BS ISO 24533-2:2022

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Intelligent transport systems — Electronic information exchange to facilitate the movement of freight and its intermodal transfer

Part 2: Common reporting system

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National foreword

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INTERNATIONAL STANDARD

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Intelligent transport systems — Electronic information exchange to facilitate the movement of freight and its intermodal transfer —

Part 2: Common reporting system

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems.*

This first edition cancels and replaces the first edition (ISO/TS 24533:2012), which has been technically revised.

The main changes are as follows:

— removal of information on the interoperability of freight data exchange standards (intended to be the subject of ISO/AWI 24533-1:—[1]);

— inclusion of information on a common reporting system allowing industry and government to communicate on freight data requirements and needs in an interoperable manner.

A list of all parts in the ISO 24533 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

1) Under development. Stage at the time of publication: ISO/AWI 24533-1:2022.

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Introduction

The seamless exchange of accurate, complete and timely data communication at transportation hand-offs has always been important for efficiency and accountability. Hand-offs with a universal method of exchange that allows data interoperability between all parties in the supply chain is critically important for maximizing efficiency and accountability. The efficient exchange of data also provides for security of transport information and for transfer of information related to security against terrorism as well as theft and traditional contraband. It is imperative for standards development organizations to address and facilitate the handling of these needs.

Consequently, Technical Committee ISO/TC 204, *Intelligent transport systems*, seeks to fill a role focusing on data exchange needs for the international supply chain, relating specifically to haulier transportation. This includes data needs for the interface with all modes of transportation, since freight movement normally includes interfaces with other modes of transportation. Those needs are essential for transport information and control systems. Additionally, the need for a standard method of interoperability between data exchange standards is critical for seamless movement within and between modes of transportation, the businesses those modes represent and the authorities requiring specific regulatory information. Some international shipments are carried out entirely by road conveyances, but most begin and end with haulier service and travel by other modes during the shipment. This document focuses on haulier transport interfaces through the supply chain, or those data items that deal specifically with the key transport information critical for getting the goods to the marketplace without delays related to data sharing.

The data structure and formats of interfacing modes need to accommodate each other to ensure efficiency and security from end to end. Truck, rail, air and ocean transport are vital components of intermodal, international shipping. It is recognized that a robust intermodal standard needs to include interface connections to these modes; this has been proven through demonstration tests. Research and tests carried out in the US motivated the use of a truck-air-truck supply chain, for example.

Preliminary investigations suggest that there is no single organization responsible for transport data standards through the intermodal supply chain. To achieve a coherent set of transport standards requires coordination among the various international organizations working on component parts of these international standards.

The vision expressed in this document is to allow electronic data sharing through many-to-many relationships between supply chain partners which can help ensure sustaining legacy standards as needed. This includes B2B (business to business) relationships as well as B2G (business to government) relationships, G2G (government to government) relationships, and G2B (government to business) relationships. Government relationships are also known as administrative relationships. One-to-one relationships require only two partners to have standard data relationships with each other and can require other partners to adopt the standards of the original two. Alternatively, they can require third-party translators, which increases costs in the transport of goods. Relationships that allow all parties in the supply chain to share data equally, for business as well as regulatory purposes, is the focus of this document.

This document builds on ISO 24533-1:—[2)], which focuses on road transport information exchange methodology and interoperability. ISO 24533-2 (this document) is designed to help implement the transport features of ISO/IEC 19845, but it lacks the details of a common reporting system like the single window (SW, a trade facilitation concept including standardized information elements, operating nation by nation) or the common reporting system (CRS).

The common reporting system (CRS) was initially developed as one of the European Union's freight demonstration projects under E-Freight. As such it only had applicability to the EU Member States. Under this document it provides a single, 'standardized' data model for reporting to authorities in compliance with international regulations across all transport modes. It was designed from first principles and therefore does not inherit the inefficiencies of transferring paper systems or mode-specific practices to an electronic system and has no modal or sectoral biases.

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Intelligent transport systems — Electronic information exchange to facilitate the movement of freight and its intermodal transfer —

Part 2:
Common reporting system

1 Scope

This document specifies the data communication concepts applicable to the data requirements of the transport community. It also includes the regulatory authorities related to freight and its intermodal transfer to participate in common reporting.

Data communication concepts include information entities (data elements), aggregated/associated information entities (groups of data elements) and messages that comprise information exchanges at transport interfaces along the chain of participants responsible for the delivery of goods from the point of origin through to the final recipient. This includes all transport entities carrying the cargo as well as the documents and information required to facilitate the cargo movement.

This document focuses on a single "thread" of the overall end-to-end supply chain. It includes motor transport data needs within the international supply chain to satisfy the requirements of both businesses and governmental organizations on business to business (B2B), business to government (B2G), government to business (G2B) and government to government (G2G) relationships. This document is applicable to shipments that originate in one country and terminate in another. It can also be applied to shipments that originate and terminate in a single country. This document is applicable to freight movements that interface with other modes and incorporates interface requirements set for those other modes.

This document is also designed to incorporate the elements of the Govcbr message (a message developed by the World Customs organization, WCO, that can facilitate data exchange but can potentially not apply to all parties throughout the supply chain) and have them apply across the whole supply-chain, on a global basis.

This document does not constrain the requirements of customs, regulatory and safety bodies at border crossings but does include the data elements likely to be required by customs authorities and other governmental bodies within a single window environment or within a port community system environment.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

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3.1
access point
business document exchange through intermediary gateway services

3.2
administration to administration
A2A
G2G
information exchange pattern in which an administration (i.e. governance body) wishes to communicate with another administration

Note 1 to entry: This is also known as “authority to authority” (A2A) or "government to government" (G2G).

3.3
administration to business
A2B
G2B
information exchange pattern in which an administration (i.e. governance body) wishes to communicate with a business (i.e. economic operator)

Note 1 to entry: This is also known as “authority to business” (A2B) or G2B "government to business" (G2B).

3.4
agent
name and address of a person or organization authorized to act for or on behalf of another party

3.5
air carrier
carrier using aircraft to transport goods

3.6
authority
statutory body existing within a jurisdiction and a specific area of responsibility that administers legislation to regulate trade and/or monitors compliance with existing legislation

3.7
business to business
B2B
information exchange pattern in which a business (i.e. economic operator) wishes to communicate with another business

3.8
business to administration
B2A
B2G
information exchange pattern in which a business (i.e. economic operator) wishes to communicate with an administration (i.e. governance body)

Note 1 to entry: This is also known as “business to authority” (B2A) or "business to government" (B2G).

3.9
buyer
customer
ultimate consignee
individual or entity purchasing goods or services

3.10
carrier
person or organization that owns and/or operates a transport means engaged in the transportation of passengers or property by land, rail, air or water

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3.11
childconsignment
one of the consignments within a consolidated consignment

3.12
common reporting system
CRS
single, standardized document which contains data fields for all the information which is required for reporting to authorities or non-government organizations across all modes and in all Member States

3.13
common intermodal transport framework
CITF
decision support framework for intermodal transport policy

Note 1 to entry: See Reference [63].

3.14
conformance
adherence of a candidate's implementation to a standard

3.15
consignee
receiver
person or company to whom goods are shipped

3.16
consignment
separately identifiable number of goods items (available to be) transported from one consignor to one consignee via one or more modes of transport and specified in one single transport document

3.17
consignor
shipper
party which, by contract with a carrier, consigns or sends goods with the carrier, or has them conveyed by the carrier

3.18
consolidated shipment
the result of combining less than full load shipments from various shippers into one full transport unit (container)

3.19
consolidation
service of consolidating multiple consignments into one shipment

[SOURCE: United Nations, Special Service Description Code, definition 7161 Code ADC][64]

3.20
container
receptacle for the transport of goods, especially one readily transferable from one form of transport to another

Note 1 to entry: This can also include crates and pallets.

3.21
customs
government organization dealing with the levying of duties and taxes on imported goods from foreign countries and the control over the export and import of goods

Note 1 to entry: See Reference [59].

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3.22
delivery terms
class for describing the terms and conditions applying to the delivery of goods

3.23
freight forwarder
party arranging the carriage of goods, including connected services and/or associated formalities, on behalf of a consignor or consignee

3.24
governance
system by which organizations are directed and controlled

3.25
Govcbr
message, developed by WCO, incorporating information on goods, cargo, transport equipment, conveyance and crew that is legally required for cross-border transactions to be sent to cross-border regulatory agencies, allowing these agencies to respond to a declaration

Note 1 to entry: It can also be used for sending this information from one cross-border regulatory agency to another.

3.26
intermediary
commercial party who provides services to customers, suppliers or authorities within the supply chain

Note 1 to entry: This includes, but is not limited to, freight transport.

3.27
intermodal transport
movement of goods in one and the same loading unit (e.g. intermodal container) or vehicle which uses successively several modes of transport without handling of the goods themselves when changing modes

3.28
intermodal freight
movement of cargo containers interchangeably between transport modes (i.e., motor, rail, water and air carriers) and where equipment is compatible within multiple systems

3.29
journey
physical movement of goods from the supplier to the consignee

3.30
manifest
document which specifies all cargo on board the transportation unit

Note 1 to entry: The manifest contains details of contents, shipper, consignee and other details that can potentially be required by customs or consular authorities. Copies of manifests are provided for the country of export and country of import customs authorities.

3.31
haulier
carrier using for-hire or private motorized transport on roads to transport goods

3.32
multimodal transport
carriage of goods by at least two different modes of transport

Note 1 to entry: In contrast, intermodal transport implies the change from one mode to another using the same form of loading unit. Multimodal transport implies that either there is more than one modal shift, or that loads may be broken into partial loads as part of a modal change.

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[SOURCE: ISO 17261:2012, 3.33]

3.33
OASIS
not-for-profit consortium that drives the development, convergence and adoption of open standards for the global information society

3.34
seller
name and address of party selling merchandise to a buyer

3.35
shipment
identifiable collection of one or more goods items, available to be transported together from the original shipper to the ultimate consignee

Note 1 to entry: More than one shipment can be combined into one consignment.

3.36
shipment stage
stage containing information about the transport leg(s) (locations, timings, etc.) and associated non-goods related information, such as crew and passenger lists

Note 1 to entry: There are mainly three shipment stages; during main carriage, during pre-carriage, and during on-carriage.

3.37
single window
facility that allows parties involved in trade and transport to lodge standardized information and documents with a single-entry point to fulfil all import, export and transit related-related regulatory requirements

3.38
original consignor
party that provides goods

Note 1 to entry: This also can be the same entity as the consignor/shipper. The supply chain physically begins with the supplier.

3.39
tracing
function of retrieving status information concerning goods, goods items, consignments or equipment

3.40
transport means
vehicle used for the transport of goods

EXAMPLE A vessel, train or truck.

3.41
transport equipment seal
mechanical or electronic device applied to a container, unit load device, trailer, etc. to guarantee authenticity or security

3.42
Universal Business Language
UBL
OASIS committee with the aim of defining a common XML library of business documents and information elements for transport and procurement

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3.43
waybill
non-negotiable document evidencing the contract for the transport of cargo

[SOURCE: UN/EDIFACT, 1001 Document name code, definition 700][62]

4 Symbols and abbreviated terms

ABIE	aggregate business information entity
BBIE	basic business information entity
BCC	basic core component
BIE	business information entity
BII	business interoperability interface
BPAWG	business process analysis working group
CC	core component
CCTS	core component technical specification
CEN	European Committee for Standardization
EAP	electronic access points
ebXML	electronic business extensible markup language
EDI	electronic data interchange
EFM	electronic freight management
FSI	freight services integrator
GII	goods item itinerary
GPS	global positioning system
IMO FAL	International Maritime Organization's Convention on Facilitation of International Maritime Traffic (IMO FAL Convention)
INF	irradiated nuclear fuel
ISSC	international ship security certificate
LSC	logistic service client
LSP	logistics services provider
MWB	multimodal eWaybill
NDR	naming and design rules
NSW	national single window
OECD	organization of economic cooperation and development
PEPPOL	Pan-European Public Procurement Online

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SME	small and medium enterprises
SSP	ship security plan
TEP	transport execution plan
TNM	transport network manager
TPS	transport progress status
TR	transport regulator
TS	transportation status
TSD	transport service description
UML	unified modelling language
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
UNECE	United Nations Economic Commission for Europe
UN/LOCODE	United Nations Code for Trade and Transport Locations
UNTDED	United Nations Trade Data Element Directory
URI	uniform resource identifier
URL	uniform resource locator
WCO	World Customs Organization

5 Intermodal freight context

5.1 General

This document addresses an interoperable methodology for using standard messages and tools that will maximize the efficiencies for transporting goods from a seller (or "original consignor") to a buyer (or "original consignee"), using intermodal transport that includes haulier, marine, air and rail links, while satisfying governmental regulatory requirements. It is appropriate for supporting operational freight movements that occur worldwide, whether that freight travels from point of origin to destination domestically or internationally. While this document is not focused on unimodal movements, and any unique requirements therein, it is considered complementary to standards of unimodal freight movement. The intent is to allow data to move securely and freely between all entities that need the freight information in connection with their areas of responsibility whether for non-governmental purposes or for governmental purposes.

This document includes surface transport data needs as well as all modes connecting with surface transportation within the international supply chain to satisfy the requirements of both businesses and governmental organizations, on B2B, B2G, G2G as well as G2B relationships. It may also be applied to consignments that originate and terminate in a single country. This document is applicable to freight movements that interface with other modes and incorporates requirements set for those other modes.

5.2 Intermodal vs. multimodal relationship

The terms "intermodal" and "multimodal" can be confusing when discussing freight that moves between more than one mode to reach its destination. Figure 1 shows the difference between those terms while incorporating the concept of interoperability.

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As defined in this document, intermodal freight transport consists of the intermodal movement of goods in one and the same loading unit (e.g. intermodal transport equipment) or vehicle which uses several modes of transport successively without handling the goods themselves when changing modes, and it may involve several contracts of carriage. Transport modes include motor, rail, water, and air carriers.

On the other hand, multimodal transport consists of the carriage of goods by at least two different modes of transport. Multimodal transport implies that either there is more than one modal shift or that loads are broken into partial loads as part of a modal change. In multimodal transport there is one contract.

Since multimodal movements use one contract, interoperability is not as critical in those situations since there is no need for data sharing from origin to destination. However, intermodal movements involve several contracts and many different parties engaged with the movement of freight. Therefore, data transfer becomes more prevalent and the need for data streamlining becomes more important to avoid any disruption in the movement of the freight.

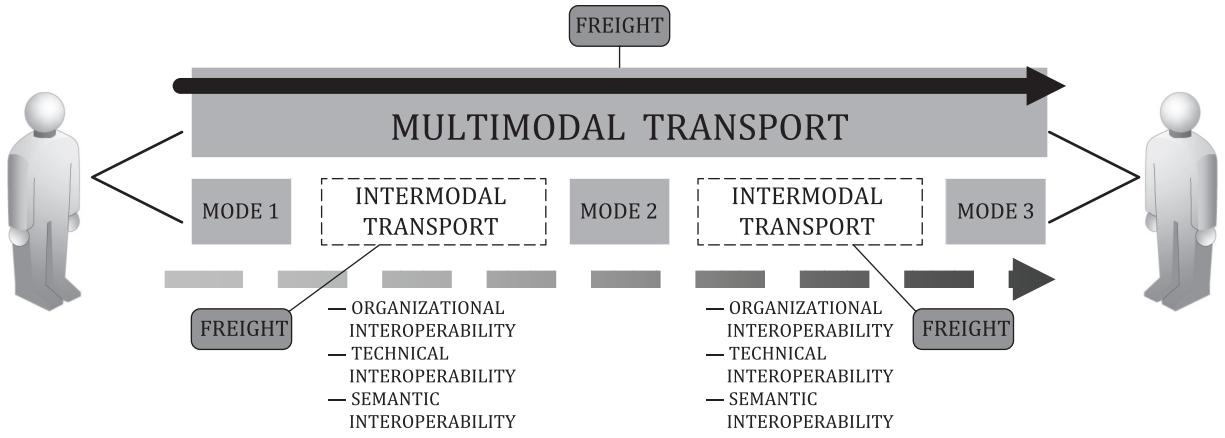

Figure 1 — Intermodal/multimodal relationships

Organizational interoperability is about being able to identify the players and organizational processes involved in the delivery of a specific eGovernment service and achieving agreement among them on how to structure their interactions, i.e. defining their “business interfaces”.

Technical interoperability is about knitting together IT systems and software, defining, and using open interfaces, standards and protocols in order to build reliable, effective and efficient information systems.

Semantic interoperability is about ensuring that the meaning of the information exchanged is not lost in the process, that it is retained and understood by the people, application and institutions involved.

5.3 Common intermodal transport framework

The common intermodal transport framework (CITF) is designed to facilitate improved interoperability between the information systems used by all stakeholders in transport and logistics. It was developed as part of ISO/IEC 19845.

Since the stakeholders have been divided into a set of roles, the CITF defines the information within "electronic documents" that need to be exchanged between the roles such that each one is able to perform the functions associated with the roles as efficiently and effectively as possible. These documents (as well as business processes involved in their exchange) were developed based on requirements collected from freight industry actors in the European projects Freightwise, e-Freight and iCargo primarily, but also receiving requirements and other input from associated European projects and a US project called Electronic Freight Management (EFM). All are related to improving freight management operations.

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The standardization process started in 2008 through cooperation with the technical committee in OASIS that was developing version 2.1 of Universal Business Language (UBL). Much work was involved in adapting the ideas of the CITF to the principles of UBL and to provide the required backwards compatibility. Eventually key elements of the CITF became part of the official version of UBL 2.1. After making UBL 2.1 complete and official, OASIS started a process of having this standard accepted by ISO. This process was completed late 2015, and elements of the Common (e-Freight) Framework are now part of ISO/IEC 19845.

The development of the framework started by defining the roles that were involved in transport and logistics:

— Logistic service client (LSC) = Logistic services buyer — defined as the party ordering the logistics services from the logistic service provider and can be either the consignor or the consignee depending on the business scenario.

— Logistics services provider (LSP) — associated with the logistics supply domain, which responds to the demands from LSCs.

— Transport network manager (TNM) — associated with the transport network management domain and responsible for providing information about availability and status for the transport and logistics infrastructure.

— Transport regulator (TR) — associated with the regulation enforcement domain and responsible for ensuring that transport and logistics operations are being conducted according to the relevant rules and regulations.

The scope for the framework was all transport modes and combinations of modes into multimodal services. It was also realized that the role previously called freight services integrator (FSI) is not a separate role in relation to the ones described in the list above. The FSI characterizes an organization or person that combines the roles of logistics services client and logistics services provider in order to conduct business. From an information exchange point of view, the FSI does not have any special requirements.

The reference model described in Figure 2 illustrates the domains and a minimum set of electronic documents that are required for operators in the different domains to do their jobs effectively.

These electronic documents are:

— Transport service description (TSD)

— Transport execution plan (TEP)

— Goods item itinerary (GII)

— Transportation status (TS)

— Multimodal eWaybill (MWB)

— Transport progress status (TPS)

— Common reporting system (CRS)

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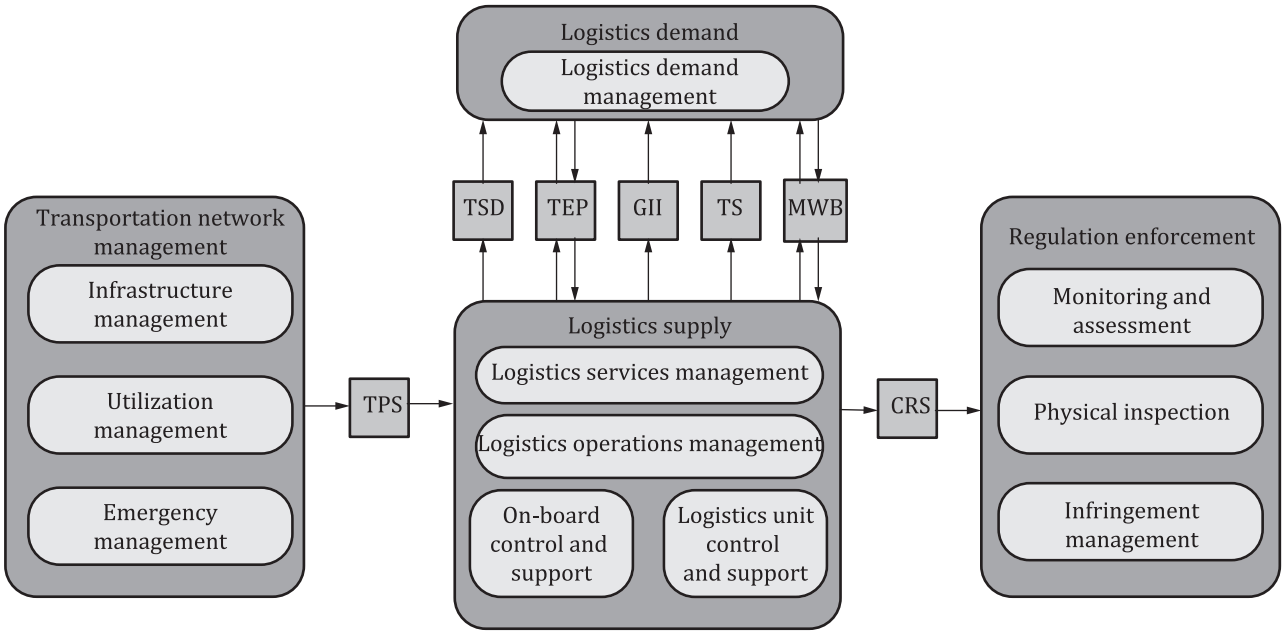

NOTE TSD, TEP, GII, TS and TPS are part of ISO/IEC 19845.

Figure 2 — Common intermodal transport framework

6 Common reporting system

The procedures active within the international supply chain are complex and often cumbersome. Numerous interactions between different parties are at work, which are guided by many factors, including type of product, country, terms of business and the methods of operation of both the consignee and the seller. Given the broad range of activities possible, within the context of transporting goods, a single transaction may involve many languages (both electronic and human), standards and operational practices.

The CRS shall be a single, harmonized information model which contains all the information fields for reporting electronically to any business or any authority in any country and across all transport modes.

It takes the form of an information model which defines the structure and content of the information that should be reported to authorities (government and non-government entities) by transport and logistics businesses. There are also several accompanying harmonized reporting process models to explain how the CRS schema is exchanged between the relevant parties.

The CRS can be thought of as a method for reporting which has many uses. Different users with different purposes complete different parts of the form; they only fill in the information that they need to. This means all parties can use the same electronic format/structure to submit the information for which they are responsible, irrespective of their present role in the transport chain. Figure 3 shows a representation of the CRS as a form with many uses.

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Figure 3 — The common reporting system schema

Due to the comprehensive nature of the CRS, there is a danger that it appears to be a cumbersome message structure. It is true that the full CRS specification is sized to accommodate all the possible fields which shall be reported to authorities. However, each individual message which is sent by transport logistics businesses is of arbitrary size, depending on what is to be reported at that point. In most cases, because each party only submits the information they need to at that point, the messages will be relatively small. The CRS structure is flexible enough to be used for both small and large message submissions, to support different operational and reporting requirements.

In the context of single windows, the CRS provides a data model that can be used to fulfil the need to "*lodge standardized information and documents with a single-entry point to fulfil all import export and transit-related regulatory requirements.*"[35] The CRS provides a standard for the information and documents to fulfil all regulatory requirements in the EU which is independent of the technical implementation of the single window system.

7 The model and its requirements

7.1 Introduction

The CRS considers all the information requirements of the large number of regulations, procedures and documents which are in use across Europe. One of the key challenges in this is to create a large enough data structure to accommodate all the information fields, whilst at the same time making it flexible enough so that it can be decomposed into smaller structures which can be submitted separately by different parties and at different times throughout the transport logistics process, without losing functionality and consistency. This clause explains how the model is composed, how it should be interpreted and how it is intended to be used in practice.

7.2 Overall structure

7.2.1 General

The top-level structure of the CRS shall include the logical relationships among four core elements of transport logistics including:

1) the cargo/goods (the Consignment class);

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2) the means of transport (the TransportMeans class;

3) the details of the journey/voyage (the ShipmentStage class); and

4) the parties involved (the Party class).

This is depicted in Figure 4.

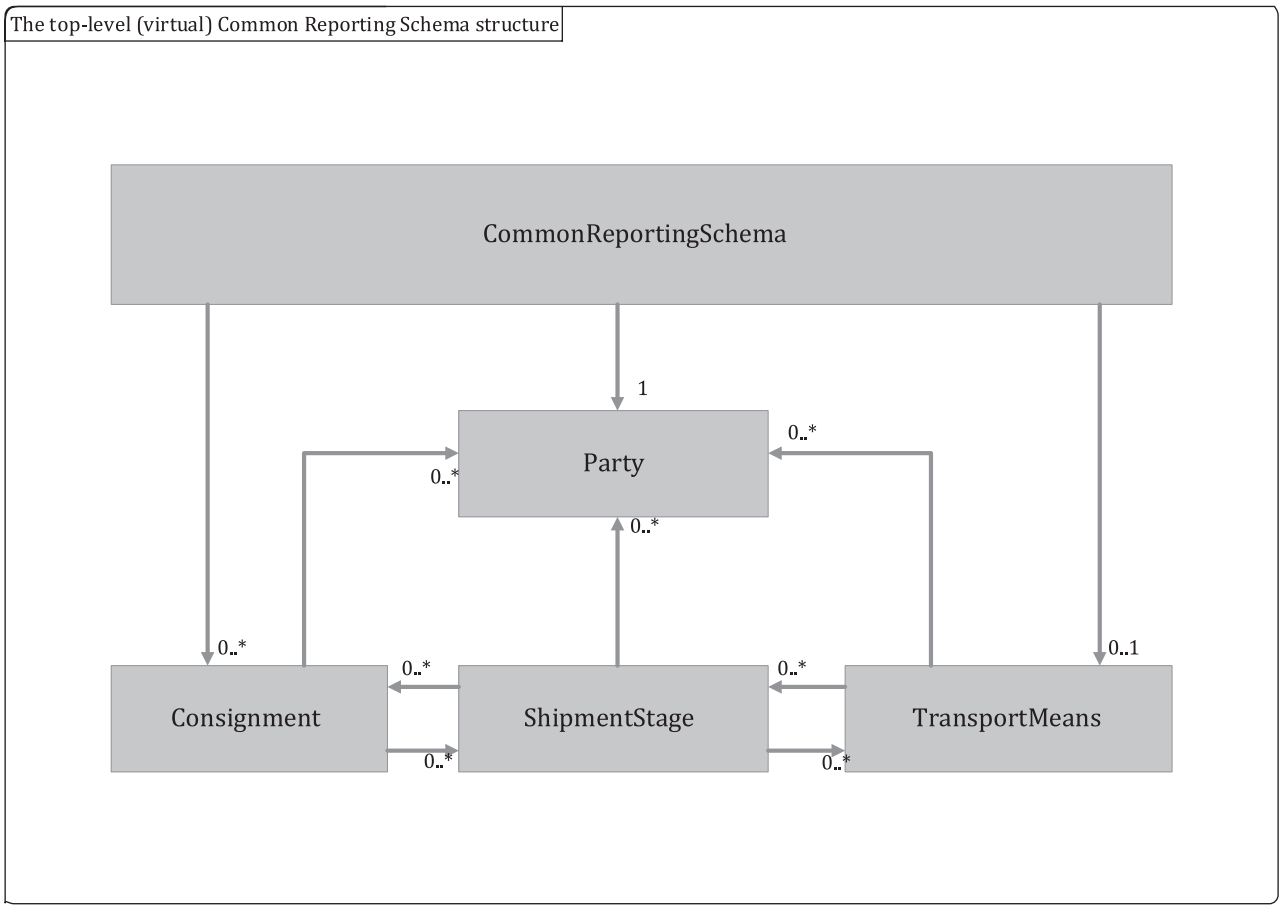

Figure 4 — The top-level (virtual) CRS schema structure

The top-level structure would not actually be instantiated in a message in the form presented in Figure 4. This model is a virtual structure that subsumes two sub-structures which are the basis for messages. The two message structures/types are described in the following subclauses. Table 1 describes the information elements that can be seen in Figure 4.

Table 1 — Information elements

Element	Content/purpose
CommonReportingSystem	Contains all the necessary message metadata and header information to support the sending/receiving of information, message identification and synchronisation
Consignment	Represents all cargo/goods information, including goods items, packages, transport equipment and dangerous goods
ShipmentStage	Contains information about the transport leg(s) (locations, timings etc.) and associated non-goods-related information, such as crew and passenger lists
TransportMeans	For each ShipmentStage, this element gives information about the means of transport (i.e. vehicle or vessel) being used (identification, registered nationality, dimensions etc.)

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Table 1 *(continued)*

Party	Various parties (actors) are involved in the transport of goods (consignor, consignee, carrier, etc.) – this element contains all the information required to represent parties, such as name, ID, location and contact details

In the following subclauses, the top-level structure of the full CRS model is presented in three ways: in the form of a UML class diagram (Figure 5), in a tabular format used by UBL (Table 2), and in the XML schema file and element diagram (Figure 6). Annex E gives a full listing of the information elements in the CRS.

7.2.2 Class diagram

As an alternative representation of the CRS model, Figure 5 presents the CRS as a unified modelling language (UML) class diagram. Within this representation, information objects (classes) are presented with their attributes along with their relationships among the other classes within the model.

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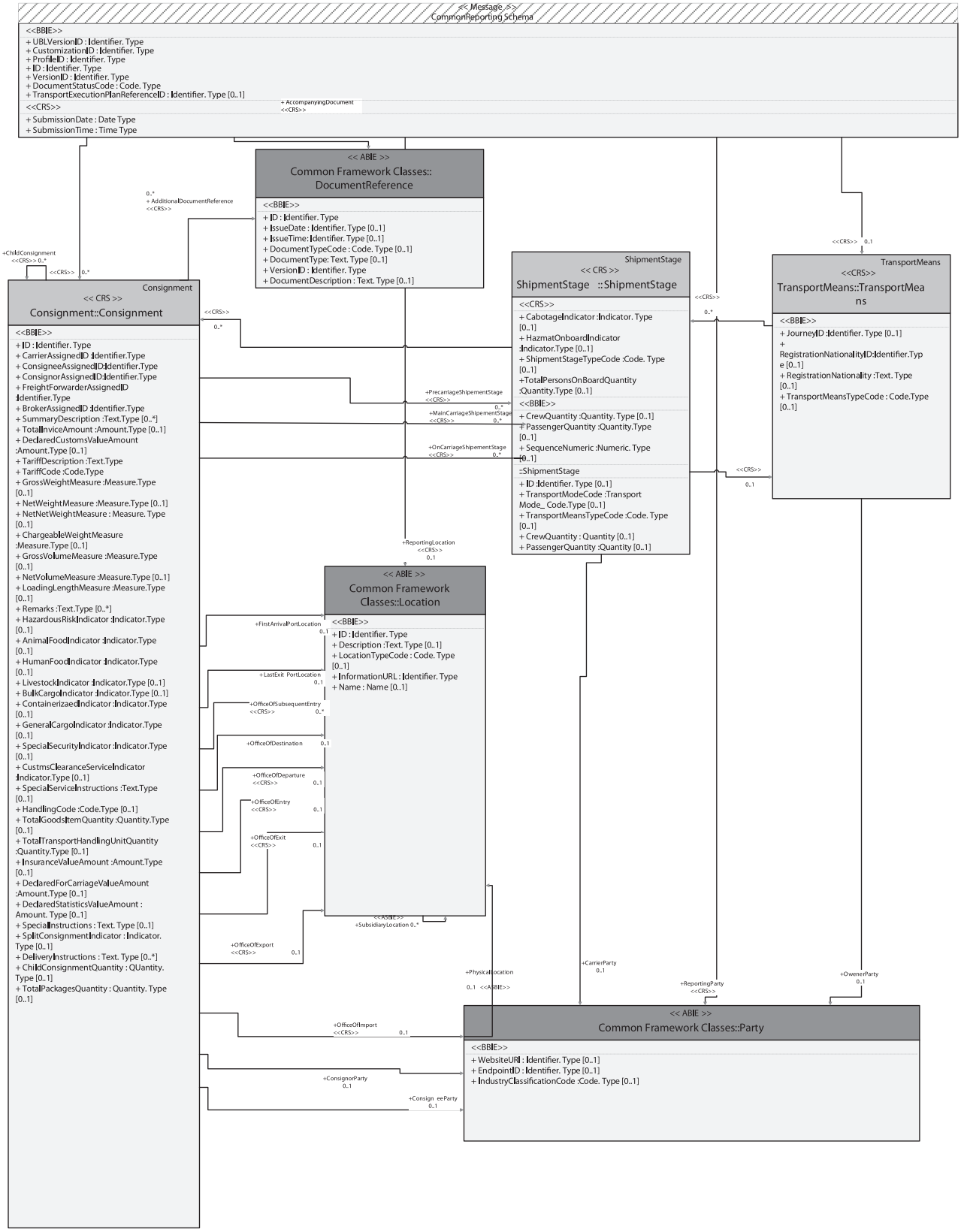

Key

Dk. blocks Greyinformation entities from the UBL library which have been extended in the CRS

<<CRS>> additional or extended field in the CRS

<<BBIE>> basic business information entity from UBL

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<<ABIE>> aggregate business information entity from UBL

Figure 5 — CRS as a UML class diagram

7.2.3 CRS model in tabular format and XML schema file

As an alternative representation of the CRS model, Table 2 presents the CRS model in tabular form. Within this representation information elements are presented with their names, data type and definitions along with their relationships among the various views within the model.

Table 2 — CRS model in tabular format

Element name	Data type	Associated object class	Ext?	Full profile	Consignment view	Transport means view	Definition
CommonReportingSchema	CommonReportingSchema						
UBLVersionID	Identifier. Type			1	1	1	The earliest version of the UBL 2 schema for this document type that defines all of the elements that can potentially be encountered in the current instance.
CustomizationID	Identifier. Type			1	1	1	Identifies a user-defined customization of UBL for a specific use.
ProfileID	Identifier. Type			1	1	1	Identifies a user-defined profile of the customization of UBL being used.
ID	Identifier. Type			1	1	1	Identifies a CRS instance.
VersionID	Identifier. Type			1	1	1	Identifies a version of a multimodal waybill in order to distinguish this instance of the document from other instances.
DocumentStatusCode	Document Status_ Code. Type			1	1	1	Indicates the status of the CRS.
TransportExecutionPlanReferenceID	Identifier. Type			0..1	0..1	0..1	A reference to the TEP agreed for this particular transport service.
SubmissionDate	Date. Type		X	1	1	1	Date when the CRS is submitted.

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Table 2 *(continued)*

Element name	Data type	Associated object class	Ext?	Full profile	Consignment view	Transport means view	Definition
SubmissionTime	Time. Type		X	1	1	1	Time when the CRS is submitted.
ReportingParty		Party	X	1	1	1	Describes the party responsible for issuing the CRS.
ReportingLocation		Location	X	0..1	0..1	0..1	Describes the location from which the CRS is issued.
Consignment		Consignment	X	0..n	1		Describes an identifiable collection of one or more goods items to be transported between the consignor and the consignee. This information may be defined within a transport contract. A consignment may comprise more than one shipment (e.g. when consolidated by a freight forwarder).
TransportMeans		TransportMeans	X	0..1		1	Describes the transport means being subject to reporting.
DocumentReference		Document Reference	X	0..n	0..n	0..n	Describes a reference to other documents that are relevant for this CRS.

7.2.4 CRS Model as an XML-based file

As an alternative representation of the CRS model, Figure 6 presents the CRS as an XML schema file along with an element diagram.

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```xml
<?xml version="1.0" encoding="UTF-8"?>

<!--
CRS Profile: Full
Version: 1.0

Uses Library: OASIS Universal Business Language (UBL) 2.1
              http://docs.oasis-open.org/ubl/os-UBL-2.1/
-->

<xsd:schema xmlns="urn:eu:specification:efreight:schema:xsd:CommonReportingSchema-1.0"
  targetNamespace="urn:eu:specification:efreight:schema:xsd:CommonReportingSchema-1.0"
  xmlns:crs="urn:eu:specification:efreight:schema:xsd:CommonReportingSchemaExtensions-1.0"
  xmlns:cac="urn:oasis:names:specification:ubl:schema:xsd:CommonAggregateComponents-2"
  xmlns:cbc="urn:oasis:names:specification:ubl:schema:xsd:CommonBasicComponents-2"
  xmlns:udt="urn:oasis:names:specification:ubl:schema:xsd:UnqualifiedDataTypes-2"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified"
  attributeFormDefault="unqualified"
  version="0.1">

  <!-- ===== Imports ===== -->
  <xsd:import
     namespace="urn:eu:specification:efreight:schema:xsd:CommonReportingSchemaExtensions-1.0"
    schemaLocation="../common/efreight-CommonReportingSchemaExtensions-1.0.xsd"/>
  <xsd:import namespace="urn:oasis:names:specification:ubl:schema:xsd:CommonAggregateComponents-2"
    schemaLocation="../common/UBL-CommonAggregateComponents-2.1.xsd"/>
  <xsd:import namespace="urn:oasis:names:specification:ubl:schema:xsd:CommonBasicComponents-2"
    schemaLocation="../common/UBL-CommonBasicComponents-2.1.xsd"/>
  <xsd:import namespace="urn:oasis:names:specification:ubl:schema:xsd:UnqualifiedDataTypes-2"
    schemaLocation="../common/UBL-UnqualifiedDataTypes-2.1.xsd"/>

  <!-- ===== Common Reporting Schema Definition ===== -->
  <xsd:element name="CommonReportingSchema" type="CommonReportingSchemaType">
  </xsd:element>

  <xsd:complexType name="CommonReportingSchemaType">
    <xsd:sequence>
       <xsd:element ref="cbc:UBLVersionID" minOccurs="1" maxOccurs="1"/>
      <xsd:element ref="cbc:CustomizationID" minOccurs="1" maxOccurs="1"/>
      <xsd:element ref="cbc:ProfileID" minOccurs="1" maxOccurs="1"/>
      <xsd:element ref="cbc:ID" minOccurs="1" maxOccurs="1"/>
      <xsd:element ref="cbc:VersionID" minOccurs="1" maxOccurs="1"/>
      <xsd:element ref="cbc:DocumentStatusCode" minOccurs="1" maxOccurs="1"/>
      <xsd:element ref="cbc:TransportExecutionPlanReferenceID" minOccurs="0" maxOccurs="1"/>
      <xsd:element ref="crs:SubmissionDate" minOccurs="1" maxOccurs="1"/>
      <xsd:element ref="crs:SubmissionTime" minOccurs="1" maxOccurs="1"/>
      <xsd:element ref="crs:ReportingParty" minOccurs="1" maxOccurs="1"/>
      <xsd:element ref="crs:ReportingLocation" minOccurs="0" maxOccurs="1"/>
      <xsd:element ref="crs:Consignment" minOccurs="0" maxOccurs="unbounded"/>
      <xsd:element ref="crs:TransportMeans" minOccurs="0" maxOccurs="1"/>
      <xsd:element ref="cac:DocumentReference" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>

</xsd:schema>
```

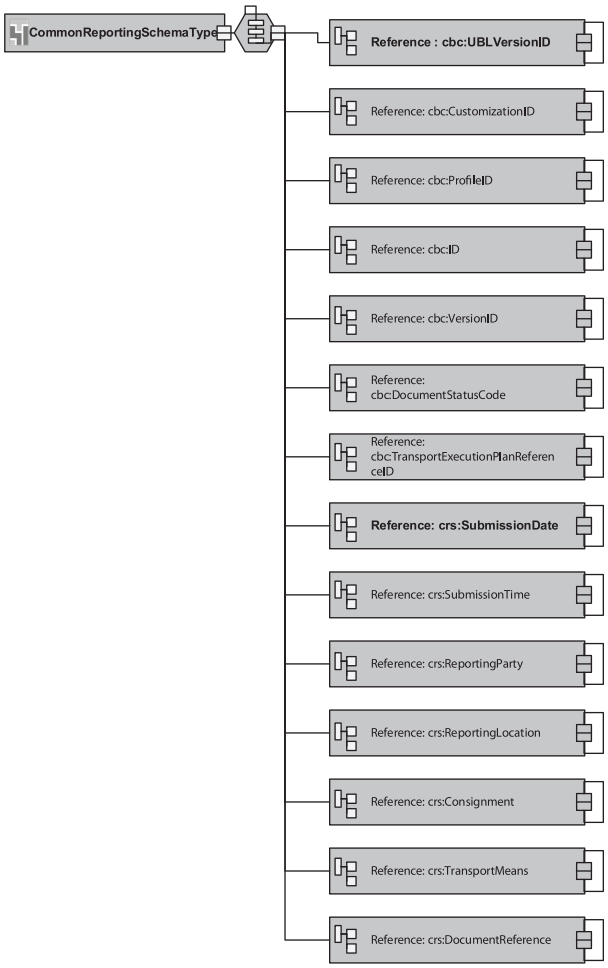

Figure 6 — CRS model in XML schema file and element diagram

7.3 Views of the CRS

7.3.1 General

Any CRS message shall be one of two sub-types which will determine the rest of the class tree. The CRS schema shall be submitted either as a consignment-oriented message, or as a transport-means-oriented message. These two views resolve the complexity of reporting for multiple transport journeys and multiple consignments simultaneously.

In the consignment-oriented message there shall be exactly one Consignment class. Each consignment shall have one or more ShipmentStages which in turn shall have one TransportMeans element. In principle this structure allows a user to make declarations for a consignment along a whole multi-leg multimodal transport chain in the same model.

In the transport-means-oriented message there shall be one specific means of transport: its lifecycle. This includes its lifecycle going from port to port, picking up and unloading different cargo each time, and changing crews and operators. Exactly one TransportMeans class shall be included. Each TransportMeans class shall have one or more ShipmentStages, which in turn shall have one or more Consignment elements. In principle this structure allows a user to make declarations for a vehicle/vessel carrying different consignments along a whole multi-leg journey in the same model.

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7.3.2 Consignment-oriented view

In the consignment-oriented structure (Figure 7), the focus of the message is on the cargo/goods being transported. This sub-type is mainly used to support reporting for trade (i.e. customs).

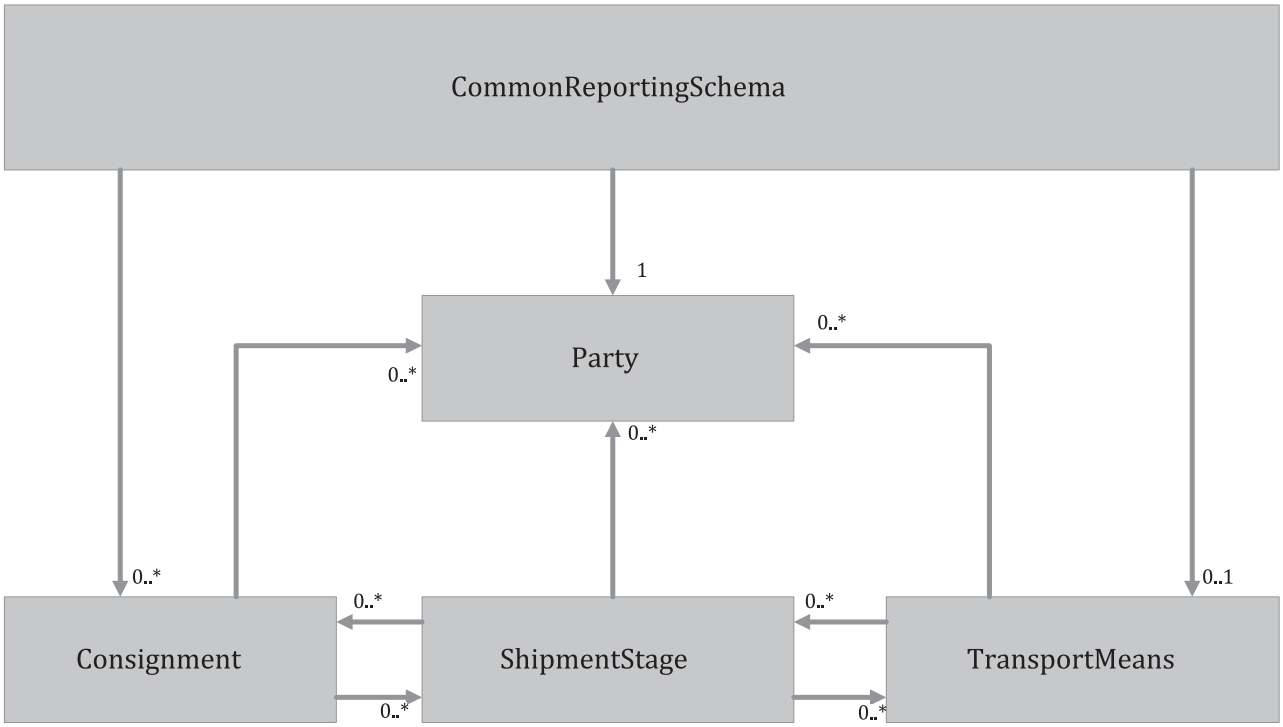

Figure 7 — Consignment-oriented CRS structure

In this structure, exactly one consignment class shall be included. At this point, the full CRS structure collapses to the model shown in Figure 7. Each consignment shall have one or more ShipmentStages, which in turn shall have one TransportMeans element. In principle, this structure allows a user to make declarations for a consignment along a whole multi-leg, multimodal transport chain in the same model.

7.3.3 Transport means-oriented view

Transport means class represents any vehicle transporting goods, i.e. vessel, truck, rail and aircraft. In the transport-means-oriented structure (Figure 8), the focus is on the means of transport. When focusing on one specific transport means, for example, vessel, its lifecycle is to go from port to port, picking up and unloading different cargo each time, changing crew and operators. The transport-means-oriented view of the CRS was designed to support the stages of this lifecycle, compared to the goods/shipment-oriented view, which follows goods items from end to end (potentially across multiple transport means). The reporting formalities refer to the obligation of the vessel to report certain information when embarking and disembarking ports, loading/unloading cargo, etc.

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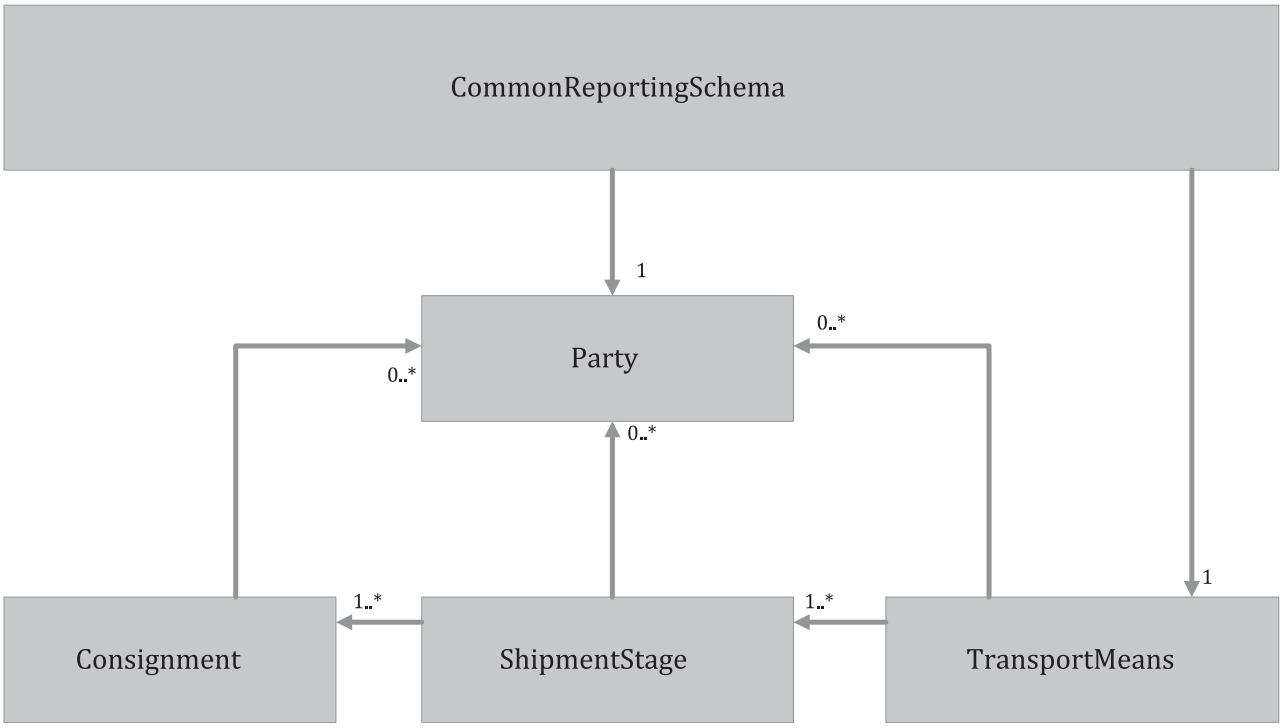

Figure 8 — TransportMeans-oriented CRS structure

In this structure, exactly one TransportMeans class shall be included. Each TransportMeans shall have one or more ShipmentStages, which in turn shall have one or more consignment element(s). In principle, this structure allows a user to make declarations for a vehicle/vessel carrying different consignments along a whole multi-leg journey in the same model.

7.4 Important structures

The main structures in the CRS are presented in the following subclauses. In the diagrams in the following subclauses, the following notation is used:

— dark grey shaded blocks indicate information structures in which some associated structures have been left off the diagram for clarity;

— light grey shaded blocks indicate information entities from the UBL library which have been extended in the CRS;

— <<CRS>> indicates an additional or extended field in the CRS;

— <<BBIE>> indicates a basic business information entity from UBL;

— <<ABIE>> indicates an aggregate business information entity from UBL.

7.5 Consignment and goods item

7.5.1 Consignment

The consignment structure (Figure 9) shall identify a collection of one or more goods items to be transported between the consignor and the consignee. This information shall be defined within a transport contract.

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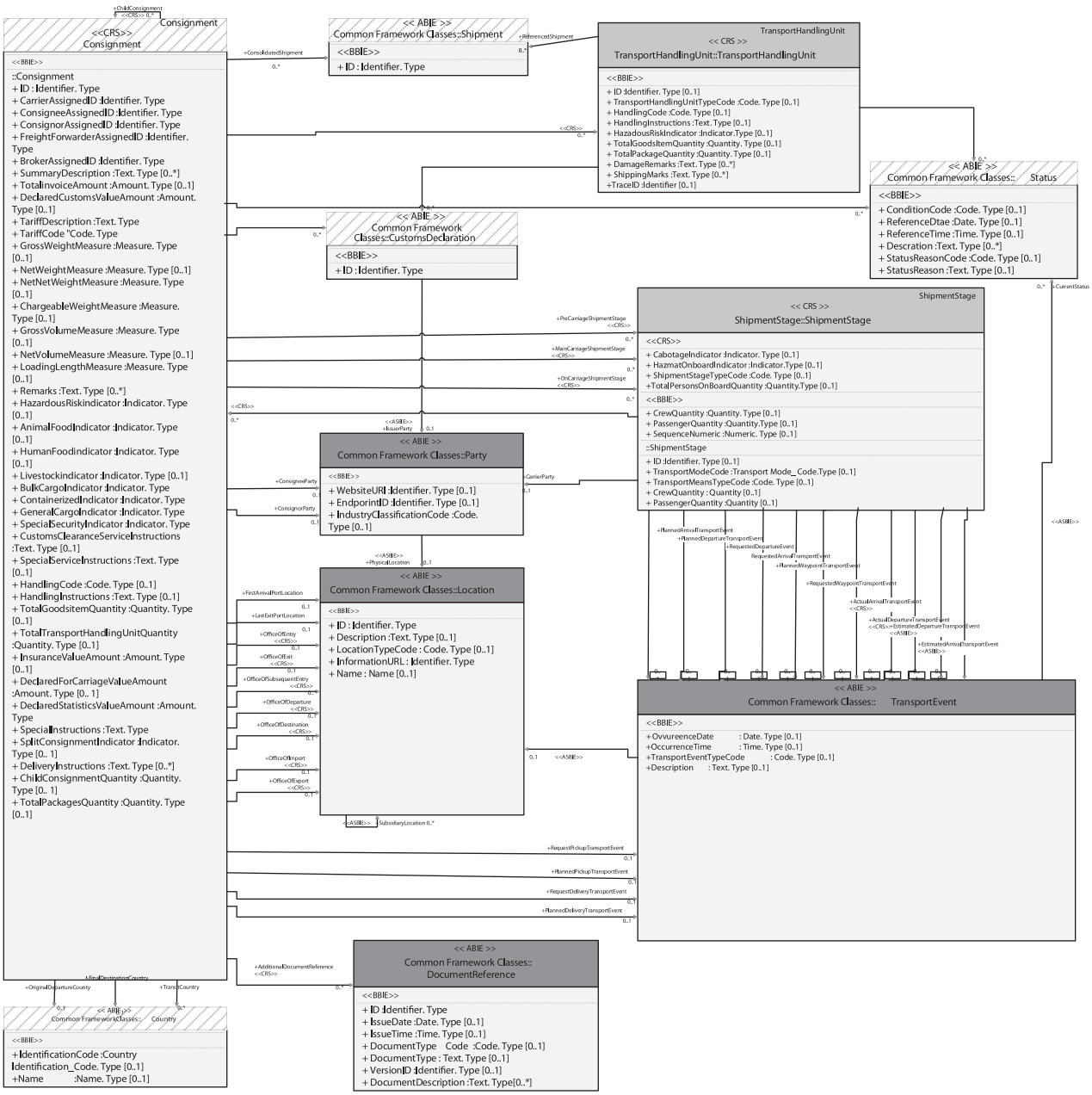

Figure 9 — Consignment structure

7.5.2 Goods item

The goods item structure, based on requirements from the European projects Freightwise, e-Freight and iCargo, describes a separately identifiable type and quantity of goods of a single product type. It is composed mainly of two classes:

1) **Goods item:** A class to describe a separately-identifiable type and quantity of goods of a single product type.

2) **Item:** A class to describe an item of trade. This includes a generic description applicable to all examples of the item together with optional subsidiary descriptions of any number of actual instances of the type.

In addition, the item class has several associations to classes that further describe the nature of the item (commodity classification), data that further identifies the item (item instance) and where the

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item originates from (OriginAddress, OriginCountry), and hazardous goods descriptions if relevant (hazardous item).

7.5.3 Goods item structure

In Figure 10 the goods item structure is shown. A goods item will be contained by a package (association to package class) or a transport equipment (association to goods item container class). The measurement of the goods item is described by the zero-to-many associations to the dimension class. The trade-oriented description of a goods item is described in its association to the item.

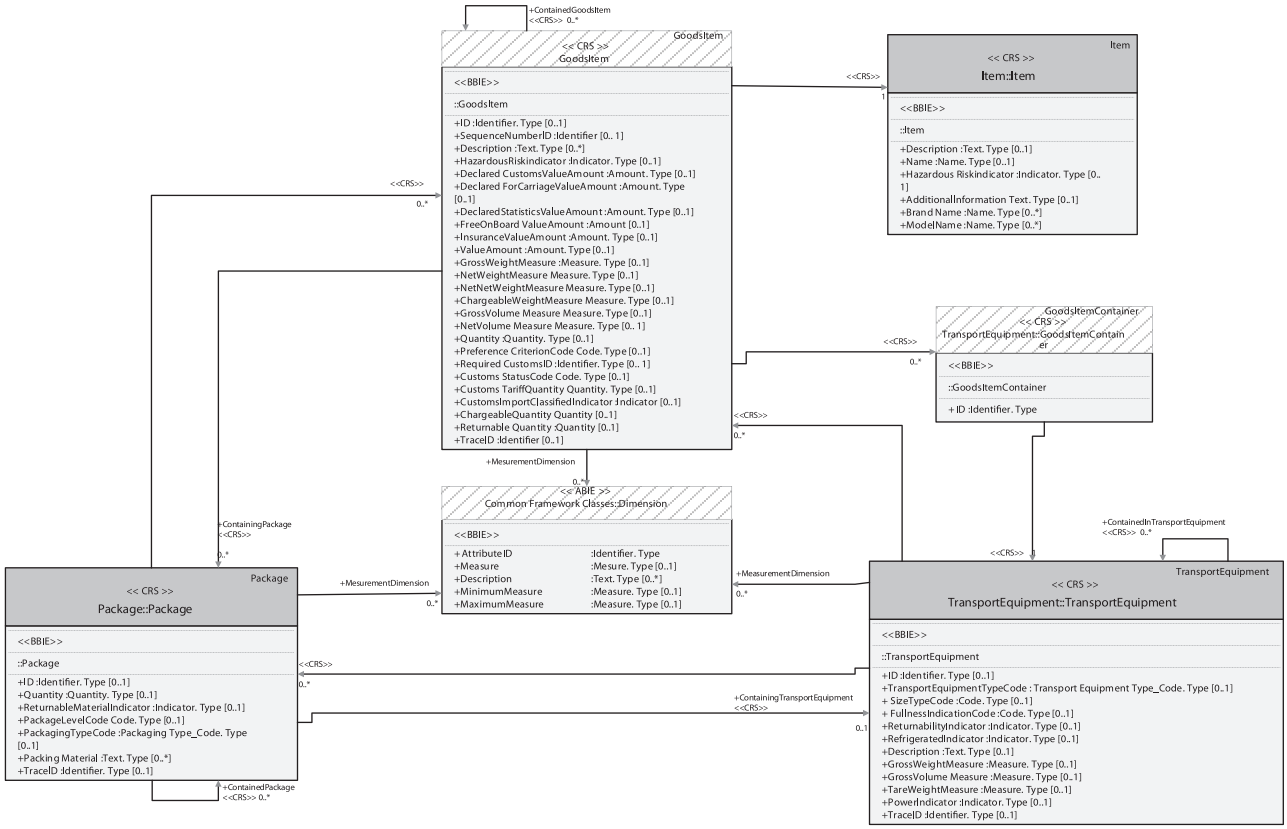

Figure 10 — Goods item structure

7.5.4 Item class structure

The item class describes specific information about a particular item (type), as shown in Figure 11. The commodity classification class contains information about the cargo type (using UNECE cargo type classification code) and commodity type (using WCO Harmonized System nomenclature). Item instance describes specific identifying data about an item. The associations towards address and country describe the origin of an item. The hazardous item class (contains more information at a sub-level such as flashpoint, emergency temperature, contact party, etc.) describes hazardous goods data if the item is of such type.

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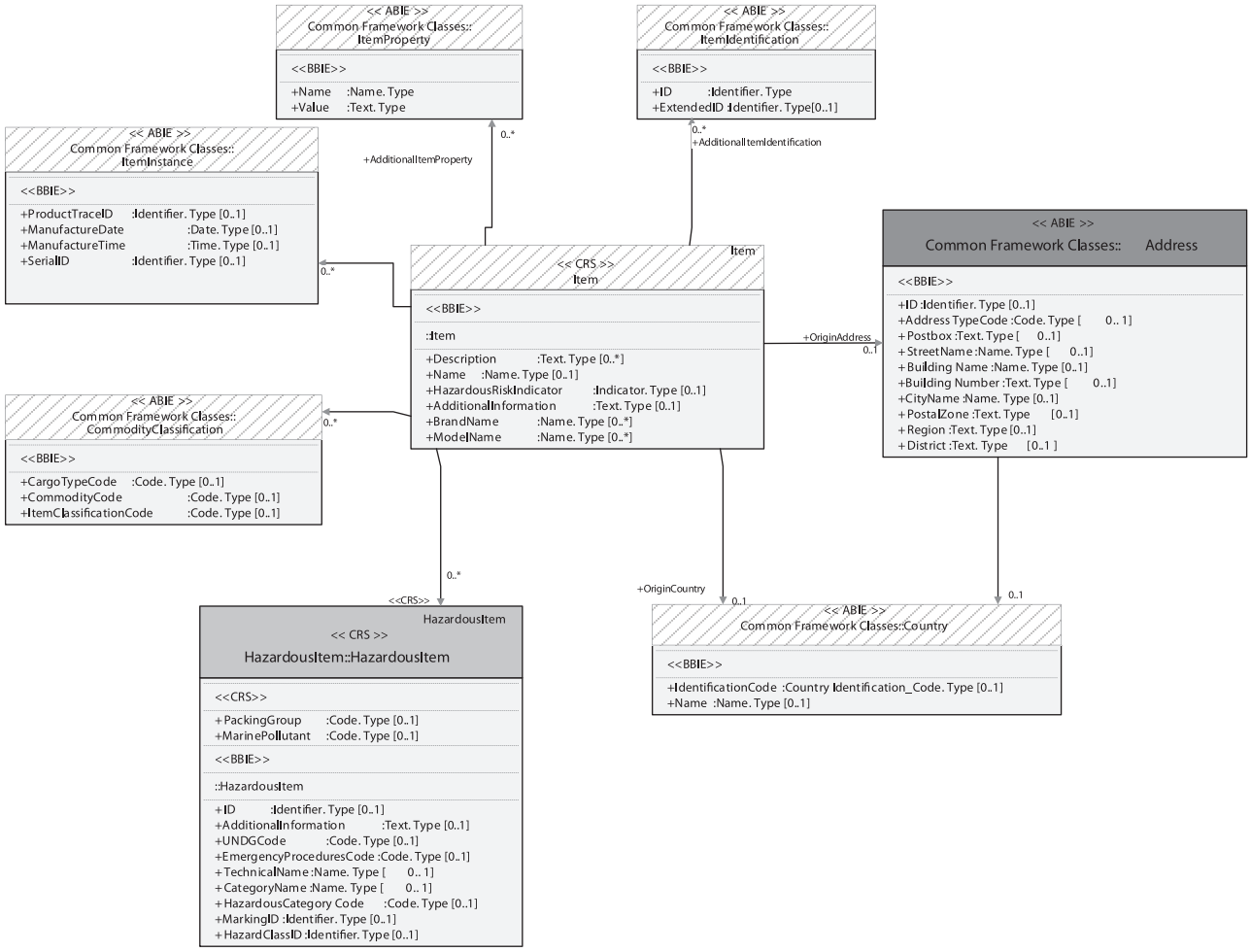

Figure 11 — Item class structure

7.5.5 Transport means structure

The transport means structure describes a particular vehicle or vessel used for the conveyance of goods or persons. It has four sub-structures representing the specific characteristics of the air, road, rail and maritime (including inland waterway) modes as shown in Figure 12.

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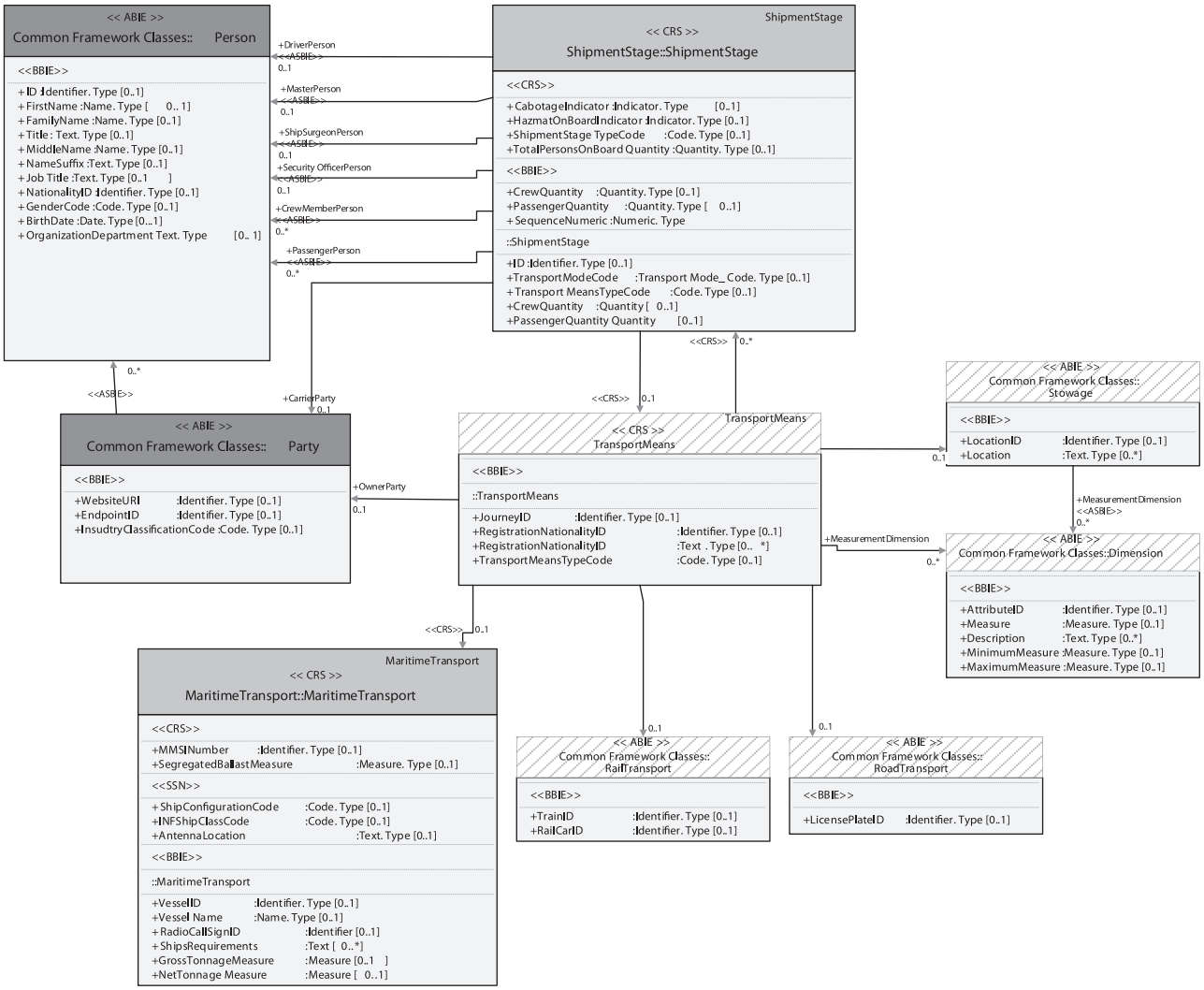

Figure 12 — Transport means structure

7.5.6 Maritime transport class

Of note is the maritime transport class. The UBL class was significantly "upgraded" by the CRS due to the extra reporting requirements in the maritime domain. The maritime transport class, representing the ship/vessel, is shown in Figure 13.

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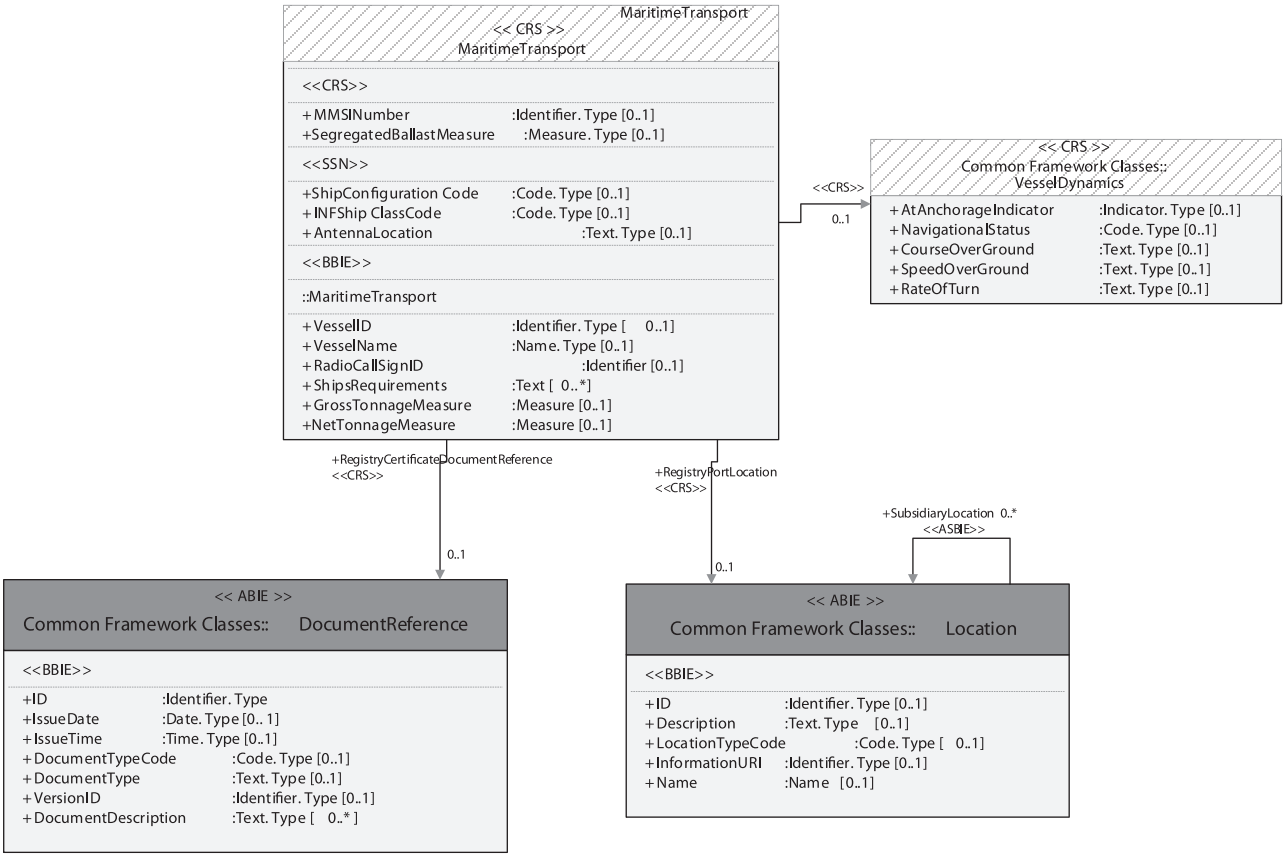

Figure 13 — Maritime transport class

7.5.7 Shipment stage

The shipment stage structure, in Figure 14, describes one stage of movement (i.e. a transport leg) in a transport of goods regardless of mode. As a minimum, it consists of a departure event at a departure location, followed sometime later by an arrival event at an arrival location. It also consists of an event during carriage. It should be noted that most of the maritime reporting formalities are associated to the shipment stage class. This is to manage the fact that it is necessary to carry out ship reporting for each port call and so each shipment stage shall have new or updated reporting information associated with it.

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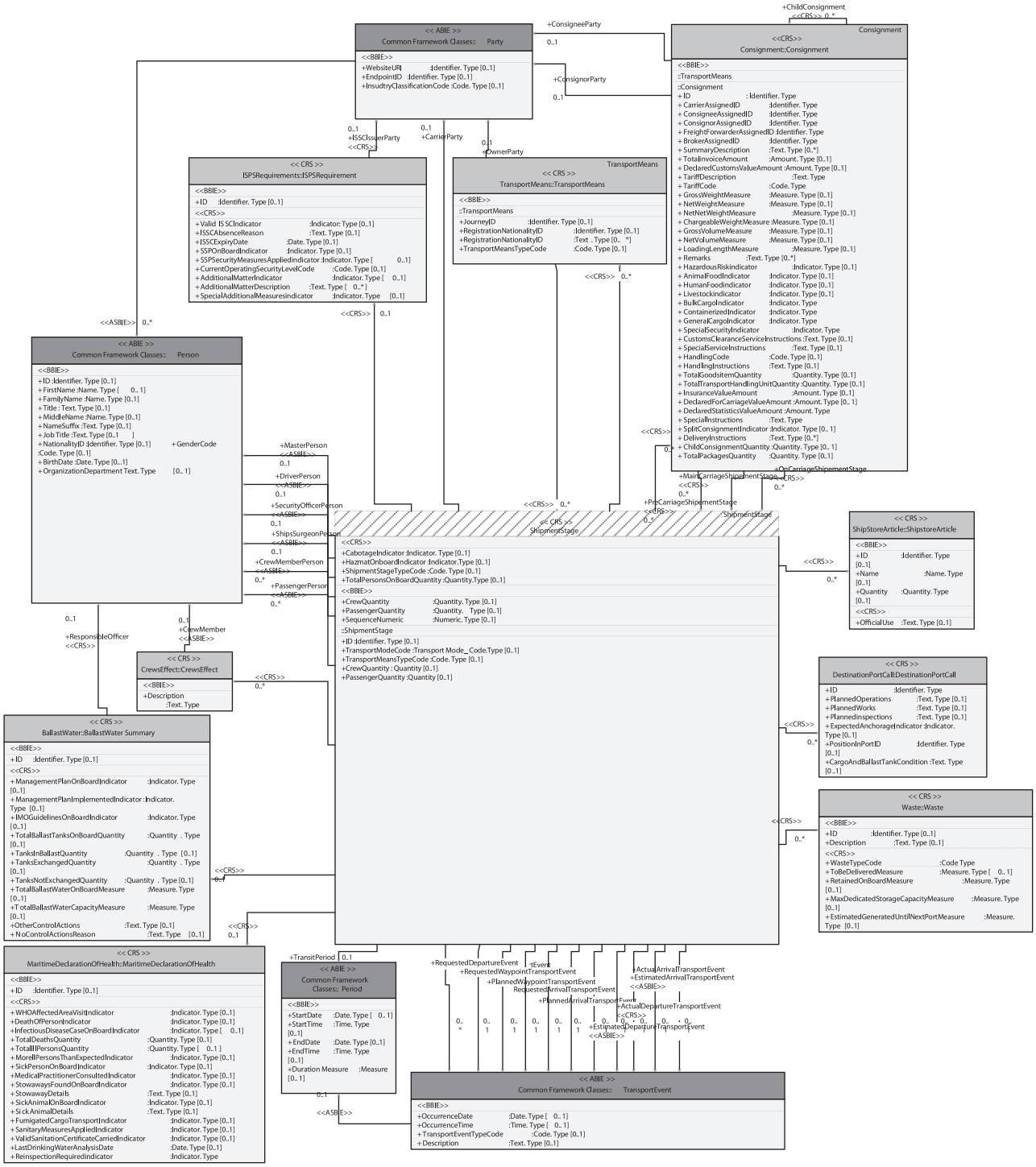

Figure 14 — Shipment stage structure

7.5.8 Location class from UBL

There are many different types of location which are used in transportation and many different methods are used to describe them. The location class from UBL is flexible enough to accommodate many different types of location description as shown in Figure 15. This is achieved through the ID attribute (which allows common location identifiers to be used, such as the UN/LOCODE) and the LocationTypeCode attribute, which is a UNECE coded value for a type of location (e.g. port, customs warehouse). Finally, any arbitrary location can always be specified using global positioning system (GPS) coordinates.

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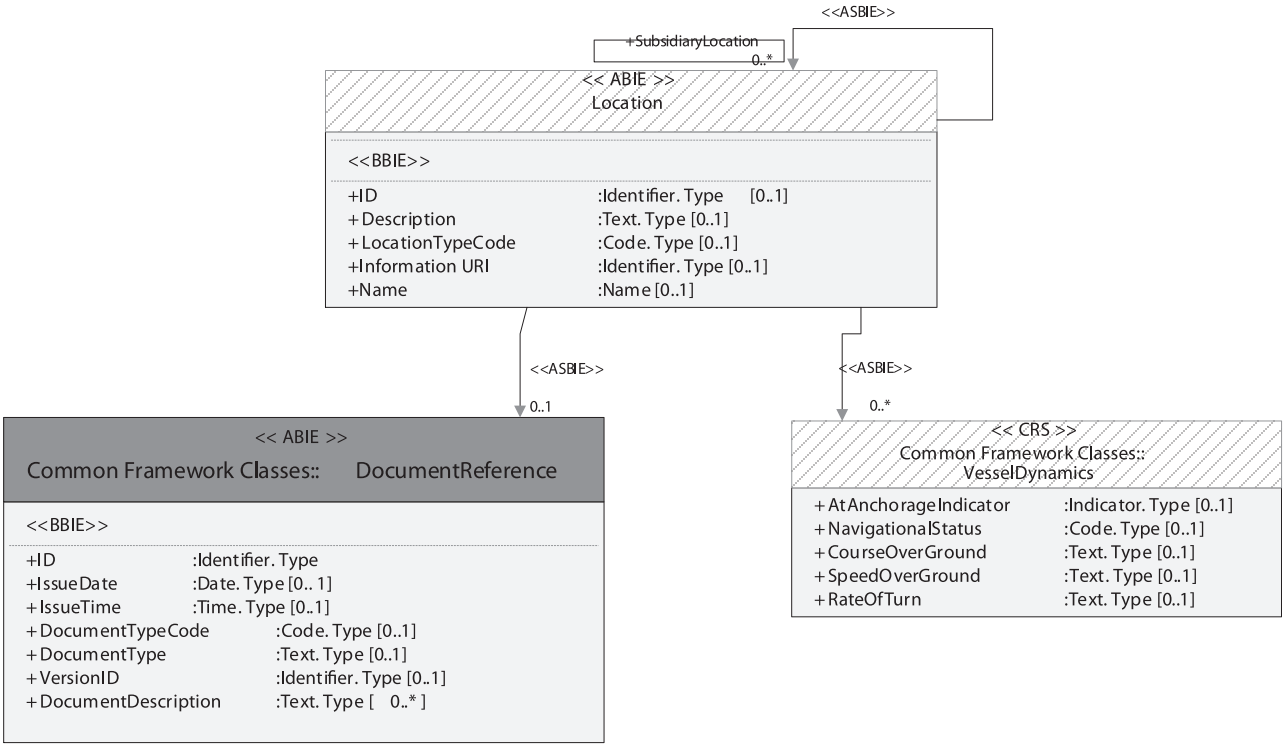

Figure 15 — Location class from UBL

8 Using the CRS in practice

8.1 General

The CRS is best used as the input to a single window system as it allows all reporting information to be submitted in the same format, and at the same time if desired, whilst ensuring that authorities receive all the information they need to perform their duties. Figure 16 shows this use case. Using the CRS, particularly when in conjunction with the information exchange capabilities of the national single window (NSW), speeds up reporting information to authorities. In each country, the NSW is configured so that each authority receives the selection of CRS information fields which meets their requirements.

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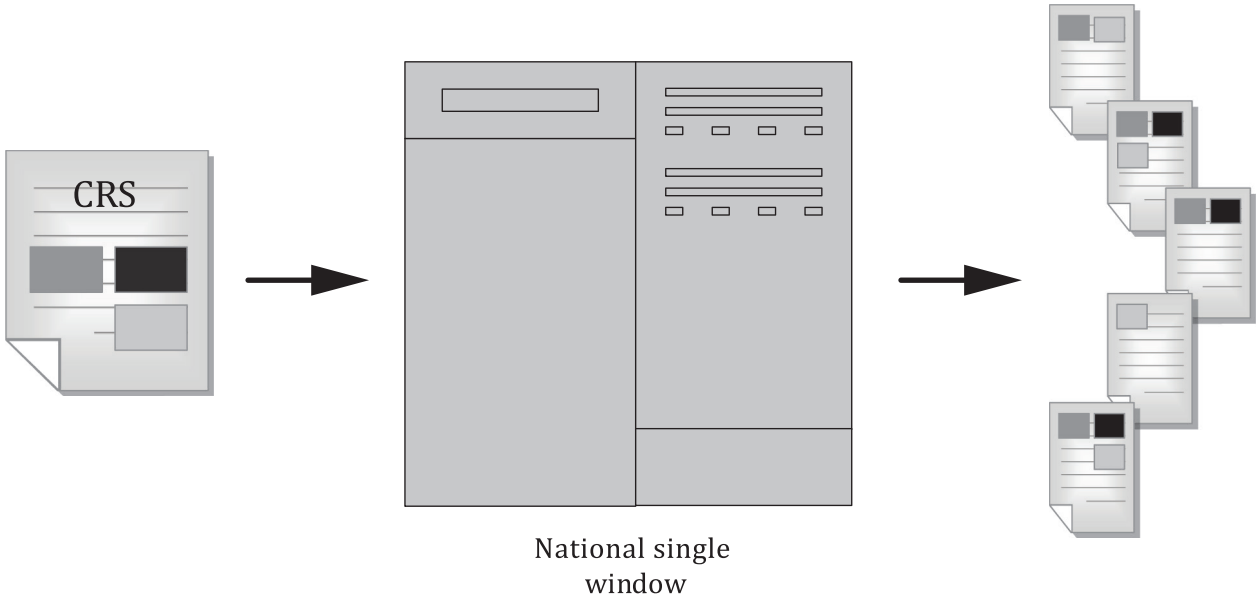

Figure 16 — Using the CRS with national single windows

8.2 CRS message profiles

The e-Freight framework follows a methodology for interoperability inspired by the European Committee for Standardization's (CEN) business interoperability interface (BII) specification. CEN BII promotes interoperable solutions for public procurement in Europe and uses the OASIS UBL standard as a basis in the information exchange. It has been suggested to be used as a model for freight data exchange interoperability.

The e-Freight framework information models, including the CRS schema, are based on the UBL common library of standardized data elements and information models. To accommodate a certain degree of flexibility with respect to implementation of information transactions, the CRS information models may be implemented according to profiles. A full profile shall include all the possible information elements, both mandatory and optional, that could be used in each transaction. A core profile shall include a core set of mandatory and optional information elements which need to be understood by both parties in the transaction.

Other informative material on using the CRS in practice is contained in Annex D.

9 Summary of benefit

The main benefits that the CRS brings can be summarized as follows:

1) **Wholly electronic data** — each data element is captured in electronic format (i.e. no scanned documents or PDF files) allowing information to be transferred, manipulated, stored and accessed easily and efficiently on a many-to-many basis.

2) **Comprehensive coverage of domain** — the model is deliberately comprehensive in its content so that it can be used as the basis for regulatory reporting in all modes. It also contains many optional fields deriving from the transport planning and operational messages which could be additionally provided by businesses in return for faster clearances or fewer checks at the border, for example. As well as this, its comprehensiveness gives the CRS longevity (i.e. it will remain valid and applicable for many years to come).

3) **Unbiased** — the CRS has been designed with no bias to country, mode or sector, which supports its ability to be substituted for any current paper reporting document across whole multimodal chains.

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4) **Single specification for all electronic reporting requirements** — implementation and data mapping to existing systems, or access point providers, only needs to be carried out once, thus reducing the burden on businesses.

5) **Inherent compatibility with the common intermodal transport framework** — companies and systems implementing the common intermodal transport framework messages can easily and automatically generate CRS submissions.

6) **Uses standard information elements** — most of the information elements are already used and understood by a large international community.

7) **Aligned with existing models and standards** — easy to map to existing systems and data formats and facilitates integration with different standardization communities.

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Annex A
(informative)

Background to the Common Reporting System (CRS)

A.1 General

Explosion of global trade in the last decade has resulted in increased complexity of regulation. Freight trade and transport-related authorities have established an extensive range of agency-specific and country-specific regulatory requirements for international trade and transport with little coordination amongst each other, at national, European or international levels.[50] A cross-border shipment typically involves 35 documents exchanged between 25 parties. There are more than 600 laws and 500 trade agreements to be considered. Even describing commodities according to applicable standards (e.g. Harmonized Tariff Schedule) is a time-consuming and costly exercise.

The result is that traders and transport operators are faced with a complex set of duplicative and redundant reporting requirements and related systems (forms, data models, messages, software applications, etc.). Consequently, businesses are forced to develop and maintain interfaces with many different systems to manage compliance with different national systems.[51] Ship, port and logistics operators and national administrations are required to develop different adaptors (often with limited useful life) to integrate with the plethora of different systems they encounter in their day-to-day operations. This adds significant costs to all parties, both in financial terms and in terms of problems in managing timeliness and accuracy of reporting data. Small and medium enterprises (SMEs) are particularly affected by this situation because they need access to information systems that are often closed and different from country to country and for different authorities.

Interoperability and collaborative processes are cornerstones in the quest for quality and efficiency in the movement of goods and form the foundation of the vision set by the Freight Logistics Action Plan for paperless planning, execution and completion of transport operations.[51] The current reality is that companies are faced with dissimilar business process scenarios and data interchanges when interacting with administrations for regulatory matters. Standardization helps, but organizations and industries are interpreting specifications and implementation guidelines differently and the result is a continued lack of interoperability. In recent years, the requirements for advance trade and transport notifications for safety and security purposes have increased regulatory compliance complexity yet further, and this is exacerbating the problems outlined above.

Therefore, supply chain stakeholders need a common reporting model based on business processes that interact efficiently and share common communication paradigms to be able to overcome barriers of interoperability and scalability. This will lead to greater transparency of operations and visibility of the flow of goods and ultimately reduce unnecessary administration costs. The need for such a model is also recognized in the industry and in the international community. Furthermore, the model needs to offer a level of standardization that is different from the type of standardization currently offered (where there are significant possibilities for interpretation), and in a way that makes it possible for SMEs to implement it and take part in efficient multimodal logistics networks.

A.2 The e-Freight framework

The e-Freight project developed the basis for a framework for interoperability (called the e-Freight framework) by specifying the semantics and syntax of messages exchanged between different organizations to allow them to interconnect in a standardized manner and to support their business processes in a scalable way. The e-Freight framework represents both B2B (business to business) and B2A/B2G (business to administration) relationships, as illustrated in Figure A.1.

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