UN/CEFACT Project Proposal

Project Name:	Open API generation from domain models		
Date submitted:	14-Dec-2023	Proposed by:	Steve Capell
Relevant SDG targets:	Not applicable – this underlying capability (methodology) that will be leveraged by all UN/CEFACT business projects that require API specifications. Consequently, all SDGs that are relevant for CEFACT projects are also relevant for this specification.		

All SDGs impacted by UN/CEFACT business deliverables.

1. Project purpose

Required

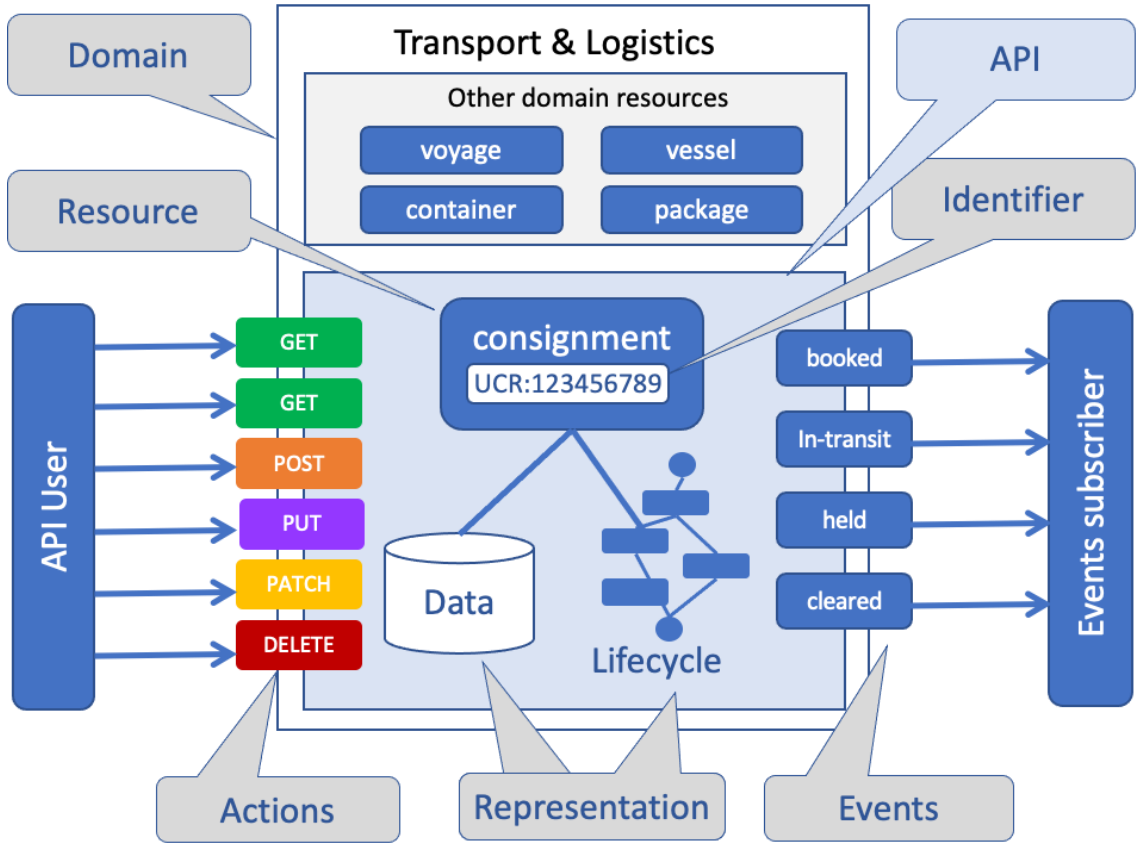
Web APIs based on Open API 3.0 (or later) standards are becoming an increasingly important technology for system-to-system data exchange interfaces. For UN/CEFACT to provide outputs that are relevant for modern web developers, it is critical that there is a consistent way to deliver API specifications for UN/CEFACT domain projects. The API generation can be incorporated into existing UN/CEFACT standard delivery methodology with minimal disruption. API specifications generated should be implementable and testable.

High quality APIs conform to the "RESTful" architecture where http verbs represent "actions" on business "resources". Good APIs also include events where authorized users can subscribe to be notified when the state of a resource like a consignment changes state.

The diagram below shows the components of a REST API, using the consignment resource and transport & logistics domain as an example. Although the consignment resource is used as an example, the methodology and specification developed through this project will be equally applicable to all UN/CEFACT work areas. The key ideas are

- That an API resource is a digital representation of a real-world object and is always a noun.
- That resources are designed to be small and self-contained by having references to other resources, which are operated on by their own APIs.
- That a resource is represented by a logical data model and, of equal importance, a state lifecycle.
- That external systems use http verbs to interact with the resource through well defined actions (eg POST /consignments/{data} will create a new consignment and return it's unique {id}, and GET /consignments/{id} will return information about a specific consignment.)
- That every transition in the state lifecycle of the resource (eg the "booked", "in-transit", "held", "cleared" examples in the diagram) will trigger an event that will be sent to any subscribed and authorized external system.
- That resources are grouped into logical business domains so that they can be governed as a logical group based on a common domain vocabulary.

Well-designed APIs are easy to understand and easy to use because they map to clear and well understood real world business objects.



Domain Resource model for RESTful API design.

A UN/CEFACT Open API Naming & Design Rules technical specification already exists (see initial contributions). However, whilst it provides a good set of design principles to guide API developers, it does not provide a pathway from UN/CEFACT logical domain models (eg the RDMs) to Open API specification generation. One challenge with Open API generation is that there are many features of an open API specification that have no logical equivalent in logical domain models – so there's nothing to map to. However, it should be feasible to embed a set of good API design opinions into a set of generation rules that are implemented as a separate template. In this way, a logical domain model with only a few simple annotations could be the source for a template-driven API specification generation.

Therefore, the purpose of this project is to empower UN/CEFACT business domain experts to use simple high level modelling tools to develop business domain models that are based on UN/CEFACT semantics – and then to generate rich Open API specifications with little effort. To achieve this outcome the project will define

1. An API design methodology that is targeted at business domain experts. The methodology will leverage existing business domain knowledge encapsulated in existing UN/CEFACT reference data models and document standards.
2. An extension to the exiting Open API technical specification that it targeted at tool vendors.

Relevant links

- Open API 3.x specification : https://www.openapis.org/
- Australian government API design best practices : https://api.gov.au/sections/wog-api-requirements.html

2. Project scope

Required

This project will

- Define an API design methodology for business domain experts which minimises the need for technical expertise. The methodology will allow them to extend their business domain models to support API specification generation – using any tool that conforms to the specification.
- Define a specification for generation of API specifications from domain models. This specification is targeted at tool developers. The API specifications will conform to the OpenAPI 3.x standard.
- Support implementation of the specification in at least one modelling tool that is accessible by UN/CEFACT business domain experts.

3. Project deliverables and 4. Exit Criteria

Required (check all that apply)

Please note that the Bureau may reassess and change a deliverable after its completion at its discretion.

	Project deliverables	**Exit Criteria**
☐	Policy Recommendation	Public Review logs demonstrating all comments have been satisfactorily resolved; Final document ready for publication.
☐	Business Requirement Specification	
☒	Technical Specification	
☐	White Paper	Final document ready for publication.
☐	Green Paper	
☐	Requirement Specification Mapping	
☐	Core Component Business Document Assembly	
☒	Guidelines	
☐	Executive Guide	
☐	Brochure	
☐	Entries/alignment to the Core Component Library	Final deliverable ready for publication.
☐	XML Schema	
☐	UN/EDIFACT message	
☐	Internal UN/CEFACT Document	Final document ready for Bureau approval.
☐	Other (specify)	

5. Impact analysis

Please indicate how these project deliverables will affect trade facilitation policies and regulations. Please highlight any anticipated / tangible results achieved. Indicate how the results and impact can be evaluated after the project is completed.

UN/CEFACT electronic standards for trade facilitation, sustainability, and e-business will become less relevant in the modern world unless they can also be provided as API specifications. Therefore, this project delivers wide-scale applicability across-the-board value to uplift the relevance and uptake of such UN/CEFACT standards.

6. Project Team membership and required functional expertise

Membership is open to UN/CEFACT experts with broad knowledge in the area of:	Information modelling, RESTful API design and Open API3.x

In addition, Heads of Delegations may invite technical experts from their constituency to participate in the work.
Experts are expected to contribute to the work based solely on their expertise and to comply with the UN/CEFACT Code of Conduct and Ethics and the policy on Intellectual Property Rights.
https://unece.org/trade/documents/2010/12/session-documents/intellectual-property-rights-policy

7. HoD support

Required for Technical Standards, Business Standards and UNECE Recommendations. And at the request of the UN/CEFACT Bureau. A request for HoD support will be circulated to all HoDs in these cases. If you have verbal confirmation from specific delegations of their support, please list these here. Projects that require HoD support must obtain this within 6 months of Bureau provisional approval.

Proposed :

- Japan
- Australia
- UK
- France

8. Geographical focus

The geographical focus of the project is global

9. Beneficiaries

Highlight relevance for sustainable and digital trade facilitation in developing and transition economies, and benefits to vulnerable groups (e.g. MSMEs and women-led businesses)

Most SME's use commercial small-business software for managing their business. Modern API specifications from UN/CEFACT could facilitate implementation of data interchange capabilities that bring them to a common level with larger enterprises, thereby levelling the playing field for SMEs.

10. Initial contributions

The following contributions are submitted as part of this proposal. It is understood that these contributions are only for consideration by the Project Team and that other participants may submit additional contributions in order to ensure that as much information as possible is obtained from those with expertise and a material interest in the project. It is also understood that the Project Team may choose to adopt one or more of these contributions "as is".

List any initial contributions:

This project builds upon work already completed by UNECE and partner organisations.

- UN/CEFACT BSP RDM and its domain specific subset RDMs upon which the JSON-LD vocabulary is based. These will be used as examples for the design methodology guidance paper delivered by this project.
- UN/CEFACT OpenAPI Naming and Design Rules V1.0UN/CEFACT. This is the technical specification that will be extended by this project.

- JSON-LD vocabulary : vocabulary.uncefact.org. The generated API specifications should also align with the UN/CEFACT JSON-LD vocabulary so that instance messages can include a "@context" reference that allows for automated interpretation of semantic meaning.

11. Resource requirements

Participants in the project shall provide resources for their own participation. The existence and functioning of the project shall not require any additional resources from the UNECE secretariat.

Any additional request:	None

12. Proposed project leadership

(subject to Bureau approval)

Proposed project lead:	Alastair parker	E-mail:	alastair.parker@gmail.com
Proposed Vice Chair:	Steven Capell	E-mail:	Steve.capell@gmail.com
Proposed domain	Specification		

13. Milestones (repeat for each deliverable, if different)

The following are draft milestones of the project.

	ODP Stage	Expected Completion Date	
Yes	Project Inception	1 month	
Yes / No	Requirements gathering	☒	1 month
Yes	Draft development	☐	3 months (Very quick)
		☒	6 months (Quick)
		☐	12 months (Normal)
		☐	18 months (Normal)
		☐	24 months (Long)
Yes / No	Public Draft Review	☒	2 months
Yes	Project Exit	1 month	