INTERNATIONAL STANDARD

ISO 18495-1

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Intelligent transport systems — Commercial freight — Automotive visibility in the distribution supply chain —

Part 1: Architecture and data definitions

Systèmes intelligents de transport — Fret commercial — Visibilité automobile dans la chaîne d'approvisionnement de la distribution —

Partie 1: Architecture et définitions des données

Reference number
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Foreword

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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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html

The committee responsible for this document is ISO/TC 204, *Intelligent transport systems*.

ISO 18495-1 is the first of potentially several parts of this family of International Standards deliverables relating to automotive visibility in the distribution supply chain. Subsequent parts will provide specifications for particular aspects within this architecture.

Introduction

The automotive distribution supply chain, which includes newly manufactured vehicles, second hand vehicles, industrial machines, construction machines and agricultural equipment (but, particularly, that for the supply of newly manufactured vehicles and machines), can be defined as a logistics chain from point of origin to an intended destination. The related parties are many, consisting of automotive manufactures, dealers, truckers, terminal operators, shipping lines, tally body, customs authorities, automotive dealers and other logistic related companies such as labelling, forwarding, stevedoring among others and this complexity makes the distribution chain difficult to control and financially inefficient. Most of the logistics process occurs at land transport and parks of new manufactured and used automotive terminals, both prior to international shipping and post international shipping.

Most distribution supply chain operations that manage the movement of automobiles through the distribution supply chain are currently handled manually, on a company by company basis, and generate a very significant amount of paperwork, which is duplicated at each stage throughout the distribution chain, causing duplication of unharmonized data and difficulty in matching these different data concepts associated with a single item in shipment.

Transport movements are made by international shippers and forwarders, and not on a single company basis. Inconsistent availability and format of data creates problems in the management of the distribution chain.

The many parties involved in the distribution supply chain, and lack of data or inconsistency in its format and presentation, causes inefficient land transport and highly labour intensive and complicated operations in terminals and increases the required minimum stock levels required to ensure contingency of supply in order to avoid stock-out situations.

Further, it is very common for dealers to request changes of finished vehicle options and destination based on final customers request in an actual business environment. This is complex and difficult to achieve without visibility throughout the distribution supply chain.

Improving the efficiency of the automotive distribution supply chain will make a significant contribution to reducing pollution, reducing waste of finite resources and reduction of environmental problems.

Considerable work and effort has already been undertaken to formalize, harmonize and standardize the documentation and the formal business processes associated with the documentation management of the automotive supply chain for finished vehicles, and these processes and data concepts are acknowledged and accepted with regards to the formal documentation processing and management of such systems. The existing (and standardized) supply chain documentation and data processing are not affected by this part of ISO 18495, which is complementary to those processes, and designed mostly for use by logistics operators. However, unlike many items in supply chains, automotives can be, and are, informally physically moved around car parks and holding centres during the logistics of operations.

As there are many existing practices within the process of automotive fabrication, and very local practices within dealers, it is recognized that these aspects of vehicle build and delivery will have their own domestic architectures. Similarly, there are established practices and procedures on the maritime leg of the journey. However, if the manufacturer, dealer, shipper or dealer wishes, at their option, to extend this architecture and data definitions into their domains, this architecture enables them to do so, should they so elect to do.

This part of ISO 18495 establishes a framework and architecture for data collection of the physical movement of vehicles, construction machinery and agricultural equipment, in the distribution chain between a point of origin (start of logistics movement) and an intended destination, and provides a means to monitor their actual physical movement at and between various stages of the distribution supply chain, including informal movements within any of these stages/locations, and provides consistent data architecture, harmonized data concepts and presentation for such data.

Intelligent transport systems — Commercial freight — Automotive visibility in the distribution supply chain —

Part 1: Architecture and data definitions

1 Scope

This part of ISO 18495 establishes a framework and architecture for data collection and to provide data definitions for visibility of vehicles, self-propelled construction machinery and agricultural equipment (hereinafter referred to as “automotives” or “automobiles”) in the distribution supply chain between a point of origin (start of logistics movement) and an intended destination.

This architecture is designed to cover any undocumented movements at any location. The scope of this part of ISO 18495 is to

a) enable dynamic location within a storage area/compound,

b) provide consistent use of the ISO 3779/ ISO 3780 VIN (where available) as the prime identifier, and

c) where a VIN is not available, provide consistent and standardized identification throughout the distribution chain movement.

NOTE 1 The scope of this part of ISO 18495 does not standardize the data carriers or their interrogation means.

NOTE 2 This part of ISO 18495 is expected to be the first part of multipart standard relating to this subject.

NOTE 3 This specification is complementary to, and does not replace any supply chain documentation standardized and in use by JAIF or ODETTE in the new vehicle supply chain, nor does it impose any specification or change on the representation, nor exchange of, their data concepts nor documentation.

NOTE 4 The movement of automobiles within containers is outside of the scope of this part of ISO 18495.

2 Conformance

No specific conformance requirements are specified in this part of ISO 18495.

3 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3779, *Road vehicles — Vehicle identification number (VIN) — Content and structure*

ISO 3780, *Road vehicles — World manufacturer identifier (WMI) code*

ISO 14816, *Road transport and traffic telematics — Automatic vehicle and equipment identification — Numbering and data structure*

ISO 14817 (all parts), *Intelligent transport systems — ITS central data dictionaries*

ISO 17262, *Intelligent transport systems — Automatic vehicle and equipment identification — Numbering and data structures*

4 Terms and definitions

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

4.1
architecture
fundamental concepts or properties of a system in its environment embodied in its elements, relationships and its *framework* (4.9)

4.2
automobile
automotive
any self-propelling motorized vehicle including cars, vans, trucks, self-propelling construction machinery and self-propelling agricultural equipment

Note 1 to entry: See also *vehicle* (4.14).

4.3
current location
physical position at the time of the enquiry

4.4
data concept
characterization which describes and defines the essential features of a distinct entity such as a *data element* (4.5), group of data entities or metadata, normally described by defining all or some of its object class, properties, value domain, data element concept, data element, data frame, message, interface dialogue, associations, but does not define the specific value domain

Note 1 to entry: *Data concepts* (4.4) can be classified into the following categories: object class, value domain, data element, aggregate domain, data frame, message, interface dialogue, dictionary document, term, symbol or module.

4.5
data element
union of a specific *data concept* (4.4) with a specific value domain creates a data element

Note 1 to entry: For example, the *Person-date of birth* can be combined with the *Date DDMMYYYY* value domain to create the *data element*: *Person-date of birth, DDMMYYYY*; alternatively, the *data element* could be formed using the *Date YYYY* value domain making a distinct *data element Person*.

4.6
destination
destination location
most recently updated end point of the journey

4.7
distribution chain
series of businesses or organizations that are involved in transporting, storing and selling goods to customers (Cambridge ED)

Note 1 to entry: See also *distribution supply chain* (4.8) and *supply chain* (4.13).

4.8
distribution supply chain
process of transportation and distribution, of *vehicles* (4.14) and mobile plant and equipment, through a *distribution chain* (4.7)

4.9
framework
particular set of beliefs or ideas referred to in order to describe a scenario or solve a problem

4.10
location type
function of the facility/point where the data was collected

4.11
point of origin
start point of a logistical movement of an *automotive* (4.2) to a *destination* (4.6)

4.12
status definition
identifier indicating whether the *automotive* (4.2) is "Not Ready" or "Ready" for the next function of the facility or the next READ POINT of the journey

4.13
supply chain
system of organizations, people, activities, information and resources involved in moving a (new) product or service from supplier to customer (OED)

Note 1 to entry: See also *distribution chain* (4.7) and *distribution supply chain* (4.8).

4.14
vehicle
automobile (4.2) such as automotive, van, truck, tractor unit, self-driven agricultural equipment, self-driven construction equipment

Note 1 to entry: The term vehicle within the context of this part of ISO 18495 embraces all forms of self-driven automotive.

4.15
VIN
structured combination of characters assigned to a *vehicle* (4.14) by the manufacturer for identification purposes as defined in ISO 3779 and ISO 3780

Note 1 to entry: See Annex B.

5 Symbols and abbreviated terms

ASN.1	Abstract Syntax Notation One
DD	Delivery to Destination
DFE	Destination Final Egress
DPT	Despatching Port Terminal
DVP	Dealer Vehicle Park
FVP	Finished Vehicle Park
M	Mandatory
MT	Marine Transport
O	Optional
PoO	Point of Origin
RPT	Receiving Port Terminal

UML Unified Modelling Language

VIN Vehicle Identification Number (ISO 3779/ISO 3780)

XML Extensible Markup Language

6 General requirement

6.1 Business modelling and core use cases

A high level Unified Modelling Language (UML) view of the business process actors and their data dependencies is shown in Figure 1.

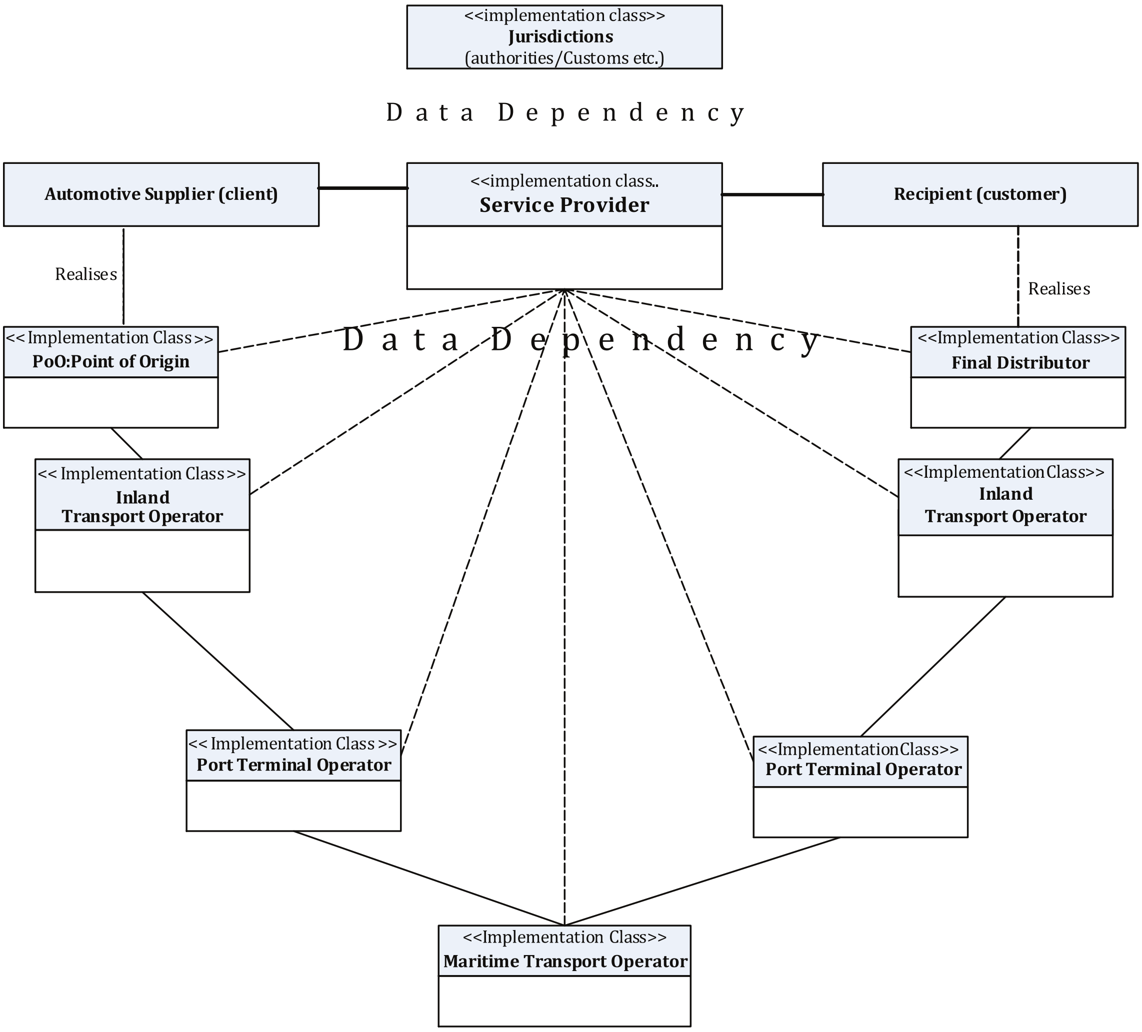


Figure 1 — UML high level view of international automotive distribution actors and their data dependency

6.2 Business process overview

6.2.1 Distribution supply chains liable to "informal" movements of automotives

Vehicle and self-powered construction and agricultural machinery manufacture (automotive production) is a global business. Specific models of vehicles are made at one or more assembly plants, then shipped to customers in all countries of the world. An automotive manufacturer of one nationality will frequently have assembly plants in many countries. But, the trend of efficient manufacturing is not that one assembly plant services the country in which it is based, but that it specializes in one or a few models at a time. The resultant product is then shipped around the world to the dealer network. A similar business environment operates for self-powered construction and agricultural machinery.

In addition to this, there is a growing movement of pre-owned automobiles from countries that habitually have a young car park, to those who tend to drive older pre-owned vehicles, and for construction and agricultural equipment to move from highly sophisticated markets to lesser developed or poorer countries as they age.

Although within countries and to some extent, continents, automobiles will be moved by road transport (driving the individual automobile or more frequently, using a transporter to move small groups of automobiles), because of the size and weight of automobiles, these international movements are overwhelmingly made by sea.

As with most business aspects, the current trends have been away from manufacturer owned and managed in-house transport towards the use of specialized logistics handlers and marine shipping organizations. A relatively small number of specialist marine shippers therefore perform large numbers of automotive movements for multiple automotive manufacturers.

As, in most cases, the automobile assembly point is not adjacent to the dockyard, this further involves road transport from the factory of assembly to a holding yard adjacent to the dock. Prior to its transport to that dockyard holding facility, automobiles are likely to be marshalled in holding pens/parks at the assembly factory, while awaiting the organization of transport. These land movements may be made by very large transport logistics companies or by small local hauliers.

Once a ship loaded with automobiles arrives at its destination port, the automobiles will be transferred into holding parks and, subsequently, transported by road, usually using “transporter” vehicles to dealerships, who may in turn hold the automobiles in vehicle parks, before shipping them to a particular dealer outlet for final inspection and handing over to the end customer, or on other circumstances may be delivered directly to the final distributor.

Throughout the process, and particularly at the assembly factory and at ports, these vehicle parks can be very large, often covering several hectares, so locating automotives for the next function of the facility or the next “Read Point” of their transport is a considerable challenge. The exigencies of the physical situation at any point in time, such as poor weather, congestion, automobiles loading at the same time as the park is being filled, etc., mean that, in practice, whatever careful planning is made, the reality is that some automotives are parked in the wrong place. Picking them for transport is therefore frequently complex and inefficient.

While consignment data is usually available electronically, and/or on paper, in the control office, consignments typically relate to batches or groups of multiple automotives, frequently of tens, sometimes hundreds, of vehicles. But, most of the physical movement of these automotives is made manually, item by item, usually simultaneously by multiple drivers. Consignments typically only identify the facility where the automotive is to be found, and not where it is precisely in that facility. Even where a scheduled location is designated in consignment documentation, the exigencies described above mean that it may not be in that exact location, so time is lost locating the vehicle, and there are cases where the nearest match vehicle that can be found is used with the consequent complication on subsequent logistics both for the substitution and substituted automotive.

Figures 2 and 3 provide visual examples.

Figure 2 — Example finished vehicle park

Figure 3 — Example of despatching port terminal

6.2.2 Business process for automotives in the distribution supply chain

Figure 4 shows the scope of this this part of ISO 18495 in the distribution supply chain elements, from point of origin to the destination. In practice, the routing may be more complex with additional holding parks.

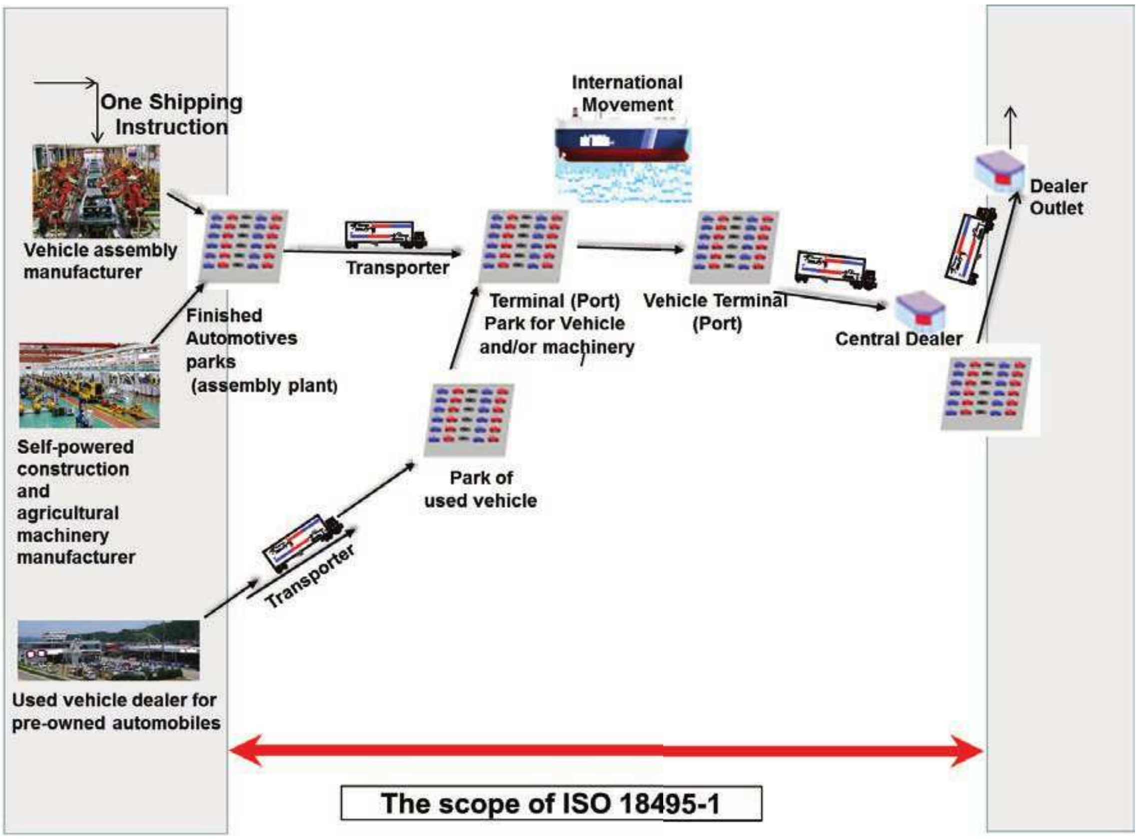


Figure 4 — Overall end-to-end logistics from an assembly factory to a dealer

Annex C provides some examples of the business process use case, example business case sequence diagrams and an example work flow, using UML representation. These are examples, and other configurations and flows are possible.

Figure D.1 provides an example of the amount of administration required behind this process.

While standards such as ISO 24533 manage and control freight at a consignment level, this part of ISO 18495 considers and characterizes the data collection points and defines the core data required for this process between the points when the automobile leaves the production line to its final movement to the dealer. This part of ISO 18495 focuses on the individual automotives in a shipment and tracks and, if necessary, traces their location en-route.

As there are many existing practices within the process of automobile fabrication, and very local practices within dealers, it is recognized that these aspects of automotive build and delivery will have their own domestic architectures. Similarly, there are established practices and procedures on the maritime segment of the journey. However, if the manufacturer, shipper or dealer wishes, at their option, to extend this architecture and data definitions into their domains, this architecture enables them to do so, should they so elect to do.

The means by which the data are stored and collected (so called data carriers) is not defined in this part of ISO 18495, but may be defined in further parts of ISO 18495.

It is important to understand that not every "Read Point" of the list, shown in Table D.1 as an example, will be present or required in any distribution supply chain. The "Read Points" of this logistics chain can be described as broadly sequential, but may vary according to the physical location and nature of the business of the manufacturer, dealer or shipper, with some of these points replicated to accommodate the physical instantiation of the distribution chain, and with other "Read Points" not present in a particular instantiation of a particular distribution chain.

The optional extension uses are shown to indicate that they are not a principal, nor required, part of this architecture and data definitions, but are available to manufacturers, shippers and dealers, should they wish, at their discretion, to extend this architecture into their domains, in order to harmonize data types and content throughout their aspects of the extended distribution supply chain.

However, many of these read points occur within the domestic environments of automotive and equipment manufacturers or the final distributor domestic logistics chains. While embracing the context of a fully consistent end-to-end information chain, this part of ISO 18495 is focused towards the aspects of these information chains which are shared through the international movement of automobiles in the distribution supply chain.

Table D.1 describes nine principle “Read Point” stages of the automotive supply chain, each comprising several sub-“Read Points” or activities where data capture may be appropriate. Not all of these sub-“Read Points”/activities, or even “Read Points”, are present in all physical instantiations of this distribution supply chain, which vary from one manufacturing plant to another, dependent on the geographic location, local terrain and business model of the manufacturer.

The logistics operator for the ”common” shared “Read Point” stages is likely to have to deal with automobiles from multiple manufacturers, through storage and distribution facilities operated by different operators, and ports, both despatching and receiving. It is of considerable benefit, therefore, that the data definition and its management are standardized.

The standardization of the architecture and data architecture is the objective of this part of ISO 18495.

Each “Read Point” stage comprises several sub-“Read Points” or activities where data capture may be appropriate. Not all of these sub-“Read Points”/activities, even “Read Points”, are present in all physical instantiations of this distribution supply chain, which vary from the instantiation of one chain to another, dependent on the geographic location, origin and destination country, local terrain and business model of the managers of the instantiation.

Column 2 of Table D.1 provides an acronym for each “Read Point” and a decimal reference for each “Read Point”. Column 3 indicates the activity at that “Read Point” and column 4 provides a unique reference code for the type of activity.

6.3 High level system data architecture

Without trying to prescribe or define the management system of any manufacturer, dealer, carrier or party involved in this distribution chain, it is the objective of the data definitions in this part of ISO 18495 to standardize a similar data capture process throughout this distribution supply chain, such that inconsistency of data and its presentation is eliminated, and without redundant data overload, when collated in the management information system, can meet any likely requirement for management information.

Regardless of where the enquirer is in the distribution system, he needs to know the following:

a) type of unambiguous identification code (see 6.5.1);

b) an unambiguous identification of the automobile;

c) the day/date/time that the data was captured;

d) the geographic location coordinates of the automobile at the time of the data capture;

e) the location ”type” that identifies the nature of activity at the location;

f) transport status code [UNECE code (Rec 24) for logistics activities];

g) status definition (whether the automotive is ready for a next step of handling).

It is also beneficial when interpreting this data to have an unambiguous “name” for the interrogation point. This enables more rapid visual interpretation of the mass of data by humans. However, while a) to f) are essential data, the system will operate without a location type or a transport status code or a status definition, so these components are "optional", but recommended.

Assuming that the management information system updates its owner and makes information also available to the automobile manufacturer or dealer (by means to be determined by the management information system of the party that captures the data), this record will identify, uniquely for each automobile, when it came into its presence, what "Read Points" it has passed through (and when) and where it was last recorded to be.

Without designing the database, the data elements of this data concept, will enable

a) search by/for automobile,

b) identify its current location,

c) identify its movement history, and

d) identify its progress through the system to date.

Table D.2 provides an example of how a manufacturer might display a record for an individual automobile using the data defined in this part of ISO 18495.

6.4 Data architecture

6.4.1 Concept

The data architecture has been determined from the highest level view with the objectives to

— minimize the number and complexity of data concepts and their constituent elements,

— provide objectivity for data repositories,

— simplify in-transit data operations,

— enable implementation specific instantiations without compromising data interoperability, and

— avoid different data requirements (and definitions) at different "Read Points" of the supply chain.

Within the scope of this part of ISO 18495, data concept semantics shall be consistent with the principles established in ISO 14817. Data concept syntax shall be defined and presented using ASN.1 (ISO 8824/ISO 8825). See Annex A.

NOTE ISO 14813-6 requires that all data are specified in a consistent format in ITS standards and ASN.1 is the selected format because it is both terse and unambiguous. This requirement does not mean that data shall always be presented/transmitted to other parties using ASN.1. The data for which there is an ASN.1 definition is easily converted to XML, UBL, UN/EDIFACT, etc. as appropriate for the media it is transmitted across and the end user application standards to which it is complying.

The simplified data architecture is defined as the AutomotiveMovementRecord aggregate domain and shall comprise two primary data concepts:

a) an automotive identifier, which uniquely identifies the automotive unit being tracked;

b) tracking event(s), which contains time stamped information about the actual tracked physical location (and related information) of the automotive/vehicle as it is being shipped.

Figure 5 provides an overview of the structure and the full definition of these concepts are provided in 6.5.

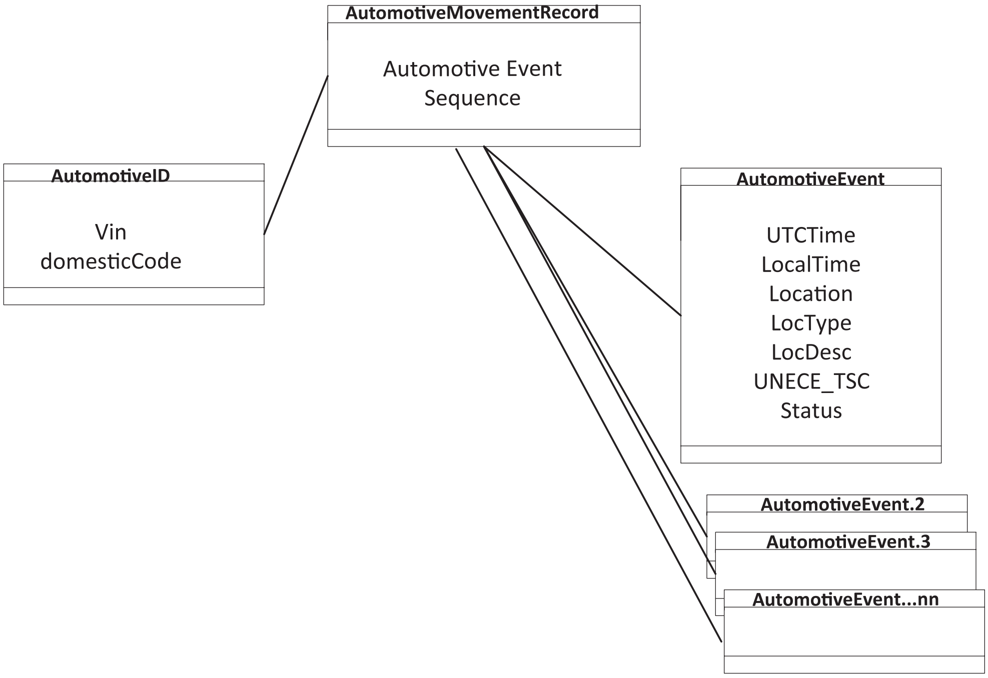


Figure 5 — Overview of the data structure

6.5 Data concept definitions

6.5.1 Automotive Identifier

This provides the identification for the automotive unit, for dynamic tracking purposes, throughout its journey. It shall be created at the commencement of the journey by the first actor in the logistics chain, or at the first opportunity thereafter.

There are two options for the automotive identifier (see below), vehicle-vin being the preferred option. Where ISO 3779/ISO 3780 VIN is readily visible, it shall always be used as the "Automotive Identifier" in preference to the automotive domestic code.

Once assigned, this "Automotive Identifier" shall be used to identify the automotive unit for whom a record of its actual physical movements is being made, throughout its journey from supplier to destination.

This tracking identification is complementary to and does not replace any ODETTE/JAIF/AIAG shipping documentation.

The automotive identifier shall be defined in ASN.1 as:

```
Automotive18495Identifier        CHOICE {

    vin     Vehicle-vin,

    Automotive18495-domesticCode,

}
```

WHERE

6.5.1.1 Vehicle-vin

The vehicle-vin data element shall be defined as:

Vehicle-vin UTF8String(17), — Vehicle VIN expressed as a string of characters: The unique

— identifier for the vehicle as defined in ISO 3779/ISO 3780

— presented as defined in an ISO 14816 or ISO 17262 coding

— scheme

6.5.1.2 Automotive Domestic Code

The automotive domestic code data element concept shall be defined as an ASN.1 SEQUENCE of 5 data elements:

Automotive18495-domesticCode :: = SEQUENCE {

startCompanyIdentifier UTF8String(1),3f — ?

companyCode UTF8String(3), — 3 letter or symbol code of the company

— generating the domestic code

endCompanyIdentifier UTF8String(1), — ?

domesticCode UTF8String(9), — Domestic code generated by company

endDomesticCode UTF8String(1),25 — %

}

— example ?MOR?123abc789 %

6.5.2 Automotive event

The Automotive event is a data concept comprising eight data elements, seven of which are simple elements and one is an aggregate element of 10 sub-elements. Automotive event shall be defined in ASN.1 as:

```
ISO-18495-1 DEFINITIONS AUTOMATIC TAGS::= BEGIN

automotive18495Event= SEQUENCE {
   id              Automotive18495Identifier,  - Automotive18495-identifier
   utcTime          DATE-TIME,                -- Automotive18495Event-utcTime
   localTime        VisibleString(SIZE(18..21)), - Automotive18495Event-localTime
   location         Location18495,            - Automotive18495Event-location
   locType          INTEGER (0..99)  OPTIONAL, - Automotive18495Event-locationType
     locDesc                    UTF8String(1..10) OPTIONAL, - Automotive18495Event-
locationDescription
   unece-tsc        INTEGER  (0..999) OPTIONAL, - Automotive18495Event-uneceTscCode
   statusDefinition BOOLEAN           OPTIONAL - Automotive18495Event-statusDefiniton
}
Automotive18495Identifier CHOICE {
   vin              VisibleString(SIZE(17)),   - Vehicle-vin
   domestic         VisibleString (SIZE(15)),  - Automotive18495-domesticCode
   ...
}

Location18495::= CHOICE {
   Universal        GeoLocation3D,  - Automotive18495Event-geoLocation
   localLocation    VisibleString(SIZE(7..20)) - Automotive18495Event-localLocation
}

GeoLocation3D::= SEQUENCE {
```

```
   lat     INTEGER (-900000000..900000001),   - GeoLocation-latitude
   lon     INTEGER (-1800000000..1800000001),  - GeoLocation-longitude
   alt     INTEGER (-8191..57344)              - GeoLocation-altitude
}

END
```

Annex A
(informative)

ASN.1 modules for the data concepts defined in this part of ISO 18945

A.1 General

Data can be presented in many ways, however, in an open system it has to be understood and exchangeable and understood by all parties. In order to do this, common data formats have to be used in all data definitions. ISO/TC 204 has determined that the most abstract, agnostic and commonly understood data syntax is ASN.1 and ISO 14813-6 requires that all data presentation in ISO/TC 204 standards provide a definition of the data in ASN.1 in order to promote data reuse and interoperability. However, please note that administrative control systems often use XML.

NOTE A particularly useful new application of ASN.1 is Fast Infoset. Fast Infoset is an International Standard that specifies a binary encoding format for the XML Information Set (XML Infoset) as an alternative to the XML document format. It aims to provide more efficient serialization than the text-based XML format.

Figures A.1 and A.2 provide a concept of the layer of standards and data usage.

It is important to understand that in the context of these figures, data collected from the vehicle is normally the vehicle ID and other data are normally added by the reader/interrogator and or local computers processing the data.

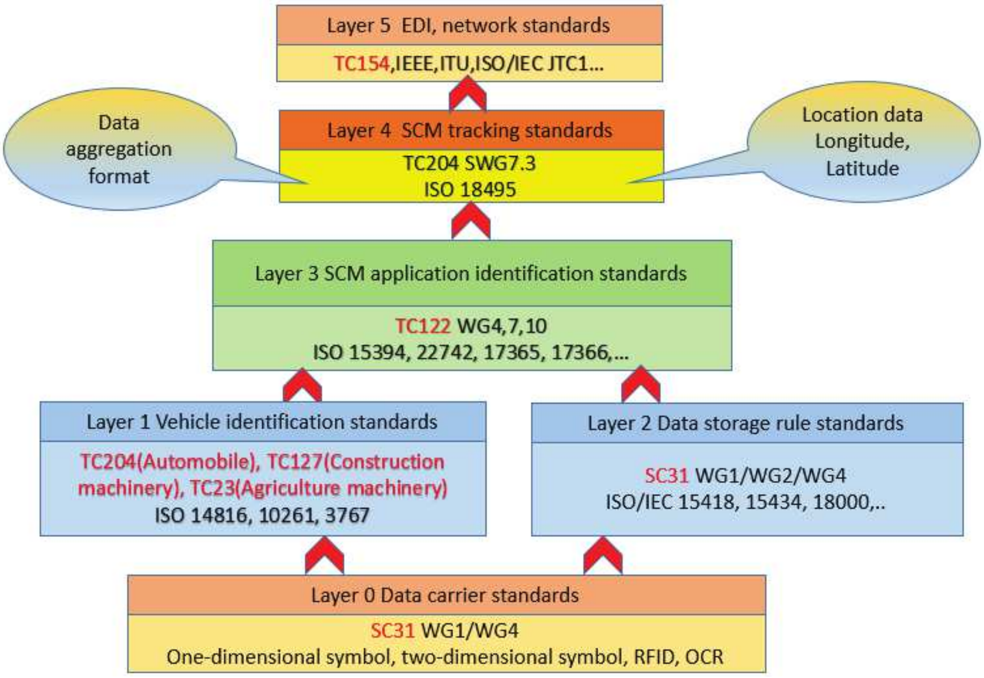


Figure A.1 — Layer concept of supply chain management standards for ISO 18495-1

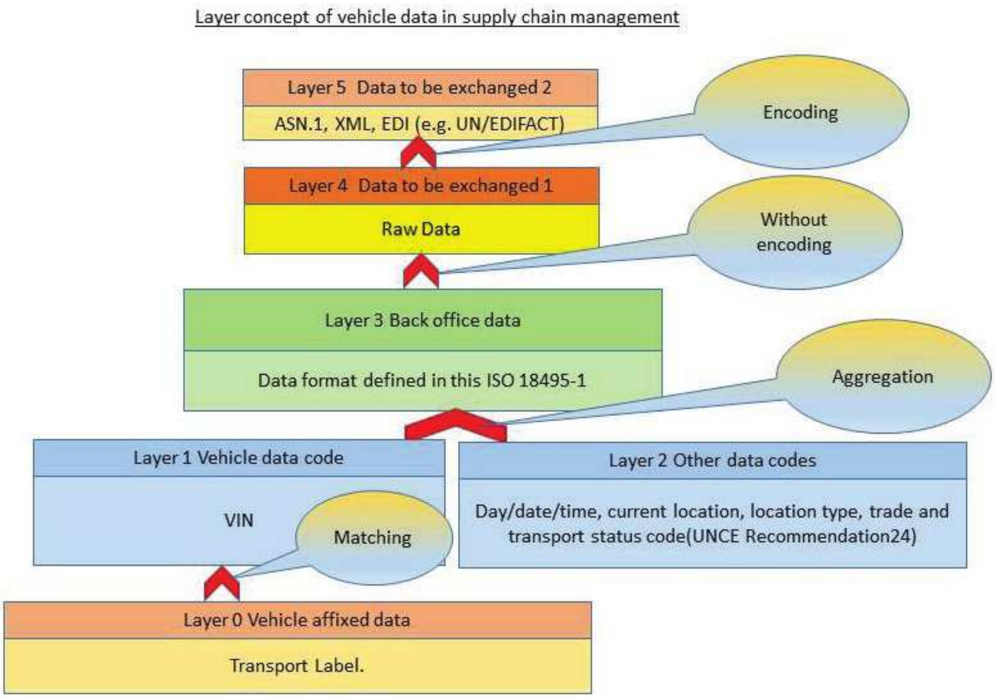


Figure A.2 — Layer concept of vehicle data in supply chain management for ISO 18495-1

The following is an example ASN.1 module for the data concepts defined in this part of ISO 18495.

A.2 ASN.1 example module

ASN.1 statement

```
  - ASN1START
  AutomotiveVisibilityDataInTheSupplyChain  {iso (1)  standard (0)  iso18495 (18495) }
AUTOMOTIVE VISIBILITY DATA IN THE SUPPLY CHAIN::= BEGIN

  AutomotiveMovementRecord::= SEQUENCE {
    Automotive18495Identifier          Automotive-unambiguousIdentifier,
  Automotive14895Events (1..n) □= SEQUENCE {
      Automotive18495Event              Automotive-event related data
              }
    }

  END
  -ASN1STOP
```

Annex B
(informative)

Interpreting a VIN number

B.1 What is a VIN?

VIN stands for Vehicle Identification Number. All vehicles are assigned a VIN when they are manufactured. They are used to uniquely identify all vehicles. VINs are recorded in accidents, insurance records and when work is done on a vehicle by a body shop, dealership or mechanic.

The VIN, as specified in ISO 3779, with the World Manufacturer Identifier (WMI) code outlined in ISO 3780, specifies the content and structure of a vehicle identification number (VIN) in order to establish, on a world-wide basis, a uniform identification numbering system for road vehicles.

The VIN consists of three sections: first, the world manufacturer identifier (WMI) section, second, the vehicle descriptor section (VDS) and last, the vehicle indicator section (VIS).

B.2 What does the VIN look like?

Sample VIN: 1 G 1 F P 2 2 P X S 2 1 0 0 0 0 1

	CHARACTER POSITION																
STANDARD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ISO 3779	World Manufacturer Identifier (WMI)			Vehicle Descriptor Section (VDS)						Vehicle Indicator Section (VIS)							
EUROPEA N UNION (more than 500 vehicles per	WMI			Indication of "the general characteristics of the vehicle"						Indication which provide "clear identification of a particular vehicle"							
EUROPEA N UNION (fewer than 500 vehicles per	WMI		9	Indication of "the general characteristics of the vehicle"						Indication which provide "clear identification of a particular vehicle"							
NORTH AMERICA (more than 500	WMI			Vehicle Attributes					Check Digit	Model Year	Plant Code	Sequential Number					
NORTH AMERICA (fewer than 500 vehicles per year)	WMI		9	Vehicle Attributes					Check Digit	Model Year	Plant Code	Manufacturer Identifier			Sequential Number		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	CHARACTER POSITION																

Figure B.1

B.3 Interpretation of the sample VIN

1 = Country it was produced in (1 USA, 2 CAN)

G = Motor Company (General Motors)

1 = Make (Chevrolet)

F = Carline Code (F-Body)

P = Carline Series (Camaro)

2 = Body Type (2 Door-Coupe Hatchback)

2 = Restraint System (Manual belts (driv+pass inflatable))

P = Engine Code (5.7L V8 (LT1) (1993-present))

X = Check Digit (most likely "X")

S = Model Year (1995)

2 = Assembly Plant (St.Therese)

100001 = Production Sequence

VINs do not use the letter "I" or "O" in order to avoid confusion with "1" and "0".

B.4 Post 1981 and Pre 1981

Vehicles from 1981 to present have 17 character VINs.

Before 1981 the VIN may be shorter.

B.5 Physical position of Vehicle Identification Number (VIN) location

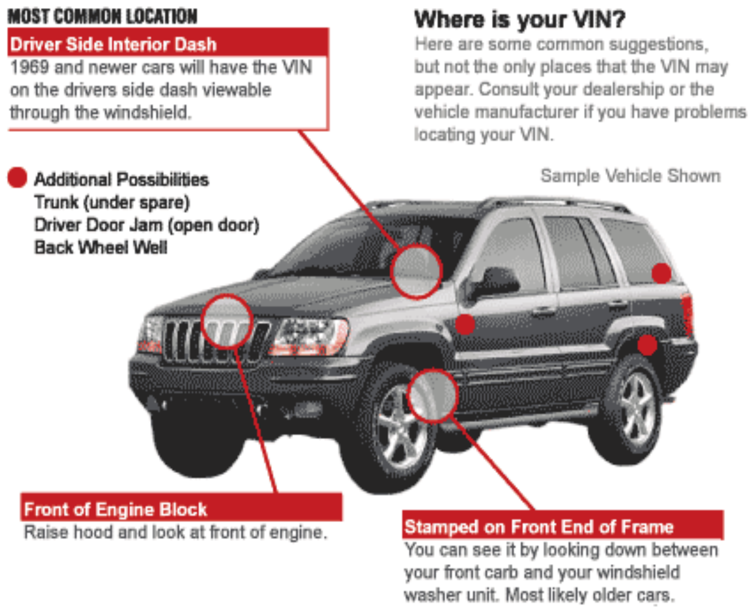


Figure B.2

Annex C
(informative)

Example business processes and work flows

C.1 UML use case diagram of business process

Figure C.1 shows an example "Use Case" for the business process associated with this part of ISO 18495, in UML representation.

NOTE Other business Use Cases are also possible.

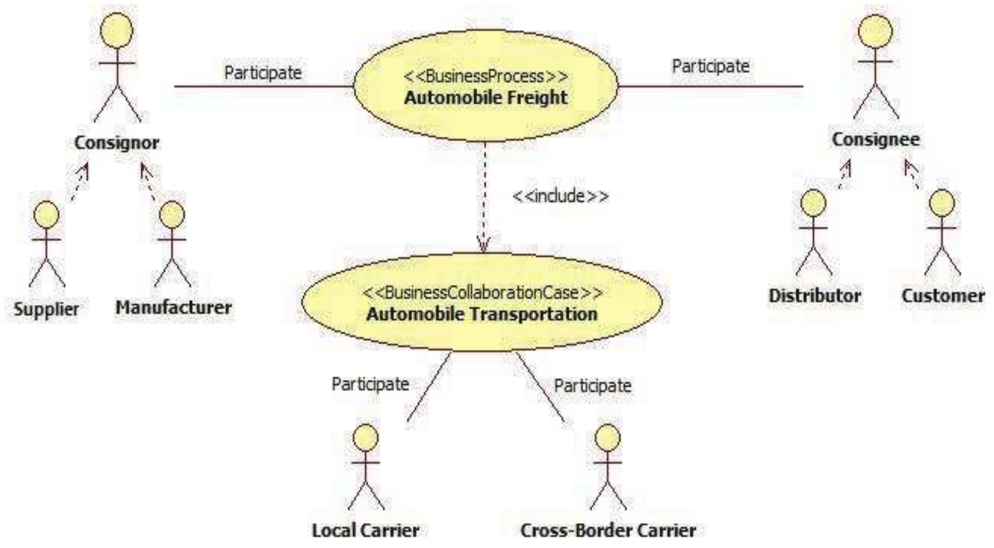


Figure C.1 — Example use case diagram of international automotive freight business process

C.2 Sequence diagram of business process

Figure C.2 describes an example of business transactions and activities when a "Consignor" delivers automobiles to a "Consignee".

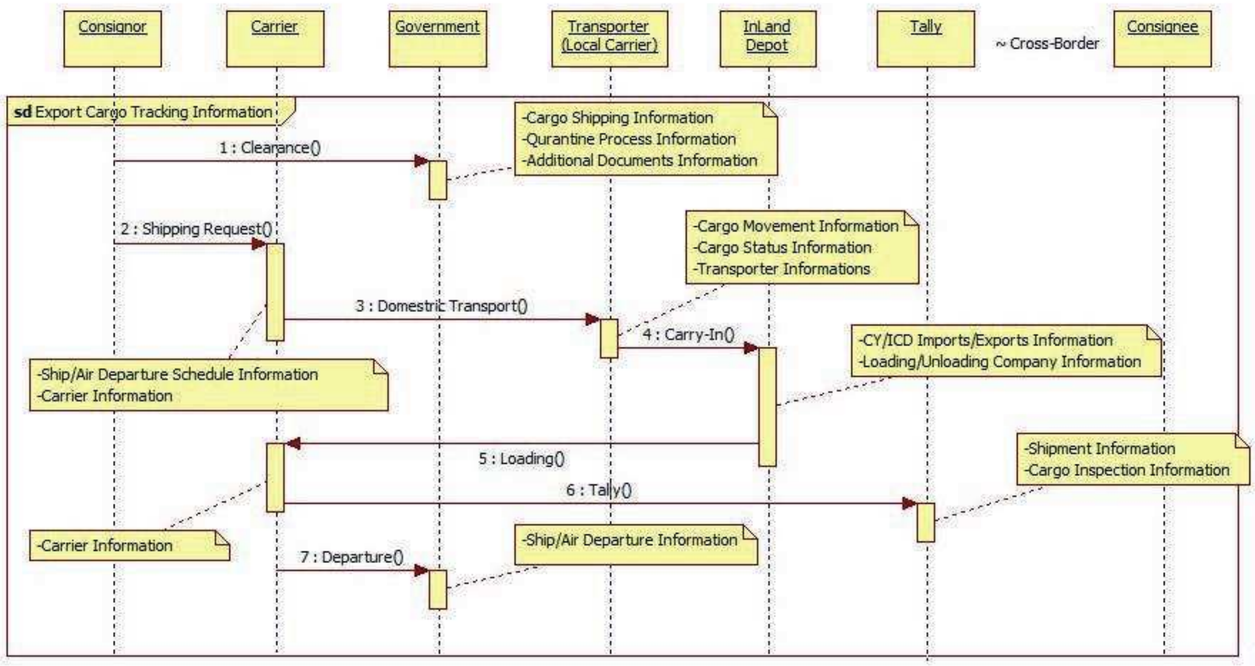
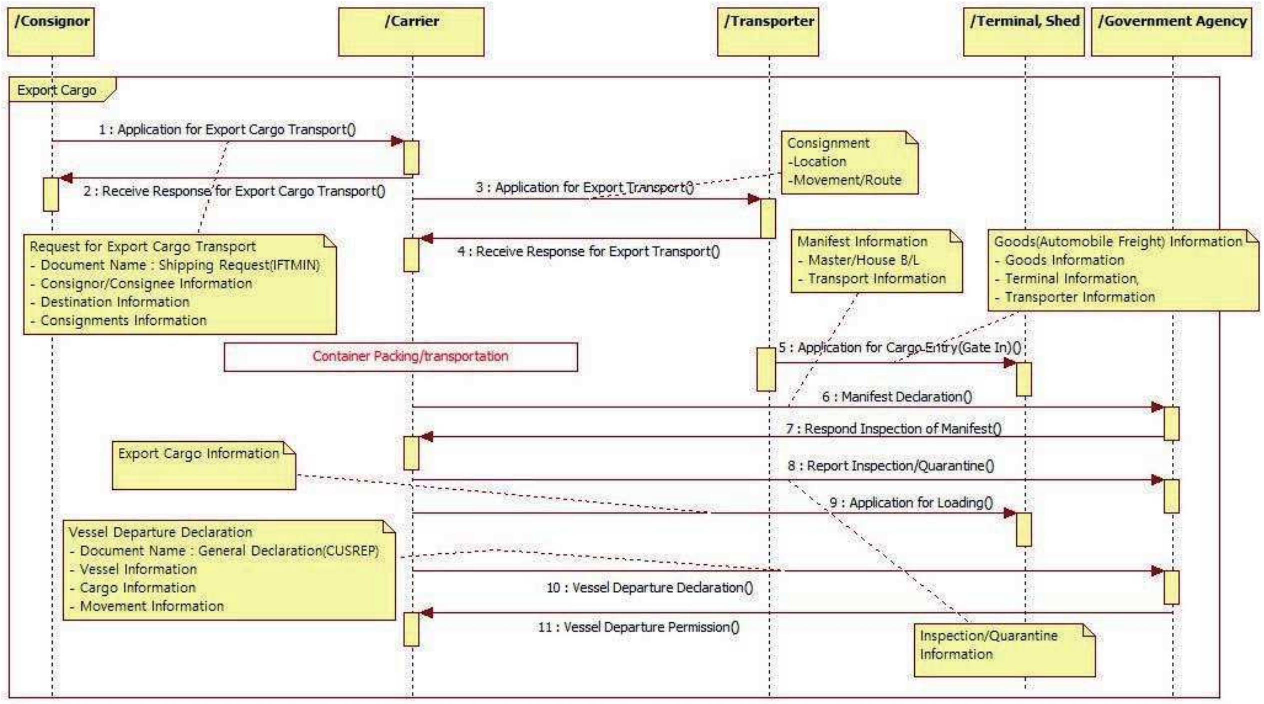


Figure C.2 — Example of business process

Figure C.3 describes business transactions and activities when a "Consignor" delivers automobiles to a Consignee including e-documentation.

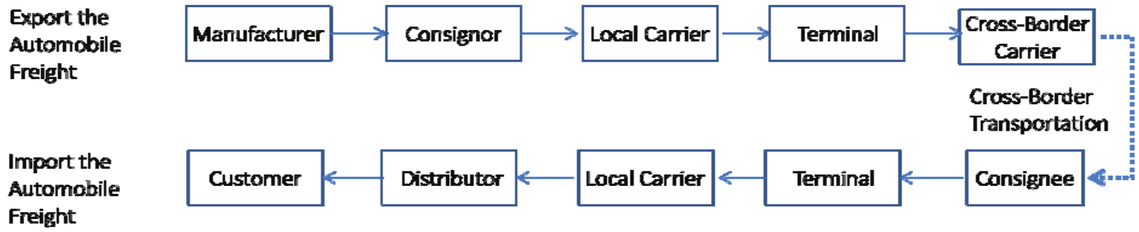


NOTE Other business transaction scenarios are also possible.

Figure C.3 — Example of business process including eDocumentation

C.3 Work Flow

The work flow in Figure C.4 shows an example of the delivery of automobiles (new or used) from "Consignor" to "Consignee".



NOTE 1 Figure C.4 broadly follows the UN/CEFACT technical specification, Business Requirement Specifications (BRS).

NOTE 2 Other work flow scenarios are also possible.

Figure C.4 — Example of work flow for delivery of automobiles from "Consignor" to "Consignee"

Annex D
(informative)

Sector descriptive information

D.1 End-to-end administrative process for automotive distribution logistics example

Figure D.1 shows an example of end-to-end administrative process for automotive distribution logistics.

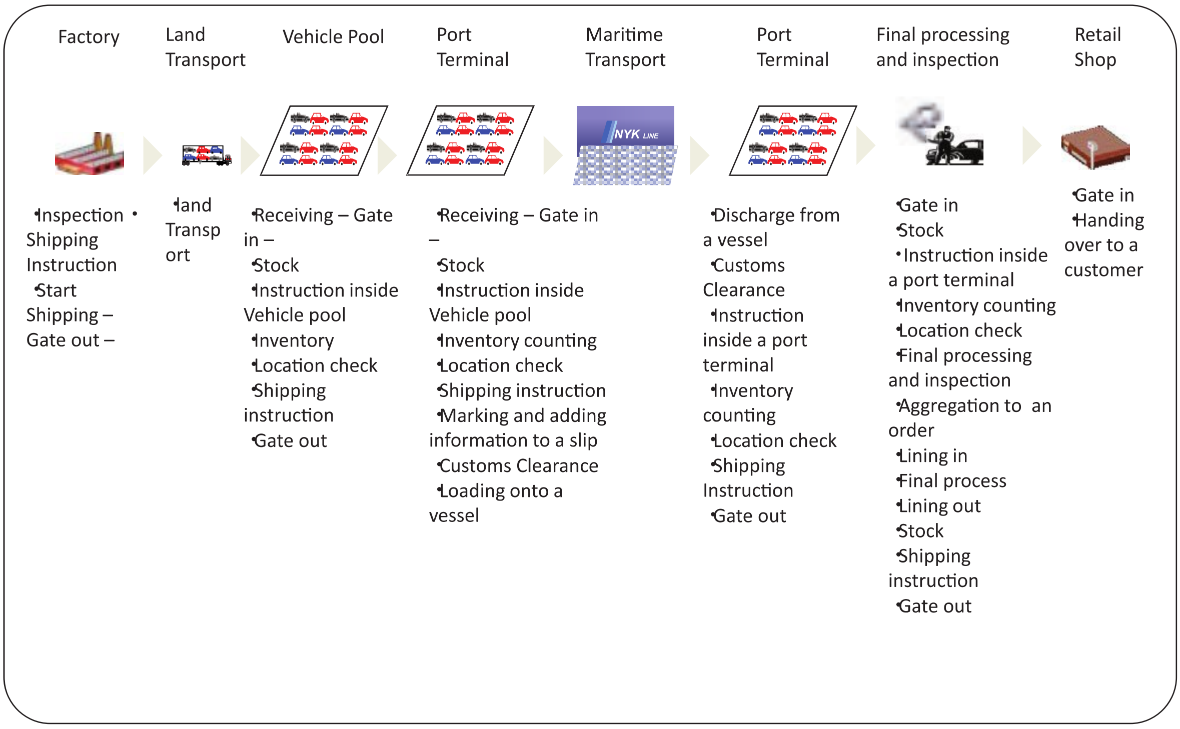


Figure D.1 — Example of an end-to-end administrative process for automotive distribution logistics

In ideal circumstances, one single harmonized set of data concepts could be used throughout the manufacturing, distribution, marine and final distributor to end customer. Table D.1 shows the key read points where the data and architecture defined in this part of ISO 18495 could be used.

Table D.1 — “Read Points” of the automobile distribution supply chain from point of origin to destination

Read Point Reference	READ POINT	Description	Location Type code
READ POINT 1::::::::: Manufacturing process	**(PoO)**	**(assembly plant)** ::::::::::::::::::::::::::	::::::::::::::::
	1.0	Chassis identification	10
	1.2	Next production step	11
	1.2	………	1..
	1.n	Final production step	23
	1.4 (2.0)	Exit to PoO	1n
READ POINT 2:::::::::::::::: POINT OF ORIGIN	**(PoO)**	**(assembly plant)** ::::::::::::::::::::::::::	::::::::::::::::
	2.0 (1.4)	Entry to PoO	20
	2.1	Control point within PoO	21
	2.2	Parking bay	22
	2.3	PoO Stocktake	23
	2.4	Exit from PoO	24
READ POINT 3::::::::::::::::DELIVERY TO PORT	**x**	::	::::::::::::::::
	3.0	Buffer area (PoO)	30
	3.1	Loading to land transporter	31
	3.2	Land transport - Driving to DPT	32
	3.3	Transporter storage compound	33
	3.4	Unloading from transporter	34
	3.5	Buffer area (DPT)	35
READ POINT 4::::::::DESPATCHING PORT TERMINAL	**(DPT)**	::	::::::::::::::::
	4.0	Entry to DPT	40
	4.1	Control point within DPT	41
	4.2	Export storage compound	42
	4.3	Parking bay	43
	4.4	DPT stocktake	44
	4.5	Customs	45
	4.6	Customs clearance	46
	4.7	Port storage parking bay	47
	4.8	Containerization	48
	4.9.1	Ready to be loaded	491
	4.9.2	Gate	492
	4.9.3	Exit from DPT	493
READ POINT 5:::::::::::::MARINE TRANSPORT	**(MT)**	::	::::::::::::::::
(Optional extension at ship operators discretion)	5.0	Boarding/loading	50
	5.1	Positioning on board	51
	5.2	MT stocktake	52

Table D.1 *(continued)*

Read Point Reference	READ POINT	Description	Location Type code
	5.3	Disembarkation	53
READ POINT 6:::::RECEIVING PORT TERMINAL	**(RPT)**	**::**	**::::::::::::::::**
	6.0	Entry to RPT	60
	6.1.1	Control point within RPT	611
	6.1.2	Discharged from vessel	612
	6.1.3	Not ready for transport	613
	6.2	Import storage compound	62
	6.3	Parking bay	63
	6.4	RPT stocktake	64
	6.5	Customs	65
	6.6	Customs clearance	66
	6.7	Final storage parking bay (Ready in stock yard)	67
	6.8.1	Ready to be loaded	681
	6.8.2	Gate	682
	6.8	Exit from RPT	683
READ POINT 7::::::DELIVERY TO DESTINATION	**(DTD)**	**::**	**::::::::::::::::**
	7.0	Loading to transporter	70
	7.1	Land transport - Driving to DVP/ DFS)	71
	7.2	Unloading from transporter	72
	7.3	Buffer area (DV/DFS)	73
READ POINT 8::::::::::::::::::::::DESTINATION VEHICLE PARK	**(DVP)**	**::**	**::::::::::::::::**
	8.0	Entry to DVP	80
	8.1	Control point within DVP	81
	8.2	Parking bay	82
	8.3	DVP stocktake	83
	8.3	Exit from DVP	84
READ POINT 9::::::::::::::DESTINATION FINAL EGRESS	**(DFE)**	**::**	**::::::::::::::::**
	9.0	Entry to destination final release	90
	9.1	Final inspection	91
	9.2	Parking bay	92
	9.3	DFE stocktake	93
	9.3	Handover to customer	94

Table D.1 describes nine principle ‘’Read Points” of the automotive distribution supply chain, each comprising several sub-“Read Points” or activities where data capture may be appropriate. Not all of these sub-“Read Points”/activities, even “Read Points”, are present in all physical instantiations of this distribution supply chain, which vary from one manufacturing plant to another, dependent on the geographic location, local terrain and business model of the manufacturer.

Column 2 of Table D.1 provides an acronym for each "Read Point" and a decimal reference for each "Read Point". Column 3 indicates the activity at that "Read Point" and column 4 provides a unique reference code for the type of activity.

However, the realities of business and commerce are that there are other views of the business process which are predominant in respect of specific aspects of the chain, and these scenarios may be of greater significance to particular actors and may logically argue for the use of different data concepts and definitions at those "closed environment" aspects of the business process.

For example, the automotive assembly process may be a closed company based process which is complex and time critical in order to achieve cost efficient manufacture. It is largely a closed domestic environment of a single manufacturer (although cross industry arrangements where one manufacturer manufactures a common platform product on behalf of another manufacturer are becoming more common).

As automotive production has become ever more complex, and "Just-In-Time" and "KanBan" techniques have streamlined and increased the efficiency of the assembly process, the definition, control and use of data has become a central part of the process. Clearly in these company-internal situations, it is not often practicable to reconstruct the processes to fit around new data concepts for the international distribution phase.

Similarly, once an automotive is put into an international shipping container, then loaded and managed aboard a ship, existing practices and standardized container management, or item management systems will have their own data concepts tailored for the shipping environment and the requirements of customs, that will be used, usually in preference to the data concepts and architectures defined in ISO 18495.

Once the vehicle has been delivered to the end distributor, in some circumstances, the final management is very domestic and small scale and, in many cases, not far of being manual paper based systems. However, in other circumstances where the vehicle manufacturer retains ownership until the point of end-sale, there may be advantage in using these standardized architectures and data concepts.

These data concepts and "Read Point" architectures are therefore offered for use where considered to be appropriate by the actors concerned, and only the common "Read Points" of the automotive distribution supply chain are defined in this part of ISO 18495.

Table D.2 shows a typical database record example for a vehicle in transit using all of the "Read Point" stages of Table D.1.

The location type codes shown here are an informative example and should be defined separately if needed when this application is implemented. Defining of these codes is out of scope of this part of ISO 18495.

Table D.2 — Typical database record for an automotive in transit

Automotive ID: 1G1FP22PXS2100001

DDT (UTC Sec)	DDT Y M D H M S	Location	LocType	LocRef	UNECE Transport Status Code
1343282850	81+9–2012 07 26 06 07 30	35.06592 137.129514	10	Asbly	53
1343283003	81+9–2012 07 26 06 10 03	35.078117 137.124851	12	MoveFVP	99
1343287586	81+9–2012 07 26 07 26 26	35.077252 137.122500	13	FVPBuff	91
1343287862	81+9–2012 07 26 07 31 02	35.077252 137.122450	20	FVP-IN	98
1343287945	81+9–2012 07 26 07 32 25	35.077252 137.122450	21	FVP_2	90
1343289600	81+9–2012 07 26 08 00 00	35.077827 137.122128	22	FVPbay	91
1343304000	81+9–2012 07 26 12 00 00	35.077827 137.122128	23	FVPStock	91
1343390400	81+9–2012 07 27 12 00 00	35.077827 137.122128	23	FVPStock	91
1343476800	81+9–2012 07 28 12 00 00	35.077827 137.122128	23	FVPStock	91
1343563200	81+9–2012 07 29 12 00 00	35.077827 137.122128	23	FVPstock	91
1343580138	81+9–2012 07 29 16 42 18	35.078357 136.865785	24	FVP-OUT	99
1343580327	81+9–2012 07 29 16 45 27	35.078260 137.121913	31	Transporter	132
1343586380	81+9–2012 07 29 18 26 20	35.005676 136.523016	34	unloadTspt	135
1343586540	81+9–2012 07 29 18 29 00	35.058021 136.872267	35	DPTBuffer	374
1343586713	81+9–2012 07 29 18 31 53	35.057934 136.874608	40	DPT-IN	1
1343586760	81+9–2012 07 29 18 32 40	35.057998 136.874601	42	Expstor	5
1343587200	81+9–2012 07 29 18 40 00	35.054874 136.872130	43	DPTbay	64
1343727660	81+9–2012 07 31 09 41 00	35.054771 136.873545	45	customs	5
1343733320	81+9–2012 07 31 11 15 20	35.057398 136.874404	46	Custclr	12
1343733500	81+9–2012 07 31 11 18 00	35.057398 136.874404	47	Portbay	67
1343808677	81+9–2012 08 01 08 11 17	35.056703 136.875639	49	DPT-OUT	99
1343808850	81+9–2012 08 01 08 14 10	35.056723 136.876723	50	boardg	48
1345036520	65+9–2012 08 15 13 15 20	51.461711. 0.352025	53	Disembark	113
1345037050	65+9–2012 08 15 13 24 10	51.456465 0.361853	60	RPT-IN	1
1345037400	65+9–2012 08 15 13 30 00	51.456545 0.368258	63	RPTbay	91

In this example, we can establish that the vehicle 1G1FP22PXS2100001 left the assembly line (in Japan) at 6:07 AM on July 26, 2012 and was moved to the finished vehicle park where it was parked in the parking bay at 35.078117 137.124851 on or before 8:00 AM on the same day. Stock checks showed that it remained in this location in the finished vehicle park for three days until the 29th of July, when it was transported to the despatching port terminal, where it was processed through customs, parked in a bay in the despatching port terminal until 1st of August, when it was loaded onto its transporting ship. No recording took place while on board ship, but it was disembarked at location 51.461711. 0.352025 (Tilbury UK) on 15th of August and moved to the receiving port terminal, where at the time of the enquiry it is located in the parking bay at 51.456545 0.368258.

UNECE transport status code can be found at:

http://www.unece.org/fileadmin/DAM/cefact/recommendations/rec24/rec24_ecetrd258e.pdf.

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