout Key for Trade Documents
- UN Rec.12 Measures to Facilitate Maritime Transport Documents Procedures
- UN Rec.13 Facilitation of Identified Legal Problems in Import Clearance Procedures
- Rec.22 Layout Key for Standard Consignment Instructions
- Rec.31 Electronic Commerce Agreement
- Rec.32 e-Commerce Self-Regulatory Instruments (Codes of Conduct)
- UN Rec.33 Recommendation and Guidelines on establishing a Single Window

WCO

- The International Convention on the Simplification and Harmonization of Customs Procedures (revised Kyoto), WCO
- WCO Single Window Compendium

UN/ESCAP

- Business Process Analysis Guide to Simplify Trade Procedures
- Data Harmonization and Modelling Guide for Single Window Environment

Recommended data elements standards

UNTDED (ISO7372)

UN/CCL (Core Components Library)

WCO data model

UBL Common Library

UN/CEFACT Recommended codes

- Rec.3 ISO Country Code: Code for Representation of Names of Countries
 - Rec.5 Abbreviations of INCOTERMS: Alphabetic Code for INCOTERMS 2000
 - Rec.7 Numerical Representation of Dates, Time and Periods of Time
 - Rec.9 Alphabetic Code for the Representation of Currencies
 - Rec.16 UN/LOCODE: Code for Trade and Transport Locations
 - Rec.17 PAYTERMS: Abbreviations for Terms of Payment
 - Rec.20 Codes for Units of Measure Used in International Trade
 - Rec.23 Freight Cost Code-FCC; Harmonization of the Description of Freight Costs and other Charges
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Customs will request for duty payment after receiving and examining the submitted declaration documents. Other possible payment requests during formalities, in accordance with applicable national regulations, can also refer to the processes and recommended standards in Table 8.

Table 8
Example of a process and recommended documents and standards

<i>Business Process</i>	<i>Data and Documents</i>	<i>Recommendations Standards</i>
<p>Notify to pay duty for duties, taxes and other related charges</p> <p>User:</p> <ul style="list-style-type: none"> - Government authority, Port authority - import/export, shipper 	<ul style="list-style-type: none"> • Notice of Payment 	<p>UN/EDIFACT standard messages:</p> <ul style="list-style-type: none"> - JUPREQ Justified payment request message <p>XML schemas:</p> <ul style="list-style-type: none"> -
<p>Fulfil payment</p> <p>User:</p> <ul style="list-style-type: none"> - import/export, shipper - Government authority, Port authority 	<ul style="list-style-type: none"> • Payment Order • The receipt of duties and related taxes • Tax Invoice 	<p>UN/EDIFACT standard messages:</p> <ul style="list-style-type: none"> - PAYORD Payment order message - REMADV Remittance advice message - VATDEC Value added tax message <p>XML schemas:</p> <ul style="list-style-type: none"> - UN/CEFACT XML Schema CrossIndustryInvoice_10p1.xsd - UBL 2.1 schemas Invoice, Remittance Advice - IATA XML Invoice (XINV)

Track and trace

The system should provide past and current locations and status of cargo, pallet and container in the process of multi-modal transport and end-to-end logistics. In order to allow users to query for information on the location of their consignments implementers can either build the function in the system or ensure connection or link to related authorities' systems, and also to the cargo tracking and tracing systems run by transport operators and carriers.

Tracking and tracing information can be obtained either by extracting it from data and documents transmitted among business partners or between business companies and Government authorities, or by query for status generated by business and authority systems.

Implementers of logistics information systems should build up this function referring to the following UN/CEFACT recommendations, international conventions, and formalities listed in Table 9.

Table 9
Recommendations Relevant for Establishing Track and Trace Function

UN/CEFACT Recommendations

Rec. 1, UN Layout Key for Trade Documents

Rec.15 Simpler Shipping Marks

Rec.18 Facilitation Measures related to International Trade Procedures

Recommended data elements standards

UNTDED (ISO7372)

UN/CCL (Core Components Library)

WCO data model

UBL Common Library

GS1/EPC Global: Core Business Vocabulary (CBV, ISO/IEC 19987)

Neal-Net: Dynamic Vessel Status Sharing Service – Vocabulary;
Container Status Sharing Service – Vocabulary

UN/CEFACT Recommended codes

Rec.3 ISO Country Code: Code for Representation of Names of Countries (ISO 3166)

Rec.7 Numerical Representation of Dates, Time and Periods of Time (ISO 8601)

Rec.8 Unique Identification Code Methodology-UNIC

Rec.10 Codes for the Identification of Ships (IMO Ship Identification Number)

Rec.16 UN/LOCODE: Code for Trade and Transport Locations

Rec.19 Codes for Modes of Transport

Rec.24 Trade and Transport Status Codes

Rec.28 Codes for Types of Means of Transport

Recommended documents

UN/EDIFACT standard messages

- IFTSTA International multimodal status report message
- IFTSTQ International multimodal status request message
- HANMOV Cargo/goods handling and movement message
- CODECO Container gate-in/gate-out report message
- CUSRES Customs response message
- MEQPOS Means of transport and equipment position message

UBL 2.1 XML schemas

- Transport Progress Status Request
- Transport Progress Status
- Transportation Status Request
- Transportation Status

Other standards

GS1/EPC Global EPC Information Services Standard (EPCIS, ISO/IEC 19987)

NEAL-NET

- Dynamic Vessel Status Sharing Service – Event Lists
 - Dynamic Container Status Sharing Service – Event Lists
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Service

Based on the functions built within the logistics information system or on internet links to Government authorities or to third party service providers, the system should provide electronic transmission of all relevant business documents and information service throughout the logistics operation, including:

- Application and acceptance of submissions
- Exchange of documentations between buyers and suppliers
- Licenses information
- Common reporting scheme
- Transport service description
- Transport execution plan
- Cargo itinerary
- Transport progress status (about transport means)
- Transport status
- Reporting and statistics

Logistics information systems should be designed and implemented as single gateways that provide services to relevant stakeholders within the logistics industry. The systems should be capable of allowing user to fulfil all the requirements related to a logistics service at one stop, from submitting data and documents, applying for certain licenses and permissions, reporting for formalities, to requesting services. This can be done by providing services like Application and acceptance of submissions, Exchange of documentations between buyers and suppliers, Licenses information, and Common reporting schema.

- Application and acceptance of submissions

Business entities should be able to send instruction or request to their partners by electronic means via a web form on the internet.

- Exchange of documentations between buyers and suppliers

Business entities should be able to transmit their business documents in the format of XML schemas and EDIFACT messages.

Implementers of logistics information systems can fulfil services of Application and acceptance of submissions, Exchange of documentations between buyers and suppliers, by referring to the UN/CEFACT recommendation, international conventions and formalities, and international standards of data elements and documents and codes.

- Licenses information

Users should be able to apply or submit information such as Export

License and other certificates issued by Government authorities to relevant authorities.

- Common reporting scheme

Users should be able to report formalities in electronic format and implement their transmission using a link to a Single Window facility.

Implementers of logistics information systems can fulfil services of Licenses information, Common reporting scheme, by referring to the UN/CEFACT recommendations, international conventions and formalities, and international standards of data elements and documents and codes listed under “Function: Import/Export clearance (Table 3) and Function: Seaport/Airport clearance (Table 5)”.

Logistics information systems mainly cover processes of transport planning and execution, tracking and tracing. The systems should be capable of providing services of information flow corresponding to the physical flow of goods, by performing the processes of *Transport service description*, *Transport execution plan*, *Cargo itinerary*, *Transport progress status*, and *Transport status*.

- Transport service description

It is a document that announces the availability of a transport service, usually sent by a transport service provider.

- Transport execution plan

It is a plan agreed between a transport user and a transport service provider meant to document the details surrounding the provision of a required transport service. Business entities can transmit this document to their partners.

- Cargo itinerary

Business entities can transmit the route and time schedule for one or more transported items to their partners; usually the transport service provider informs the transport user.

- Transport progress status (about transport means)

Business partners can report and collect information about the status of the transport means.

- Transport status

It is a document containing reports of transportation status or changes in status (events) shared among a group of participants.

Implementers of logistics information systems can refer to the UN/CEFACT recommendations, international conventions and formalities, and international standards and codes listed under Function: track and trace (Table 9).

Table 10
Example of a transport service process and recommended documents and standards

<i>Business process</i>	<i>Data and documents</i>	<i>Recommendations standards</i>
Define transport service demand User: - Shipper, consignor/consignee - Forwarder, transport company (each modes of transport)	<ul style="list-style-type: none"> • Request for transport service description • Transport service description 	UN/EDIFACT standard messages: - REQDOC Request for document message - IFTSAI Forwarding and transport schedule and availability information message XML schemas: - UBL 2.1 XML schema: Transport service Description request, transport service description
Booking transport service - Forwarder, shipper, consignor/consignee - Transport company (each modes of transport)	<ul style="list-style-type: none"> • Request for transport plan • Transport plan • Goods item itinerary 	UN/EDIFACT standard messages: - REQDOC Request for document message - IFTRIN Forwarding and transport rate information message - IFTMBP Provisional booking message XML schemas: - UBL 2.1 XML schema: transport execution plan request, transport execution plan; goods item itinerary
Transport and monitor - Shipper, consignor/consignee - Forwarder, transport company (each modes of transport)	<ul style="list-style-type: none"> • Request for transport status • Transport means and equipment status • Transport status 	UN/EDIFACT standard messages: - IFTSTQ International multimodal status request message - IFTSTA International multimodal status report message - MEQPOS Means of transport and equipment position message - See other messages in “Function: track and trace” XML schemas: - UBL 2.1 XML schema: transport progress status request, transport progress status, transportation status request, transportation status Other standards: - GS1/EPC Global: EPC Information Services Standard (EPCIS, ISO/IEC 19987) - NEAL-NET: Dynamic Vessel Status Sharing Service – Event Lists; Dynamic Container Status Sharing Service – Event Lists

Logistics information systems should be capable to collect and publish logistics statistics for the use of public users by providing a service of *Reporting and statistics*.

- Reporting and statistics

Logistics related information and statistical data should be accessible to users of Logistics Information Systems.

To build this function up, implementers of logistics information systems can refer to the UN/CEFACT recommendations, international conventions and formalities, and international standards (data elements and documents) and codes as listed in Table 11.

Table 11

Recommendations relevant for the establishment of reporting and statistics function

Recommended data elements standards

UNTDED (ISO7372)

UN/CCL (Core Components Library)

UN/CEFACT Recommended codes

Rec.3 ISO Country Code: Code for Representation of Names of Countries

Rec.5 Abbreviations of INCOTERMS: Alphabetic Code for INCOTERMS 2000

Rec.7 Numerical Representation of Dates, Time and Periods of Time

Rec.9 Alphabetic Code for the Representation of Currencies

Rec.16 UN/LOCODE: Code for Trade and Transport Locations

Rec.19 Codes for Modes of Transport

Rec.20 Codes for Units of Measure Used in International Trade

Rec.21 Codes for Types of Cargo, Packages and Packaging Materials

Rec.28 Codes for Types of Means of Transport

Recommended documents

GESMES Generic statistical message

RDRMES Raw data reporting message

CLASET Classification information set message

Data standards

The international standards recommended as reference for the implementation of data standards:

Table 12

Recommendations relevant for the implementation of data standards

UN/EDIFACT Messages	Standard messages are specified and listed in UN/TDID, issued by UN/CEFACT
UNECE Recommendations on Code	Standard codes are recommended in UN/CEFACT recommendation 3, 5, 7, 8, 9, 10, 16, 17, 19, 20, 21, 23, 24, 28.
UN/TDED and UN/CCL	Standard data elements and user code list are specified and listed in UN/TDED. Standard core components, business entities, data types are specified and listed in UN/CCL.
NEAL-NET	Standardized Vessel Schedule Status, Container Status, and query interface are specified in Neal-Net.
WCO Data Model	WCO Data Model contains business process model, information model, international standard codes, harmonized data sets, and XML schemes/messages.
WCO HS	Commodity code (Harmonized System) is specified in the International Convention on the Harmonized Commodity Description and Coding System.
IMO Vessel ID number	IMO Vessel ID number is described in UN/CEFACT Rec. 10.
IMO FAL Forms	IMO FAL Forms are standard FAL Forms, including “General Declaration”, “Cargo Declaration”, “Ship’s Store Declaration”, “Crew’s Effects Declaration”, “Crew List”, “Passenger List”, “DG Manifest”.
IATA: Cargo IMP and Cargo XML	77 EDI messages widely used in the air cargo industry are specified in Message Specifications, including embedded data elements, abbreviation codes, and enhanced search function printing capabilities. Cargo XML is strongly recommended.
SWIFT	Standardized financial messages are defined by SWIFT (the Society for Worldwide Interbank Financial Telecommunication).
GS1/EPC Global	Standard XML events are specified in GS1 EPCIS (ISO/IEC 19987), and standard vocabulary elements are specified in GS1 EPCIS CBV (ISO/IEC 19987).
UBL	UBL consists of a library of XML schemas for data components such as “Address”, “Item”, and “Payment”, and a set of XML schemas for common business documents such as “Order”, “Dispatch Advice”, and “Invoice”.

Cooperation mechanisms

At national level, effective cooperation of Government agencies is fundamental for the implementation of logistics information systems. To support the process, it is important to have a designated agency leading the implementation, with the main role of coordinating all participating authorities and entities to ensure successful implementation.

Cooperation between Governments is paramount for the interconnection of their respective national logistics information systems to establish transnational/international systems. In such cases, the lead agencies from the participating countries will cooperate to implement and maintain the transnational/international platform. The cooperation may take the form of a regional mechanism with regular meetings of experts on various aspects related to the functioning and evolution of the platform.

To ensure the efficient functioning and continuous evolution of the system at both national and transnational/international levels, it is important to allocate sufficient resources: technical expertise, regular working meetings, allowing proactive, constant and regular exchanges between public and private sectors.

2. Important elements for consideration

2.1 Systems/data harmonization

Harmonization and mutual recognition of standards can enhance the availability and handling of information, simplify information flows between private partners and Governments and reduce compliance complexity by streamlining processes, avoiding redundant and conflicting standards. Effective and efficient logistics lead to overall cost reduction for all parties.

National formalities, procedures, operations and documents should be streamlined and aligned to improve interoperability among systems. Both the public and private sectors should adapt their respective existing systems to comply with international conventions, standards and practices.

At national level, different existing systems from both governmental and private sectors can be linked through a “bridging platform” to create single gateway accessibility. Similarly, such “bridging platform” can be developed to connect national logistics information systems from different countries to ensure international/transnational systems interconnectivity.

Systems/data harmonization implementation involves three broad phases:

- **Analytic framework:** the first phase is dedicated to considering and developing a broad system framework by outlining target scenarios. Scope, roles and relationships of the scenarios should be identified and defined. Exchanges and collaborations with relevant Government and private sector stakeholders are strongly encouraged so differences between specificities and technicalities of all stakeholders can be identified and considered.
- **Modelling business process and business rules:** in the second phase, system developers/implementers should focus on the harmonization of business model, i.e. standardization of business processes and business rules.

A business process is a sequence of tasks/activities that contribute (directly or indirectly) to the added value of a service or product. A process can be cross functional and ranges over several business functions. Business rules are lists of statements describing the operations, definitions and constraints which can apply to people, processes, corporate behaviour and information systems in an organization.

Business rules are extracted from the business process and can define activities in a flexible and configurable way for adapting to rapidly changing business environments. A relatively stable business process and flexible business rules allow business modellers and implementers to modify the implementation of a business process more easily, without changing and redeploying it.

“Re-use” can be an efficient and simple way to implement a system or to create the basis for standardization. A set of business rules can be used to conduct standard components for reusable building blocks that allow participants in the supply chain to develop their information systems based on the same standard business process. Standardization of business processes and business rules also simplifies systems/data mapping, enabling the interoperability.

The main reference specifications and tools for modelling business and abstracting business rules are: UN/CEFACT UMM, WCO data model, UN/CEFACT Business Requirement Specifications (BRS) and Requirements Specification Mapping (RSM). Other tools, such as UML developed by international organizations, can also be used.

- **Standardization of information:** the third level of harmonization involves the standardization of information model. An information model is a conceptual schema of a representation of concepts and the relationships, constraints, rules and operations to specify data semantics for a specific domain of application. It can provide consistent definition to the meanings and interrelationship of data based on semantic in order to share, integrate, and manage the data. Information model needs to be built to transform the work flow into data flow or data exchanges between activities.

Information modelling consists of definition of the scope, analysis of information requirements and the transformation of information requirements into a conceptual model. UML and XML schemas are recommended for building an information model.

2.2 Cooperation between standards setting organizations and industry

In designing, establishing and operating logistics information systems, it is important to consider the existing recommendations, standards and tools developed by intergovernmental agencies and international organizations such as ECE, UNCTAD, the WCO, IMO, ICAO and the ICC. Cooperation with these organizations is also very important as it (i) ensures all those interested are aware of updates, and (ii) may create the possibility for some emerging regional standards such as e-Freight and NEAL-NET Standards to be incorporated into existing or new ISO and UN standards.

Collaboration between implementers and relevant stakeholders to harmonize standards is key in avoiding divergence or overlapping between national and transnational standards, benefiting all partners in international trade, logistics and supply chain.