UN/CEFACT Semantic Vision

Tuesday, 27 June 2023
Using CCL, RDM and BRS development methodologies for UN/CEFACT Business Standards Projects

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Data Exchange Generational View

1\textsuperscript{st} generation – UN Layout Key and Aligned Document Families

2\textsuperscript{nd} generation – UN/EDIFACT global document equivalent electronic message structures

3\textsuperscript{rd} generation – data exchange independent semantic document equivalent message structures (UN/XML)

4\textsuperscript{th} generation – data exchange semantic Reference Data Models for reuse in both process driven and document equivalent exchanges (UN/XML and JSON schema)

5\textsuperscript{th} generation – restful APIs (JSON LD)

The UNCCL reused in Reference Data Model views of the International Supply Chain provides Common Semantics for use in the multi-generational projects which develop the UN/CEFACT eBusiness standards
UN/CEFACT International Supply Chain Process Model

**Commercial Procedures**
- Establish Contract
- Order Goods
- Advise On Delivery
- Request Payment
- Packing
- Inspection
- Certification
- Accreditation
- Warehousing

**Transport Procedures**
- Establish Transport Contract
- Collect, Transport and Deliver Goods
- Provide Waybills, Goods Receipts, Status reports etc.

**Regulatory Procedures**
- Obtain Import/Export Licences etc
- Provide Customs Declarations
- Provide Cargo Declaration
- Apply Trade Security Procedures
- Clear Goods for Export/Import

**Financial Procedures**
- Provide Credit Rating
- Provide Insurance
- Provide Finance
- Execute Payment
- Issue Statements

**Involves**

*BUY*

*SHIP*

*PAY*

*Prepare for Export*

*Export*

*Transport*

*Prepare for Import*

*Import*
One link in a global supply chain

- Most dematerialization projects are only looking at one sectoral view
  - Almost all sectoral views are just one part of a global supply chain
  - The international supply chain is very complex (multiple actors and multiple relations in data exchanges)

- A holistic view and approach are needed
  - Information will not be related purely to goods or purely to transport or purely to regulatory
  - There are clear links between the information in each part of the global supply chain

- UN/CEFACT deliverables all take this holistic approach
  - Cross Industry
  - MultiModal
  - Cross-border Management
Benefits:

- Cross-Industry
- Multi Modal
- Trade & Transport semantic alignment – common BUY SHIP PAY foundation
- The support for information sharing, such as enabled by data pipelines, with the timely capture of quality data from original data sources ensuring supply chain visibility
- Reduction of administrative burden by efficient reuse of data shared across the international supply chain
- Standardized data exchange structures, based on common Master data exchange structure and independent of data exchange syntax
- Common semantic basis for implementing in chosen data exchange syntax(es)
UN/CEFACT International Supply Chain Reference Data Model Family

Library level

Inheritance plus business customisation

Contextualised RDM level 1

D22B – includes 1348 ABIEs

Inheritance plus business customisation

D22B only uses 381 ABIEs

Contextualised RDMs level 2

Supply Chain RDM (SCRDM)

D22B only uses 140 ABIEs

Multimodal Transport RDM (MMT)

D22B only uses 156 ABIEs

Cross-Border Management RDM

D22B only uses 87 ABIEs

ESG Sustainability RDM

D22B only uses 178 ABIEs

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UN/CEFACT International Supply Chain Reference Data Model Family - Future

Buy/Ship/Pay (BSP) RDM

- SC RDM: Cross Industry Supply Chain View
- MMT RDM: Multi Modal Transport View
- CBM RDM: Cross-Border Management View
- SDCE RDM: Sustainable Development & Circular Economy View
Recently Completed Projects

- Buy Ship Pay Reference Data Model
- Cross Industry Supply Chain Track and Trace eb Standard
- White Paper overview of Blockchain in Trade
- White Paper on Verifiable Credentials (to be developed into new TF Recommendation)
- Cross-Border Management RDM
- UNDA COVID-19 initiative (UNTTC) – Electronic Transport Data Exchange Structures based on MMT (MultiModal Reference Data Model)
- Cross-modal Dangerous Goods data harmonisation

UN/CEFACT Semantic Publications:
https://unece.org/trade/uncefact/mainstandards
The mission of this project: Where is the product at any time?

- Enable tracking and tracing of products (or assets) and information sharing in *standard* electronic format.
- Track and trace any *traded and identified items* including transport equipment or assets (e.g., box, pallet, container, etc. ... Even empty!).
- Logistic services: transport the traded goods between the *seller* and the *buyer*. 
Challenges and opportunities

- Numerous stakeholders, large amount of information and multiple modes can be involved in a single journey
- End users and competent authorities have increasing expectations due to new regulations and technology progress
- Emergence of many digital data streams offering more visibility (smart containers, RFID, etc.)
- It is not possible to impose the usage of the same unique identifier across all logistic chain actors
- Many scenarios defining relationship of traded items, logistic units, transport and means of transportation (consolidation, de-consolidations, incident, etc.)
ID GAPS in multimodal transport cases

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**Order ID: A-123**
- Item ID: A-123-1 | Package ID: P-A

**Order ID: B-123**
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**Delivery/Shipmen ID: SO-1**

**Order ID: B-123**
- Item ID: B-123-1 | Package ID: P-C

**Delivery/Shipmen ID: SO-2**

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Trade and Transport identity gaps

Starting point

Will transport incorporate trade IDs?

NO, only some by transport service buyer of the original seller/consignor

How to solve?

Create a collection of events carrying the different IDs

Pass the IDs (links) through the transport value chain
Track & Trace Project Deliverables

- **White Paper:** “Integrated Track and Trace for Multi-Modal Transportation” presented to the 27th UN/CEFACT Plenary in April 2021
- **Business Requirements Specification (BRS)** detailing the Business Processes of Cross Industry Track and Trace

UN/CEFACT has developed a new international eBusiness standard to enable improved tracking of goods across complex supply chains
Events to capture the different IDs

1. Packing
2. Consolidation
3. Combining consignments
4. Loading consignment onto transport means
5. Unloading consignments from transport means
6. De-Consolidating Consignments
7. Shipment splitting event
Decentralized identifiers – accepting different IDs, as long the identifier is associated with a recognized standards body. This is referenced today in the UN/CEFACT MMTRDM

**UN/CEFACT MMT RDM already contains all required semantic data structures**

Combining existing data elements in concert with using new digital technologies make it now possible to close the trade-transport gap and move closer toward operational and systems interoperability.

**Supports mapping to existing standards such as GS1 defined unique identifiers and event structure (EPCIS)**
• Supply Chain data extracts sent to regulatory agencies at key time points
• Standardised overall data exchange structure
• Quality data from the original source at earliest time
• Regulatory and supply chain visibility benefits
UN/CEFACT Data Pipeline Exchange Standard (PDES)

Data from the source of truth

Principle:
Right data from the Right person at the Right time
• UN New York launched **COVID-19 initiative to encourage exchange of digitised electronic data** rather than paper documents in transport contract related data exchanges

• **UNECE and UN/CEFACT joint contribution:**
  - UN/CEFACT Cross-modal project to develop modal data exchange guides as subsets of the UN/CEFACT MMT Reference Data Model to support digitised data exchanges between transport modes

  - **7 Heads of Delegation** supported the Project
    (Germany, Spain, Greece, Russia, Italy, US and Ukraine)

  - Project completed all ODP steps successfully and published on UN/CEFACT website plus links to UNTTC website
Dangerous Goods MMT-based Customisations

✓ Maritime
✓ Road
✓ Rail
✓ Inland Waterway
✓ Air

In conjunction with UNECE Transport Division, IMO FAL, ICAO and the EU DG MOVE eFTi and EMSWe Regulation development
UN/CEFACT Semantics enable cross-modal harmonisation

### MMT-based Inter Modal Matrix (Auto-generated)

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Support for JSON

- All RDM data exchange subsets to be published as JSON schema
- JSON schema export technical specification almost completed
- UN/CEFACT developing JSON-LD web vocabulary based on RDM semantics
- JSON deliverables to support future restful API developments
UN/CEFACT Publication Transport Example: electronic Road Consignment Note (eCMR)

BUY SHIP PAY (BSP)
Semantic model
Subset of UN/CCL

BUY SHIP PAY
Master message structure

MMT subset
Exchange syntax-neutral
data exchange structure

SHIP (MultiModal Transport)
CCL subset

SHIP
Master message structure

eCMR message structure

Syntax Instantiation e.g.
XML schema, JSON LD?

Multi Modal Transport RDM
Customised Subset (Decorated)
Trade Example: UN/CEFACT Cross Industry Invoice (CII)

**SEMANTIC MODEL**

Supply Chain (BUY PAY)
(subset of BSP)

- **BUY SHIP PAY (BSP)**
  - Semantic model
    - subset of UN/CCL

- **BUY SHIP PAY**
  - Master message structure

- **BUY PAY**
  - Exchange Syntax-neutral business data exchange structure

**Invoice message model**

- **Syntax**
  - XML Invoice schema

- **CII European Invoice Mandatory Syntax Implementation**
Example Business Standard Streamlined Publications 1

**Multi-Modal Transport Reference Data Model (MMT-RDM)**
- White Paper on RDM [English](#) [French](#) [Russian](#)
- RDM Guidelines [](#)
- BRS [](#)
- Executive Guide on RDM [English](#) [French](#) [Russian](#)
- Structure Report / Data Elements [](#)
- XSD Schema [](#)
- UML Diagram [](#)
- HTML Index [](#)

**International Forwarding and Transfer**
- Multimodal Booking [](#)
- Multimodal Shipping Instruction [](#)
- Multimodal Waybill [](#)
- Multimodal Status Report / Request [](#)
- Road Consignment Note (eCMR) [](#)
- Maritime Bill of Lading [](#)
- Inland Waterway Bill [](#)
- Rail CIM-SMGs (URL) [](#)
- Rail SMGS [](#)
- Rail Wagon List [](#)
- Air Waybill [](#)
- Air Dangerous Goods Declaration [](#)
- Air Consignment Security Declaration [](#)
- Smart Containers [](#)
- Pipeline Data Exchange Standard (PDES) [](#)
- IMO FAL Compendium [](#)

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**RDM Artefacts**

**CCBDA Subset Business Standards Based on MMT RDM**

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Example Business Standard Streamlined Publications 2

Transport and Logistics

Multi-Modal Transport Reference Data Model
International Forwarding and Transfer

- BRS Overall
- XSD Schema
- UML Diagram
- XLS Guideline Structure
- Spreadsheet
- HTML

RDM Artefacts

Business Standard CCBDA MMT Subset Artefacts

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For further Information

• All UNECE and UN/CEFACT Recommendations, codes, standards and publications are available for free on our website at:
  • [www.unece.org/cefact/](http://www.unece.org/cefact/) and tfig.unece.org
  • All experts are welcome to join the standards development work free of charge

UN/CEFACT Secretariat

• Kamola Khusnutdinova
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