

User Guide on Standards Compliance Criteria

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Executive Summary

GS1 Standards help making cross-company supply chain management und co-operations efficient and scalable which is crucial in business contexts including that of the NextTrust pilots. This user guide is the outcome of NexTrust Task T.6.2.2 containing research on existing and applicable standards for each pilot case and identification of “standardisation gaps”. The frame for this work builds the GS1 standardisation concept of *Identify, Capture, Share* and *Use*. It is explained at an early pilot stage the different GS1 Standards ideally suited for the pilots and elaborates what the pilot participants already can prepare with respect to utilising standards in order to gain the highest benefit.

Depending on the development of the individual pilot scenarios this user guide will be supplemented by deliverables

- D.6.9
which will comprise requirements for the integration of GS1 Standards into the NexTrust IT platform (due by month 20) and
- D.6.10
a white book about the role of standardisation/collaboration in vertical and horizontal supply chains (due by month 34).

Table of Contents

Executive Summary	II
Table of Contents	III
List of Figures.....	IV
List of Tables.....	IV
1 Introduction	1
2 Project Overview	1
3 The Role of GS1 Organisation and Classification of GS1 Standards	2
4 Purpose and Scope of this User Guide.....	3
5 NexTrust Pilots Supply Chain Scenarios	4
6 Identify Capture Share Use – the Foundation of GS1 Standards	5
6.1 Identify	5
6.2 Capture	7
6.2.1 GS1 Application Identifier System	7
6.2.2 GS1 Portfolio of Data Carriers.....	7
6.2.3 The GS1 Logistics Label	10
6.3 Share	12
6.3.1 Electronic Data Interchange	12
6.3.2 EPCIS	14
6.4 Use	15
6.4.1 Efficient Unit Loads	15
6.4.2 Pallet Heights	16
6.4.3 Cross Docking.....	16
6.4.4 Time Slot Management (TSM)	17
7 How GS1 Standards Contribute to NexTrust Pilots.....	19
7.1 General Overview of Logistics Processes and GS1 EDI Messages.....	20
7.1.1 NexTrust Pilots Moving from LTL to FTL (WP 1)	21
7.1.2 NexTrust Pilots Optimizing FTL Transport Flows (WP 2).....	24
7.1.3 NexTrust Pilots Concentrating on Last Mile and E-Commerce (WP 4)	24
8 Checklist: Standard Compliance Criteria for the Platform Users	25
9 Summary.....	26
10 References	27
11 Acronyms and Abbreviations	28

List of Figures

Figure 1: Optimized product flows of NexTrust pilots (<i>Source: GS1 Germany</i>).....	4
Figure 2: GS1-128 example (<i>Source: GS1</i>)	8
Figure 3: GS1 DataBar example (<i>Source: GS1</i>)	8
Figure 4: EAN/UPC Code example (<i>Source: GS1 Germany</i>)	9
Figure 5: Example with GS1-128 and GS1 DataMatrix encoding a GRAI (<i>Source: GS1 Germany</i>)	10
Figure 6: GS1 Logistics Label example (<i>Source: GS1 Germany</i>).....	11
Figure 7: GS1 Logistics Label placement on larger logistic units (<i>Source: GS1 Germany</i>).....	11
Figure 8: Packaging levels (<i>Source: AT Kearney; ECR Europe</i>)	15
Figure 9: Cross Docking process (<i>Source: GS1 Germany</i>)	17
Figure 10: Time Slot Management and related EDI messages (<i>Source: GS1 Germany</i>)	18
Figure 11: Screenshot GS1 Visibility App (1) (<i>source: GS1 Global</i>)	19
Figure 12: Screenshot GS1 Visibility App (2) (<i>source: GS1 Global</i>)	19
Figure 13: EDI Messages in general logistics processes (<i>Source: GS1 Germany</i>).....	20
Figure 14: General view on supply chain target scenario (<i>Source: GS1 Germany</i>)	22
Figure 15: General view on supply chain target scenario (<i>Source: GS1 Germany</i>)	23

List of Tables

Table 1: Overview of GS1 identification keys (extract) (<i>Source: GS1</i>)	6
Table 2: Checklist: Standard compliance criteria for the platform users	26

1 Introduction

Standardisation within the NexTrust project is related to the use of GS1 Standards. This user guide refers to the question on how NexTrust pilot participants can benefit from using GS1 Standards. This factor gains especially in importance with regard to transferability and scalability of the pilot outcomes for future exploitation. To facilitate these objectives Standards Compliance Criteria for the use of GS1 Standards in the logistics sector have been collected and are part of this document.

2 Project Overview

NexTrust objective is to increase efficiency and sustainability in logistics by developing interconnected trusted collaborative networks along the entire supply chain. These trusted networks, built horizontally and vertically, will fully integrate shippers, LSPs and intermodal operators as equal partners. To reach a high level of sustainability, we will not only bundle freight volumes, but shift them off the road to intermodal rail and waterway. NexTrust will build these trusted networks ideally bottom up, with like-minded partners, adding multiple layers of transport flows that have been de-coupled and then re-connected more effectively along the supply chain. We will develop C-ITS cloud based smart visibility software to support the re-engineering of the networks, improving real-time utilization of transport assets. NexTrust will focus on research activities that create stickiness for collaboration in the market, validated through pilot cases in live conditions. The action engages major shippers as partners (Beiersdorf, Borealis, Colruyt, Delhaize, KC, Mondelez, Panasonic, Philips, Unilever) owning freight volumes well over 1.000.000 annual truck movements across Europe, plus SME shippers and LSPs with a track record in ICT innovation. The pilot cases cover the entire scope of the call and cover a broad cross section of entire supply chain (from raw material to end consumers) for multiple industries. The creation and validation of trusted collaborative networks will be market oriented and implemented at an accelerated rate for high impact. We expect our pilot cases to reduce deliveries by 20%-40% and with modal shift to reduce greenhouse gas (GHG) emissions by 40%-70%. Load factors will increase by 50%-60% given our emphasis on back-load/modal shift initiatives. NexTrust will achieve a high impact with improved asset utilization and logistics cost efficiency, creating a sustainable, competitive arena for European logistics that will be an inspirational example for the market.

3 The Role of GS1 Organisation and Classification of GS1 Standards

GS1 is a neutral, not-for-profit standards organisation that helps companies to do business across the world. Standards developed and maintained are used by over one million companies worldwide within 25 industries across 150 countries. GS1 Germany is one out of more than 100 GS1 Member Organisations serving the user community worldwide.

The GS1 System is the collection of standards, guidelines, solutions, and services created by the GS1 community through GS1's community development processes, and is the most widely used supply chain standards system in the world. GS1 Standards support the information needs of end users interacting with each other in supply chains, specifically the information required to support the business processes through which supply chain participants interact. The subjects of such information are the real-world entities that are part of those business processes. Real-world entities include things traded between companies, such as products, parts, raw materials or packaging. Other real-world entities of relevance include the equipment and material needed to carry out the business processes such as containers, transport machinery or entities corresponding to physical locations in which the business processes are carried out.

GS1 Standards can be divided into the following categories according to their role in supporting information needs:



- Identify: There are standards to identify real-world entities by means of GS1 identification keys. They may be used in an information system and are subject to electronic information sharing.



- Capture: These standards provide the capability to automatically capture information carried directly on physical objects in the shape of standardised GS1 barcode symbols or RFID transponders (RFID tags). They build the bridge between the world of physical objects and electronic information.



- Share: GS1 Standards for information sharing include data standards for master data, business transaction data, and physical event data, as well as communication standards for sharing this data between applications and trading partners. They build the foundation for electronic business transactions.



- Use: These recommendations describe how the three categories mentioned above are combined to efficiently meet business requirements in application environments (e. g. cross-company traceability).

In terms of transport and logistics, GS1 supports the following five business processes to increase their efficiency, speed and accuracy:

- Delivery management
- Transport management
- Warehouse management
- Asset management as well as
- Border procedure management

The GS1 System is an integrated system of global standards that provides for accurate identification and communication of information regarding locations, products, assets, services and locations. The GS1 identification standards, known as GS1 identification keys, bring value by permitting secure and portable identification across technologies such as barcodes, RFID tags and electronic messages, and by connecting the physical flow of goods and services to the flow of information. The transport & logistics industry involves the movement of goods using multiple transport modes, including road, rail, air and maritime.

Similarly, this industry involves a wide variety of parties such as consignor and consignee, freight forwarders and carriers as well as official bodies like customs and port authorities. The combination of logistics channels and parties implies an opportunity to simplify asset and shipment identification using GS1 identification keys and sharing this information between carriers and other service providers.

4 Purpose and Scope of this User Guide

This user guide shows how GS1 Standards can help NexTrust pilot partners to efficiently co-operate and foster scalability of the pilot effects. It is based on the current status and intermediate results of the NexTrust pilots and summarizes the outcome of NexTrust Task T.6.2.2 which is the research on existing and applicable standards for each pilot case and identification of “standardisation gaps”. The GS1 standardisation concept of Identify, Capture, Share and Use builds the base for this work. Due to its early date of completion it should be interpreted as an intermediate status enabling NexTrust pilot participants to already figure out what GS1 Standards to use while conducting the pilots. Above this it is intended to be integrated in Deliverable D.6.10 which will be a white book on the role of standardisation and collaboration in vertical and horizontal supply chains.

Chapter 8 contains a checklist for standard compliance criteria. Summing up the recommendations of the preceding chapters it describes what NexTrust pilots should fulfil in order to be compliant with GS1 Standards and realise the depicted benefits.

Since at the time of completion there is no stable as-is-process description for every single pilot available the recommendations are based on the general concepts of some pilot categories dealing with collaborative Less Than Truck Load (LTL), Full Truck Load (FTL), Logistics Service Providers (LSP) and intermodal as well as e-commerce.

5 NexTrust Pilots Supply Chain Scenarios

The NexTrust pilots aim at optimising the transport of goods by combining flows of different suppliers and/or to different destinations. In general most of these optimized flows can be broken down into several typical scenarios described in Figure 1.

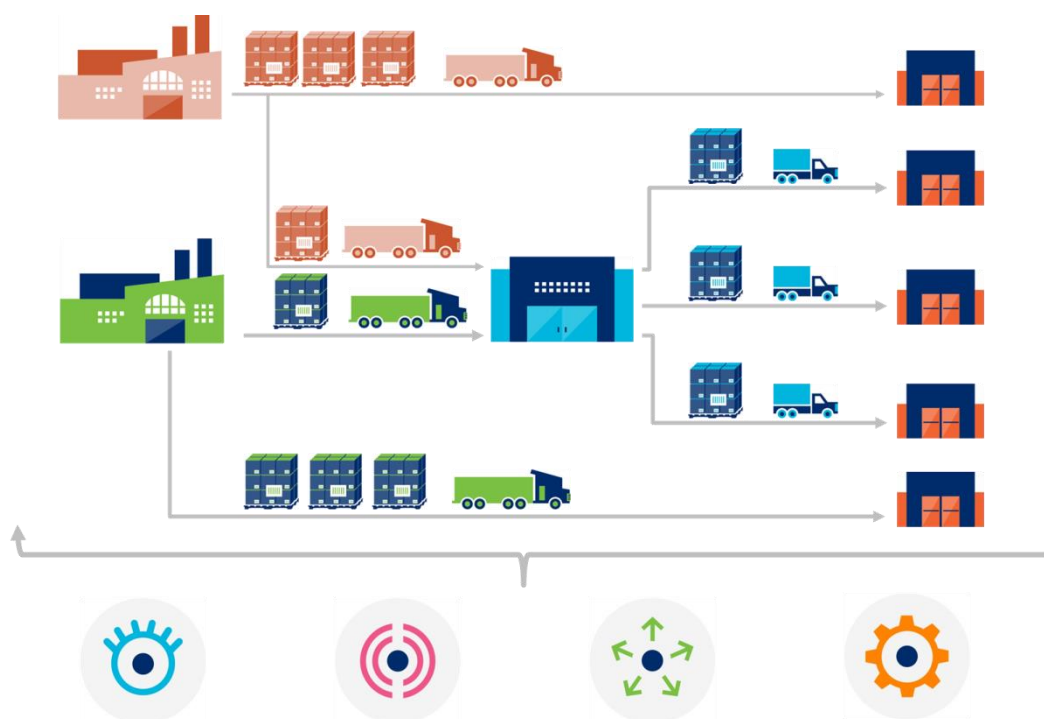


Figure 1: Optimized product flows of NexTrust pilots (Source: GS1 Germany)

The main scenarios of optimised product flows and transport processes are the use of FTL or LTL. The first scenario describes the direct transport of a full truck between manufacturer and retailer without additional stops. The second scenario describes the combination and consolidation of more than one load by one or more distribution centres.

The chapters below give an outline on the GS1 Standards and illustrate how the four different categories help optimising the process flow and give precise details which particular standard within a category, e. g. which data carrier or electronic data interchange (EDI) message can support a certain pilot or group of pilots.

6 Identify Capture Share Use – the Foundation of GS1 Standards

6.1 Identify



The GS1 Standards for identification provide the means to identify real-world entities so that they may be the subject of electronic information that is stored and/or communicated by end users.

The GS1 identification standards include unique identifiers (called GS1 identification keys), which may be used by an information system to refer unambiguously to a real-world entity such as a trade item, logistics unit, physical location, document, service relationship or other entity. A GS1 identification key is an identifier defined by the GS1 Standards that is usable and intended as to refer to a specific business entity. All GS1 keys are

- Unique
- Non-significant
- International: GS1 identification keys may be used in all countries and all sectors
- Secure: GS1 identification keys have a defined structure and most include check digits

One of the most used GS1 identification key is the Serial Shipping Container Code (SSCC). By adhering to GS1 identification standards all logistic units receive a globally unique SSCC, so that any supply chain partner is assured of having a unique way to refer to a given logistic unit in its information systems, and each company need only assign a single identification to its logistic unit.

GS1 identification keys give companies efficient ways to access information about items in their supply chains, and share this information with trading partners.

Because GS1 identification keys are globally unique, they can be shared between organisations, increasing supply chain visibility for trading partners. To build a GS1 identification key, your organisation must become a member of GS1 and obtain a [GS1 company prefix](#). This will form the basis of your ID keys.

There are 11 GS1 identification keys, allowing organisations to connect physical events and related information. For the NexTrust pilot projects the following GS1 identification keys are in particular relevant:

ID key	Used to Identify	Example
GTIN: Global Trade Item Number	Products and services	Can of soup, chocolate bar, music album
GLN: Global Location Number	Parties and locations	Companies, warehouses, factories, stores
SSCC: Serial Shipping Container Code	Logistics units	Unit loads on pallets, roll cages, parcels
GRAI: Global Returnable Asset Identifier	Returnable assets	Pallet cases, crates, totes
GIAI: Global Individual Asset Identifier	Assets	Medical, manufacturing, transport and IT equipment
GINC: Global Identification Number for Consignment	Consignments	Logistics units transported together in an ocean container
GSIN: Global Shipment Identification Number	Shipments	Logistics units delivered to a customer together

Table 1: Overview of GS1 identification keys (extract) (Source: GS1)

An overview of all GS1 identification keys can be found following this link: <http://www.gs1.org/id-keys>

To find out what key to use for a certain object/subject an interactive guide on key clarification assists. Link: <http://www.gs1.org/1/tlkeys/>

6.2 Capture



6.2.1 GS1 Application Identifier System

A principle of GS1 Standards is that data elements are defined in a data carrier neutral way so that their semantics is the same regardless of what data carrier is used to affix them to a physical object (and also the same outside of a physical data carrier, such as an electronic message). This is secured by GS1 Application Identifiers (AIs), used in all symbologies capable of encoding data beyond GTIN. Every data element 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 Serial Shipping Container Code is used on every GS1 Logistics Label and is announced by AI 00 containing 18 numbers.

6.2.2 GS1 Portfolio of Data Carriers

GS1 Standards for data capture provide the means to automatically capture data that is carried directly on physical objects, bridging the world of physical things and the world of electronic information. The GS1 data capture standards allow GS1 identification keys and supplementary data to be affixed directly to a physical object. Barcodes are symbols that can be scanned electronically using laser or camera-based systems. GS1 manages several types of barcodes. Since the different bar code types have different strengths the GS1 System provides several types of bar code for use by GS1 members depending on the application. GS1 selects the bar code that best fits the application.

Each item carries its GS1 identification key, e.g. SSCC for logistic units or GTIN for trade items, directly on the package using a barcode that adheres to the GS1 barcode standards (or alternatively using GS1-compliant RFID tags). Data capture systems conforming to GS1 Standards are used to automatically and reliably record items as they move through the supply chain, from shipping to receipt to point-of-sale.

For NexTrust pilots the following GS1 data carriers are of importance:

6.2.2.1 GS1-128 – used in general distribution and logistics

The GS1-128 is a versatile 1D barcode used to represent ID keys and attributes. It is very much used in a distribution or logistics environment and the only symbol allowed on a GS1 logistics label and as such most suitable for most NexTrust applications. It must not be used solely on Point-of-Sale products (consumer units) since it is not omnidirectional¹.

Features:

- Capacity: 48 alphanumeric (per symbol, multiple symbols may be used)
- Supports all GS1 identification keys such as the SSCC
- Supports attributes using GS1 application identifiers (e. g. best-before date, weight, lot, serial number, see below)



Figure 2: GS1-128 example (Source: GS1)

[Additional information on GS1-128](#)

6.2.2.2 GS1 DataBar

GS1 DataBar is a barcode group that encodes ID keys and attributes. Four types of GS1 DataBar are omnidirectional. They support applications in a distribution, logistics and point-of-sale environment and thus are applicable on consumer packages and outer cases.

Features:

- Capacity: up to 74 numeric / 41 alphanumeric
- Supports GS1 identification keys such as the GTIN
- Supports attributes using GS1 application identifiers (e.g. best-before date, weight, lot, serial number, see below)



Figure 3: GS1 DataBar example (Source: GS1)

[Additional information on GS1 DataBar](#)

¹ * A omnidirectional linear barcode symbol is designed to be read omnidirectional in segments by suitably programmed high-volume omnidirectional point-of-sale (POS) scanners.

6.2.2.3 EAN/UPC Family

An EAN/UPC symbol is used to exclusively encode a GTIN. As a consequence in a logistic environment it is very rarely used exclusively.

Features:

- Capacity: 13 numeric
- Omnidirectional
- Encodes GTIN
- Does not support attributes



Figure 4: EAN/UPC Code example (Source: GS1 Germany)

[Additional information on EAN/UPC Codes](#)

6.2.2.4 Two-dimensional (2D) Barcodes

There are two 2D symbols in the GS1 portfolio: GS1 DataMatrix and GS1 QR Code. They are compact, and high-capacity suitable for representing all GS1 keys and attributes. They cannot be scanned by laser scanners but only by image-based scanning equipment. This is why their use within the GS1 System is restricted to special applications like direct part marking or the identification of returnable assets with the GRAI.

Features of GS1 DataMatrix

- Capacity: 3,116 numeric, 2,335 alphanumeric
- Omnidirectional
- Supports all GS1 identification keys (e.g. GRAI, GIAI)
- Supports attributes



Figure 5: Example with GS1-128 (bottom) and GS1 DataMatrix (top) encoding a GRAI
(Source: GS1 Germany)

[Additional information on 2D symbols](#)

6.2.3 The GS1 Logistics Label

A logistic unit is an item of any composition established for transport and/or storage which needs to be managed throughout the supply chain. The GS1 Logistics Label allows users to uniquely identify logistic units so that they can be tracked and traced throughout the supply chain. The only mandatory requirement is that each logistic unit must be identified with a unique serial number, the Serial Shipping Container Code (SSCC).

Scanning the SSCC barcoded on each logistic unit allows the physical movement of units to be matched with the electronic business messages (EDI messages) that refer to them. Using the SSCC to identify individual units opens up the opportunity to implement a wide range of applications such as cross docking, shipment routing, and automated receiving. Besides the SSCC other information can be included on the GS1 Logistics Label.

On the GS1 Logistics Label a distinction is made between the types of data communicated on the GS1 Logistics Label, in order to facilitate interpretation by machines and people. For this purpose the data can be expressed in three building blocks:



1. The **'Free Format'** building block may contain non-human readable interpretation (Non-HRI) text and graphics.
2. The **'Non-HRI Text Including Data Titles'** building block contains Non-HRI text reflecting the information represented in the barcode(s) using data titles rather than AIs, and optionally additional information not represented in barcodes (preferably including data titles).
3. The **'Barcodes and HRI'** building block contains the barcode(s) including HRI.

Figure 6: GS1 Logistics Label example (Source: GS1)

With regard to the label placement the following recommendations apply:

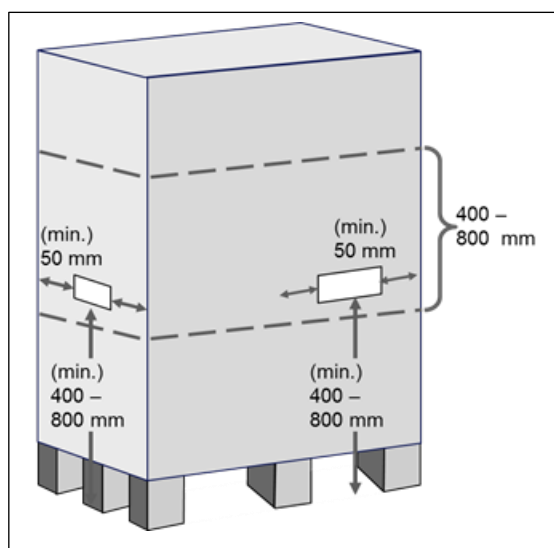


Figure 7: GS1 Logistics Label placement on larger logistic units (Source: GS1 Germany)

For all types of pallets, the target height for the bottom of the barcode is between 400 millimetres and 800 millimetres from the base of the pallet. For pallets less than 400 millimetres high, the barcode shall be placed as high as possible while protecting the barcode.

The symbol including its quiet zones shall be at least 50 millimetres from any vertical edge to avoid damage.

Each logistic unit should at the minimum have one label. For pallets it is recommended that two sides of the item are labelled the exact same data, to ensure one label is always visible (e. g. pallets that are stored either long or short edge facing). On rolling logistic units a label on one side is usually sufficient.

6.3 Share



The use of standards in data exchange provides a predictable structure of electronic business messages, enabling business partners to communicate business data in an automated way, efficiently and accurately, irrespective of their internal hardware or software types. Business partners do not have to align the format and structure of messages - they can use the standard, readily-available format instead.

GS1 identification keys are used in all GS1 Standards, both in the physical flow of goods and in information flow of business data in GS1 EDI messages for the identification of products, location and parties and logistics units.

Bar code scanning provides direct access to information received in electronic messages (e.g. Order or Despatch Advice) in the data base, without any additional mapping and complex cross-referencing.

6.3.1 Electronic Data Interchange

Electronic Data Interchange (EDI) allows rapid, efficient and accurate automatic electronic transmission of agreed business data between trading partners.

GS1 EDI provides global standards for electronic business messaging that allow automation of business transactions commonly occurring across the entire supply chain. It covers master data alignment, order and delivery and financial settlement management, as well as transport and warehouse management. The main business partners in scope for this are retailers, manufacturers, material suppliers and logistic service providers.

GS1 has currently three sets of complementary EDI standards:

- EANCOM®
- GS1 XML
- GS1 UN/CEFACT XML

All are implemented in parallel by different users. Although GS1 XML is a newer technology than EANCOM®, the latter has a large and constantly growing number of users. GS1 is going to continue supporting both syntaxes for as long as is necessary.

6.3.1.1 EANCOM®

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. It 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 (GLN) identifying the trading partners. It allows integrating the physical flow of goods with related information sent by electronic means.

The EANCOM® messages are mostly equivalent to 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,
- messages used to instruct transport services to move the goods,
- messages used in settlement of the trade transactions through the banking system.

6.3.1.2 GS1 XML

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

6.3.1.3 GS1 UN/CEFACT XML

GS1 UN/CEFACT XML business message standards are developed within UN/CEFACT hosted by the UNECE, a body of the UN. This guarantees an international focus, openness in the process and free usage, as this is the mission of UN/CEFACT and the policy of UNECE as a global forum. For all published specifications and standards, the Intellectual Property Rights (IPRs) are owned by the UN and as such are open for free use by everyone.

GS1 UN/CEFACT, a subsidiary intergovernmental body of the UNECE Committee on Trade, is mandated to develop a programme of work of global relevance to achieve improved worldwide coordination and cooperation in the areas of trade facilitation and electronic business, covering both commercial and government business processes that can foster growth in international trade and related services. It encourages close collaboration between governments and private business to secure the interoperability for the exchange of information between the public and private sector.

Example messages are: Cross Industry Despatch Advice and Cross Industry Invoice.

6.3.2 EPCIS

Electronic Product Code Information Services (EPCIS) 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 logistics sector encompass products, shipments, documents, locations, returnable transport items as well as assets. It is important to comprehend that EPCIS is data carrier agnostic. Each time an EPC is read, an event is generated containing 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.

6.4 Use



This pillar refers to applying the foundational standards of GS1 – i. e. the three pillars explained above – to standardised business processes. The following pages describe important standardised processes relevant for the NexTrust pilots.

6.4.1 Efficient Unit Loads

Efficient Unit Loads (EUL) is one of the essential solutions to improve efficiency across the supply chain. The harmonisation of transport and storage items is a key driver to supply chain integration and an important aspect to realise efficiency potential in transport, storage and handling.

A unit load consists of a bundle of products put together to optimise transport and handling. This includes primary, secondary and tertiary items. Primary items, in general are defined as the sales unit to the consumer at the point-of-sale. Secondary items group or package primary products and can be for example plastic trays or cardboard boxes. Tertiary items group secondary items and can be pallets or roll cages.

Three packaging levels



Figure 8: Packaging levels (Source: AT Kearney; ECR Europe)

6.4.2 Pallet Heights

The pallet is the dominant tertiary item. In order to manage complex and dynamic European supply chains, and to prevent supply chain inefficiencies driven by individual company approaches, ECR Europe published in 2000 a guideline concerning “Transport Optimisation”. Part of this guideline is a recommendation regarding pallet heights (load plus item). Pallet heights should be derived from inner truck height dimensions and should maximise height utilisation. There are two EUL-pallet heights recommendations:

Heights (in mm)	EUL 1	EUL 2
Loading height	1.050	2.250
Item height	150	150
Pallet height	1.200	2.400

A recommendation of international uniform pallet heights was mandatory because of the variation of different national regulations and the resulting economic and ecologic inefficiencies. The EUL standard considers increasing transport distances (globalisation, centralisations of production sites) and increasing transport costs (road pricing, fuel prices, and environmental requirements).

6.4.3 Cross Docking

Cross Docking (CD) is to be understood as a process within the supply chain, in which the arrival of goods at the Cross Docking platform as well as the delivery to the consignee are coordinated (in terms of time and quantity) which lead to an omission of all warehousing processes including the typical activities in the inventory stock.

The concept surpasses the main process of physical handling.

Efficient planning, governance and monitoring along the whole chain, especially at the Cross Docking platforms, can be assured with the aid of a narrow informative connection between all involved parties on the basis of enabling technologies.

Concerning NexTrust, only the Single-Stage Cross Docking (Cross Docking 1) is considered as relevant. The consignor picks end-recipient-related and the logistical units are passed on to the consignee over one or more Cross Docking platforms without any further adjustments.

The Cross Docking platform then receives a notification of delivery including all existing data of delivery picked. The Notification needs to take place for each individual order and is to be transpired with the aid of the EANCOM®-Message DESADV. The following principal shall apply: one order = one delivery = one notification of delivery (DESADV). The SSCC is deposited in the EANCOM®-Message (DESADV) and serves the purpose of a clear identification of the package as well as the particular reference to the logistical data deposited.

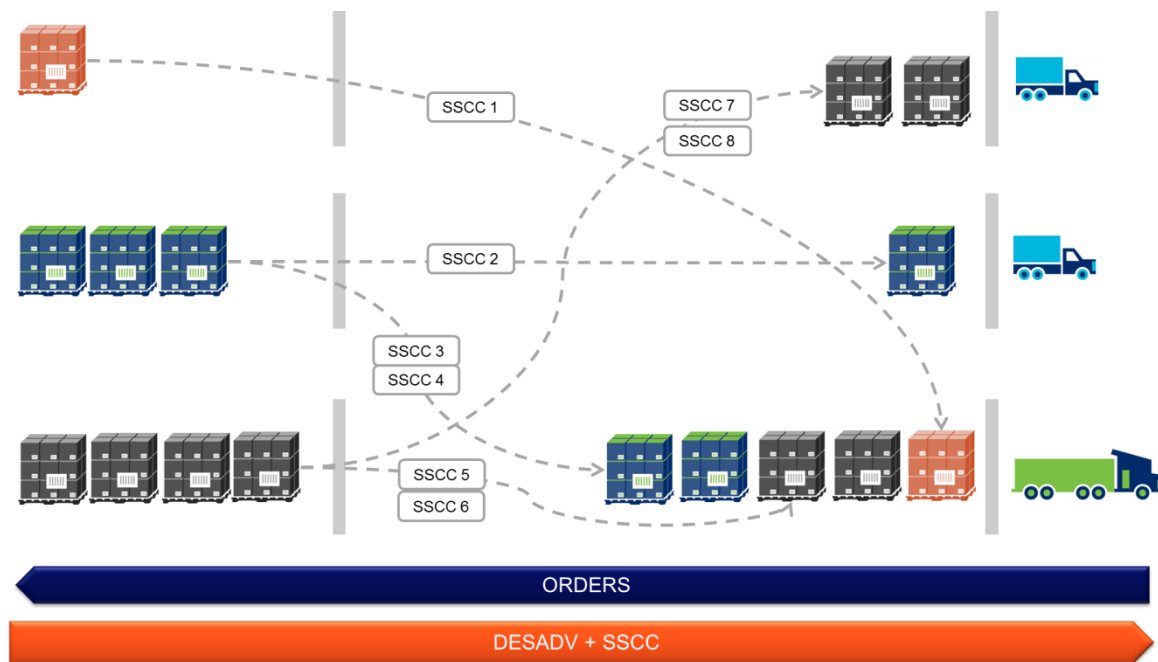


Figure 9: Cross Docking process (Source: GS1 Germany)

6.4.4 Time Slot Management (TSM)

The loading ramps of industry and trade are considered as a point of combustion in regards to efficient loading and unloading processes. Productivity losses occur due to unexpected standing and waiting times, fluctuating peaks and an unpredictable demand of resources. As an approach for decreasing these problems as well as to simplify the whole process, time slots can be awarded.

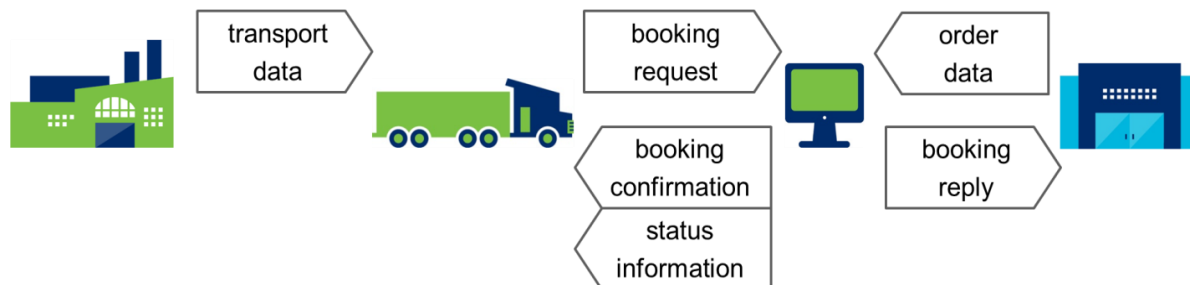
The TSM offers available time slots for the delivery of the goods to the operating LSP on behalf of the consignee. Time slots are usually booked in reference to the location of the consignee, the location of the ramp or the assortment.

A contractual agreement between the forwarder and the provider of the TSM regulates the general use of the TSM.

The booking of the time slot takes place on the basis of a previously defined reference (order number). Furthermore, the booking needs to be made in relation to the tour.

The message Transport Order is transmitted once the goods have been picked and are ready for transport and therefore contains details on the SSCC as a compulsory element. In regard to booking a time slot this occurs too late. The transport notification serves for the application of a delivery at the logistics service provider at an early stage. The forwarder makes use of the transport details for immediately booking a time slot at the

complying TSM. The transport notification therefore is of relevance in terms of the time slot management. It furthermore serves an early transport capacity and route scheduling through the logistics service provider.



EDI message types



Figure 10: Time Slot Management and related EDI messages (Source: GS1 Germany)

7 How GS1 Standards Contribute to NexTrust Pilots

This chapter combines the ideal use of GS1 Standards (Identify, Capture, Share) with the NexTrust pilot scenarios and shows in a general way how to use the standards in the pilots. The following process charts describe at what stage GS1 Standards can ease co-operation within the pilots and guarantee scalability and transferability to other pilots and implementations within and beyond the NexTrust project. In addition the [GS1 Visibility App](#) is an interactive tool giving details on what GS1 Standards can be of benefit for each stakeholder in a given supply chain location:



Figure 11: Screenshot GS1 Visibility App (1) (source: GS1 Global)

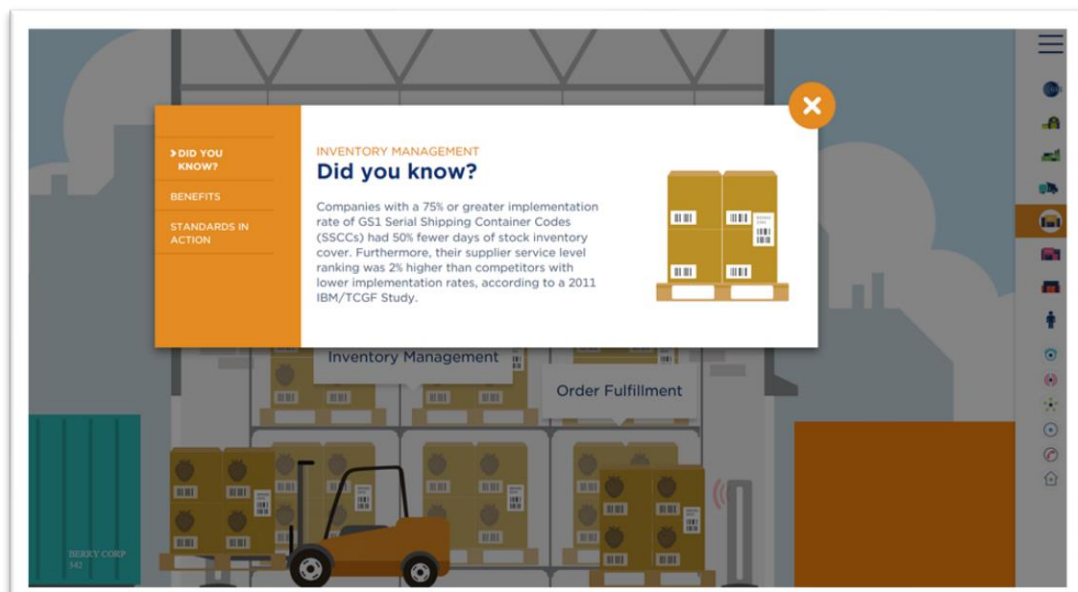


Figure 12: Screenshot GS1 Visibility App (2) (source: GS1 Global)

7.1 General Overview of Logistics Processes and GS1 EDI Messages

The process chart shown in Figure 13 describes the general logistics processes and the relevant GS1 EDI messages applying to many NexTrust pilots. The processes and electronic messages appear in chronicle order according to the numbers. Messages without numbers are optional and do not always apply. More information on the EDI messages (EANCOM® or GS1 XML) can be found in Chapter 9.

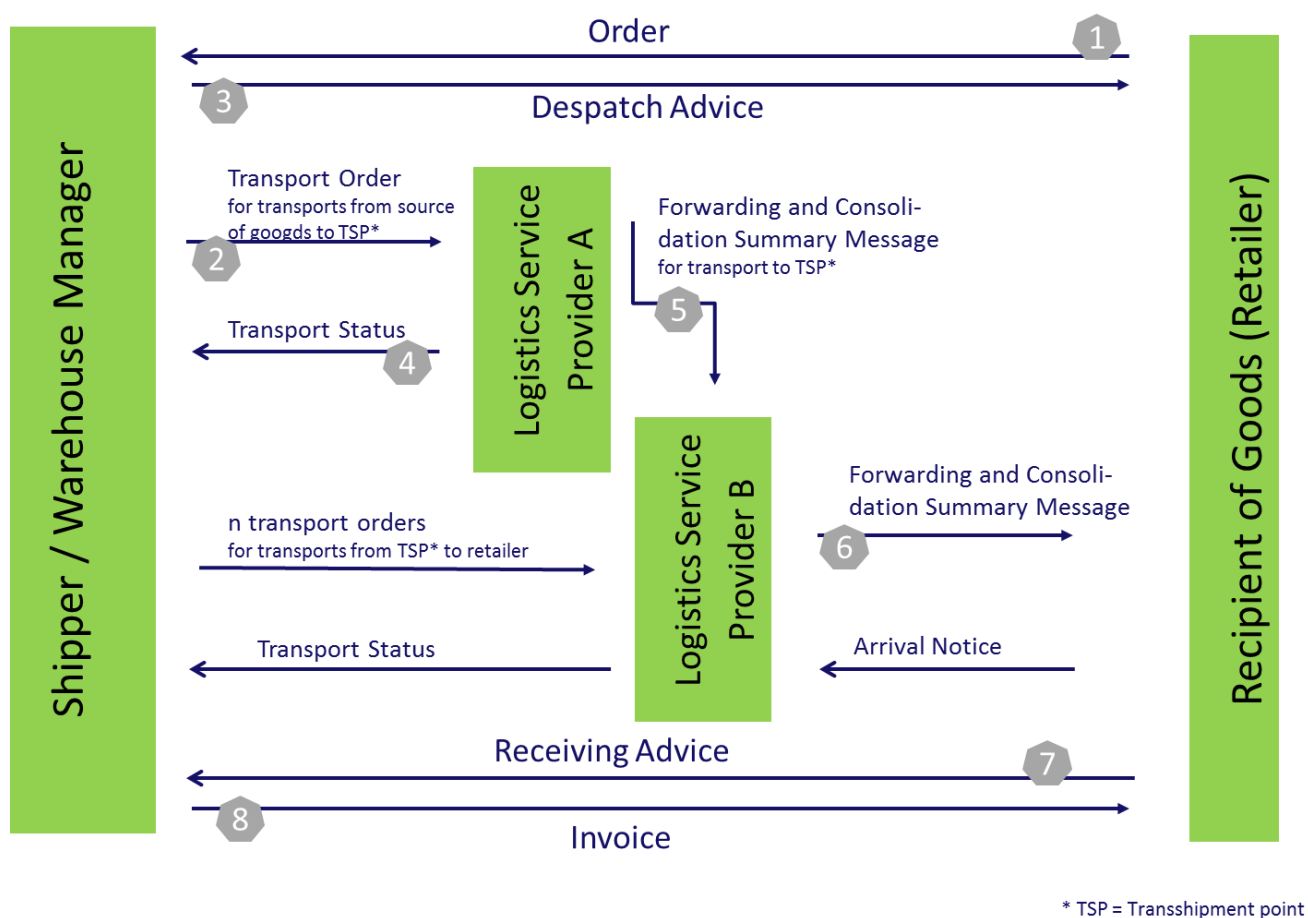


Figure 13: EDI Messages in general logistics processes (Source: GS1 Germany)

7.1.1 NexTrust Pilots Moving from LTL to FTL (WP 1)

Some NexTrust Pilots, especially those from Work Package 1, focus on transforming LTL shipments to FTL. This can be reached by combining transport items from different sources (shippers) and/or to different destinations. In this context LSP regroup shipments with the aim of a higher transport means capacity utilization.

The Cross Docking 1 process, leaving each single pallet unaffected, is a key process in these pilot types. It is carried out by one or more logistics service providers. In case a (shared) intermediate storage will be integrated, e. g. in order to function as a buffer and enable more FTL transports the same ID keys and EDI messages come into play.

Figure 14 describes the flow of goods from the beginning of the order placement and on a time scale from left to right, including all stakeholders. It should be noted that one supply chain partner can have just one role or may incorporate different roles like LSP and Cross Docking centre in the event for instance to collect the products from the shipper and also to conduct the cross docking process. The processes and applicable standards are not influenced by these individual circumstances.

Based on the high level target process Figure 15 shows in detail what GS1 Standards, subdivided in the four categories, can be relevant for each process step. In any case Figure 14 and Figure 15 are exemplary for the NexTrust pilots and describe the logistics processes of the supply chain rather than administrative/bookkeeping activities.

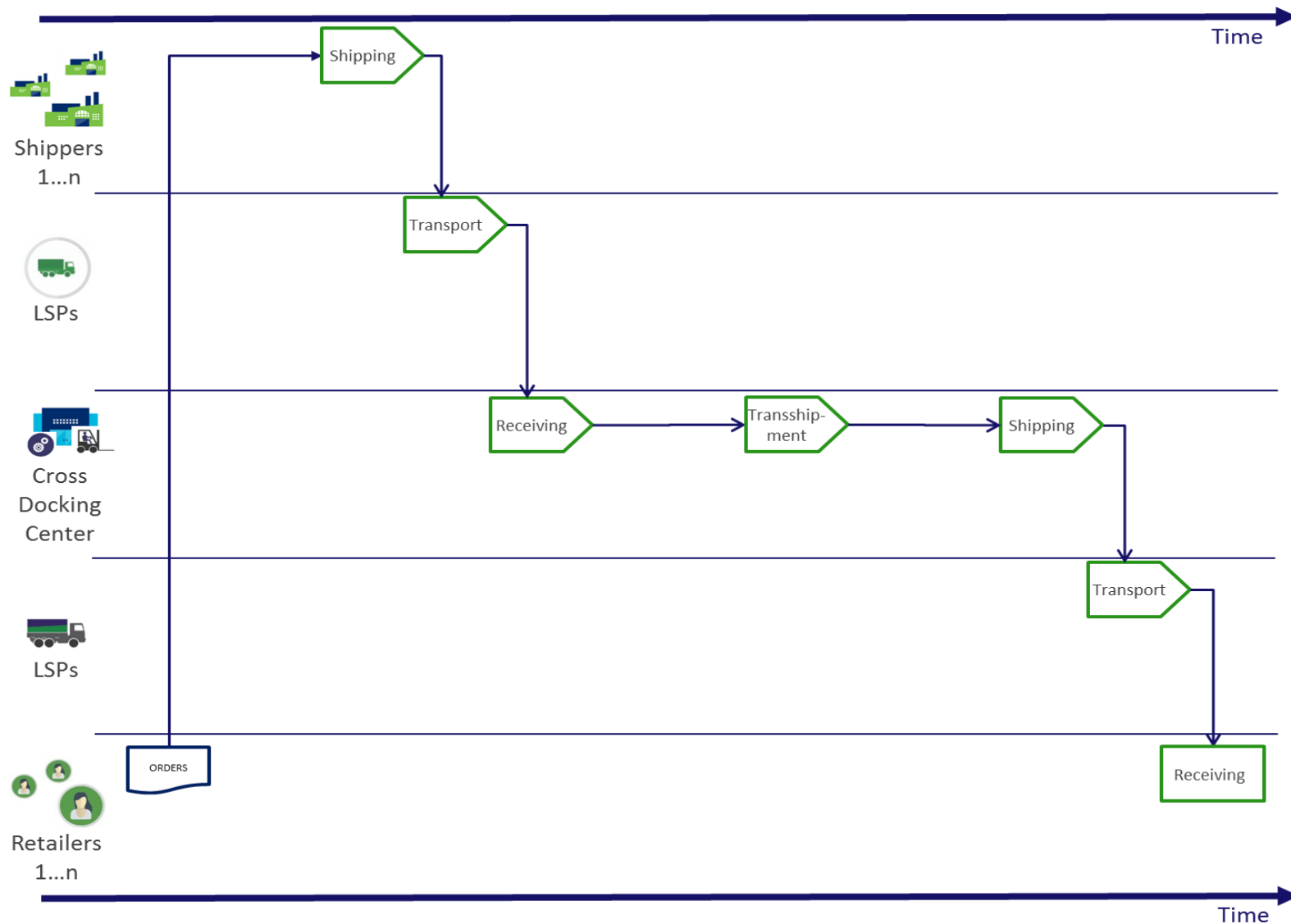


Figure 14: General view on supply chain target scenario (Source: GS1 Germany)

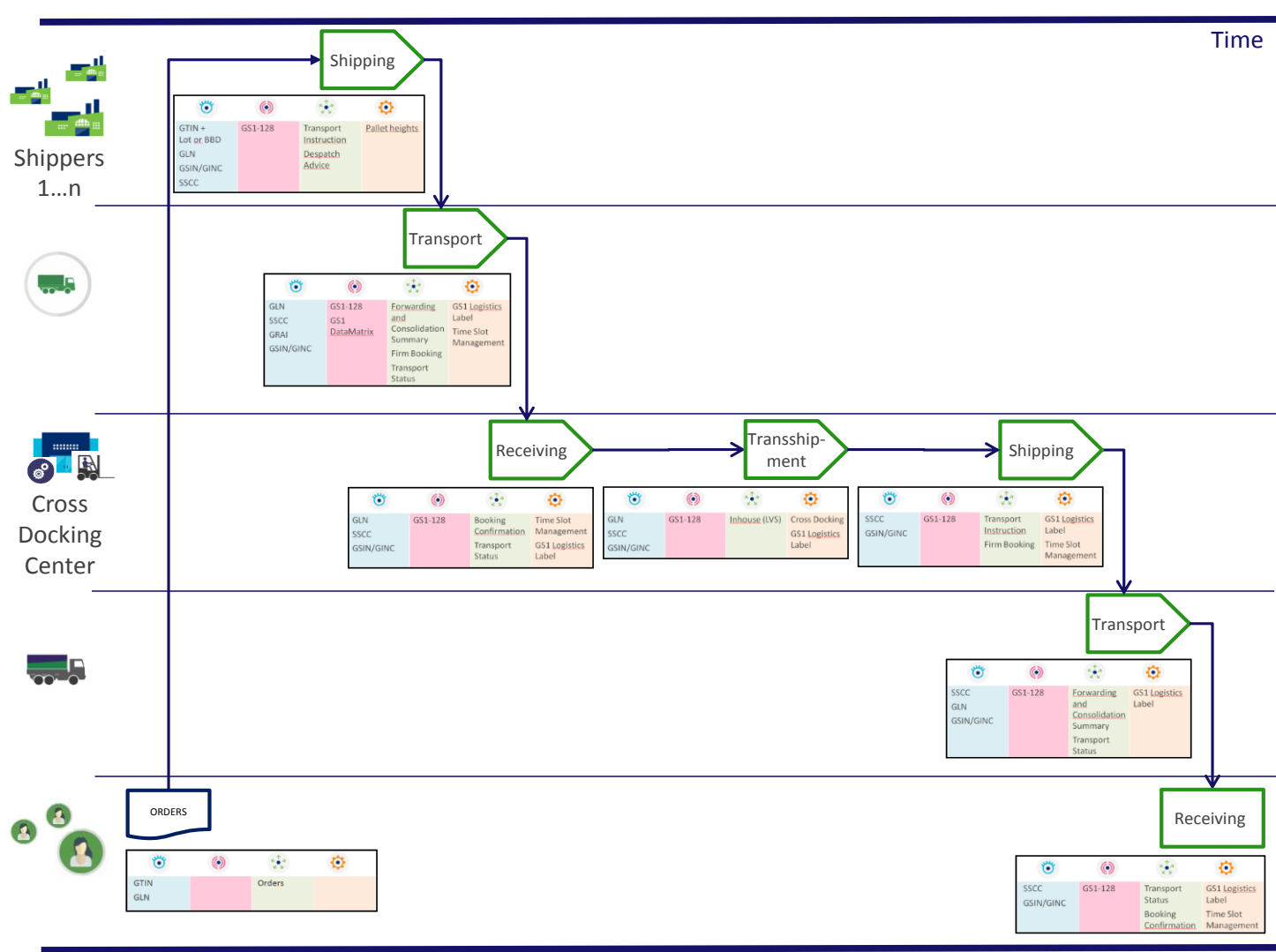


Figure 15: General view on supply chain target scenario (Source: GS1 Germany)

Explanation of Figure 15:

If the shipper for instance wants his products to be collected by an LSP he will from the

1. Identification perspective:
 - a. Allocate a GTIN to the product(s) and might add optional information like lot or serial number or best before date,
 - b. allocate an SSCC to every logistic unit such as to every pallet and
 - c. if applicable allocate the GSIN to every Shipment
2. Capture perspective:
produce a GS1 Logistics Label for every logistic unit (containing SSCC and other data like GTIN contained)
3. Sharing perspective:
send electronic GS1 messages like Transport Instruction and DESADV
4. Use perspective:
benefit from standardised pallet heights (EUL).

7.1.2 NexTrust Pilots Optimising FTL Transport Flows (WP 2)

Another group of NexTrust pilots aims at “closing loops in transport” in order to avoid empty vehicle movements, empty running of vehicles between trips and intermodal flows. They do not merely focus on Cross Docking processes but on combining transport flows. Independent on what the final scenarios will look like the following EDI messages can be relevant for the different stakeholders for

- Despatch Advice Information
(EANCOM[®]: DESADV; GS1 XML: despatchAdviceMessage)
- Transport Instruction Information
(EANCOM[®]: IFTMIN; GS1 XML: transportInstructionMessage)
- Transport Status Information
(EANCOM[®]: IFTSTA; GS1 XML: transportStatusNotificationMessage)

7.1.3 NexTrust Pilots Concentrating on Last Mile and E-Commerce (WP 4)

NexTrust WP 4 pilots concentrate on pooling underutilized existing transport equipment and capacity sharing in the E-Commerce environment. This can be supported by EDI messages such as transport instruction (EANCOM[®]: IFTMIN; GS1 XML: transportInstructionMessage) and transport status messages (EANCOM[®]: IFTSTA; GS1 XML: transportStatusNotificationMessage) in combination with the GS1 Logistics Label including the SSCC.

8 Checklist: Standard Compliance Criteria for the Platform Users

In a nutshell this checklist enumerates what NexTrust pilots can do in order to make use of GS1 Standards in an efficient way.

No.	Compliance Criteria (What?)	Explanation (How?)
1	All pilot partners that need to allocate GS1 ID keys (GTIN, SSCC, etc.) should be allocated a Global Company Prefix (GCP)	The GCP is allocated by a GS1 Member Organisation and valid worldwide. Link to all GS1 Member Organisations: http://www.gs1.org/contact
2	Each pilot partner should be uniquely identified by a GLN.	The GLN is used e. g. for identification in EDI messages. Depending on the country it is either allocated by a GS1 Member Organisation (MO) or by the company, derived from its GCP. Link to GLN allocation rules: http://www.gs1.org/1/glnrules/en/about
3	Each organisation should have an effective synchronisation process with its trading partners. Depending on the field of activity it relates to - parties, - physical locations - assets and/or - trade items	The GS1 standard process for synchronizing master data is the Global Data Synchronization Network (GDSN) (see http://www.gs1.org/how-gdsn-works).
4	All relevant internal and external locations like warehouses, distribution centres or tracks should be uniquely identified.	This is done by a GLN, a GLN extension component or a Serialized GLN (SGLN).
5	All assets that are used along the supply chain should be globally and uniquely identified.	The corresponding GS1 Standard is the GRAI (Global Returnable Asset Identifier) or GIAI (Global Individual Asset Identifier). According to the GS1 EPCIS for Rail Vehicle Visibility Application Standard each rail vehicle is identified with a "master" GIAI, which identifies each rail vehicle as an asset. This should make it possible to unambiguously determine static information about the rail vehicle, such as the rail vehicle type, the axle count, the vehicle owner, etc. This may be accomplished by communicating this information as master data. Link: http://www.gs1.org/sites/default/files/docs/epc/GS1_EPCIS_Rail_Standard.pdf
6	All trade items (including multipacks, cartons, and outer cases) must be identified by a GTIN.	In general the GTIN is allocated by the brand owner. Link to GTIN allocation rules: http://www.gs1.org/1/gtinrules/
7	All trade items (including multipacks, cartons, and outer cases) must carry a GS1 barcode with the GTIN encoded	The corresponding GS1 Standards for trade items scanned in general distribution (grouping of trade items) are EAN-13, ITF-14, GS1-128, GS1 DataBar, GS1 DataMatrix (Healthcare and Direct Part Marking only).
8	Items scanned in general	Link to European Industry Guidance for Standard Case

	distribution like cartons and outer cases should have additional information encoded depending on the product category, e.g.: • Best-before date or expiration date on fresh products • lot number on food, dry food or cosmetics	Code Labeling including Extended Product Attributes: http://www.gs1.eu/gtins-and-barcodes-activities
9	Items scanned in general distribution like cartons and outer cases should have two labels (recommendation) with the same data	This is a cost-effective way to meet the supply chain requirements referring to one symbol being always visible even if stored or put on a pallet.
10	All logistic units must be identified by an SSCC	In general the SSCC is allocated by the company that physically assembles the logistics unit using its own GCP. It can also be allocated using the GCP of the brand owner.
11	All logistic units must carry at least one GS1 logistics label, including the SSCC in a barcode (two labels with the same content recommended)	The corresponding GS1 barcode is GS1-128.
12	All shipments, that need to be traced, must be physically identified with a global, unique Shipment Identification Number	The corresponding GS1 barcode is the GS1-128 with the Global Shipment Identification Number (GSIN AI 402).
13	For using the GS1 XML transportInstructionMessage it is mandatory to identify the shipments with a GSIN or the consignments with a GINC	The general structure of the message requires to use the GSIN or/and GINC on line item level before identifying e. g. the pallet with a SSCC.
14	The GS1 electronic document "Despatch Advise" (DESADV) should be used to send detailed dispatch information of trade items to the trading partners prior to physical delivery	Prior to the delivery of a trade item, an electronic message that includes the information of the dispatched trade item is sent to the trading partners. The corresponding GS1 Standards are EANCOM® or GS1 XML. EDI Advance Shipping Notice (ASN) can also be used.

Table 2: Checklist: Standard compliance criteria for the platform users (Source: GS1 Germany)

9 Summary

For each NexTrust pilot it is advisable to investigate on the proper use of GS1 Standards in time. This user guide gives advice on what standards to use, what are the next steps for each partner and where to find additional information or support. In a nutshell the identification keys focusing on logistics like SSCC, GS1-128 and GSIN and the corresponding EDI messages seem to be most beneficial in terms of Identify, Capture and Share. The enumerated process recommendations seem to be the most obvious ones but are not exhaustive and represent a wide range of recommendations.

10 References

- (1) Nextrust project website www.nextrust-project.eu
- (2) GS1 General Specifications: <http://www.gs1.org/barcodes-epcrfid-id-keys/gs1-general-specifications>
- (3) Overview of all GS1 identification keys: <http://www.gs1.org/id-keys>
- (4) All local GS1 Organisations (Member Organisations): <http://www.gs1.org/contact>
- (5) [Global Data Synchronisation Network](http://www.gs1.org/1/glnrules/en/about): <http://www.gs1.org/1/glnrules/en/about>
- (6) GLN Allocation Rules: <http://www.gs1.org/1/glnrules/en/about>
- (7) GTIN Allocation Rules: <http://www.gs1.org/1/gtinrules/>
- (8) Interactive guide on the use of GS1 keys: <http://www.gs1.org/1/tlkeys/>
- (9) Link to European Industry Guidance for Standard Case Code Labeling including Extended Product Attributes: <http://www.gs1.eu/gtins-and-barcodes-activities>
- (10) Information on transport management: <http://www.gs1.org/transport-management>
- (11) EDI messages: <http://www.gs1.org/edi>
- (12) EPCIS: <http://www.gs1.org/epcis>
- (13) GS1 EPCIS for Rail Vehicle Visibility Application Standard
http://www.gs1.org/sites/default/files/docs/epc/GS1_EPCIS_Rail_Standard.pdf
- (14) GS1 application standard for visibility in rail: <http://www.gs1.org/articles/1722/new-gs1-application-standard-visibility-rail>
- (15) FAQs on Transport and Logistics:
<http://ocp.gs1.org/sites/faq/Pages/topic.aspx?t=GS1%20Transport%20%EF%BC%86%20Logistics>
- (16) GS1 Discovery App: <http://discover.gs1.org/cpg/languages>
- (17) GS1 Glossary: [Link](#)

11 Acronyms and Abbreviations

Please list **only** the acronyms used in the document

ACROYNM	EXPLANATION
BBD	Best Before Date
CD	Cross Docking
CI (dissemination level)	Classified, as referred to in Commission Decision 2001/844/EC
CO (Dissemination level)	Confidential
DEC (deliverable type)	Websites, patent fillings, videos, etc.
DESADV	Despatch Advise
EDI	Electronic Data Interchange
EPCIS	Electronic Product Code Information Services
EUL	Efficient Unit Loads
FTL	Full Truck Load
GCP	Global Company Prefix
GHG	Green House Gas
GINC	Global Identification Number of Consignment
GLN	Global Location Number
GRAI	Global Returnable Asset Identifier
GIAI	Global Individual Asset Identifier
GSIN	Global Shipment Identification Number
GTIN	Global Trade Item Number
HRI	Human Readable Interpretation
IFCSUM	Forwarding and Consolidation Summary Message
IFTMBC	Booking Confirmation Message
IFTMBF	Firm Booking Message
IFTSTA	Trasport Status Message
LSP	Logistics Service Provider
LTL	Less Than Truck Load
PU (Dissemination level)	Public
R (deliverable type)	Document, Report
SGLN	Global Location Number With or Without Extension
SSCC	Serial Shipping Container Code
TSM	Time Slot Management
WP	Work Package
XML	eXtensible Markup Language

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