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Intelligent transport systems — Freight land conveyance content identification and communication —

Part 3: Monitoring cargo condition information during transport

Systèmes intelligents de transport — Identification et communication du contenu des marchandises transportées par voie terrestre —

Partie 3: Suivi des informations sur l'état de la cargaison durant le transport

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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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*.

A list of all parts in the ISO 26683 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.

Introduction

This document establishes requirements for the transport and condition monitoring of agri-food and perishable goods through the applications, models, processes, and information bundles established in ISO/IEC 19845. It also focuses on both domestic and cross-border consignments and is mainly concerned with reliability, safety, and freshness of those goods as they move through the supply chain. Whenever the term “this document” is used, the reference is to ISO 26683-3.

The methods described in ISO/TS 24533 and ISO/TS 17187 are included by reference. Both Technical Specifications are being revised to international standard status, to be balloted in 2019.

Agri-food and perishable goods has seen the ratio of rejection at custom inspection increasing recently. In the case of US imported seafood inspection, where they inspected 1 % of the imported seafood, the rejection rate was up to 51 %. The reasons for rejection were disease and insect pest detection, residual chemicals exceeding acceptable limits, or heavy metal content exceeding permissible levels. In some countries, up to 60 % of agricultural and fisheries goods in transport have to be discarded, lost or wasted. Additionally, mislabelling of raw materials is possible and can cause health problems.

For safety and freshness, end users (consumers) want to have a comprehensive record of the consignment's status and its transportation history, both for the origin of raw material as well as the final product. Consumers and regulators want to know whether or not the original produce or its final product may still have other types of contamination or degradation. A transport information model and related business processes are needed to provide a foundation to track transport activities.

The transport information model prescribed in this document is focused on the movement of goods by service provider by air, sea, road, and railway. The expectation is that the movement and storage of agri-food and perishable goods can be checked for cargo status and condition at any point on its path to its end destination.

Therefore, additional features are necessary to ensure reliable food product and transparency on transport processes between transportation events (or transport nodes). Based upon the ISO/IEC 19845 library of documents (messages) and information elements, this document establishes an enhanced model containing status information for transporting and storing agricultural food and perishable goods, including historical information and transaction information.

The basis for this document has its foundation in ISO/IEC 19845:2015, ISO/TS 24533, ISO/TS 17187 and ISO 15638-17.

Intelligent transport systems — Freight land conveyance content identification and communication —

Part 3:
Monitoring cargo condition information during transport

1 Scope

This document establishes requirements for transport and condition monitoring of transported consignments such as agri-food and perishable goods, through applications, models, processes, and information bundles. This document applies to both domestic and cross-border transport of transported consignments, and incorporates the methods described in ISO/IEC 19845, ISO/TS 24533 and ISO/TS 17187 which are transport domain specific, as discussed in the Introduction. Specific extensions include additional actors in the model related to, in particular, the agriculture transport sub-domain, with extended specific processes, and additional information items and/or information bundles for consignment conditions.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 19845:2015, *Information technology — Universal business language version 2.1 (UBL v2.1)*

3 Terms and definitions

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

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

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

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

3.1
agri-food business
business of producing food agriculturally

3.2
agroterrorism
agriterrorism
malicious attempt to disrupt or destroy the agricultural industry and/or food supply system of a population through the malicious use of plant or animal pathogens to cause devastating disease in the agricultural sectors

3.3
business area
category of decomposable business areas or *process areas* (3.17) (on the lowest level of a business area hierarchy)

Note 1 to entry: This means that a business area collates either other business areas, process areas, or business process use cases

3.4
business entity
business significance that is shared amongst two or more business partner types in a collaborative business process, e.g. product, order, account

[SOURCE: Business Requirements Specifications (BRS) — Documentation Template V2.0.1 — May 2012]

3.5
business process
collection of related, structured activities or tasks that serves a particular business goal

Note 1 to entry: Complex business processes may involve many participants and can be made up of other business processes. The simplest business process involving two participants is known as a business transaction.

[SOURCE: Business Requirements Specifications (BRS) — Documentation Template V2.0.1 — May 2012]

3.6
carrier
public or privately-owned firm or corporation that transports the goods of others over land, sea, or through the air, for a stated freight rate

Note 1 to entry: By government regulation, a common carrier is required to carry all goods offered if accommodations are available and the established rate is paid.

[SOURCE: Exel Glossary International Freight Terms]

3.7
cold chain
temperature-controlled supply chain

Note 1 to entry: An uninterrupted series of storage and distribution activities which maintain a given temperature range. It is used to help extend and ensure the shelf life of products such as fresh agricultural produce, seafood, frozen food, photographic film, chemicals, and pharmaceutical drugs.

3.8
export consignor
person who consigns goods himself or to another party in a bill of lading or equivalent document

Note 1 to entry: A consignor can be the owner of the goods, or a *freight forwarder* (3.9)who consigns goods on behalf of his principal as presented in ISO/IEC 19845:2015 (reformatted).

3.9
freight forwarder
arrangement of transport of goods on behalf of either the seller or buyer

Note 1 to entry: In many cases the freight forwarder will also consolidate several small shipments into one larger one to take advantage of better freight rates. In most cases the freight forwarder will assume the legal liabilities of acting as a carrier.

[SOURCE: Glossary of International Shipping Terms]

3.10
import consignee
person bringing overseas cargo to a country through a contract with transporters, e.g. shipping companies, forwarders

Note 1 to entry: See *export consignor* (3.8).

3.11
information model
abstract, formal representation of many kinds of real-world objects, e.g. business documents, orders, transportation mechanisms, e.g. trucks, containers, ship bays, and/or abstract objects, e.g. for the entities used in a billing system

Note 1 to entry: The objects have a name, properties and relationships to other objects. An information model provides a means to describe the information in a domain of interest without constraining how that description is mapped to an actual implementation in software.

[SOURCE: Business Requirements Specifications (BRS) — Documentation Template V2.0.1 — May 2012]

3.12
inspection service provider
person who does counting and status checking against cargo when cargos are loaded to or unloaded from transport means

3.13
inspection and quarantine agency
organization that brings overseas cargo to a country through a contract with transporters, e.g. shipping companies, forwarders

3.14
loading/unloading company
company that conducts loading or unloading of cargos on behalf of importers, exporters and shipping companies

3.15
logistics point
particular space established as a basic facility for transport

Note 1 to entry: Logistics can be classified into transport route, end point and point; logistics points are points and include terminal, ICD and bonded warehouse.

3.16
perishable goods
goods such as food products that must be used within a short period of time

3.17
process area
category of common business process use cases

[SOURCE: Business Requirements Specifications (BRS) — Documentation Template V2.0.1 — May 2012]

3.18
producer
person, company, or country that makes, grows, or supplies goods or commodities for sale

3.19
service repository
person or organization making the information regarding the web service available to any potential requester

Note 1 to entry: Whoever implements the broker decides the scope of the broker. Public brokers are widely available, but private brokers are only available in limited amounts to the public.

3.20
shed
place for temporary storage of cargo including terminal and bonded warehouses

3.21
shipping agent
independent person or corporation acting as a representative, usually in a foreign market, who attempts to sell products for an overseas seller (principal) and earns a commission on successful sales

Note 1 to entry: Agents are not normally involved in delivery or servicing of product.

3.22
shipping company
company that regularly runs ships between ports and provides shipping services for cargo transport in return for fees

3.23
transport service provider
carrier (3.6) (domestic or cross-border)

3.24
transport service user
producer, consignor, consignee, warehouse, terminal, CFS/CY, *inspection service provider* (3.12), manufacturers or another individual or legal entity making use of services (works) provided (performed) by transport enterprises

4 Abbreviated terms

BC	Business Collaboration
BP	Business Process
BT	Business Transaction
CFS	Container Freight Station
CY	Container Yard
EA	Enterprise Architecture
HTTP	Hyper Text Transport Protocol
IEC	International Electrotechnical Committee
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
IT	Information Technology
SMTP	Simple Mail Transport Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
UML	Unified Modelling Language
WEB	World Wide Web
XML	Extensible Markup Language

5 General requirements

5.1 Supply chain scenario

Figure 1 shows cargo movements transported by domestic carriers and includes cross-border. These carriers deliver consignments from producer (farmer or fisheries) or manufacturer to customer side through a logistics base in the global supply chain. The boundary of this document encompasses from producer or manufacturer through customer, origin to destination.

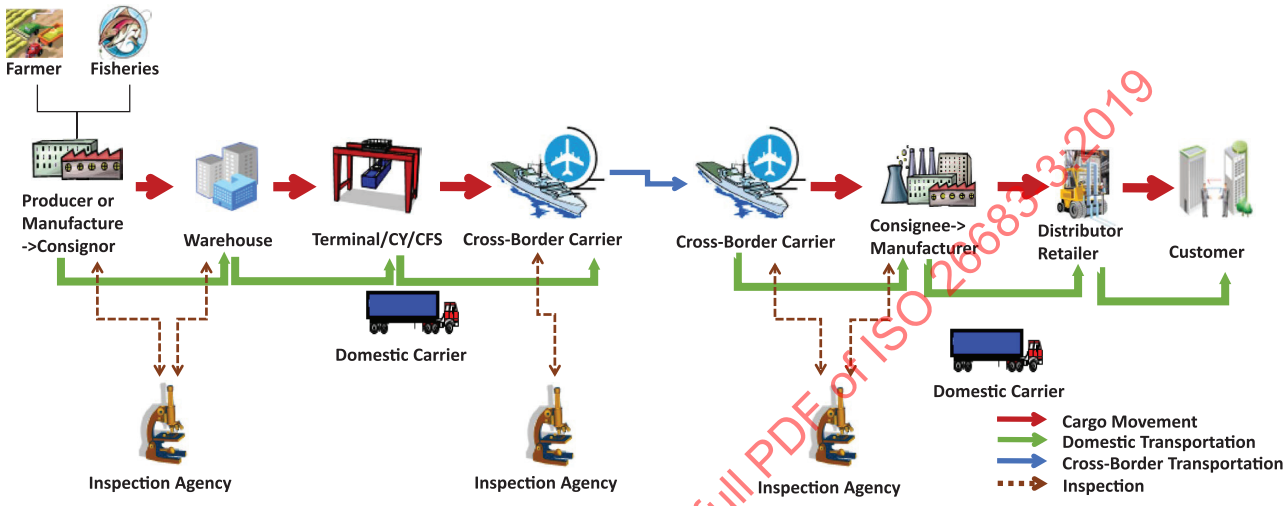

Figure 1 — Cargo movement from producer to customer in supply chain

This transport information will be shared among the relevant participating business entities (e.g. inspection service provider). Sharing information such as agricultural certificate of origin, agricultural goods and status, and integrity of produce (regarding agricultural chemicals or radioactive material) will improve visibility and reliability of the goods transported (regarding contained or non-contained goods). In contrast to packaged goods, agriculture and perishable goods are transported through non-standardized package units from consignor to consignee, and freshness and safety for agriculture goods is the most important factor regarding transportation. At food manufacturing industries, a company has to produce food products using raw agriculture material, e.g. corn or salmon. Consumers want to know detailed information about the raw material or product, whether or not residual agriculture chemicals or radioactive matter, which can remain in agriculture goods, was found in agriculture products or perishable food products, or are exceeding the acceptable limits. Once a standard is established, the global trade in food products will be enhanced and the logistics service such as cold-chain transportation will have increased value.

A cold chain is a temperature-controlled supply chain. An unbroken cold chain is an uninterrupted series of storage and distribution activities which maintain a given temperature range. It is used to help extend and ensure the shelf life of products such as fresh agricultural produce, seafood, frozen food, photographic film, chemicals, and pharmaceutical drugs.

In order to use information across internal systems, and to integrate with systems deployed by trading partners, that information needs to be semantically coherent and in a format that is recognizable and usable by all parties. The policy for operating under these rules is that all business entities wishing to engage with other business partners to facilitate electronic trade using the tools described herein shall follow certain standards of practice for information interchange. This document is envisioned to be the core standard for interoperability for all enterprises wishing to benefit from the resulting efficiencies as a member user. It includes transport data to satisfy the requirements of both businesses and governmental organizations.

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, agriculture organizations, and other involved organizations.

This document is focused on transport of agriculture products as well as other products, and it is not intended to be confused with standards related to agriculture standards set by other standards organizations for regulation of food products. This document only focuses on the monitoring of cargo conditions of the safeness, freshness and reliability of the agri-food and perishable goods in transport.

5.2 Architectural framework

One of the first requirements for building a system to monitor cargo conditions and associated information during transport is to establish an architectural framework. The purpose of this framework is to provide an overall view of the elements that can be employed to evaluate the condition of the agri-food and perishable goods transported from origin to destination.

The requirements of the framework for monitoring cargo conditions is illustrated in Table 1, below.

There needs to be business and technological integration across the entire chain of events. Much of this can be helped through an enterprise approach to the architecture. Additionally, there needs to be horizontal and vertical integration to allow all parties access to the common information that will ensure the goods get to market in the expected condition, free of infestation and in an acceptable state of freshness.

The architecture needs to have a flexible structure and allow for integration into legacy systems, without disruption to those systems other than interface linkages.

The architecture needs to adhere to intelligent transportation systems models and be receptive to current architecture examples of big data and cloud technology to help keep the system viable for future adaptation.

The system will need the capability to be easily evaluated for performance. This will require key performance measures/indicators for determining the effectiveness of the condition monitoring system and will need the capability to adjust where needed to modify system components.

The performance indicators will also assist with monitoring and risk management indicators. Risks, such as tainted agri-foods and perishable goods passing inspections will need to be evaluated from a system perspective as well as from a human perspective.

Table 1 — The requirements of framework for monitoring cargo condition information during transport

Requirements of architecture framework		Details of activities on design
Business and technological integration across the entire chain	— Functional partitioning of a system into its constituent subsystem components — Specification of system-component and component-component relationships — Specification of component interfaces — Definition of Enterprise Information Infrastructure models	— Develops Common infrastructure (architecture framework) — Horizontal integration through value networks — End-to-end digital integration of engineering — Vertical integration and networked manufacturing systems — Communicate between human, machines, and resources — Conceptual/information models of important information entities specified at transportation of the supply chain
Flexible structure	— Specification of the business process at the inter-enterprise (e.g., supply chain), enterprise	— Dynamic business and engineering process — Ad-hoc networking - dynamic configuration — Easily application integration
Knowledge-based intelligent system	— Definition of mechanisms for data collection, data exchange, and data archiving — Definition of mechanisms for defining the context of, storing, accessing, and exchanging the results of analyses about the makeup, capabilities, and/or operation of the manufacturing enterprise	— Provides the optimized decision-making — Through simulation or data analytics (using big data, cloud technology) — Reduce unnecessary costs by simulation
Performance Assessment	— Definition of the properties of and interrelationships between enterprise resources to enable enterprise resource management	— Resource management — Sustainability: energy efficiency — Develops Key Performance Indicators
Rule-based Risk Management		— Problem detect and alerting — Auto detecting and Monitoring — Build risk repository: categorize error (problems, faults) and the reason

In principle, the architecture framework should be independent of the hardware system, scalable in its structure, and, to the extent possible, reusable. It must also define all the necessary business processes and low-level functions as simple service components. These components are stored in a service repository. They can be used as is or composed (assembled) into more complex services as needed. Users and other organizations can access this repository using standard communication protocols such as TCP/IP, HTTP, WEB Service, and SMTP. The set of services needed to process that data, and the sequence in which they are executed, are determined by additional external logic typically written in Java or any other object-oriented language. More discussion is provided on the definition of enterprise architecture in Annex A.

Figure 2 shows an architecture framework that can be helpful in the implementation of this document. The first column shows the key categories for the architecture. These include Business Processes, Data Analysis, Resource Data and Communications Infrastructure.

Across the rows for each of these categories are the key components for each. The business processes for farm and marine products include and understanding of their histories as well as that of processed goods, good foods or relieved foods, and the transportation systems needed to deliver the agri-food and perishable goods.

In order to have the management information to assess performance indicators and other management tools the architecture needs to include the inspection methodologies as well as how to collect that data and the history of inspection systems that have been used. Security is a key component of the data system to help avoid infestations and major population infections.

To identify tainted products will require resource data to quickly pinpoint any step along the supply chain from production, retail, inspection, transportation components and the origin of the raw material. These are critically important in the risk management process.

Since the architectural framework should be independent of the hardware system, the Architecture Communication Infrastructure is identified at the high level of communications capabilities. Internet of Things is still under development, radio telecommunications are in use for roadway monitoring, web service is still the communications standard for connectivity of supply chain partners, and image and voice processing are viable options for connectivity as well. Attached devices fit into the same internet category.

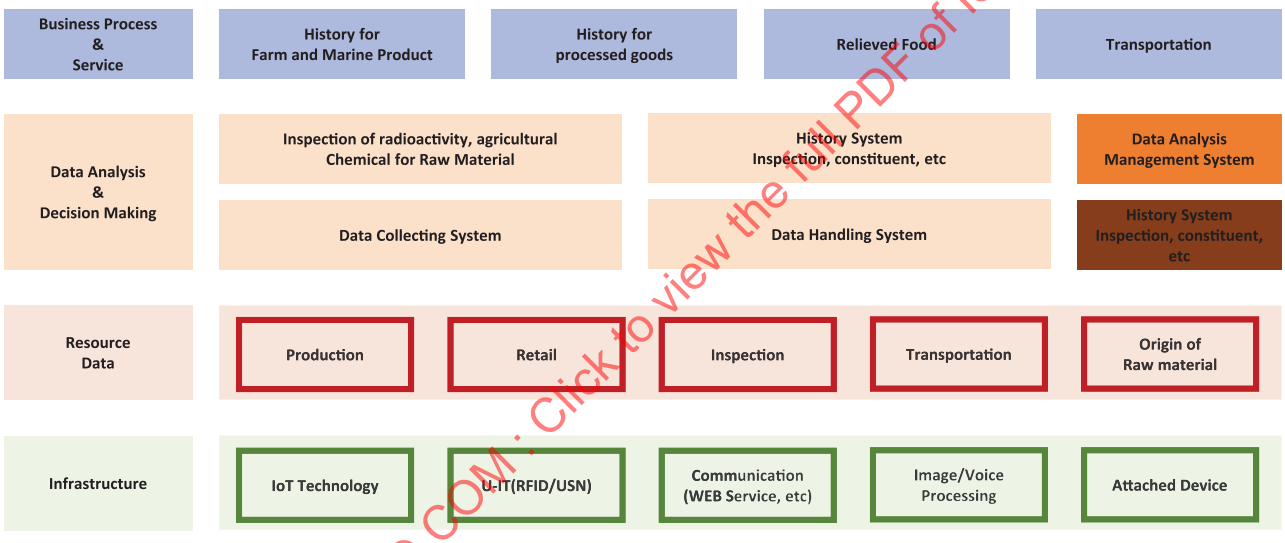

Figure 2 — Architectural framework to monitor cargo conditions during transport

5.3 Business elaboration

As already mentioned in the Scope, reliability, safety, and freshness during transport are the most important factors in the global supply chain. Cargo condition information can be collected and managed starting from transportation of place of origin to destination. This information consists of cargo status information such as temperature, humidity, or whether the cargo package (or box) is opened or not, and inspection information.

Figure 3 shows the work flow process for monitoring cargo conditions during transport. The goods start with production at the farm, fishery or manufacturer. From there it begins its process through the supply chain where it may be held for storage in a warehouse. All along the supply chain its condition is monitored and will require detailed inspection at least one time through the supply chain process. Other inspection processes can consist of monitoring the goods while in transport. If any issues related to the conditions described below are found then the cargo is interrupted for more thorough inspection.

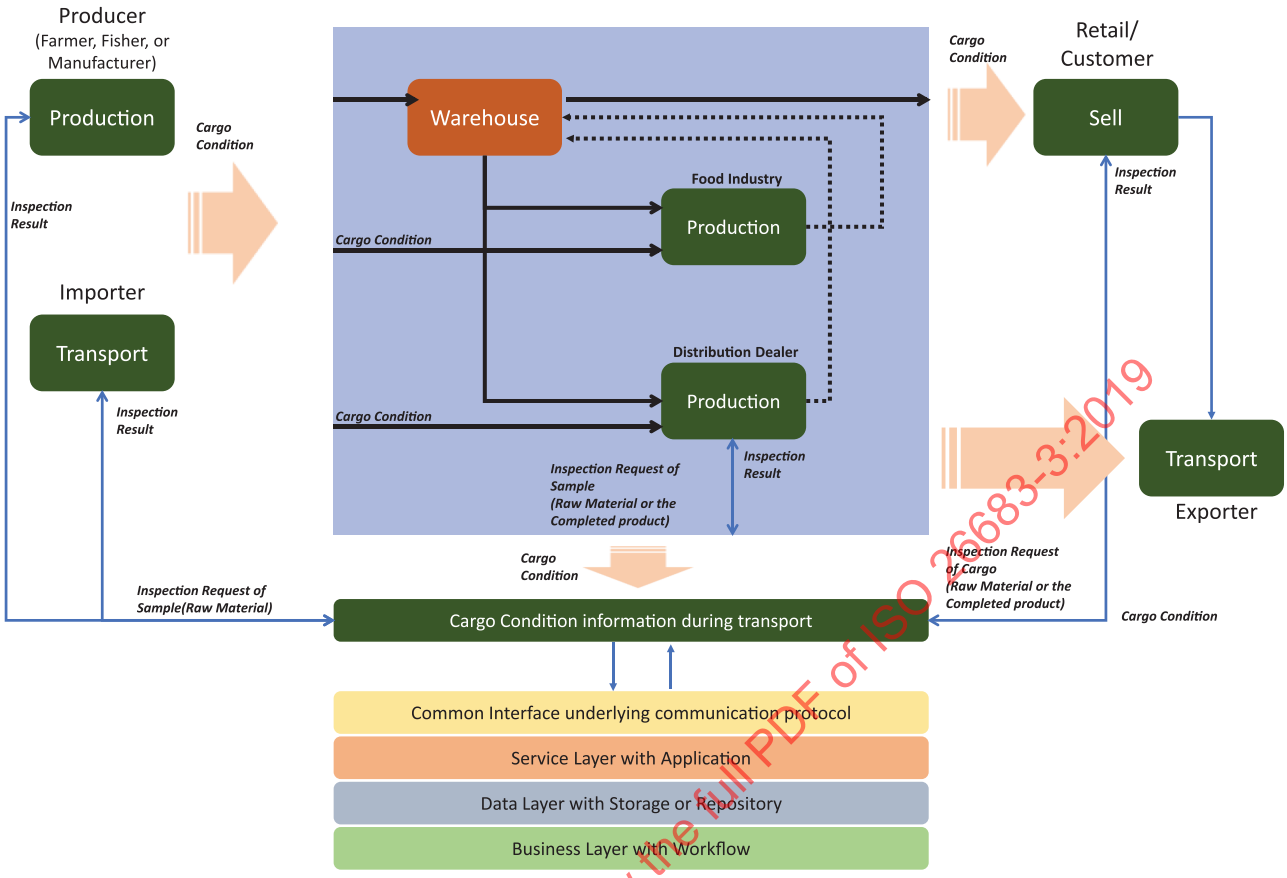

Figure 3 — Work flow including inspection process to monitor cargo conditions during transport

Cargo condition information defined by this document shall include following information:

— who is generating cargo condition information;

— who is sending or receiving cargo condition information;

— a unique identifier which identifies the cargo;

— history of cargo condition during transport;

— the relevant entities who are involved in the movement of the goods e.g. consignor, consignee, forwarder, transport service provider;

— consignment information.

This cargo condition information will be generated or managed by the Transport Service Provider or Transport Service User. Details of cargo condition information is presented in 5.2.2.4.

Table 2 shows the structured contents and relevant business processes according to the ISO/IEC 19845 and UN/CEFACT BRS analysis procedure to help readers' understanding. The business area is mainly divided into transport, loading and unloading, inspection, and status for the purpose of minimizing potential overlap of areas. Transport covers the movement of cargo using a means of transport; it is divided into cross-border import/export transport, domestic transport, and transhipment. Loading and unloading covers the processes of loading, unloading, and discharging of transported cargo at terminal, port, railroad station, etc. In the case of storage, it covers entry and exit of cargo (Gate In/Out) in terminal, port, shed, etc. for the movement of cargo. Inspection covers processes occurring between users and government authorities or private Inspection Service Provider; it may vary from country to country, but the document attempts to cover common processes used in most countries.

Table 2 — List of business processes

Business area	Process area	Business process
Name	Name	Name
Agriculture Goods Transport	Domestic Transport	Application for Domestic Transport
	Export Transport	Application for Export Transport
	Import Transport	Application for Import Transport
	Transhipment	Application for Transhipment
Agriculture Goods Loading & Unloading	Unloading	Application for Unloading
	Loading	Application for Loading
Agriculture Goods Inspection	Inspection	Application for Inspection
Status	Status Report on Transport	Application for Status Report on Transport
	Status Report on Inspection	Application for Status Report on Inspection

Table 3 lists electronic messages used by each business process. Modelling is done in accordance with ISO 19845 and UN/CEFACT BRS analysis procedure.

Table 3 — Details of business processes

Business process	Business collaboration	Business transaction	ISO/IEC 19845
Name	Name	Name	Name
Application for Domestic Transport	Process Application for Domestic Transport	Submit Application for Domestic Transport	Transport Execution Plans Request Transport Execution Plans
		Receive Application for Domestic Transport	
		Notice of the Result	
Application for Export Transport	Process Application for Export Transport	Submit Application for Export Transport	Transport Execution Plans Request Transport Execution Plans
		Receive Application for Export Transport	
		Notice of the Result	
Application for Import Transport	Process Application for Import Transport	Submit Application for Import Transport	Transport Execution Plans Request Transport Execution Plans
		Receive Application for Import Transport	
		Notice of the Result	
Application for Transhipment	Process Order to Transhipment	Submit Order to Transhipment	Process is handled outside the condition monitoring context.
		Receive Order to Transhipment	Process is handled outside the condition monitoring context.
		Notice of the Result	Process is handled outside the condition monitoring context.
Application for Unloading	Process Order to Unloading	Submit Order to Unloading	Process is handled outside the condition monitoring context.
		Receive Order to Unloading	
		Notice of the Result	
	Process Order to Loading	Submit Order to Loading	
Application for Loading		Receive Order to Loading	Process is handled outside the condition monitoring context.
		Notice of the Result	

Table 3 *(continued)*

Business process	Business collaboration	Business transaction	ISO/IEC 19845
Name	**Name**	**Name**	**Name**
Application for Inspection	Process Application for Inspection	Submit Application for Inspection	Process is handled outside the condition monitoring context.
		Receive Application for Inspection	
		Notice of the Result	
Application for Status Report on Transport	Process Application for Status Report on Transport	Submit Application for Status Report on Transport	Process is handled outside the condition monitoring context.
		Receive Application for Status Report on Transport	
		Notice of the Result	
Application for Status Report on Inspection	Process Application for Status Report on Inspection	Submit Application for Status Report on Inspection	Transportation Status Request Transportation Status Transport Progress Status Request Transport Progress Status
		Receive Application for Status Report on Inspection	
		Notice of the Result	

5.3.1 Business requirements

The following business requirements are focused on the needed cargo status checks throughout the entire movement of the goods and will be included in the status of the condition of cargo throughout its full movement to end destination.

Reliability

— Check whether the movement of a consignment is suspended or not.

— Able to forecast the estimated arrival time, supports Just-In-Time.

— Check whether container is opened or not during transport.

Safety

— Includes inspection information for raw materials or the completed products.

— Able to check accurate status of consignment; smuggled food products or packaging materials that might contain invasive species, identify a malicious attempt to disrupt or destroy the agricultural industry and/or food supply system of a population through "the malicious use of plant or animal pathogens to cause devastating disease in the agricultural sectors", numerical value of inspection factor is changing depending on environment.

— Check traceability of consignments during transport; on production, transportation and storage.

Freshness

— Check the status of consignments during transport, especially cold-chain transportation.

— Status: temperature, humidity, whether open or not for boxes, vibration, g-force.

To assess the above factors, data needs to be collected, analysed, and the results need to be provided to the transport service provider and user. Therefore, when the transport service provider transports cargoes between logistics bases, shown below, (those logistic bases include transport service requestor, transport service user, consignor, inspection centre, warehouse, port, terminal, station, consignee, etc.), the e-document regarding cargo movement, status, and inspection information is updated throughout

the process. Figure 4 shows the configuration of part of the common freight framework to support reliable and safe transport, and freshness of consignment.

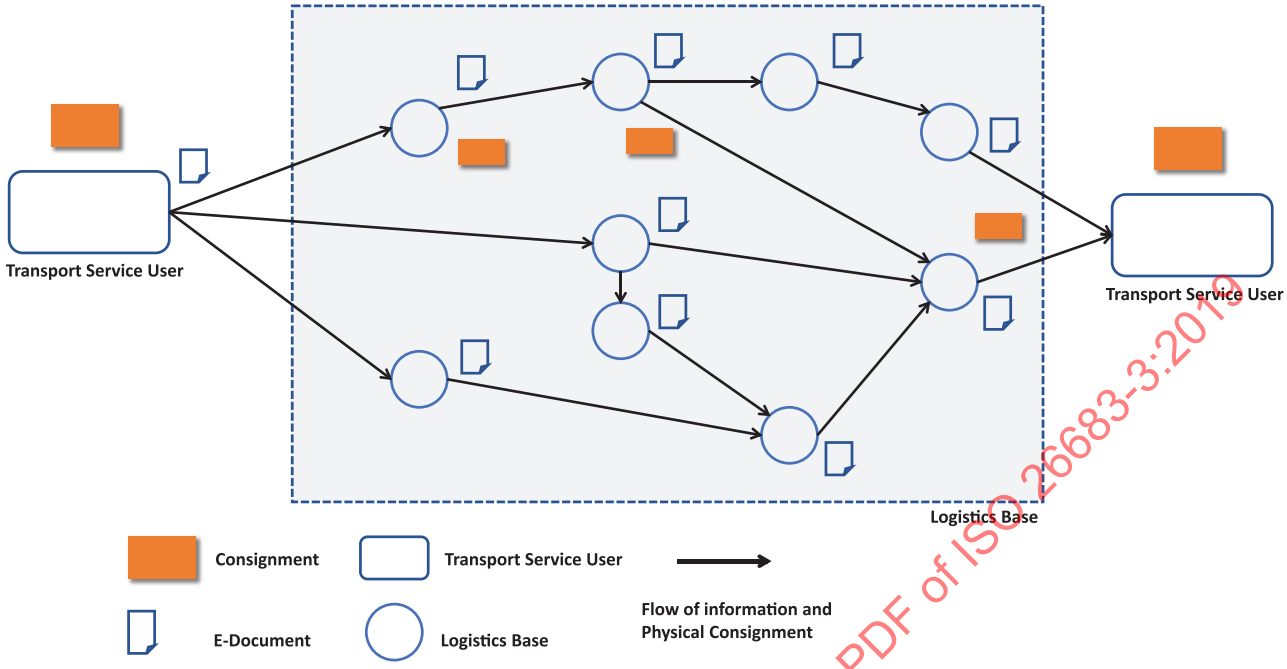

Figure 4 — Configuration of common framework to support for reliable and safe transport, and freshness of consignment

As shown by the orange consignment block in Figure 4, the data on status and condition follows the goods throughout the path taken in the Logistics Base. The electronic e-document and the consignment are tied together throughout the process. The e-document is exchanged between business entities, and contains information regarding cargo movement, status and results of inspections.

Developing the required information model requires an analysis of the business requirements and the related business processes using international standard modelling methodology. There should be a complete understanding of information and goods movement flow. Figure 5, which is a sequence diagram of the export procedure, shows some of these flows that include an example of business transactions and activities when a 'Consignor' delivers cargoes to a 'Consignee' in case of export business process.

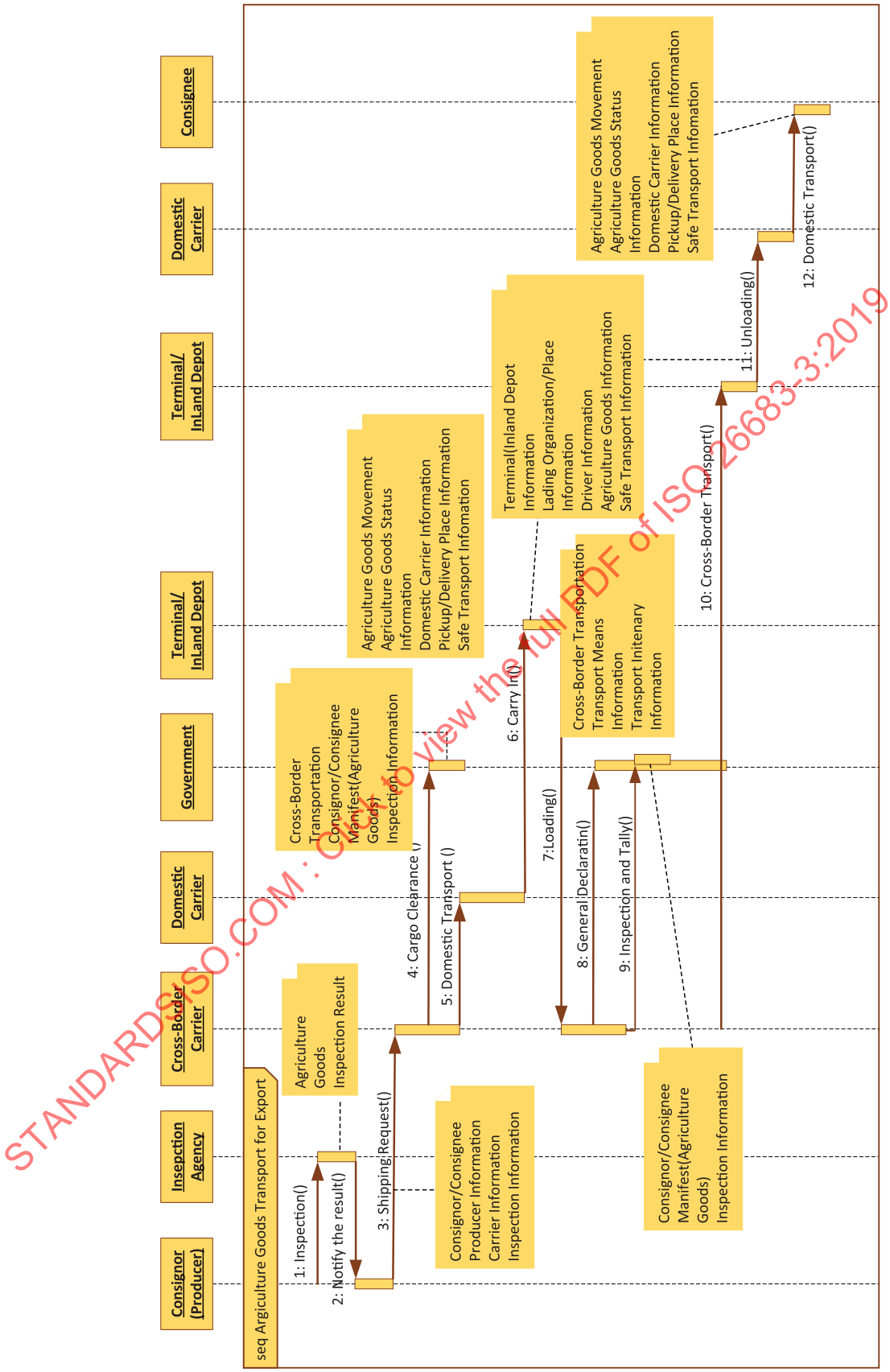

Figure 5 — Sequence diagram of goods transport in case of export business process

5.3.2 Details of business processes

5.3.2.1 General

The business processes include three major activities that are explained in detail below. These are the Goods Transport Movement, Inspection Service during Transport, and Monitoring cargo condition information during transport.

A description of the content or business information payload of each message can be accessed through Annex C, XML Schema.

5.3.2.2 Goods transport movement

A use case diagram of high-level Unified Modelling Language (UML) shown in Figure 6 describes business actors who are involved in business processes and their dependencies at "Goods Transport Management" business process. Business process "Goods Transport Management" has the participating entities such as consignor, consignee, carrier, inspector, etc. and includes business collaboration processes such as monitoring cargo condition information during transport and domestic and cross-border transport. Table 4 shows the process description, such as precondition, definition, and exception regarding the "Goods Transport Management" business process among the Transport Service user such as Consignor, Consignee, Transport Service Provider such as Domestic Carrier, Cross-Border Carrier.

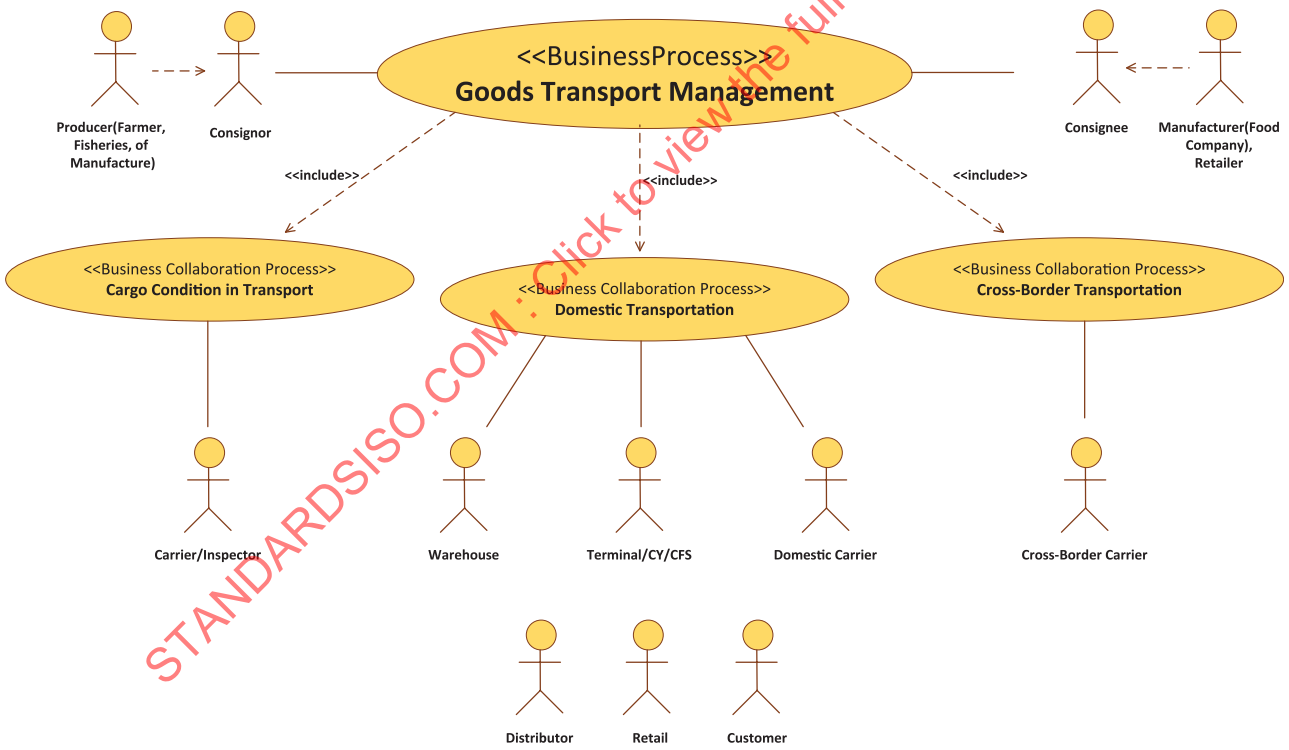

Figure 6 — Use case diagram for "Goods Transport Management" business process including collaboration process with the participating entities

Table 4 — Process description of "Goods Transport Management" business process

Pre conditions	Producer shall have cargo such as agri-food and perishable goods, and trade business is starting between consignor and consignee.
Begins when	After trade business, "Goods Transport" business process starts when Transport Service Requestor requests an inspection of agriculture goods to Inspection Service Provider before domestic or cross-border transportation.
Definitions	Transport Service User requests Cargoes Transport to Transport Service Provider from one place to the other place. Hereby, transportation in this business process includes domestic and cross-border transport. — Transport Service User: Producer, Consignor, Consignee, Warehouse, Terminal, CFS/CY, Inspection Service Provider, Manufacturers, etc. — Transport Service Provider: Carrier (Domestic, Cross-Border)
Ends when	Transport Service Provider delivers cargo to the designated Transport Service User.
Exceptions	Transport Service Provider may reject a transport request from Transport Service User.
Post conditions	

Figure 7 shows an activity diagram of the "Goods Movement Transport" business process. This diagram shows sequence of activities between Transport Service User and Transport Service Provider, which Transport Service User includes Consignor, Consignee, or Freight Forwarder; and Transport Service Provider includes cross-border carrier or domestic carrier. This business process starts when the Transport Service User sends a "Transport Request" to the Transport Service Provider. The Transport Service Provider then picks up cargo from origin place and delivers it to their assigned destination. During transportation or storing, the Transport Service Provider sends the status information of cargo or transportation to the Transport Service User.

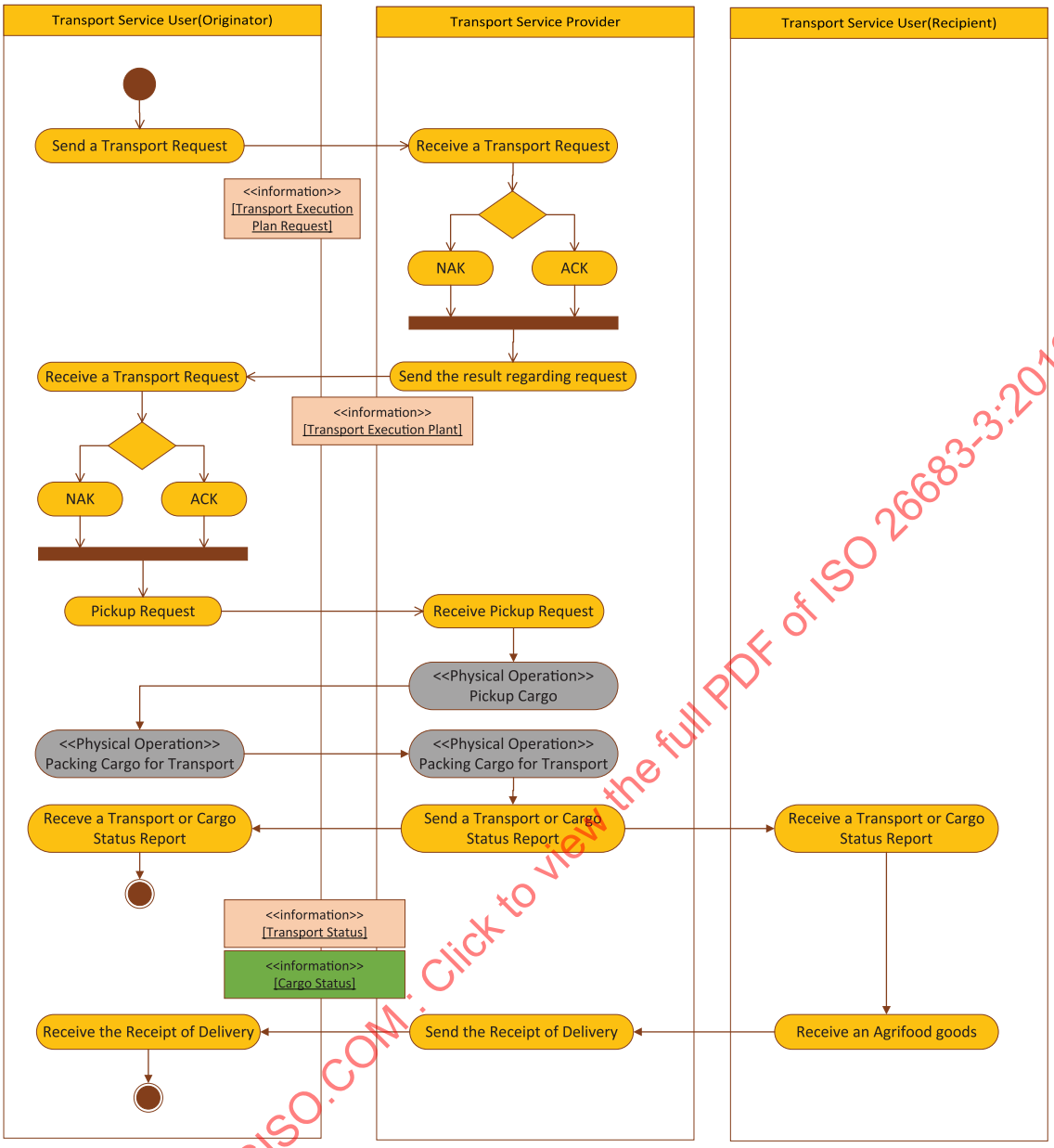

Figure 7 — Activity diagram of goods transport management including e-document

— *Transport Service User: Producer (Farmers, Fisheries), Consignor, Consignee, Warehouse, Terminal, CFS/CY, Inspection Service Provider, Manufacturers*

— *Transport Service Provider: Domestic Carrier, Cross-Border Carrier*

5.3.2.3 Inspection service during transport

There are four diagrams in this subclause that offer different views of the inspection process during the freight movement from Origin to Destination. Each view is at different perspectives.

Figure 8 illustrates the inspection process within the framework of the entire consignment process. This overall process includes two inspections. There are 21 steps shown for a consignment to reach its end destination to the consignee. During that process there are two inspection requests:

— one takes place at step 1, leaving Producer/Consignor;

— the other takes place at step 11, leaving Terminal Inland Depot.

There are also two inspection results:

— one takes place at step 6, preparing for cross border carrier;

— the other takes place at step 15, also preparing for cross border carrier.

These inspection steps are focused, for the purposes of this document, on agriculture food and perishable goods. The inspectors will perform the following:

— examine insect, radioactive matter, agriculture chemicals, heavy metal content, persistent organic pollutants, harmful organism of agriculture foods and perishable goods being transported or stored;

— identify smuggled agricultural products or packaging materials that might contain invasive species;

— inspect wooden pallets that could hide the larvae of wood-boring insects poised to attack native trees or nursery stock;

— determine if imported agriculture (for example, fruits and vegetables) are pest-free.

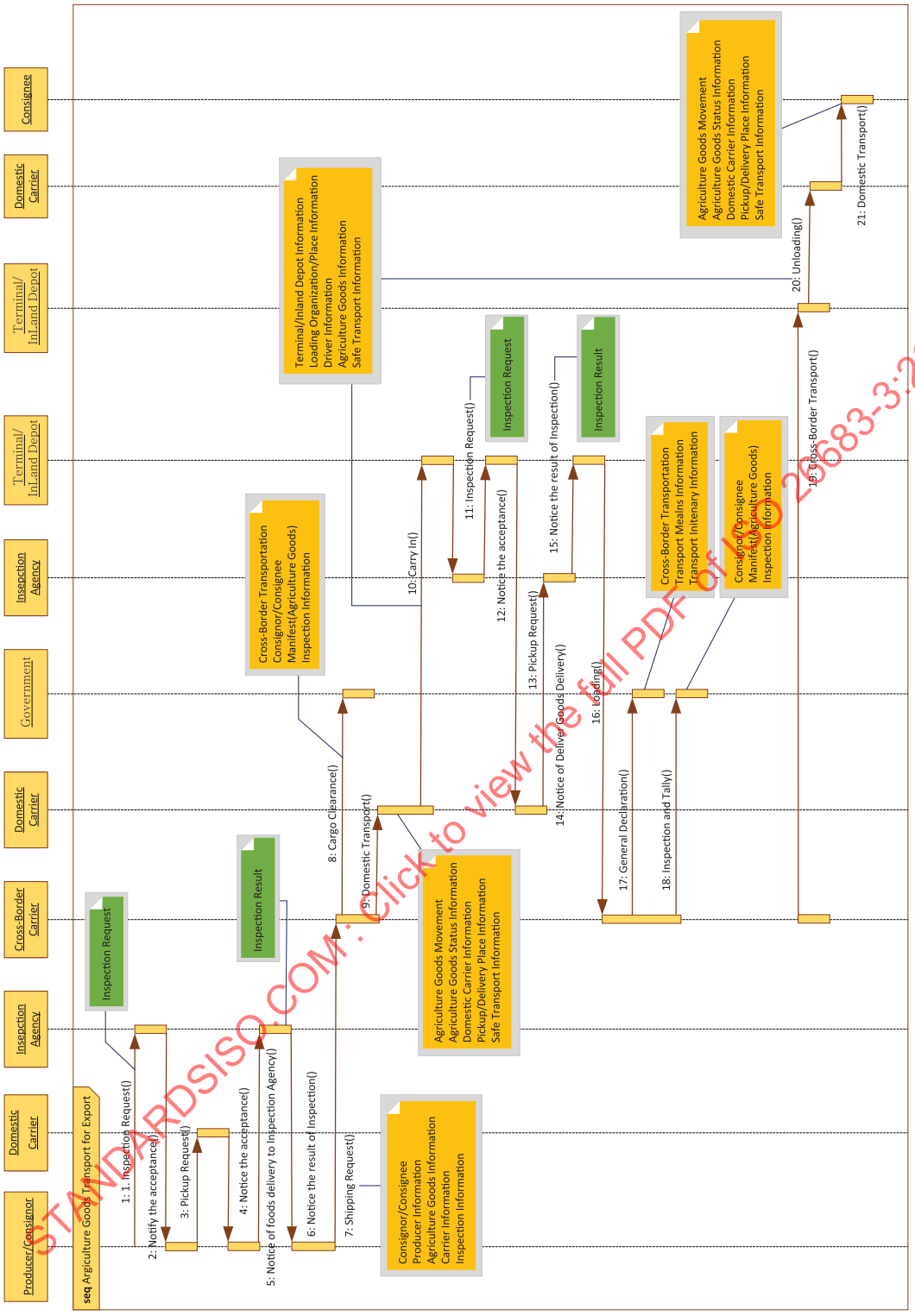

Figure 8 — Sequence diagram on exporting goods with inspection

Figure 9 is also inspection related and provides more close-up detail on the 5 steps identified in that process. It also identified the responsible parties of Inspection Service User, Transport Service Provider and Inspection Service Provider. The Inspection Service Provider has the responsibility of preparing the results of the inspection.

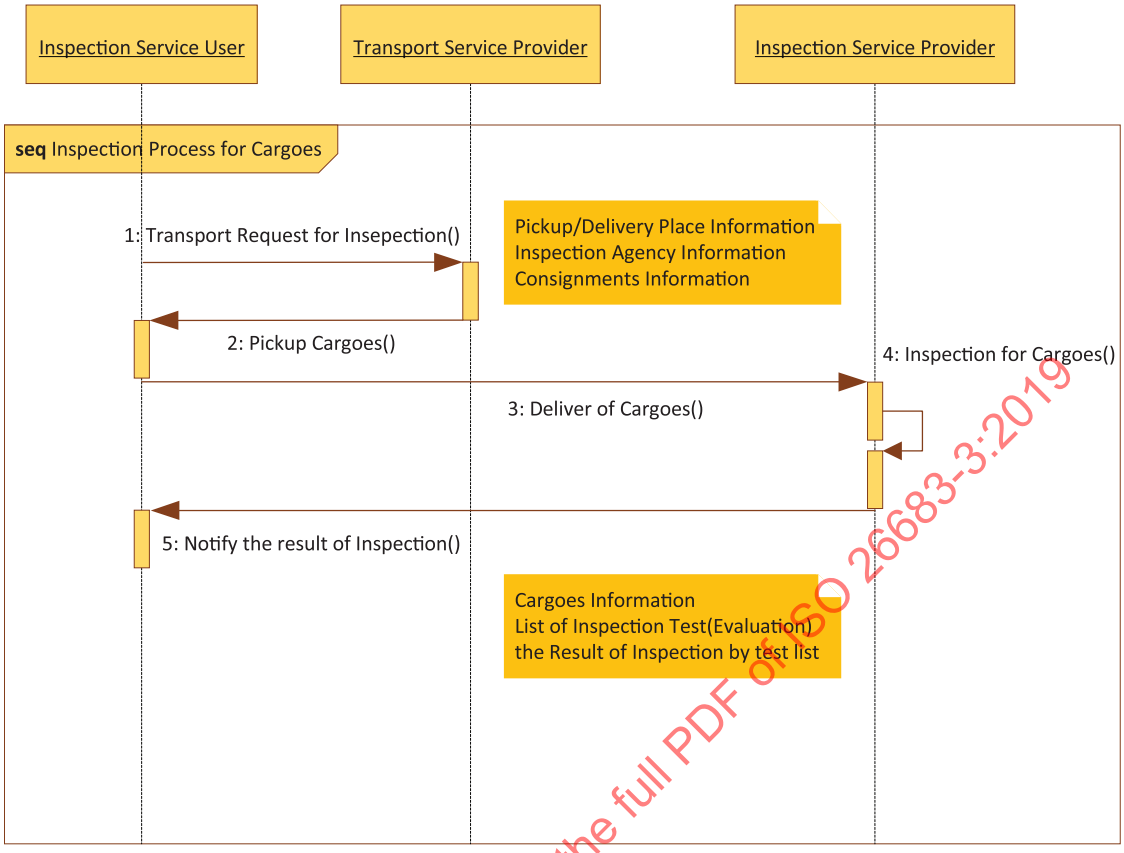

Figure 9 — Sequence diagram of inspection service

Figure 10, below, is another view of the inspection process and shows a use case diagram of the business processes between the Inspection Service Requestor, or User, and Inspection Service Provider, and the necessary collaboration from the Transport Service User and Provider.

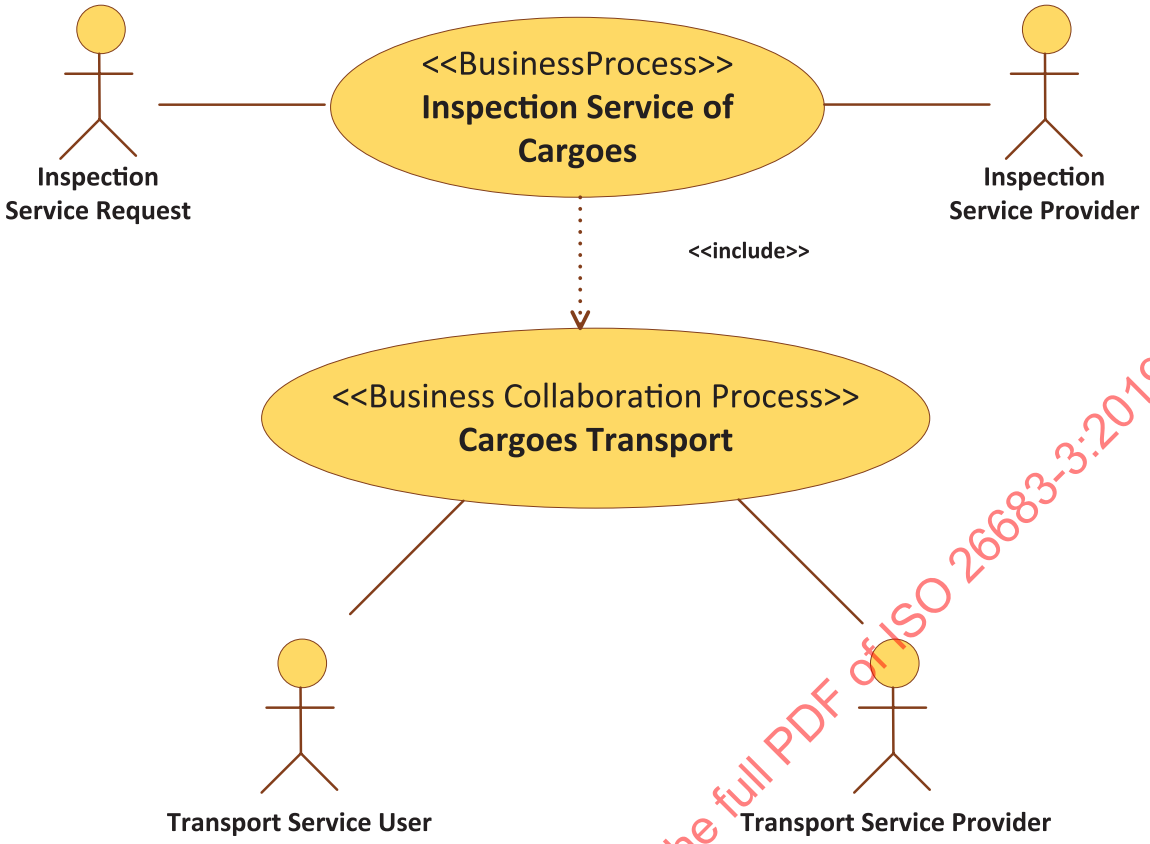

Figure 10 — Use case diagram of inspection service during transport

— *Inspection Service User: Producer (Farmers, Fisheries), Consignor, Consignee, Manufacturers (Food Company), Retailer, Distributor, Government Agency.*

— *Inspection Service Provider: Government Inspect Agency, Private Inspect Agency*

Table 5, below, presents the process description of the Inspection Service business process. It states that the process of inspection occurs when the Inspection Service User sends a message to the Inspection Service Provider that the goods are ready for inspection. It ends when the Inspection Service Provider sends the results of the inspection to the Inspection Service User. The report could also delay the shipment if a problem occurs.

Table 5 — Process description of "Inspection Service" business process

Preconditions	Inspection Service User
Begins When	Inspection Service User sends a request of Inspection Service of Agri-foods and Perishable Goods to Inspection Service Provider.
Definitions	Inspection Service User checks the following things for agriculture food and perishable goods before business operation such as import, export, manufacturing, distributing, etc. — Examine for insect, radioactive matter, agriculture chemicals, heavy metal content, persistent organic pollutants, harmful organism, etc of agriculture goods being transported, stored, etc. — Smuggled agricultural products or packaging materials that might contain invasive species. — Wooden pallets that could hide the larvae of wood-boring insects poised to attack native trees or nursery stock. — Check whether imported agriculture (for example, fruits and vegetables) are pest-free. — **Agroterrorism**, also known as **agriterrorism**, is a malicious attempt to disrupt or destroy the agricultural industry and/or food supply system of a population through "the malicious use of plant or animal pathogens to cause devastating disease in the "agricultural sectors".
Ends When	Inspection Service Provider sends the result of the Inspection Service to Inspection Service User.
Exceptions	
Post conditions	If the result of the public inspection service has a problem, the government agency may make some restriction to the Inspection Service user, e.g. holding agriculture goods on site, rejecting some requests (export, import, distributing, etc.), or giving some penalties to Inspection Service user.

Figure 11, below, shows an activity diagram of the "Inspection Service" business process. This diagram shows the sequence of activities between the Inspection Service User and the Inspection Service Provider, and the actions that may occur from the inspection process. The Inspection Service Provider includes government agencies such as customs, or private Inspection Service Provider. This business process starts when the Inspection Service User sends an "Inspection Request" to the Inspection Service Provider. Next, the Inspection Service User sends a "Pickup Request" to the Transport Service Provider (Carrier). Then, the carrier picks up the cargo from the Inspection Service User and delivers it to the Inspection Service Provider. After completing the inspection process, the Inspection Service Provider sends the result of the inspection process to the Inspection Service User.

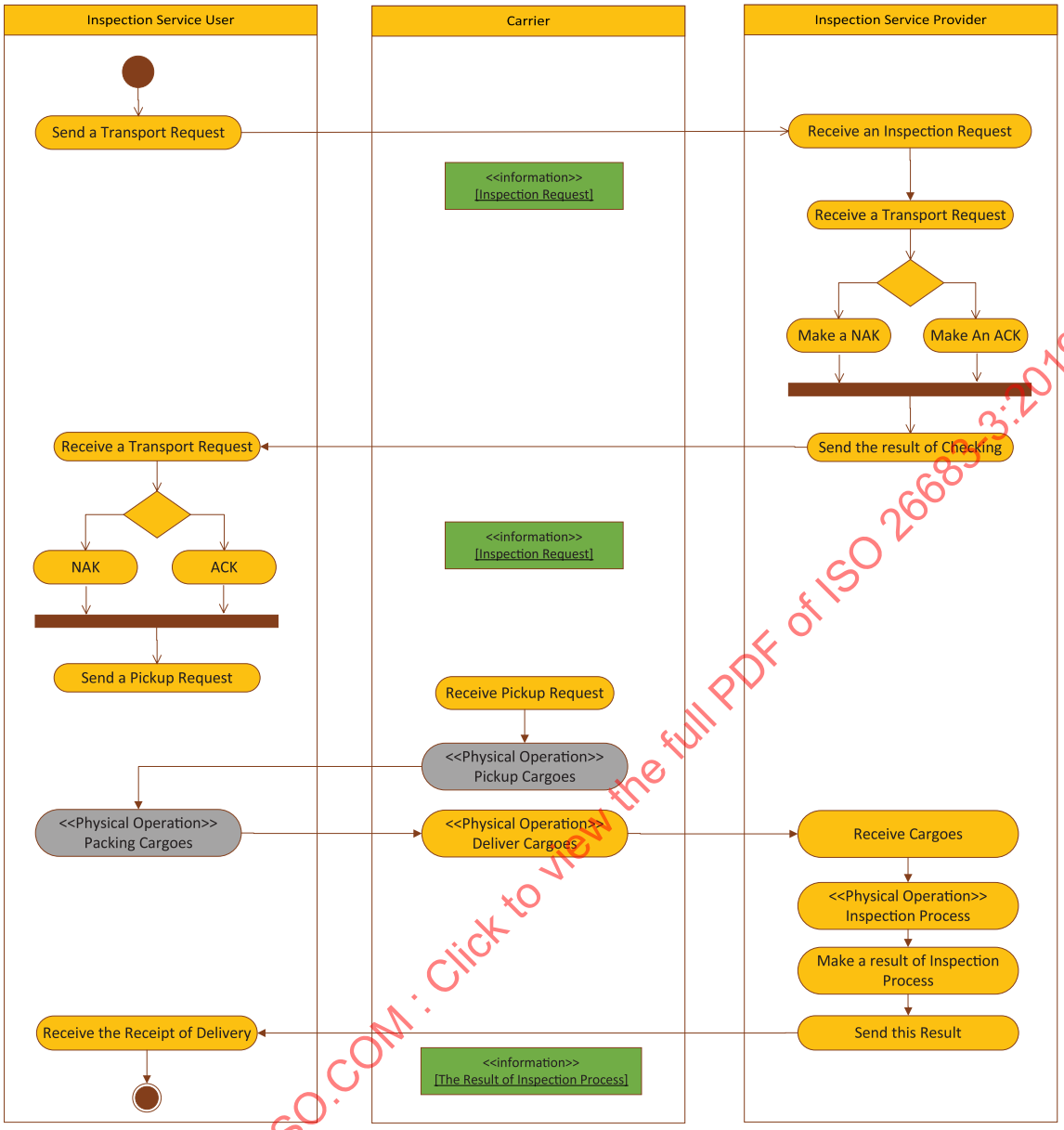

Figure 11 — Activity diagram of inspection service

5.3.2.4 Monitoring cargo condition information during transport

The relevant business entities such as producer, consignor, consignee, carrier, Inspection Service Provider, will submit cargo condition data during transport to a monitoring system that collects cargo condition information. This collection data will be provided to the relevant entities when they want to see cargo condition information. Figure 12 shows a use case diagram of capturing cargo condition information during the transport business process. Table 6 shows the process description, e.g. precondition, definition, and exception, regarding the “Capturing cargo condition information during Transport” business process between the cargo condition Information Provider and the cargo condition Information Server.

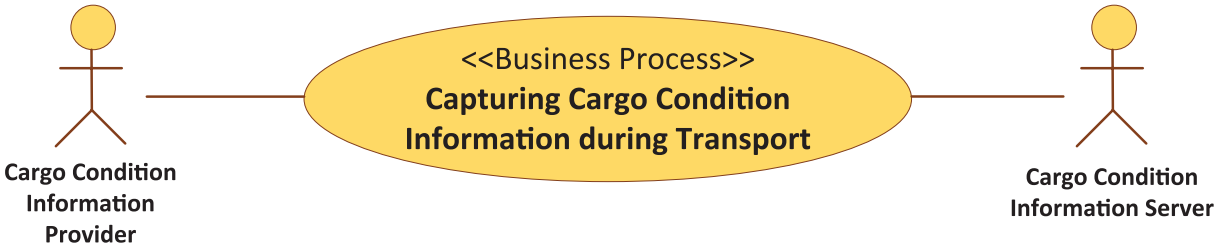

Figure 12 — Use case diagram of capturing cargo condition information during transport

— *Cargo condition information provider: Producer (Farmers, Fisheries), Consignor, Consignee, Manufacturers(Food Company), Retailer, Distributor, Government Agency, etc.*

Table 6 — Process description of "capturing cargo condition information during transport" business process

Pre conditions	The relevant business entities have a processed business process that handles the transportation work of cargo from consignor (or exporter) to consignee (or importer). To do this, the relevant business entities exchange electronic data (or electronic message) between business entities or government agents.
Begins when	This process starts by exchanging electronic data (or electronic message) before/after or on performing business process for cargo movement.
Scenario	The exchanged electronic data (electronic message) is captured and sent to the integrated data centre as basic data for cargo condition information during transport, which acknowledges the data to the sender.
Ends when	The relevant business entities receive acknowledgement of the receipt of the captured data from the integrated data centre.
Exceptions	
Post conditions	Captured data is ready for data handling or errors are reported to the sender.

Figure 7 shows the inspection activities in the goods movement process and Figure 13, below, shows a sequence diagram of the party generating cargo condition information and at what location in the process they send this information, and when the consignee exports goods including inspection business process.

Cargo condition information includes:

— Meets time arrival requirement at condition check point;

— Container/box opened during transport;

— Cold-chain parameters; temperature and humidity;

— Container/box vibration, g-force.

As shown in Figure 13, Cargo condition information is checked along with Transportation Status at steps 4, 8, 12, 19, and 21 in the freight movement process.

The transportation status parameters include:

— The goods/consignment/equipment/means of transport has been cleared by agriculture, food or fisheries authorities.

— The goods/consignment/equipment/means of transport has been cleared by port authority.

— The goods/consignment/equipment/means of transport has been cleared by customs.

— The goods/consignment/equipment/means of transport is moving to destination.

— The goods/consignment/equipment has been released from bond.

— The goods/consignment/equipment has arrived at the port.

— The consignment of goods has been split.

— The movement of the goods/consignment/equipment has been stopped.

— The goods/consignment/equipment has been transferred to another means of transport.

— The goods/consignment/equipment/means of transport has been delayed in transit.

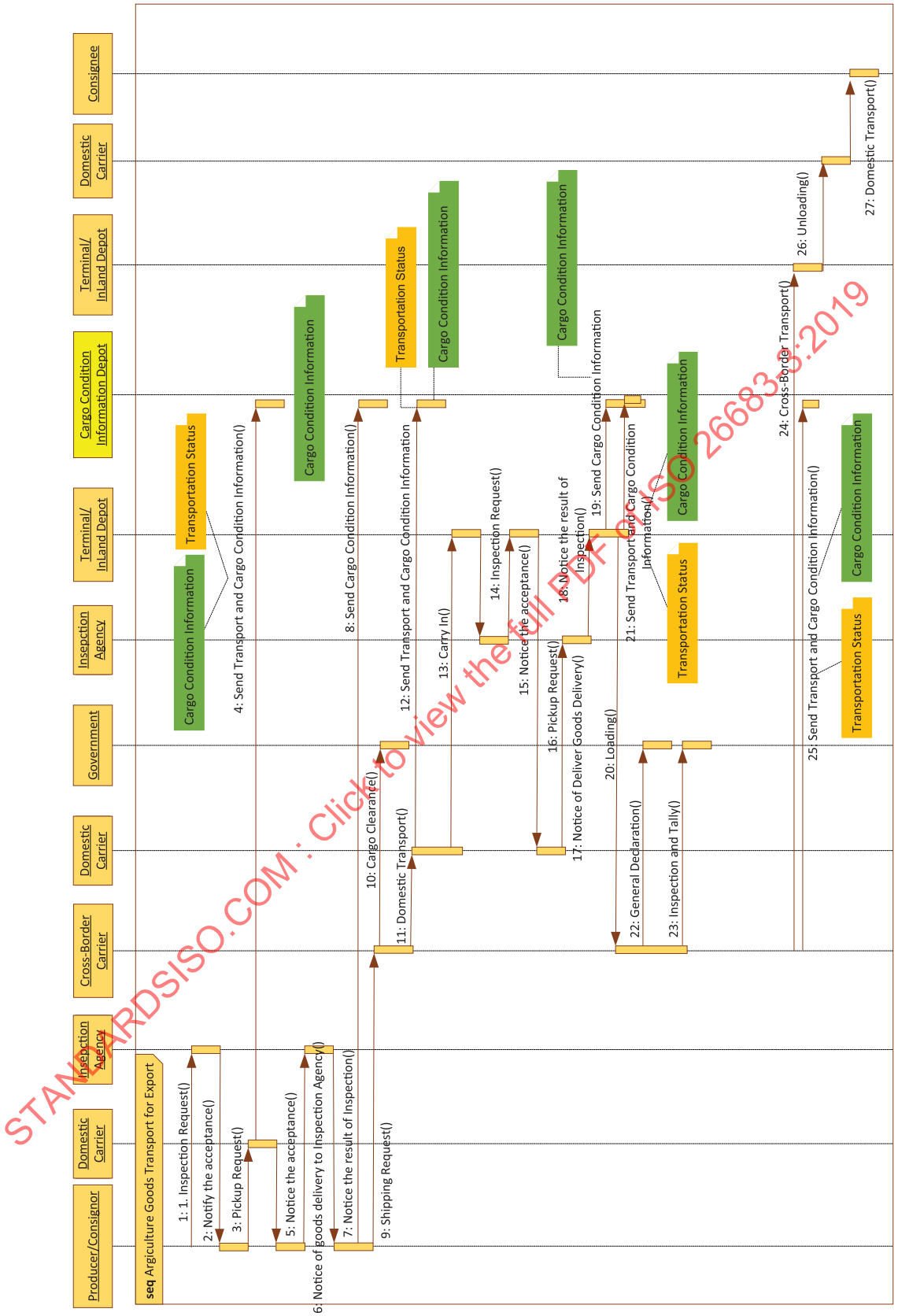

Figure 13 — Sequence diagram on capturing cargo condition information during transport

Figure 14 shows an activity diagram of the capturing cargo condition information during transport business process. This diagram shows the sequence of activities between the cargo condition

Information Provider and the cargo condition Information Server. Cargo condition Information Provider includes Consignee, Carrier, Inspection Service Provider.

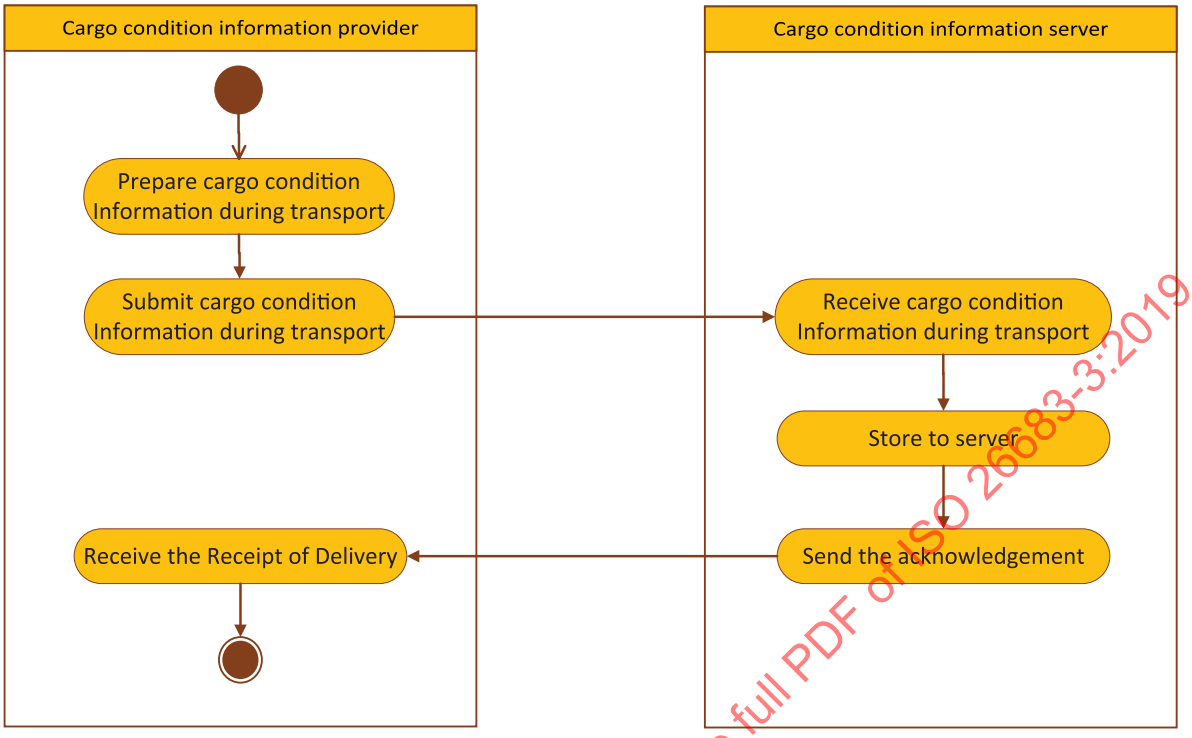

Figure 14 — Activity diagram of "capturing cargo condition information during transport" business process

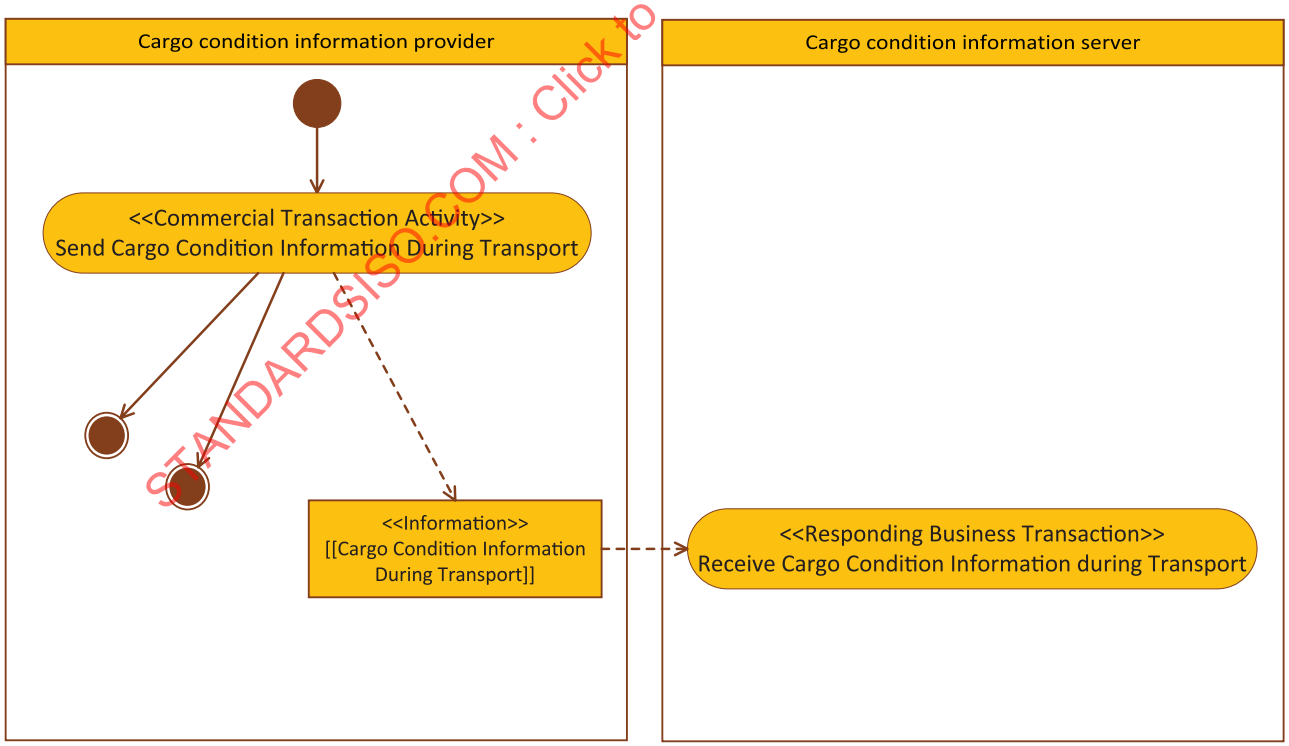

Figure 15 — Activity diagram of "capturing cargo condition information during transport" business transaction