



Deliverable D300.4

Smart-Logistics Standardization Needs and Roadmap

WP300

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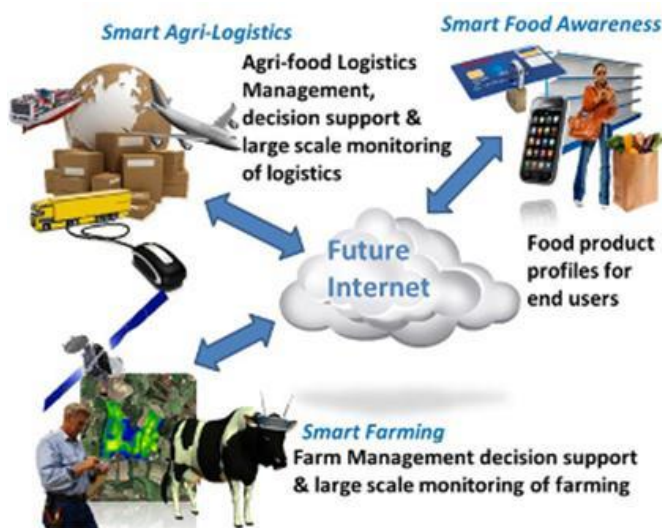
The SmartAgriFood Project

The SmartAgriFood project is funded in the scope of the Future Internet Public Private Partnership Programme (FI-PPP), as part of the 7th Framework Programme of the European Commission. The key objective is to elaborate requirements that shall be fulfilled by a “Future Internet” to drastically improve the production and delivery of safe & healthy food.

Project Summary

SmartAgriFood aims to boost application & use of Future Internet ICTs in agri-food sector by:

- Identifying and describing technical, functional and non-functional Future Internet specifications for experimentation in smart agri-food production as a whole system and in particular for smart farming, smart agri-food logistics & smart food awareness,
- Identifying and developing smart agri-food-specific capabilities and conceptual prototypes, demonstrating critical technological solutions including the feasibility to further develop them in large scale experimentation and validation,
- Identifying and describing existing experimentation structures and start user community building, resulting in an implementation plan for the next phase in the framework of the FI PPP programme.



Project Consortium

- | | |
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PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Document Summary

This deliverable addresses the standardization initiatives that enable smart agri-food logistics. Standardization needs are identified in this context and an inventory of applicable standards is provided. The standards are subsequently classified according to their level of abstraction and functionality by placing them in a standardization framework and subjected to a quality assessment. The result of this deliverable is a standardization roadmap, in which the gaps of standardization are addressed and an elaboration of the application possibilities of various standards is given.

Abbreviations

ADED	Agriculture Data Element Dictionary	CCTS	Core Component Technical Specification
ADIS	Agriculture Data Interchange Syntax	CLIENT	Controle op Landbouwgoederen bij Import en Export naar een Nieuwe Toekomst
AGMES	Agricultural Metadata Element Set	CS	Catalogue Service
AI	Application Identifier	DAPLOS	Data Plot Sheet
BPSS	Business Process Specification Schema	DD	Document Definition
BRC	British Retail Consortium	EANCOM	European Article Number Communication
CAP	Common Alerting Protocol	ebMS	ebXML Message Service Specification
CBV	Core Business Vocabulary		

ebXML	Electronic Business using eXtensible Markup Language	O&M	Observations and Measurements
eCert	Electronic certification	OASIS	Organization for the Advancement of Structured Information Standards
EDI	Electronic Data Interchange	OGC	Open Geospatial Consortium
EDIFACT	Electronic Data Interchange For Administration, Commerce and Transport	PLU	Price Look-Up
EFSA	European Food Safety Authority	QS	Qualität und Sicherheit
EIF	European Interoperability Framework	RDF	Resource Description Framework
EPC	Electronic Product Code	RFC	Request for Change
EPCIS	EPC Information Services	RFID	Radio-Frequency Identification
EU	European Union	RTI	Returnable Transport Item
F&P	Flowers and Plants	SAF	SmartAgriFood
FAO	Food and Agriculture Organization of the United Nations	SAS	Sensor Alert Service
FFV	Fresh Fruits and Vegetables	SensorML	Sensor Markup Language
FI	Future Internet	SGTIN	Serialized Global Trade Item Number
FI-PPP	Future Internet Public Private Partnership Programme	SKOS	Simple Knowledge Organization System
FSR	Freight Security Requirements	SOPSSC	Standard Operating Procedures for Security in the Supply Chain
GDSN	Global Data Synchronisation Network	SOS	Sensor Observation Service
GE	Generic Enabler	SPS	Sensor Planning Service
GIEA	Gestion des Informations de l'exploitation Agricole	SQF	Safe Quality Food
GLN	Global Location Number	SSCC	Serial Shipping Container Code
GML	Geography Markup Language	TBG	Trade & Business Processes Group
GPC	Global Product Classification	TCX	TraceCore XML
GRAI	Global Returnable Asset Identifier	TML	Transducer Markup Language
GS1	Global Standards ONE	TSR	Trucking Security Requirements
GTIN	Global Trade Item Number	UBL	Universal Business Language
HCCA	Haut Conseil de la Cooperation Agricole	UMM	UN/CEFACT's Modelling Methodology
HI-tier	Herkunftssicherungs- und Informationssystem für Tiere	UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
IACS	Integrated Administration and Control System	UNDP	United Nations Development Programme
ICT	Information and Communication Technology	UNECE	United Nations Economic Commission for Europe
ID	Identification	UNSPSC	United Nations Standard Products and Services Code
IEEE	Institute of Electrical and Electronics Engineers	USDA	United States Department of Agriculture Agricultural Marketing Service
IFPS	International Federation for Produce Standards	AMS	Agricultural Marketing Service
IFS	International Food Standard	VBN	Vereniging van Bloemenveiligen in Nederland
INSPIRE	Infrastructure for Spatial Information in the European Community	VKC	Vaste Keurings Commissie
IPR	Intellectual Property Rights	WCO	World Customs Organization
ISO	International Organization for Standardization	WNS	Web Notification Service
JSON	JavaScript Object Notation	WP	Work Package
KAVB	Koninklijke Algemeene Vereeniging voor Bloembollencultuur	XML	Extensible Markup Language

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1 Introduction

1.1 Objectives of D300.4

As standards are considered significantly important for enabling tracking and tracing in the agri-food supply chains, task 340 is concerned with identifying the needs for standardization in smart agri-food logistics. A multitude of standards can be relevant for smart agri-food logistics. One could not just think of standards for technical communication, but also of coding schemes and identification of products, containers and locations. In addition, there are standards to support information exchange in logistics. The main objective of this task is to come up with a roadmap for standardization activities, in which gaps and opportunities should be reflected. Therefore, first the specific needs for smart agri-food logistics must be identified, both for the definition, the usage and the maintenance of standards. A review is executed based on desk research to list relevant standards: not just those that are currently already adopted in the chain, but also standards from broader/other application fields that seem promising to apply in the agri-food chain. The standards that are considered useful are then further investigated by subjugating them to a quality assessment. The remaining set of standards will subsequently have its application possibilities for smart agri-food logistics described in more detail. In addition, we will identify gaps within the standardization efforts of smart agri-food logistics. Together these two provide guidelines for further standardization activities in the smart agri-food chain.

1.2 Dependencies between tasks and deliverables

Task 340 is related to:

- Task 310: Specification for Experimentation
Task 320: Generic Enabler and Architectural Requirements
Task 330: Domain-specific Sub-system Specification;
These tasks are the input for task 340, especially for the phase of identifying the needs for standardization.
- Task 620: Standardization planning;
Concerned with bringing together the standardization activities from the different use cases. Alignment between the activities of this task and task 620 is established in order to have a common basis to work from. This ensures smooth integration of the results of the various tasks related to standardization.

The deliverable that is most important as an input for this deliverable is D300.2. Pilot specifications provide useful input material as well. Standardization tasks in the other work packages (200, 400, 600), possibly relevant standards are exchanged. The tasks themselves are executed in parallel, but task 620 will merge the results and come up with an overall standardization plan.

As deliverable D600.2 merges the results of the standardization activities of smart farming, smart agri-food logistics and smart food awareness, this deliverable serves as input for D600.2.

1.3 The roadmapping process

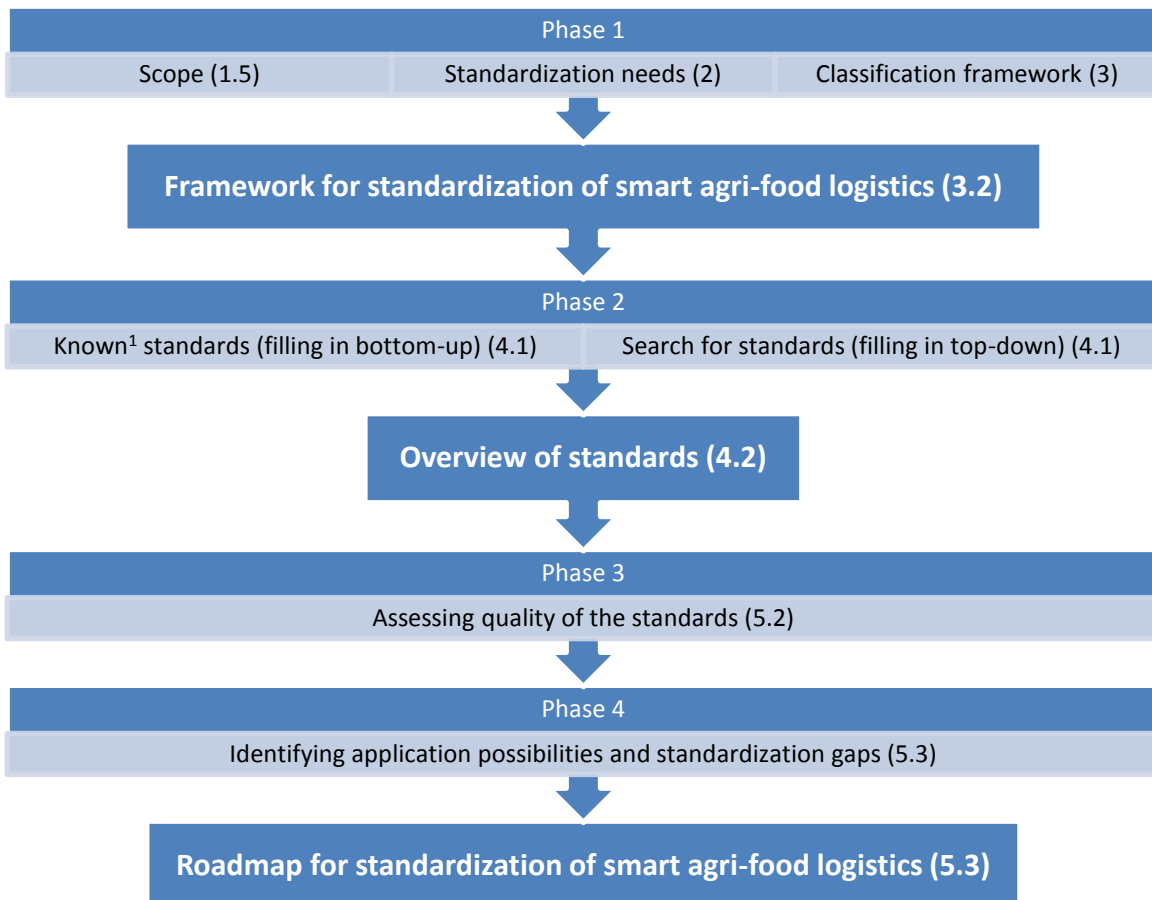
The standardisation roadmap is a map that matches SAF WP300 goals for agri-food logistics with specific standards that can help meet those goals. The purpose of the roadmap is threefold:

1. The roadmap should aid in reaching consensus about standards required to satisfy the set of needs: by mapping standards based on topics and themes relevant to WP300, the roadmap addresses WP300 requirements with respect to (IT-related) pilots and solutions.
2. It should help gain insight in standards development: by addressing uptake and development of relevant standards, the roadmap assesses the potential of the standard to be a successful part of (IT-)solutions applied to the SAF pilots and project.
3. It should provide a framework to help coordinate SAF developments, providing guidance on standardization for follow-up activities: by providing standards as enablers for topics and themes relevant to WP300 as a whole, the roadmap provides common solutions to implementation challenges.

1.4 Method

In order to have a clear structure in this deliverable and to make sure that a systematic way of working is followed to attain the roadmap, the method depicted in the figure below is proposed to stick onto for this task. The corresponding chapters can be found in brackets behind the steps.

Figure 1: Method for deliverable



¹ Standards that are mentioned in other deliverables within the project or already applied within the pilots.

- Phase 1 is concerned with identifying the needs for defining, using and maintaining standards. This is done based on previous deliverables, to ensure that the scope of SmartAgriFood, and especially work package 300, is in sight. Parallel to the identification of standardization needs, a framework is developed which can be used to classify standards. This framework will guide the phases that follow. The result of phase 1 is an (empty) framework for standardization of smart agri-food logistics.
- This empty framework is subsequently filled with standards in two ways. Standards that are mentioned in other deliverables within SmartAgriFood or that are already applied within the pilots of work package Smart Logistics are listed and, if considered useful, put in the framework. For cells in the framework that remain empty after this step, desk research is performed in order to find standards that could be applied in the smart agri-food chain, but are not yet (well-) known. An overview of possible standards for smart agri-food logistics is the result.
- For each of the standards in the overview the quality is assessed. Based on this analysis the gaps in the standardization can be identified. For all remaining standards the application possibilities will be formulated. The gap analysis together with the application possibilities of the standards is the resulting standardization roadmap for smart agri-food logistics.

1.5 Scope

Work package 300 within SmartAgriFood focuses on smart logistics for the agri-food supply chain. Three topics which are identified to be relevant to achieve these smart logistics are real-time virtualization, logistics connectivity and logistics intelligence. Within this work package, two scenarios are examined, which are the flowers and plants (FP) supply chain and the fresh fruits and vegetables (FFV) supply chain.

The scope for this deliverable is expressed in Figure 2. The arrows depict information flows between the various parties in the chain. The producer of the products (and their suppliers) and the retailer (and their consumers) are strictly speaking out of scope. However, information flows between one of the intermediate parties and the producer/retailer are taken into account, if at least this flow is concerned with information related to logistics. In addition, information flows that are semi-dependent on or have impact on logistics are studied. One could e.g. think of product quality information, as it is not directly considered solely logistics information, but it can be used to base decisions on for logistic purposes. A more elaborate overview of all information flows that will be taken into account is worked out in the next chapter.

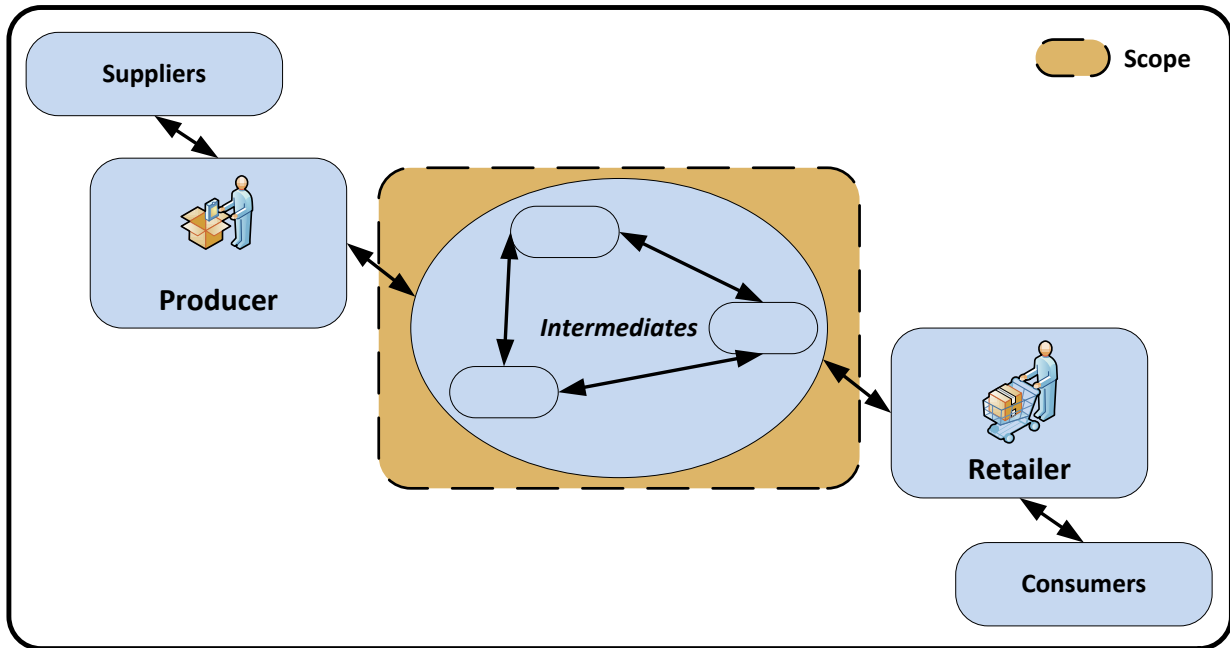


Figure 2: D300.4 scope

As the topics in focus are real-time virtualization, logistics connectivity and logistics intelligence, at least the identity, the location and the state of both products and logistics resources is important information. This information is used for planning, control, coordination/orchestration and, if possible, corrective and preventive actions on (smart) objects.

In more detail, Figure 3 visualizes the parties that are involved in the two specific supply chains. A distinction has been made between the main stakeholders and their supporting parties, the external service providers. The similarities and differences between the two supply chains become clear when looking at Figure 3.

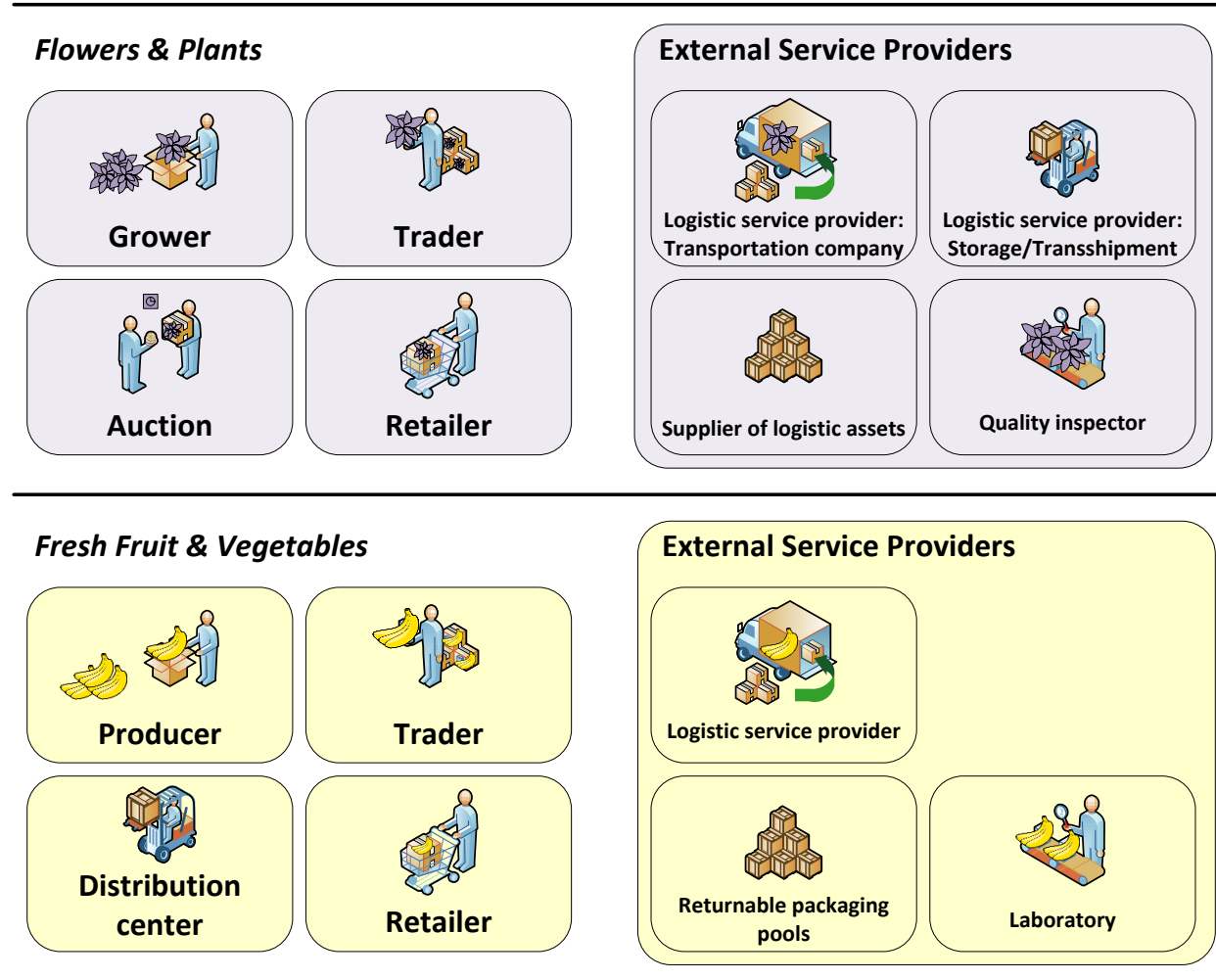


Figure 3: Parties in the Flowers & Plants and Fruit & Vegetables pilots

Focusing on logistics, not all parties mentioned in the figure above are equally relevant. As this deliverable looks at the possibilities for standardization of the information flows concerning smart logistics, the focus will be on the organisations related to logistics and the parties which need their information or provide them with information. The actual information flows will be mapped in the next chapter. As the supply chains for Flowers & Plants and Fruit & Vegetables are to a large extent similar, this mapping will use a general overview for both chains.

2 Standardization needs for smart agri-food logistics

2.1 WP300 requirements and architecture

Standardization is an essential component of any ICT architecture, providing common solutions to implementation choices and addressing the common, long-term challenges involved in the project.

Deliverable D300.2 has provided a summary of consolidated architectural requirements from the food logistics sector, an analysis of the FI GEs applicable in smart agri-food logistics and proposals for the ICT architectures of smart agri-food logistics pilots: it established a transparent link between requirements and ICT architectures for both smart agri-food logistics pilots.

A standardization roadmap thus has to identify and determine standardization alternatives that provide fitting solutions to implementation of these ICT architectures and their requirements. From D300.2, we can incur that the most prominent functional blocks that are within scope of this deliverable, are:

Flowers and Plants: Ordering and confirmation, Quality Control/prediction, (Sensor/RFID) Data management, transport scheduling

Fruit and Vegetables: ID allocation & registry, Data management, ID processing, Virtualisation & aggregation of crates.

2.2 Pilot information flows

In order to identify where standardization in the supply chain should or could be applied, the information flows between the different parties must be revealed. The current information flows between these parties are depicted in the two figures below, concerning the Flowers & Plants pilot and the Fresh Fruit & Vegetables pilot respectively.

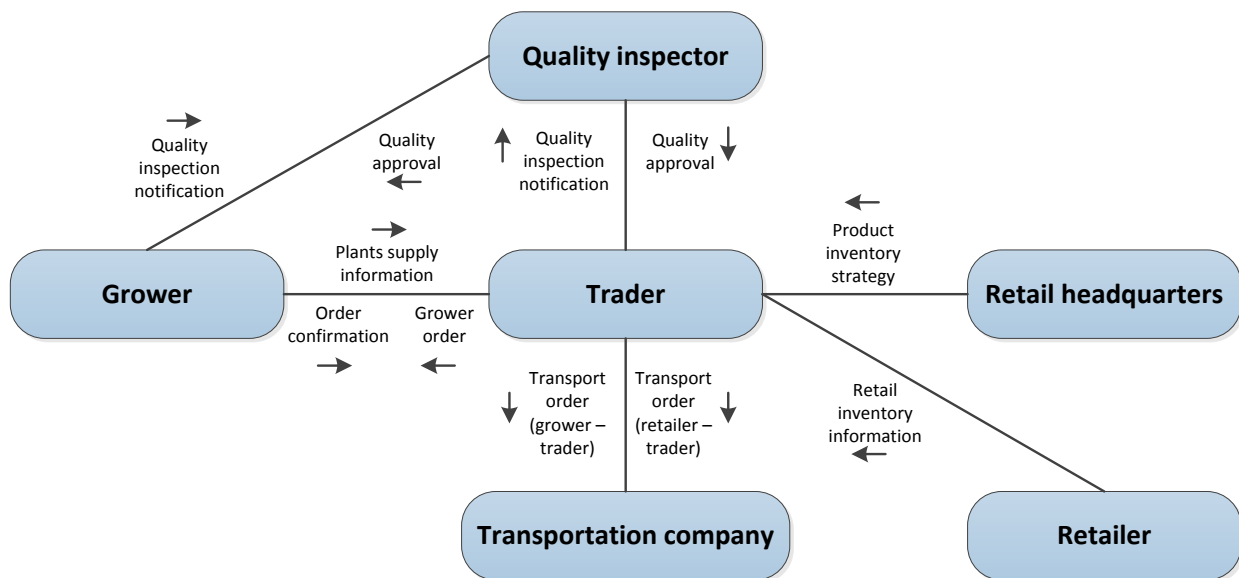


Figure 4: Current information flows within Flowers & Plants pilot

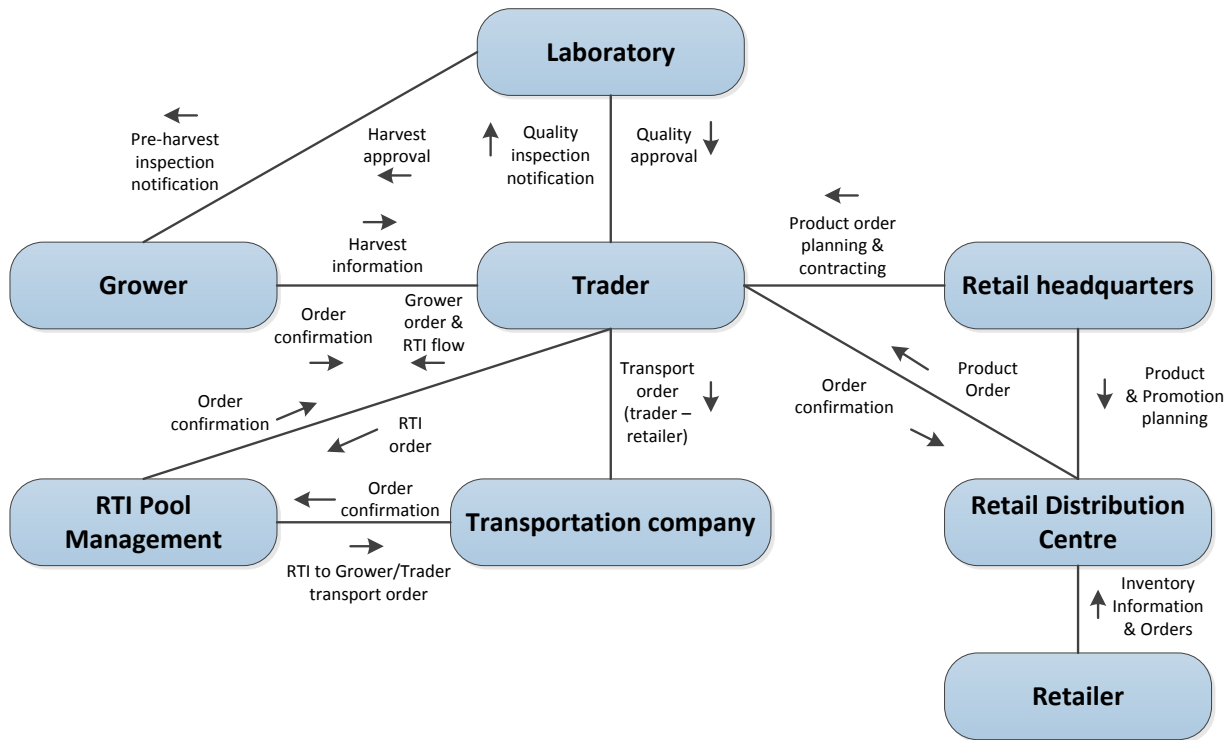


Figure 5: Current information flows within Fresh Fruit & Vegetables pilot

After looking at both figures can be concluded that the information flows in both pilots have a lot in common. A set of business functions to which these information flows are related can be filtered out of the figures. These are:

- Ordering, demand & supply
- Planning
- Transport
- Quality control

In the envisaged situation in the supply chain, some more flows of information take place. These extra flows, which hold for both pilots, are depicted in the figure below.



Figure 6: Envisaged extra information flows

The flow of product information cannot directly be coupled with a business function. Exception reporting information is concerned with monitoring.

What can be concluded from the analysis above is that at each of the interfaces information is exchanged. What kind of information this is can be classified by looking at the business function to which the information belongs. To have a solid basis for the standardization activities, a complete set of business functions which can be standardized has to be identified. This will happen in

the next paragraphs. As you will see, the business functions filtered out the information flows all appear in the resulting set.

Deliverable 300.1 specifies the basic supply chains roles that are allocated to the various actors in the chain. These roles are:

- Production
- Outbound logistics
- Inbound logistics
- Logistics orchestration
- Product development
- Marketing and sales

As smart agri-food logistics, and therefore this deliverable, focuses on the logistics flows from primary production (farm) to the market, not all roles within the supply chain are relevant to focus on. From the farm gate, where the primary produce is shipped, to the retail gate, where the agri-food products are received by the retailer, only the roles of outbound logistics, inbound logistics and logistics orchestration are important. These three roles can on their turn be specified as follows:

- Outbound logistics
 - Sales order processing
 - Sorting
 - Picking
 - Packaging
 - Labelling
 - Transportation
- Inbound logistics
 - Purchase order processing
 - Quality control
 - Storage
- Logistics orchestration
 - Planning
 - Monitoring
 - Coordination

The roles above are for this deliverable combined into the following business functions:

- Order processing (sales + purchase)
- Sorting, picking, packaging, labelling
- Transportation
- Quality control
- Storage
- Planning
- Monitoring
- Coordination

These business functions will be used to study the information flows between the various actors in the chain. Only looking at the information flows between the interfaces of the various actors without combining them related to their business functions, would lead to the creation of a lot of redundancy. This due to the fact that a lot of standards are concerned with business processes/functions and are not specified for the interactions between actors.

3 Classification of standards

In the previous chapter the information flows which can be considered for standardization are identified. Before studying what standards are already defined and possibly also already used between two or more parties, first a framework for classifying the standards will be proposed. The purpose of the use of such a framework is to make sure that no useful or necessary standards are overlooked and that interoperability is achieved on all levels.

To be able to effectively work together, it is required that not only at one level interoperability is ensured, but that a coherent stack of agreements is present for all levels. If technical interoperability is fixed, but the meaning of the messages that are exchanged is not recorded and agreed upon, effective cooperation is not possible. In other words, also on the level of semantics and syntax must be strived for interoperability [2].

Based on these statements the choice is made to make a vertical classification to arrange the standards. A variety of interoperability frameworks is already present to make such a vertical classification. The framework that is proposed for this deliverable is based on one of these existing classifications, out of the European Interoperability Framework for European Public Services.

3.1 European Interoperability Framework (EIF)

To support the pan-European delivery of electronic government services to citizens and enterprises, the European Interoperability Framework is established. The framework consists of a set of recommendations and guidelines for eGovernment services which make public administrations, enterprises and citizens able to interact across the borders of the European Union [3]. For this deliverable, the EIF is used to provide a framework for comparing standards. It gives levels of abstractions according to which the standards can be divided. What makes EIF useful in this case is that the framework and corresponding abstractions can be used across domains.

Within the EIF different dimensions of interoperability are distinguished. Where the first version, the EIF for Pan-European eGovernment Services, came up with three layers of interoperability, the second version, the EIF for European Public Services, describes four levels:

- Technical interoperability: concerned with formalizing specifications for technical aspects of linking information systems, such as interface specifications, interconnection services, data integration services, data presentation and exchange.
- Semantic interoperability: concerned with agreeing on the meaning of exchanged information
- Organizational interoperability: concerned with cooperation between organizations to achieve mutually agreed goals and integrating business processes and related data exchange
- Legal interoperability: concerned with maintaining legal validity of information that is exchanged across borders and the consideration of data protection legislation [4]

3.1.1 Semantic interoperability

In the EIF semantic interoperability encompasses both the meaning of data (semantics) as the format (syntax). For the framework proposed for smart agri-food logistics these two categories are split up into separate layers, as this is also done by Van der Veer and Wiles [5]. Where both categories are concerned with the processing of received data, semantic interoperability focuses on the interpretation of these data [6].

The semantic layer may be divided in three different parts. The subcategories that will be present in the framework under ‘Semantic’ are (partially) based on the e-Business Specifications of CEN [7]:

- **Document definition:** this category is concerned with the structure of the semantics and the metadata. This may include an XML document definition that provides a generic type structure for semantics, e.g. vehicle type, packaging type, container type, contract, (generic) product types, etc. or a standard that incorporates both types and so called specializations of the type, e.g. truck, lorry, produce type A, etc.
- **Vocabulary:** this category is concerned with the terminology within the structure, the actual labels/names used to specify structural elements. This may include code lists, taxonomies and vocabularies. An example of a standard would be the AgroVoc vocabulary.
- **Identification:** this category is concerned with the ability to find, distinguish, reference to and link instances. It provides and proposes a structure or scheme for identification. An example of standards in this area is e.g. the family of GS1 Identification keys.

Although some standardization efforts allow for separation of vocabulary and structure for a.o. maintenance and flexibility reasons, it is not unusual to find the document definition and vocabulary parts of semantics integrated in the specification of the same standard. An example of the latter is the Florecom standard.

3.2 Framework for standardization

Bringing together all what is written above, the following framework is the result for this deliverable.

Table 1: Framework for standardization

Framework for standardization		
Legal		Legal validity of data and data protection
Organizational		Organizational aspects of data exchange
Semantic		Meaning of data
	Document Definition (DD)	Structure of semantics and metadata
	Vocabulary (Voc)	Terminology within the structure
	Identification (ID)	Identification of data instances
Syntactic		Format of data
Technical		<i>Technical aspects of data exchange</i>

The technical layer is considered to be concerned with standards that are too generic for the scope of this deliverable.

Next to this vertical classification, also a horizontal arrangement can be made, supplementing the framework. This is relevant as a choice on one of the vertical layers may not be the same across all business functions. If the vertical framework is combined with the business functions identified in the previous chapter on the horizontal axis, the following matrix is the result.

Table 2: Empty matrix for standardization of smart agri-food logistics

	Order processing (sales + purchase)	Sorting Picking + Packaging Labelling	Transportation	Quality control	Storage	Planning	Monitoring	Coordination
Legal								
Organizational								
Semantic DD								
Voc								
ID								
Syntactic								
Technical								

As an example, the column Quality control is filled in with some standards to get an idea of the intended use of the matrix.

Table 3: Example filling of standardization matrix

	Quality control
Legal	
Organizational	UNECE standards
Semantic DD	eCert
Voc	ISO 7563:1998
ID	
Syntactic	eCert
Technical	

4 Overview of standards

4.1 List of standards

In appendix A the long-list of standards that are assessed for their applicability for smart agri-food logistics can be found. For all standards that are not considered in more detail a short motivation is provided. Appendix B is a list with an extensive description of all the standards that are identified as being relevant within the context and scope of this deliverable. For each of the standards the following aspects are described:

- **Name:** Identifying name of standard
- **Issuing organization:** Standards developing organization that issues standard
- **URL:** Web address where standard can be found
- **Level:** Class to which standard belongs (according to framework of chapter 3)
- **Description:** Short summary of purpose of standard
- **Regional scope:** Geographical area where standard is applied (National / EU / Global)
- **Language:** Language in which standard and documentation is written
- **Status:** Current status of standard, concerning: latest stable version, recent developments, active community and working groups
- **License:** Possibilities to re-use standard, concerning: terms of use and intellectual property rights
- **Participation:** Accessibility and possibility to participate in developments
- **References:** Where can more information about the standard be found

On the next page a summary is given of all the standards.

Name standard	Issuing organisation	Regional scope	Language	URL
AgroVoc	FAO	Global	Multi	http://aims.fao.org/standards/agrovoc/about
Core Business Vocabulary	GS1	Global	English	http://www.gs1.org/gsm/kc/epcglobal/cbv
DAPLOS	UN/CEFACT TBG18	Global	English	http://www.unece.org/trade/untidd/d08a/trmd/daplos_c.htm
EANCOM	GS1	Global	Multi	http://www.gs1.org/gsm/kc/ecom/eancom
ebXML	UN/CEFACT OASIS	Global	English	http://www.ebxml.org/specs/index.htm
eCert	UN/CEFACT TBG18	Global	English	http://www1.unece.org/cefact/platform/pages/viewpage.action?pageId=5964708
Edibulb standards	Edibulb	National	Dutch	http://www.edibulb.nl/index.php?option=com_content&view=category&layout=blog&id=52&Itemid=97
EFSA	EFSA	EU	English	http://www.efsa.europa.eu/
eLab	UN/CEFACT TBG18	Global	English	http://www.tuinbouwdigitaal.net/Onderzoek/Kennisbank/tabid/2046/articleType/ArticleView/articleId/561/e-LAB-Business-Requirements-Specification.aspx
Electronic Product Code (EPC)	GS1	Global	English	http://www.gs1.org/gsm/kc/epcglobal
EPCIS	GS1	Global	English	http://www.gs1.org/epcglobal/standards
Florecom standards	Florecom	National	Dutch	http://www.florecom.nl/Diensten/Standaardberichten/tabid/100/language/nl-NL/Default.aspx
Global Product Classification (GPC)	GS1	Global	English	http://www.gs1.org/gdsn/gpc
GS1 Application Identifiers	GS1	Global	English (other)	www.gs1.org
GS1 Identification standards	GS1	Global	English	http://www.gs1.org
GS1 XML	GS1	Global	Multi	http://www.gs1.org/gsm/kc/ecom/xml/xml_bms
ISO 21067:2007	ISO	Global	English	http://www.iso.org/iso/catalogue_detail?csnumber=34399
ISO 7563:1998	ISO	Global	English French	http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=14346
LanguaL	LanguaL	Global	English	www.langual.org

Name standard	Issuing organisation	Regional scope	Language	URL
Observations and Measurements	OGC	Global	English	http://www.opengeospatial.org/standards/om
PLU Codes	IFPS	Global	English	http://plucodes.com/
TraceCore XML (TCX)	Trace (EU)	EU	English	http://www.tracefood.org/index.php/Tools:TraceCore_XML_Overview
UN/CEFACT TBG3 standards	UN/CEFACT TBG3	Global	English	http://www1.unece.org/cefact/platform/display/TBG/TBG3
UN/CEFACT TBG15 standards	UN/CEFACT TBG15	Global	English	http://www1.unece.org/cefact/platform/display/TBG/TBG15
UNECE standards	UNECE	Global	English	http://www.unece.org/trade/agr/standard/fresh/ffv-standardse.html
			French	http://www.unece.org/trade/agr/standard/potatoes/pot_e.html
			(Russian)	http://www.unece.org/trade/agr/standard/meat/meat_e.html
			(others)	http://www.unece.org/trade/agr/standard/flowers/flower_e.html
UNSPSC	UNDP	Global	English	http://www.unspsc.org/
	GS1 US			
VBN Code	VBN	National	Dutch	http://www.vbn.nl/nl-NL/Codes/Pages/default.aspx
WCO Data model	WCO	Global	English	http://www.wcoomd.org/en.aspx

4.2 Standards in framework

	Order processing (sales + purchase)	Sorting, Picking Packaging, Labelling	Transportation	Quality control	Storage	Planning Coordination ²	Monitoring	Generic
Legal								
Organizational				UNECE standards				ebXML UN/CEFACT TBG 15
Semantic DD	Florecom Edibulb GS1 AI	GS1 AI WCO Data model	Florecom Edibulb UN/CEFACT TBG 3 GS1 AI WCO Data model	DAPLOS ³ EFSA eCert eLab	GS1 AI	GS1 AI	EFSA TracecoreXML GS1 AI	ebXML
Voc	GPC	LanguaL ISO 21067:2007 Core Business Voc GPC UNSPSC VBN Code WCO Data model	Agrovoc Core Business Voc GPC UNSPSC VBN Code WCO Data model	Agrovoc ISO 7563:1998	Core Business Voc GPC UNSPSC	GPC UNSPSC	GPC UNSPSC	
ID	GS1 Identification	GS1 Identification EPC VBN Code UNSPSC PLU Codes	Edibulb (codes) GS1 Identification EPC VBN Code UNSPSC		GS1 Identification EPC UNSPSC	GS1 Identification EPC UNSPSC	GS1 Identification EPC UNSPSC	
Syntactic	EANCOMGS1 XML Florecom Edibulb	EANCOM EPCIS GS1 XML WCO Data model	EANCOM EPCIS GS1 XML Florecom Edibulb UN/CEFACT TBG 3 WCO Data model	DAPLOS EFSA eCert eLab	EANCOM EPCIS GS1 XML	EANCOM EPCIS GS1 XML	EANCOM EFSA EPCIS GS1 XML TracecoreXML O&M	ebXML

² The columns Planning and Coordination are merged, as after filling in the framework with standards these two exactly resembled.

³ At first glance Daplos is not directly associated with quality control, but the data recorded in Daplos can be applied for quality control.

As can be seen, the framework is not fully filled with standards. The empty cells show that not on all levels and for all business functions standards do yet exist. In general can be concluded that on the higher levels less standards are present. An elaborate clarification of this fact can be found in the following chapter. Furthermore it strikes that multiple standards are both present on the semantic document definition layer and on the syntactic layer. This means that a variety of standards exist that provide both a structure for the semantics and a format for the data.

5 Roadmap

5.1 Quality criteria for assessment of standards

The main selection criterion for a standard is its ability to support the ICT architecture and its associated requirements. Assessment and placement in the roadmap however, also involves inspection of the standard per se, outside of its applicability and use within the scope of SAF.

The quality of a standard can be defined as its ability to support its intended design goal. We can describe every standard by having a set of features or characteristics, be they inherent to the product or the environment of the product (e.g. development organisation), that may define this quality. Together, these quality characteristics provide a means to assess the standard and its fit for purpose. Several frameworks exist that attempt to define quality explicitly according to established and well-defined terms [8] [9].

One can distinguish several categories of quality, when introducing a quality model for standards:

- **Product quality:** concerned with the internal quality and functionality of the standard. Defines the extent to which the standard provides functionality according to its intended scope. Quality features include completeness of functionality, usability including availability of specifications and support for specific localizations.
- **Process quality:** concerned with the standardization process behind the standard, relates to the organisation and development/maintenance process of the standard. Quality features include openness of standardization organisation, options for participation by stakeholders, continuous activity in working groups and progress in the lifecycle of the standard or its (direct) descendants.
- **Quality in practice:** concerned with the application of the standard in a context of use. Quality features include a.o. support for and uptake of the standard in its domain, support for the standard by software/hardware vendors and outlook on development.

For the quality assessment in this deliverable, we have opted to select the following criteria, based on relevance to the activities and scope of SAF and the feasibility of testing these criteria:

- **Product quality:** we have limited product quality to usability features, more specifically its openness. Specific quality measures are availability of specifications and intellectual property rights (or the absence thereof). In addition, we take its geographical scope into account (local, global) as a measure of potential fit to the specific goals and requirements of SAF.
- **Process quality:** We perceive the openness of the standardization process as a contributor to the applicability and suitability of the standard to SAF, since open standards and potentially, contribution to standardization developments are amongst the goals of the project. We include accessibility of standardization process, the options for participation in development through e.g. working groups, the openness of the decision process and presence of an (active) community as quality criteria.
- **Quality in practice:** we have selected criteria that pertain to current status and use and outlook on development by looking at the life cycle of the developments in the standardization process.

A table with the quality information of all standards can be found in the next sub chapter, which can be found on the following page.

5.2 Quality assessment of standards for smart agri-food logistics

	License	Reg.Scope	Participation	Community	Status	Language
AgroVoc	Free for non-commercial use	Global	Open for all to contribute	Active	Up-to-date, active website/community	Multilingual
CBV	Royalty-free	Global	Open, but different levels	Active	Version 1.0 and EPCGlobal ratified in 2010	English
DAPLOS (TBG18)	Free to use, no IPR	Global	Open, but different levels	Small	Latest release in 2006	English
EANCOM	Royalty-free	Global	Open, but different levels	Active	Updated every two years	English, German, other
ebXML	Free to use	Global	Completely open	Small	Last update 2011, website no longer updated	English
eCert (TBG18)	Free to use, no IPR	Global	Open, but different levels	Small	Latest release in 2008	English
Edibulb	Free to use	National	Open for all for RFCs, not for decisions	Small	Messages last update 2010, Codes up-to-date	Dutch
EFSA	Free to use	EU	-	-	Once published	English
eLab	Free to use	Global	Open, but different levels	Active	Version 0.3, final version to be released in 2013	English
EPC	Royalty-free	Global	Open, but different levels	Active	Regularly updated, latest update 2011	English
EPCIS	Royalty-free	Global	Open, but different levels	Active	Version 1.0.1 from 2007	English
Florecom	Royalty-free	National	Open, but different levels	Active	Regularly updated, last in 2011/2012	Dutch, English
GPC	Royalty-free	Global	Open, but different levels	Active	Last update 2012	English, other
GS1 AI	Royalty-free	Global	Open, but different levels	Active	Regularly updated	English, other
GS1 Id standards	Royalty-free, costs involved in using identifiers	Global	Open, but different levels	Active	Last updates in 2008 or 2009	English
GS1 XML	Royalty-free	Global	Open, but different levels	Active	Regularly updated, last update 3.0 in 2012	English
ISO 21067:2007	Fee, no IPR	Global	Open, but different levels	Active	Current, latest update 2007	English
ISO 7563:1998	Fee, no IPR	Global	Open, but different levels	Active	International Standard confirmed (2009)	English
LanguaL	Free to use	Global	Open, decision by technical committee	Small, Active	Latest update 2010	English
O&M	Royalty-free	Global	Open, but different levels	Active	Latest update 2011	English
PLU Codes	Fee for code	Global	Decision by members	Active	Continuous development of codes	English
TCX	Free to use	Global	Irrelevant	Irrelevant	Abandoned	English
TBG3 standards	Free to use, no IPR	Global	Members	Small	Latest update 2011	English
TBG15 standards	Free to use, no IPR	Global	Members	Small	Latest update 2011	English
UNECE standards	Free to use	Global	Completely open	Active	Latest update 2010 (FFV), regular updates	English, French, Russian
UNSPSC	Free to use	Global	Members, decision by commission of advisors	Active	Latest update unknown (login req.)	English

	License	Reg.Scope	Participation	Community	Status	Language
VBN Code	Free to use	National	Decision by members	Active	Daily updates	Dutch
WCO Data Model	Costs involved for specification	Global	Members	Active	Latest (v3.2) update nov 2011	English

Explanation of terms applied in the table:

- **License:** terms of use and intellectual property rights
- **Regional scope:** denotes geographical scope of the standard (National / EU / Global)
- **Participation:** denotes accessibility of the standardization process, possibility to participate in developments (open / closed (only open for (paying) members / different levels (restrictions on openness according to level of membership)
- **Community:** degree of activity of community, working groups
- **Status:** latest stable version and/or most recent developments
- **Language:** languages the standard is available in

Based on a closer look at the standards and the quality assessment of the previous page, the applicability for smart agri-food logistics of some of the standards which were first considered relevant is revised. The next five standards are not further considered in more detail.

Table 4: Standards not further considered into more detail

Name	Comments
ebXML	Minor community
eLab	Under development, no final version yet
O&M	Too generic
TCX	Abandoned
TBG15	This group facilitates other groups, scope is harmonizing practices and procedures
WCO	Requires purchase of documentation, only cross border

The following standards are still in place and the resulting set will again be placed into the framework.

Table 5: Resulting set of standards for smart agri-food logistics

Name
Agrovoc
CVB
Daplos
EANCOM
eCert
Edibulb
EFSA
EPC
EPCIS
Florecom
GPC
GS1 Application Identifiers
GS1 ID standards
GS1 XML
ISO 21067:2007
ISO 7563:1998
LanguaL
PLU Codes
TBG3 standards
UNECE standards
UNSPSC
VCN Code

Table 6: Resulting set of standards placed in framework

	Order processing (sales + purchase)	Sorting, Picking Packaging, Labelling	Transportation	Quality control	Storage	Planning Coordination	Monitoring
Legal							
Organizational				UNECE standards			
Semantic DD	Edibulb GS1 AI Florecom	GS1 AI	Edibulb UN/CEFACT TBG 3 GS1 AI Florecom	DAPLOS eCert EFSA eLab	GS1 AI	GS1 AI	GS1 AI
Voc	GPC	GPC UNSPSC Core Business Voc LanguaL ISO 21067:2007	GPC UNSPSC Core Business Voc Agrovoc	Agrovoc ISO 7563:1998	GPC UNSPSC Core Business Voc	GPC UNSPSC	GPC UNSPSC
ID	GS1 Identification	GS1 Identification EPC UNSPSC PLU Codes VBN Code	GS1 Identification EPC UNSPSC VBN Code		GS1 Identification EPC UNSPSC	GS1 Identification EPC UNSPSC	GS1 Identification EPC UNSPSC
Syntactic	Edibulb EANCOM GS1 XML Florecom	EPCIS EANCOM GS1 XML	EPCIS EANCOM GS1 XML Edibulb UN/CEFACT TBG 3 Florecom	DAPLOS eCert EFSA eLab	EPCIS EANCOM GS1 XML	EPCIS EANCOM GS1 XML	EPCIS EANCOM GS1 XML

5.3 Application possibilities of standards

The remaining standards are all identified as having a high potential for supporting smart agri-food; the first check for applicability was passed and the following assessment showed a sufficient quality. This section describes the standards in somewhat more detail and their application possibilities are summarized. Also the overlap, the differences and the relations between the various standards are pinpointed. The standards are grouped by their horizontal position in the framework.

5.3.1 Legal

For the legal layer of the framework, there seem to be no standards available. The importance of legal interoperability is emphasized by many, especially in the context of adoption of open access information policies and increased online availability of data [10]. However, while substantial progress is being made in achieving interoperability on lower levels, a long road ahead is foreseen before basic levels of legal interoperability will be achieved [11]. Bearing this in mind, the lack of availability of standards for legal interoperability in smart agri-food logistics is hardly surprising. This in turn means that, for the pilots it is not yet feasible to aim for legal interoperability.

5.3.2 Organizational

Specifications at this level describe how business processes are organized across organizational boundaries. The business process layer, either presented in a formal business process specification standard such as ebXML Business Process Specification Schema (BPSS) or with an informal workflow definition like flowcharts or interaction diagrams, provides a message choreography, exception flows (error handling) and other business rules for the eBusiness application roles participating in the process [12].

The quality assessment of standards shows that on the organizational level only one standard is found to be currently applicable for smart agri-food logistics. The UNECE standards are quality standards, which aim to facilitate international trade. They are *agricultural* quality standards, specified for a number of agricultural products, such as fresh fruit and vegetables, met and cut flowers, which make them very applicable for the pilots within SmartAgriFood. Within the standards quality criteria for the assessment of the products can be found, which make them useful guidelines for governments, producers and traders.

5.3.3 Semantic – Document definition

UN/CEFACT TBG3 is the working group of UN/CEFACT that focuses on developing standards for logistics planning and transport. Both operational movements of goods, administrative and governmental requirements and safety and security of freight movements are topics that are addressed. Current projects that are running in TBG3 are Cargo Tracing & Tracking, Transport Core Components and Transport Status Reporting.

Edibulb has developed several messages supporting the business functions in the flower bulb chain. Apart from messages related to ordering, delivery and invoicing, a so-called Logistics message set also exists. This message set aims at supporting the logistic processes between growers, transporters and traders. One main drawback of Edibulb is that, although the messages are in English as they are based on ebXML messages, the documentation is all in Dutch. Florecom has developed a similar set of messages for the use in the flower chain, formerly based on EDIFACT but currently also based on ebXML messages. Apart from commercial, financial and

clock messages, Florecom similarly provides a messaging standard for logistic purposes. Both transport (order and status) and delivery activities are covered. The documentation of Florecom, like Edibulb, is in Dutch.

Edibulb, Florecom and UN/CEFACT TBG3 all provide standard messages. However, a main difference between the three is that UN/CEFACT TBG3 provides generic messages, which are focused on transport and logistics, and Edibulb and Florecom have developed specific messages for flower bulbs and flowers respectively, but involving more business functions. Nevertheless, the Edibulb Logistics message and the Florecom logistics message set do not contain elements that are specific to flower(s) (bulbs) only, which implies that the messages could probably be applied on a larger scale, also for other agricultural products. This is supported by the fact that both are already aligned with GS1 standards.

Daplos, eCert and EFSA are all standards that have a narrow but clear scope. Daplos can be used to exchange data about the inputs and techniques used on crops and livestock conditions. This information originates at the farmer, but is meant to be sent to partners upwards in the chain. eCert has an even narrower scope, the standard must be used to exchange sanitary and phytosanitary certificates and is only meant to be used between governments. EFSA has developed two documents for the exchange of data for quality control; a standard description for food and feed and a guidance document on data exchange.

GS1 Application Identifiers are used to connect physical things and logical things to information or business messages related to them. The definition, format and structure of data fields encoded in data carriers are provided by GS1 AIs. Additional information that cannot be looked up based on an ID is attached using the GS1 AI.

5.3.4 Semantic – Vocabulary

Both GPC and UNSPSC provide a vocabulary for product classification. However, they are not overlapping, but more complementary. UNSPSC delivers a framework to globally classify all products and services, while GPC adds detailed classification attributes and values. GS1 (GPC) and UNSPSC already work together to harmonize their products. Also Languag provides a vocabulary for product classification, but only focused on food products. This description language uses a standardized vocabulary to describe specific characteristics of such products, which makes it comparable to the functionality that GPC offers for a broader range of products. Worth mentioning for the pilots is that there is a GPC implementation for fresh fruit and vegetables and the GPC for flowers and plants implementation is in development.

A vocabulary with a broad scope but focused on agriculture is Agrovoc. The vocabulary is multi-lingual and covers next to food and agriculture also other topics such as fisheries, forestry and environment. However, the vocabulary does only come up with terms, it does not give definitions of these terms. An added value of Agrovoc is that it incorporates relationships between the terms, but next to the hierarchical relations ‘broader term’ and ‘narrower term’ other interrelationships are indicated by ‘related term’ and are not further specified.

The other selected vocabularies do all have their (very) specific application possibilities. The Core Business Vocabulary (CBV) is developed to complement the EPCIS standards. Where EPCIS provides a data model to define the what, when, where and why of events related to RFID or barcode reads in the supply chain, does CBV provide specific data values to populate the EPCIS data model in order to have a common understanding of the semantic meaning of that data. Amongst others does CBV define business steps, business transactions and physical locations. The two ISO standards, 7563 and 21067, also consist of vocabularies. They can serve a similar purpose as CBV, as in complementing other standards in providing standard terminology and specific data values. However, these two are not yet related to certain other standards.

Whereas ISO 21067 provides a vocabulary for packaging, ISO 7563 is more concerned with conditions of fruit and vegetables. When comparing these two ISO standards and CBV to Agrovoc, it can be observed that the vocabularies are developed with different principles in mind. Where Agrovoc relates terms to each other, do the ISO vocabularies and CBV only sum a set of terms. In contrary, Agrovoc does not provide any definitions, where the other three clearly specify what is meant by the terms.

5.3.5 Semantic – Identification

GS1 has a lot of standards in their portfolio which provide coding schemes for identification. These standards are complementary, as they all focus on identification on different levels. The four standards that are considered as relevant for smart agri-food logistics are the Global Location Number (GLN), the Serial Shipping Container Code (SSCC), the Global Returnable Asset Identifier (GRAI) and the Global Trade Item Number (GTIN). In short, these can be applied at:

- Locations: GLN. This includes physical, functional or legal locations that need to be identified in the supply chain, such as companies, departments and warehouses.
- Logistic units: SSCC. This includes physical units that need to be tracked and traced individually in the supply chain, which are used for transport and storage of products. When used together with electronic business transactions, the SSCC can identify the contents of the logistics unit, acting as a license plate.
- Returnable assets: GRAI. This includes reusable packages and transport equipment.
- Trade items: GTIN. This includes both products and services of which pre-defined information needs to be received at any point in the supply chain. GTINs can be encoded into GS1 barcodes and Electronic Product Codes (EPC). As the GTIN only identifies product types instead of individual instances of particular product types, the GTIN is serialized when used in EPC to be able to uniquely identify an individual physical object. The so-called Serialized GTIN (SGTIN) is the result of a GTIN product identifier with a unique serial number.

Identification on product level is also facilitated by UNSPSC, in addition to providing a product classification scheme, UNSPSC also assigns codes to the product classes. These codes make it possible to indicate what kind of products one is dealing with, though it is not possible to identify individual product instances, just as the non-serialized version of GTIN.

A specialized identification on product level is provided by VBN. These codes are used by floricultural companies in the Netherlands to identify products and describe them in more detail. As the Netherlands is leading in the flower domain, is it a possibility to apply these codes on a broader scale, but it seems not possible extend the use to other domains. A good example is that the VBN classification already forms the basis for the flowers and plants implementation of GPC (see previous section).

The EPC is an identifier framework, which was already mentioned above to be able to include GTIN. Also the other coding schemes (GLN, SSCC and GRAI) are supported by EPC. It combines information to identify the manufacturer of a product and the product type, together with a serial number to uniquely identify an individual product. An EPC can be associated with specific product information, such as date of manufacture, origin and destination of shipment.

Identification at retailers dealing with fresh fruit and vegetables is supported by the PLU codes. These Price-Lookup codes aim at checking-out and inventory control and are primarily assigned to fresh produce. The PLU number identifies items based upon attributes such as the commodity,

the variety, the growing methodology and the size group. The PLU Codes are aligned with the fruit and vegetables implementation of GPC.

5.3.6 Syntactic

Both EANCOM and GS1 XML provide electronic business messages. Where EANCOM is a subset of EDI messages, XML in turn is used for GS1 XML. Messages within the EANCOM standard support trade and cover the following functions:

- Enablement of trade transactions to take place (catalogues, orders, invoices)
- Instruction of transport services to move goods
- Settlement of trade transactions through the banking system

The messages which exist within EANCOM are: Party Information, Product Information, Commercial Transactions (Quotation, Purchase Order, Transport and Logistics, Invoice), and Report and Planning. The identification coding schemes which are mentioned in the previous subchapter can be incorporated into the electronic messages of EANCOM. GS1 XML can also be used to support business functions within a supply chain and these functions are comparable to those of EANCOM. The specific messages that are developed within GS1 XML are Party Identification, Trade Item Identification, Ordering Products and Services, Delivery of Products and Services, Invoice and Payment Processes.

As concluded in section 5.3.2, Edibulb, Florecom and UN/CEFACT TBG3 all also provide standard messages, UN/CEFACT TBG3 focused on transport and logistics and Edibulb/Florecom covering more business functions. A same set of functions is covered by Edibulb/Florecom and as EANCOM and GS1 XML cover. For standard messages to support transport and logistics and related business functions, a choice can be made between EANCOM, GS1 XML, Edibulb, Florecom and UN/CEFACT TBG3.

EANCOM and GS1 XML do not come up with messages that serve a same purpose as Daplos, eCert and EFSA. As far as this report has investigated, no substitutes for these messages exist.

EPCIS, Electronic Product Code Information Services, is a standard for sharing information between trading partners that is related to the EPC. The 'What', 'Where', 'When' and 'Why' of events occurring in the supply chain is exchanged via the EPCIS standard, in a safe and secure way. EPCIS is a bridge between the physical world and the information systems, as it facilitates internal data capture as well as secure external sharing of information about movement and status of goods in the physical world. EPCIS does not address any of the other business functions described above, which does not make it possible to use EPCIS to replace the standards based on EDI.

5.4 Roadmap

The steps of the roadmapping process as described in chapter 1.3 are up to this point almost all addressed. What completes the roadmap for smart agri-food logistics is a look ahead. Therefore this sub chapter provides guidance on standardization for follow-up activities.

Organizational: semantic interoperability and standards are a precondition to organizational interoperability. Current pilots and activities in the project do not seem to be at a stage where there is need for standards that solve interoperability issues at this level. This is mainly due to the fact that identification and vocabulary semantics take higher priority and are considerably bigger challenges. The main step to solve interoperability issues at this level thus consist of enhancing current semantic standardization efforts (see below), including richer semantics required to support interoperability in organizational processes.

Semantic – Document definition: semantic standards at the document level that apply across the full range of business functions in agri-food logistics, are currently lacking. Most are too specific in terms of functionality to be applied in other business functions or are at best an ill fit. At the same time, it can be concluded from other domains, that an all-encompassing semantic model or standard will likely prove to be an illusion. Alignment between standards to overcome this deficit then seems a prerequisite for meaningful exchange of information. A preferably stable core of well-defined semantics could bridge the gap between competing semantic alternatives in the smart agri-food domain. This means that mapping of semantics becomes of paramount importance in order to overcome incompatible (re)definitions of semantics.

Semantic - Vocabulary: vocabularies prove their strength when implemented according to the intended purpose of providing sets of well-defined terms, covering a specific domain or subdomain. Combining the vocabularies in an agri-food logistics setting and referencing them from a semantic context is the well accepted approach to separate a stable core of domain semantics and an extensible mechanism to capture the dynamics of terms related to a specific domain. Specialization in specific parts of the domain is thereby an accepted approach. The vocabularies mentioned in the final framework all adhere to this paradigm.

Semantic - Identification: Identification solutions differ in their application of numbering schemes and identifiers, with GS1 standards set and UNSPSC as main, but incompatible and rivalling solutions. Identification solutions strongly rely on the globality of their applicability for them to achieve maximum usefulness. Specialist coding standards such as PLU codes and Florecom may thus eventually be combined with (or ultimately replaced by) globally more accepted identification schemas to allow transparent identification of products across a network of organizations.

Syntactic: most standards on a syntactic level are still embedded in a relatively outdated technology solution, i.e. EDI. Only GS1 XML employs a more modern and flexible, structured variant in XML, which more naturally extends to semantic solutions (e.g. XML schemas) on top of syntax standards. Since most interoperability solutions in any domain nowadays tend to lean towards incorporating XML technology, future solutions in the domain of agri-food logistics are wise and likely to switch to this technology as well, strengthening the common basis between solutions and stakeholders exchanging information.

6 Conclusions

The objective of this deliverable was to provide an overview of relevant standards and to describe the standardization opportunities in smart agri-food logistics.

The assessment in this deliverable serves as an overview and reference list for utilisation of standards in near future specification and realisation of pilot activities.

To that end, we have applied a method that involved:

- Establishing the scope for standardization. The scope of SAF in general, the pilot specifically and the exchange of information between parties was considered.
- Setting up a classification framework for standards. The classification framework had to allow for both separation of levels of abstraction and separation of functionality in order to accommodate and classify the various standards.
- Providing an overview of relevant standards. Input from other project activities and deliverables and desk research resulted in a long list of standards in scope.
- Assessing the long list on several quality criteria, including status, openness and accessibility of its organisation and development process and availability of documentation and license and IPR terms involved.
- Placing the resulting short list in the classification framework.
- Identifying gaps and opportunities for use of standards on various levels of abstraction.
- Recommending on how to proceed with the use of various standards in smart agri-food logistics.

In conclusion, we especially find that semantic standards at the document level that apply across the full range of business functions in agri-food logistics are currently lacking. Most are too specific in terms of functionality to be applied in other business functions or are at best an ill fit. As has been concluded in SAF deliverable D100.4, the most obvious core to any set of standards may well be the GS1 family. It requires GS1 however to expand to cover the gaps in both content and functionality over time on the level of semantics.

On other levels (both vocabulary, identification and syntax) we find ample proof of standards that apply across a broad range of business functions. There is variety in functionality and vertical integration (GPC/UNSPC or GS1 family) to choose from. The business function of quality control requires its own set of standards, which typically do not seem to cover other business areas.

On the higher levels (organizational and legal) hardly any standards are found that can be applied. At this moment it is not feasible to strive for interoperability across the chain enforced by standards on these layers, due to the lack of availability of such standards.

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8 Appendix A: Long-list of standards

Name	Shortlist	Comments
ADED	No	focus on agricultural production
ADIS	No	focus on agricultural production
AgGateway	No	seems promising for smart agri-food logistics, but no information publicly available
AGMES	No	focus on agricultural production
Agro EDI Europe Code repositories	No	focus on agricultural production
Agro EDI Europe EDI messages	No	focus on agricultural production
Agronomical observations	No	focus on agricultural production
AgroVoc	Yes	part of vocabulary is concerned with for example transport, quality
AgroXML schemas	No	focus on agricultural production
BRC Global Standards	No	focus on manufacturing and retail
CAP	No	out of scope for agri-food logistics
CCTS	No	too generic
CLIENT export	No	application instead of standard
CLIENT import	No	application instead of standard
Core Business Vocabulary	Yes	
CS	No	not a standard, but a service
DAPLOS	Yes	concerned with conditions of production and attributes of quality and meant for exchange in the chain
EANCOM	Yes	
ebMS	No	too generic, protocol for message exchange
ebXML	Yes	generic descriptions of agreements between chain partners, collaboration protocols
eCert	Yes	interesting for quality control
EDI Teelt	No	focus on agricultural production
Edibulb standards	Yes	
EDIFACT	No	too generic
EFSA Guidance on data exchange	Yes	concerned with food safety, related to quality control, monitoring
EFSA Standard sample description	Yes	
eLab	Yes	
Electronic data exchange proxy	No	
EPC	Yes	
EPCIS	Yes	
EU marketing standards	No	focused on marketing
Filter Encoding	No	too generic
Florecom standards	Yes	
Frugicom standards	No	only apply GS1 standards
FSR	No	no standard, only guidelines for freight, outside scope
GDSN	No	more of an implementation than a standard
GIEA	No	focus on farm level
GLN	Yes	
GML	No	focused on geo information, outside of scope for smart agri-food logistics

Name	Shortlist	Comments
GPC	Yes	
GRAI	Yes	
GS1 Application Identifiers	Yes	
GS1 XML	Yes	
GTIN	Yes	
HCCA Coops	No	focus on financial information in agriculture
HI-tier	No	focus on live stock
IACS	No	could be used for farm identification, but is only focused on financial transactions
IEEE 1451.7	No	describes functionalities and capabilities of sensors, no standard for information exchange
IFS Logistics	No	guidelines for auditing
INSPIRE	No	focus on spatial information
ISO 11784:1996	No	focus on animals
ISO 11785:1996	No	focus on animals
ISO 15961.4	No	describes functionalities and capabilities of sensors, no standard for information exchange
ISO 18600-6	No	describes functionalities and capabilities of sensors, no standard for information exchange
ISO 21067:2007	Yes	
ISO 24753.2	No	describes functionalities and capabilities of sensors
ISO 7563:1998	Yes	
ISOagriNET	No	focus on farm level
ISOBUS	No	only concerned with agricultural machinery
JSON	No	too generic
KAVB	No	registration of cultivars
Ketenregister	No	application instead of standard
LanguaL	Yes	can possibly be applied in packaging, labeling
O&M	Yes	focused on creating meaningful information out of sensor data
PLU Codes	Yes	
QS Standard for Logistics	No	yet to be developed
RDF	No	too generic
RFC33.0	No	interface specification
SAS	No	not a standard, but a service
SensorML	No	describes framework for sensor systems, outside scope for this deliverable
SKOS	No	too generic
SOPSSC	No	focus on security procedures
SOS	No	sensor system specification standard
SPS	No	interface specification standard for sensor systems
SQF	No	guidelines for certification
SSCC	Yes	
TCX	Yes	
TML	No	describes framework for sensor systems, standard retired
TSR	No	guidelines for trucks
UBL	No	too generic
UMM	No	too generic

Name	Shortlist	Comments
UN/CEFACT TBG 3 standards	Yes	
UN/CEFACT TBG 15 standards	Yes	
UNECE standards	Yes	multiple UNECE standards for FFV, FP, meat, concerned with product id and quality characteristics
UNE-ISO 28000	No	focus on security
UNSPSC	Yes	
USDA AMS	No	focus on marketing
VBN Code	Yes	
VKC	No	registration of flowers
WCO Data Model	Yes	
WebEDI	No	only involves solution instead of standard
WNS	No	service instead of standard
XML	No	too generic

9 Appendix B: Extensive overview of standards

9.1 AgroVoc

Name of standard

AgroVoc

Issuing organization

FAO. The AGROVOC Thesaurus is owned and maintained by a community of institutions all over the world. FAO is only the curator.

URL

<http://aims.fao.org/standards/agrovoc/about>

Level

- Semantic – Vocabulary
- Transportation & Quality control

Description

The AGROVOC thesaurus by the Food and Agricultural Organization of the United Nations (FAO) is nowadays the most comprehensive multilingual thesaurus and vocabulary for agriculture. Originally, it was devised for indexing of literature, but it is increasingly used also in facilitating knowledge sharing and exchange through electronic media and machine-readable data formats. It The AGROVOC thesaurus contains more than 40 000 concepts in up to 21 languages covering topics related to food, nutrition, agriculture, fisheries, forestry, environment and other related domains [1].

The vocabulary is provided in standard RDF and SKOS and concepts are identified by URLs. Therefore, it is easy to reference these concepts or create mappings to other vocabularies. Apart from several agricultural ontology relations (for a complete list see <http://aims.fao.org/website/Ontology-relationships/sub>) AGROVOC uses common thesauri relationships like “broader term”, “narrower term”, “related term”.

Regional scope

Global

Language

Multilingual

Status

Latest stable release version 1.0

License

Copyright for the AGROVOC thesaurus content in English, French, Russian and Spanish is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License. For any other language, the copyright rests with the institution responsible for its production. AGROVOC may be downloaded and used free of charge for non-commercial purposes providing the source is fully acknowledged. All other use is subject to authorization by the copyright holder(s).

Participation

Within AIMS a community exists for Agrovoc, to participate and contribute to the AGROVOC thesaurus. AIMS welcomes librarians, information management specialists, software developers, researchers, students, policy makers, and others to participate.

References

[1] <http://aims.fao.org/website/About/sub>

[2] <ftp://ftp.fao.org/unfao/bodies/coaim/coaim-2/AC493e.doc>

9.2 CBV

Name of standard

Core Business Vocabulary

Issuing organization

GS1

URL

<http://www.gs1.org/gsmc/kc/epcglobal/cbv>

Level

- Semantic – Vocabulary
- Sorting, Picking, Packaging, Labelling & Transportation & Storage

Description

Accompanying standard to EPCIS (see section 9.11) which basically defines vocabulary elements (i.e., business steps, dispositions, and business transaction types) in order to populate EPCIS event messages. Thus, all business partners have a common understanding of the meaning of an EPCIS event message.

Regional scope

Global

Language

English

Status

In use.

License

GS1 has an IP policy, which intent is to provide royalty-free use of the standards. All standards are publicly available, either at GS1 global or at the local GS1.

Participation

GS1 has an extensive community, with working groups which each focus on each of the standards. GS1 has the Global Standard Management Process (GSMP), which is the worldwide collaborative forum where GS1 standards are built and maintained and it is a user-driven process.

Both members and non-members are allowed in the development process of GS1 standards, all participants must however agree with the IP policy. Only GS1 members can receive a royalty-free licence to implement mandatory features of GS1 standards.

References

Core Business Vocabulary Standard (version 1.0)

9.3 DAPLOS

Name of standard

DAPLOS (Data Plot Sheet)

Issuing organization

UN/CEFACT TBG18 / Agro EDI Europe

URL

http://www.unece.org/trade/untdid/d05b/trmd/daplos_c.htm

Level

- Semantic – Document definition & Syntactic
- Quality control

Description

The Data Plot Sheet (DAPLOS) is to be used in Electronic Data Interchange (EDI) between trading partners involved in administration, commerce and transport, both for national and international trade and independent of the type of business or industry. The message describes the data plot sheet exchanged between farmers and suppliers. The information exchanged includes a technical description and information of the crop production in order to give information about traceability to the farmer's partners (cooperatives, manufacturers, suppliers etc.)

Regional scope

Global

Language

English

Status

Message Type : DAPLOS

Version : D

Release : 05B

Contr. Agency: UN

Revision : 1

Date : 2006-01-17

Available on: http://www.unece.org/trade/untdid/d05b/trmd/daplos_c.htm

License

There is a strict demand of no claims of IPR of any contributions to the committee work. All specifications IPRs are owned by the UN and as such open for free use by everyone. A backside of the non-proprietary claim is that implementation guidelines are excluded from the committee work.

Participation

Participation is open to all interested parties. Participation can be at the member or observer level. Observers will be allowed full access to and involvement in all discussions. Voting is restricted to members. Membership is open to any expert with broad knowledge in the area of processes, procedures and modeling in the international trade and e-business arenas, the functions of UN/CEFACT, and its groups.

References

BUSINESS REQUIREMENTS SPECIFICATION (BRS): Crop Data Sheet process (http://www.unece.org/fileadmin/DAM/cefact/brs/BRS_eDAPLOS_v0.7.pdf)

9.4 EANCOM

Name of standard

EANCOM

Issuing organization

GS1

URL

<http://www.gs1.org/gsmp/kc/ecom/eancom>

Level

- Syntactic
- Order processing & Sorting, Picking, Packaging, Labelling & Transportation & Quality control & Planning, Coordination & Monitoring

Description

EANCOM is a GS1 subset of the UN/EDIFACT standard (United Nations Electronic Data Interchange for Administration, Commerce and Transport), which comprises a set of internationally agreed standards, directories and guidelines for the electronic interchange of data.

EANCOM is fully compliant to UN/EDIFACT. It provides the collection of only those message elements which are needed by the business application and required by the syntax (mandatory elements). Omitted are optional elements covering very specific business requirements not relevant for GS1 users.

EANCOM incorporates into the electronic messages the GS1 standards of physical identification of trade items, logistics units and the Global Location Numbers identifying the trading partners. It allows integrating the physical flow of goods with related information sent by electronic means.

The EANCOM messages are equivalent of traditional paper business documents. Messages available in the EANCOM standard cover the functions required to complete a trade transaction:

- messages which enable the trade transaction to take place, e.g. price catalogue, purchase order, invoice, etc;
- messages used to instruct transport services to move the goods;
- messages used in settlement of the trade transactions through the banking system.



Regional scope

Global. Local (national) recommendations are in some countries available.

Language

English, German and other languages are available.

Status

EANCOM 6.0. In use.

GS1 EANCOM is an international standard, used by over 100 000 companies worldwide. Therefore is the GS1 EANCOM standard the leading and most widely used EDI standard in the world today. The international network of GS1 Member Organisations (including GS1 China), covering more than 150 countries, provides support, documentation and training in local languages.

License

GS1 has an IP policy, which intent is to provide royalty-free use of the standards. All standards are publicly available, either at GS1 global or at the local GS1.

Participation

GS1 has an extensive community, with working groups which each focus on each of the standards. GS1 has the Global Standard Management Process (GSMP), which is the worldwide collaborative forum where GS1 standards are built and maintained and it is a user-driven process. Both members and non-members are allowed in the development process of GS1 standards, all participants must however agree with the IP policy. Only GS1 members can receive a royalty-free licence to implement mandatory features of GS1 standards.

References

<http://www.gs1.org/gsmf/kc/ecom/eancom>

9.5 ebXML

Name of standard

ebXML (Electronic Business using eXtensible Markup Language)

Issuing organization

Maintaining and advancing specifications: UN/CEFACT and OASIS (Organization for the Advancement of Structured Information Standards)

Issuing specifications: ISO (ISO 15000-1, 15000-2, 15000-3, 15000-4, 15000-5)

URL

<https://www.oasis-open.org/>

http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=53186

Level

- Organizational & Semantic – Document definition & Syntactic
- Generic

Description

A newer standard for electronic business is ebXML (Electronic Business using eXtensible Markup Language). It is maintained by the UN/CEFACT and by OASIS (Organization for the Advancement of Structured Information Standards). The first version was already issued in May 2001, since then a number of its specifications have become ISO standards. ebXML includes five types of specifications: on business processes [1], on collaboration protocols and agreements [2], on messaging services (ebMS; [3]) on registries and repositories [4, 5] and on core data components. All definitions of the data exchanged over ebXML are stored in an ebXML registry as XML documents. The data pools are managed by service providers or major suppliers. ebMS is based on SOAP [6], the underlying communication protocol is usually HTTP. SOAP Version 1.2 is a lightweight protocol intended for exchanging structured information in a decentralized, distributed environment. "Part 1: Messaging Framework" defines, using XML technologies, an extensible messaging framework containing a message construct that can be exchanged over a variety of underlying protocols.

For ebXML, an implementation of the Core Components Technical Specification [7] is the Universal Business Language [8]. This standard data format has been defined by OASIS and provides XML schemas for business documents (e.g. order, invoice, etc.).

Regional scope

Global

Language

English

Status

The latest contributions of the workgroups working on various specifications have been published in 2006 (business process), 2012 (messaging), 2011 (registry), 2010 (core and protocol). A very small community resides at ebxml.xml.org. A site promoting the standard ebXML is hosted on ebxml.org, but this site is no longer actively updated.

License

OASIS provides ebXML specifications free of charge. There are no royalties or fees associated with the use of the ebXML specifications.

Participation

Membership of OASIS is open to all organizations and persons. OASIS has transparent governance and operational procedures in place. Agreement on technical topics is determined by members in a joint technical process that allows them to influence standards and contribute specifications for advancement. Work groups focus on a specific standard. Consensus on topics addressed is reached by consensus. An open voting procedure allows for ratification of proposals. Members of the Board of Directors or Technical Advisory Board are nominated in an open election process and serve a two-year term.

References

- [1] J.-J. Dubray, S. St. Amant, M. J. Martin (2006): ebXML Business Process Specification Schema Technical Specification v2.0.4. ebXML Business Process Technical Committee.
- [2] OASIS ebXML Collaboration Protocol Profile and Agreement TC (2002): ebXML Collaboration Protocol Profile and Agreement Specification Version 2.0. OASIS ebXML Collaboration Protocol Profile and Agreement Technical Committee.
- [3] P. Wenzel (2007): ebXML Messaging Services Version 3.0: Part 1, Core. OASIS ebXML Messaging Services Technical Committee.
- [4] S. Fuger, F. Najmi, N. Stojanovic (2005a): ebXML Registry Information Model Version 3.0. OASIS ebXML Registry Technical Committee.
- [5] S. Fuger, F. Najmi, N. Stojanovic (2005b): ebXML Registry Services and Protocols Version 3.0. OASIS ebXML Registry Technical Committee.
- [6] N. Mitra, Y. Lafon (2007): SOAP Version 1.2 Part 0: Primer (Second Edition). World Wide Web Consortium.
- [7] UN/CEFACT (2003): Core Components Technical Specification – Part 8 of the ebXML Framework, Version 2.01. United Nations Centre for Trade Facilitation and Electronic Business.
- [8] J. Bosak, T. McGrath, G. K. Holman (2006): Universal Business Language v2.0. OASIS Universal Business Language (UBL) Technical Committee.

9.6 eCert

Name of standard

Electronic certification

Issuing organization

UN/CEFACT TBG18 / Agro EDI Europe

URL

<http://www1.unece.org/cefact/platform/pages/viewpage.action?pageId=5964708>

Level

- Semantic – Document definition & Syntactic

- Quality control

Description

eCert is a message standard used in electronic transmission between government inspection and quarantine authorities involved in border clearance activities for agricultural products. The eCert Data Standard and Message Structure has been recognized by UN/CEFACT as a standard for government to government (G2G) exchange of sanitary and phytosanitary certificates.

eCert standard is based on an established business processes that operates in accordance with international standards and best practice.

Regional scope

Global

Language

English

Status

eCert XML schema is available from the UN-CEFACT website (Standards – XML-schemas – version D08B

refers : http://www.unece.org/cefact/xml_schemas/index.htm#2008B).

To access the XML-schema an XML-editor-software-tool is necessary.

- Download the D08B-package.
- Extract the information using the XML-editor-software-tool.
- Launch SPSAcknowledgement_2p0.xsd and SPSCertificate_2p0.xsd (mentioned under Data – Standard).

License

There is a strict demand of no claims of IPR of any contributions to the committee work. All specifications IPRs are owned by the UN and as such open for free use by everyone. A backside of the non-proprietary claim is that implementation guidelines are excluded from the committee work.

Participation

Participation at UN/CEFACT is open to all interested parties. Participation can be at the member or observer level. Observers will be allowed full access to and involvement in all discussions. Voting is restricted to members. Membership is open to any expert with broad knowledge in the area of processes, procedures and modelling in the international trade and e-business arenas, the functions of UN/CEFACT, and its groups. For eCert holds that it involves government to government data exchange, so participation is restricted to governmental parties.

References

[1] www1.unece.org/cefact/platform/download/attachments/5964708/UNCEFACT_ECERT_ImplementationGuide_Draftv1+0+GUIDE.doc?version=1&ei=7LG8ULTQEOz34QTQ7ICwDg&usg=AFQjCNEu06iNBFNbih-ib3Q1laOpnXPpiw

[2] <http://www1.unece.org/cefact/platform/pages/viewpage.action?pageId=5964708>

[3] http://www.cbp.gov/xp/cgov/trade/trade_programs/textiles_and_quotas/ecert/ecert.xml

9.7 Edibulb standards

Name of standard

Edibulb standards

Issuing organization

Edibulb

URL

http://www.edibulb.nl/index.php?option=com_content&view=category&layout=blog&id=52&Itemid=97

Level

- Semantic – Document definition & Semantic - Identification & Syntactic
- Order processing & Transportation

Description

Edibulb is a common initiative of trade organizations within the sector of growers, purchase & sales offices and traders. Together with market parties standard messages are developed for electronic message exchange within the industry. These various messages, based on XML Schema, are focused on flower bulbs and are based on globally accepted EDI messages.

The following messages exist:

- Order
- Order confirmation
- Delivery
- Proof of receipt
- Invoice
- Logistics

Next to the messages, Edibulb also supplies standard code lists for the data that is within the messages. One could think of bulb cultivars, but also measures and conditions.

Regional scope

National

Language

Dutch

Status

Various parts of the standards are in various stages of development.

Last publication of most of the messages is from 2007, the logistics message has a more recent version, from 2010.

Most of the types of codes are updated each week, some only each year.

License

Free use, no restrictions. Technical specification is publicly available.

Participation

Active users and their software suppliers can send requests for change, which are processed once a year. Edibulb decides whether the changes are applied in the new version of the standard. No costs are involved in joining Edibulb. Once necessary changes in software must be paid.

Everyone can request a new product code.

References

http://www.edibulb.nl/index.php?option=com_content&view=category&layout=blog&id=52&Itemid=97

9.8 EFSA

Name of standard

EFSA Standard sample description for food and feed

EFSA Guidance on Data Exchange

Issuing organization

EFSA (European Food Safety Authority)

URL

<http://www.efsa.europa.eu/>

Level

- Semantic – Document definition & Syntactic
- Quality control & Monitoring

Description

The EFSA collects data from the EU member states, the European Commission, the industry etc. on food consumption, the incidence and prevalence of biological risks, and occurrence of contaminants and chemical residues. A standard sample description for food and feed is used, which is composed of a list of standardized data elements (definition and structure), controlled terminologies and validation rules [1]. The target is to harmonize the collection of analytical measurement data on food and feed. Controlled terminologies for all parameters of the analysis have been established, e.g. for the analytical method, the country of origin, the result etc. The product code describing the product under analysis is a hierarchical tree with 376 terms such as “Lettuce” or “Goat liver”, thereof 34 root terms such as “Citrus fruit”, “Baby food”. Each term is coded with a 9-digit product code, e.g. “P0120110A”. Another list of terms describes the processes applied to the product or any indexed ingredient.

A detailed guidance document on data exchange has been published by the EFSA [2]. The main requirement was the simplicity of the protocol and its easy implementation. The transmission of data might be either by manual posting of files (upload to a web application) or by automatic transmission. As file formats, Microsoft Excel files or CSV files (comma separated values) are permitted for a limited period only, as these formats are more susceptible to errors and automatic validation is more demanding. The preferred format for the data is XML.

The Message Exchange Protocol describes the exchange of messages between sender (e.g. member state authorities) and receiver (the EFSA): the data message, the MRN message (Message Receipt Notification) and the acknowledgement message. The transport layer for the

physical exchange of the messages can be FTP or by web services. To meet security requirements, the sender software has to provide a user identification and password and to use a secure internet protocol such as FTP through SSL.

Regional scope

EU member states

Language

English

Status

- Standard sample description for food and feed:

Type: Guidance of EFSA

On request from: EFSA

Question number: EFSA-Q-2009-00698

Approved: 18 January 2010

Published: 29 January 2010

Affiliation: European Food Safety Authority (EFSA), Parma, Italy

Guidance document: <http://www.efsa.europa.eu/en/efsajournal/doc/1457.pdf>

Standard sample description:

<http://www.efsa.europa.eu/en/datexdata/docs/StandardSampleDescription.xls>

- Guidance on Data Exchange :

Type: Guidance of EFSA

On request from: EFSA

Question number: EFSA-Q-2009-00614

Approved: 28 October 2010

Published: 05 November 2010

Last updated: 11 November 2010. This version replaces the previous one/s.

Affiliation: European Food Safety Authority (EFSA), Parma, Italy

Guidance document: <http://www.efsa.europa.eu/de/efsajournal/doc/1895.pdf>

License

Guidance documents are publicly available. No restrictions for use.

Participation

Technical Working Group on Data Collection has developed the two guidance documents. The documents seem to be issued only once in the EFSA journal.

References

[1] European Food Safety Authority. Standard sample description for food and feed. EFSA Journal 2010; 8(1):1457. [54 pp.]. doi:10.2903/j.efsa.2010.1457. Available online: www.efsa.europa.eu/efsajournal

[2] European Food Safety Authority. Guidance on Data Exchange. EFSA Journal 2010;8(11):1895. [50 pp.]. doi:10.2903/j.efsa.2010.1895. Available online: www.efsa.europa.eu/efsajournal

9.9 eLab

Name of standard

e-LABs observation report message

Issuing organization

UN/CEFACT TBG18 / Tuinbouw Digitaal (NL)

URL

<http://www.tuinbouwdigitaal.net/Onderzoek/Kennisbank/tabid/2046/articleType/ArticleView/articleId/561/e-LAB-Business-Requirements-Specification.aspx>

Level

- Semantic – Document Definition
- Quality control

Description

The purpose of the standard is to define the laboratory observation exchange processes for all users in the agri domain of laboratory observations and the development and installation of a standard reporting message, using the UN/CEFACT Modeling Methodology (UMM) approach and Unified Modelling Language to describe and detail the business processes and transactions involved.

Regional scope

Global

Language

Dutch / English

Status

In development (version 0.1).

Licence

Participation

References

<http://www.tuinbouwdigitaal.net/Onderzoek/Kennisbank/tabid/2046/articleType/ArticleView/articleId/561/e-LAB-Business-Requirements-Specification.aspx>

9.10 EPC

Name of standard

Electronic Product Code

Issuing organization

GS1

URL<http://www.gs1.org/gsmp/kc/epcglobal>**Level**

- Semantic – Identification
- Sorting, Picking, Packaging, Labelling & Transportation & Storage & Planning, Coordination & Monitoring

Description

An EPC is a unique, individual identifier for different types of business objects (i. e. instances of articles, returnable transport items (RTI), shipments, etc.). The EPC is used in information systems that need to track or otherwise refer to business objects. A large subset of applications that use the EPC rely upon RFID Tags as a data carrier. However, it is vital to understand that RFID is not necessarily needed in order to utilize the EPC standard(s).

The following table displays four of the most relevant EPC schemes for the agri-food domain as specified in the EPC Tag Data Standard: Serialized Global Trade Item Number (SGTIN), Serial Shipping Container Code (SSCC), Global Returnable Asset Identifier (GRAI), and Global Location Number with optional extension (SGLN). Apart from that, the EPC can also be used to identify service relations (patients, e.g.), documents (certificates, tenders, eCoupons, etc.) as well as assets (farm machines, etc.).

EPC scheme	Area of application	Example (URI form)
SGTIN	Trade items	urn:epc:id:sgtin:4012345.066666.12345
SSCC	Shipments; logistics unit loads	urn:epc:id:sscc:4012345.1234567891
GRAI	Returnable/ reusable items	urn:epc:id:grai:4012345.77777.678
SGLN	Locations	urn:epc:id:sgln:4012345.66666.5

Regional scope

Global

Language

English

Status

In use.

Licence

GS1 has an IP policy, which intent is to provide royalty-free use of the standards. All standards are publicly available, either at GS1 global or at the local GS1.

Participation

GS1 has an extensive community, with working groups which each focus on each of the standards. GS1 has the Global Standard Management Process (GSMP), which is the worldwide collaborative forum where GS1 standards are built and maintained and it is a user-driven process. Both members and non-members are allowed in the development process of GS1 standards, all participants must however agree with the IP policy. Only GS1 members can receive a royalty-free licence to implement mandatory features of GS1 standards.

References

Tag Data Standard (current version: 1.6)

9.11 EPCIS

Name of standard

EPCIS (Electronic Product Code Information Services)

Issuing organization

GS1

URL

<http://www.gs1.org/epcglobal/standards>

Level

- Syntactic
- Sorting, Picking, Packaging, Labelling & Transportation & Storage & Planning, Coordination & Monitoring

Description

EPCIS (Electronic Product Code Information Services) is a standard for the capture and exchange of visibility data of objects identified with an EPC (Electronic Product Code). Examples for objects relevant for the agri-food sector encompass products, animals, shipments, documents, locations, returnable transport items as well as assets. It is important to comprehend that EPCIS is data carrier agnostic. Thus, EPCIS does not necessarily require RFID technology.

It is meant to be complementary to EDI. Each time an EPC is read, an event is generated containing fine-granular visibility data encompassing four dimensions: what (uniquely identified objects), where (location and read point), when (time of event) and why (status and business process). The events are stored in decentralized databases (EPCIS repositories). An EPCIS repository has a capture interface for storing as well as a query interface for retrieving event data. The transfer of data via the capture interface is via HTTP, the query interface uses SOAP, XML over AS2 and XML over HTTP(S). All message protocols must be able to use authentication and authorization.

Apart from the Object Name Service (ONS) and EPC Discovery Services, EPCIS is the most important of the three major components of the EPCglobal network. Their interaction is as fol-

lows: The ONS (Object Name Service) can be used to provide a lookup service for delivering the network address (URL) of an EPCIS system. In contrast to that, the EPC Discovery Services will serve as a search engine for obtaining information about specific EPCs. However, the latter are yet under development.

The standard defines the structure of meaning of event and master data through an Abstract Data Model, a Data Definition Layer and a Core Event Types module. The Core Event Types module specifies the events that are created by EPCIS Capturing Applications and published to an EPCIS infrastructure using the EPCIS Capture Interface described.

A complete free and open source implementation of the EPCIS specification including repository as well as query/ capture clients and interfaces – Fosstrak – has been developed by the Auto-ID Labs. (<https://code.google.com/p/fosstrak/wiki/EpcisMain>)

Regional scope

Global

Language

English

Status

In use.

License

GS1 has an IP policy, which intent is to provide royalty-free use of the standards. All standards are publicly available, either at GS1 global or at the local GS1.

Participation

GS1 has an extensive community, with working groups which each focus on each of the standards. GS1 has the Global Standard Management Process (GSMP), which is the worldwide collaborative forum where GS1 standards are built and maintained and it is a user-driven process. Both members and non-members are allowed in the development process of GS1 standards, all participants must however agree with the IP policy. Only GS1 members can receive a royalty-free licence to implement mandatory features of GS1 standards.

References

EPCIS Standard (current version: 1.0.1)

9.12 Florecom standards

Name of standard

Florecom standards

Issuing organization

Florecom

URL

<http://www.florecom.nl/Diensten/Standaardberichten/tabid/100/language/nl-NL/Default.aspx>

Level

- Semantic – Document definition & Semantic - Identification & Syntactic

- Order processing & Transportation

Description

Florecom has developed a message set for use in the flower chain, based on EDI messages. Apart from commercial, financial and clock messages, Florecom provides a messaging standard for logistic purposes. Both transport (order and status) and delivery activities are covered.

Regional scope

National

Language

Dutch

Status

Some of the messages (Trader transaction, Confirmation, Supply message BB, and all Financial) have not been updated since 2006. The other messages have newer versions from either 2011 or 2012.

License

Costs are involved in both joining the so-called ‘Order methodology’ and purchasing a special software module supporting this ‘Order Methodology’.

The EDIFACT messages and the functional description of the standards can be found on the website of Florecom. The corresponding XML Schemas are not publicly available, a log-in is required.

Participation

Florecom knows working groups, in which representatives of supply chain parties take part. There exists both a working group for assessing the requests for changes and one for developing new standards.

References

<http://www.florecom.nl/Diensten/Standaardberichten/tabid/100/language/nl-NL/Default.aspx>

9.13 GPC

Name of standard

Global Product Classification (GPC)

Issuing organization

GS1

URL

<http://www.gs1.org/gdsn/gpc>

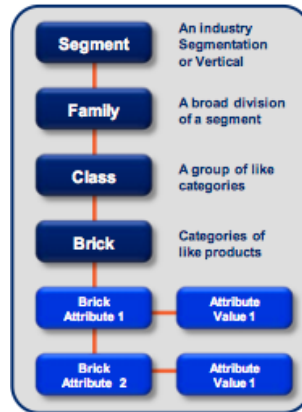
Level

- Semantic – Vocabulary
- Ordering & Sorting, Picking, Packaging, Labelling & Transportation & Storage & Planning, Coordination & Monitoring

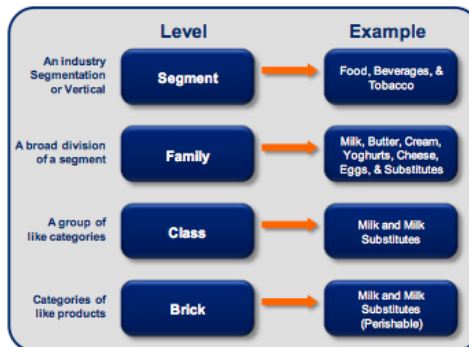
Description

The GPC is a system that gives buyers and sellers a common language for grouping products in the same way, everywhere in the world.

The foundation of GPC is called a "Brick;" GPC bricks define categories of similar products. Using the GPC brick as part of GDSN ensures the correct recognition of the product category across the extended supply chain, from seller to buyer. Bricks can be further characterised by Brick Attributes.



Using GPC hierarchy to find the Brick



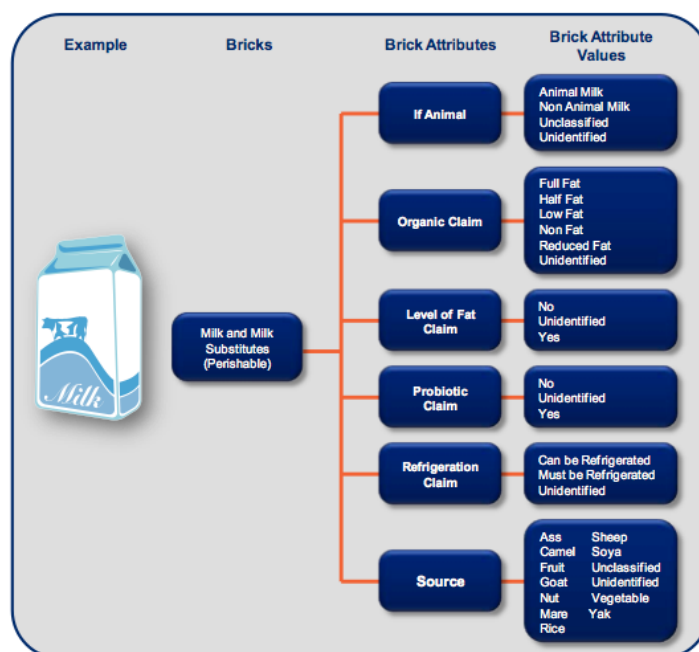
One GTIN, One Brick

A Global Trade Item Number (GTIN) can only be assigned to one Brick.



Using attributes

Bricks can be further characterised using attributes where required.



Regional scope

Global

Language

English and other languages are available. E.g. German.

Status

In use.

License

GS1 has an IP policy, which intent is to provide royalty-free use of the standards. All standards are publicly available, either at GS1 global or at the local GS1.

Participation

GS1 has an extensive community, with working groups which each focus on each of the standards. GS1 has the Global Standard Management Process (GSMP), which is the worldwide collaborative forum where GS1 standards are built and maintained and it is a user-driven process. Both members and non-members are allowed in the development process of GS1 standards, all participants must however agree with the IP policy. Only GS1 members can receive a royalty-free licence to implement mandatory features of GS1 standards.

References

<http://www.gs1.org/gdsn/gpc>

9.14 GS1 Application Identifier System

Name of standard

GS1 Application Identifier System

Issuing organization

GS1

URL

http://www.gs1.org/barcodes/technical/application_identifiers

Level

- Semantic – Document definition
- Order processing & Sorting, Picking, Packaging, Labelling & Transportation & Storage & Planning, Coordination & Monitoring

Description

The GS1 Application Identifier is used in all symbologies encoding data beyond GTIN. Every kind of information is denominated by an Application Identifier stating the content and the structure of the information. For example the batch/lot number is announced by AI 10 and may have up to 20 alphanumeric characters. The BBD is announced by AI 15. Its structure is YYMMDD (YearYearMonthMonthDayDay).

Regional scope

Global

Language

English

Status

In use.

License

GS1 has an IP policy, which intent is to provide royalty-free use of the standards. All standards are publicly available, either at GS1 global or at the local GS1.

Participation

GS1 has an extensive community, with working groups which each focus on each of the standards. GS1 has the Global Standard Management Process (GSMP), which is the worldwide collaborative forum where GS1 standards are built and maintained and it is a user-driven process. Both members and non-members are allowed in the development process of GS1 standards, all participants must however agree with the IP policy. Only GS1 members can receive a royalty-free licence to implement mandatory features of GS1 standards.

References

http://www.gs1.org/barcodes/technical/application_identifiers

9.15 GS1 Identification standards

Name of standard

Global Location Number (GLN)

Global Trade Item Number (GTIN)

Global Returnable Asset Identifier (GRAI)

Serial Shipping Container Code (SSCC)

Issuing organization

GS1

URL

www.gs1.org

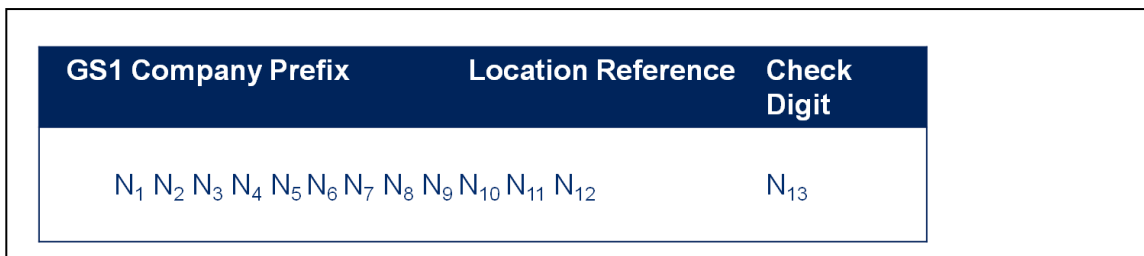
Level

- Semantic – Identification
- Ordering & Sorting, Picking, Packaging, Labelling & Transportation & Storage & Planning, Coordination & Monitoring

Description

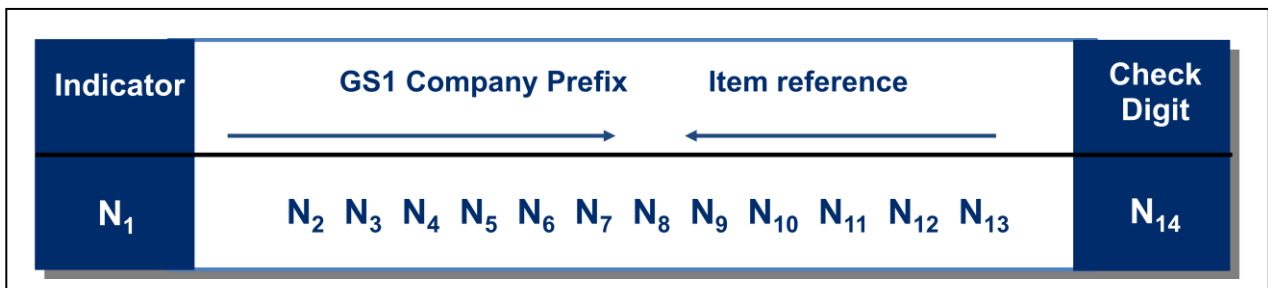
Global Location Number (GLN): The GLN is the worldwide unique identification of each company or physical location within a company.

GLN Structure:



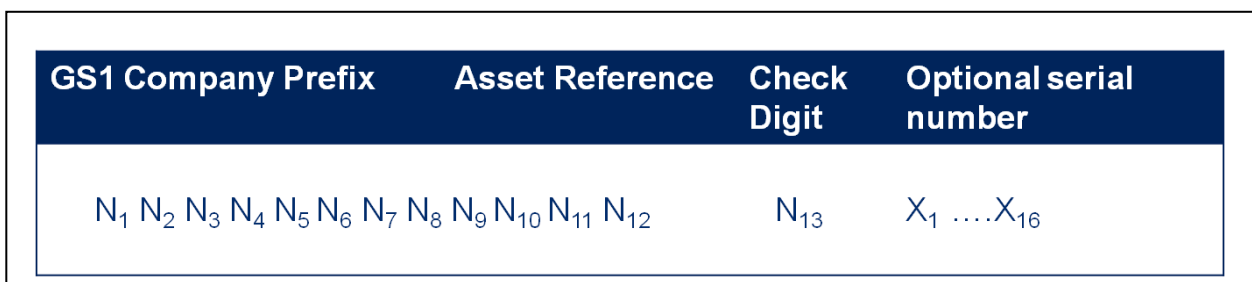
The GTIN identifies each product or service by its unique number that is generated based on the GCP of the brand owner, brand co-operative or producer.

GTIN Structure:



Global Returnable Asset Identifier: Identifies any returnable containers or packaging that will be returned to their source.

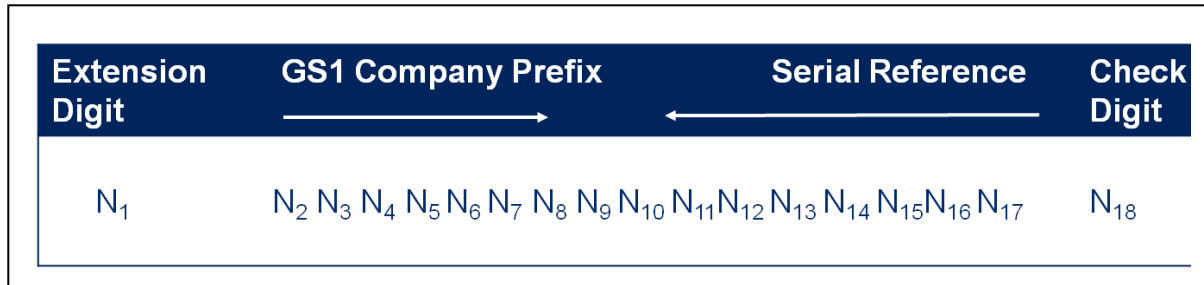
GRAI Structure:



Assets, for example crates or boxes belonging to the same type are identified by the same GRAI. GRAIs can be serialized by their optional serial number.

The Serial Shipping Container Code (SSCC) identifies an item of any composition made up for transport or storage.

SSCC Structure:



Regional scope

Global

Language

English. In some countries there are national translations available.

Status

In use.

License

GS1 has an IP policy, which intent is to provide royalty-free use of the standards. All standards are publicly available, either at GS1 global or at the local GS1.

Participation

GS1 has an extensive community, with working groups which each focus on each of the standards. GS1 has the Global Standard Management Process (GSMP), which is the worldwide collaborative forum where GS1 standards are built and maintained and it is a user-driven process. Both members and non-members are allowed in the development process of GS1 standards, all participants must however agree with the IP policy. Only GS1 members can receive a royalty-free licence to implement mandatory features of GS1 standards.

References

www.gs1.org

9.16 GS1 XML

Name of standard

GS1 XML

Issuing organization

GS1

URL

<http://www.gs1.org/gsmp/kc/ecom/eancom>

Level

- Syntactic
- Order processing & Sorting, Picking, Packaging, Labelling & Transportation & Storage & Planning, Coordination & Monitoring

Description

XML is an acronym for "eXtensible Markup Language". XML is designed for information exchange over the internet. Within GS1 set of standards, XML is used for Electronic Data Interchange - GS1 eCom.

GS1 XML is designed in such a way that the messaging is transport agnostic. GS1 supports reliable and secure messaging via the use of AS1, AS2, AS3, AS4 and ebMS, as well as other transport protocols. It is very simple to exchange GS1 XML documents using any technical solution or profile, such as Web Services.

The GS1 XML messages are developed using the business process modelling methodology. First, the business process is described, including identification of business data that need to be exchanged between the main parties. This information is then mapped to the electronic messages. Thus, the GS1 XML messages are not always equivalent of traditional paper business documents.

The messages available in the GS1 XML standard cover the following areas of the supply chain:

- Data Synchronisation messages that enable sending information about the trade item attributes and support its automated synchronisation between business partners, using the Global Data Synchronisation Network (GDSN)
- Messages used to order goods and respond to this order;
- Messages used to announce the despatch of goods and confirm their receipt
- Messages requesting payment for the goods sold and informing about the payment being sent
- Messages for planning and execution of transport
- Messages supporting automated replenishment of goods

GS1 XML standards support both Downstream (between the consumer goods manufacturers and retail) and Upstream (between the consumer goods manufacturers and their suppliers of raw material, packaging, etc.) communication.

Regional scope

Global

Language

English, German and other languages are available.

Status

In use.

GS1 XML standards provide solutions for multiple sectors using the same XML business message. GS1 XML is an international standard, and has been implemented in 33 countries, by more than 22.000 companies. The international network of GS1 Member Organisations (including

GS1 China), covering more than 150 countries, provides support, documentation and training in local languages.

License

GS1 has an IP policy, which intent is to provide royalty-free use of the standards. All standards are publicly available, either at GS1 global or at the local GS1.

Participation

GS1 has an extensive community, with working groups which each focus on each of the standards. GS1 has the Global Standard Management Process (GSMP), which is the worldwide collaborative forum where GS1 standards are built and maintained and it is a user-driven process. Both members and non-members are allowed in the development process of GS1 standards, all participants must however agree with the IP policy. Only GS1 members can receive a royalty-free licence to implement mandatory features of GS1 standards.

References

<http://www.gs1.org/gsmg/kc/ecom/eancom>

9.17 ISO 21067:2007

Name of standard

Packaging - Vocabulary

Issuing organization

ISO

URL

http://www.iso.org/iso/catalogue_detail?csnumber=34399

Level

- Semantic – Vocabulary
- Sorting, Picking, Packaging, Labelling

Description

This International Standard is intended to be used as a source document within the global community. This inventory of terms will be useful in a multilingual thesaurus showing concept relationships as well as terms in other languages. Work on this proposed standard, begun in 1987, has been under convenorship of ANSI since 1995 as ISO/TC 122, Working Group 5, Terminology and vocabulary. This International Standard does not cover environmental statements referring to packaging. These are covered by ISO 14021.

This International Standard specifies preferred terms and definitions related to packaging and materials handling, for use in international commerce.

For packaging designed for the transport of dangerous goods, terms and definitions are given in the United Nations Recommendations on the Transport of Dangerous Goods

Regional scope

Global

Language

English

Status

Published

License

Standards are available after paying a fee. Further, a licence agreement is present which holds for downloading the standards.

Participation

Standard is developed by technical committee 122, packaging. TCs are made up of representatives of industry, NGOs, governments and other stakeholders, who are put forward by ISO's members. ISO's full members (member bodies) can decide if they would like to be a participating member (P-member) of a particular TC or an observing member (O-member). P-members participate actively in the work and have an obligation to vote on all questions submitted to vote within the technical committee. O-members follow the work as an observer but cannot make any comments about the development process or vote. 3 kinds of membership: Full member, correspondent member, subscriber member, each needs to pay a fee.

References

[1] www.evs.ee/preview/iso-21067-2007-en.pdf

9.18 ISO 7563:1998

Name of standard

Fresh fruit and vegetables - Vocabulary

Issuing organization

ISO

URL

http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=14346

Level

- Semantic – Vocabulary
- Quality control

Description

This International Standard defines the terms most frequently used in the context of fresh fruits and vegetables.

Regional scope

Global

Language

English

Status

Published

License

Standards are available after paying a fee. Further, a licence agreement is present which holds for downloading the standards.

Participation

Standard is developed by technical committee 34, food products. TCs are made up of representatives of industry, NGOs, governments and other stakeholders, who are put forward by ISO's members. ISO's full members (member bodies) can decide if they would like to be a participating member (P-member) of a particular TC or an observing member (O-member). P-members participate actively in the work and have an obligation to vote on all questions submitted to vote within the technical committee. O-members follow the work as an observer but cannot make any comments about the development process or vote. 3 kinds of membership: Full member, correspondent member, subscriber member, each needs to pay a fee.

References

[1] http://members.wto.org/crnattachments/2010/tbt/uga/10_2040_00_e.pdf

9.19 LanguaL

Name of standard

LanguaL (Langua aLimentaria)

Issuing organization

LanguaL Secretariat and European LanguaL Technical Committee

URL

www.languaL.org

Level

- Semantic – Vocabulary
- Sorting, Picking, Packaging, Labelling

Description

A faceted classification is a multihierarchical classification, where each item is described by a number of characteristics, the “facets”. LanguaL [1] is a food description thesaurus which uses a faceted classification. Each food is described by a set of standard, controlled terms chosen from facets characteristic of the nutritional and/or hygienic quality of a food, as for example the biological origin, the methods of cooking and conservation, and technological treatments.

The facet term lists are hierarchically structured. The work on LanguaL started in the late 1970's in the USA. In recent years, the EuroFIR (European Food Information Resource), an EU funded project has indexed a large number of foods. LanguaL is now multilingual with approximately 70000 terms (English, German, French etc.). The main focus is on food consumption and food composition.

Regional scope

Global

Language

English

Status

2012-10-14: The 2011 version of LanguaL™ published.

License

The LanguaL™ Food Product Indexer software and the LanguaL™ Thesaurus is provided to you free of charge.

Participation

Suggestions to introduce new concepts or to improve those proposed in this edition are welcome. Special interest groups on different topics are formed as need arises. Eventual suggestions for updates/corrections should be send to the LanguaL Secretariat and European LanguaL Technical Committee or U.S. LanguaL Technical Committee. The LanguaL Technical Committees publish proposals for new facet terms on the LanguaL Internet site for international discussion and approval before incorporation into the official LanguaL thesaurus. The discussion period is two months from the date of submission to (date of reception by) the LanguaL Technical Committee. Comments will be sent to the submitter during the discussion period and will be published with the changes in the following update of LanguaL.

References

[1] Møller A., Ireland J.: LanguaL 2010 – The LanguaL Thesaurus. EuroFIR Nexus Technical Report D1.13. Danish Food Information, 2011.
<http://www.langual.org/download/LanguaL2010/LanguaL%202010%20Thesaurus%20Final.pdf>

9.20 O&M

Name of standard

Observations and Measurements

Issuing organization

OGC (Open Geospatial Consortium)

URL

<http://www.opengeospatial.org/standards/om>

Level

- Syntactic
- Monitoring

Description

Observations & Measurements (OM) provides general models and schema for supporting the packaging of observations from sensor system and sensor-related processing. The model supports metadata about the Observation, as well as the ability to link to the procedure (i.e. sensors plus processing) that created the observation, thus, providing an indication of the lineage of the measurements [1].

Models are provided for the exchange of information describing observation acts and their results, both within and between different scientific and technical communities. Observations

commonly involve sampling of an ultimate feature-of-interest. O&M defines a common set of sampling feature types classified primarily by topological dimension, as well as samples for ex-situ observations [2].

Regional scope

Global

Language

English

Status

In 2011 the latest version of the O&M – XML Implementation is published, which is version 2.0 [3].

In 2011 O&M 2.0 is also adopted as an ISO standard [2].

License

The charter of each Standards Working Group shall specify whether the SWG to be formed is a RAND-Royalty Free SWG or a RAND-Fee SWG. Standards are publicly available.

<http://www.opengeospatial.org/about/ipr>.

Participation

A working group exists to consider revisions of the implementation standards. Targeted participants of this working group are members of the ISO 19156 EC who are also OGC members and OGC members which are interested in the topics of the standard [4]. Change requests can be submitted by anyone and will be judged by the working group.

Further, the OGC is an open membership organization, with four types of membership options:

- Associate: voting access to working groups, non-voting participation in TC proceedings
- Technical: voting access to working groups and TC
- Principal: voting access to working groups, TC and Planning Committee
- Strategic: voting access to working groups, TC, Planning Committee and Strategic Member Advisory Committee

All types of memberships ask a substantial fee.

References

[1] <http://www.ogcnetwork.net/OM>

[2] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=32574

[3] <http://www.opengeospatial.org/standards/om>

[4] <http://www.opengeospatial.org/projects/groups/om2.0swg>

9.21 PLU Codes

Name of standard

Price-look up codes

Issuing organization

International Federation for Produce Standards (IFPS)

URL

<http://plucodes.com/>

Level

- Semantic – Identification
- Sorting, Picking, Packaging, Labelling

Description

PLU codes are 4 or 5 digit numbers which have been used by supermarkets since 1990 to make check-out and inventory control easier, faster, and more accurate. They ensure that the correct price is paid by consumers by removing the need for cashiers to identify the product; e.g., whether or not it is conventionally or organically grown. They are primarily assigned to identify individual bulk fresh produce (and related items such as nuts and herbs) and will appear on a small sticker applied to the individual piece of fresh produce. The PLU number identifies produce items based upon various attributes which can include the commodity, the variety, the growing methodology (e.g. organic) and the size group.

The 4-digit PLU codes for produce are assigned randomly within a series of numbers within the 3000 and 4000 series. There is no intelligence built into the 4-digit code. For example, no one number within the 4-digit number represents anything in particular. The 4-digit codes are for conventionally grown produce. 5-digit codes are used to identify organic or genetically modified produce. The prefix of '8' would be placed in front of the 4-digit code for genetically modified produce and the prefix of '9' would be placed in front of the 4-digit conventionally grown code for organic produce. You will not see the 5 digit codes in the PLU codes database since they are simply prefixes added to the conventionally grown produce PLU codes.

Regional scope

Global

Language

English

Status

Codes are continuously updated.

License

Documentation is publicly available. A fee must be paid to apply a code.

Everyone can apply for a code, but only when the criteria of IFPS are met.

Participation

All PLU applications are reviewed by the IFPS members prior to voting. In some regions, national or regional groups may provide input to the IFPS members from their region as expert advice on the validity of a new application in the context of the criteria outlined in the application.

References

<http://plucodes.com/>

9.22 TCX

Name of standard

TraceCore XML

Issuing organization

Trace (EU)

URL

http://www.tracefood.org/index.php/Tools:TraceCore_XML_Overview

Level

- Semantic – Document definition & Syntactic
- Monitoring

Description

TraceCore XML (TCX) is an XML format for the capture and exchange of traceability information between parties in a supply chain. It is being developed in Work Package 4 as part of the EU project "Trace" lasting from 2005 through 2009.

The purpose of TCX is to define a format where all the minimum elements (hence the "Core" in the name) needed to model traceability relations between organizations in a supply chain are included. Only some basic properties are included in the core, while extension mechanisms are meant to provide ways to include industry specific properties, properties exchanged between specific parties etc.

Regional scope

EU

Language

English

Status

The adoption of the standard has had limited success so far. As the project has ended in 2009, no more funds to further develop, support and maintain the standard are present. The most recent version of the standard is Revision 2. It has been decided to map the TraceCore data model onto the XML format in use by the EPCIS specification developed by the EPCglobal community.

License

Documentation and XSD files are publicly available.

Participation

As developments and changes are no longer funded, participation is not relevant anymore.

References

http://www.tracefood.org/index.php/Tools:TraceCore_XML_Overview

9.23 UN/CEFACT TBG3 standards

Name of standard

UN/CEFACT TBG3: Transport standards

Issuing organization

UN/CEFACT TBG3

URL

<http://www1.unece.org/cefact/platform/display/TBG/TBG3>

Level

- Semantic – Document definition & Syntactic
- Transportation

Description

TBG3 has the primary mission to identify EDIFACT standard message requirements for the transfer of transport data and to develop and maintain United Nations Standard Messages (UNSM"s) for transport and logistics purposes. TBG3 develops the transport Business Models, the transport Core Components and Business Information Entities, in accordance with the UML and UMM methodology, such as to develop standard XML documents for the transport and logistics sector. TBG3 also deals with the relevant Codes lists including UN Recommendations.

Regional scope

Global

Language

English

Status

(Unknown)

License

There is a strict demand of no claims of IPR of any contributions to the committee work. All specifications IPRs are owned by the UN and as such open for free use by everyone. A backside of the non-proprietary claim is that implementation guidelines are excluded from the committee work.

Participation

Participation is open to all interested parties. Participation can be at the member or observer level. Observers will be allowed full access to and involvement in all discussions. Voting is restricted to members. Membership is open to any expert with broad knowledge in the area of processes, procedures and modelling in the international trade and e-business arenas, the functions of UN/CEFACT, and its groups.

References

<http://www1.unece.org/cefact/platform/display/TBG/TBG3>

9.24 UN/CEFACT TBG15 standards

Name of standard

UN/CEFACT TBG15: Trade facilitation standards

Issuing organization

UN/CEFACT TBG15

URL

<http://www1.unece.org/cefact/platform/display/TBG/TBG15>

Level

- Organizational
- Generic

Description

Recommendation 34 Data Simplification and Standardization for International Trade

The intent of the data simplification and standardization process is to identify and define the known maximum set of data that a trader may have to provide to meet official requirement for international trade. Initially, governments should not require any information outside of the standard data set. Where special control, commodity or product requirements emerge government should consider carefully the need for additional information beyond the national data set. It is important to note that most of the data presently required is conditional, based on the mode of transport, type of transaction, and type of cargo. Traders will never be required to submit the entire data set.

Regional scope

Global

Language

English

Status

(Unknown)

License

There is a strict demand of no claims of IPR of any contributions to the committee work. All specifications IPRs are owned by the UN and as such open for free use by everyone. A backside of the non-proprietary claim is that implementation guidelines are excluded from the committee work.

Participation

Participation is open to all interested parties. Participation can be at the member or observer level. Observers will be allowed full access to and involvement in all discussions. Voting is restricted to members. Membership is open to any expert with broad knowledge in the area of processes, procedures and modelling in the international trade and e-business arenas, the functions of UN/CEFACT, and its groups.

References

<http://www1.unece.org/cefact/platform/display/TBG/TBG15>

9.25 UNECE standards

Name of standard

UNECE standards for Fresh Fruit & Vegetables, Seed potatoes, Meat and Cut flowers

Issuing organization

UNECE (UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE)

URL

<http://www.unece.org/trade/agr/standard/fresh/ffv-standardse.html>

http://www.unece.org/trade/agr/standard/potatoes/pot_e.html

http://www.unece.org/trade/agr/standard/meat/meat_e.html

http://www.unece.org/trade/agr/standard/flowers/flower_e.html

Level

- Organizational
- Quality control

Description

Meat:

In order to streamline the flow of information throughout the supply chain and to provide a standard for use between buyer and seller in the meat industry, UNECE (United Nations Economic Commission for Europe) Working Party on Agricultural Quality Standards defined the “UNECE STANDARD Bovine Carcasses and Cuts” [1]. Similar standards exist for caprine, chicken, duck, llama/alpaca [2], ovine, porcine and turkey meat [3]. Each standard gives detailed specifications to identify cutting lines including colour photographs and diagrams. Also, minimum requirements for meat are formulated. All data are coded in a 20-digit string.

The UNECE purchase specification code has been assigned the GS1 application identifier (7002) to be used in conjunction with a Global Trade Item Number (GTIN) and represented in the GS1-128 bar code symbology. This allows the UNECE code information to be included in GS1-128 bar code symbols on shipping containers along with other product information.

Regional scope

Global

Language

English, French, Russian

Status

- Fresh Fruit & Vegetables – 2006 version: www.unece.org/trade/agr/standard/fresh/FFV-Std/English/23melons.pdf
- Seed potatoes – 2006 version: www.unece.org/trade/agr/standard/potatoes/pot_e/S-1_e.pdf
- Caprine meat carcasses and cuts – 2007 version:

www.unece.org/trade/agr/standard/meat/e/Caprine_2007_e.pdf

- Cut flowers – 1994 version:

www.unece.org/trade/agr/standard/flowers/flower_e/h1flower.pdf

License

The standards can be downloaded cost free from the website and used free of charge.

Participation

The Working Party on Agricultural Quality Standards develops the standards. The WP has four specialized sections - on fresh fruit and vegetables, dry and dried produce, seed potatoes and meat. In view of the global character of commercial agricultural quality standards, any member of the United Nations or of one of its specialized agencies can participate, on an equal footing, in the activities of the Working Party on Agricultural Quality Standards.

References

- [1] UNECE (2004): UNECE Standard: Bovine Meat Carcasses and Cuts. 2004 Edition. United Nations Publication ECE/TRADE/326. United Nations Economic Commission for Europe, Working Party on Agricultural Quality Standards.
- [2] UNECE (2009): UNECE Standard: Turkey Meat Carcasses and Parts. 2009 Edition. United Nations Publication ECE/TRADE/358. United Nations Economic Commission for Europe, Working Party on Agricultural Quality Standards.
- [3] UNECE (2006): UNECE Standard: Llama/Alpaca Meat Carcasses and Cuts. 2006 Edition. United Nations Publication ECE/TRADE/368. United Nations Economic Commission for Europe, Working Party on Agricultural Quality Standards.

9.26 UNSPSC

Name of standard

United Nations Standard Products and Services Code

Issuing organization

UNDP

URL

<http://www.unspsc.org/>

Level

- Semantic – Vocabulary & Semantic – Identification
- Sorting, Picking, Packaging, Labelling & Transportation & Storage & Planning, Coordination & Monitoring

Description

The United Nations Standard Products and Services Code is a hierarchical convention that is used to classify all products and services.

Regional scope

Global

Language

English

Status

2 codeset versions are published per year.

License

The latest version of the code will always be available free of charge to the general public.

Participation

Any individual or entity can request a change to the code (addition, deletion, move, or edit) after becoming a member of UNSPSC. Requests are posted on the web site and voted by Segment Technical Advisers- voting members who have elected to become actively involved in the update of the UNSPSC by contributing their specific expertise.

References

<http://www.unspsc.org/>

9.27 VBN Code

Name of standard

VBN Code

Issuing organization

VBN

URL

<http://www.vbn.nl/en-US/Codes/Pages/default.aspx>

Level

- Semantic – Identification
- Sorting, Picking, Packaging, Labelling & Transportation

Description

The VBN administers codes for auctions. Floricultural auctions use codes to identify products and describe them in more detail in trading plants and flowers. Product codes are used for identification. Characteristic codes are used for further description of certain aspects of the product important to trade, including quality characteristics (with the inspection code), sorting characteristics and logistical aspects (container code). The information is necessary for the correct product information in the chain. Next to these kinds of codes, VBN also knows group codes, barcodes, country codes and colour codes.

The coding system has been revised under the project name Linnaeus. The product codes in here have been expanded from 5 to 7 positions, more product information can be added, the information in chain messages is available in several languages regulations regarding compulsory characteristics for auction batches have been included in the code lists.

Regional scope

National

Language

Dutch

Status

Continuous development, the list of product codes is updated regularly, new products and changes to products appear continuously.

The technical specification is updated regularly; the current version is 2.9, issued in 2011.

License

Everyone can use codes, no fee for use of inspection of code lists.

Participation

The VBN has auctions as its members. The auctions are co-operations in which growers are united to organize their mutual sale.

Product codes can be requested at VBN. The codes are issued and controlled by VBN. They are accepted when they satisfy the constraints set by VBN. The participants in the decision process are the participants of VBN.

References

<http://www.vbn.nl/en-US/Codes/Pages/default.aspx>

9.28 WCO Data Model

Name of standard

WCO Data Model

Issuing organization

World Customs Organization (WCO)

URL

<http://www.wcoomd.org/en.aspx>

Level

- Semantic – Document definition & Semantic – Vocabulary & Syntactic
- Sorting, Picking, Packaging, Labelling & Transportation

Description

The WCO Customs Data Model provides a maximum framework of standard and harmonized sets of data and standard electronic messages to be submitted by trade for Customs and other regulatory purposes to accomplish formalities for the arrival, departure, transit and clearance of goods in international cross-border trade. The revised Kyoto Convention requires Customs administrations to request as few data as necessary to ensure compliance with Customs laws. Customs administrations concerned will therefore require only the data elements they have listed for each customs procedure in the respective data sets. These self-imposed limits discourage future increases in data requirements.

Regional scope

Global

Language

English

Status

Continuous development, the current version is 3.2, issued in November 2011.

License

Purchase of the standard is free for governments, but requires a fee for corporations. Use of the model is free.

Participation

(Unclear)

References

<http://www.wcoomd.org/en.aspx>

