

Standards for Interoperability In the Context of Blockchains for Traceability

Virginia Cram-Martos





UN/CEFACT – UN Centre for Trade Facilitation and Electronic Business

Objectives

- Simple, transparent and effective processes for global business
- Efficient and automated exchange of information

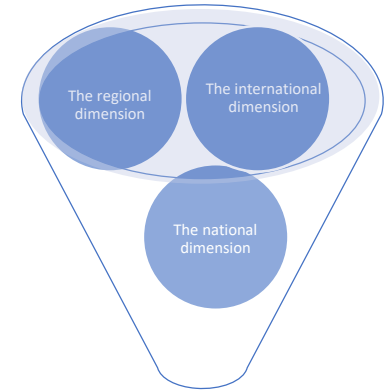
Key tools

- Global trade facilitation recommendations
- eBusiness standards
- Guidelines

Means

- Public-Private Partnership – over 1000 experts
- Meeting virtually practically every week

Trade facilitation is discussed at three levels: all complementary



Interoperability

Why do we care?

- Supply chains have many stakeholders & traceability requires that increasing amounts of data be shared along the supply chain
- Stakeholders often participate in more than one supply chain & in the future, they will also participate in more more than one blockchain network
- Supply chain stakeholders change over time & so will the blockchain networks they participate in
- It is important that participation be competitive & that brand-name “orchestrators” not be locked into the use of suppliers only because of their technical infrastructure

Two Aspects of Interoperability

- **Semantic Interoperability**
- **Technical Interoperability**



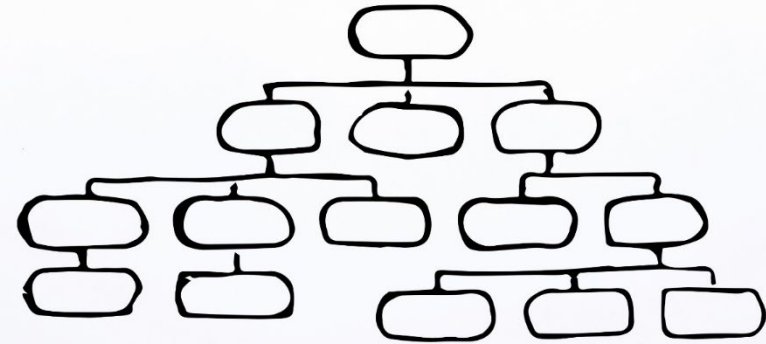
Semantic Interoperability

- Need to ensure that everyone understands the same data in the same way
- Simple terms like Date/Time of Arrival can be interpreted in many different ways
 - Arrival in a Country
 - Arrival in a Port
 - Arrival at Berth
 - Arrival in a Warehouse
 - Arrival at Consignee
 - ...
- Blockchain can help secure the data and help parties collaborate... but they need to understand the same thing



Process Driven Data Exchange

- Document centric exchanges forces stakeholders to repeat information unnecessarily
- UN/CEFACT is mapping the relationship between the information in each business process
- Creating a process-driven approach to data exchange which can be greatly enhanced by blockchain technology



A clear semantic base is key!
UN/CEFACT Core Component Library (CCL)
& Reference Data Models (RDMs)

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):

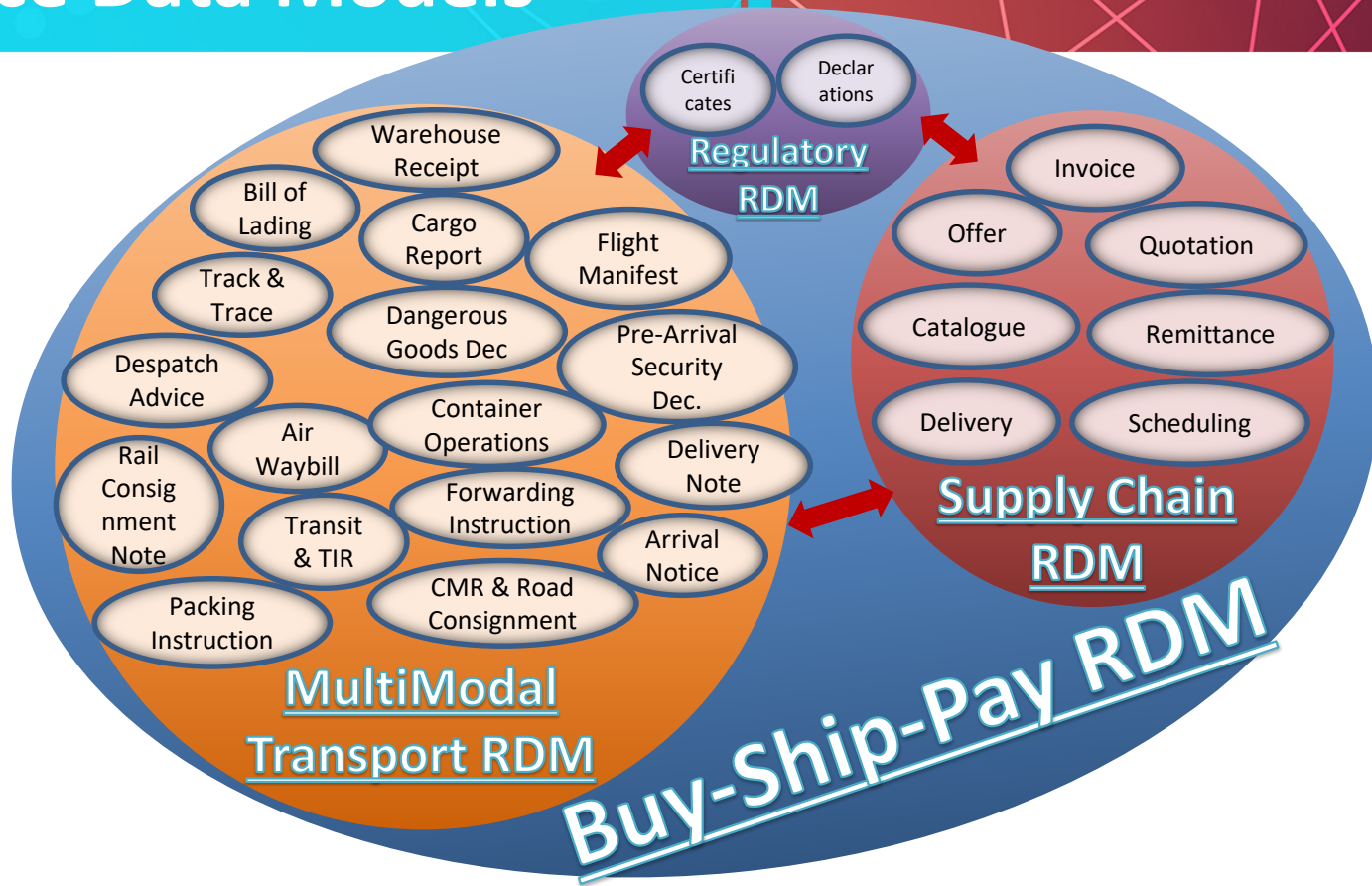
- A Shipment can only be destined for one Buyer
- A Shipment can be made up of some or all Trade Items from one or more Sales Orders
- A Shipment can have only one Customs UCR
- A shipment may form part or all of a Consignment or may be transported in different Consignments.

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

UN/CEFACT Reference Data Models



The Objective



Is to capture reliable data once, from the accountable sources
(although possibly in stages)

as raw materials are transformed into products and move
down the supply chain

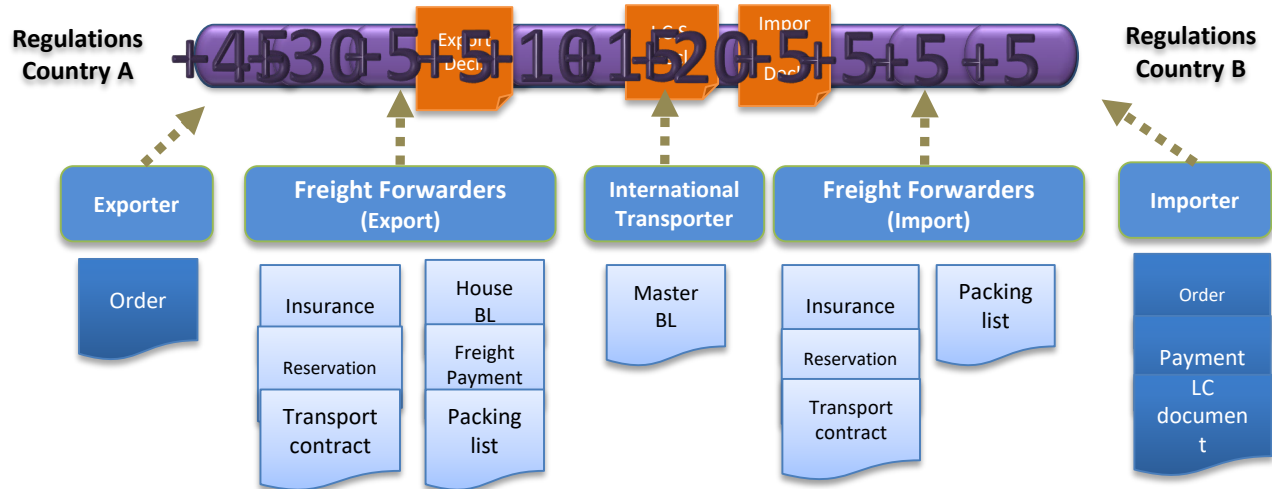
and then to share this data, as required, with the many players
in the supply chain.

All done electronically with no manual re-inputting

Improving Data Quality – Trade Example

Data Pipeline (Blockchains can be used as a neutral, trustworthy «pipeline»)

- Results from three EU projects (Cassandra, CORE & SELIS).
- Innovative methodology to recuperate data at the source and thus improve data quality.



Technical Interoperability

Ensures that systems (applications and databases, including blockchain distributed ledgers)

- **Can connect with one another**
- **Can identify what information/action is being requested or supplied**



Multiple Solutions

For example:

- **Application Programming Interfaces (APIs)**
- **Information “package” headers (related to syntax, i.e. how data is formatted)**
- **Token exchanges (in blockchains for the transfer of value)**
- **Etc**

UN/CEFACT is currently working on Standardized APIs and also on “document headers”

The RDM2API Project



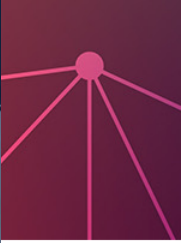
This technical project's objective is to **define a standard methodology** for producing **OpenAPI specifications** and JSON-LD dictionaries **from existing UN/CEFACT semantic (core-component) library subsets** known as Reference Data Models (RDMs)

This methodology will allow users to:

- **Re-use UN/CEFACT semantics:** i.e. UN/CEFACT library subsets (Reference Data Models (RDMs)) can be imported into any conformant modelling tool or semantic tool
- **Model consistently:** API Resource / Event models and JSON-LD dictionaries can be created in any conformant modelling tool and easily mapped to the imported RDM definitions.
- **Publish specifications:** API reference specifications (Including Open API3.0 and JSON-LD) can be generated from the modelling tool and published to open platforms such as GitHub
- **Test conformance of their implementations.** Actual API implementations can be tested against the reference specifications and a conformance report generated

UN/CEFACT brings it all together

- **Under the United Nations umbrella**
 - **Non-competitive; inclusive by nature; free to participate and free for use**
- **Base semantic definitions**
 - **Developed in an open, public-private partnership**
 - **Mature, robust and trusted; developed over twenty years**
 - **Covers the entire international supply chain; all sectors and all countries**
- **Base technical specifications**
 - **Reused by many organizations, promoting interoperability**
- **International code lists**
- **Standard messages and processes**



Un Grand Merci!
Many Thanks!
Muchas Gracias!

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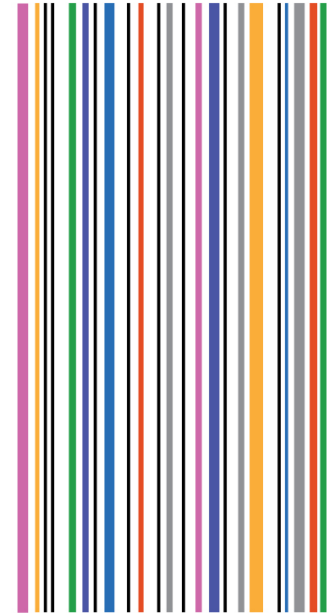
UNECE
United Nations Centre for
Trade Facilitation and
Electronic Business
(UN/CEFACT)



EXCERPT FROM
Liaison Report to ITU-T FG-
DLT Mtg of 2019-08-01

For ITU-T SG17 Security
2019-08-26

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UN / CEFACT



Blockchain Whitepaper Project Deliverable 1



White Paper

Technical Applications of Blockchain to UN/CEFACT deliverables

**A gap analysis of technical aspects of blockchain
and its relation to UN/CEFACT deliverables**

Published as ECE/TRADE/C/CEFACT/2019/8, available online at:

http://www.unece.org/fileadmin/DAM/cefact/GuidanceMaterials/WhitePaperBlockchain_TechApplication.pdf

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Blockchain Whitepaper Project Deliverable 2, 3 and Future



2) An introduction to blockchain technology for trade policy makers

Published as ECE/TRADE/C/CEFACT/2019/9, available online at:
http://www.unece.org/fileadmin/DAM/cefact/GuidanceMaterials/WhitePaperBlockchain_TechApplication.pdf

3) Blockchain in Trade Facilitation: Sectoral Challenges and Examples

Published as ECE/TRADE/C/CEFACT/2019/INF.3, available online at:
http://www.unece.org/fileadmin/DAM/cefact/cf_plenary/2019_plenary/CEFACT_2019_INF03.pdf

Future) Blockchain in Trade Facilitation: Sectoral Challenges and Examples

Sectors being finalized: Finance, Healthcare and Government Services



Cross border Inter-ledger Exchange for Preferential Certificates of Origin (CoO) Using Blockchain Project



Will define how blockchain could be used to create a platform to facilitate the B2G and G2G exchange of digital CoOs + related documents

AND

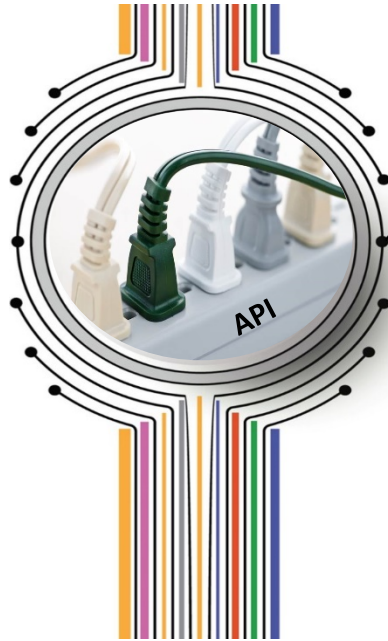
- **How existing UN/CEFACT deliverables could be used by such a platform**
- **Possible changes to existing UN/CEFACT deliverables, or new deliverables needed to support the creation of such a platform**
- **Key issues to consider when creating, administering and using such a platform**

Project Details:

<https://uncefact.unece.org/display/uncefactpublic/Cross+border+Inter-ledger+exchange+for+Preferential+CoO+using+Blockchain>

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APIs for Interoperability

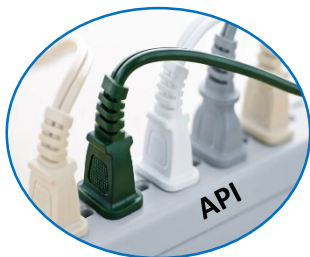


One way to create greater interoperability is to use Application Programming Interfaces. An API is part of a server (which may host a blockchain or a website or a web application) that receives requests and sends responses.

To create an environment conducive to the development of open APIs that are based on standards and can be shared, UN/CEFACT has launched 2 projects.



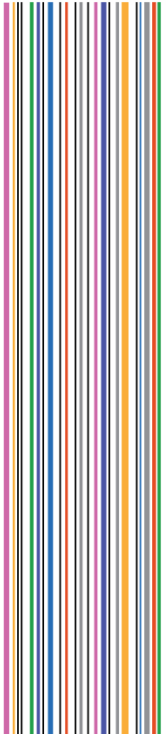
The RDM2API Project



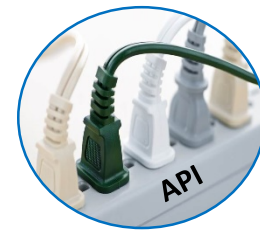
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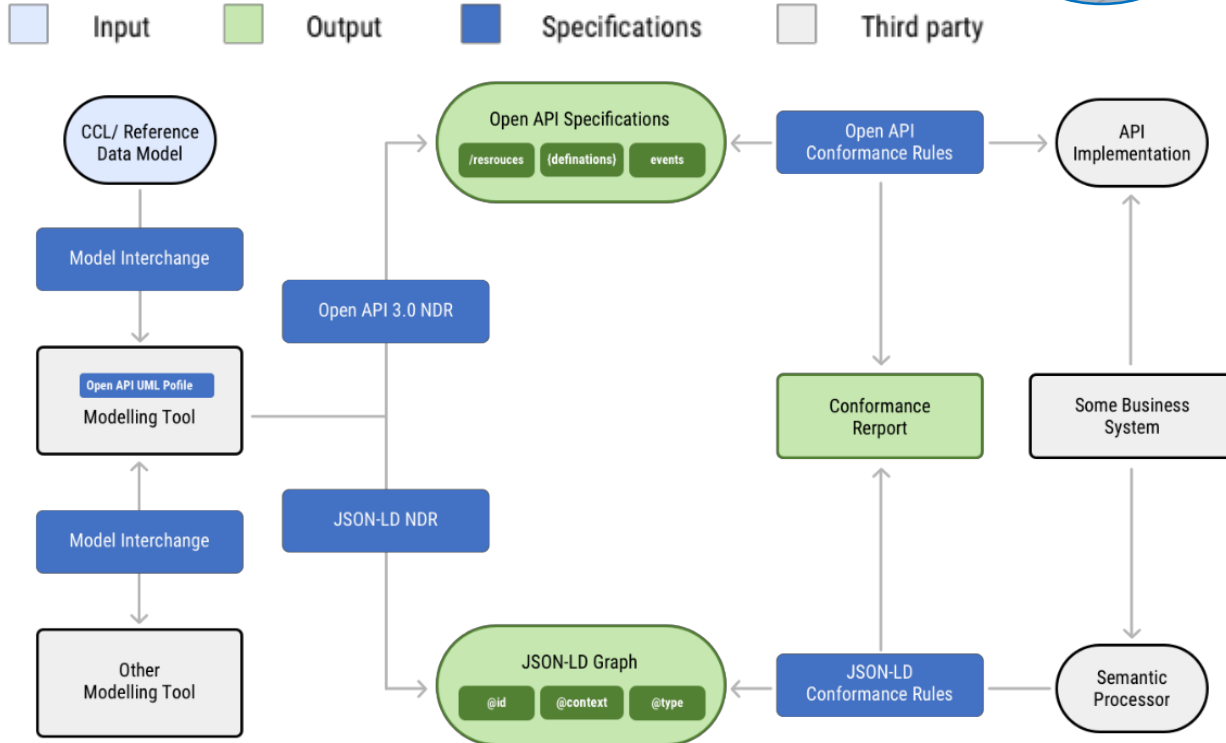
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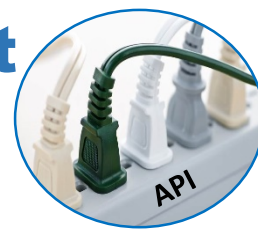
The RDM2API Project



The deliverables from this project will be the specifications in the dark (blue)

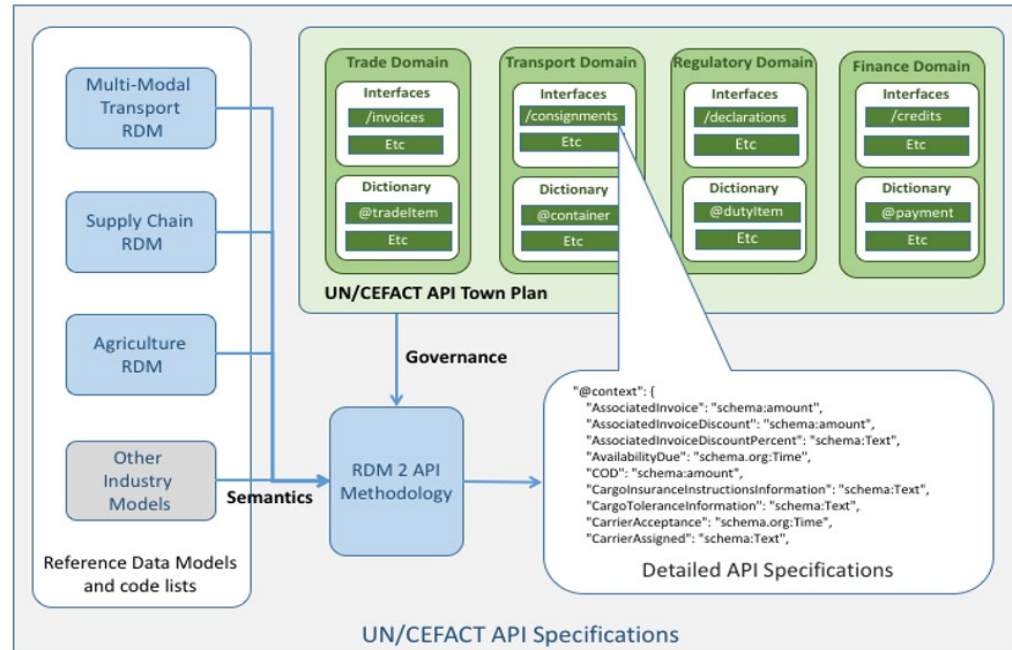


The API Town Plan Project



This is an internal project which seeks to **create a well-managed architecture** for storing APIs from UN/CEFACT business domains where

- Every domain knows where they fit
- All users can easily navigate the plan to find the APIs they need



Project details: <https://uncefact.unece.org/display/uncefactpublic/API+Town+Plan>

UN/CEFACT

Where to find documents

www.unece.org/cefact

The screenshot shows the UN/CEFACT website interface. At the top, there is a navigation bar with the UNECE logo and menu items: 'About UNECE', 'Our work', 'Themes', 'Where we work', and 'Open'. Below this is a search bar. The main content area features a header 'UN/CEFACT Where to find documents' with the URL 'www.unece.org/cefact'. A sidebar on the left contains a 'Standards' section with the following items: 'UN/LOCODE', 'Streamlined presentation of UN/CEFACT standards' (circled in red), 'Business Requirement Specifications (BRS)', 'Core Components Library (UN/CCL)', 'ISO/TC 154', 'Requirements Specification Mappings (RSM)', 'UN/EDIFACT', 'UNTD-ED-ISO7372', 'XML Schemas', and 'Technical Specifications'. The main content area also has a 'Key areas of work' section with a red arrow pointing to 'Standards' and 'Recommendations' icons, and an 'In Focus' section with bullet points.

This screenshot shows the 'Streamlined presentation of UN/CEFACT standards' page. It lists several standards and documents:

- United Nations Code for Trade and Transport Locations (UN/LOCODE)**
 - UN/LOCODE
- United Nations rules for Electronic Data Interchange for Administration, Commerce and Transport (UN/EDIFACT)**
 - UN/EDIFACT
- Supply Chain Management**
 - Supply Chain Reference Data Model (SCRDM)
 - Cross Industry Invoice
 - Cross Industry Delivery
 - Cross Industry Catalogue
 - Material Safety Data Sheet Data
 - Cross Industry Quotation
 - Cross Industry Remittance Advice
 - Cross Industry Scheduling
 - Contract Financial Execution Management
 - Cross Industry Ordering Process
 - Market Research Information
- Transport and Logistics**
 - Multi-modal Transport (MMT)
 - Multi-Model Transport and Logistics (MMT) Reference Data Model
 - White Paper on RDM [English](#) [French](#) [Russian](#)
 - RDM Guidelines [📄](#)
 - BRS [📄](#)
 - Executive Guide
 - Structure Report / Data Elements [📄](#)
 - XSD Schema [📄](#)
 - UML Diagram [📄](#)
 - HTML index
 - Transport & Logistics - eCMR
 - Transport & Logistics - eCMR
 - Verified Gross Mass (VERMAS)
 - International Forwarding and Transfer

This block provides a detailed view of the 'Transport and Logistics' section. It highlights the 'Multi-modal Transport (MMT)' sub-section, which includes the 'Multi-Model Transport and Logistics (MMT) Reference Data Model' and a list of documents: 'White Paper on RDM' (with links for English, French, and Russian), 'RDM Guidelines', 'BRS', 'Executive Guide', 'Structure Report / Data Elements', 'XSD Schema', 'UML Diagram', and 'HTML index'. Below this, the 'Transport & Logistics - eCMR' section is also visible.

UN/CEFACT

Where to find documents

tfig.unece.org



The screenshot shows the homepage of the Trade Facilitation Implementation Guide (TFIG) website. The header features the title "TRADE FACILITATION IMPLEMENTATION GUIDE" and the UNECE logo. A navigation menu includes links for Home, About, Intro, Domains, Itineraries, Instruments, Organizations, Case Stories, and Training, along with a language dropdown set to English. The main content area has a large graphic of colorful lines and nodes, followed by a welcome message: "Welcome to the Trade Facilitation Implementation Guide. A tool for simplifying cross-border trade." A button for "Introduction to Trade Facilitation" is visible. Below this are four categories: Domains, Itineraries, Instruments, and Organizations, each with a representative icon. The footer contains the text "Trade Facilitation Implementation Guide" and the UNECE logo.

TRADE FACILITATION IMPLEMENTATION GUIDE

UNECE United Nations Economic Commission for Europe

Home About Intro Domains Itineraries Instruments Organizations Case Stories Training English

Welcome to the **Trade Facilitation Implementation Guide**
A tool for simplifying cross-border trade

WTO TF Agreement

Introduction to Trade Facilitation

Domains Itineraries Instruments Organizations

Trade Facilitation Implementation Guide

UNECE United Nations Economic Commission for Europe

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- www.unece.org/
 - www.unece.org/trade
 - www.unece.org/cefact/
 - tfig.unece.org
-
- Secretary of UN/CEFACT, Head of UN/CEFACT Support Unit:
 - Lance THOMPSON, UNECE
 - lance.thompson@un.org

UN/CEFACT Supports Smart Connectivity

- Uses clear, free, openly available and harmonized standards, recommendations, guidance, regulations, conventions... in order to promote seamless exchanges
- Applies Information and Communication Technologies (ICT) and innovative processes to improve interactions (between people, companies, governments, economies, objects)
- Brings together public service needs with private sector innovation and financing capabilities

