DATA ALIGNING IN A SUPPLY CHAIN THROUGH GLOBAL DATA SYNCHRONIZATION STANDARDS AND EPC GLOBAL COORDINATED BY GLOBAL COMMERCE INITIATIVE

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Abstract: *The GDS vision it is focused around Master Data for "Article", "Location", and will be added soon after that. Master Data represents a set of data that describes the specification and structure of each Product (or Article) and Locations (or Parts) involved in the supply chain processes, through key identifiers, Global Trade Item Number (GTIN) and Global Location Number (GLN), Serial Shipping Container Code (SSCC).*
Global Registry of GS1 and interoperable Data Pool are the fundamental elements of the GDS process. The most important role of Global Registry oh GS1 is to make sure that the initial data are registered only one time, in one place. Data Pools allows the publication of certified standard data and the subscription to this data.
Obtaining the benefits promised by ePC based on RFID will be possible if the networks solve also the inaccuracy data problem that exists today in the supply chains, mostly in retail.
EPC GLOBAL develops standards for the radio frequents where RFID will operate to assure the global alignment of labels and readers.

Key words: Supply Chain, Alignment, Efficient Consumer Response, Global Data Synchronization, Global Trade Item Number (GTIN), Global Location Number (GLN), Serial Shipping Container Code (SSCC), Global Commerce Initiative, RFID, EPC, Data Pools, Global Registry, Food Traceability, Data Traceability.

The right moment for adapting a global systemic language in the fast moving consumer goods industry is now mature. From adopting and implementing these voluntary global systemic standards it will result benefices for the manufacturers and the suppliers, like income and productivity increasing, reducing working capital and the increasing consumer satisfaction. Especially Global Data Synchronization (GDS) will lead to a decreasing of the supply chain costs of 1.3%.

A supply chain is optimized when the right quantity of products is available at the right place, at the right time. This dream can be reached now, by introducing GDS. The potential benefits are huge enormous. The industry can

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substantially reduce (shrinkage) the waste and the costs, at the level of the supply chain links. This is the major benefit: better, faster and a lower price.

The present reality is different. If the ideal is communicating instantly and facilitating exact data that are immediately understood, what exists now is a slaw and expensive communication with information that is often incomplete, inexact and misunderstood. Different language form a barrier for communication, creating a variety of costs: the time and money needed for the "translations", the delays caused by the required corrections, and the inevitable blanks and the data's misunderstanding.

If we could have a choice, we would all choose the "high speed business" instead of a supply chain with confusion and data misunderstanding. Now, this alternative can become reality. With the existing technology as the Internet and the platforms based on it, the firms from the fast moving consumer goods industry have the unique opportunity to increase the efficiency level in the industry and distribution of the fast moving consumer goods. Using the best practices in ECR (Efficient Consumer Response) like CPFR (Collaborative Planning, Forecasting and Replenishment), this technologies can help the firms to make the dream about working better, faster and at a lower price, become reality. It appears the need of a common language for all these to be real efficient. If we will fail to realize this, the confusion, complexity and the current misunderstandings will increase.

The potential benefits associated with the adaptation of the voluntary global standards will have an impact over a multitude of logistic processes, command management, catalogues maintenances and the category management. These benefits have been identified during the activity of developing the adaptation principles of the global standards and GDS.

The basic building blocks of Global Trade Item Number (GTIN) and Global Location Number (GLN) have been around for a number of years whereas GDS is now being set in place. The GTIN is a single, unique number assigned to all products and services, so that these products and services can be easily and accurately identified by everyone, regardless of country, region or continent. The GLN provides businesses with a globally accepted method of identifying legal entities and locations, such as plants, offices, stores and any other shipping or receiving point. GDS is a process designed to help keep everyone in the industry on the same page by ensuring that basic data such as item and party information stored by one company matches the corresponding data in the systems of their business partners.

The development of the business case rationale for GTIN/GLN/GDS led to a number of key conclusions:
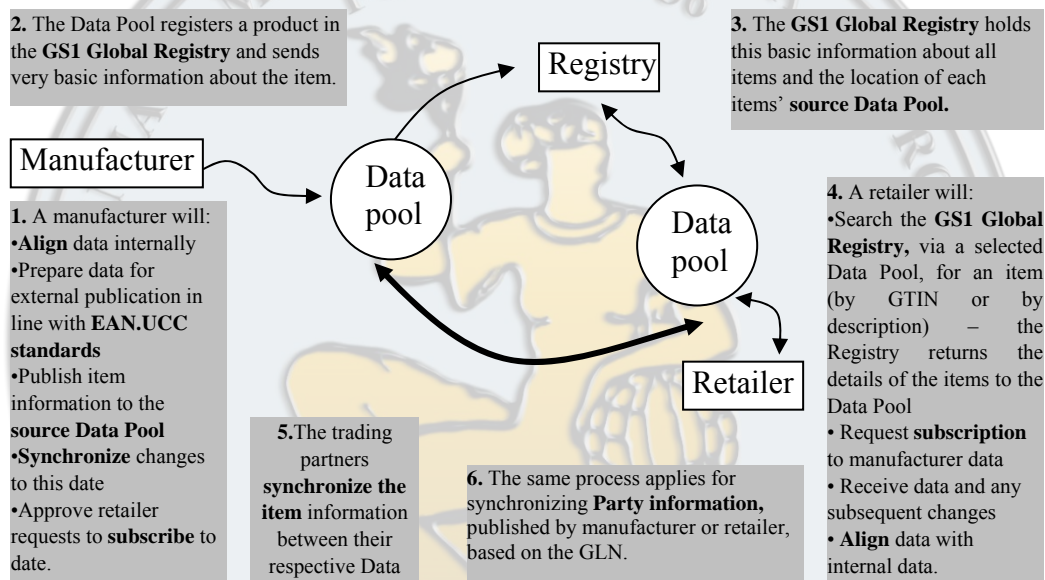
- Data synchronization is currently relatively underdeveloped. This situation is impeding further improvements in the supply chain.

- Substantial benefits can be achieved. Even in the medium term, retailers and manufacturers can reduce their supply chain costs by 1 percent to 3 percent, depending on their current state. In addition, there will be a positive impact on revenues from the recommended improvements.

- The long-term benefits are even greater, as these foundational standards enable the large-scale implementation of collaborative business processes such as Collaborative Planning, Forecasting and Replenishment.

- The benefits range from productivity gains and working capital reduction to revenue gains and customer satisfaction.

- Companies of all sizes will enjoy the benefits.

- The identification of the benefits makes it clear that the potential for improvement is comparable for manufacturers and retailers. The bottom-line impact can be 10 percent to 15 percent for both.

- To maximize the benefit potential, the industry must collaborate in order to improve end-to-end processes that involve item and party data exchange.

- The implementation costs will vary considerably depending on the current state and ambition of each company.

- Data accuracy is an absolute prerequisite for successful data synchronization. Without it, the process will only add costs. The development work also made clear the importance of taking a global approach. This global approach will result in less diversity in communication between existing trading partners (even locally), thereby reducing overhead. In addition, the ongoing growth of   cross-regional trading within the industry will demand a global system language. And while a global approach to standards will make international trade easier and less prone to error, it will also provide these benefits within organizations that operate across regions. These objectives are achievable, but ongoing leadership and communication will be required to increase the awareness of GCI-endorsed standards and the benefits associated with adoption and implementation. Joint implementation projects between manufacturers and retailers will build credibility, accelerate the realization of benefits and lead to critical mass. The journey to implementation will

vary by company and can be mapped using the findings of the business case. It provides the elements to build your company specific justification for investments in these standards.

The GDS Network consists of:
  • Interoperable, certified Data Pools
  • A Global Registry; provided by GS1
  • A set of EAN.UCC Standards, ensuring that all supply chain partners use common product descriptions and classification and the same message structures to exchange the data.

Figure 1: The GCI Vision for GDS

2. The Data Pool registers a product in the **GS1 Global Registry** and sends very basic information about the item.

3. The **GS1 Global Registry** holds this basic information about all items and the location of each items' **source Data Pool.**

Manufacturer

Registry

Data pool

Data pool

1. A manufacturer will:
•**Align** data internally
•Prepare data for external publication in line with **EAN.UCC standards**
•Publish item information to the **source Data Pool**
•**Synchronize** changes to this date
•Approve retailer requests to **subscribe** to date.

4. A retailer will:
•Search the **GS1 Global Registry,** via a selected Data Pool, for an item (by GTIN or by description) – the Registry returns the details of the items to the Data Pool
• Request **subscription** to manufacturer data
• Receive data and any subsequent changes
• **Align** data with internal data.

5.The trading partners **synchronize the item** information between their respective Data

6. The same process applies for synchronizing **Party information,** published by manufacturer or retailer, based on the GLN.

Retailer

Source: ***, „An Integrated View of the Global Data Synchronisation Network and the Electronic Product Code Network", Global Commerce Initiative, IBM, 2004

The GS1 Global Registry and the interoperable Data Pools are at the heart of the GDS process. Their roles and functions are distinct but complementary. The key role of the GS1 Global Registry is to ensure that original data is registered once, at place. Data Pools provide for the publication of certified standard data and subscription to this data.

The Network works with the following principles:

  • The GS1 Global Registry and the Data Pools will be EAN.UCC certified

  • There is interoperability among all Data Pools and the GS1 Global Registry

• One single point of entry into the Network by all participants

• Only the Data Pools will communicate with the GS1 Global Registry

• Only GDS EAN.UCC Business Messages will be used within the Network.

RFID-based EPC will fail in supply chains built on inaccurate data.

Delivering the benefits promised by RFID-based EPCs will only be possible if trading networks also address the issue of inaccurate data that pervades today's supply chains, especially in the retail sector. There is little point in knowing that a case of goods with a particular EPC is speeding its way through the system if you think it is toothpaste when it is actually shampoo. Since the EPC is a GTIN based number, synchronizing the meaning of the GTIN during the order management process is critical to ensuring accurate fulfilment of that order and downstream supply chain processes based on EPC scanning.

Figure 2. RFID technology
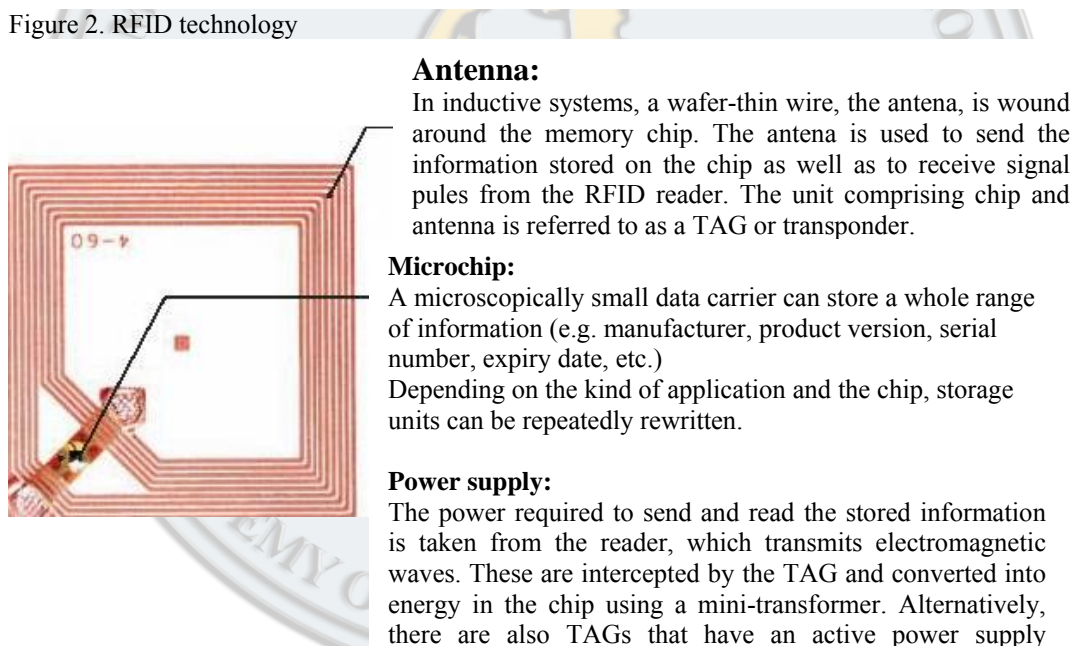
Antenna:

In inductive systems, a wafer-thin wire, the antena, is wound around the memory chip. The antena is used to send the information stored on the chip as well as to receive signal pules from the RFID reader. The unit comprising chip and antenna is referred to as a TAG or transponder.

Microchip:

A microscopically small data carrier can store a whole range of information (e.g. manufacturer, product version, serial number, expiry date, etc.)
Depending on the kind of application and the chip, storage units can be repeatedly rewritten.

Power supply:

The power required to send and read the stored information is taken from the reader, which transmits electromagnetic waves. These are intercepted by the TAG and converted into energy in the chip using a mini-transformer. Alternatively, there are also TAGs that have an active power supply
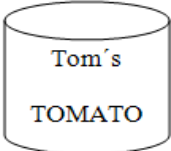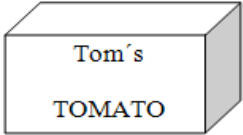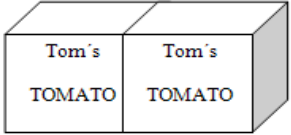
Reader:

The RFID reader communicates with the TAG with no contact or line-of-sight requirement. Installed at every point in the value chain, these interfaces independently process the data read and communicate with external data processing applications (such as inventory management systems, storage management, etc.)

Source: ***, EPC Global Tag Data Standard, Powered by GS1, Standard Specification , 2005

Therefore, prior to the implementation of RFID readers and tags, all retailers and their suppliers must adopt the single Global Data Synchronization (GDS) vision being promoted by the Global Commerce Initiative (GCI)[2] and EAN.UCC. EAN.UCC, the standards organization for retail, has not only developed a single standard for identifying products, the Global Trade Identification Number (GTIN), but also an infrastructure the Global Data Synchronization Network (GDSN)—to allow the retail industry to share data more easily. When fully implemented, GDS will allow detailed data about products from any supplier anywhere in the world to be accessed by any retailer anywhere in the world, through a network of locally held databases of GTINs called data pools.

Table 1: A different Shelf Ready Packaging (SRP) with GTIN & EPC Bare Data

	GTIN Base Data for Sync	**EPC Based Data for Reference**
Tom's TOMATO	GTIN: 065231 000106 Tom's Soup **20 oz, Tomato Soup** Cost: $.50, MSRP $.99, UOM: EA	EPC: 16.3.065231.00010.0000000001 **20 oz, Tom's Soup, Tomato Soup** **Date of Manufacture: 02152004** **Factory GLN: 006523100001, Lot # 349230Z** **Line # 100, Expiration Date: 02152006**
Tom's TOMATO	GTIN: 10 065231 000 106 Tom's Soup **Case of 24, 20 oz,** **Tomato Soup** Cost: $12.00, MSRP $0, UOM: EA	EPC: 16.3.106523I.OOO1O.OOOOOOOOO1 **Case of 24, 20 oz, Tom's Soup, Tomato Soup** **Date of Packing: 02152004** **Factory GLN: 006523100001, Line #: 8663**
Tom's TOMATO / Tom's TOMATO	GTIN.: 20 065231 000 106 Tom's Soup **Pallet 18 Case of 24, 20 oz,** **Tomato Soup** Cost: $ 144.00, MSRP $0, UOM: EA	EPC: 16.3.2065231.00010.0000000001 **Pallet 18 Case of 24, 20 oz, Tom's Soup, Tomato Soup** **Date Build: 02152004** **Warehouse GLN: 006523100002** **Storage Temp 10 C** **Logistics Visibility**

*Source: ***, „Electronic Product Code: RFID Drives The Next Revolution in Adaptive Retail Supply Chain Execution", Global Exchange Services, 2004*

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[2] The Global Commerce Initiative (GCI) is a voluntary body created in October 1999 to improve performance of the international supply chain for consumer goods through the collaborative development and endorsement of recommend standards and key business processes.
GCI operates through an Executive Board composed of senior representatives of more than 45 companies drawn equally from manufacturing and retailling and doing busines across continents organizations representating the interests of one million businesses, large and small.
Four of the sporing bodies represent the interests of manufactures and retailers (AIM, CIES, GMA and FMI). Two sponsors (the ECR movements and VICS) develop working tools for the collaborative management of the supply chain. The other two bodies are the principal standards organisations, EAN Interantional and the Uniform Code Council, Inc. (UCC).

As with the barcode, a set of standards is emerging to govern the EPC data structure stored on RFID tags, so that a tag attached to a pallet by a supplier can be read and understood when that pallet reaches the customer. The format of EPCs is governed by EPC global, an RFID standards development joint venture between EAN International and Uniform Code Council. EPC global is also developing standards for the radio frequencies at which RFID tags will operate to ensure global interoperability of tags and readers.

Figure 3. Structure of EPC: GTIN 14 Digits
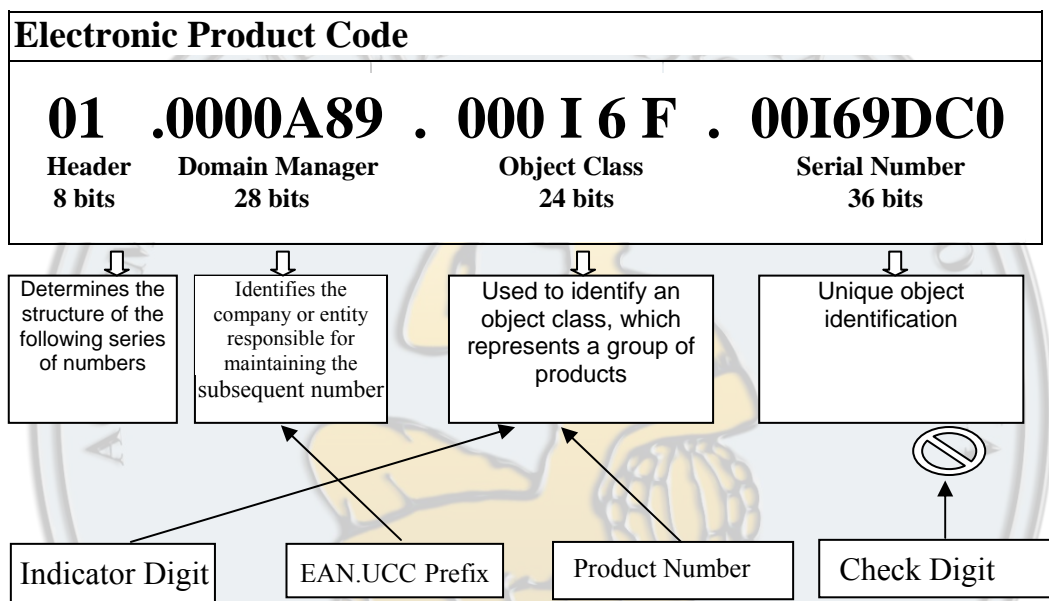
Source: ***, „Electronic Product Code: RFID Drives The Next Revolution in Adaptive Retail Supply Chain Execution", Global Exchange Services, 2004

Decoding the number:
Header-Used by readers to determine the type of data contained on the chip, ep., 64-bit EPC vs. 96-bit EPC.
Domain Manager-EAN.UCC Company Prefix
Object Class-Combination of Product Hierarchy Indicator (00+UPCI2, or 0+EAN 13) and Product Number (balance of GTIN minus check digit)
Serial number-Consecutive number for each item produced.
Note: The GTIN check digits is not encoded in an EPC.

RFID tags can be active, passive or semi-passive. Active tags include a battery that powers the antenna to broadcast a signal to be picked up by the reader. Passive tags have no battery but draw power from the reader, which sends out electromagnetic waves that induce a current in the tag's antenna. Semi-passive tags use a battery to run the chip's circuitry, but communicate by drawing power from the reader. Active and semi-passive tags can be read up to 100 feet (30 meters) away while passive tags can only be read from within 10 feet (3 meters). Active and semi-passive tags are also much more expensive. This means they are economical for tracking high-value goods that need to be scanned from a distance but are not suitable for tagging very low cost items.

By applying accepted standards, RFID is compatible with any network. And RFID is of most benefit when used across the board by every single partner along the value chain - from the manufacturer to the branch manager, working together hand-in-hand for fast, secure, free-flowing and cost-saving processes.

Table 2: Overview of Benefits for Manufacturer and Retailer

	MANUFACTURER	RETAILER
CORPORATE MANAGEMENT	• Simplified corporate reporting • Expand geographic retailer base • Eliminate IT system redundancy • Opportunity for shared service creation	• Simplified corporate reporting • Enable global sourcing • Corporate transparency/sales synergy • Eliminate IT system redundancy • Opportunity for shared service creation
CATEGORY /PROMOTION MANAGEMENT	• Improve visibility/stock-level planning • Product posting/maximize retail exposure • Reduce time spent on complaints/disputes • Simplified and enhanced category reporting • Reduce product introduction lead time • Reduce product promotion lead time	• Reduce need for local agents/intermediation • Expand supplier base • Corporate sourcing price transparency • Improve visibility/stock-level planning • Reduce time spent on complaints/disputes • Simplified and enhanced category reporting • Reduce product introduction lead time • Reduce product promotion lead time
ADMINISTRATIV DATA HANDING	• Eliminate need for cross-reference tables • Fewer invoice disputes • Fewer write-offs • Reduce accounts receivable • Fewer sales order defects	• Less catalogue maintenance • Eliminate need for cross-reference tables • Fewer invoice disputes • Fewer order defects • Improved fill rate
LOGISTICS	• Simplified order tracking and tracing • Fewer return shipments • Improved rate of perfect orders • Fewer emergency orders • More accurate picking • Optimized short-term planning	• Error-free shipment receiving • Fewer return shipments • Fewer backorders • Less excess/safety stock • Optimized location dispatch

Source: ***, „Creating the business Case for Global Data Synchronising in Your Company", Cap Gemini Ernst & Young, Global Commerce Initiative, 2002

A GDS application in food traceability

The Regulation 178/2002 on Food Safety

The legal text says: *"The traceability of food, feed, food-producing animals, and any other substance intended to be, or expected to be, incorporated into a food or feed shall be established at all stages of production, processing and distribution. Food and feed business operators shall be able to identify any person from whom they have been supplied with a food, a feed, a food producing animal, or any substance intended to be, or expected to be, incorporated into a food or feed.*
To this end, such operators shall have in place systems and procedures, which allow for this information to be made available to the competent authorities on demand. Food and feed business operators shall have in place systems and procedures to identify the other businesses to which their products have been supplied. This information shall be made available to the competent authorities on demand. Food or feed which is placed on the market or is likely to be placed on the market in the Community shall be adequately labelled or identified to facilitate its traceability, through relevant documentation or information in accordance with the relevant requirements of more specific provisions."

To assist material suppliers, manufacturers and retailers, EAN International has defined key traceability principles and produced an implementation grid which links them to enabling technologies and relevant EAN•UCC standards. The four key traceability principles are:

1. Unique identification of products, logistic units and locations

2. Traceability data capture and recording

3. Links management and traceability data retrieval

4. Traceability data communication

Table 3: EAN•UCC Traceability Implementation Grid

| TRACEABILITY PRINCIPLES	ENABLING	EAN.UCC SYSTEM TOOLS
UNIQUE IDENTIFICATION	AUTOMATED IDENTIFICATION	GTIN, SSCC, GLN, APPLICATIONS IDENTIFIERS
DATA CAPTURE AND RECORDING	AUTOMATED DATA CAPTURE	EAN/UPC, UCC/EAN-128
LINKS MANAGEMENT	ELECTRONIC DATA PROCESSING	**SOFTWARE APPLICATIONS**
DATA COMMUNICATION	ELECTRONIC DATA INTERCHANGE	EANCOM / XML

- *Source: ***, ECR – Using Traceability in the Supply Chain to Meet Consumer Safety Expectations, ECR Europe, 2004*

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Traceability links management and retrieval

In a majority of supply chains, products are tracked and traced by their production lot, which has undergone the same transformation (production process) and by their transport/storage path (distribution process).

Figure 4 shows the use of EAN•UCC standards for identifying locations (GLN), logistic units (SSCC – Serial Shipping Container Code), manufacturing lots (AI 10) and consumer units (GTIN) in a production environment. Identification management in a production environment.

**Figure 4: The food supply chain with the EAN.UCC Standards for
identifying location logistic units & consumer units**
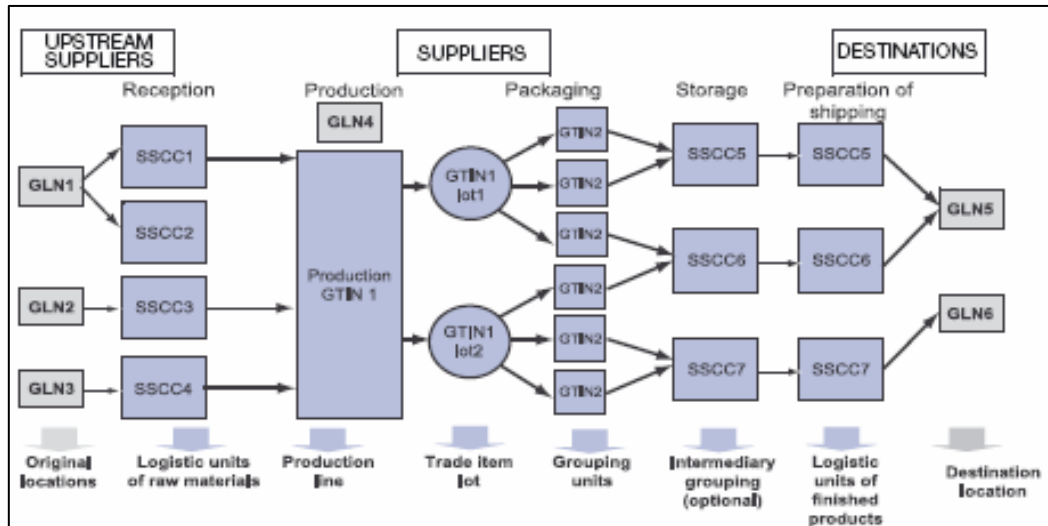
*Source: ECR – Using Traceability in the Supply Chain to Meet Consumer Safety Expectations,
ECR Europe, 2004*

Conclusions:

The business cases developed either by ECR Europe, local EAN organizations or
the Global Commerce Initiative have all shown the direct impact of the quality of
the master data on the reliability of any supply chain process.

The implementation of a master data synchronization process between all the
partners, which may be involved in the traceability, withdrawal and recall
processes, is crucial and highly recommended considering the sensitivity aspect of
these processes linked to consumer safety and the absolute need for accurate and
fast procedures.

R E F E R E N C E S

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