GS1 Global Traceability Standard

Business Process and System Requirements for Full Chain Traceability

GS1 Standards Document

Issue 1, Sep-2007

Document Summary

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Document Description	This document is the GS1 Global Traceability Standard. It describes the traceability process independent from the choice of enabling technologies. It also defines minimum requirements for all companies, industry sectors, countries, and corresponding GS1 Standards to be used in combination with information management tools.

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1. Overview

1.1. Business Opportunity and Business Needs

Businesses, consumers and authorities in various markets around the world have an interest in establishing systems to track and trace products at various points of the supply chain. This shared interest is never more evident than for food, beverage and pharmaceutical products, but the key principles can be applied to any industry sector served by GS1 that has a need to track and trace product through the supply chain.

This document is a standard because it is the definition for GS1 members (exclusive of any other definition) of what the process standard for traceability encompasses and it shows the corresponding numbering, automatic identification data capture (AIDC) or data communication standards that must be in place for best practice applications. For example, from now on a GS1 traceability implementation guideline will only be referred to as such if it addresses all the use cases described in the GS1 Global Traceability Standard.

Trading partners in a supply chain use product traceability to enable business needs such as:

- To comply with regulatory requirements (e.g., EU Regulation 178/2002 on food law, FDA requirements on establishment and maintenance of records (21 CFR 1) and guidance on recalls (21 CFR 7.59), USDA requirements and guidance on recalls (FSIS Directive 8080.1).

- To reduce business risks above and beyond legal compliance

- Product recall and withdrawal (notably to achieve a greater degree of precision, to demonstrate control, increase efficiency and reduce the cost of product recall or withdrawal)

- To comply with a trading partner's specifications

- Efficient logistics management

- Effective quality management

- To support product safety

- To provide information to consumers and trading partners

- To verify the presence or absence of product attributes (e.g., organic, dolphin safe)

- Brand protection

- Product authentication and anti-counterfeit policies

1.2. Business Intention

The goal in this document is to create a 'GS1 Global Traceability Standard'. This is a PROCESS standard describing the traceability process independent from the choice of enabling technologies (see sections 6, 7.3 and 8). It defines minimum requirements for all companies, industry sectors and countries and corresponding GS1 Standards to be used in combination with information management tools (see section 7.1).

This is a building block for developing:

- Traceability systems

- Industry or country specific traceability user guidelines

- Extensions of traceability requirements for specific industries, countries or business needs

■ New GS1 standards that may be required (or leveraging existing standards)

Note: Refer to section 11.

The intention is therefore to create a generic framework that is expected to be used by any business sector, any company, large or small, and by any country in order to develop specific implementation guidelines or additional requirements. These implementation guidelines will take into consideration, for example, scope and traceable item hierarchy specific to their needs (see sections 4, 7, 9, 11).

This GS1 Global Traceability Standard will maximise use of the well-established and globally acceptable GS1 voluntary business standards that uniquely identify a "traceable item", describe the establishment of appropriate and effective records of transactions, and provide for accurate communication about the traceable item between trading partners.

This meets the core need to be able to trace back and trace forward (one step up, one step down) at any point along the whole length of the supply chain no matter how many trading partners and business process steps are involved.

This may be used for benchmarking or certification of traceability systems.

1.3. Business Justification

Companies require consistent traceability solutions spanning the entire supply chain regardless of country or industry sector.

By defining a shared minimum requirement and showing what action is required from companies, sectors, countries, or a group of trading partners, the GS1 Global Traceability Standard will enable maximum interoperability between traceability systems across the whole supply chain whilst accommodating specific business, trading sector, or national requirements.

Each trading partner in the supply chain will have their own objectives in terms of the use of the traceability system, the level of the smallest traceable item and data to manage dependently relative to their trading environment and strategy. Yet trading partners need to work collaboratively in order to achieve the required level of traceability across the entire supply chain. Furthermore, having a proven standard-based traceability process can demonstrate that an organisation has met requirements of corporate responsibility.

The GS1 Global Traceability Standard will serve as a foundational standard for all GS1 industries and countries to use as a starting point for identifying their unique requirements. This framework will ensure a common approach and understanding of key principles by users around the world.

To demonstrate that these ideas are shared by businesses, legislators and regulators in countries all around the world, here are some extracts from key reference documents:

Traceability in the USA

"Firms have three primary objectives in developing, implementing, and maintaining traceability systems: to improve supply management, to facilitate trace back for food safety and quality, and to differentiate and market foods with subtle or undetectable quality attributes. The benefits associated with these objectives range from lower-cost distribution systems, reduced recall expenses, and expanded sales of products with attributes that are difficult to discern. In every case, the benefits of traceability translate into larger net revenues for the firm."

Traceability in the U.S. Food Supply: Economic Theory and Industry Studies, USDA, Economic Research Service, March 2004, page 4.

Canada: Identifying a Need for National and International Standards

"The Agricultural Policy Framework (APF) established an objective of achieving 80% traceability for Canadian food by 2008. Abroad, the pressures for Canadian exporters came from bio terrorism legislation in the United States and traceability legislation in the European Community […] There was a growing public concern about food safety and animal health as a result of a number of high profile media events in both North America and Europe. As a result of these and other factors, more companies and organizations began to develop traceability systems for their particular sector or supply chain requirements. However, without the benefit of a national or international standard their efforts were proprietary and did not cover the depth and breadth of the entire supply chain."

Can-Trace, Canadian Food Traceability Standard
Version 1.0, October 2004, page 4

Europe Building Collaboration to Facilitate Track and Trace

"Collaboration between trading partners should be promoted continuously. Through the use of voluntary, global business standards each company involved in the supply chain can remain responsible for selecting the service provider to implement their system in an open, competitive market place. The use of voluntary, global business standards improve efficiency and drives down total supply chain costs."

ECR – Using Traceability in the Supply Chain to meet Consumer Safety Expectations
ECR Europe, March 2004, Chapter 4 "Business Needs", page 16

Building the Business Case for Data Management

"Since product record information can differ according to the purpose of product traceability, company, and industry, the management of this information should emphasize the importance of company and industry initiatives. However, if traceability goals and purposes are the same within an industry, it is desirable for the management method and product record information (including item code and serial number data structure of the product identification code system) to be the same."

Study Group on the Improvement of Product Traceability, Interim Report, April 2003

Ministry of Economy, Trade & Industry, Japan, Chapter 3.2 "Efforts which should be shared as much as possible", page 11

1.4. Audience

The audience is all GS1 member companies, the service provider industry that serves them and business associations. This includes all parts of the supply chain, for example: raw material (sometimes called "primary") producers, processors, manufacturers, retailers, wholesalers, importers/brokers and exporters, third party logistic providers, foodservices, logistic providers, transporters or carriers and solution providers.

The audience includes all senior managers with executive responsibility, managers and employees working in production, quality and safety, logistics, information technology, product development, marketing and customer management roles.

2.   Acknowledgements

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3. References

Reference Name	Description
[Ref 1] GS1 General Specifications	GS1, Version 6.0
[Ref 2] ECR – Using Traceability in the Supply Chain to meet Consumer Safety Expectations	ECR Europe, March 2004
[Ref 3] Can-Trace	Canadian Food Traceability Standard, version 1.0, October 2004
[Ref 4] GS1 Traceability Implementation Guidelines	GS1, 2003
[Ref 5] GS1 Business Message Standards	GS1
[Ref 6] Traceability in the U.S. Food Supply: Economic Theory and Industry Studies	USDA, Economic Research Service, Agricultural Economic Report Number 830, March 2004
[Ref 7] "Implementing Traceability in the Food Supply Chain"	CIES, 2nd version, January 2005

Reference Name	Description
[Ref 8] Wine Supply Chain Traceability Guidelines	GS1, 2005
[Ref 9] Fresh Produce Traceability Guidelines	GS1, 2001
[Ref 10] Banana Supply Chain Traceability Guidelines	GS1, 2005
[Ref 11] EAN International Traceability of Beef Guidelines	GS1, 2003
[Ref 12] Traceability of Fish Guidelines	GS1, 2003
[Ref 13] EU Regulation 178/2002/EC known as the "European Food Law"	EU commission, 2002
[Ref 14] USDA Country Of Origin Labelling regulation	USDA, 2004
[Ref 15] FDA Maintenance of records regulation under the US Bio-terrorism Act.	FDA, 2004
[Ref 16] The Beef Traceability Law	The Law for Special Measures concerning the Management and Relay of Information for Individual Identification of Cattle, Japan, Ministry of Agriculture, Forestry and Fisheries, 2004
[Ref 17] ISO 9001: 2000 ISO project of traceability standard for food sectors	ISO, 2000
[Ref 18] Study Group on the Improvement of Product Traceability, Interim Report,	Ministry of Economy, Trade and Industry, Japan, April 2003

4. Scope

4.1. Overall Business Context

Context Category	Value(s)
Industry	All industries served by GS1
Geopolitical	All
Product	All (raw material, packaging material, and finished goods)
Process	Traceability
System Capabilities	GS1 System
Official Constraints	None

4.2. In Scope

The GS1 Global Traceability Standard includes:

- Identification of parties, items and events

- Labelling and/or marking and/or tagging of products

- The nature and type of data to be captured and collected

- Record keeping including archiving / data storage

- Communication and sharing of information (Information can be shown at the physical level of packaging labels and printed bar-codes or captured and recorded at a data management level and communicated using e-business messaging including, e.g., EDI.)

- Links identification and management

- Retrieval / search of information (The ability to track and trace a traceable item from creation to the point of sale or destruction depending on the industry.)

All sectors where GS1 members are involved are in scope, for example the following supply chains from upstream to downstream, including raw materials:

- Food and Fibre

- Feed

- Primary production

- Agriculture inputs (e.g., pesticides)

- Fast Moving Consumer Goods / Consumer Packaged Goods

- Cosmetics

- Drugs

- Packaging materials

All types of products are in scope, for example:

- Consumer units (e.g., an individual product, batches / lots)

- Trade items (e.g., a carton containing consumer units)

- Logistic units (e.g., a pallet)

- Packed and bulk products

- Branded Goods, private labels, generic unbranded products

Note: By-products, recycled products, surplus stock and returns follow the same traceability process.

Figure 4-1 Product Flow in Supply Chain
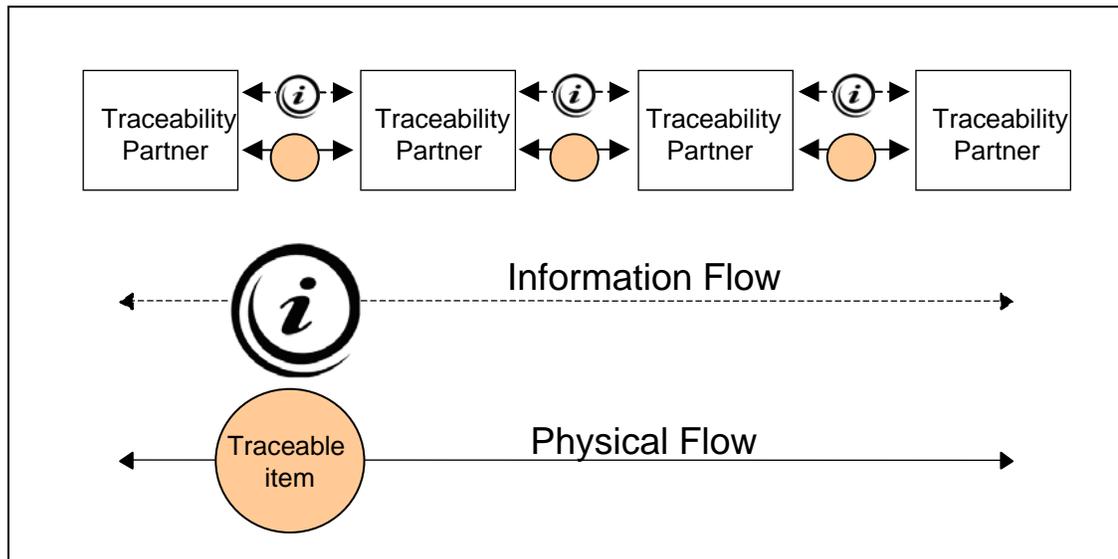
Traceability involves trading partners, a physical flow with traceable items and information flows with traceability data. Trading partners can be any actor in the supply chain. The physical flow can include, depending on the industry, any product from initial inputs up to, but not including, sale to the final consumer. Traceability during the physical flow can also include the use of a traceable item and the destruction of any traceable item.

For example in the food sector, the following products may be within the scope of a traceability system:

- Any input to animal or plant agriculture, e.g., feed, pesticide

- Any individual product destined for human consumption, e.g., an egg

- Any ingredient used in a multi-ingredient food, e.g., the flour, eggs, spices, additives, etc., in a cake

- Any item of packaging used in contact with a product. Examples of packaging include a glass bottle, a sealed foil pack, a tin, plastic film or a carton

- Any finished manufactured product, e.g., a batch / lot of cakes

- Any trade item and logistic unit, e.g., a tank of milk

4.2.1. Immediate Phase

The outputs of the immediate phase are:

- To define the traceability process

- To define minimum traceability requirements for all

- To identify existing GS1 standards and new requirements to be leveraged or developed as a priority

The principles of traceability can apply to any industry served by GS1 even if meeting regulatory requirements and establishing the basis for efficient product recalls and withdrawals in the food sector is considered to be the initial priority.

4.2.2. Subsequent Phases

The following topics may be addressed in subsequent phases:

- Development of new GS1 Standards required for traceability

- Industry or application specific extensions

- Use of traceability information (e.g., notification of a product withdrawal or recall)

- Exceptions

- Traceability up to the final consumer (beyond the point of retail sale)

- Waste

- Samples (laboratory samples or promotional items)

- Returnable assets (e.g., roll cages, tanker trucks, reusable pallets...)

4.3. Out of Scope

The process of collaborative product development and defining product specifications is not part of the traceability process. However, data deriving from this process may need to be taken into account as part of the traceability data for a product recall.

Industry or application specific user guidelines will need to be developed to facilitate the implementation of the GS1 Global Traceability Standard. The implementation process required to incorporate all participants in a supply chain traceability process standard is out of scope of the standard in itself including, e.g., training and implementation support.

5. General Definition

5.1. Initial Challenges

Companies have different objectives and ways of implementing traceability. These differences are intrinsic to their various roles in the supply chain (e.g., manufacturer, distributor, transporter), from the diversity of products and sectors, to their regulatory and business environment, to their different strategies in terms of costs and benefits.

In many countries, trading partners such as farmers have limited understanding of traceability requirements and no capital to invest in traceability tools, yet products are supplied to sophisticated markets where traceability is required. This can be addressed using generic requirements for traceability using simple business processes.

Legislation generally does not specify the traceability system to be used. Most products cross geographic borders at least once in their life cycle, subjecting them to multiple, sometimes inconsistent, regulations. Supply chains have different business requirements and different expectations in terms of enabling technologies. Some do not recommend any specific automatic data capture (e.g., Can-Trace); some recommend best practices with bar-codes and EDI (e.g., ECR Europe); some are beginning to use RFID; and some are implementing a traceability network to be able to electronically retrieve information about products from each point along the chain.

The challenge for this Process Standard is to agree on generic requirements and on a common way to describe the traceability process beyond these differences.

For more details on challenges faced when designing traceability systems across the chain, please refer for example to "Traceability in the U.S. Food Supply: Economic Theory and Industry Studies", USDA, Economic Research Service, March 2004.

The GS1 Global Traceability Standard remains a high level description of the process enabling and promoting supply chain collaboration but allowing each company to design its traceability system in terms of breadth, depth and precision with regards to its own objective. This process standard is applicable to large and small companies in any part of the supply chain.

5.2. Assumptions

The GS1 Global Traceability Standard is based on the use of global, voluntary GS1 standards. The following definition taken from ISO 9001:2000 is considered as the reference definition of traceability in this document:

*"**Traceability** is the ability to trace the history, application or location of that which is under consideration."*

For further examples of existing definitions, please refer to the documents listed in section 3, notably documents published by USDA, EU Regulation 178/2002/EC, Codex, Ministry of Economy from Japan, GS1, ECR Europe and CIES.

For specific industry sectors, there may be other definitions. For clarity and to assist shared understanding and wider implementation of this GS1 Global Traceability Standard, a Glossary of Business Terms has been identified (section 13). It is recommended that the reader studies this glossary before reading section 6 to12 of this document.

5.3. Dependencies

The following GS1 standards enable implementation of the GS1 Global Traceability Standard:

- Global Trade Item Number (GTIN)
- Global Location Number (GLN)
- Serial Shipping Container Code (SSCC)
- UCC/EAN-128
- Reduced Space Symbology (RSS)
- Electronic Product Code (EPC)
- Global Data Dictionary (GDD)
- XML and EANCOM e-business messages (Align and Deliver)
- General Specifications

GS1 user groups have already established a number of User Guidelines proposing the use of GS1 Standards as part of the traceability process ; for example, Meat, Fruit, Wines and Spirits (refer to section 3 References). These provide helpful practical examples for companies, industry sectors and countries that seek similar collaborative solutions.

6. Business Process Analysis

This analysis breaks down the traceability process. The resultant sub-processes and concepts are defined using terminology that must be understood before reading through this section; the reader should also refer to the Glossary in Section13.

Included here in this section is:

- an explanation of internal and external traceability
- the concept of roles such as Traceable Item Creator and Traceability Data Source
- a Traceable Item Matrix to facilitate the understanding that the traceable item can exist at different levels
- a breakdown of the different responsibilities that can result due to the traceable item involving both a data flow and a physical flow which may involve different parties (Traceable Item Source and Traceable Item Recipient, Traceability Data Source and Traceability Data Recipient).

The specific Business Requirements (BR) and Business Rules (BRU) in parenthesis (e.g., BRU 14) are detailed in section 6.

## 6.1. Business Scenario for Traceability

6.1.1. Business Process Participants Descriptions

The GS1 System distinguishes between parties and roles.

- A party is a generalisation of a legal or physical entity, for example a retailer.
- A role is a specific function of a party in a specific process at a specific time for example, a buyer.

A party can have more than one role. For example, the Manufacturer can act as a seller of items and also as a buyer of raw materials.

Figure 6-1 Party Relationship
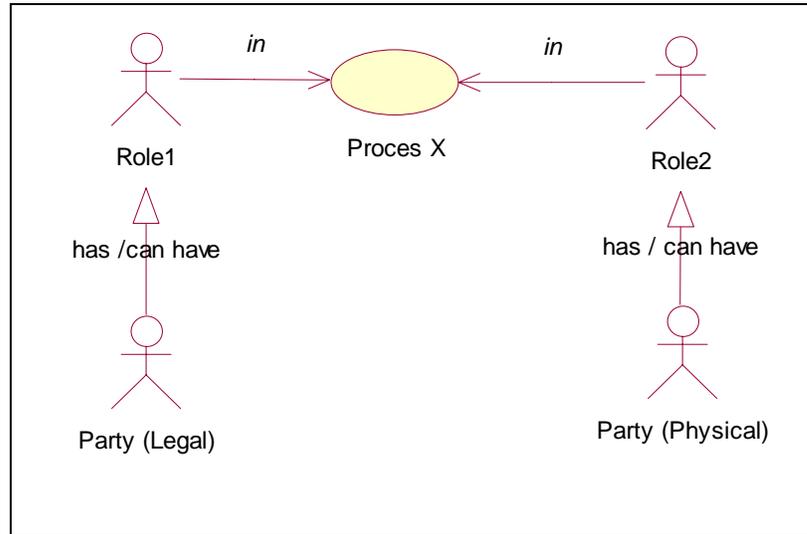
Figure 6-1 shows two parties, each of them plays a different role in the process.

List of Parties:

Party	Description
Carrier / Third Party Logistics Provider (3PL)	The party responsible for the delivery or shipping of the traceable item.
Processor / Manufacturer / Primary Producer	Typically receives inputs and transforms those inputs. Examples include the farmer, an abattoir or a packer that consolidates product from a number of growers, and a food manufacturer that processes food ingredients into a finished product. A supply chain may be comprised of more than one processor/manufacturer/primary producer.
Retailer / Point of Sale or Service Operator	Has the final relationship with the consumer. For example, a retailer, healthcare provider, institution, or hospitality service such as a hotel or restaurant.
Warehouse / Distribution Centre	Responsible for the handling (may transform the traceable item) and storage of the traceable item.
Authorities	The party legally mandated to protect the public interest.

The same legal entity can be more than one party. For example a Third Party Logistics Provider may also act as a Warehouse or Distribution Centre.

List of Roles:

Role	Description
Brand Owner	The party that is responsible for allocating GS1 System numbering and bar code symbols on a given trade item. The administrator of a GS1 Company Prefix. And / or the party that is the ultimate authority for the trade item. And / or the owner of the product specifications. And / or responsible for placing a traceable item into commerce.

| Role	Description
Traceability Data Creator	The Traceability Partner that generates traceability information.
Traceability Data Recipient	The Traceability Partner authorized to view, use, and download traceability information.
Traceability Data Source	The Traceability Partner that provides the traceability information.
Traceable Item Creator	The Traceability Partner that generates a traceable item, or makes a distinct traceable item by transformation of one or more traceable items.
Traceable Item Recipient	The Traceability Partner that receives the traceable item.
Traceable Item Source	The Traceability Partner that despatches or provides a traceable item.
Trace Request Initiator	The person who starts the trace request.
Transporter	The Traceability Partner that receives, carries, and delivers one or more traceable items from one point to another without transforming the traceable item(s). Typically only has possession, custody, or control of a traceable item, but may have ownership.

Figure 6-2 Role
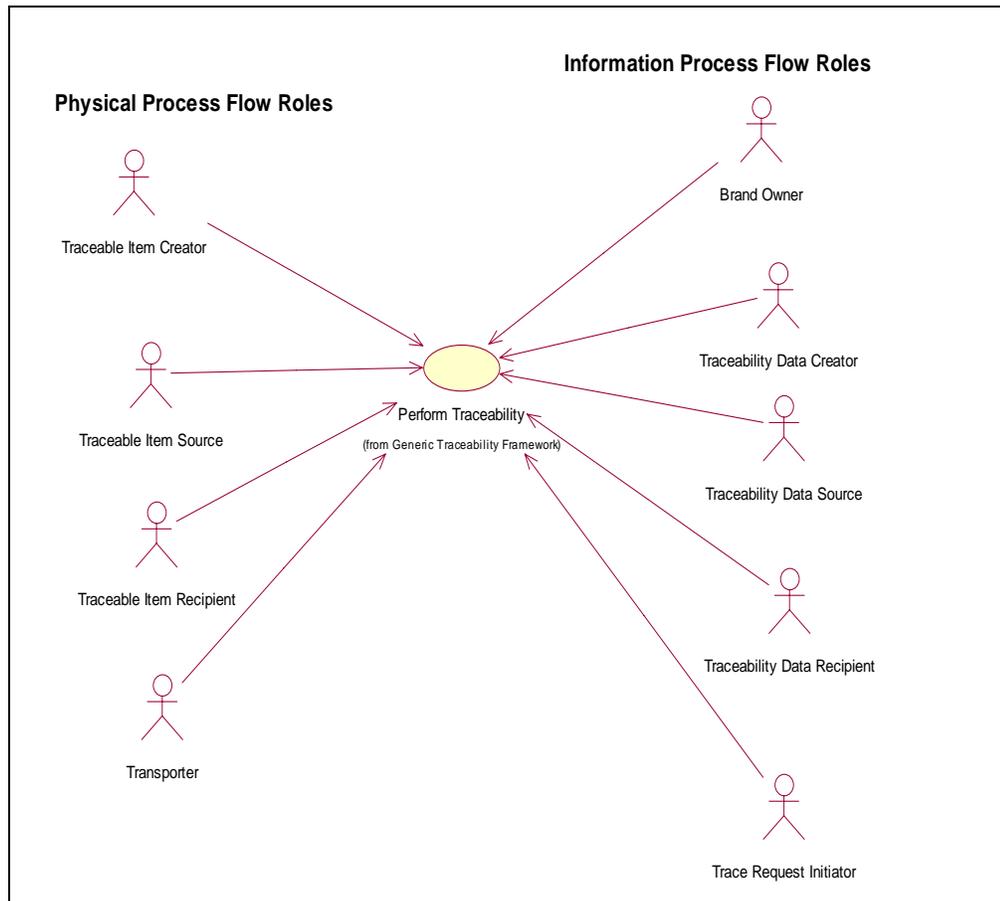
Figure 6-2 illustrates that parties with different roles all have a responsibility to perform traceability.

Figure 6-3 Example Manufacturer Party Relationship
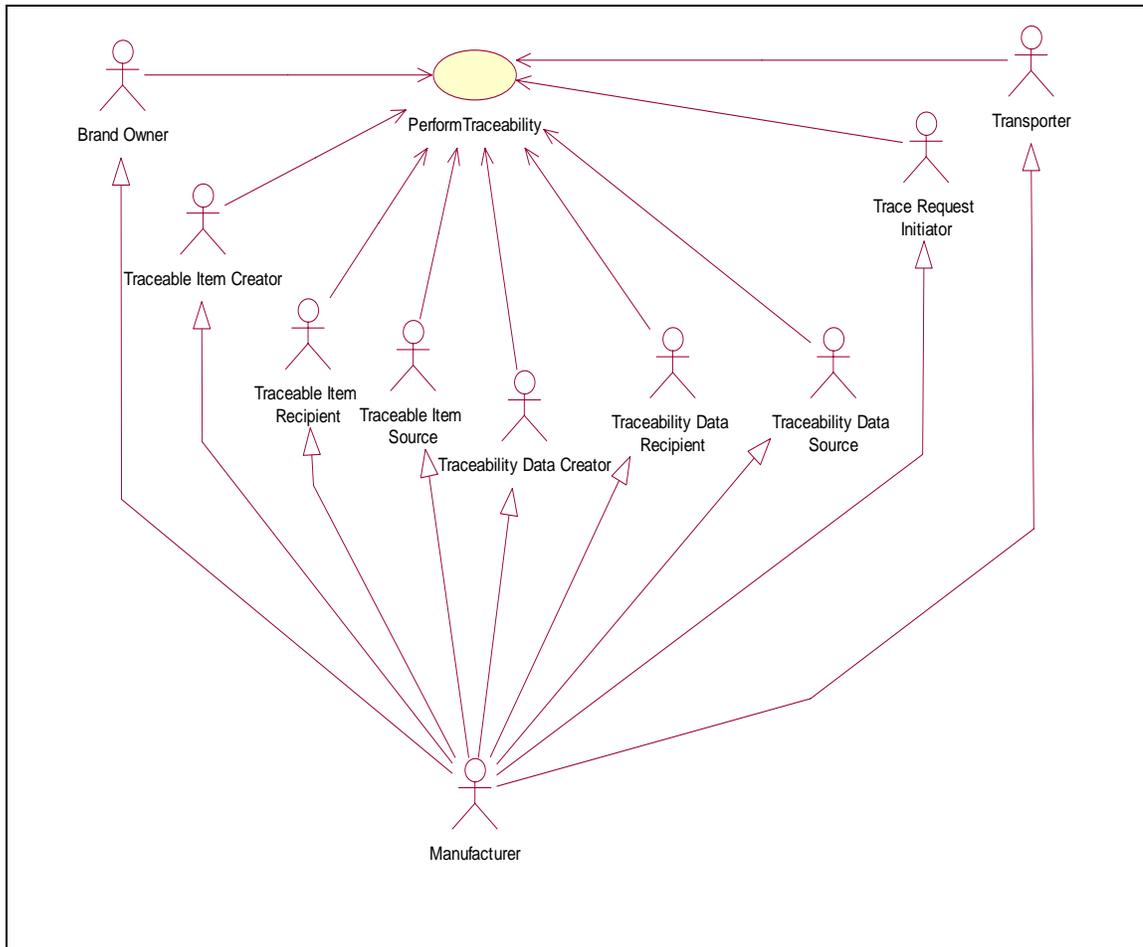
Parties in the Supply Chain often play multiple roles in the traceability process; Figure 6-3 illustrates the Manufacturer playing multiple roles.

Supply chains are complex, there is not one simple and unique schema describing who is involved in the Supply Chain from upstream to downstream for all industry sectors. Yet there are typical roles in all supply chains. Reference is made to the five primary parties in this document, though there may also be intermediary parties such as secondary processors.

By the time a traceable item is purchased and consumed, it may have gone through a number of events and transformations. Each transformation will have involved a number of different parties. Every party has a responsibility to manage traceability and can use the generic traceability framework to achieve this goal.

While maintaining traceability is generally the responsibility of the Traceable Item Source and Traceable Item Recipient (party with "possession, custody, or control" of the traceable item), in some instances other parties may also have responsibility. For example, an importer may never take ownership or possession of a shipment but may have a responsibility to regulatory authorities as the "person responsible" for the traceable item. Some parties that act as an agent for another party, and never take physical possession of the traceable item (such as an importer or food broker) may also be viewed by their Traceability Partners as having responsibility for traceability.

With regard to parties, we have on the one hand all Traceability Partners involved in the physical flow and / or information flow (processor, carrier, retailers), and on the other hand other parties that are not

directly involved in the trade (such as certification bodies, authorities). The function or internal process often determines the level of responsibility.

In the case of product recall, two levels of responsibility can be distinguished:

■ **Primary responsibility:** Typically importers, producers, processors, manufacturers, or distributors and food retailers who are responsible for the specification and content of products, withdrawal and / or recall and notification. They are each responsible within the limits of the activities under their control.

■ **Secondary responsibility:** Typically transporters, carriers, ship owners, storage companies, and logistics providers who work on behalf of the companies with primary responsibility. However, those with secondary responsibility must create, capture, record and share data about their activities.

6.1.2. Business Scenario Overview

Traceability management involves the association of a flow of information with the physical flow of traceable items. Each actor must perform different roles within the supply chain, but all actors must follow the basic agreed-to steps of the traceability process.

Figure 6-4 Traceability across supply chain
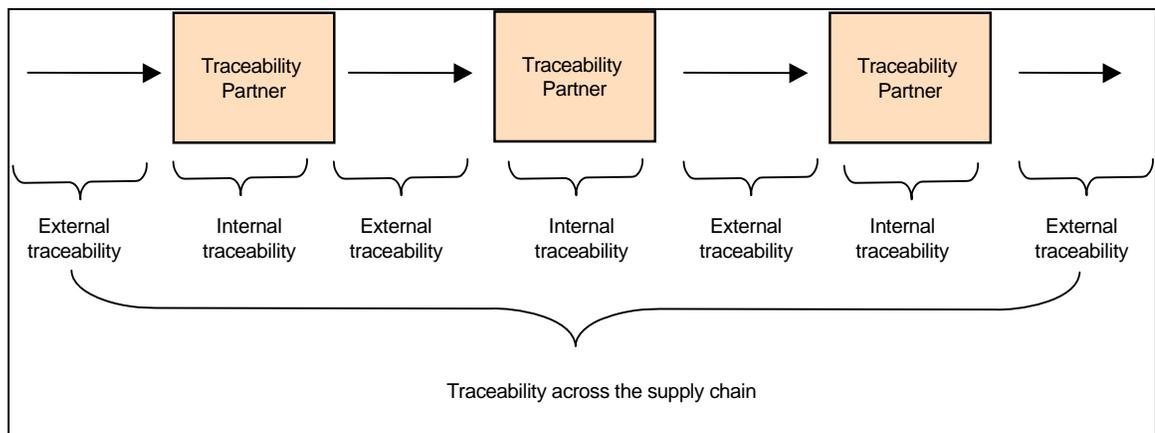
In order to achieve traceability across the supply chain, all Traceability Partners must achieve internal and external traceability (BRU 10).

6.1.2.1. Internal Traceability

Internal traceability takes place when a Traceability Partner receives one or several instances of traceable items as inputs that are subjected to internal processes, before one or more instances of traceable items are output. The following are the relevant events in respect of collecting traceability data.

Figure 6-5 Internal Traceability
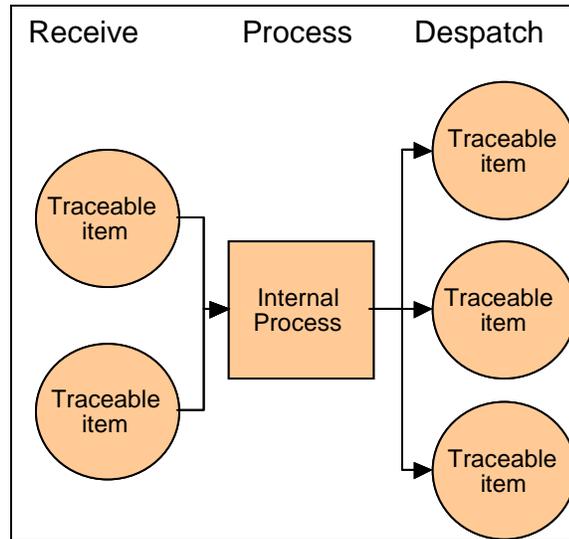
Every trading partner involved in the physical flow of products receives, processes, and despatches instances of traceable items.

The following list shows the events when traceability data should be collected:

- **Receiving** is the result of a traceable item crossing the boundary from external to internal, transferring from one party to another party.

- The traceable item received could be for example, raw materials, packaging, or finished products.

- **Internal process** is one or more subprocesses performed by the same party or without a significant involvement of other trading partners. Each sub process involves traceable item inputs and results in traceable item outputs. At a minimum, the internal process must consist of one of the four following sub processes:

  □ Movement

  □ Transformation

  □ Storage

  □ Destruction

- **Movement** is the physical relocation of a traceable item.

- **Transformation** is the act of changing a traceable item, its identity and/or characteristics, such as combining ingredients to make a finished product or the combination of different finished products to create a mixed pallet. Transformation can be production, grouping, splitting, mixing, aggregation, packing or re-packing traceable items. The act of transforming a traceable item requires specific responsibilities for the Traceable Item Creator such as applying the identification to the newly created physical traceable item(s) and recording the relevant data to support the information requirements.

- **Storage** is the act of holding a traceable item at a location within the Traceability Partner's organisation.

- **Destruction** is the act of destroying a traceable item. For example, items returned to a company may be incinerated.

Depending on the internal process, the relationship between traceable Item received (inputs) and traceable items shipped (outputs) can be:

- Many to One (e.g., when raw materials and packaging are combined into a finished good)

- One to Many (e.g., when a batch of product stored in bulk is packed into cases)

- Many to Many (e.g., when items are repacked into new promotion formats)

- One to One (e.g., when a raw material is transformed from fresh to frozen)

- Many to None (e.g., when finished goods are destroyed)

- One to None (e.g., when a material is destroyed)

- None to One (e.g., when a batch of water is produced)

- None to Many (e.g., when batches of fish are caught)

Despatching is the transfer from one actor to another actor in the supply chain.

A company that is not physically handling any products but that has a legal or contractual responsibility towards the products (Brand Owner, broker…) may still be involved in traceability requirements for the information flow. As an example, the Brand Owner must be able to reply to a trace request concerning the traceable item details.

A **change of status** (e.g. quarantine, change of ownership…) is also a possible event.

Every Traceability Partner has a responsibility to maintain data that links input into a transformation process with the output, and that links the original and final location after movement (BRU 2, BR 14). For example, this link data could be held as quality records.

It's understood that each company may have its own internal process(es) to track product throughout its internal movement and / or transformation. Traceability records of movement and storage may help identify the impact of quality failure such as incorrect storage temperature or damage during transit. For those companies who currently do not have any processes in place, or are looking to standardise their external and internal processes, this document recommends the use of GS1 global standards to capture the data that links inputs during a products internal life cycle.

6.1.2.2. External Traceability

External traceability takes place when instances of a traceable item are physically handed over from one Traceability Partner (Traceable Item Source) to another (Traceable Item Recipient).

Figure 6-6 External Traceability
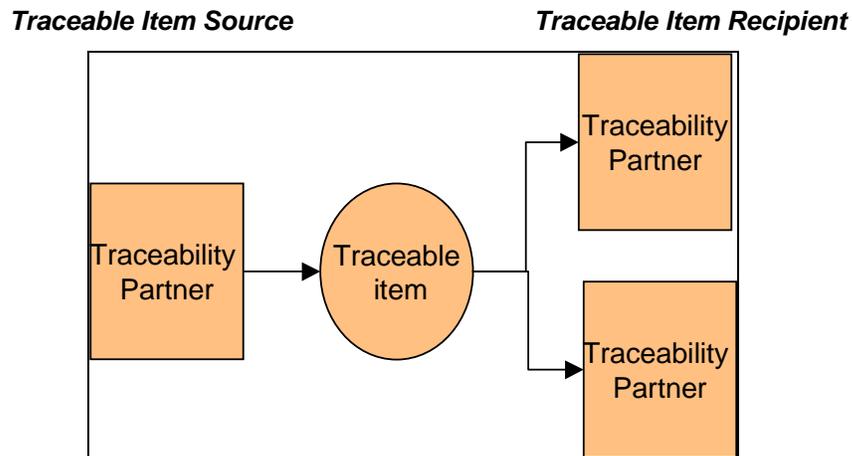
Each Traceability Partner should be able to trace back to the direct source and be able to identify the direct recipient of the traceable item (one step up, one step down principle).

A shipment may contain several levels of traceable items (e.g., logistic units each containing part of a batch / lot of consumer units) (BRU 2, BRU 6, BRU 8). This allows the company to trace back and trace forward at both the logistic unit level and the production batch / lot level (e.g., a batch of consumer units split in several logistic units for different customers).

Traceability does not imply each traceability partner must hold and publish all traceability information, but the Traceable Item Source and Recipient must communicate and record identification of at least one common level of traceable item within their respective systems (e.g., logistic units) (BRU 16, BRU 21). This ensures efficient information flow of data when tracing back or tracing forward.

All traceable items must carry identification allocated to it and be labeled / marked / tagged at source (creation) (BR 6). This document recommends the use of a GTIN or SSCC.

The Brand Owner must ensure the true uniqueness of the identification of the traceable item (BR 7). Where sub-contractors or licensees are involved, the way to proceed to ensure the uniqueness is up to the Brand Owner and depends on contractual agreements.

The identification carrier (mark / tag / label / accompanying document sometimes called "passport" or "identity card" in some industry sectors) must remain on the traceable item or attached to it until the traceable item is consumed or destroyed. (BR 8).

6.1.2.3. Information Flow Links

In parallel to the physical flow, the Traceable Item Source must share information with the Traceable Item Recipient and the Traceable Item Recipient must collect this information (BRU 15, BRU 21, BRU 22, BRU 23). Traceability requirements in terms of information flow may be different for transporters and Traceable Item Creators.

Figure 6-7 Traceable Item Creator and Transporter Information Flow
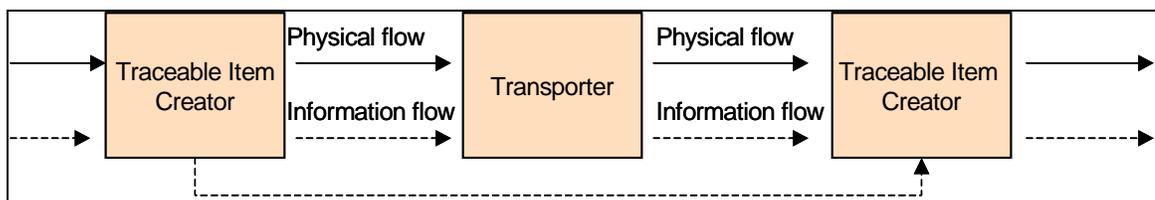
The "One up, one down" principle between the supplier and the customer may mean several parallel flows of data: from supplier to customer, from supplier via a Third Party Logistics Provider, from a Third Party Logistics Provider on behalf of the supplier (who would not itself have all the data about transportation / storage but would set "service level agreements / contracts" to fulfil responsibility via a third party...)

In most trading relationships, the Buyer and the Seller are the Traceability Data Recipient and Traceability Data Source, even if they are not handling the traceable items.

There is a minimum amount of data that must be recorded internally by Traceability Partners. They must maintain the minimum data elements to ensure visibility and linkage to all applicable levels. Some of these data elements must be exchanged between Traceability Partners (BR 13).

Depending on the internal objective, the industry or the specific application of the traceability process, additional information may also need to be captured, recorded and shared. This document acts as the foundation for the business application in which additional information can be included.

6.1.2.4. Traceability Data

Traceability data includes information about (BRU 3):

- Who? Party [Identification + data elements]

- Where? Location [Identification + data elements]

- When? Date / Time

- What? Traceable item [Identification + data elements]

- What happened? Process or event [Identification + data elements]

Traceability data can be planned, expected or actual. With respect to traceability, it is usually the actual date that is relevant.

Traceability data can be master or transactional data (BRU 09). In the traceability context, master data is relatively consistent over time and independent from day to day physical transactions (e.g., name of the trade item, dimensions, country of origin of the raw material if part of the product specifications…). Transactional data is created during the physical flow of goods. It can only be collected when events occur (e.g., date of receipt, weight if variable…). The recommendation is to align master data which is public (shared between trading partners) before the physical flow begins (see section 6.1.3).

Figure 6-8 Traceability Data Matrix with Examples
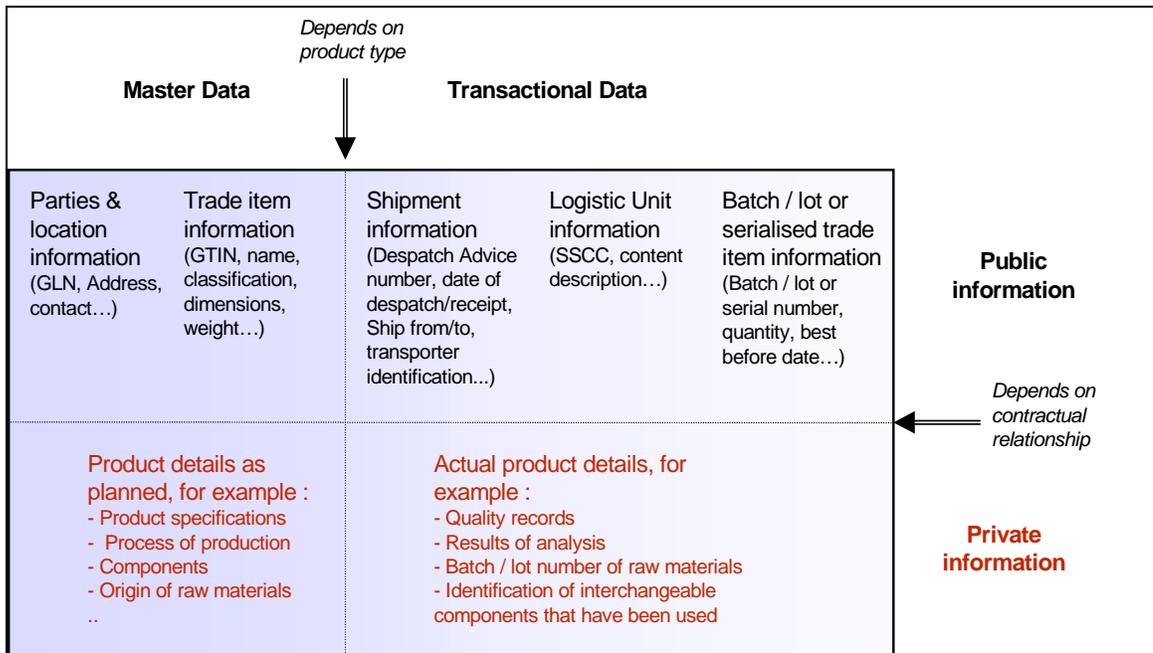
Traceability does not imply Traceability Partners must hold and share all traceability information, but they must all have the ability to internally search and access relevant information, and share the necessary information required without infringing the intellectual property of each Traceability Partner (BRU 14).

The type of the traceability data impacts the appropriate solution used to record the information and later on, to conduct a trace request:

1. If the traceability data is private, it is likely to be in the traceability records of one of the previous or subsequent trading partners.

2. If the traceability data is public, it may be in the traceability records of the traceable item holders (successive traceable item sources and recipients).

3. If the traceability data is a key for the identification of the traceable item, it should be on the identification carrier (BR 6).

Figure 6-9 Where is the Traceability Data?

1. Information is in traceability records from one of the previous or subsequent traceability partners.

2. Information is in the traceability records of the traceable item holder because it has been communicated by the previous Traceability Partner or created internally.

Information flow

physical flow

Traceability Partner

Traceability Partner

Traceability Partner

3. Information is available on the identification carrier of the traceable item or of the asset containing it.

6.1.2.5. Trace Request

A trace request is a formal inquiry about history, application or location of a traceable item. Any Traceability Partner can initiate a trace request (e.g., a customer, a producer).

A trace request starts when a Traceability Partner is looking for information about a traceable item and this information is not available internally (BR 18, BR 19). The authorities or a consumer complaint may be the reason for a Traceability Partner to start a trace request.
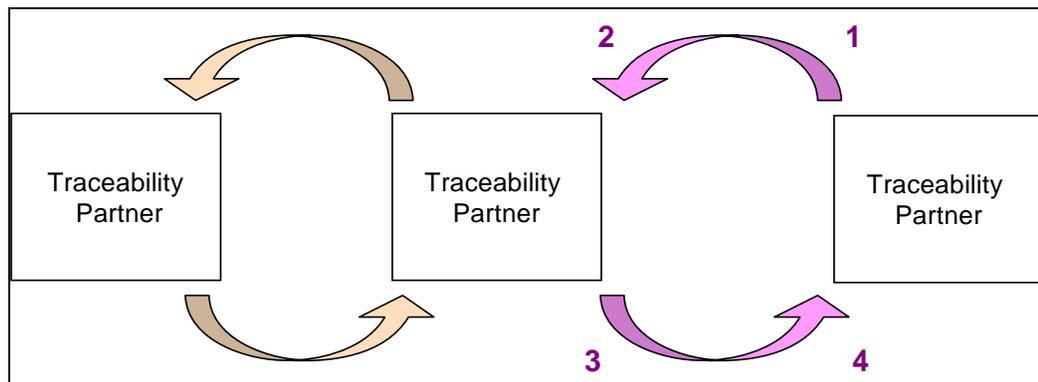
Figure 6-10 Trace Request

Traceability Partner

Traceability Partner

Traceability Partner

A Trace Request Initiator must contact the source of the traceable item and through a repetitive process via each link in the supply chain, the Traceable Item Creator, Brand Owner or Licensee will be contacted (, BRU 17, BRU 24). The logic of the trace request is that it follows the same path as the information flow (Fig. 8). The Trace Request may jump a step to contact a Traceability Partner further up or down the chain in order to obtain the information more quickly.

The data source must reply as quickly as possible to the enquiry (BRU 25). The time period allowed may be defined in local regulations or commercial agreements.

A trace request may trigger subsequent trace requests up or down several levels of the supply chain in order to fulfil the original request (BRU 26). This fulfils the requirement often included in regulations to the effect that traceability must work "one step up and one step down" the supply chain.

A reply may include all the data required, part of that data or may say that no information is available. There are many types of trace request, they depend on the specific business need and use of the information. For example:

■ What are the ingredients of this traceable item? (e.g., inquiry about possible contaminant or allergen which is not mentioned on the label)

■ Where are these traceable items located? (e.g., inquiry about the status of delivery or of product removal)

■ Which traceable items have been created using this specific traceable item pallet of origin or batch of raw material? (e.g., to facilitate product recall or withdrawal)

The relevant trace request scenario, data and messages can be precisely defined only in the context of a specific business need or application.

6.1.2.6. Traceable Item Hierarchy

Figure 6-11 Traceable Item Hierarchy
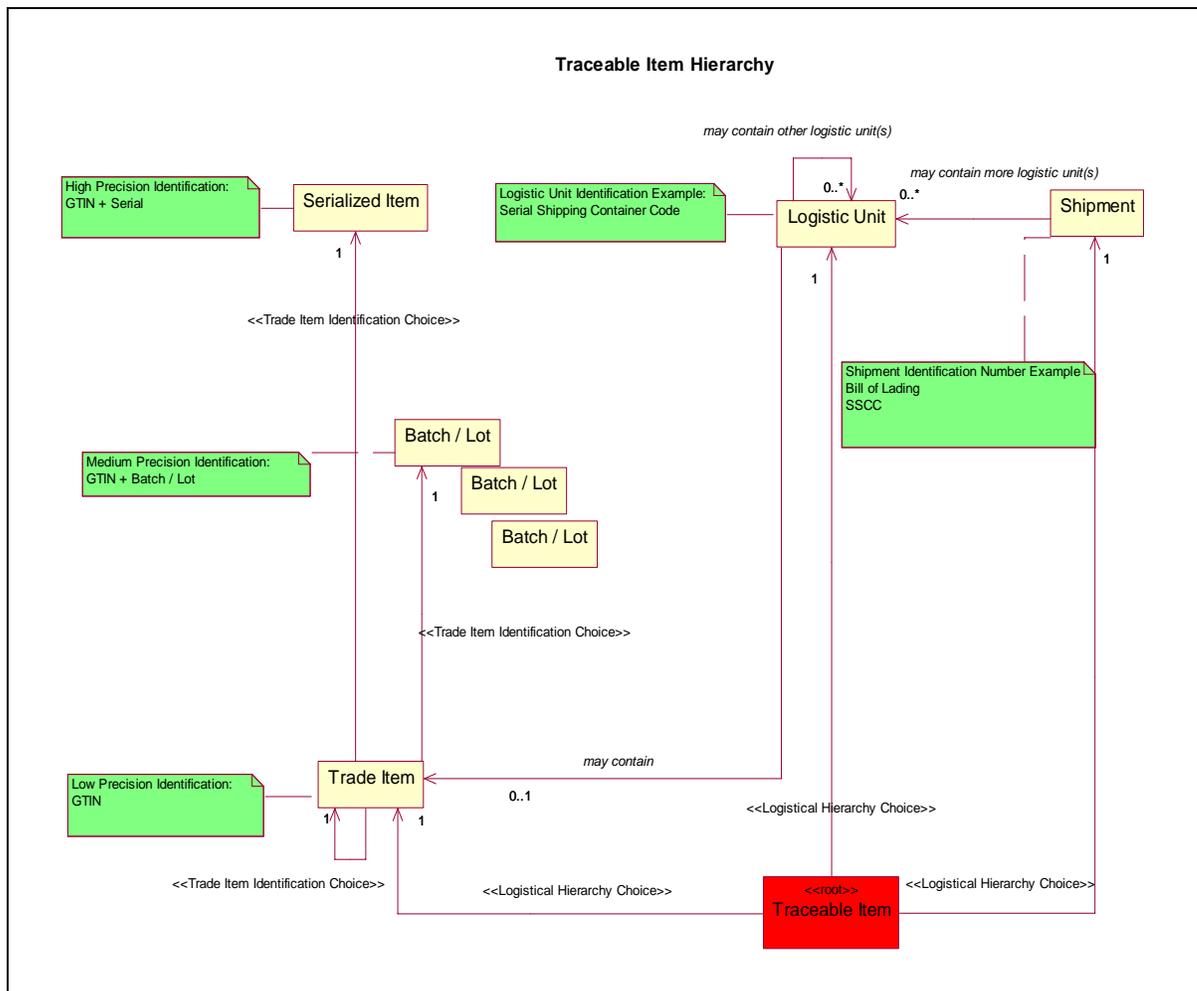
A traceable item is a physical object where there may be a need to retrieve information about its history, application, or location.

The level at which the traceable item is defined within a product packaging or logistical hierarchy is dependent on the industry and degree of control required.

A traceable item may be a

- Shipment
  - □ May contain one or more logistics unit(s)

- Logistics unit
  - □ May contain other logistics unit(s)
  - □ May contain one or more trade item(s)
  - □ May be a trade item

- Trade item
  - □ Trade item
  - □ Batch / Lot of trade items
  - □ Serialized trade item

The level of traceable item is a combination of logistical hierarchy levels and the precision of the identification.

Here are some logistical examples:

<u>Shipment:</u>	Truck Load, Vessel, 10 pallets of various items
<u>Logistics unit:</u>	Pallet, Container
<u>Trade item not crossing the POS:</u>	Carton, Bag
<u>Trade item crossing the POS:</u>	Consumer Unit

Figure 6-12 Traceable Item Matrix

Precision of the identification	Shipment	Logistic Units	Trade Item not crossing the point of sale	Trade Item crossing the POS, Consumer unit
Unique (serialized)	Shipment Identification Number (SIN)	SSCC	GTIN + Serial number SGTIN	GTIN + Serial Number SGTIN
Specific (batch)	Not applicable	Not applicable	GTIN + Batch / Lot Number	GTIN + Batch / Lot Number
Generic	Not applicable	Not applicable	GTIN	GTIN

Level in the logistical hierarchy

The GTIN is the basis for product identification. For the purpose of traceability, this may not be sufficient, requiring additional information to uniquely identify a product or grouping of products. This concept is indicated in the yellow shading in Figure 13.

 Assumptions for the traceable item matrix / hierarchy:

■ All traceable items may need to be physically marked with a Batch / Lot Number to comply with legal requirements, e.g., food products

■ Where appropriate, e.g., chilled and fresh food, a Best Before Date should be added

■ As the level of precision required is increased it may be appropriate to identify traceable items with a Serial Number, e.g., a car, a washing machine, a personal computer

■ A Serial Number may be appropriate for trade items not crossing the point of sale (cases of consumer units) that need to be traced at this level, e.g., a tray of fruit or vegetables, a carton of meat

When the logistic unit is a trade item (e.g., a pallet), it is also identified with a GTIN and cumulates the corresponding identification standards from both columns "Logistic Unit" and "Trade Item not crossing the point of sale".

A traceable item may be related to another traceable item, for example:

■ Is contained in

■ Contains (reverse process is possible, e.g., a carton contains 50 T-shirts)

■ Is similar to

■ Is composed of (reverse process is not possible, e.g., a cake is composed of sugar, eggs…)

■ Manufactured just before

■ Manufactured just after

Figure 6-13 Traceable Item Relationship Examples
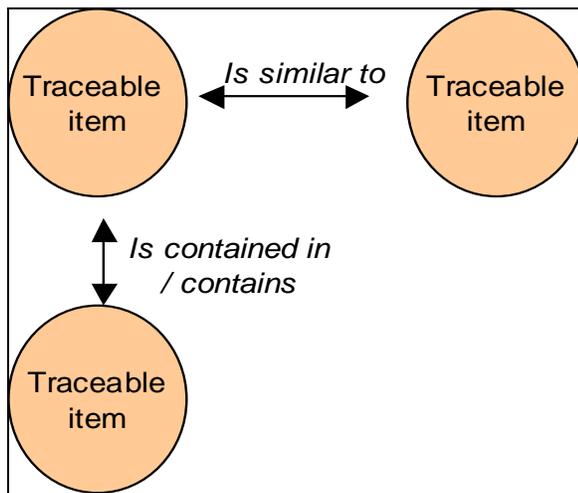
A traceable item could exist in multiple locations at the same time. For example; the traceable item is identified at the trade item and batch level and is stored by or has been sold to many trading partners.

6.1.3. Current Business Scenario ("as is")

The performance goal of the traceability process is for Traceability Partners to be able to retrieve information about the history, application or location of a traceable item from any point in the supply chain.

It is composed of:

A. Plan and Organize (pre-requisite)

Output: All Traceability Partners have determined how to assign, collect, share, and keep traceability data. The Traceability Partners have determined how to manage links between inputs, internal processes, and outputs.

B. Align Master Data

Output: All Traceability Partners have aligned their master data.

C. Record Traceability Data

Output: Traceability Partners can identify traceable items and collect and record relevant traceability data as traceable items move across the supply chain.

D. Request Trace

Output: The traceability data is available and Traceability Partners can provide comprehensive, accurate and timely information to an authorized party upon request about a traceable item.

The trace request involves communication of data that has been collected and recorded. A trace request may be initiated weeks or months after a traceable item has been processed or consumed. The types of trace request that traceability partners wish to conduct determines the traceability data that traceability partners must communicate. For example, quality records are not necessary to locate logistics units but may be relevant if the objective is to clarify the origin of a product safety problem.

E. Use information

The use of the information that results from a trace request may be, for example, to resolve a quality issue or to inform trading partners.

Example: In the case of product withdrawal or recall, a traceability partner sends a trace request upstream in order to identify the cause of the problem and to find out which traceable items may have the same problem. Then there is a downstream trace request in order to locate the products and a notification to trading partners who have received them.

The traceability system is defined as the tools and organisation necessary to implement the traceability process in a given environment, party or group or parties.

Current business scenario depicted in Figure 6-14 below.

Figure 6-14 – Use Case Actor Matrix

Use Case	Plan and Organize		Align Master Data					Record Traceability Data						Request Trace				Use Information
	1. Determine how to assign, collect share, and keep traceability data.	2. Determine how to manage links between inputs, internal processes, and outputs.	3. Assign identification to the party	4. Assign identification to physical locations	5. Assign identification to asset as appropriate.	6. Assign identification to trade item	7. Exchange Master Data	8. Assign Identification to the traceable item when it is created.	9. Apply the identification to the traceable item or in an accompanying document when a transformation takes place.	10. Capture the identification of the traceable item or the asset containing it from the identification carrier when despatching and receiving the traceable item.	11. Collect all other data including traceability information from internal and external sources by any method.	12. Share relevant traceability data (send information by any method).	13. Store traceability data.	14. Initiate the trace request	15. Receive the Trace Request	16. Send a Reponse.	17. Receive a Response	18. Take action
Physical Process Flow Roles																		
Traceable Item Creator	X	X	X	X	X		X	P	P	X	X	X	X	X	X	X	X	X
Traceable Item Source	X	X	X	P	X		X			P	X	X	X	X	X	X	X	X
Traceable Item Recipient	X	X	X	P	X		X			P	X		X	X	X	X	X	X
Transporter	X	X	X	X	X		X			X	X	X	X	X	X	X	X	X
Information Process Flow Roles																		
Brand Owner	X	X	X	X	X	P	X	X					X	X	X	X	X	X
Traceability Data Creator	X	X	X	X	X		X	X				X	X	X	X	X	X	X
Traceability Data Source	X	X	X	X	X		X			X	X	P	X	X	X	X	X	X
Traceability Data Recipient	X	X	X	X	X		X			X	P		X	X	X	X	X	X
Trace Request Initiator														P			P	X

P: is the primary role responsible for the specific use case.

X: designates a role involved in the specific use case.

6.1.4. Proposed Business Scenario ('to be')

Proposed Business Scenarios not applicable

7. Business Rules and Requirements Analysis

7.1. Business Requirements

A business requirement is a statement of <u>need</u> concerning the business area or business process under study. It is something that the system must do or a quality that the system must have. A requirement exists either because the type of product demands certain functions or qualities, or the client wants the requirement to be part of the delivered product.

To keep consistent with the three major activities the following abbreviations are used in the number column for the Business Requirements.

- AMD→Align Master Data
- RTD→Record Traceability Data
- RT→ Request Trace

Key Words

- **MUST = Mandatory -** This word, or the terms "REQUIRED" or "SHALL" means that the definition is an absolute requirement of the specification.

- **MAY= Optional** - This word, or the adjective "OPTIONAL", means that an item is truly optional.

The Corresponding Use Case(s) should be referenced to Figure 6-14.

Table 7-1 Use Cases

Number	Business Requirement	Rationale
BR 1 (AMD)	Any internal or external location which needs to be traced MUST be globally and uniquely identified. This may be at a high level (warehouse location) but could be at the detail level (precise bin location) within a warehouse.	Rationale For unique identification of location. Corresponding Standard GLN Corresponding Use Case(s): 3,4
BR 2 (RTD)	Trading Partners MUST be globally and uniquely identified.	Rationale Identifying the actor to whom a trace request must be directed, will expedite the collection of the traceability information. Corresponding Standard(s) GLN and Party role list for messages Corresponding Use Case(s): 7, 11, 12, 14
BR 3 (AMD)	Any trade item, which needs to be traced forward or traced back, MUST be globally and uniquely identified. This applies to any level of the Product Hierarchy for example, Consumer Unit or a Trade Item not crossing the point of sale	Rationale For unique identification of trade item Corresponding Standard(s) GTIN Corresponding Use Case: 6

Number	Business Requirement	Rationale
BR 4 (AMD)	Any asset, which needs to be traced forward or traced back, MUST be globally and uniquely identified.	Rationale For unique identification of the asset Corresponding Standard(s) GRAI (Global Returnable Asset Identifier) and GIAI (Global Individual Asset Identifier) [Ref 1] General Specifications, section 2.3 Corresponding Use Case: 5
BR 5 (RTD)	The identification of the traceable item MUST be assigned, at the latest, when physically created. When the traceable item is a trade item, the trade item identification MUST at a minimum be identified with a GTIN, For the purpose of traceability, this may not be sufficient, requiring additional information to uniquely identify a product or grouping of products such as a Batch / Lot Number or where appropriate, a serial number. When the traceable item is a logistic unit, it MUST be uniquely identified.	Rationale For unique identification of the traceable item Corresponding Standard(s) GTIN GTIN + Batch / Lot Number GTIN + Serial Number/ SGTIN Logistic Unit – SSCC [Ref 1] General Specifications sections 2.1, 2.2, 2.7, 2.8, 4 Best Practice At minimum this information must be displayed in human readable form. For example printed on the product/label or accompanying document or electronic record. Corresponding Use Case: 8
BR 6 (RTD)	All instances of a traceable item must carry a global, unique identification directly on the traceable item or if not possible at least on the asset containing it or on an accompanying document.	Rationale To carry the unique, global, identification. Corresponding Standard(s) If the traceable item is Trade Item: GTIN Batch / Lot of trade item: GTIN + Batch / Lot Number Serialized Trade Item: GTIN + Serial Number, SGTIN Logistic Unit: SSCC Shipment: Shipment Identification Number [Ref 1] General Specifications section 3 Best Practice : The traceable item identification should be at least one of the following: electronically held electronically transmitted machine readable on the identification carrier. Corresponding Use Case: 9
BR 7 (RTD)	The Brand Owner MUST ensure the unique identification of the traceable item.	Rationale The Brand Owner is the party responsible for allocating GS1 System numbering and bar code symbols on a given trade item. Corresponding Standard(s) [Ref 1] General Specifications Corresponding Use Case: 8

Number	Business Requirement	Rationale
BR 8 (RTD)	The identification carrier MUST remain on or attached to the traceable item until the traceable item is consumed, sold for consumption or destroyed.	Rationale For unique identification of the traceable item throughout the trade item life cycle. Corresponding Standard(s) [Ref 1] General Specifications section 2.2 Allocation Rules and Labelling Corresponding Use Case(s): 9,10
BR 9 (RTD)	The identification carrier MUST remain on or attached to the traceable item when it is packed in an upper level of packaging.	Rationale For unique identification of the traceable item throughout the trade item packaging hierarchy. Corresponding Standard(s) [Ref 1] General Specifications section 2.1 Allocation Rules and Labelling Corresponding Use Case(s): 9,10
BR 10	The identification carrier MUST carry some information to link with at least one Traceability Data Source (i.e. Brand Owner, importer,).	Rationale : This allows you to identify a data source so that a trace request can be directed to it. Corresponding Standard(s) GS1 Logistics Label Corresponding Use Case: 14

Number	Business Requirement	Rationale
BR 11 (RTD)	All Traceable Item Sources and Traceable Item Recipients MUST collect the identification of the traceable item or asset containing it from the identification carrier.	Rationale To follow the path of a traceable item Corresponding Standard(s) With Bar-Codes: If the traceable item is a trade item crossing the point of sale (consumer unit): EAN/UPC, RSS* It the traceable item is a trade item not crossing the point of sale (grouping of trade items): UCC/EAN-128, ITF-14, RSS*, EAN/UPC (excluding EAN / UCC-8) If the traceable item is a Batch / Lot of trade items not crossing the point of sale: UCC/EAN-128, ITF-14, RSS**, EAN/UPC (excluding EAN / UCC-8) If the traceable item is a serialized trade item not crossing the point of sale: UCC/EAN-128, ITF-14, RSS**, EAN/UPC (excluding EAN / UCC-8) If the traceable item is a logistic unit: UCC/EAN-128, RSS* If the traceable item is a shipment: UCC/EAN-128. [Ref 1] General Specifications section 4 With RFID*: 900 MHz class 0 Radio Frequency (RF) Identification Tag 860 - 930 MHz Class 1 Radio Frequency (RF) Identification Tag Radio frequency & Logical Communication Interface Specification Class - 1 Generation 2 UHF EPC Global Air Interface Protocol EPC Tag Data Standard * The technical and data specifications related to RSS and EPC are approved by GS1. RSS is approved for restricted global application. Both RSS and EPC are being considered for application standards but are currently not solutions for an open use. Corresponding Use Case: 10
BR 12 (RTD)	Traceability Partners MUST agree on what the common level of traceable item is and for this common level agree on the set of consistent traceability data to be exchanged.	Rationale The traceability Partners will exchange product with each other and ensure that these goods are uniquely identified to manage links between inputs, internal processes, and outputs. Corresponding Use Case(s): 8 to 13

Number	Business Requirement	Rationale
BR 13 (RTD)	All Traceable Item Source(s) and Traceable Item Recipient(s) MUST record and MAY share the following data elements (often recorded within shipment identification documents): TRADING PARTNER IDENTIFICATION: Traceable Item Source Identification Traceable Item Recipient Identification Traceability Data Source Identification Traceability Data Recipient Identification TRACEABLE ITEM IDENTIFICATION AND DETAILS: When the Traceable Item is a Trade Item: Trade Item Identification Trade Item Description Trade Item Quantity When the Traceable Item is a Batch/ Lot of Trade Items: Trade Item Identification + Batch / Lot Number Trade Item Description Trade Item Quantity When the Traceable Item is a serialised Trade Item: Trade Item Identification + Serial Number Trade Item Description Trade Item Quantity When the Traceable Item is a Logistics Unit: Logistic Unit Identification Logistic Unit Quantity When the Traceable Item is a Shipment: Shipment Identification FOR ALL TRACEABLE ITEMS: Date of Despatch and / or Receipt	Rationale These are the minimum data requirements necessary to perform traceability to manage links between inputs, internal processes, and outputs. Each industry should consider whether an extension to this generic standard is required to meet their specific data requirements. See section 11 "Implementation Considerations". Corresponding Standard(s) Business Message Standards Global Data Dictionary (GDD) EANCOM UCC/EAN-128 and Application Identifiers Best practice All instances of a traceable item must carry a globally unique identification. When a Batch / Lot Number is required to ensure traceability, this Number should be recorded. The product identifier (GTIN) serves as a reference to the full body of product information; examples include description, ingredients, handling requirements, product life. There is no need to duplicate existing records for traceability. For example, a shipment identification serves as a reference to other data elements such as « Ship from », « Ship to », « Date of despatch », « Unit of measure »… Examples of shipment identification: Bill of Lading Number Despatch Advice Number Invoice Number Packing Slip Number Container Number Proof of delivery Refer to BRU 25 for rationale and BR 6 for corresponding standards to Traceable Item identification. Note: The traceability Data Source and Traceable Item Source are often the same Corresponding Use Case(s): 12,13

Number	Business Requirement	Rationale
BR 14 (RTD)	All Traceable Item Creators, Sources and Recipients MUST record the linkage between Traceable Items created, received, processed and / or dispatched.	Rationale Traceability requires the management of successive links between what is received, produced, packed, stored and shipped across the entire supply chain. Corresponding Standard(s) Global Data Dictionary GS1 best practices used internally Corresponding Use Case: 13 Example Batches of trade items contained in a pallet Trade items used as ingredients for a finished good Pallets that have been involved for picking and creating a new pallet
BR 15 (RTD)	The Traceable Item Source MAY have to share or make available some details and quality information about the traceable item with one or more Traceability Partners.	Rationale The Brand Owner is the party responsible for allocating GS1 System numbering and for replying to trace requests about the traceable item details. Resolving a trace request may require the Traceable Item Source to share information with the Brand Owner or other Traceability Partners. Corresponding Standard(s) EANCOM message QALITY Corresponding Use Case: 12
BR 16 (RTD)	The traceable item identification MUST appear in all accompanying documents or messages containing information related to the traceable item.	Rationale Ensure reliability of traceability data to avoid mistakes with manual data entry. It allows the Traceability Partner to cross check the information included in all documents. Corresponding Standard(s) None Corresponding Use Case(s): 11 To 13
BR 17 (RT)	A process or event on which there may be a need to retrieve information MAY be uniquely identified.	Rationale To access the data elements related to the event. Corresponding Standard(s) None Corresponding Use Case(s): 12,14
BR 18 (RT)	Any Traceability Partner MAY send a trace request to a Traceable Item Source, Traceable Item Recipient, Traceability Data Source or Traceability Data Recipient.	Rationale The trace request may be initiated by any Traceability Partner as the suspected problem can originate from anywhere in the supply chain. Corresponding Standard(s) None Corresponding Use Case(s): 14,15

Number	Business Requirement	Rationale
BR 19 (RT)	Traceability partners who wish to initiate a trace request MUST communicate to the Traceability Data Source at least one item of information from the list to help the Traceability Data Source find the information requested : Traceable item identification (or some traceable item attributes) Traceability Partners identification (or some Traceability Partners attributes) Location identification (or some location attributes) Date / Time, period of time Process or event identification (or some process attributes)	Rationale These are the minimum data requirement for the trace request. Corresponding Standard(s) None Corresponding Use Case(s): 14 To 17
BR 20	Traceability data MUST be archived for a minimum period that is set by regulation (e.g., food law), business practice (e.g., internal policy, contract) or GS1 standards.	Rationale Trace requests may occur a long time after the information has been collected. Corresponding Standards None Corresponding Use Case: 13

7.2. Technical Requirements

Technical requirements are technical constraints or capabilities around business requirements (e.g. "claim reports must be sent via the xml"). Technical Requirements include User Interface, Security, Performance, Quality, Backwards Compatibility.

Table 7-2 Technical Requirements

Number	Technical Requirement	Rationale
	No Technical Requirements.	Rationale Test Criteria (pass/fail) *(To be used to test the resulting standard)* Pass: Fail:

7.3. Business Rules

Business rules are statement of **<u>fact</u>** concerning the business area or business process under study that must survive changes to process or data. Business rules are a constraint, in the sense that a business rule lays down what must or must not be the case

Business rules define **what** must be the case rather than **how** it comes to be.

Table 7-3 Business Rules

Number	Rule	Details
BRU 1	Traceability systems and procedures serve the purpose of meeting business, regulatory, and legal requirements for public safety by providing access to relevant party and product traceability information.	Rule Type: Definition Corresponding Use Cases: All
BRU 2	A traceable item must be one of the following: Shipment Logistic unit Trade item Batch / lot of trade items Serialized trade item	Rule Type: Definition Corresponding Use Cases: 8 to 10
BRU 3	Traceability data includes information about: What is it? (i.e., the traceable item) Who has been involved? (i.e., the traceability partner(s)) Where did it happen? (i.e., location) When did it happen? (i.e., date / time, period of time) What happened? (i.e., process or event) The following information is NOT within the scope of an external traceability system: full recipes or formulas financial or pricing data, employees personal data, or research and development data	Rule Type: Definition Rationale Key questions for traceability Corresponding Use Cases: All
BRU 4	Key traceability principles are: Unique identification of products, logistic units, locations and assets Capturing and recording traceability data Sharing traceability data between trading partners Linking in-bound materials through changes to new out-bound traceable items	Rule Type: Definition Corresponding Use Cases: All
BRU 5	Traceability is an integral part of the business process. It is not separate from logistical processes and/or product safety / quality programs.	Rule Type: Definition Corresponding Use Cases: All
BRU 6	A traceable item may be related to another traceable item.	Rule Type: Definition Corresponding Use Cases: 8 to 10
BRU 7	Instances of a traceable item may exist in multiple locations at the same time.	Rule Type: Definition Corresponding Use Cases: 9 to 13 Example: Drugs from the same batch that have been despatched between several customers.

Number	Rule	Details
BRU 8	There may be several levels of traceable items at the same time in one shipment with regards to the traceable item hierarchy.	Rule Type: Definition Corresponding Use Cases: 8 to 17 Example: Refer to fig 12 "Traceable Item Hierarchy"
BRU 9	Traceability data may be master data, constant across time (e.g. GTIN) or transactional, changing with each case or shipment (e.g., lot / batch).	Rule Type: Definition Corresponding Use Cases: 13 to 17
BRU 10	All Traceability Partners must have internal and external traceability to achieve traceability across the supply chain.	Rule Type: Guideline Corresponding Use Cases: All
BRU 11	Every Traceability Partner may decide on HOW to implement internal traceability systems. It is essential that they be able to collect, record, and share the necessary information with upstream and downstream Traceability Partners in an accurate and timely manner.	Rule Type: Guideline Corresponding Use Cases: All
BRU 12	Traceability Partners use GS1 standards to ensure fast and accurate flow of information between trading partners.	Rule Type: Guideline Corresponding Use Cases: All
BRU 13	Traceability Partners should not impose proprietary practices on other Traceability Partners.	Rule Type: Guideline Corresponding Use Cases: All
BRU 14	It is not necessary for ALL Traceability Partners to store and share ALL traceability information, but they must be able to access relevant information and share it without infringing the intellectual property of each traceability partner.	Rule Type: Guideline Corresponding Use Cases: 12 to 17
BRU 15	The minimum information shared between Traceability Partners should be the greater of: 1) minimum requirements defined in this GS1 Global Traceability Standard 2) what is needed for day to day business transactions with trading partners.	Rule Type: Guideline Corresponding Use Case: 12
BRU 16	Each Traceability Partner must define at least one level of traceable item for each shipment.	Rule Type: Guideline Corresponding Use Case: 8
BRU 17	The Brand Owner and / or Traceable Item Creator must know the details of the traceable item and be able to reply to a trace request.	Rule Type: Guideline Corresponding Use Cases: 11 to 17

Number	Rule	Details
BRU 18	A Traceable Item Source must know what has happened to the traceable item during its internal process and when, where, and to whom it has despatched the traceable item. Each Traceability Partner must store the data links between what is received, produced, packed, stored and shipped. When the Traceable Item is mixed with similar items from many locations or batches, e.g. in a grain silo, the Traceability Partner must store records of all inputs and outputs in order to provide fair estimates of where the Traceable Item has gone.	Rule Type: Guideline Corresponding Use Cases: 8 to 13 Example: refer to example 4 in section 10
BRU 19	A Traceable Item Recipient must know the Traceable Item Source that supplied the traceable item.	Rule Type: Guideline Corresponding Use Cases: 11 to 13
BRU 20	If a traceable item is contained within another traceable item and links are maintained, traceability partners may store only records of the movements and location of the higher level traceable item. "Contained in" means that there is an upper level of packaging and that the lower level item can be removed. It is different from an ingredient "composing" a finished good.	Rule Type: Guideline Corresponding Use Cases: 10 to 13
BRU 21	Traceability Partners must link physical movement of traceable items to the information movement, both between the Traceable Item Source and themselves, and between Traceable Item Recipient and themselves. This transactional flow of information must exactly reflect the physical movement. This linkage is necessary for the traceable item to be traced from point of origin to the retail store or foodservice operator. Conversely, this linkage must also ensure that product can be traced back through the supply chain.	Rule Type: Guideline Corresponding Use Cases: 11 to 13
BRU 22	The Traceable Item Recipient may collect information from both the previous Traceable Item Source and the previous Transporter source (land, ocean, rail or air).	Rule Type: Guideline Corresponding Use Cases: 10 to 13
BRU 23	The Traceable Item Source may communicate information to both the Traceable Item Recipient and the subsequent Transporter (land, ocean, rail or air).	Rule Type: Guideline Corresponding Use Cases: 10 to 13
BRU 24	A Trace Request Initiator must contact its Traceability Partners, including the Brand Owner.	Rule Type: Guideline Corresponding Use Case: 14

Number	Rule	Details
BRU 25	The Traceability Data Source must reply as quickly as possible to the party requesting traceability information. The time period allowed may be defined in local regulations or commercial agreements.	Rule Type: Guideline Corresponding Use Cases: 16, 17
BRU 26	A Trace Request may trigger subsequent trace requests up or down the supply chain in order to fulfil the original request.	Rule Type: Guideline Corresponding Use Cases: 14, 15
BRU 27	A traceability system is only as good as its weakest link. If failure occurs at any point, traceability breaks down.	Rule Type: Guideline Corresponding Use Cases: All
BRU 28	Various industries, regions, countries or roles may have additional Business Requirements beyond this generic GS1 Global Traceability Standard. These should be addressed by defining specific extensions.	Rule Type: Guideline Corresponding Use Cases: All

8. Structured Business Scenarios

8.1. Structured Business Scenario for *Perform Traceability*

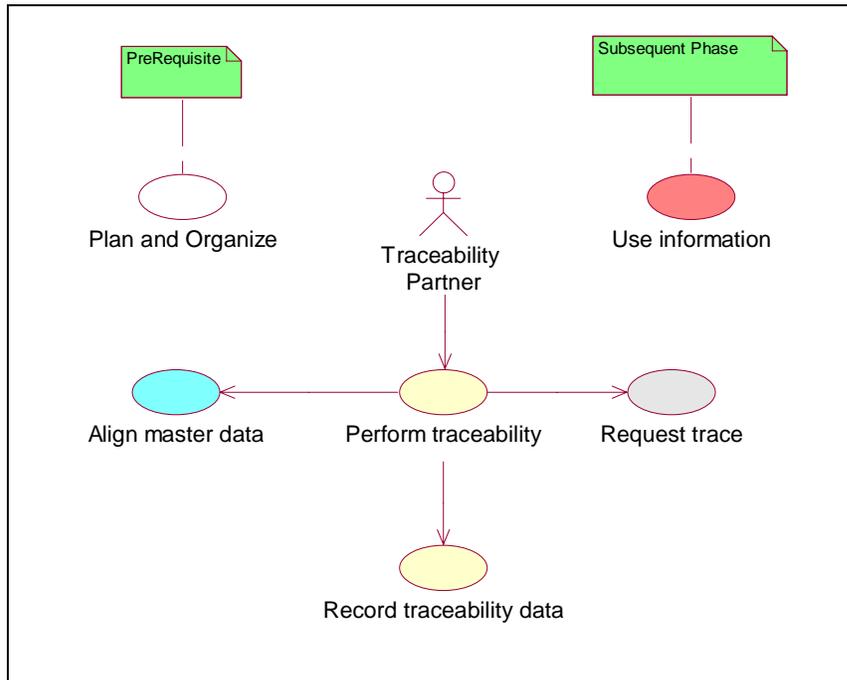The generic traceability framework is broken down into three main activities.

■ Align Master Data

■ Record Traceability Data

■ Request Trace

The Plan and Organize use case is a prerequisite phase and Use Information use case is subsequent phase development, and they are out of scope.

The Use Case Diagram depicts the Traceability Partner's interaction with key processes in the traceability process. The use case diagram is a pictorial representation for Figure 15 Use Case Actor Matrix. They are colour coded Blue (Align Master Data), Yellow (Record Traceability Data), which is our focus, and Grey (Request Trace). Therefore, at the highest level to perform traceability, the Traceability Partner's must Plan and Organize, Align Master Data, Record Traceability Data, Request Trace, and lastly Use Information. The Use Case Description boxes are a textual representation drilling down to the sub processes for each figure 16-19.

8.1.1. Use Case Diagram: Perform Traceability

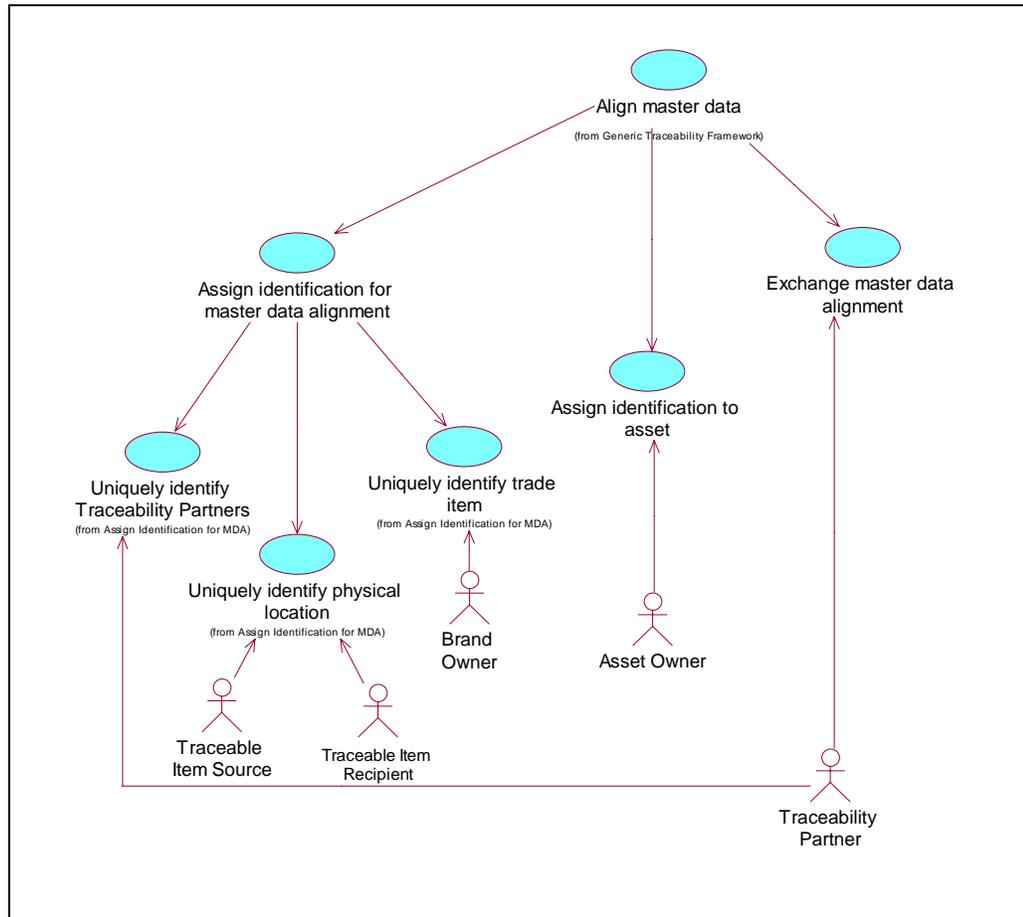**Figure 8-1** Use Case Diagram: Perform Traceability

Use Case ID	UC-1
Use Case Name	Perform traceability
Use Case Description	Provides the processes involved to perform traceability.
Actors (Goal)	Traceability Partner's goal is to perform traceability. Traceable Item Creator, Traceable Item Source, Traceable Item Recipient, Transporter, Brand Owner, Traceability Data Creator, Traceability Data Source, Traceability Data Recipient, and Trace Request Initiator.
Performance Goals	The ability to trace and track trade items across the supply chain. At each step in the process there is basic information that needs to be collected from Traceability Data Source and kept and shared with Traceability Data Recipient. All Traceability Partners involved in the supply chain must systematically associate the physical flow of materials, intermediate and finished products with the information flow. To ensure the continuity of the information flow, each Traceability Partner must communicate pre-defined traceability data to the next one.
Preconditions	Traceability Partners in the supply chain have planned and organized their systems and processes to perform traceability.
Post conditions	Traceability Partners in the supply chain are able to perform traceability.

Scenario	Perform Traceability Begins when: Traceability Partner wishes to conduct future business. (Template Form) Continues with... Step # Primary Actor Secondary Actor (If necessary) Activity Step Step: 1 Actor: Traceability Partner Activity Step: Align master data Step: 2 Actor: Traceability Partner Activity Step: Record traceability data Step: 3 Actor: Traceability Partner Activity Step: Request Trace Ends when: The trace request initiator receives the requested information or receives the message that the information cannot be found.
Alternative Scenario	No alternative scenarios
Related Requirements	Related Business Requirements contained in sub use cases.
Related Rules	Related Business Rules contained in sub use cases.

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8.1.2. Use Case Definition: Align Master Data

Figure 8-2 Use Case Diagram: Align Master Data

Use Case ID	UC-1.1
Use Case Name	Align master data
Use Case Description	Provides the processes to align master data.
Actors (Goal)	Traceability Partner's goal is to align master data.
Performance Goals	The ability to align master data to ensure traceability can be performed.
Preconditions	Traceability Partners in the supply chain wish to align master data.
Post conditions	Traceability Partners in the supply chain are able to exchange aligned master data.

Scenario	**Align Master Data**
	Begins when: Traceability Partner wishes to align master data.
	Step: 1
	Primary Actor: Traceability Partner
	Activity Step: Assign identification to the party.
	Step: 2
	Primary Actor: Traceable Item Source and Traceable Item Recipient.
	Secondary Actor: Traceable Item Creator, Transporter, Brand Owner, Traceability Data Creator, Traceability Data Source, Traceability Data Recipient, and Trace Request Initiator
	Activity Step: Assign identification to the physical locations.
	Step: 3
	Primary Actor: Traceability Partner
	Activity Step: Assign identification to the assets.
	Step: 4
	Primary Actor: Brand Owner
	Activity Step: Assign identification to the trade item
	Step: 5
	Primary Actor: Traceability Partner
	Activity Step: Exchange Master Data
	Ends when: Master data alignment has been achieved.
Alternative Scenario	No alternative scenarios
Related Requirements	Business Requirements: 1-4
Related Rules	Business Rules: 1-7, 9-14, 27, 28

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8.1.3. Use Case Definition: Record Traceability Data

Figure 8-3 Use Case Diagram: Record Traceability Data
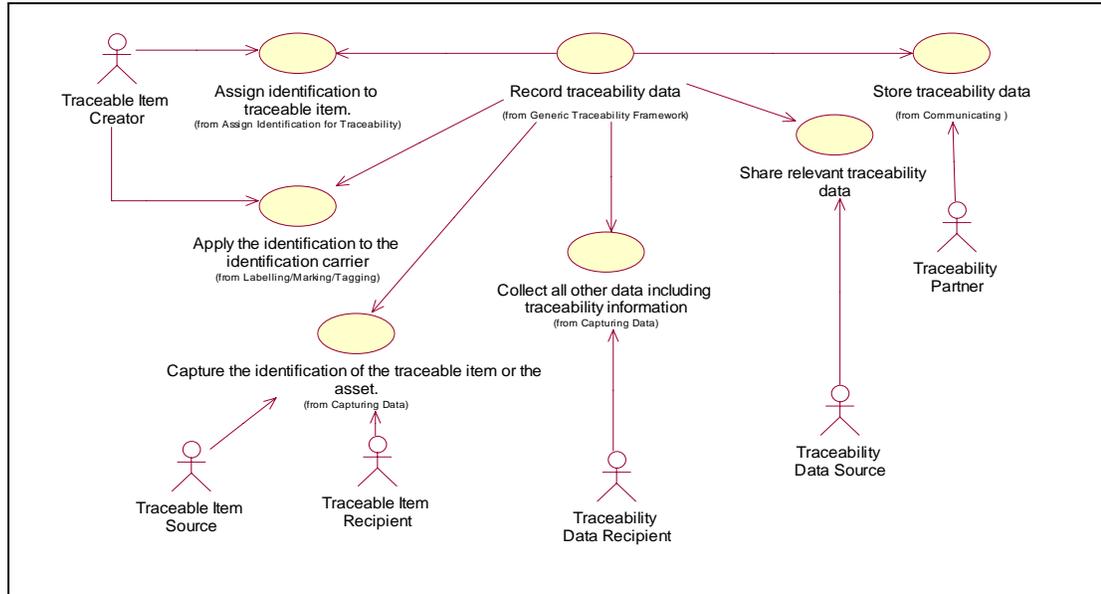
Use Case ID	UC-1.2
Use Case Name	Record traceability data
Use Case Description	Provides the processes involved to record traceability data.
Actors (Goal)	Traceability Partners can identify traceable items and collect and record relevant traceability data as traceable items move across the supply chain.
Performance Goals	The ability to identify traceable items collect and record relevant traceability data as traceable items move across the supply chain.
Preconditions	Aligned master data.
Post conditions	Traceability Partners are able to fulfil a trace request.

Scenario	Record Traceability Data
	Begins when: Manufacturer needs to create additional inventory, or Vendor Managed Inventory triggers inventory creation request.
	Step: 1 Primary Actor: Traceable Item Creator Secondary Actor: Brand Owner and Traceability Data Creator Activity Step: Assign identification to traceable item. A traceable item is a physical object where there may be a need to retrieve information about its history, application, or location. Reference section 6.1.2.5 for details.
	Step: 2 Primary Actor: Traceable Item Creator Activity Step: Apply the identification to the identification carrier on the traceable item or in an accompanying document when a transformation takes place.
	Step: 3 Primary Actor: Traceable Item Source and Traceable Item Recipient Secondary Actor: Traceable Item Creator, Transporter, Traceability Data Source, and Traceability Data Recipient Activity Step: Capture the identification of the traceable item or the asset containing it from the identification carrier when despatching and receiving the traceable item.
	Step: 4 Primary Actor: Traceability Data Recipient Secondary Actor: Traceable Item Creator, Traceable Item Source, Traceable Item Recipient, Transporter, Traceability Data Creator, and Traceability Data Source Activity Step: Collect all other data including traceability information from internal and external sources by any method.
	Step: 5 Primary Actor: Traceability Data Source Secondary Actors: Traceable Item Creator, Traceable Item Source, Transporter, and Traceability Data Creator Activity Step: Share relevant traceability data (send information by any method).
	Step: 6 Primary Actor: Traceability Partner Activity Step: Store traceability data.
	Ends when: Deliver to "Back Room" or "Back Door" (The receiving area for the final stage of the point of sale or service) or destruction of item or out of scope of traceability process.
Alternative Scenario	No alternative scenarios
Related Requirements	Business Requirements 5-17, 20
Related Rules	Business Rules 1-14, 15-23, 27, 28

8.1.4. Use Case Definition: Request Trace

Figure 8-4 Use Case Diagram: Request Trace
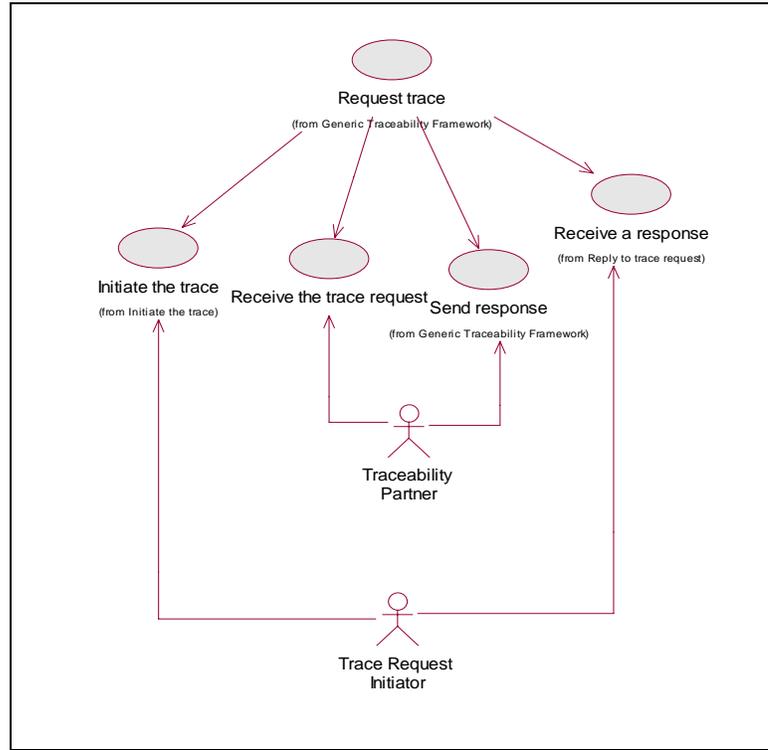
Use Case ID	UC-1.3
Use Case Name	Request trace
Use Case Description	Provides the processes involved to request a trace.
Actors (Goal)	Traceability Partner's goal is to fulfil the trace request.
Performance Goals	The data is available and trading partners can provide comprehensive, accurate and timely information to an authorized party upon request about a traceable item.
Preconditions	The Traceability Partner recorded traceability data for that traceable item.
Post conditions	Traceability Partner in the supply chain received the information on their request.

Use Case ID	UC-1.3
Scenario	<u>Request Trace</u> Begins when: There is a need for trace. The information is not available internally, and the information must be requested to external trading partner. Step: 1 Primary Actor: Trace Request Initiator Secondary Actor: Traceable Item Creator, Traceable Item Source, Traceable Item Recipient, Transporter, Brand Owner, Traceability Data Creator, Traceability Data Source, and Traceability Data Recipient. Activity Step: Initiates trace request. Step: 2 Primary Actor: Traceability Partner Activity Step: Receives the trace request. Step: 3 Primary Actor: Traceability Partner Activity Step: Sends a reply against the requested trace. Ends when: The Trace Request Initiator receives information or receives the message that the information cannot be found.
Alternative Scenario	No alternative scenarios
Related Requirements	Business Requirements 18-19
Related Rules	Business Rules1-7, 9-14, 17-19, 24-28

8.1.5. Activity Diagram

No Activity Diagram

8.1.6. Sequence Diagrams

No Sequence Diagram

9. Business Object Analysis

9.1. Business Object Life-Cycle Discussion

The purpose of this section is to identify and explain the minimum data elements required for a global traceability process standard that a company / industry sector should plan to create, capture, record and be prepared to share with Traceability Partners in the supply chain. (Refer to BR13) Companies should consider adopting these minimum data elements when selecting, designing and implementing their internal business process.

This minimum level is generic to any GS1 member company:

■ Anywhere in the supply chain

■ In any industry or industry sector

■ In companies of any size

There is an implicit understanding that trading partners in a particular industry sector may need to create, capture, record and share additional information beyond those defined here. Specification Number or Best Before Date may be required in some industry sectors or, for example, very specific information may be required, such as "Herd of origin" in the beef industry.

Data is created and recorded at many steps along the supply chain. It is not necessary for all of this to be exchanged with every Traceability Partner, but a minimum amount of traceability data must be exchanged to accompany the physical flow of goods. Other data should be recorded and linked within internal traceability records so that it is available to investigate and share as appropriate when a trace request is received. (Refer to section 6.1.2.4 figure 10 and to BRU 11)

The minimum information required, and corresponding data elements identified are as follows:

Minimum Information Required	Data Element Required	GS1 Standard
Who is my Traceability Partner?	Source identification and Recipient identification for each relevant party. This includes intermediaries such as carriers or 3rd party logistics providers. ■ Parties may serve as a: ■ Traceable Item Source ■ Traceability Data source ■ Traceable Item Recipient ■ Traceability Data Recipient The Traceability Data Source and Traceable Item Source are often the same. The Traceability Data Recipient and Traceable Item Recipient are also often the same.	Global Location Number (GLN)

Minimum Information Required	Data Element Required	GS1 Standard
What is the Traceable Item?	The level at which the traceable item is defined within a product packaging or logistical hierarchy is dependent on the industry and degree of control required. The data elements required are dependent on the level of traceable item chosen as follows: When the Traceable Item is a Trade Item: ■ Trade Item Identification ■ Trade Item Description ■ Trade Item Quantity When the Traceable Item is a batch of trade items : ■ Trade Item Identification ■ Batch / Lot Number ■ Trade Item Description ■ Trade Item Quantity When the Traceable Item is a serialised trade item : ■ Trade Item Identification ■ Serial Number ■ Trade Item Description ■ Trade Item Quantity When the Traceable Item is a Logistics Unit: ■ Logistic Unit Identification ■ Logistic Unit Quantity When the Traceable Item is a Shipment ■ Shipment Identification	Global Trade Item Number (GTIN) Global Data Dictionary (GDD) trade item attributes Depending on the choice of traceable item, the traceable item identification is (refer to BR 5) Trade Item: GTIN Batch / lot of trade item: GTIN + Batch / Lot Number Serialized trade item: GTIN + Serial Number, SGTIN Logistic unit: SSCC and applications identifiers Shipment: Shipment Identification Number UCC/EAN-128 Application Identifiers Note: as at July 2005, SGTIN only exists for RFID technology using EPC, there is no bar coding solution
Where was it shipped from or shipped to?	Best practice or specific extensions of traceability requirements: "ship from" or "ship to" identification	GLN
When did I receive / despatch it?	Date of receipt and / or date of despatch as relevant depending on the role of the party	EDI DESADV

⚠ **Important:** In order for traceability to be effective along the supply chain, and the above data elements to be truly useful, each Traceability Partner must practice <u>internal</u> traceability. This requires that each Traceability Partner establishes and records linkages between inputs and outputs (BR 14, BRU 6, BRU 10). While outside the scope of this GS1 Standard, internal traceability best practices are available at, for example, [ref 2] Chapter 6 of *ECR – Using Traceability in the Supply Chain to Meet Consumer Safety Expectations.*

9.1.1. State Diagram(s)

No State Diagram.

9.1.2. Business Object relationship discussion

No Business Object relationship discussion

10. Conceptual Solution (Examples)

10.1. Fully Worked Example: Traceability in the Wine Supply Chain

This example is based on the GS1 Wine Supply Chain Traceability Guideline, January 2005 and the actions / roles defined in this Business Requirement Analysis Document Section 6. The purpose is to show how the GS1 Global Traceability Standard and GS1 best practices can be used to establish a robust scheme for traceability in an industry sector.

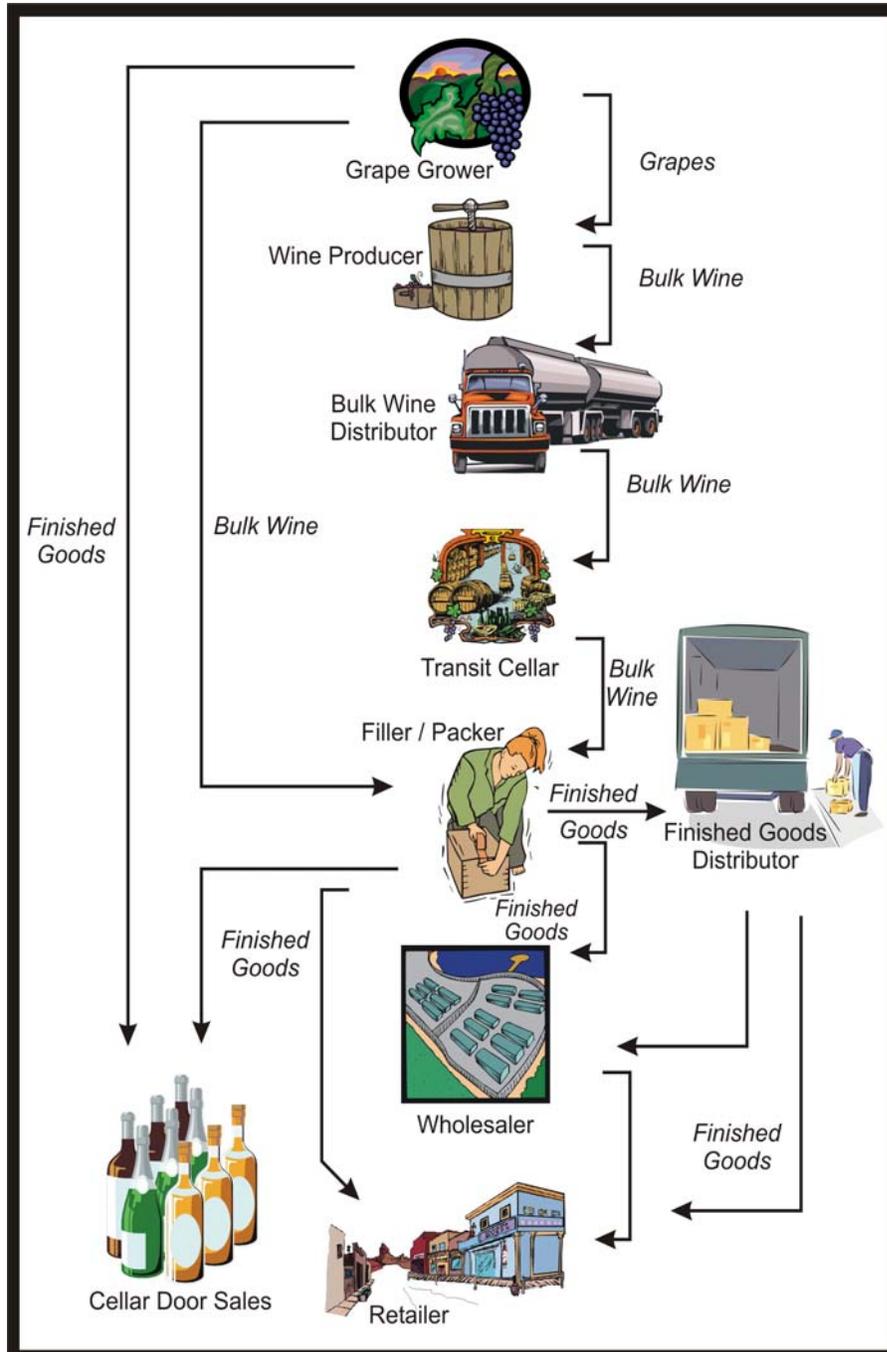**Figure 10-1** The Wine Supply Chain

Table 10-1 Traceability in the Wine Supply Chain

1. Who are the Traceability Partners?	Industry Sector: Wine Traceability Partners: Grape Grower; Wine Producer; Bulk Wine Distributor; Transit Cellar; Filler / Packer; Wholesaler; Retailer
2. What is the business need?	1. Product traceability in a complex, global supply chain 2. Quality management 3. Product safety and to support withdrawal or recall 4. Global supply chain logistics efficiency 5. Legal compliance with national and regional Food Regulation 6. Brand protection, product authentication and reduction in risk of counterfeit or fraud
3. Description of the physical flow of product.	The physical flow of goods in the wine supply chain is described in the schema attached below (and one enterprise may manage several steps): ■ **Grape Grower:** Responsible for the production, harvest and delivery of grapes: record keeping should include vineyard treatments. ■ **Wine Producer:** Responsible for receiving the grapes and for the production, manufacture and/or blending of wine products. ■ **Bulk Wine Distributor:** Responsible for receipt, storage, dispatch, processing, sampling and analysis of bulk wine. ■ **Transit Cellar:** Responsible for the receipt, storage, dispatch, processing, sampling and analysis of bulk wine, as well as record keeping of appropriate information about what is received and what is dispatched. ■ **Filler / Packer:** Responsible for the receipt, storage, processing, sampling, analysis, filling, packing and dispatch of finished goods ■ **Wholesaler / Distributor:** Responsible for the receipt, storage, inventory management and dispatch of finished goods, as well as re-packing and re-labelling as required. ■ **Retailer:** Receives pallets and cartons from the Finished Goods Distributor and picks and dispatches goods to the retail stores.
4. What is the "traceable item"?	1. Grapes 2. Bulk wine 3. Packaging materials as production inputs by Batch / Lot Number 4. Finished goods by Batch / Lot Number
5. Traceability Partner "Roles"	The key roles performed for traceability in the Wine Supply Chain are listed below (one trading partner may perform several roles): 1. Traceable Item Creator (e.g., Filler / Packer) 2. Traceable Item Source 3. Traceable Item Recipient 4. Transporter (e.g., third party logistics provider, forwarding agent) 5. Brand Owner 6. Traceability Data Creator 7. Traceability Data Source 8. Traceability Data Recipient 9. Trace Request Initiator The Wines and Spirits supply chain is usually required by local tax regulation to manage the supply chain within strict Customs and Excise controls and this establishes additional roles, data and business requirements including the operation of Bonded Warehouses and documented Under Bond and / or duty paid movement of goods.

6. Traceability data to create, capture and record	Minimum data attributes to create / capture / record as appropriate at each step include data described in BR 11 and Customs and Excise documentation required by international and local regulation Additional categories of information to create, capture and record based on supply chain roles includes: 1. **Grape Grower:** Vineyard treatments including fertilisers, pesticides, fungicides, wine treatments. 2. **Wine Producer:** Vine variety; bulk wine treatments including fining, blending, storage, maturation. Physical samples should be retained / analysed. 3. **Bulk Distributor:** Bulk tank identification; storage; blending. 4. **Transit Cellar:** Receipt; storage; processing; dispatch 5. Filler / Packer: Receipt; storage; processing; sampling; analysis; filling; packing including materials used by batch / lot inputs and outputs 6. **Distribution:** Receipt; storage; inventory management; dispatch; rework 7. **Retail:** Receipt; picking / packing and dispatch to retail stores
7. Enabling technologies and GS1 "best practices" to consider	Section 6, Business Process Analysis– describes the roles and the activities carried out by each traceability partner throughout the supply chain. Enabling technologies are available to support the use of GS1 e-business standards, together with traditional methods, meeting the needs of companies both large and small. Some of the choices of GS1 standards available in the Wine Supply Chain are identified in the GS1 Wine Supply Chain Traceability Guideline as follows (refer to Glossary) : ■ Global Location Number (GLN) ■ Global Trade Item Number (GTIN) ■ Serial Shipping Container Code (SSCC) ■ Application Identifier (AI) ■ Global Returnable Asset Identification (GRAI) Some of the enabling technologies for larger, more automated systems include: 1. Bar code – linear and reduced space symbologies to apply asset identification (EAN/UPC 13 - bottles, ITF14 - cases, UCC/EAN-128 – pallets / full shipping containers, 2D – serial number identification) 2. Electronic Data Interchange (EDI) and internet based messaging (XML) 3. RFID – electronic tag, Electronic Product Code (e.g., to secure and identify shipping containers) 4. Fixed and hand held Bar code and electronic scanners, Radio frequency local area networks, interfaces to Enterprise Resource Systems 5. Small and medium sized enterprises can achieve all the required steps by reference to human readable information on labels, accompanying shipping documents, buying specifications and purchase orders and other conventional business records.

| 8. How do Traceability Partners assign identification to the traceable item using GS1 "best practice"? | Bulk Wine:

Bulk wine containers, such as storage tanks, are identified with a Serial Shipping Container Code (SSCC) allocated by the bulk distributor. When bar coded, the SSCC is represented in an UCC/EAN-128 symbol. The AI (00) indicates that the data field contains an SSCC.

The bulk wine container may have several sections, each identified with batch numbers.

The mandatory AI is (00) – Serial Shipping Container Code (SSCC).

Serial Shipping Container Code (SSCC) bar coded in UCC/EAN-128 symbol
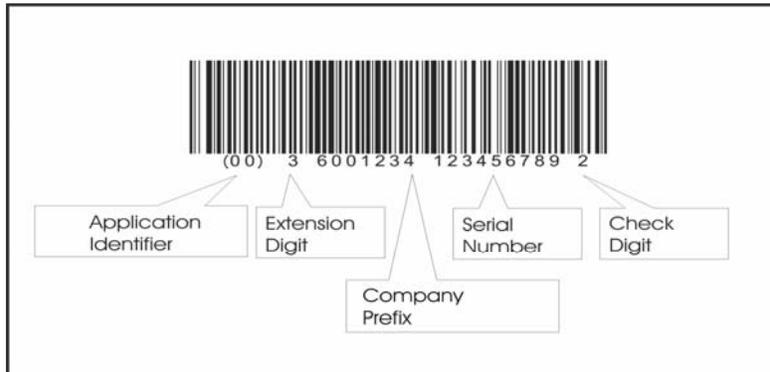
Finished Goods:

A. Trade items crossing the point of sale (bottle, can, jug, bag in box):

These must be identified with a GTIN and bar coded with EAN/UPC symbol for scanning at point-of-sale. Some countries, including EU member states, require the allocation of a Batch / Lot Number to each consumer unit created during the filling process. This information may be displayed in human readable form.

B. Trade items that may be crossing the point of sale (carton)

Trade items sold through a retail point of sale are identified with a GTIN and bar coded with an EAN/UPC symbol. For traceability purposes, a UCC/EAN-128 add-on bar code symbol may be applied. Example:

EAN/UPC and UCC/EAN-128 add-on bar code
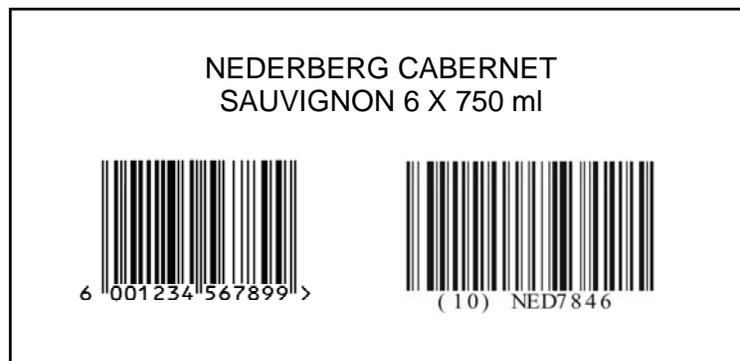
For cartons that will not be sold through a retail point of sale, identification is done through the use of Application Identifiers (01) (GTIN) and (10) (Lot Number), and encoded in UCC/EAN-128 bar code. |

UCC/EAN-128 Bar Code

(01)06001234567899(10)4512XA

Should the Filler / Packer be uncertain where the product is to be distributed and sold (either through a retail point of sale or only in a warehouse environment), it is recommended that the EAN/UPC and UCC/EAN-128 add-on bar code symbol option be used – as shown in the figure above.

C. Logistic units (pallets)

Identification and traceability of pallets is ensured through the allocation of a Serial Shipping Container Code (SSCC). Any pallet, independently of its type (mixed or uniform), needs to carry an SSCC allocated by the filler/packer. A new SSCC must be allocated every time a new logistic unit (pallet) is created.

EAN.UCC Logistics Label

EAN.UCC LOGISTICS LABEL

SSCC

0 0614141 1234567890

CONTENT
00614141000418

COUNT
20

BEST BEFORE (ddmmyy)
14.02.05

BATCH
4512XA

(02)00614141000418(15)050214(10)4512XA(37)20

(0 0) 0 0 6 1 4 1 4 1 1 2 3 4 5 6 7 8 9 0

9. How do Traceability Partners apply the identification carrier?	The identification carrier (e.g., linear or 2D bar code; RFID electronic tag) is applied at source when the finished goods are created or shipped. Bulk goods can be managed using traditional methods such as unique identification of bulk transport container linked to purchase order, invoice, accompanying shipment documentation, correspondence, e-business messages.
10. How do Traceability Partners collect the identification of the traceable item?	The identification carrier can be scanned to automatically capture data when it is in the form of a bar code and / or RFID tag. The data is also available in human readable format on labels / documentation.
11. How is other relevant data collected?	Other data is held in the form of physical wine samples, with accompanying records created through scientific analysis, held in traditional company archives.

12. How is relevant data shared?	Data is shared through traditional correspondence, e-business messages including fax, email, EDI, XML, data synchronisation and through personal telephone and face to face communication.
13. How is data recorded?	Data is recorded in electronic databases, on shipping and customs documentation, in company paper based records.
14. Managing a "Trace request"	A "Trace Request" may arise as a result of several scenarios – but perhaps the most typical is as a result of a consumer complaint made to a retail store. At this moment, especially for wine, it is important for the retailer to obtain and secure a sample of the defective product. The sample of wine may be required to conduct analyses of the product for comparison with records and to identify any foreign materials the bottle may contain. From the physical bottle and label all the key minimum data required to trigger a trace request can be obtained including: 1. Brand name and product description 2. Supplier name and contact address 3. Pack size 4. Batch / Lot Number (e.g., laser etched on the glass bottle or ink jet printed on glass / paper label / cardboard packaging – sometimes including a bottle serial number) The retailer can identify and contact the supplier and investigate the nature, impact and resolution required for the specific problem identified.

Application Identifiers / Data Attributes recommended for a Beers, Wines and Spirits Industry UCC/EAN-128 Pallet Label are defined below:

Application Identifier (AI) or Header	Data Attributes
Header	Company name, corporate logo and GLN number of the producer
Header	Product Description, e.g. Brand / Quality / Age Ref/ Size / number in case / % ABV)
(00) (Mandatory)	Identification of a logistic unit – Serial Shipping Container Code (SSCC)
(02) (Strongly Recommended)	Identification of a trade item, i.e. the case of bottles (Global Trade Identification Number - GTIN)
(37) (SR)	Count of trade items contained in a Logistic Unit, i.e., number of cases on the pallet
(10) (SR)	Batch / Lot Number
(15) (SR)	Minimum Durability Date (quality) (YYMMDD), i.e., Best Before Date if it appears on the label on the packaged goods

10.2. Additional Examples

Example 1:

	A pharmaceutical company needs to identify and manage a batch of medicine at consumer unit level, e.g.,: vaccine bottle.
Who are the Traceability Partners?	**Industry sector:** Pharmaceutical medicine **Traceability Partners:** Manufacturer, distributors, medical practitioners
What is the Traceable Item?	Vaccine bottle Level of precision: Batch / Lot Product hierarchy: Consumer unit
What is the business need?	Examples include: ▪ Product safety ▪ Product traceability ▪ Quality Management ▪ Legal Compliance ▪ Brand protection and ant-counterfeit / fraud
Traceability requirements to consider	To identify the bottle and batch uniquely: ▪ assign number (GTIN) to vaccine bottle ▪ assign number (batch / lot) to vaccine bottle
Comments	Although the traceable item is the consumer unit + Batch / Lot Number, it will be necessary to use trade item and Batch / Lot labelling at grouping of trade items (case) in order to achieve efficient data capture in business processes. If an even greater level of precision is required, the consumer unit could be marked with a serial number, Batch / Lot Number and/or Best Before Date

Example 2:

	An animal – e.g., a cow
Who are the Traceability Partners?	**Industry sector:** Agriculture **Traceability Partners:** Farmer, abattoir, distributor
What is the Traceable Item?	The traceable item is each individual cow delivered by a farmer to an abattoir. Level of precision: Serial Number Product hierarchy: Individual animal – the Cow
What is the business need?	**Examples include:** ▪ Product traceability ▪ BSE ▪ Quality Management ▪ Product safety ▪ Legal compliance **Business Process:** The Farmer selects cows from his herd and transports them himself to an abattoir who will receive other cattle from other Farmers that day.

	An animal – e.g., a cow
Traceability requirements to consider	To identify each cow in the shipment individually ■ Assign unique number to each cow in the herd (GTIN or a country-specific solution). An ear tag bearing the animal's unique identifying number is applied (to each cow). ■ An animal passport is created for each cow and is provided to the abattoir upon delivery ■ Link the cow's unique number to the Farmer's herd (and records about its upbringing and history)
Comments	Additional country based legal requirements may apply

Example 3:

	A milk company needs to identify and track pallets of milk cartons or bottles
Who are the Traceability Partners?	**Industry sector:** Dairy **Traceability Partners:** Milk filler / packer, logistics operator, retailer
What is the Traceable Item?	Pallet / roll cage Level of precision: Serial Number Product hierarchy: Logistic dispatch unit
What is the business need?	**Examples include:** ■ Quality management ■ Cold Chain ■ Product safety ■ Supply chain logistics efficiency ■ Efficient asset utilisation (e.g., roll cage) **Business process:** Milk cartons or bottles of milk have a GTIN and a Batch / Lot Number assigned to them. However, the logistic unit is the pallet or roll cage that contains them and the company, the logistics operator and the retailer move pallets / roll cages across the supply chain. The company wants to keep records of the journey / return of every pallet / roll cage.
Traceability requirements to consider	**To identify the pallet uniquely:** ■ Assign number (SSCC) to pallet / roll cage ■ Record the GTIN and batch number of all milk cartons / bottles contained in the pallet **To identify the roll cage uniquely:** ■ assign a GRAI
Comments	If the pallet / roll cage is mono-lot, the Batch / Lot Number will be displayed on the product / logistics labels. If it is a multi-lot pallet, the Batch / Lot Number will have to be transmitted by electronic means or paper.

Example 4:

	Raw material - Silo of rice
Who are the Traceability Partners?	**Industry sector:** Food production **Traceability Partners:** Raw material supplier, food manufacturer
What is the Traceable Item?	Rice Level of precision: batch /lot Product hierarchy: trade item

	Raw material - Silo of rice
What is the business need?	**Examples include:** ■ Quality Management ■ Supply chain logistics efficiency ■ Legal compliance **Business process:** A company uses rice as raw material for its products. Rice is stored in a silo.
Traceability requirements to consider	To identify the silo uniquely as an asset. Every time a batch / lot of bulk rice is received: Record the silo number where rice is stored Record the date Record the traceability information received from the rice producer Update production process with this information when applicable.
Comments	Mathematical models can be used to simulate the movement of rice through the silo for product traceability

Example 5:

	A pasta manufacturer wishes to trace batches / lots.
Who are the Traceability Partners?	**Industry sector:** Food **Traceability Partners:** Manufacturer, distributors, retailers
What is the Traceable Item?	Case containing several consumer units Level of precision: batch /lot Product Hierarchy: trade item
What is the business need?	**Examples include:** ■ Quality management ■ Legal Compliance ■ Brand protection ■ Product Safety **Business process:** The product requires a "Best Before Date". The level of traceability is determined by the Batch / Lot Number marked on each trade item.
Traceability requirements to consider	To identify the Batch / Lot Number for consumer units and other trade items: ■ Assign GTIN to consumer units & other trade items ■ Mark Batch / Lot Number and Best Before Date on consumer units and other trade items ■ Record movement by Batch / Lot, quantity of Traceable Items, Traceable Item Recipients (including customers) and delivery location
Comments	The location / ownership of trade items can be traced. Individual consumer units can be identified at batch / lot level by individual inspection.

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11.   Implementation Considerations

This section provides a methodology for a company and / or an industry sector.

The following key steps should be considered by each company and / or industry sector that is considering how to implement best business practices to utilise the recommended approach described in the GS1 Global Traceability Standard.

For examples of application, please refer to section 10.

11.1.   Contact your GS1 organisation to get expert advice

Your local GS1 organisation will provide expert advice about the GS1 Global Traceability Standard and any existing extension, support during your project to implement a traceability policy, plus help to identify technology most suited to your requirements and to help you get an appropriate level of knowledge and training on this technology and the appropriate GS1 Standards.

In the case of an industry sector, you may want to establish a working group with representatives from all types of operators in your industry sector. Your local GS1 organisation can host and facilitate such working groups. If an industry sector discovers that it requires an extension to this generic standard, the GS1 organisation will advise and support this process.

The list of GS1 Organisations may be found at www.gs1.org.

11.2.   Model the supply chain where traceability is to be accomplished

It is extremely important to determine the scope of the traceability process in your supply chain, the Trading Partners who are involved (Traceability Partners) and to clearly identify the boundaries of your traceability model.

Example:

In the Consumer Goods Industry –from the purchase of raw material ingredients and packaging for use as inputs, the internal business processes through to the output and delivery of finished products to the customer Distribution Centre or Retail Store. The scope may include some inputs (such as seeds, meat…) and exclude some others (packaging which is not in contact with the product…).

Check with your local GS1 Organisation to see if this model already exists within the GS1 community.

11.3.   Determine priority business needs

As data to record and the relevant level of traceable item depends on business needs, it is important to determine at the beginning what the main uses are that you expect from the traceability system and the type of trace request (by data attribute) that you want to be able to conduct.

Example:

In case of anti-counterfeiting, a common useful trace request is to be able to retrieve logistic information about a particular unit of product. In that case, the relevant level of traceable item in addition to logistic units is the serialized consumer item.

11.4.   Describe the physical flow of products

Identify the type of products that are exchanged between your trading partners and describe the logistical hierarchy

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You may find it helpful to "walk" each step of your supply chain and identify the physical locations, inputs, internal processes, and outputs. The supply chain "map" can be prepared in the form of a diagram or template, providing a record and the basis for a comprehensive traceability plan.

Check with your GS1 organisation if all or part of your model has already been defined in the GS1 community and make use of established best practices.

Once the model is completed, the model provides a template like this:

Traceability Partner 1←→---(process 1-2)--- ←→ Traceability Partner 2 ←→--(process 2-n)---- ←→ Traceability Partner n ←-----

Each process represents a particular step in the supply chain and is associated to product inputs and outputs. Each Traceability Partner represents an entity involved in a preceding, current or subsequent step in the chain.

Section 6.1.2. may help you to develop this description.

Example:

A logistics operator might have two or more delivery processes: (1) direct store delivery (2) warehouse delivery (3) customer collection. For example, the physical flow between two trading partners may be a truck with bulk goods or a truck containing big bags of seeds.

11.5. Define Traceability Partners' roles

Associate the roles that each Traceability Partner has according to the GS1 Global Traceability Standard. These roles determine which roles / business processes the Traceability Partner must perform to achieve traceability.

This analysis can be checked and developed by referring to the grid of Roles and "use cases" described in Section 6.1.3 "Current Business Scenario".

Example:

A Traceability Partner may receive, store and despatch (warehouse keeper / transporter); a Traceability Partner may receive, transform and despatch (a producer) …

11.6. Model the Process (for each Physical Process that is Relevant)

11.6.1. Identify the level of the Traceable Item

Determine the traceable item level(s) by using your description of the physical flow.

This will be dependant on the company/industry sector, Trading Partner requirements and the level of risk/cost considered appropriate.

If relevant (company/industry specific) extension or "GS1 User Guidelines for Implementing Traceability" exist they should be consulted.

A system of classifying risk as 'High', 'Medium', or 'Low' can be used to determine the level of detail required for traceability. Risks can, for example, be financial, affect company reputation, impact consumer health, etc…Batch management is a best practice used in many businesses and they must define their own batch. In other industry sectors, e.g., pharmaceutical industries and perfumes, Serial Number identification of each individual consumer unit or other trade item is often used to support product authentication and anti-counterfeit strategies.

The traceable item should be defined based on two main variables that help to define the level of risk a company is prepared to accept when Traceable Item data is applied to a circumstance such as the need to identify and recall defective product :

■ Level of accuracy

■ Logistics hierarchy

That is, the traceable item will be that item that fulfils both: on one hand it achieves the level of accuracy that reflects the company's required risk profile and on the other, it represents the logistic unit / trade item where traceability is to be applied.

To help in the decision-making, the traceable item hierarchy can be developed by referring to the Figure 6-11 and Figure 6-12 in Section 6.1.2.6, Traceable Item Hierarchy". The BR 5 presents the corresponding identification standards.

Date information may be used to facilitate "First In First Out" warehouse management systems and to manage the sequence of sales / use by consumer unit at the point of sale / consumption. Application Identifiers for appropriate date information are available in UCC/EAN-128 labelling. However, "Best Before Date" and "Use By Date" are normally not sufficient as a key identification for traceability purposes since they may not carry the same information as the Batch / Lot Number.

Example of traceable item: bulk goods, batch of crop, Logistic Unit, serialised carton of beef products, batch of bottles of milk.

11.6.2. Decide on the traceability information needed for each type of Traceability Partner.

The GS1 Global Traceability Standard identifies a number of data attributes that should be created, collected, recorded and shared between Supply Chain Partners to ensure best practice in a traceability plan (GTIN, Batch / Lot Number, SSCC...)

You may need to create, collect, record and share a wide range of other data attributes that are appropriate for your company and Traceability Partners, according to legislation or specific supply chain requirements, and you need to identify these attributes and plan how to ensure that appropriate arrangements can be established and maintained.

Implementation of data synchronisation processes enables the exchange of master data about party and item (product) efficiently and accurately. This can be supplemented with the necessary relationship dependent and transactional data as appropriate.

The minimum data requirements can be checked in BR 13. They are explained in Section 9 "Business Object Analysis".

11.6.3. Select the enabling technology to support traceability

Some use case and traceability requirements are technology independent (e.g. assigning the identification to the traceable item, list of minimum data to record).

Yet you need to select an appropriate enabling technology to attain traceability and data exchange based on the model of your supply chain process.

Use case (section 6.1.3)	Possible enabling technologies
Identification carrier	Ink jet, label, tag, accompanying document It can be human readable or machine readable (bar codes, RFID…)
Collect and share data	Label, Marking, EDI, Facsimile, Internet, Phone, Data Base, Physical inspection, Accompanying document…

Use case (section 6.1.3)	Possible enabling technologies
Store data	Notebook, data base (internal or from a service provider via Internet)
Manage a trace request	Phone, e-mail, Facsimile, Gepir (www.gepir.org), GDSN, EPC Network and electronic catalogues may be used for trace requests.

For each enabling technology, there are corresponding standards.

The following enablers are examples of the most common "technological models", but there are many other alternatives:

Model	Technology	Comments
Traceability information is sent with the physical object	Paper	No automatic process.
	UCC/EAN-128*	All traceability information is included in the UCC/EAN-128 label (GTIN, Batch / Lot Number, Best Before Date,)
Traceable item is identified by batch/lot or serialised and traceability information is sent with the physical object or exchanged by any other means	UCC/EAN-128+ EDI/XML	UCC/EAN-128 logistic unit label only needs to have an SSCC although for homogenous pallets additional attributes may be displayed in human readable and bar code format. Additional information is exchanged via EDI/XML.
	EPC	The EPC RFID tag contains a unique 'licence plate' number. Traceability information is obtained from the associated system and databases.
Traceable item is identified by batch/lot or serialised and traceability information is made available in a database	UCC/EAN-128	UCC/EAN-128 logistics unit label only needs to have an SSCC. Information is sent to a database shared between Supply Chain Partners.
	EPC	The EPC RFID tag contains a unique "licence plate" number. Traceability information is obtained from the associated system and databases.

* Or other equivalent barcodes standards

Create the technical guide to exchange information between parties following the criteria and recommendations defined in the GS1 Global Traceability Standard.

Example:

UCC/EAN-128 -> define AI and label models

EDI/XML -> define Message Implementation Guidelines describing the data elements to be used, and so on…

11.6.4. Validate the process

Validate your Implementation and Technical Guidelines with your GS1 organisation to obtain verification of global standards compliance. This could be under a certification process for the use of GS1 standards for traceability.

11.7. Internal process model (applicable to companies)

Define the internal process to attain traceability (stock management, production/transformation/manipulation process). GS1 standards (and all the best practice related) can also be used as a tool for the implementation of the internal traceability.

11.8. Traceability model coherence

Once all parties and business processes have been defined, you should validate the whole model. In particular, attention must be paid to the capabilities of Parties to fulfil the goods receiving process requirements and the delivery process requirements (i.e. answer the question - will it be possible to link receiving and delivery traceability information). For instance it would not be logical for a logistics operator that performs picking operations to decide that his reception process is based on a manual procedure (e.g., no barcode labels on the pallet) but that the delivery process is based on bar-coding systems. All such inconsistencies should be eliminated to ensure success for the application of the GS1 Global Traceability Standard.

11.9. Standards Maintenance

When a company implements the GS1 standards, and a gap is recognized against their business needs, the company should contact their local GS1 Organisation and receive guidance on submitting a Change Request into the Global Standard Management Process. The local GS1 organisation can provide the latest standard development. To contact your local GS1 Organisation and get information about GS1 Standards, the following website can be used: www.gs1.org

12. Test Scenario Summary

This section could be filled in during the implementation phase development.

Test Scenario ID	Description	Rule ID	Requirement ID	Use Case ID
	Description of scenario to be tested. For example: Seller is able to create and send an Order Receipt Acknowledgement.	Associated Business Rule	Associated Requirement	Associated Use Case

13. Glossary of Business Terms

Term	Description
Actor	An actor is a role that a user plays with respect to a system.
Application Identifier (AI)	The field of two or more characters at the beginning of an Element String that uniquely defines its format and meaning.
Apply	Physically mark or attach
Assign	Designate or allocate.
Batch / Lot Number	A batch unites products / items that have undergone the same transformation processes. Batch and Lot are considered as synonyms.
Brand Owner	The party that is responsible for allocating GS1 System numbering and bar code symbols on a given trade item. The administrator of a GS1 Company Prefix. And / or the party that is the ultimate authority for the trade item. And / or the owner of the product specifications. And / or responsible for placing a traceable item into commerce.
Buyer	The Party to which the traceable item is sold.
Consumer	One that consumes, especially one that acquires goods or services for direct use or ownership.
Consumer Unit	The trade item intended to be sold to the end consumer.
Collect	Gather required information by any means.
Event	Is an occurrence of a process in a specific time or a period of time.
External Traceability	External traceability takes place when instances of a traceable item are physically handed over from one traceability partner (traceable item source) to another (traceable item recipient).
Extension	An extension is a standard defining additional requirements to a generic standard required to meet specific business needs or practices. An industry specific extension to the GS1 Global Traceability Standard could set up, for example, additional data to record or leverage minimum requirements concerning the use of bar-codes or RFID. It is different from "user guidelines" the purpose of which is to explain in detail an existing standard in a given context (e.g. country, type of product) and to help the user during the implementation phase.
GLN (Global Location Number)	A number that uses the EAN/UCC-13 Data Structure to identify physical, functional, or legal entities.
Global Trade Item Number (GTIN)	A Global Trade Item Number[®] may use the EAN/UCC-8, UCC-12, EAN/UCC-13, or EAN/UCC-14 Data Structure.
Global Returnable Asset Identifier (GRAI)	A number that uses the EAN/UCC-13 or UCC-12 Data Structure to identify Asset Type combined with an optional serial number.
GS1 System	The specifications, standards, and guidelines administered by GS1.
Homogeneous Pallet	Homogeneous Pallet is composed of identical products (identified with the same trade item identification) originating from the same Batch / Lot.

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Term	Description
Identification	The identity assigned to an item or party that is needed to access other relevant information about the item or party.
Identification Carrier	Mark / tag / label / accompanying document sometimes called "passport" or "identity card" in some industry sectors
Internal Process	A series of actions, changes or function(s) within a company or organization that brings about a result.
Internal Traceability	Internal traceability takes place when a traceability partner receives one or several instances of traceable items as inputs that are subjected to internal processes, before one or several instances of traceable items are output.
Link	Recording the information necessary to establish the relationship to other relevant information.
Location	A place where a traceable item is or could be located. [ISO / CD 22519] A place of production, handling, storage and / or sale.
Logistic Unit	An item of any composition established for transport and / or storage that needs to be managed through the supply chain.
Master Data	Master Data describes each item and party involved in supply chain processes. Master Data is defined as data having the following characteristics: Permanent or lasting nature Relatively constant across time, not being subject to frequent change Accessed / used by multiple business processes and system applications. Can either be neutral or relationship dependent.
Mixed Pallet	Mixed Pallet is composed of one or more different products (identified with different trade item identification).
Party	A party (or) location is any legal, functional or physical entity involved at any point in any supply chain and upon which there is a need to retrieve pre-defined information. A party is uniquely identified by a GS1 Global Location Number.
Process	A series of actions or steps towards achieving a particular end. Examples of common processes include Production, Transformation, Quality Control, Storage, Transportation, Movement, Recycle, Return, Packing, Receiving, Traceability.
Record	Act of creating a permanent piece of information constituting an account of something that has occurred.
Seller	The party selling the traceable item to a buyer.
Serial Shipping Container Code (SSCC)	The unique identification of a logistic unit or a shipment using an 18-digit data structure.
Serialized Global Trade Identification Number (SGTIN)	SGTIN is a method of identifying unique items at the unit or retail level as well as at the case and carton levels. It is composed of a GS1 assigned Company Prefix & Item Reference (GTIN), combined with a Serial Number. Where UCC/EAN bar codes have traditionally been used, the SGTIN specification combined with an RFID tag can give visibility beyond the Item Reference right down to the exact serial number of the item.
Share	Act of exchanging information about an entity or traceable item with another Traceability Partner.
Shipment	An item or group of items delivered to one party's location at one moment in time that have undergone the same despatch and receipt processes.
Store Data	Keeping information available by any method.

Term	Description
Traceability	[ISO 9001: 2000] Traceability is the ability to trace the history, application or location of that which is under consideration.
Traceability Data	Any information about the history, application or location of a traceable item. This may be either master data or transactional data.
Traceability Data Creator	The Traceability Partner that generates traceability information.
Traceability Data Recipient	The Traceability Partner authorized to view, use, and download traceability information.
Traceability Data Source	The Traceability Partner that provides the traceability information.
Traceability Partner	Any Trading Partner involved in the traceability process e.g., Traceable Item Creator, Traceable Item Source, Traceable Item Recipient, Transporter, Brand Owner, Traceability Data Source, and Traceability Data Recipient.
Traceable Item	A physical object where there may be a need to retrieve information about its history, application, or location. The level at which the traceable item is defined within a product packaging or logistical hierarchy is dependent on the industry and degree of control required. Could be tracked, traced, recalled or withdrawn. Could exist in multiple locations at the same time (for example, if identified at the trade item and batch level). A traceable item may be related to another traceable item. See also definition for process
Traceable Item Creator	The Traceability Partner that generates a traceable item, or makes a distinct traceable item by transformation of one or more traceable items.
Traceable Item Recipient	The Traceability Partner that receives the traceable item.
Traceable Item Source	The Traceability Partner that despatches or provides a traceable item.
Trace Request	A formal inquiry about the history, application, or location of a traceable item. A request can trigger subsequent trace requests up or down the supply chain in order to fulfill the original request. The Trace Request Initiator requires a response from the data source.
Trace Request Initiator	The person who starts the trace request.
Tracing	Tracing is defined as the ability to identify the origin, attributes, or history of a particular traceable item located within the supply chain by reference to records held.
Tracking	Tracking is defined as the ability to follow the path of a traceable item through the supply chain as it moves between parties.
Trade Item	A trade item is a product, on which there is a need to retrieve predefined information and that may be priced or ordered or invoiced at any point in the supply chain.
Trading Partner	Any Supply Chain Partner that has a direct impact on the flow of goods through the supply chain. Examples include Third Party Logistics Provider, Manufacturer, Retailer, and Grower.
Transactional Data	Information necessary for the business process being executed. Example: Item codes and ordered quantities are transactional as these are mandatory fields within a purchase order and may vary by purchase order.
Transformation	A change to the nature of a traceable item that changes the identity and/or the characteristics of the traceable item. The act of changing the item such as combining ingredients to make a finished product or case picking to create a new pallet. Transformation can be production, aggregation, grouping, splitting, mixing, packing and repacking traceable items.

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Term	Description
Transporter	The Traceability Partner that receives, carries, and delivers one or more traceable items from one point to another without transforming the traceable item(s). Typically only has possession, custody, or control of a traceable item, but may have ownership.

14. Summary of Changes

Change	BRAD Version	Associated CR Number
Reference Document Summary		

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