UN/CEFACT 2022 Virtual Spring Forum

Friday, 20 May 2022
Introducing CCL, RDM and BRS development methodologies for UN/CEFACT Business Standards Projects

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UN/CEFACT Key Outputs

• Business Standards
  • Process Models (BRS)
  • Reference Data Models (RDMs)
  • Semantic Libraries (UNTDED, Core Component Library (CCL) and UN/XML)
• Trade Facilitation Recommendations
• Technical Specifications
UN/CEFACT Open Development Process for Business Standards

Stage 1: Project Inception
Stage 2: Requirements Gathering
Stage 3: Draft Development
Stage 4: Public Review (Optional)
Stage 5: Project Exit
Stage 6: Publication
Stage 7: Maintenance (Optional)
UN/CEFACT Business Standards Deliverables

- **1:** Business Requirements Specification (BRS) including
- **2:** Business Information Entity Discovery
- **3:** CCL submission (optional)
- **4:** CCBDA subset of Reference Data Model
- **5:** Technical Artefacts production
Standardising Business Processes & Data

**BRS**
Business Requirement Specification
Creates a high-level semantic description of business processes for a specific scope

**CCTS**
Core Component Technical Specification
The modelling methodology which enables the development and maintenance of the CCL library

**UN/CCL**
Core Component Library
A semantic library of CCTS classes
Data harmonized across all BRS domain business processes

**UN/ISCRM**
Int’l Supply Chain Ref. Model
Processes harmonized with all other existing business processes

**CCBDA**
Core Component Business Document Assembly
Creates a subset of the CCL Master Document Structure corresponding to the BRS entity requirements

**UN/MM**
UN/CEFACT Modelling Methodology
Methodology to document business process models and their relations within the BRS library

**NDR**
Naming & Design Rules
Defines how to create a sample XML and JSON schema from the CCBDA data exchange subsets

**RDM**
Reference Data Model
Logical subsets of the UN/CCL that represent a specific context

**CCBDA - MA**
Core Component Business Document Assembly – Message Assembly
Defines the data elements which are to be exchanged in the business processes covered by a BRS
What data for the business processes?

**UN/XML**
Standard for exchanging electronic documents

**UN/EDIFACT**
ISO 10303 (STEP)

**UN/232**
ISO 9608

**UN/ISRM**
Int’l Supply Chain Ref. Model

**UN/CEFACT**
Core Component Technical Specification

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UN/CEFACT Business Standards Deliverables

1: Business Requirements Specification (BRS) including
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UN/CEFACT International Supply Chain Process Model

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

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

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

**Prepare for Export**
**Export**
**Transport**
**Prepare for Import**
**Import**

**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

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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 Agencies
Basis for Semantic Interoperability

Agreed and Harmonised

- Party and Role Definitions
- Semantic Anchors
- Message Structures
- Contextualised Code Subsets
- Contextualised Business Rules
The actors
Global Trade – Semantic Anchors

Shipment (Trade Delivery)

• 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
Template: Business Requirements Specification

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

UNITED NATIONS CENTRE FOR TRADE FACILITATION AND ELECTRONIC BUSINESS (UN/CEFACT)

BUSINESS REQUIREMENTS SPECIFICATION (BRS)

Documentation Template

Approved: UN/CEFACT Bureau ________________

Version: 2.0
Release: 1.0
Template: Business Requirements Specification

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE
UNITED NATIONS CENTRE FOR TRADE FACilitation
AND ELECTRONIC BUSINESS (UN/CEFACT)

BUSINESS REQUIREMENTS SPECIFICATION
(BRS)

Documentation Template

Approved: UN/CEFACT Bureau ________________

Version: 2.0
Release: 1.0
Overview of BRS Development Process

• A BRS MUST start with a clear specification of the scope of the project and where this project fits into a global context of business operations and MAY refer to a UMM model of the business domain.

• The Scope MUST be specified in terms of the Business Processes that are involved and the Business Entities about which information is to be exchanged by the participants who are involved directly in the Information Exchanges that support the related business process. It MUST also indicate stakeholders who have an interest in the processes, or may participate in related processes, and whenever appropriate, what is out of scope of this particular project. The process and information flows that constitute the business process, the business rules that govern the exchanges and the details of the information that is to be exchanged during these processes, SHOULD then be elaborated.

• The requirements MUST first be specified in business terms and then expressed in formalized terms. The business requirements MUST be presented as a numbered list so as to facilitate a check to be made that all requirements have been met in the eventual e-commerce solutions proposed. As the process of completing a BRS progresses, new requirements may be recognized and added to the list.
The resulting BRS will include text, templates (worksheets) and diagrams, and may refer to a UMM model of the domain. To help with future re-usability, interoperability and to provide a degree of standardization in the developing a BRS, an initial set of preferred terms is provided in Annex 2.

To minimize the work in creating a new BRS, improve harmonisation and encourage reusability, wherever possible, any relevant existing BRSs artefacts or UMM models SHOULD be used as a basis for producing the new requirements.

A high level BRS MAY be used to define the context and scope of a domain that is refined by a cascade of more specific BRSs.

For example, the Business Requirements Specification Cross-Border Supply Chain (UNeDocs) ECE/TRADE/C/CEFACT/2007/8. This BRS sets the scope for the Common Supply Chain BRS which in turn sets the scope for more specific BRSs for: Ordering, invoicing, etc.
Knowledge and application of the following standards is crucial to the development of quality business requirements specifications. Other key references are shown in the appropriate parts of the BRS template document.


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4. Scope

This section describes the extent and limits of the business process within the supply chain being described in this document.

![Positioning Invoice in BUY-SHIP-PAY Model](image)

**Figure 4.1 Positioning the Invoice in BUY-SHIP-PAY model**

<table>
<thead>
<tr>
<th>Categories</th>
<th>Description and Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Process</td>
<td>Invoice process in the supply chain</td>
</tr>
<tr>
<td></td>
<td>BUY-SHIP-PAY/Procurement&amp;Sales/Invoice</td>
</tr>
<tr>
<td>Product Classification</td>
<td>All</td>
</tr>
<tr>
<td>Industry Classification</td>
<td>All</td>
</tr>
<tr>
<td>Geopolitical</td>
<td>Global</td>
</tr>
<tr>
<td>Official Constraint</td>
<td>None</td>
</tr>
<tr>
<td>Business Process Role</td>
<td>Customer and Supplier</td>
</tr>
<tr>
<td>Supporting Role</td>
<td>ShipTo, ShipFrom, Consignor, Consignee, Customer’s Accountant, Seller, etc.</td>
</tr>
<tr>
<td>System Capabilities</td>
<td>No limitations</td>
</tr>
</tbody>
</table>
5.1. Business Process Elaboration

5.1.1. Traditional or supplier initiated invoice (Business Process)

![Business Process Use Case Diagram]

Table 5.1 Business Process Use Case Description

<table>
<thead>
<tr>
<th>Business process name</th>
<th>Traditional or supplier initiated invoice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifier</td>
<td>Cross industry traditional invoice</td>
</tr>
<tr>
<td>Actors</td>
<td>Customer, Supplier</td>
</tr>
<tr>
<td></td>
<td>(Optional, additional roles – Invoicer, Invoice issuer, Customer Accountant, Supplier Accountant)</td>
</tr>
<tr>
<td>Pre-conditions</td>
<td>Framework Agreement or Contract and that an order is in place with agreed prices. The supplier has provided goods or services according to the conditions set in the contract, agreement or order. The customer has received the goods or services.</td>
</tr>
<tr>
<td>Description</td>
<td>The supplier presents to the customer, for the ordered or delivered, received or consumed goods or services, a detailed statement of trade account payable (invoice). The customer reconciles the invoice with the agreed prices and the goods or services rendered and initiates the payment remittance.</td>
</tr>
<tr>
<td>Post-conditions</td>
<td>Based on the reconciled invoices, the customer should issue the notification for the payments. For the incorrect invoices, the customer will generate a dispute notice to the supplier.</td>
</tr>
</tbody>
</table>
Figure 5-2 Business Process Activity Diagram
5.1.1.1. Traditional Invoice (Business Collaboration)

**Traditional Invoice** — *(Business Collaboration Use Case diagram)*

**Figure 5.3 Business Collaboration Use Case Diagram**
UN/CEFACT Business Standards Deliverables

1: Business Requirements Specification (BRS) including
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5: Technical Artefacts production
UN/CEFACT evolution/revolution – Reference Data Models

Benefits of UN/CEFACT Semantic Models

• 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 within the BUY SHIP PAY domain model

• Standardized data exchange structures, based on common Master data exchange structure and independent of exchange syntax

• Common basis for implementing in chosen data exchange syntax(es)
UN/CEFACT International Supply Chain Reference Data Model Family

- Buy/Ship/Pay RDM
  - Supply Chain RDM (SCRDM)
  - Multimodal Transport RDM (MMT)
  - Cross-Border Management RDM

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CoreComponent→ABIE contextualisations

Example Person Core Component
80 Attributes
27 Associations incl.

17 reuses as Business Information Entities

Reuse example: Transport Person for IMO FAL
RDM Data Exchange Structure Relationships

- Exchange Header
- Regulatory Header
- SHIP
- BUY
- PAY

- Buy Ship Pay Master **
  - Exchanged Document Context
  - Exchanged Document
  - Exchanged Declaration
  - Logistics Transport Movement
  - Supply Chain Consignment
  - Logistics Transport Equipment
  - Transport Service
  - Trade Settlement Payment
  - Supply Chain Trade Transaction
  - Valuation Breakdown Statement
  - Financing Request Document
  - Financing Summary

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Supply Chain (SCRDM) Master Message Structure

- Supply Chain Context
- Reuses just under 10% of the Reference ABIEs from Core Component Library
- Customised set of BSP ABIEs
Sample Supply Chain CCBDA Subset Data Exchange Structures
Transport & Logistics (MMTRDM) 
Master Message Structure

- MultiModal Transport
- Reuses just 10% of the Reference ABIEs from Core Component Library
- Customised set of BSP ABIEs
Sample Transport CCBDA Subset Data Exchange Structures

- **Bill of Lading/IFTMCS**
  - Document Context
  - Exchanged Document
    - Declaration Header
    - Transport Movement
  - Consignment
    - Transport Equipment
    - Transport Service

- **Container BayPlan/BAPLIE**
  - Document Context
  - Exchanged Document
    - Declaration Header
    - Transport Movement
    - Consignment
    - Transport Equipment
    - Transport Service

- **Operational Manifest/IFCSUM**
  - Document Context
  - Exchanged Document
    - Declaration Header
    - Transport Movement
  - Consignment
    - Transport Equipment
    - Transport Service

- **Customs Cargo Report/CUSDEC/GOVCBR**
  - Document Context
  - Exchanged Document
    - Declaration Header
    - Transport Movement
    - Consignment
    - Transport Equipment
    - Transport Service

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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?
Core Component Dictionary Entry
Names and Definitions

Business Name

Definition

Tripartite Dictionary Entry Name

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Built-in mappings to UNTDED, UN Layout Key and UN/EDIFACT
UN/CEFACT Core Component Library

UN CCL (Core Component Library) Progress

Business Information Entities (BIEs)
Reuses of Object Class Library in different business Contexts
(D21B ~ 1350 BIEs)

Semantic Foundation - Core Component (CCs)
Object Class Library
(D21B ~ 650 CCs)
ISO 11179

Tripartite Data Element Naming

- **Object Class Term**: the primary concept or *Object Class* of the data element
- **Property Term**: the distinguishing characteristic or *Property* of the *Object Class*
- **Representation Term**: the form or *Representation* of the data element

Example: Country + Name + Text
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!)
CCTS Dictionary Entry Names

Object Class (OC):
- Document
- Address
- Event
- Product
- Process
- Person
- Country
- Transport Means
- Payment Terms

Property Term (PT):
- Cost
- Delivery
- Type
- Estimated Arrival
- Price
- Status
- Identification
- Time
- Volume

Representation Term (RT):
- Amount
- Code
- Date Time
- Identifier
- Indicator
- Measure
- Numeric
- Percent
- Quantity
- Text

Examples:
- Product. Price. Amount
- Address. City Name. Text
- Transport Means. Estimated Arrival. Date Time
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
## Example CCL Submission

<table>
<thead>
<tr>
<th>ADD/CHG</th>
<th>ACC/BC/ASC</th>
<th>Dictionary Entry Name (auto generated)</th>
<th>Definition Mandatory</th>
<th>Object Class Term</th>
<th>Property Term</th>
<th>Represenation Term</th>
<th>Associated Object Class</th>
<th>Occurrence Min</th>
<th>Occurrence Max</th>
<th>Version</th>
<th>Ref Library Version</th>
<th>Submitter Name</th>
<th>Unique submittor CR ID</th>
<th>Short Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ACC</td>
<td>Aggregate Core Component</td>
<td>Basic Core Component contained within the ACC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>BCC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>ASCC</td>
<td>Associated (Aggregate) Core Component</td>
<td>Associated with the ACC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>ADD</td>
<td>Consignment Item, Specified Risk Analysis Result</td>
<td>A result of a risk analysis calculation for this consignment item</td>
<td></td>
<td></td>
<td>Specified Risk Analysis Result</td>
<td>Consignment Item</td>
<td>0</td>
<td>unbounded</td>
<td>1.0</td>
<td>D21A</td>
<td>COVID-19 Multimodal</td>
<td>COVID-15CC001</td>
<td>Risk Analysis Result</td>
</tr>
<tr>
<td>5</td>
<td>ADD</td>
<td>Dangerous Goods, Radioactive Indicator</td>
<td>The indicator of whether or not these dangerous goods are radioactive</td>
<td>Dangerous Goods</td>
<td>Radioactive</td>
<td>Indicator</td>
<td>Dangerous Goods</td>
<td>Radioactive</td>
<td>0</td>
<td>1</td>
<td>1.0</td>
<td>D21A</td>
<td>COVID-19 Multimodal</td>
<td>COVID-15CC002</td>
</tr>
<tr>
<td>6</td>
<td>ADD</td>
<td>Dangerous Goods, Stated Condition</td>
<td>A stated condition of these dangerous goods</td>
<td>Dangerous Goods</td>
<td>Stated</td>
<td>Condition</td>
<td>Dangerous Goods</td>
<td>Stated</td>
<td>0</td>
<td>unbounded</td>
<td>1.0</td>
<td>D21A</td>
<td>COVID-19 Multimodal</td>
<td>COVID-19CC003</td>
</tr>
<tr>
<td>7</td>
<td>ADD</td>
<td>Radioactive Isotope, Specified Radioisotope</td>
<td>Radioisotope details specified for this radioisotope</td>
<td>Radioactive Isotope</td>
<td>Specified</td>
<td>Radioisotope</td>
<td>Radioactive Isotope</td>
<td>Specified</td>
<td>0</td>
<td>unbounded</td>
<td>1.0</td>
<td>D21A</td>
<td>COVID-19 Multimodal</td>
<td>COVID-19CC004</td>
</tr>
<tr>
<td>8</td>
<td>ADD</td>
<td>Material, Radioactive Package Transport Index</td>
<td>A code specifying the radioactive package transport index for this material</td>
<td>Material, Radioactive Package Transport Index</td>
<td>Radioactive Package Transport Index</td>
<td>Code</td>
<td>Material</td>
<td>Radioactive Package Transport Index</td>
<td>Radioactive Package Transport Index</td>
<td>0</td>
<td>unbounded</td>
<td>1.0</td>
<td>D21A</td>
<td>COVID-19 Multimodal</td>
</tr>
<tr>
<td>9</td>
<td>ADD</td>
<td>Material, Fissile Criticality Safety Index, Numeric</td>
<td>The number (rounded up to the next tenth) assigned to and placed on the label of a fissile material package, to designate the degree of control of accumulation of packages, overpacks or freight containers containing fissile material during transportation</td>
<td>Material</td>
<td>Fissile Criticality Safety Index</td>
<td>Numeric</td>
<td>Material</td>
<td>Fissile Criticality Safety Index</td>
<td>Numeric</td>
<td>0</td>
<td>1</td>
<td>1.0</td>
<td>D21A</td>
<td>COVID-19 Multimodal</td>
</tr>
<tr>
<td>10</td>
<td>ADD</td>
<td>Material, Applicable, Isotope</td>
<td>A radioactive isotope applicable to this material</td>
<td>Material</td>
<td>Applicable</td>
<td>Isotope</td>
<td>Material</td>
<td>Applicable</td>
<td>Isotope</td>
<td>0</td>
<td>unbounded</td>
<td>1.0</td>
<td>D21A</td>
<td>COVID-19 Multimodal</td>
</tr>
<tr>
<td>11</td>
<td>ADD</td>
<td>Package, Stated, Condition</td>
<td>A stated condition of this package</td>
<td>Package</td>
<td>Stated</td>
<td>Condition</td>
<td>Package</td>
<td>Stated</td>
<td>0</td>
<td>unbounded</td>
<td>1.0</td>
<td>D21A</td>
<td>COVID-19 Multimodal</td>
<td>COVID-19CC008</td>
</tr>
<tr>
<td>12</td>
<td>ADD</td>
<td>Radionuclide Details</td>
<td>An atom that has excess nuclear energy, making it unstable</td>
<td>Radionuclide</td>
<td></td>
<td></td>
<td></td>
<td>Radionuclide</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
<td>D21A</td>
<td>COVID-19 Multimodal</td>
</tr>
</tbody>
</table>
1: Business Requirements Specification (BRS) including
2: Business Information Entity Discovery
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4: CCBDA subset of Reference Data Model
5: Technical Artefacts production
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

RDM Artefacts

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

CCBDA Subset
Business Standards
Based on MMT RDM
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