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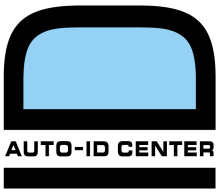

TECHNICAL MEMO

Auto-ID Business Use-Case Framework (A-Biz)

Background

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ABSTRACT

The Auto-ID Business Use-Case Framework (hereafter referred to as a-Biz, short for "Auto-ID Business Use-Cases") provides the foundation for the integration of Auto-ID technologies with existing Business Information Systems (BIS). This document provides the necessary background information of the high-level needs and features of the project, laying the foundation for more detailed function specific Use-Cases to follow.

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Biography

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Masters Candidate, MIT Lab

Timothy Milne received Bachelor's and Master's Degrees from Brigham Young University where he graduated with honors from the Department of Mechanical Engineering. At BYU he was involved in the Computer Aided Design (CAD) and Computer Aided Geometric Design (CADG) labs. His Master's thesis presented a new method for topologically mapping arbitrary N-Genus surfaces to single planar domains. Mr. Milne later developed CAD software for various industries including the Aerospace Corporation, Rhythm and Hues Studios, and Varimetrix Corporation. Most recently he worked for Corrpro, a corrosion protection consulting firm, writing a software package for corrosion protection management.

Mr. Milne will receive a Masters in Engineering from MIT in Spring 2003. His work at the Auto-ID Center includes the Physical Markup Language, which describes physical things in a platform neutral format that can be used by companies and people involved in all aspects of supply chain management.

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1. BACKGROUND

1.1. Where to Begin

When one considers the supply chain as a whole, there are numerous opportunities where the Auto-ID infrastructure will generate cost savings and enhance productivity. For example, consider the Standards in Action Roadmap© (SIA) published by the EAN.UCC[1], which maps the collaborative processes between a retailer and a supplier. Figures 1 and 2 show modified versions of both halves of the SIA – with key supply chain related functions that will initially be impacted by Auto-ID highlighted in blue. As further applications develop we expect Auto-ID to impact the non-highlighted functions as well.

As a starting point, we have elected to look into warehouse shipping and receiving processes in more detail and how they will be impacted with Auto-ID technology.

[1] Standards in Action Roadmap by the EAN and UCC, download an original copy from: http://www.retailsystems.com/communitycenters/cscc/SIA_map.pdf

1.2. Shipping and Receiving

Current warehouse practices rely heavily on manual labor and intervention. They are fraught with inaccuracies and the potential for human error. All too frequently discrepancies arise between what the supplier claims to have shipped and what the customer claims to have received. The discrepancies are not only limited to quantity but can also involve violations in the terms of sale and conditions for delivery. Often, when discrepancies arise, deductions[2] and charge backs[3] are taken.

In one recent study, a company hereafter referred to as company A moved away from 'Live Loads' (LL)[4] to a 'Shipper's Load and Count' (SLAC)[5] shipping method to one of its customers, company B. While the revised practice speeds up shipping by eliminating the need for the driver to be present, it places the burden on the shipper (Company A) to load the trailer accurately. The result has been a rise in the amount of deductions taken.

When company B detects a wrong quantity in a shipment, they can either pay for what they claim they actually received, or pay for the quantity that appears on the invoice and make adjustments on future shipments. Either way, company A is forced to examine and resolve every deduction taken, reclassifying them as either reclaimed, or as valid deductions. In the year 2000 alone, the company under consideration incurred $500M in deductions out of $20.5B in invoices. 40% of these deductions were later declared invalid and reclaimed. Auto-ID enabled automation processes have the potential of eliminating most of these mistakes and reducing the overhead required to track and reconcile them.

[2] There are many categories for deductions, including discrepancies in the product types, quantities, and prices.

[3] If the terms stipulate that a shipment arrive no later than 10 am, but it doesn't actually arrive until 3 pm, the receiving company can issue a 'Charge Back', or a reduction in the invoice as per prearranged terms in the Trade Agreement.

[4] A 'Live Load' requires the transportation carrier's driver to be present for loading, to watch and keep track of all the loaded items, and then sign the invoice. The carrier then shares the responsibility for the shipment's accuracy.

[5] Under 'Shipper's Load and Count', company A loads and seals the trailer with the packing invoice. As long as the seal is intact upon arrival at company B, the carrier is relieved from any responsibility for mistakes in the shipments.

Figure 1: The blue highlighted functions will be impacted by Auto-ID.

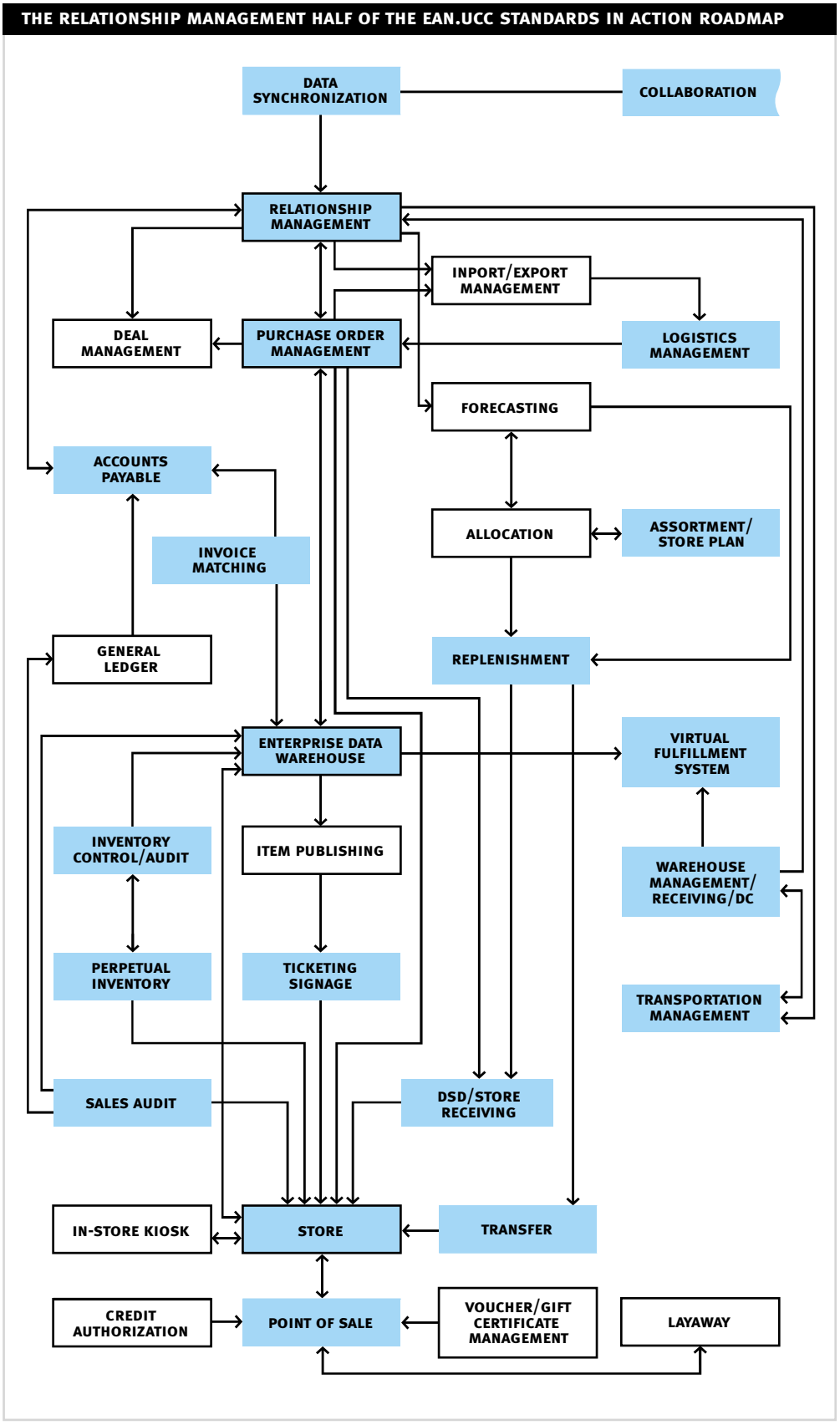
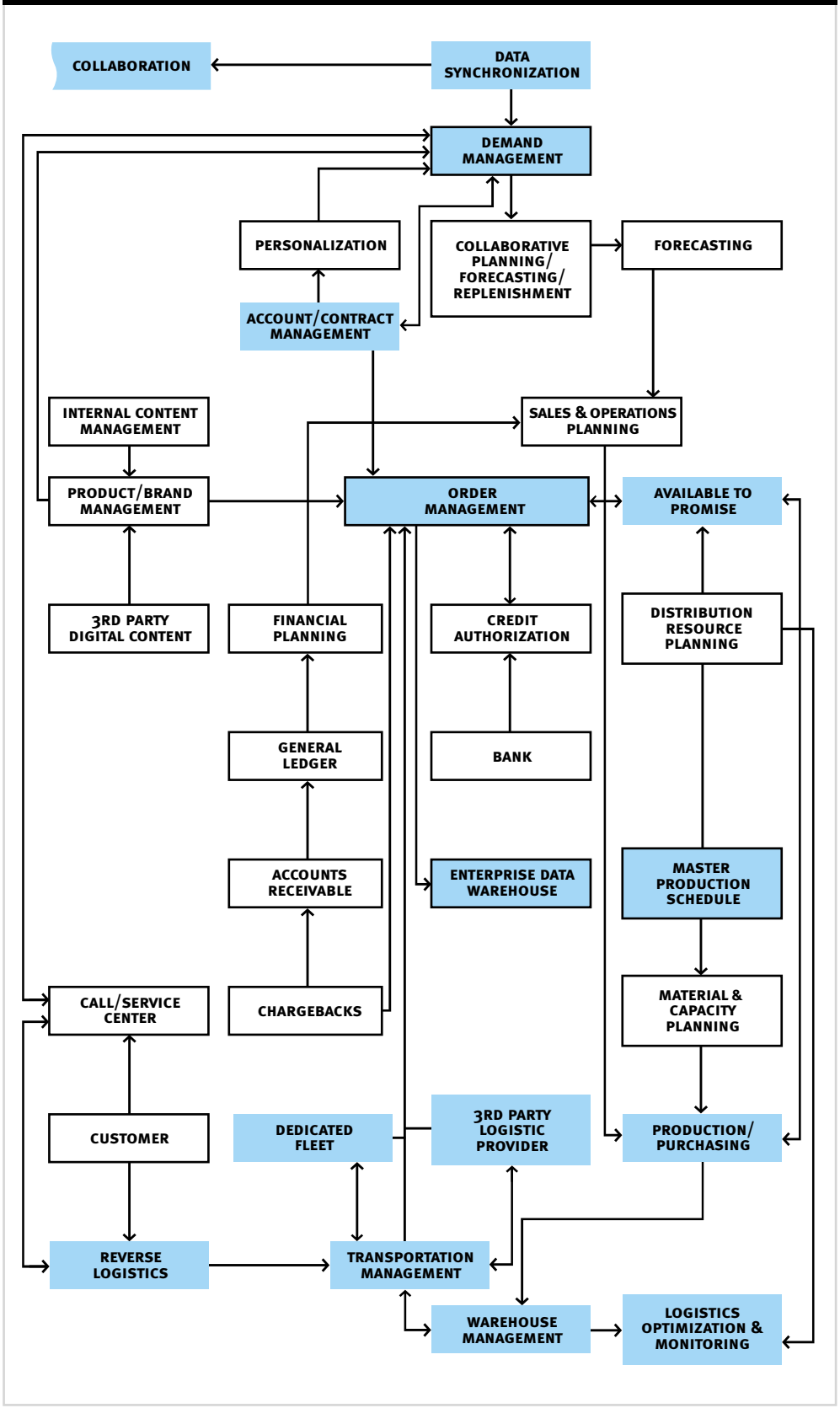


Figure 2: The highlighted functions will be impacted by Auto-ID.

THE DEMAND MANAGEMENT HALF OF THE EAN.UCC STANDARDS IN ACTION ROADMAP



Given the problem presented, the a-Biz project will begin by detailing the use-case by which the composition of a pallet is verified and checked by the staff at a receiving party's warehouse dock. The project will also address mixed pallets and aggregation issues. What makes the receiving process an attractive choice is that it occurs in almost any industry. Furthermore, the results of this project could find immediate application in the third stage of the Auto-ID Center Field Trial.[6]

[6] Announcing the beginning of the Field Trial: http://www.autoidcenter.org/news_monthlyreport_sep_01.asp

1.3. Example Use-Case: Despatch Advice

Currently many industries use an Advanced Shipping Notification (ASN)[7] or Despatch Advice (DA)[8] to send electronic data concerning a shipment from a supplier to a customer. The DA gives detailed information on the content of a shipment and date of movement to the receiver of that shipment. For the receiving party, the DA is utilized in three ways:

[7] RosettaNet, Johnson Controls, others

[8] UCC, UCCNet, others

1. Material schedulers with the receiving party use the DA to determine and confirm goods in transit.
2. The receiving party uses the DA to verify and receive product into their information system.
3. The accounts payable team uses the DA to create an electronic invoice that will generate payment to our suppliers.[9]

[9] Johnson Controls, Inc. Global Supplier Standards Manual ref: WW-POS-ST-06-01

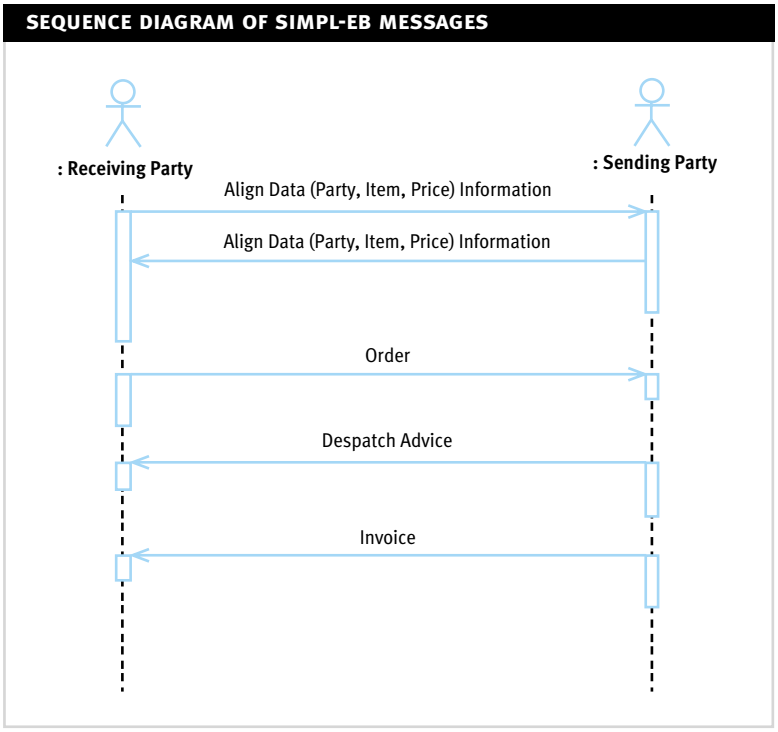
For example, the complete EDI/ASN message for one company studied must contain the SPECIFIED INFORMATION listed below:

1. Shipment ID number
2. Shipment date/time
3. Gross weight of shipment
4. Net weight of shipment
5. Total lading quantity (e.g. # of cartons)
6. SCAC Standard Carrier Alpha Code
7. Mode code (e.g. "E" for expedite, "A" for air, etc.)
8. Pool point location (if applicable)
9. Trailer number (or air bill if it's an air shipment)
10. Packing slip number(s)
11. Ship from location (a supplier code, GLN or DUNS Code)
12. Ship to location(s) (plant code(s) including dock code(s), GLN or DUNS code)
13. Receiving party part number
14. Engineering change level (part)
15. Quantity shipped
16. Unit of measure
17. Purchase order number
18. Number of cartons shipped of each part
19. Quantity per carton[10]

[10] Johnson Controls, Inc. Global Supplier Standards Manual ref: WW-POS-ST-06-01

The DA is an alternative to the ASN outlined above. The DA in one of a series of business messages that the UCC has recently developed in coordination with its Business Modeling Group to model a typical e-business transaction. They began their modeling effort by putting together a basic framework of transactions between a buyer and a seller, which they call Simpl-eb. The core sequence of messages includes: party introductions, exchange item request and price, place an order, despatch advice and invoice. The first two messages are grouped under alignment, and the last three under trade or commerce. Figure 3 is a UML sequence diagram that puts all of these messages in context.

Figure 3: Courtesy UCC
* Party, Item, Price



With the message framework in hand, they turned to the Business Modeling Group to generate a detailed list of business requirements for each message. They've taken these requirements and built UML models of the business rules, which they call BUML. The BUML models are technology neutral. When done, they pass the BUML models to the IUML/XML group, which generates separate technology specific Implementation UML models, which are then turned into XML schemas.

The DA in the UCC's model is referred to as a Simple Despatch Advice[11]. This message is kept simple by aligning the data prior to the sending of the advice message, and is representative of the way business is currently conducted. Prior alignment of the data avoids the problem of serialized lookups at the receiving dock and the attendant bandwidth congestion that would result using the Auto-ID infrastructure. The Simple DA is sent to inform the receiving company of what's coming, when, and with what order it's associated so they can prepare to receive it. No other data transfer is necessary at the time of receipt. Without the DA, however, when goods arrive the receiver would be forced to generate a series of ONS lookups to determine the composition of the shipment and then tie into the company's Order Management system to try and reconcile it with outstanding orders.

[11] UCC's Business Modeling group (BMG) Business Requirements Analysis Document For Simple Despatch Advice, January, 2001

A strength of the Simpl-eb framework is that it was developed using consensus within the UCC,'s Business Modeling Group[12]. Furthermore, it draws upon standard technologies and methodologies that are commonplace and consistent with those in the Auto-ID center for the development of the PML language[13].

[12] Refer to the Global Standards Management Process (GSMP): http://www.ean-ucc.org/global_smp/gsmp_smp.htm

[13] UML Use Case Models, Rational Modeler, XML and XML Spy etc.

It is therefore the intent of this project to show where and how the addition of the Auto-ID infrastructure can be used to automate the capture and verification of the data contained in a DA, and what form any new Auto-ID data should take. Once completed, the framework developed will be applied to additional use-cases.

2. CONCLUSION AND SUPPLEMENTAL DOCUMENTS

With the background herein presented, we are ready to begin looking at particular use-cases. Please refer to the supplemental documents that outline each of the associated use-cases. Each use case section can be taken as a stand-alone document. Taken as a whole, a-Biz will become a framework for integration with existing Business Information Systems.

3. GLOSSARY

3.1. a-Biz – Auto-ID Business Use-Case Framework

a-Biz is the project for which this paper serves as a background document. The project will eventually consider the integration of Auto-ID technology with many real world business use-cases, thus enabling "Automated Business", or a-Biz.

3.2. ASN – Advanced Shipping Notification

Also referred to as Despatch Advice (DA). This electronic document is sent ahead of the shipped goods to give notice that they are in transit and to convey the composition of the shipment.

3.3. BIS – Business Information System

Business Information System, or BIS, is the system used to handle information about commerce transactions.

3.4. DA – Despatch Advice

Also referred to as Advanced Shipping Notification (ASN). This electronic document is sent ahead of the shipped goods to give notice that they are in transit and to convey the composition of the shipment.

3.5. EAN – European Article Numbering

The system founded in 1974 when manufacturers and distributors of 12 European countries formed an ad-hoc council. Its brief was to examine the possibility of developing an uniform and standard numbering system for Europe, similar to the UPC system already in operation in the USA. As a result, a UPC compatible system called "European Article Numbering" was created. http://www.ean-int.org

3.6. EDI – Electronic Data Interchange

Electronic Data Interchange is a framework for the exchange of information related to business processes between trading partners.

3.7. EPC™– Electronic Product Code™

The Electronic Product Code, or EPC™, is the unique code used to identify an object in the Auto-ID infrastructure. It is similar in purpose to the GTIN, UPC and others.

3.8. LL – Live Loads

A 'Live Load' refers to the practice requiring the transportation carrier's driver to be present for loading, to watch and keep track of all the loaded items, and then sign the invoice. The carrier then shares the responsibility for the shipment's accuracy.

3.9. ONS – Object Name Service

The Object Naming Service, or ONS, is a component of the Auto-ID framework, and performs a name resolving function similar to the Domain Naming Service employed by the internet today.

3.10. PML – Physical Markup Language

The physical markup language is used by the Auto-ID infrastructure to communicate information about physical objects.

3.11. Savant™

The Savant™ is a part of the Auto-ID framework. It is a globally distributed server that serves as a data router performing the functions of data capturing, data monitoring, and data transmission.

3.12. SLAC – Shipper's Load and Count

'Shipper's Load and Count' refers to the practice where company A loads and seals the trailer with the packing invoice. As long as the seal is intact upon arrival at company B, the carrier is relieved from any responsibility for mistakes in the shipments.

3.13. SIA – Standards in Action Roadmap© (SIA)

The Standards in Action Roadmap is published by the EAN.UCC, which maps the collaborative processes between a retailer and a supplier. Follow this link for an electronic version:http://www.retailsystems.com/communitycenters/cscc/SIA_map.pdf

3.14. UCC – Uniform Code Council

The mission of the Uniform Code Council, Inc., is to take a global leadership role in establishing and promoting multi-industry standards for product identification and related electronic communication. The goal is to enhance supply chain management thus contributing added value to the customer. http://www.uc-council.org

3.15. UML – Unified Modeling Language

The Unified Modeling Language, or UML, is a descriptive modeling framework for modeling the requirements and business processes via Use-Cases, Activity Diagrams, etc.

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