Linked Data Vocabulary and Shapes Project

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other**Project Details**

Domain	Specification Domain
Project Identifier	P1129
Bureau Decision #	#2402012
Project Proposal Status	Official
Project Page	Linked Data Vocabulary and Shapes Project
Supporting VC	Steven Capell
Project Lead	Damien TRUFFAUT
HoD Support	SE, FR, BR, SG
Status	Initiated
Version	1.0
Submitted date	2024-01-03
Draft Development Completion	2024-12-31
Publication Date	2025-01-30

Relevant SDG targets:

This proposed underlying capability (methodology) will support the future sustainability of all UN/CEFACT business domain project deliverables. Consequently, all SDGs that are relevant for UN/CEFACT projects are also relevant for this specification.

Project Purpose

The UN/CEFACT Core Component Library (UN/CCL) serves as a foundational element within the UN/CEFACT's suite of standards and specifications, contributing to the facilitation of international trade and electronic business. The UN/CCL supports the harmonization of business processes by providing a common vocabulary for expressing business data elements. This harmonization is essential for promoting efficiency, reducing redundancy, and improving the overall interoperability of systems and processes involved in cross-border trade. The UN/CCL includes the identification, definition, and management of standardized data components, such as data types, business entities, and data structures. These components are designed to be reusable across different domains and industries, promoting consistency and reducing the need for custom data definitions.

UN/EDIFACT, the first generation of globally standardized electronic data interchange paved the way for digital document-based communication within strongly constrained environments (slow communication, poor computing capabilities, costly storage systems). Second generation UN/CEFACT XML Schemas were introduced as a step further towards digitized data exchange but XML itself lacks the ability to be deployed in more complex situations without dramatically increasing complexity where applications are combining multiple sources of different information due to the lack of global XML naming and design rules and the fact that typically XML schemas are designed as document replacements rather than process driven snippets. The third generation of data interchange standards developed and published by UN/CEFACT are the UN/CCL-based process-driven global supply chain Reference Data Model exchange standards deployable through any exchange syntax. The UN/CEFACT fourth generation resource driven JSON-LD Web Vocabulary now offers additional Restful API data exchange possibilities.

Links between these generational standards are critical to support the facilitation of digitised global supply chains as no single technical exchange syntax solution can be a single-source solution. Whilst the UN/CCL and RDM standards provide the semantic foundation, the latest LD Web Vocabulary must be kept up to date with the semantic foundation developments which result from our UN/CEFACT Forum domain business project work.

The primary objective of this project proposal is to establish and implement a process that ensures the timely publication of a new version of the UN /CEFACT LD Web Vocabulary whenever the UN/CEFACT Library is updated. This initiative aims to support the interoperability of trade and electronic business by providing an accurate and up-to-date linked data representation of the UN/CEFACT Buy-Ship-Pay Reference Data Model.

The UN/CEFACT LD Web Vocabulary project focuses on creating and maintaining a dynamic and responsive web vocabulary that captures the evolving terminologies and semantics within the UN/CCL-based UN/CEFACT Buy-Ship-Pay Reference Data Model). This effort is crucial for enhancing the interoperability of trade-related systems and facilitating seamless communication across the global supply chain. UN/CEFACT aims to solidify its position as a leader in trade facilitation and electronic business standards by providing this valuable additional resource for the global trade community through its interoperable LD Web Vocabulary. It is essential for UN/CEFACT to provide up-to-date outputs that are relevant for modern web developers.

The aim of this project is to develop an automated mechanism to monitor changes and updates in the UN/CEFACT semantic framework (UN/CCL plus the Buy Ship Pay Reference Data models) to enable them to be reflected in the UN/CEFACT LD Web Vocabulary. It is necessary to ensure that whenever a new version of the semantic framework standards are delivered, the delivery automatically triggers the generation of a new version of the LD Web Vocabulary. JSON schema is another syntactic format that can be used for publishing the UN/CEFACT Business Standard deliverables. It is a lightweight and easily readable data interchange format and its simplicity makes it suitable for deployment in various software environments. This project proposes a target RDF vocabulary to allow UN/CEFACT JSON or XML Schema conforming data to be exposed as Linked Data.

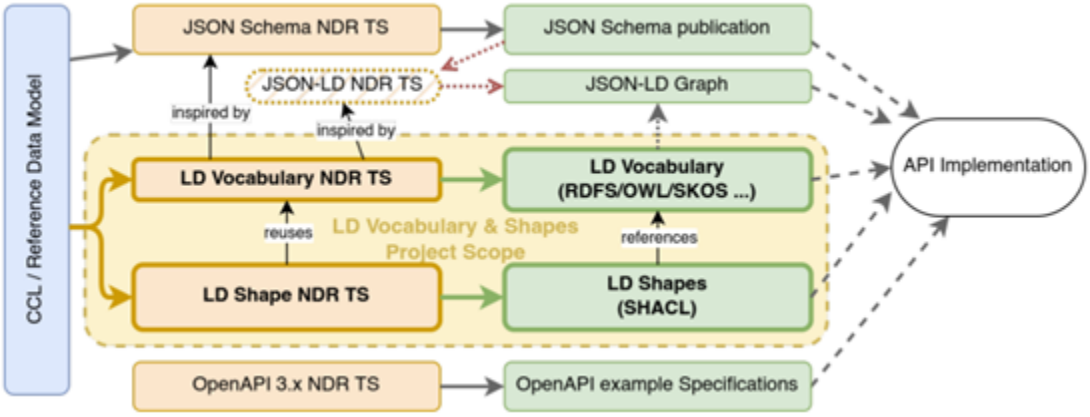
A more recent approach adopted by many organizations (GS1, OGC, IATA, ETSI, HL7, …) is to produce communication specifications, based on W3c RDF recommendations for Linked Data (LD) [3] : This allows information to be distributed in a more convenient and atomic manner: for instance, message parts could be cited and its content processed automatically as described in dereferencing [4], allowing automation on up-to--date information with more lightweight systems. This would allow SMEs to enter into the ecosystem, and small or large companies to benefit from evolving knowledge graphs (see: lod-Cloud [6]). This approach has already been initiated at UN/CEFACT with the publication of the “UN/CEFACT Web Vocabularies” [7] . The complexity arising from the chosen method (see a synthesis of the process [8]) has multiple consequences:

- The Web vocabulary (JSON-LD context & vocabulary) can be hard to keep synchronized with UN/CEFACT semantic framework updates
- API implementations will be difficult unless there is a machine readable description of messages structures & constraints (cardinalities…). Those are provided by JSON Schema or XML Schema, but not by JSON-LD @context
- The resulting vocabulary is difficult to combine or align with other vocabularies

Note: JSON--LD [9] is a JSON -based format to serialize Linked. LD vocabularies or ontology descriptions rely on several vocabularies (c.f. RDF Primer [10] , RDF Schema [11] , OWL [12] , ShEx [13], SHACL [14], SKOS [15]..). They may be serialized as JSON--LD

Project Scope

This project will
• To push forward the objectives of “JSON¬LD Web Vocabulary” project [16]
• To improve the LD Web Vocabulary publication by producing it directly from the UN/CCL-based Reference Data Models
• To facilitate LD API implementations by providing reusable “Shapes” with structural and constraints descriptions (expressed with SHACL [14]) directly from the UN/CCL-based Reference Data Models as Application Profiles of the vocabulary.
• To allow alignment of other semantic vocabularies with UN/CEFACT [17]



A proof of concept is already in progress, for the JSON¬LD Graph to be produced from the UN/CCL-based Reference Data Models. The project will deliver the following :
• Linked Data Web Vocabulary update methodology technical specification

Project Deliverables

Deliverable 1: Technical Specification
Deliverable 2: Requirement Specification Mapping

Exit Criteria

The exit criteria will be:
Deliverable 1: Public Review logs demonstrating all comments have been satisfactorily resolved; Final document ready for publication.
Deliverable 2: Final document ready for publication.

Impact analysis

UN/CEFACT electronic standards for trade facilitation evolves covering aspects such as sustainability and products circularity. We need to make sure that all the data elements in the UN/CCL-based Reference Data Models will be accessible using the modern technologies. Therefore, this project delivers wide-scale across-the-board value to uplift the relevance and uptake of the UN/CEFACT semantic standards across all relevant data exchange syntaxes and methodologies.

Project Team Membership and Required Functional Expertise

Membership is open to UN/CEFACT experts with broad knowledge in the area of: CCL/RDM Business Semantics, JSON-LD technology

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

Geographical Focus

The geographical focus of the project is global.

Beneficiaries

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

Initial Contributions

References and initial contributions:

1. UN/CEFACT JSON Schema Naming and Design Rules Technical Specification
2. UN/CEFACT OpenAPI Naming and Design Rules
3. How JSON Schema NDR and OpenAPI can enhance the interoperability and accessibility of UN/CEFACT standards. How JSON Schema NDR and OpenAPI (unece.org)
4. JSON-LD Web Vocabulary. UN/CEFACT Collaboration Environment.https://uncefact.unece.org/display/uncefactpublic/JSON-LD+Web+Vocabulary
5. Reuse of UN/CEFACT standards. PowerPoint Presentation (unece.org)
6. Introducing UN/EDIFACT | UNECE
7. XML Schemas | UNECE
8. LinkedData - W3C Wiki
9. DereferenceURI - W3C Wiki
10. The Digital Economy and Society Index (DESI) | Shaping Europe’s digital future (europa.eu)
11. The Linked Open Data Cloud (lod-cloud.net)
12. JSON-LD 1.1.https://www.w3.org/TR/json-ld/
13. RDF 1.1 Primer. RDF 1.1 Primer. https://www.w3.org/TR/rdf11-primer/
14. RDF 1.2 Schema. RDF 1.2 Schema (w3.org)
15. OWL 2 Web Ontology Language Document Overview (Second Edition). https://www.w3.org/TR/owl2- overview/
16. Shape Expressions (ShEx) 2.1 Primer. https://shex.io/shex-primer/index.html
17. Shapes Constraint Language (SHACL) https://www.w3.org/TR/shacl/
18. SKOS Simple Knowledge Organization System Primer. https://www.w3.org/TR/2009/NOTE-skos-primer-20090818/

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

Project Proposal Files

File	Modified
PNG File alignment of other semantic vocabularies with UN-CEFACT.png	Mar 18, 2024 by Jie WEI
PDF File UNCEFACT Project proposal LD Vocabulary Project jan 2024 V3.pdf	Mar 18, 2024 by Jie WEI
PDF File 240409 - 3x Linked Data Vocab - FR HoD support.pdf	Apr 26, 2024 by Jie WEI
PDF File 240409 - 3x Linked Data Vocab - SE HoD support.pdf	Apr 26, 2024 by Jie WEI
JPEG File 240507 - 3x Linked Data Vocab - SG HoD support.jpg	Apr 29, 2024 by Jie WEI
PDF File 240507 - 3x Linked Data Vocab - BR HoD support.pdf	Apr 29, 2024 by Jie WEI

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