UN/CEFACT Semantics

Definitions, Importance, Lessons, and Achievements

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Introducing UN/CEFACT CCL and RDM development methodologies for providing an international supply chain semantic harmonization foundation

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UN/CEFACT Semantics History - 1

- 1970 United Nations Layout Key

- 1990 UN Trade Data Elements Directory (UNTDED and ISO 7372) first version published

- Most recent version published 2005 – new version needed?

- 1989 UN/EDIFACT Directory of United Nations Standard Messages first published

- UN/EDIFACT Directories still maintained and published twice yearly reflecting submitted change requests

- UNCEFACT Trade Facilitation Code recommendations

UN Layout Key (UNLK)

- First published 1960
- Flexible aligned data presentation which has become the de facto standard for the majority of international trade documents
- Foundation for International transport conventions e.g. Maritime B/L (ICS), Airwaybill (IATA), Road CMR (IRU), Rail CIM (UIC) etc.
- Foundation of Customs and other Regulatory Procedures e.g SAD, Phyto-Sanitary Certificates, Cert of Origins etc.
- Hundreds of document formats based on UNLK across trade, transport, finance, customs, insurance, inspection etc.
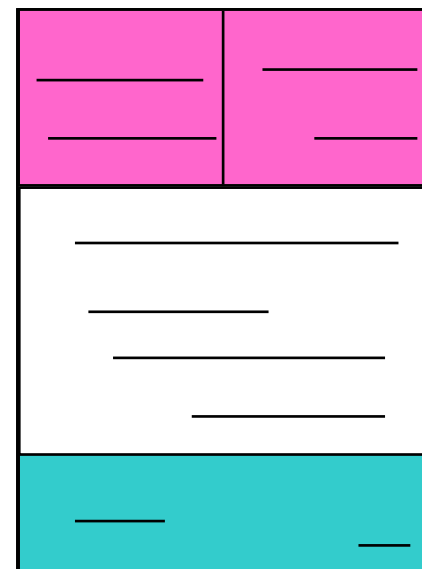- Reference semantics provided by UNTDED (ISO 7372)

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Cross-Sector Transaction Data

Sector Specific Detail e.g.
order line items, goods items ...

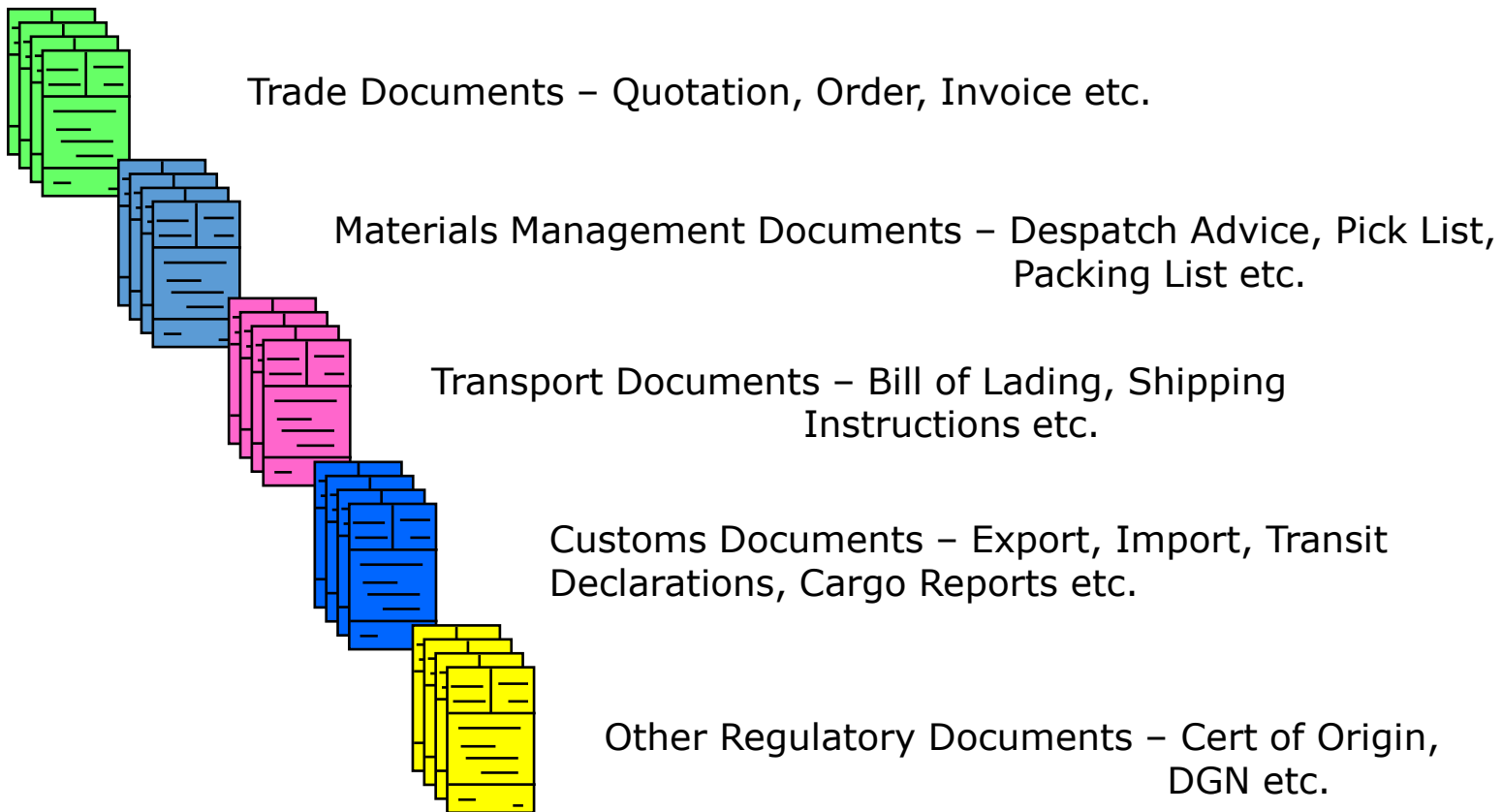Document Function Specific

UNLK Form Families

Trade Documents – Quotation, Order, Invoice etc.

Materials Management Documents – Despatch Advice, Pick List, Packing List etc.

Transport Documents – Bill of Lading, Shipping Instructions etc.

Customs Documents – Export, Import, Transit Declarations, Cargo Reports etc.

Other Regulatory Documents – Cert of Origin, DGN etc.

UN Layout Mapping Example

UID 2280
Name Transport Means. Actual Departure. Date Time
Definition **Date and or time of the departure of means of transport**
Synonym Flight Date, Sailing Date
Repr. an..17
Mapping UNLK: L 17, P 16

UNTDED (ISO 7372)

- An internationally accepted standard *repository for the semantic of trade data elements* used in international trade

- A method to describe information requirements from business perspective (*a non-technical description of trade information*).

- The definition is *syntax-neutral* and provides the *basis for migrating to* paperless trade.

- Defining the data content in terms of the UNTDED makes *different trade documents become directly comparable*, which helps identify duplication and reduce the number of documents to the strict minimum.

- UNTDED data elements reused in UN/EDIFACT Directories

- Latest version published 2005

UNTDED/SO 7372 Example Page

Normative

International Layout Mappings

B2 = Document. Type Name.Text

	UID	ISO7372 TDED Name	Definition	TDED repr.	Locations, Bridges
2	1000	Document. Type Name.Text	Free text name of a document such as 352 for Proforma invoice, 380 for Commercial invoice.	an..35	UNLK: L 02, P 45-80 MAR: IMO/FAL 1-7
3	1001	Document. Type.Code	Code specifying the name of a document such as 352 for Proforma invoice, 380 for Commercial invoice.	an..3	UNLK: L 04, P 41-45 CIMP: (120): a1 SAD: (SAD 1(first to third subdivision))
4	1099	Transport Means. Stay.Identifier	Identifier of the stay of a means of transport in a port or airport	an..35	
5	4219	Transport Service. Priority.Code	Code specifying the priority of a transport service.	an..3	CIMP: (704):a1
6	5068	Invoice. Line Item. Amount	Total sum charged with respect to a single line item of an invoice.	n..18	UNLK: L 56, P 63-80
7	5070	Consignment. For Customs Total.Amount	Total amount for customs purposes of all goods in a consignment, whether or not they are subject to the same customs procedure, and have the same tariff/statistical heading, country information and duty regime	n..18	AWB: L 24, P 71-81 CIMP: (509):n..12, or the letters 'NCV'
8	6094	Consolidation. Package.Quantity	Count of the total number of packages in all of the consignments referred to as one consolidation.	n..16	
9	6292	Goods Item. Gross Weight.Measure	Weight (mass) of goods including packaging but excluding the carrier's equipment.	n..14	AWB: L 33-44, P 13-19 CIM: L 28-33, P 63-74 (CIM 26) CIMP: (600):n..7 CMR: L 28-42, P 63-71 (CMR 11) SAD: (SAD 35) UNLK: L 28-52, P 63-74

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UN/EDIFACT

- UN/EDIFACT (the United Nations rules for Electronic Data Interchange for Administration, Commerce and Transport)

- Data elements based on UNTDED (ISO 7372)

- First published 1989 (2 UNSM messages - purchase order and invoice)

- Latest version D22B (220 UNSM Messages covering 15 international domains including B2B, B2G and G2G exchanges)

- Millions of UN/EDIFACT messages exchanged globally each day

- The first truly global document exchange electronic standard

UN/EDIFACT Messages

FINPAY	2	Multiple interbank funds transfer message
FINSTA	1	Financial statement of an account message
GENRAL	3	General purpose message
GESMES	3	Generic statistical message
GOVCBR	3	Government Cross Border Regulatory message
HANMOV	7	Cargo/goods handling and movement message
ICASRP	2	Insurance claim assessment and reporting message
ICSOLI	2	Insurance claim solicitor's instruction message
IFCSUM	16	Forwarding and consolidation summary message
IFTCCA	4	Forwarding and transport shipment charge calculation message
IFTDGN	8	Dangerous goods notification message
IFTFCC	3	International transport freight costs and other charges message
IFTICL	1	Cargo insurance claims message
IFTMAN	11	Arrival notice message
IFTMBC	10	Booking confirmation message
IFTMBF	12	Firm booking message
IFTMBP	10	Provisional booking message
IFTMCA	3	Consignment advice message
IFTMCS	12	Instruction contract status message
IFTMIN	16	Instruction message
IFTRIN	4	Forwarding and transport rate information message
IFTSAI	10	Forwarding and transport schedule and availability information message
IFTSTA	16	International multimodal status report message
IFTSTQ	4	International multimodal status request message
IMPDEF	2	EDI implementation guide definition message
INFCON	1	Infrastructure condition message
INFENT	2	Enterprise accounting information message
INSDES	3	Instruction to despatch message
INSPRE	1	Insurance premium message
INSREQ	2	Inspection request message

Example UNSMs

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UN/EDIFACT Semantics

Segments

ADR	Address
AGR	Agreement identification
AJT	Adjustment details
ALC	Allowance or charge
ALI	Additional information
APP	Applicability
APR	Additional price information
ARD	Monetary amount function
ARR	Array information
ASI	Array structure identification
ATT	Attribute
AUT	Authentication result
BAS	Basis
BGM	Beginning of message
BII	Structure identification
BUS	Business function
CAV	Characteristic value
CCD	Credit cover details
CCI	Characteristic/class id
CDI	Physical or logical state
CDS	Code set identification
CDV	Code value definition
CED	Computer environment details
CIN	Clinical information
CLA	Clause identification
CLI	Clinical intervention
CMP	Composite data element identification
CNI	Consignment information
CNT	Control total
COD	Component details
COM	Communication contact

Data Elements

9175	an..3	X	Data element usage type code
9213	an..3	X	Duty regime type code
9280	an..35		Validation result text
9282	an..35		Validation key identifier
9285	an..3	X	Validation criteria code
9302	an..35		Sealing party name
9303	an..3	X	Sealing party name code
9308	an..35		Transport unit seal identifier
9321	an..8		Application error code
9352	an..256		Government Procedure
9353	an..3	X	Government procedure code
9411	an..3	X	Government involvement code
9415	an..3	X	Government agency identification code
9416	an..256		Government action
9417	an..3	X	Government action code
9419	an..3		Service layer code
9421	an..3	X	Process stage code qualifier
9422	an..512		Value text
9424	an..512		Array cell data description
9426	an..35		Code value text
9428	an..35		Array cell structure identifier
9430	an..35		Footnote set identifier
9432	an..35		Footnote identifier

Codes

Code	Name
1	Clearance
2	Detention
3	Fumigation
4	Inspection
5	Security
6	Means of transport admittance
7	Cargo hold inspection
8	Container inspection
9	Cargo packaging inspection
10	Export certificate not required

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UN/CEFACT Semantics History - 2

- 1999 ebXML launched as joint project with OASIS

- Resulted in realisation that syntax exchange independent semantics were needed to support future technological advances

- Core Components Technical Specification (CCTS) was developed to provide a semantic modelling methodology tailored to build in maximum global harmonisation

- Core Components TS v2.01 published by UN/CEFACT 2.01 and by ISO TC154 15000-5 v CCS

- 2003 UN/CEFACT started building a core component library based on CCTS covering international supply chain data exchange processes

- 2006 First version UN/CEFACT Core Component Library (CCL) published

ebXML
A global XML & EDI joint initiative
1999-2003

Accelerating the adoption of industry standards
100+ member companies including IBM, Sun, Microsoft, Corel, Software AG, and Oracle.

United Nations Centre for the Facilitation of Procedures and Practices for Administration, Commerce and Transport

- OASIS
  - Non-profit international consortium
  - SGML, XML, xml.org

- UN/CEFACT
  - United Nations body under Trade Facilitation
  - Global policy and technical development in the area of trade facilitation and electronic business
  - UN Layout Key, UN/EDIFACT

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UN/CEFACT CCTS v2.01 (ISO 15000-5)

Core Components Technical Specification aka
Part 8 of the ebXML Framework 2003

- This Core Components Technical Specification describes and specifies a new approach to the well-understood problem of the lack of information interoperability between applications in the e-business arena.
- Traditionally, standards for the exchange of business data have been focused on static message definitions that have not enabled a sufficient degree of interoperability or flexibility.
- A more flexible and interoperable way of standardising Business Semantics is required.
- The UN/CEFACT (United Nations Centre for Trade Facilitation and Electronic Business) Core Component solution described in this specification presents a methodology for developing a common set of semantic building blocks that represent the general types of business data in use today and provides for the creation of new business vocabularies and restructuring of existing business vocabularies

https://unece.org/DAM/cefact/codesfortrade/CCTS/CCTS_V2-01_Final.pdf

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Core Components

- Basic building block – a data element
- No business context
- Types
  - ACC = Aggregate Core Component
  - BCC = Basic Core Component
  - ASCC = Associate Core Component
    - Connects two ACCs

Business Information Entities

- Reuses of Core Components
- Have Business Context
- Types
  - ABIE = Aggregate Business Information Entity
    - Built from an ACC
    - Qualified with a meaningful term
  - BBIE = Basic Business Information Entity
    - Built from a BCC
  - ASBIE= Association Business Information Entity Connects two ABIEs
    - Built from an ASCC

CCTS Naming Convention

- The Dictionary Entry Name of any Core Component is unique

- Dictionary Entry Names consist of Object Class Terms Property Terms, Representation Terms, Qualifiers and Special Terms (like "Details" or "Type")

- Dictionary Entry Names are ISO11179 compliant

- Terms are separated by a period (.) and a single space

- Qualifiers are separated by an underscore (_) and a space

- Multiple words are separated by spaces (no CamelCase!)

ISO 11179
Tripartite Data Element Naming

Object Class Term	+	Property Term	+	Representation Term
the primary concept or *Object Class* of the data element		the distinguishing characteristic or *Property* of the *Object Class*		the form or *Representation* of the data element
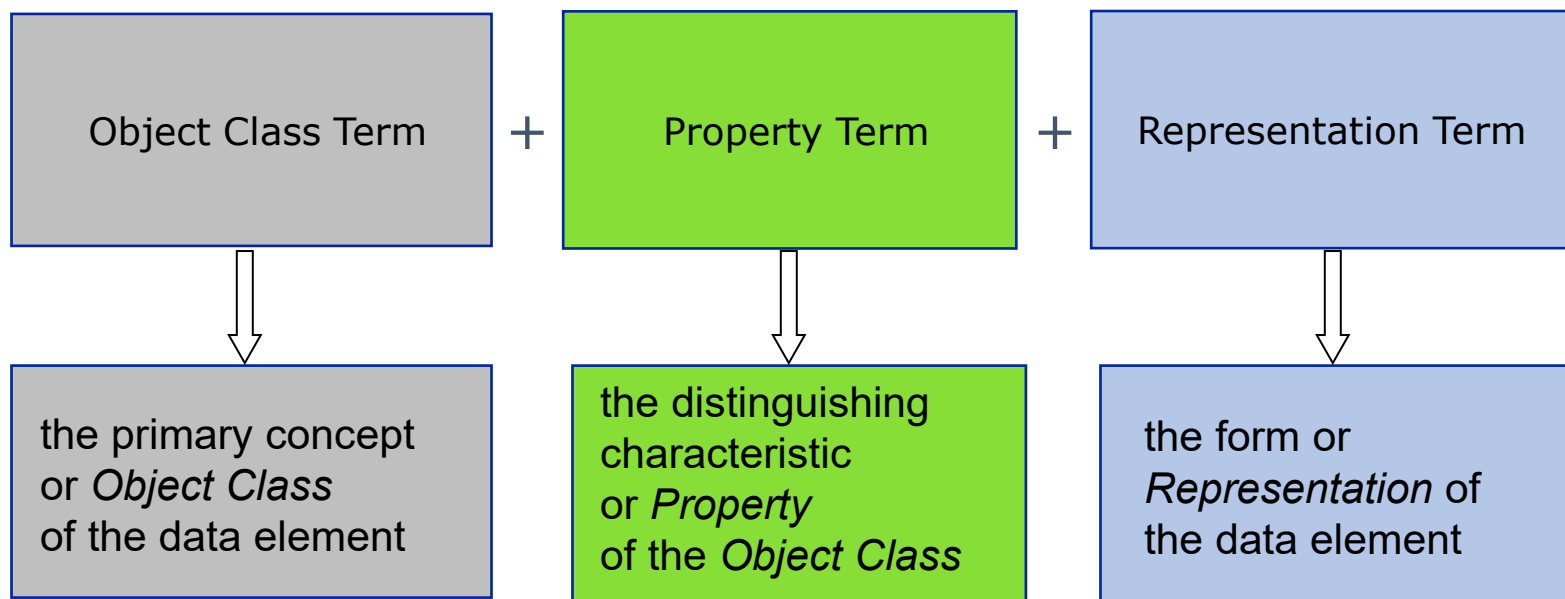
Example: Country + Name + Text

CCTS Dictionary Entry Names

Object Class (OC)	.	Property Term (PT)	.	Representation Term (RT)
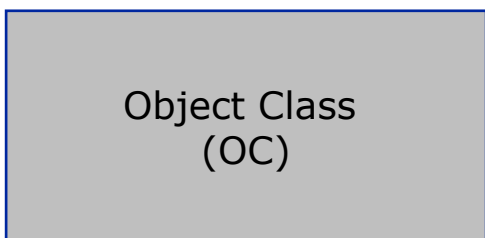
e.g.
- Document
- Address
- Event
- Product
- Process
- Person
- Country
- Transport Means
- Payment Terms
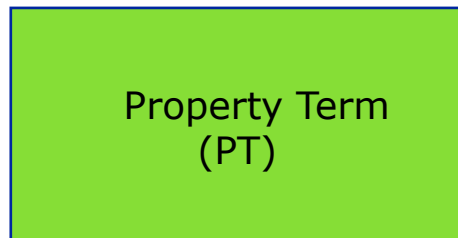
e.g.
- Cost
- Delivery
- Type
- Estimated Arrival
- Price
- Status
- Identification
- Time
- Volume
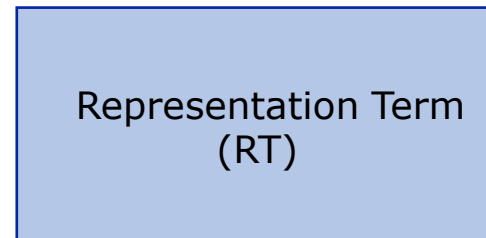
e.g.
- Amount
- Code
- Date Time
- Identifier
- Indicator
- Measure
- Numeric
- Percent
- Quantity
- Text

Examples:

Product. Price. Amount

Document. Status. Code

Address. City Name. Text

Transport Means. Estimated Arrival. Date Time

UN Core Component Library (UNCCL)

- A semantic library of eBusiness constructs based on Core Component Technical Specification v2.01 (ISO 15000-5)
- Object Orientated data objects based on UML
- Exchange syntax-neutral library which provides common basis for interoperable exchange syntax implementations
- Naming convention based on ISO 11179 provides semantic clarification and support for language translations
- 'extension by restriction' supports greater semantic interoperability
- Mature, stable and trustable library developed, maintained and published by UNECE UN/CEFACT
- Freely available as per UN IPR

ebMOU Resolution R07/06 Semantic harmonization
MoU/MG encourages member SDOs to submit their core components to the UN/CEFACT library maintenance point of contact, and participate in relevant UN/CEFACT activities.

UN/CEFACT Core Component Library
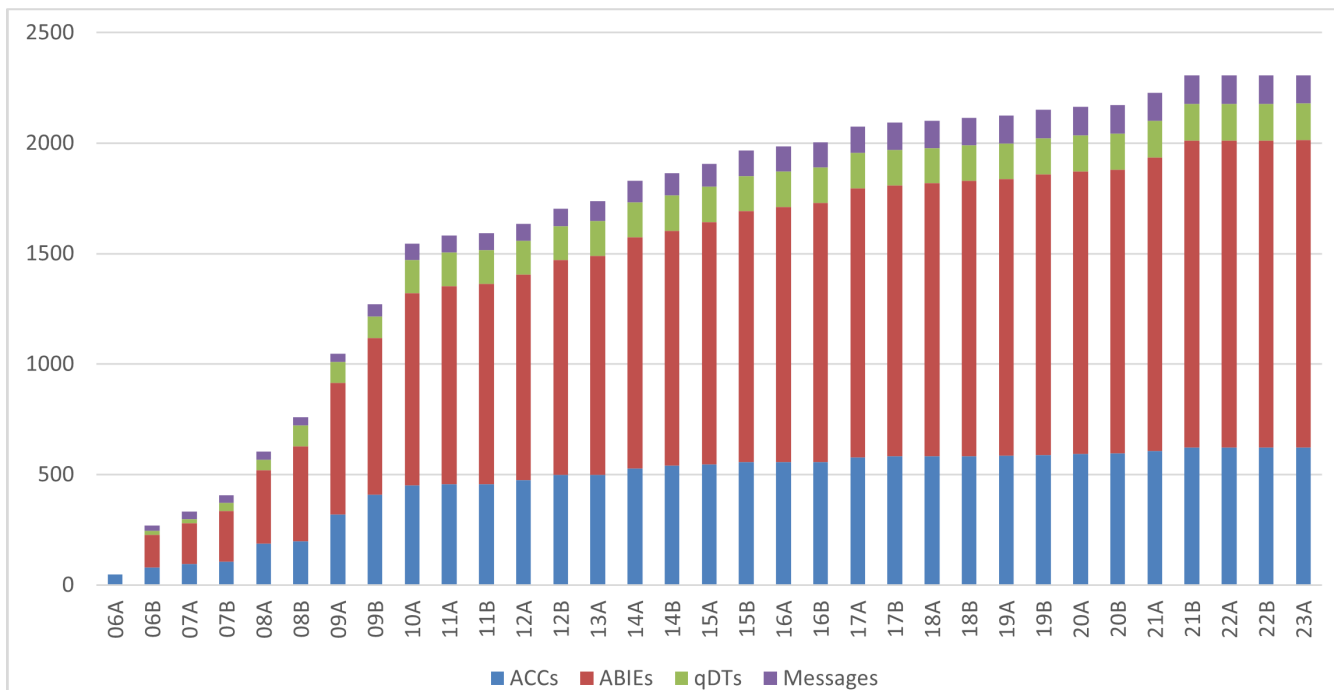
Business Information Entities (BIEs)

Reuses of Object Class Library in different business Contexts

(D23A ~ 1350 BIEs)

Semantic Foundation - Core Component (CCs)

Object Class Library

(D23A ~ 650 CCs)

Semantic Anchors

Shipment

A shipment is an identifiable collection of one or more Trade Items (available to be) transported together from the Seller (Original Consignor/Shipper), to the Buyer (Final/Ultimate Consignee):
- A Shipment can only be destined for one Buyer
- A Shipment can be made up of some or all Trade Items from one or more Sales Orders
- A Shipment can have only one Customs UCR
- A shipment may form part or all of a Consignment or may be transported in different Consignments.

Consignment

A consignment is a separately identifiable collection of Consignment Items (available to be) transported from one Consignor to one Consignee via one or more modes of transport as specified in one single transport service contractual document:
- A Consignment can only have one Transport Service Buyer
- A Consignment can only have one Transport Service Provider
- A Consignment can only have one Consignor
- A Consignment can only have one Consignee
- The Transport Service Buyer can be either the Consignor or the Consignee
- A Consignment is made up of one or more Consignment Items
- A Consignment can be made up of some or all Trade Items (aggregated into Consignment Items) from one or more Shipments

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Sales Order Contract	Transport Service Contract	Definition
Seller	Original Consignor/Original Shipper	The party selling goods or services as stipulated in a Sales Order Contract.
Buyer	Final Consignee/Ultimate Consignee	The party to whom goods are sold services as stipulated in a Sales Order Contract.
	Transport Services Buyer (Consignor or Consignee)	The buyer of transport services as stipulated in a Transport Service Contract.
	Transport Services Provider (Carrier or Freight Forwarder)	The provider i.e. seller of transport services as stipulated in a Transport Service Contract.
	Consignor	The party consigning goods as stipulated in a Transport Service Contract.
	Consignee	The party receiving a consignment of goods as stipulated in a Transport Service Contract.
	Carrier	The party which provides transport services.
	Freight Forwarder	The party undertaking the forwarding of goods by provision of transport, logistics, associated formalities services etc.
	Despatch Party	The party from whom the goods are collected or taken over by the transport services provider. Operational term is 'Pick-up Place'.
	Delivery Party	The party to which goods should be delivered by the transport services provider. Operational term is 'Place of Positioning'.
Ship From	Original Despatch Party	The party from whom goods will be or have been originally shipped.
Ship To	Final Delivery Party/Ultimate Delivery Party	The party to whom goods will be or have been ultimately shipped.

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Core Component Dictionary Entry Names and Definitions

Business Name

Definition

Tripartite Dictionary Entry Name (unique for exchange)

Built-in mappings to UNTDED, UN Layout Key and UN/EDIFACT

CoreComponent→ABIE contextualisations

Example Person Core Component

80 Attributes

27 Associations incl.

- A Alternate Language Code
- A Alternate Language Proficiency Code
- A Director Or Officer Indicator
- A Social Insurance Eligibility Indicator
- A Social Insurance Contract ID
- A Medicare Qualified Indicator
- A Social Security Number Release Authorization C
- A Tax Filing Status Code
- A Affiliate Privacy Response Code
- A Third Party Privacy Response Code
- A Disablement Registration Date Time
- A Role Text
- A Attends School Indicator
- A College Grade Average
- A School Disciplinary Action Indicator
- A Highest Grade Completed Text
- A High School Grade Average Text
- A College Grade Average Value
- A Category Code
- A Role Code
- A In Transit Indicator
- C Residence Address
- C Nationality Country
- C Telephone
- C Fax
- C URI
- C Information Address

17 reuses as
Business Information Entities

- C Main/ABIE/AAA Chart Of Accounts_Person. Details
- C Main/ABIE/AAA Journal_Person. Details
- C Main/ABIE/AAA Report_Person. Details
- C Main/ABIE/AAA Wrap_Person. Details
- C Main/ABIE/Authoritative Signatory_Person. Details
- C Main/ABIE/Contact_Person. Details
- C Main/ABIE/Guest_Person. Details
- C Main/ABIE/Inspection_Person. Details
- C Main/ABIE/Operator_Person. Details
- C Main/ABIE/Payment_Person. Details
- C Main/ABIE/Project_Person. Details
- C Main/ABIE/Representative_Person. Details
- C Main/ABIE/Reserving_Person. Details
- C Main/ABIE/Responsible_Person. Details
- C Main/ABIE/SPS_Person. Details
- C Main/ABIE/TMW_Person. Details
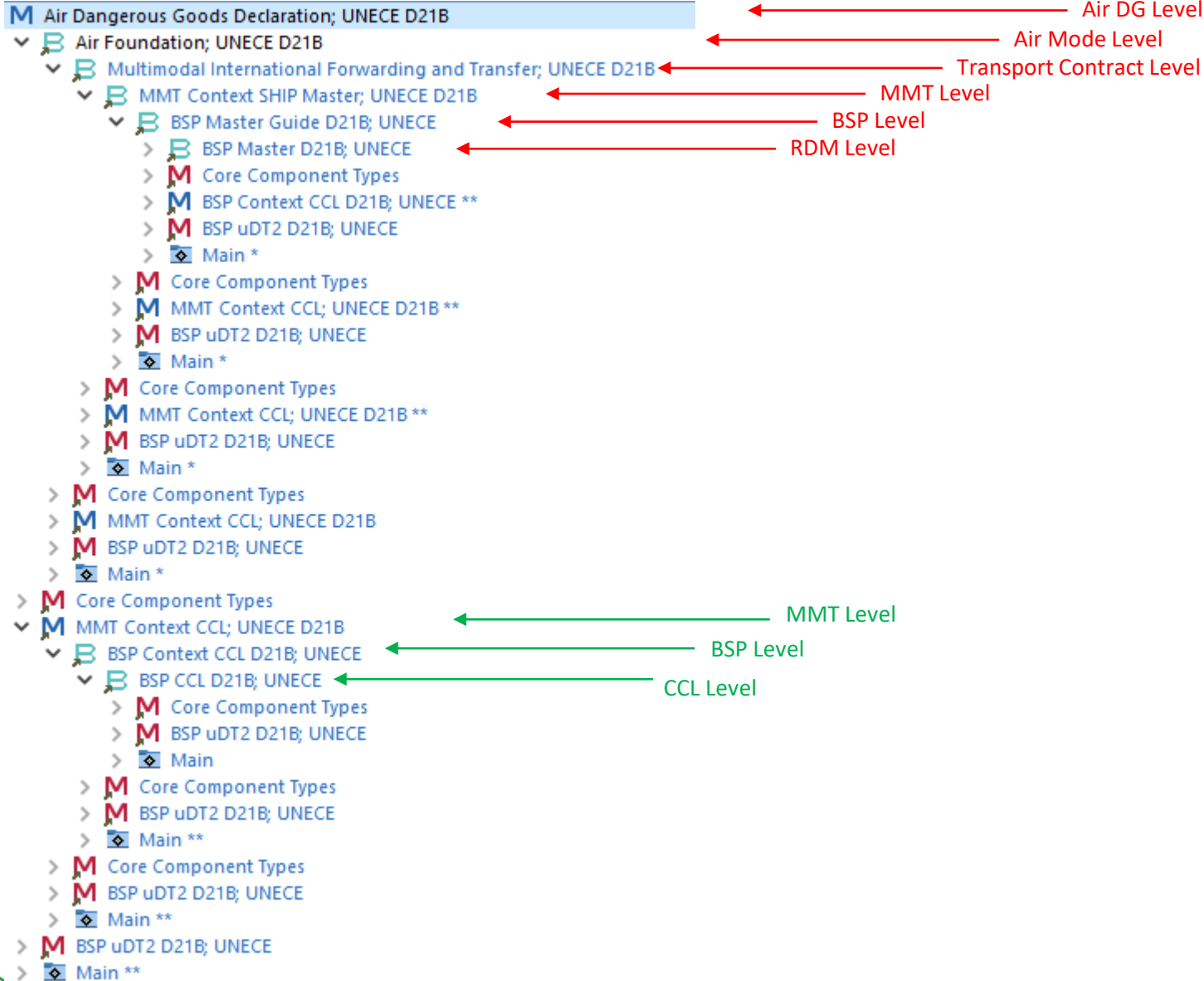- C Main/ABIE/Transport_Person. Details

Reuse example:
Transport Person for IMO FAL

- C Transport Person
  - C Based on "Person"
  - A ID
  - A Name
  - A Birth Date Time
  - A Language Code
  - A Role Text
  - A Role Code
  - A Category Code
  - A Gender Code
  - A Given Name
  - A Family Name
  - A Birth Country Code
  - A Birthplace Name
  - A In Transit Indicator
  - C Nationality Country
  - C Certified Accreditation
  - C Attained Qualification
  - C Embarkation Location
  - C Disembarkation Location
  - C Travel Identity Document
  - C Travel Visa Document
  - C Crew Travel Effects
  - C Landline Telephone
  - C Mobile Telephone
  - C Email Address

UN/CEFACT International Supply Chain Reference Data Model Family

UN/CEFACT CCL

Library level

D22B – includes 1348 ABIEs

Inheritance plus business customisation

Buy/Ship/Pay RDM

Contextualised RDM level 1

D22B only uses 381 ABIEs

Contextualised RDMs level 2

Inheritance plus business customisation

Supply Chain RDM (SCRDM)

Multimodal Transport RDM (MMT)

Cross-Border Management RDM

ESG Sustainability RDM

D22B only uses 140 ABIEs

D22B only uses 156 ABIEs

D22B only uses 87 ABIEs

D22B only uses 178 ABIEs

UN/CEFACT RDM Inheritance Levels

M Air Dangerous Goods Declaration; UNECE D21B ← Air DG Level
- B Air Foundation; UNECE D21B ← Air Mode Level
  - B Multimodal International Forwarding and Transfer; UNECE D21B ← Transport Contract Level
    - B MMT Context SHIP Master; UNECE D21B ← MMT Level
      - B BSP Master Guide D21B; UNECE ← BSP Level
        - B BSP Master D21B; UNECE ← RDM Level
        - M Core Component Types
        - M BSP Context CCL D21B; UNECE **
        - M BSP uDT2 D21B; UNECE
        - Main *
      - M Core Component Types
      - M MMT Context CCL; UNECE D21B **
      - M BSP uDT2 D21B; UNECE
      - Main *
    - M Core Component Types
    - M MMT Context CCL; UNECE D21B **
    - M BSP uDT2 D21B; UNECE
    - Main *
  - M Core Component Types
  - M MMT Context CCL; UNECE D21B
  - M BSP uDT2 D21B; UNECE
  - Main *

CCBDA Subset Inheritance

- M Core Component Types
- M MMT Context CCL; UNECE D21B ← MMT Level
  - B BSP Context CCL D21B; UNECE ← BSP Level
    - B BSP CCL D21B; UNECE ← CCL Level
      - M Core Component Types
      - M BSP uDT2 D21B; UNECE
      - Main
    - M Core Component Types
    - M BSP uDT2 D21B; UNECE
    - Main **
  - M Core Component Types
  - M BSP uDT2 D21B; UNECE
  - Main **
- M BSP uDT2 D21B; UNECE
- Main **

CCL Subset Inheritance

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How CCL growth is managed

Library Maintenance Team responsible for

- Cross-Domain **Harmonisation**

Project Teams responsible for

- **Contextualised** RDM development, CCL submissions and **customised** data exchange structures

New data structures

Projects e.g. Smart Container, eCMR Data Elements & Exchange Structures

MultiModal Transport Reference Data Model

UN/CCL Core Component Library

Example CCL Submission