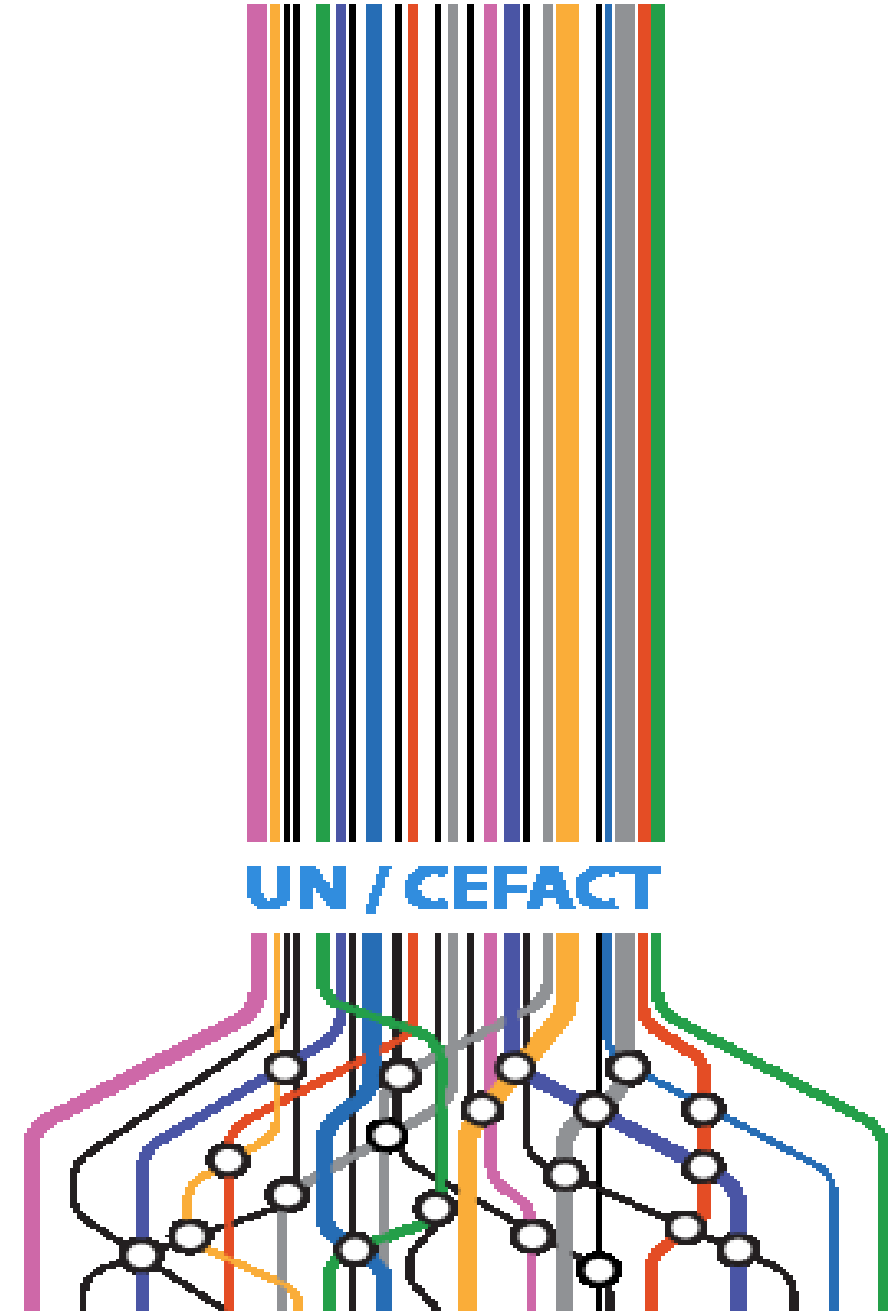
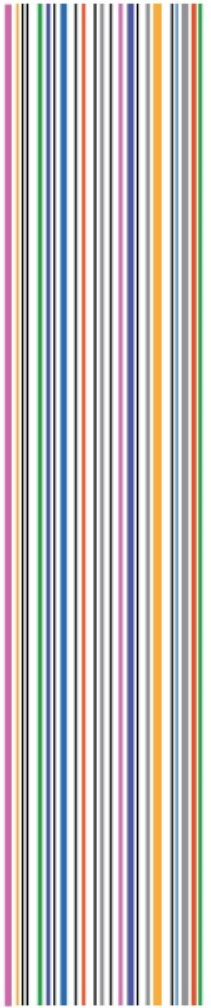


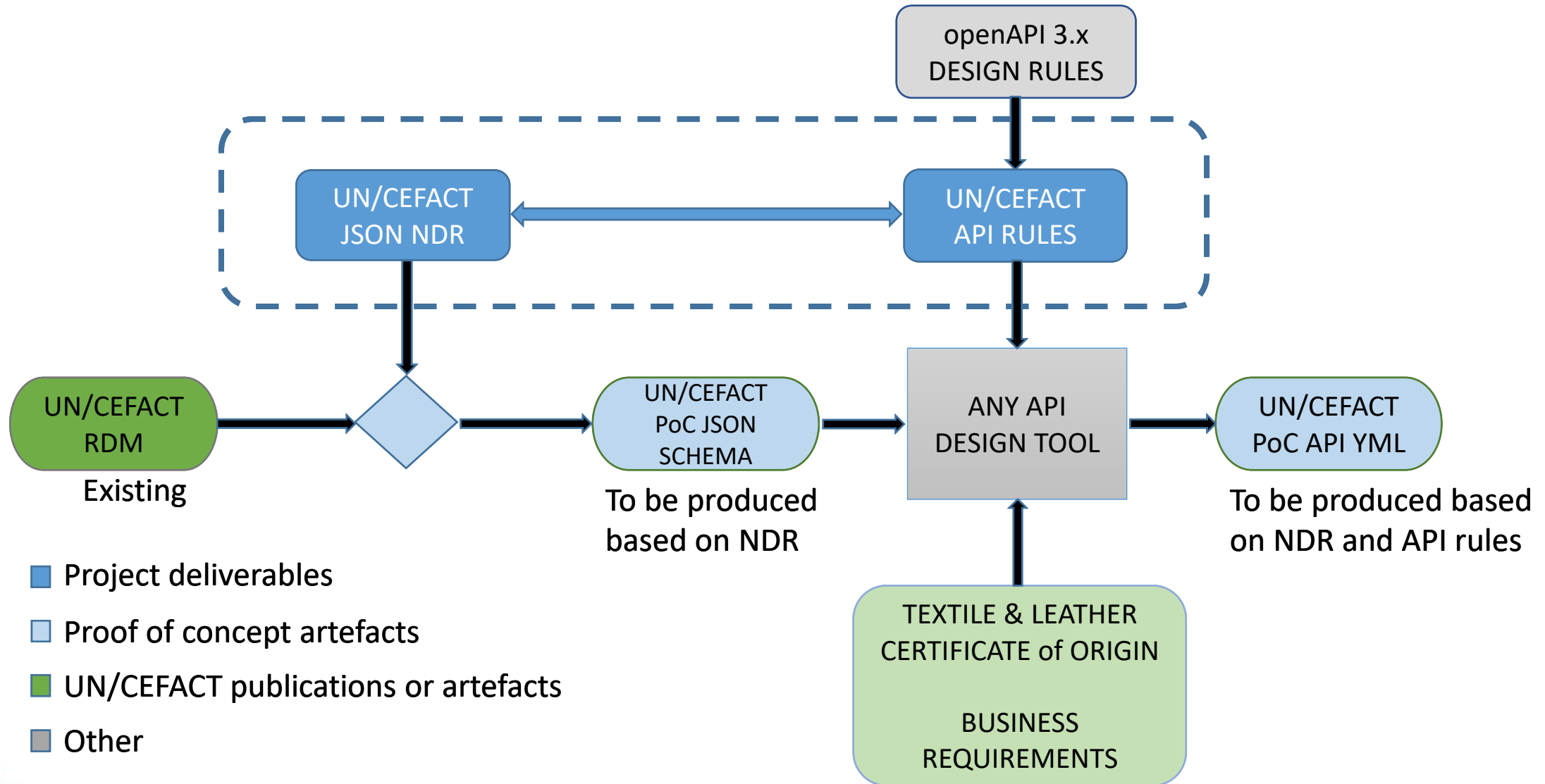
# How JSON Schema NDR and OpenAPI can enhance the interoperability and accessibility of UN/CEFACT standards

Lunch & Learn  
8<sup>th</sup> May 2023





# UN/CEFACT API NDR Project



# How JSON Schema NDR and OpenAPI can enhance the interoperability and accessibility of UN/CEFACT standards

Andreas Pelekies

Lead editor API-Tech-Spec project

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Lunch & Learn

May 8<sup>th</sup> 2023

UN / CEFACT



# **Just-in-time production needs just-in-time-data – but things happen!**

**3.500 cars a day, 10.000 parts per car**

**10.000 suppliers**

**Parts only for 2 hours of production**

**ETA is the most important parameter**

**~ 20 minutes EDI messages containing the  
ETA for each individual part are sent**

**One order per part**

# 408

## Request timeout

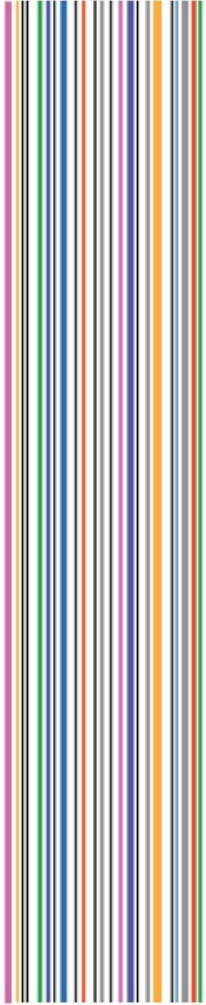
## API design patterns

Joining meeting timeout.

Your connection has timed out and you cannot join the meeting. Verify your network connectivity and try again.

Retry

OK



# Many API design patterns out there

Google Cloud

Cloud APIs

## Common design patterns

On this page

- Empty Responses
- Representing Ranges
- Resource Labels
- Long Running Operations
- List Pagination
- ...

### Empty Responses

The standard `Delete` method **should** return `google.protobuf.Empty`

Microsoft

Learn / Azure / Architecture / Best Practices /

## RESTful web API design

Article • 03/28/2023 • 23 contributors

### In this article

- What is REST?
- Organize the API design around resources
- Define API operations in terms of HTTP methods
- Conform to HTTP semantics
- Filter and paginate data
- Support partial responses for large binary resources
- Use HATEOAS to enable navigation to related resources
- Versioning a RESTful web API
- Open API Initiative

aws

Search in this guide

AWS > Documentation > AWS Prescriptive Guidance > Integrating microservices

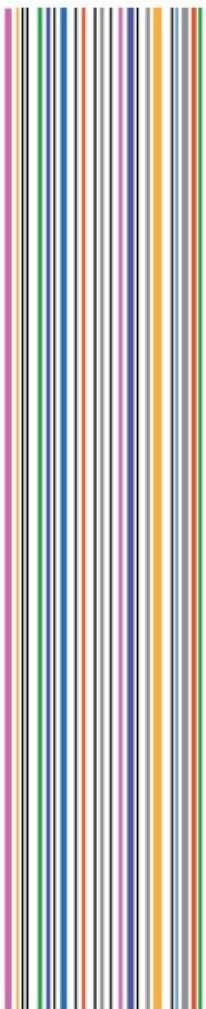
## Patterns for integrating microservices

PDF | RSS

The following patterns are used to integrate microservices architecture.

### Topics

- API gateway pattern
- Decouple messaging pattern
- Pub/sub pattern



# Individual industries have individual requirements and individual implementation standards

## 3.6 Property names

Property names on objects **MUST** be in camelCase.

Property names containing arrays **SHOULD** be plural.

Property names **MUST NOT** include FK (Foreign Key) or PK (Primary Key), as this exposes database design.

Boolean properties **MUST** be prefixed by either `is` or `has`.

## 3.7 Enum values

Enum values **SHOULD** be declared using UPPER\_SNAKE\_CASE.

## 3.8 Arrays

Empty arrays **MUST NOT** be represented with null – but **MUST** be empty lists `[]`.

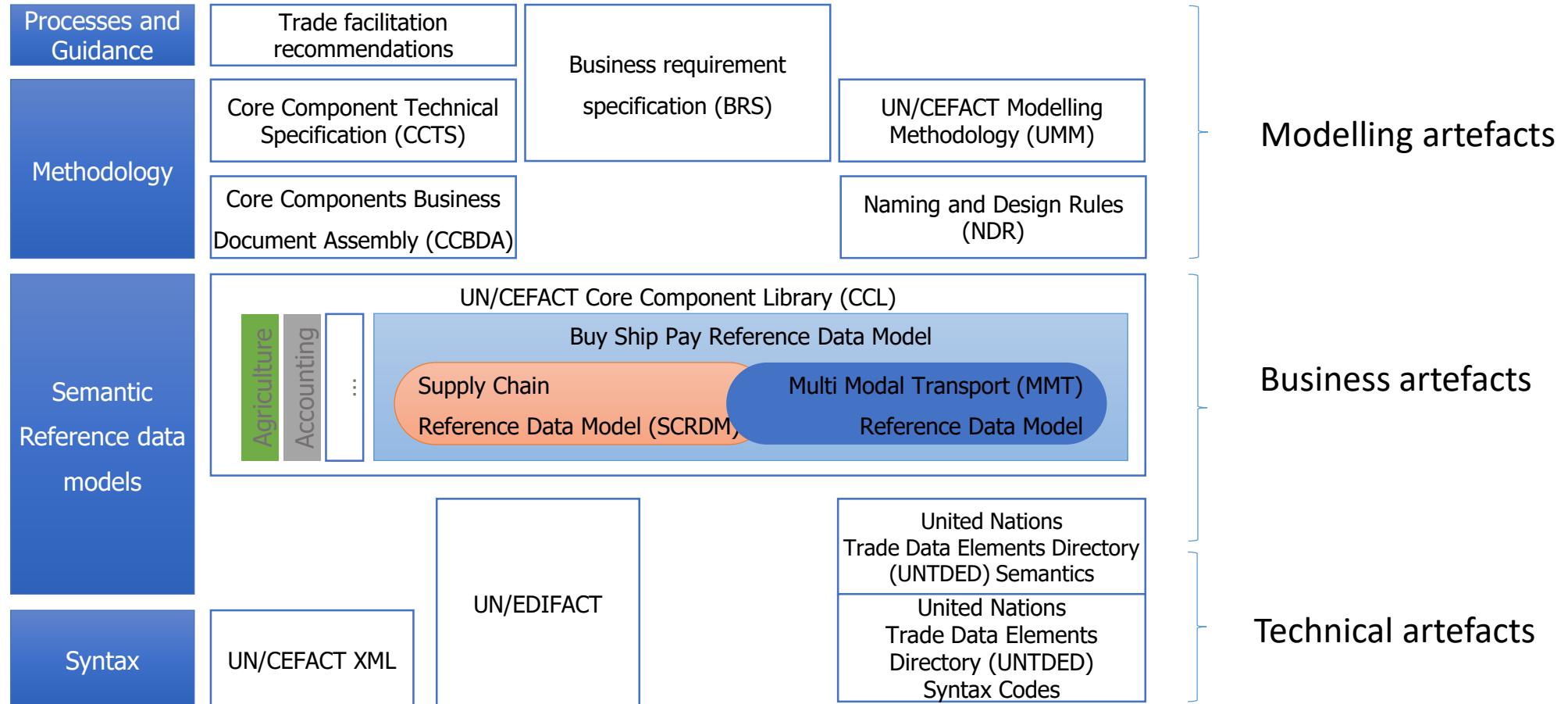
## 3.9 Date and Time properties

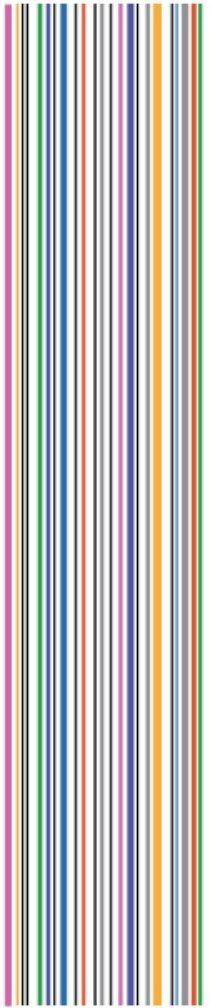
Date properties **MUST** be suffixed with *"Date"*. A Date property only contains a date in YYYY-MM-DD format.

Source: DCSA API Design Principles 1.0, September 2020

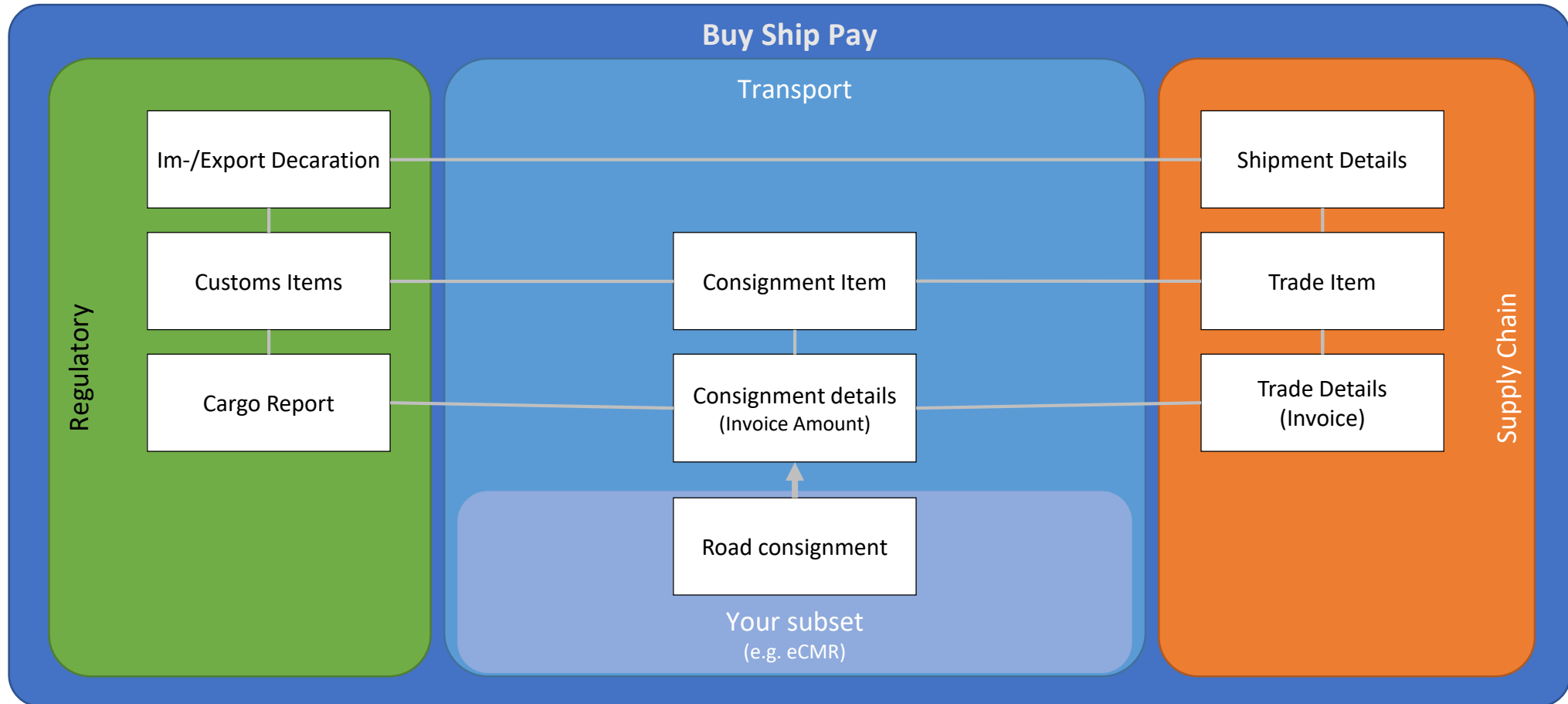


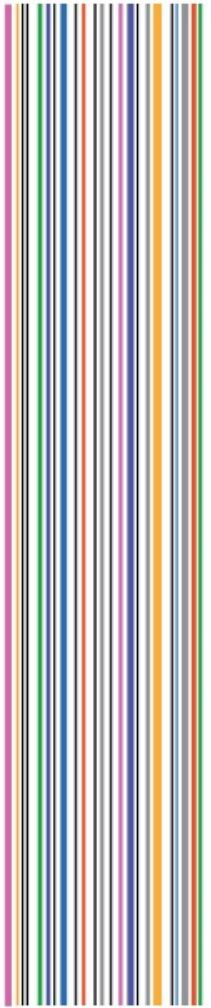
# UN/CEFACT Modelling Framework



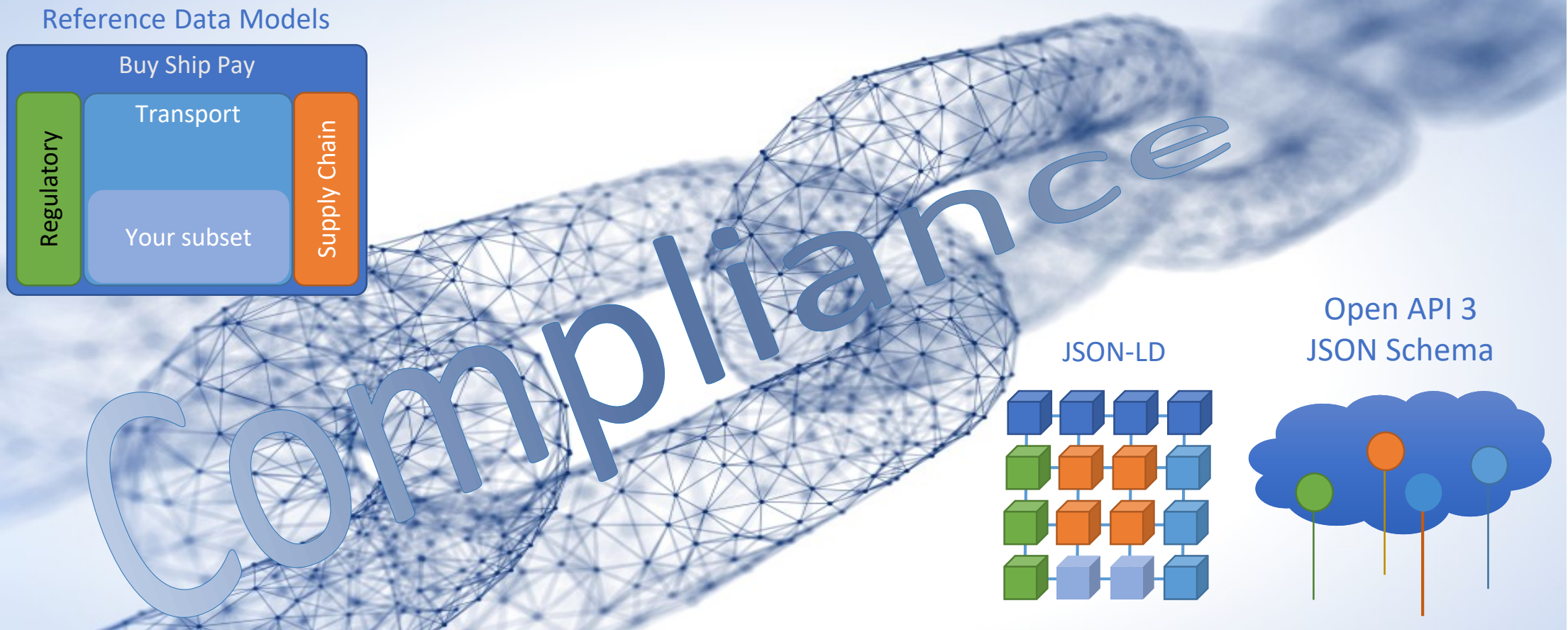


# From generic to concrete: Layers of profiles / subsets

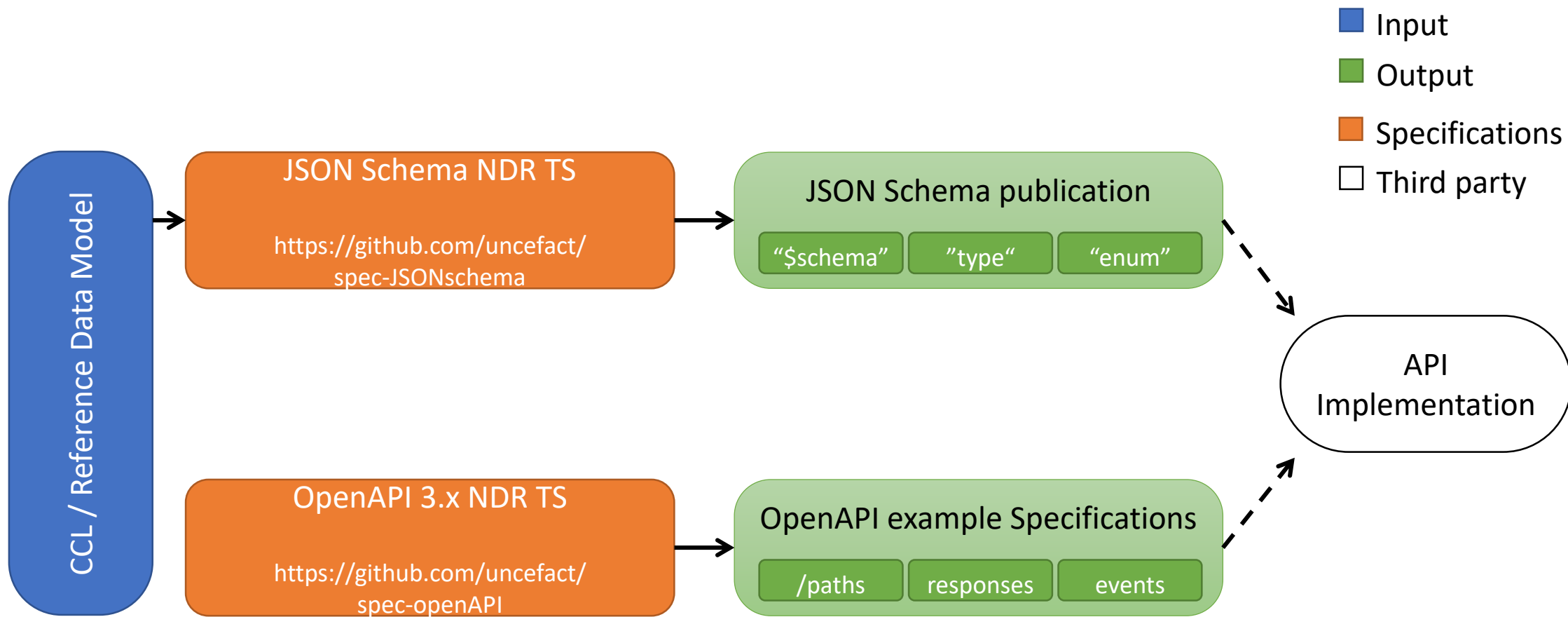




# NDR's: From RDM to API



# UN/CEFACT API Standards



# **UN/CEFACT JSON-LD Vocabulary based on the BSP RDM**

Internal UN/CEFACT implementation



**UN / CEFACT**





# Ever tried buying furniture online ?



... for a room like this one ...





# The magic of schema.org and JSON-LD


swiss cheese fondue


×





 All

 Images

 Shopping

 Videos



 Maps

 More



Tools

About 7.100.000 results (0,43 seconds)



Recipes :



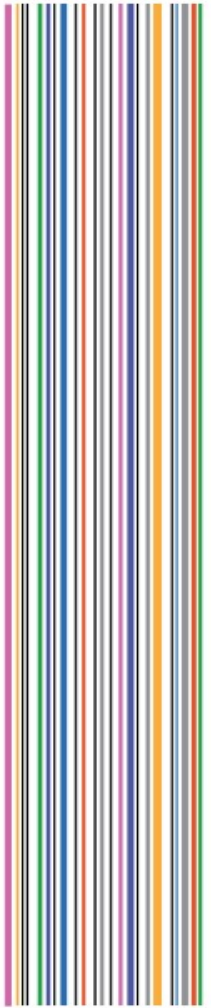
**Classic Swiss Cheese Fondue**  
Food & Wine  
5,0 ★★★★★ (3,6K)  
15 mins  
Swiss cheese, white wine, lemon juice, garlic, kirsch



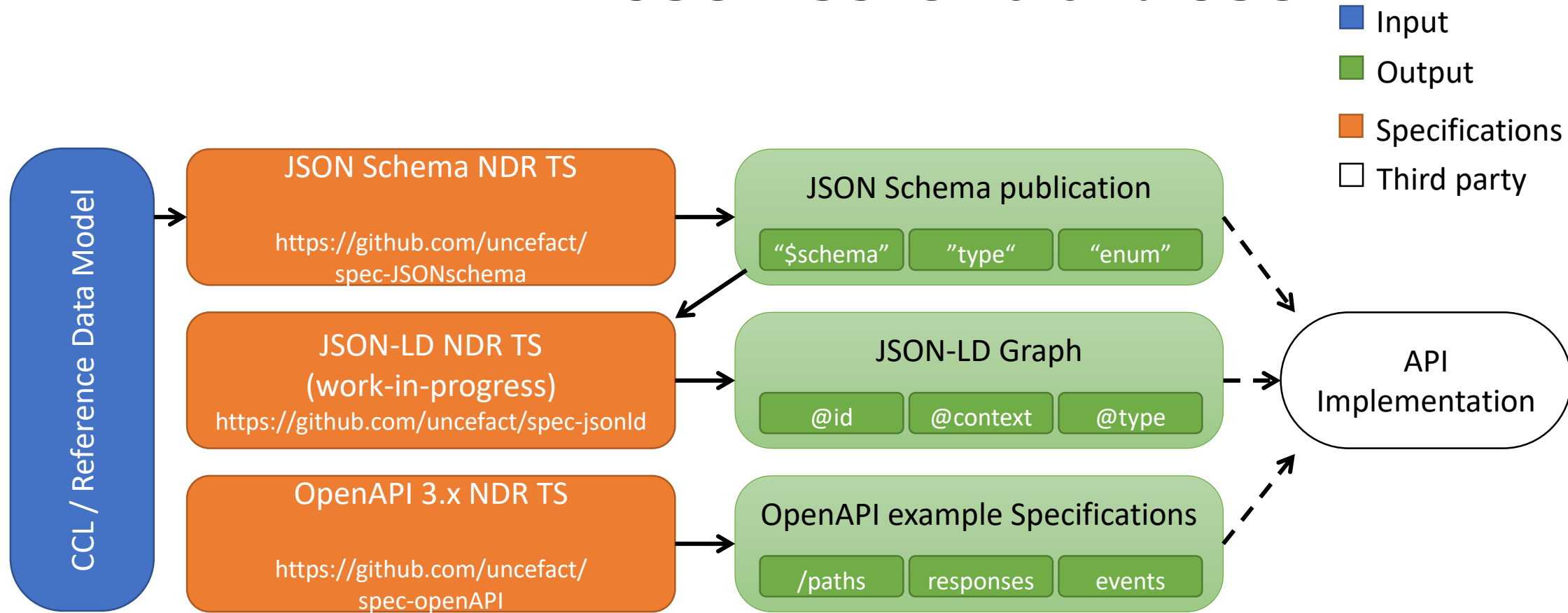
**Authentic Swiss Cheese Fondue**  
Earth, Food, and Fire  
4,5 ★★★★★ (30)  
30 mins  
White wine, crusty french bread, gruyere cheese, garlic, kirsch



**Swiss Cheese Fondue (The Best)**  
Ricardo Cuisine  
5,0 ★★★★★ (73)  
25 mins  
Ham, broccoli, white wine, green apple, cherry tomatoes



# Interoperability by design between JSON Schema and JSON LD



# Buy Ship Pay Reference Data Model

## Draft JSON-LD Vocabulary

### Data Models

- > UN/CEFACT - Buy Ship Pay Reference Data Model

### Code Lists

- > UNECE Rec 20 - Codes for Units Of Measure Used in International Trade
- > UNECE Rec 21 - Codes for Passengers, Types of Cargo, Packages and Packaging Materials
- > UNECE Rec 24 - Trade and

### AccountingAccount

@id: uncefact:AccountingAccount

@type: rdfs:Class

**Comment:** A specific account for recording debits and credits to general accounting, cost accounting or budget accounting.

#### Properties >

#### Relationships >

#### Referenced by >

<https://service.unece.org/trade/uncefact/vocabulary/uncefact/>

Challenge => Subset Reference Data Models

# UN/CEFACT OpenAPI NDR 1.0

API Design Patterns for B2B communication

UN / CEFACT





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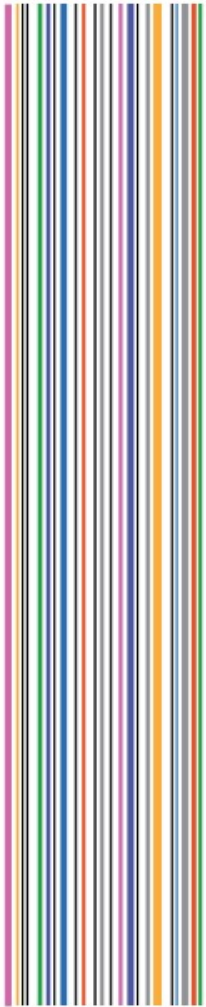
# UN/CEFACT OpenAPI NDR TS 1.0

Template and examples on

<https://github.com/uncefact/spec-openAPI>

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# UN/CEFACT JSON Schema NDR TS 1.0

library	Updated library export. Still some open issues. (See meta-library-...	4 months ago
meta-library	Link corrections	4 months ago
snapshot	First complete upload. This version does not represent the last ch...	7 months ago
subset	Typo	4 months ago
README.md	Link corrections	4 months ago
meta-schema	Typo	5 months ago

README.md

## UN/CEFACT JSON Schema draft 2020-12 publication

This directory contains JSON schema artefacts. They are fully based on the JSON schema draft 2020-12. This means that they fully comply with the requirements of OpenAPI 3.1.x.

In the [library](#) directory, the UN/CEFACT reference data models are provided in the library variant. This means that all contextualisations of the base classes can be reproduced. Thus, in addition to the basic data types, it also contains the business messages derived from the respective master messages. These can be further contextualised during implementation if required.

ApplicationResponse
CrossBorderManagement
MultiModalTransport
Pay/Financing
Regulatory/eCert
SupplyChain
SustainabilityAndCircularEconomy...
TravelAndTourism
eNegotiation

<https://github.com/uncefact/spec-JSONschema>

# API Pilot Implementation in Automotive Inbound Supply-Chain

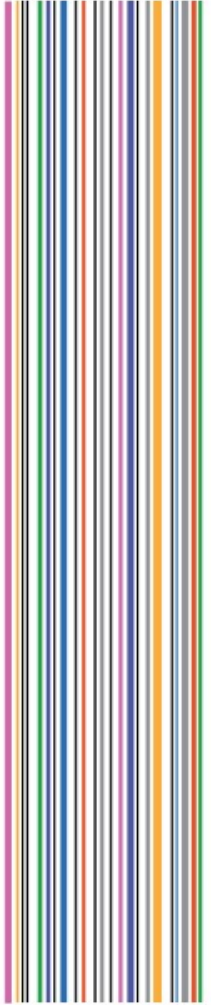
Jörg Walther

Odette International Ltd.

[jwalther@odette.org](mailto:jwalther@odette.org)

May 2023

The logo for UN / CEFAC, featuring the text 'UN / CEFAC' in blue capital letters. Above the text is a decorative graphic consisting of a dense bundle of vertical lines in various colors (purple, blue, green, orange, grey, etc.). Below the text, the lines continue and branch out into a network of interconnected nodes and lines, resembling a complex supply chain or data network.

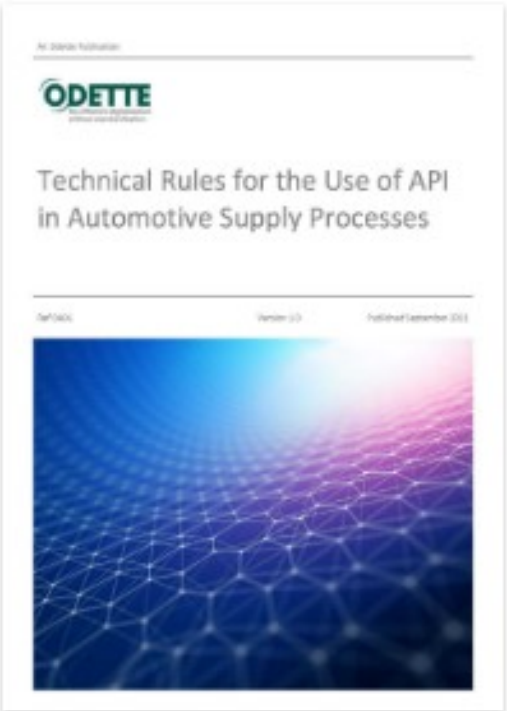
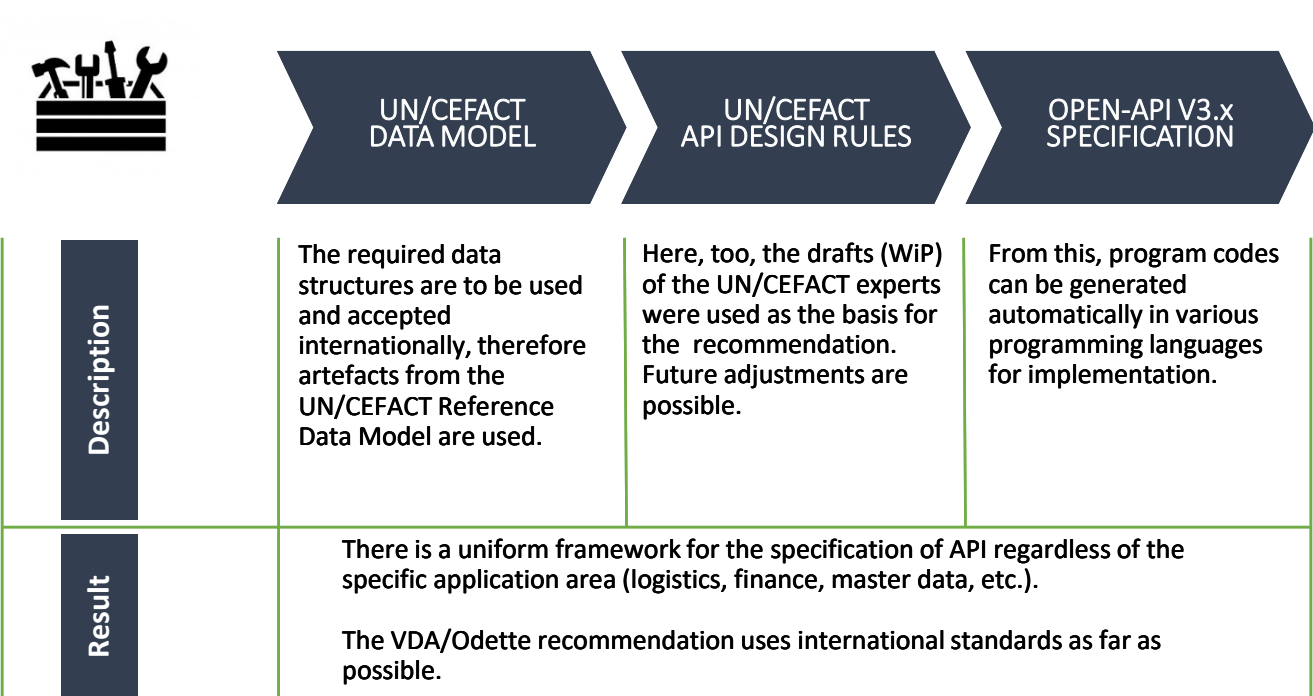


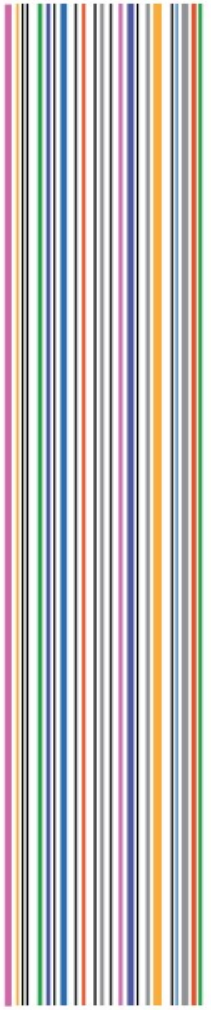
# Background

- In 2020 VDA and Odette started to explore the potential of Rest API in the Automotive Supply Chain
- Aims:
  - To get familiar with the (for us new) technology
  - To decide, which standards exist and should be taken into account
  - To identify potential Use-Cases

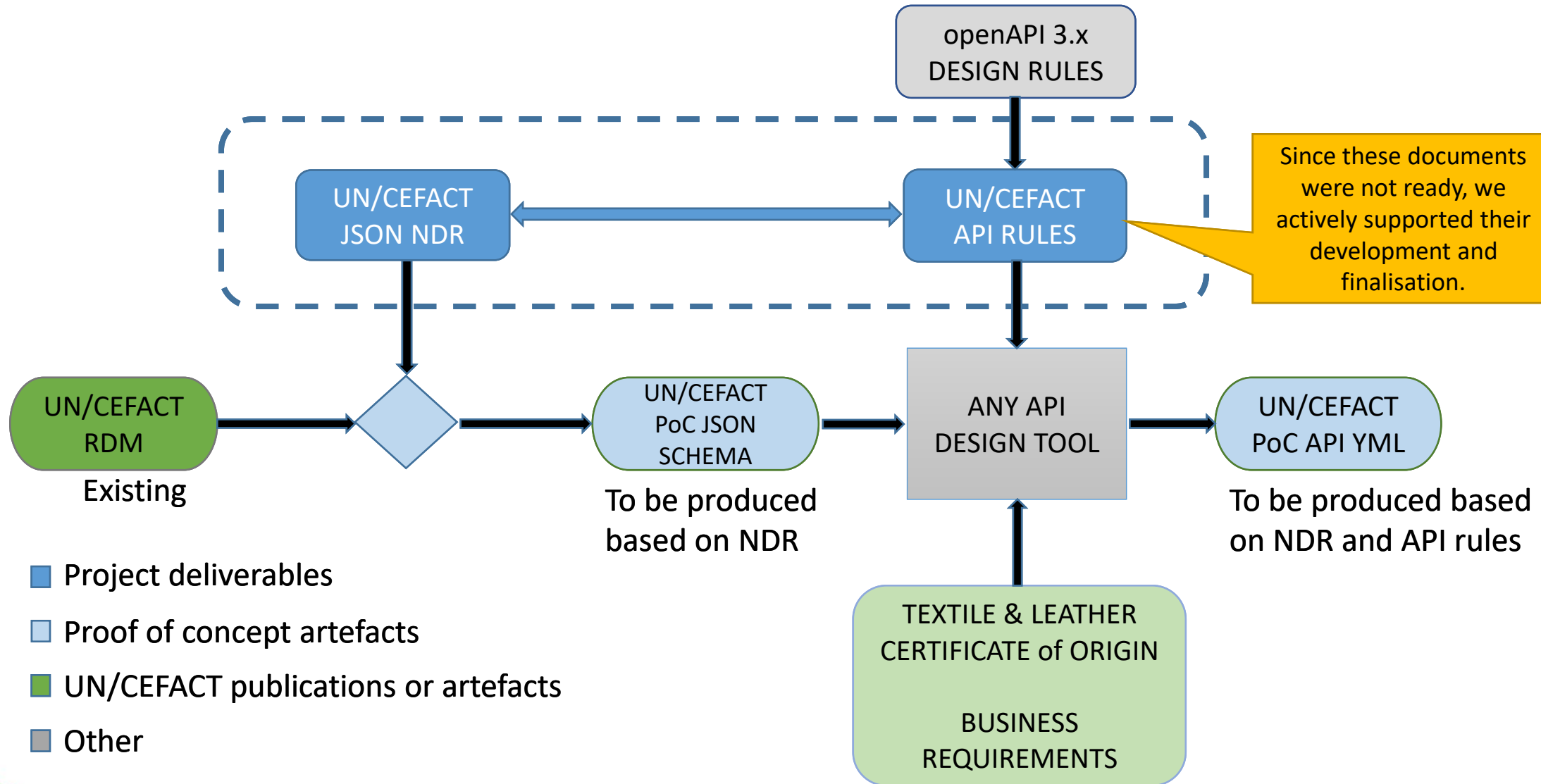


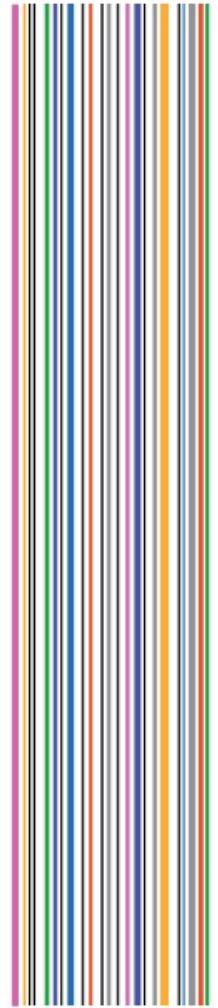
# Our “API Toolbox”



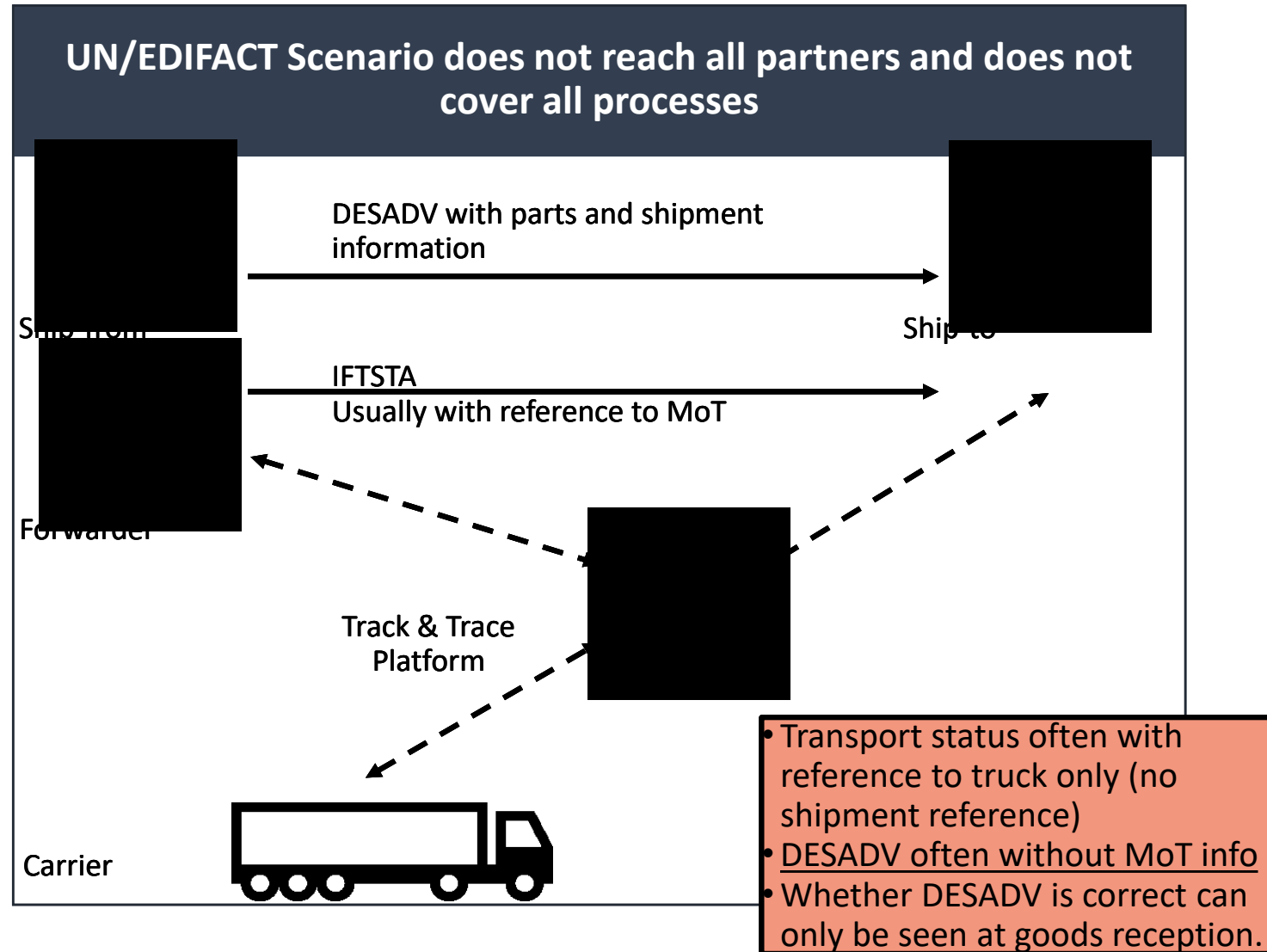


# UN/CEFACT API NDR Project

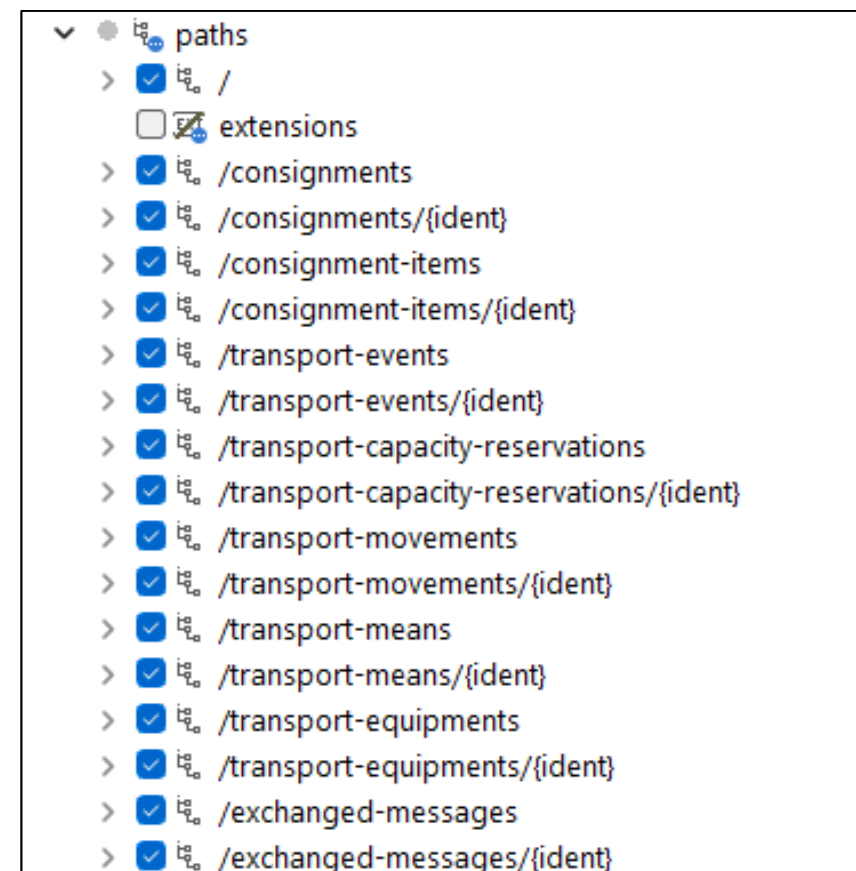
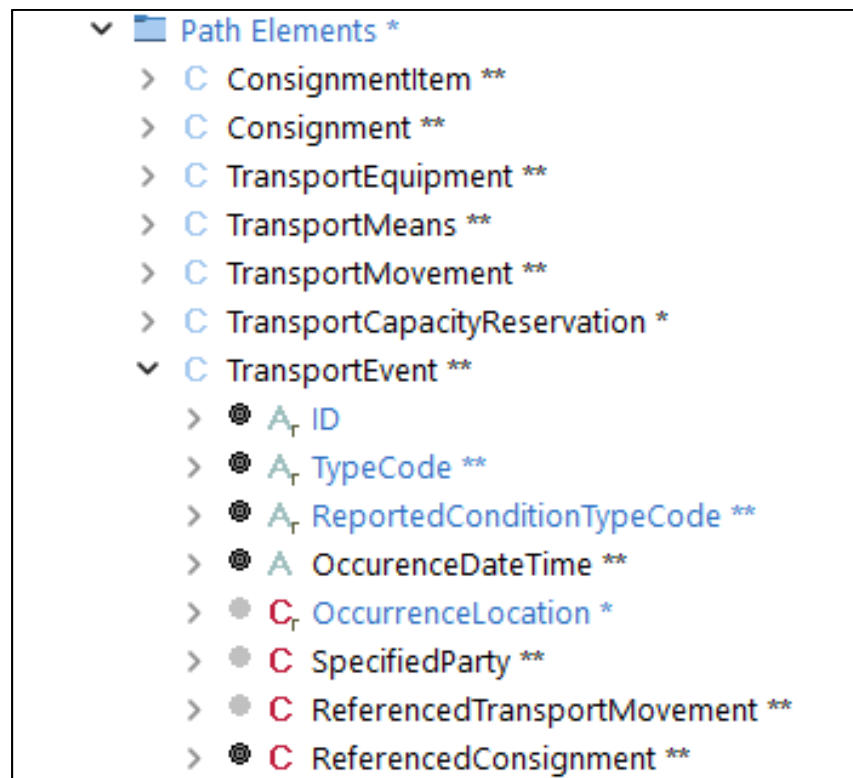


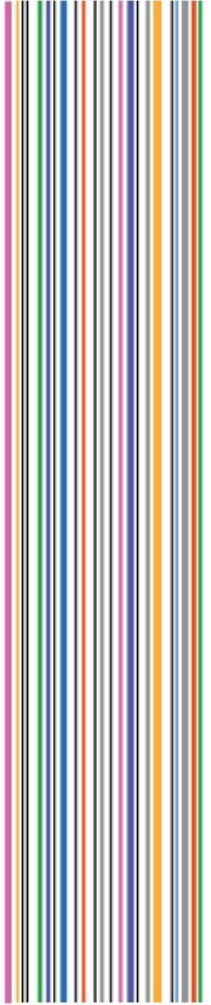


# Identification of the Business Need (use-case)



# From RDM to openAPI Spec (initial draft)

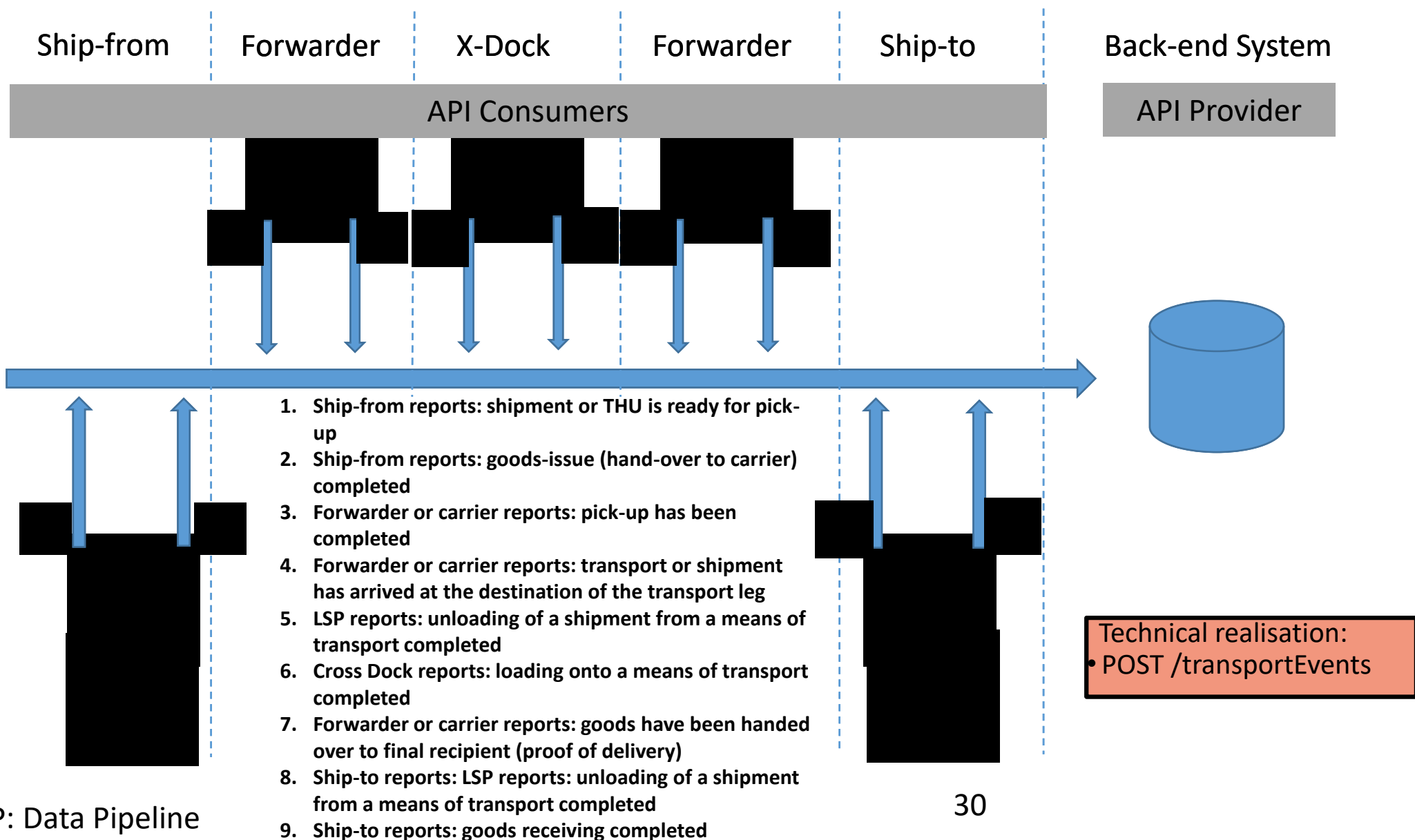


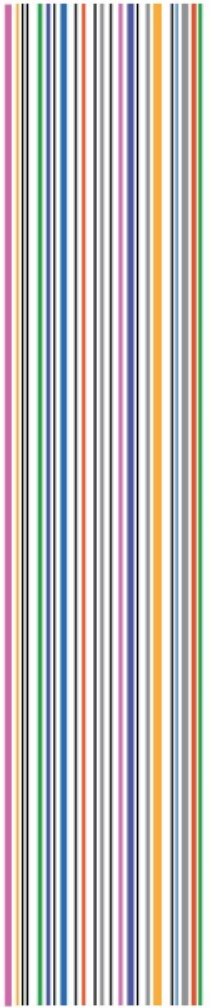


# **Implementation as MVP Our Proof-of-Concept**

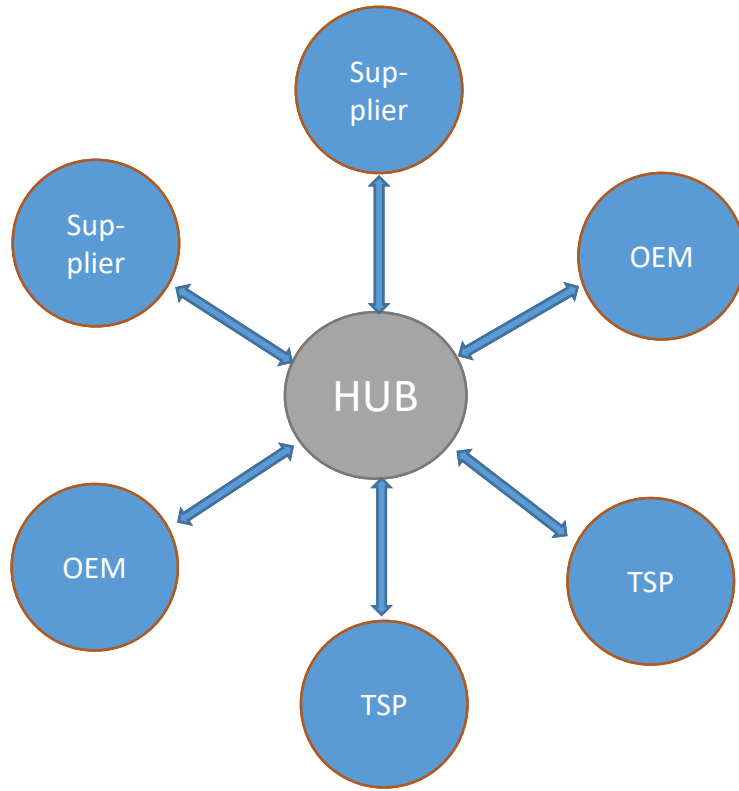


# Business Information Orchestration (our DP\*)

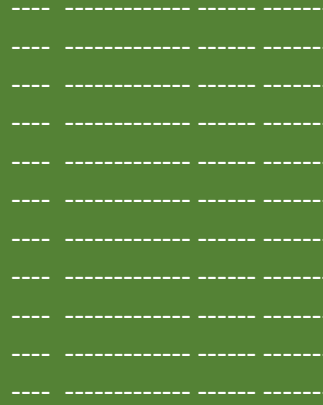




# Expected Results / Benefits



Digital Transport File



## Technical realisation:

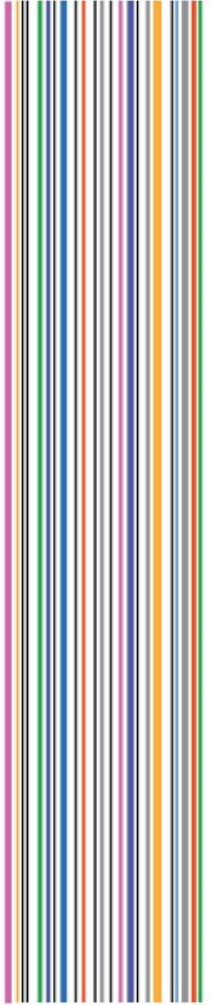
- GET /consignments/{id}
- GET /transportEvents/?ConsignmentID=XYZ123

## Technically:

- One access point to provide and retrieve data for many different partners (EDI mainly Point-to-Point);
- Data capture and provision with mobile devices;
- New partners can be integrated more easily.

## Business-wise:

- The actual (latest) status of shipments is always retrievable due to link between MoT and shipment;
- Shorter reaction times in cases of disturbances;
- In the end, a full history of the transport can be retrieved and analysed.



# Lessons Learned (so far)

- Regarding the business process:
  - Keep it simple: require only the necessary information;
  - Take, what you get;
  - Consider imperfect processes – make sure, the system still works.
- Regarding the data model:
  - We probably need a standardised way of defining new relations between ABIE (outside the document centric philosophy)  
e.g. we have Consignment – has – Events but we need  
Event – references – Consignments  
(in our context API are often event-driven).
- Regarding the solution:
  - Put the intelligence in the back-end.

# E-Business Standard API

Implementation of development

Andreas Pelekies

Lead editor API-Tech-Spec project

[andreas.pelekies@gefeg.com](mailto:andreas.pelekies@gefeg.com)

The logo for UN / CEFAC, featuring the text 'UN / CEFAC' in blue capital letters. Above the text is a decorative graphic consisting of a dense array of vertical lines in various colors (purple, blue, green, orange, grey, etc.). Below the text, the lines transition into a network of interconnected nodes and lines, resembling a circuit board or a data network diagram.

# Using a Business Requirement Specification

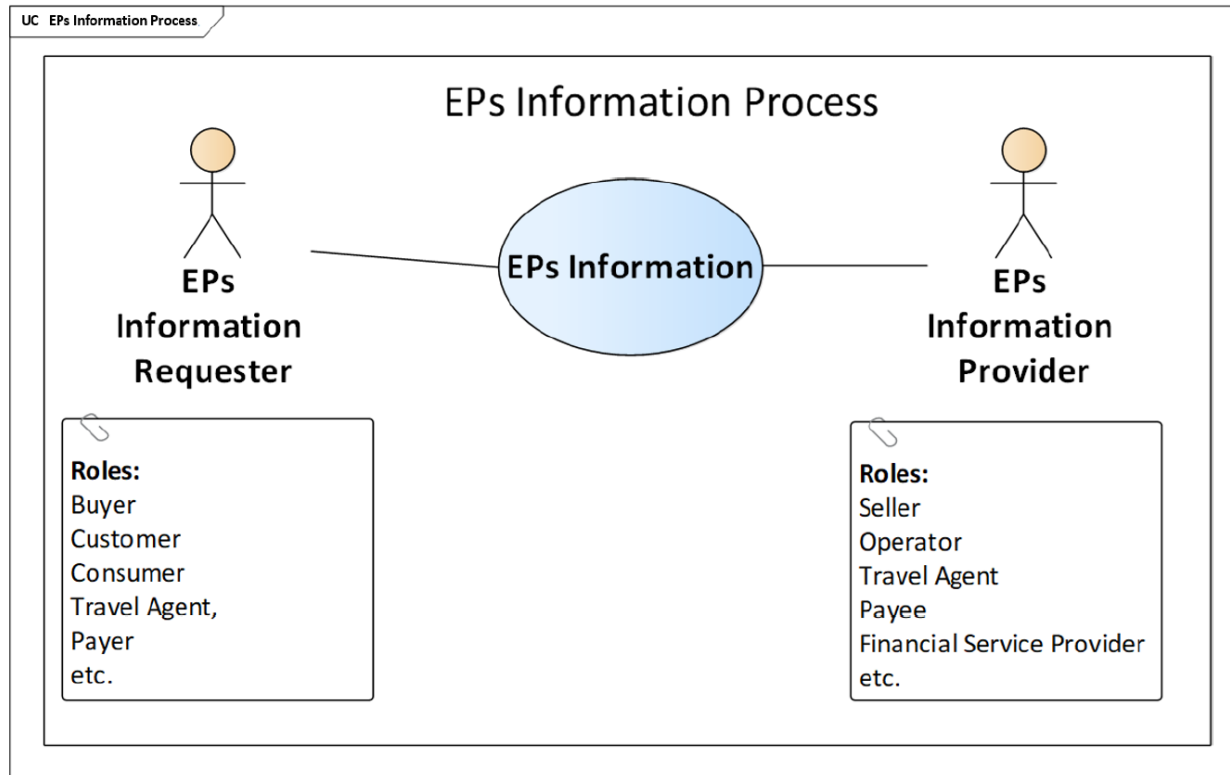


Figure 2-1 Use case diagram - EPs Information Exchange

## BRS

- Defines the processes and requirements



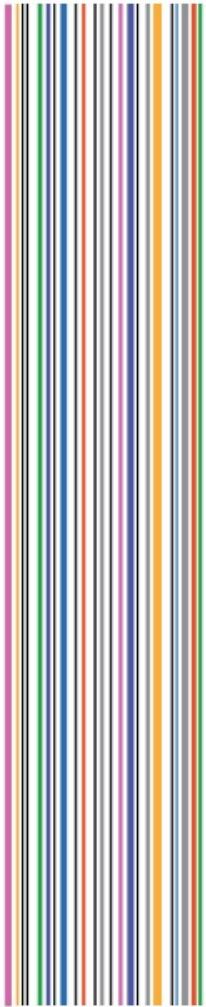
## JSON Schema

- Contextualise RDM



## OpenAPI

- Use JSON-Schema
- Create services for process implementation



UN / CEFAC



# Re-Use the wisdom of decades

- Import or re-use your own or your industries
  - XSD specification
  - JSON schema
  - JSON-LD
- Compliant to the UN/CEFACT standards
- Tick-off what you do not need

OpenAPI model: OpenAPI Demo; UN CEFAC NDR eCMR - GEFEG.FX

Datei Home View

eCMR > Road Consignment > ID (Supply Chain\_ Consignment. Identification. Identifier) >

OpenAPI document

- openapi: 3.0.3
  - info
    - title: UN/CEFACT eCMR Demo using OpenAPI 3.0.3
    - description: This is a proof of concept API design to
    - version: 1.0.0
  - servers
  - paths
    - /eCMR/dangerous-goods/{RegistrationPlateNumber}
    - /eCMR/{ID}
    - /eta/{consignmentId}
  - components
    - schemas
      - dangerousGoods
      - party
      - eCMR
        - Document Context
        - eCMR Header Details
        - Road Consignment
          - ID
          - Consignor Assigned ID
          - Carrier Assigned ID

BBIE CCTS Notes Enhanced Children

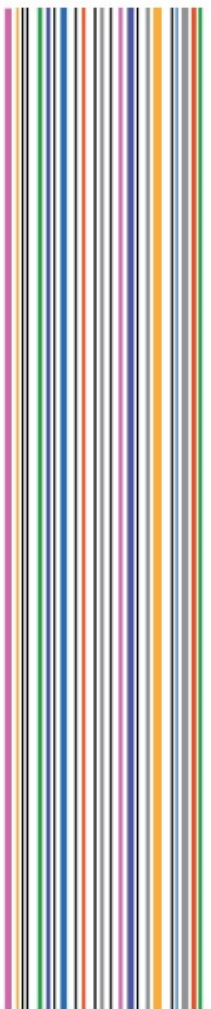
TC154

UID	1202
TDDED repr.	
Locations, Bridges	UNLK: an..17, L 06, P 63-80 CIM: L 64, P 69-79 and n7; L 66, P 73-82
Dictionary Entry Name	Consignment. Identifier
Definition	Unique reference identifying a particular consignment of goods.
Links to UNCL	
Oper	
Notes for September MA meeting	
TBG15 Notes April 2004	
June 7372MA meeting update	

Pub Refs

Identifier	UN01004160
Ref qDT ID	
Usage Rules	
Example	
Version	1.0
TDDED	(1202)
Source	D08B

1 Edit



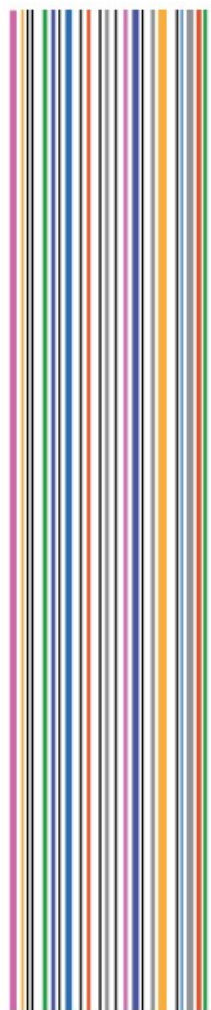
# From Model to Specification including harmonised definitions and code lists

```
openapi: 3.0.3
info:
  title: UN/CEFACT eCMR Demo using OpenAPI 3.0.3
  description: |
  version: 1.0.0
servers:
paths:
  /:
  /eCMR/dangerous-goods/{RegistrationPlateNumber}:
    get:
      tags:
      description: Gets a list of dangerous goods on a
        transport means.
      operationId: getDangeoursGoodsInfo
      parameters:
      responses:
        200:
          description: OK
          headers:
            Link:
              description: |
                Link header providing information on
                pagination.

              Examples:

              Link:
                <https://api.unece.org/demo?cursor=A7HFJ98M>;
                rel="current"
```

```
DocumentCode:
  description: Code specifying the name of a
    document such as 352 for Proforma invoice,
    380 for Commercial invoice.
  type: object
  properties:
    content:
      description: |
        Applicable codes:
        * '730' - Road consignment note
      enum:
        - '730' # Road consignment note
      type: string
  listAgencyID:
    enum:
```



UN / CEFAC

# Use JSON Schema to create API Specs with the tool of your choice

## UN/CEFACT eCMR Demo using OpenAPI 3.0.3

1.0.0 OAS3

This is a proof of concept API design to test the OpenAPI NDR version 1.0.

### Servers

<https://sandbox.api.na.tld/all/v1> - Example server

### Administrative services

All services related to administrative processes

### eCMR services

All services for eCMR-related processes

GET

/eCMR/dangerous-goods  
/{RegistrationPlateNumber}

GET

/eCMR/{ID}

GET

/eta/{consignmentId}

### Schemas

#### dangerousGoods ▾ {

UNDGID\*

RegulationCode

TechnicalName

UpperPartOrangeHazardPlacardID

LowerPartOrangeHazardPlacardID

PackagingDangerLevelCode

Code > {...}

DangerousGoodsRegulationCode > {...}

Text > {...}

ID > {...}

ID > {...}

DangerousGoodsPackagingLevelCode ▾ {  
content\* string

Applicable codes:

- '1' - Great danger
- '2' - Medium danger
- '3' - Minor danger
- '4' - Not assigned

## 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/)
- The (draft) JSON Schema artefacts can be found at <https://github.com/uncefact/spec-JSONschema>
- The (draft) OpenAPI artefacts can be found at <https://github.com/uncefact/spec-openAPI>
- All experts are welcome to join the standards development work free of charge

**We look forward to answering your questions!**

Lunch & Learn  
May 8<sup>th</sup> 2023

**UN / CEFAC**

