



The Global Language of Business

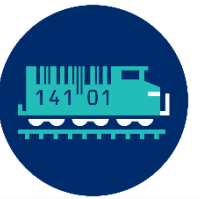
'Perspectives and experiences of GS1 on semantic interoperability

With a focus on the Digital Product Passport

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9th of June 2026



GS1 - A worldwide, international association sans but lucratif (AISBL)



Not-for-Profit

International and locally

Founded by companies to help companies

Solves the neutral actor challenge for its members

150
Countries

7
Billion scanned
barcodes daily

6'500
members in CH

114
Local offices

2,0
Mio. members
globally

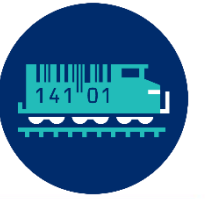
20
Different sectors, from
retail to construction and
rail

 Countries with a GS1 office

 Countries served by the GS1 global office



GS1 standardises in three main dimensions



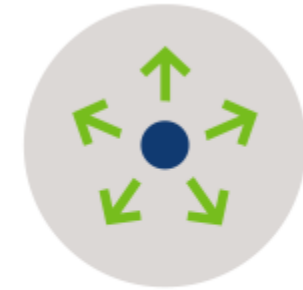
Identify

**Identification keys for
objects, e.g. products,
assets, logistic units**



Capture

Data carrier



Share

Data exchange



**GS1
DISCOVERY
SERVICE**
by GS1 DACH



firstbase
Reliable data powered by GS1 Switzerland.

The Digital Product Passport – a semantic accelerator

Digital container of information
about a **product** and its **manufacturer**

Data points

Technical and environmental data
in a **machine-readable format**



Documents

Link to all documents
required by the regulations



Certificates

Certifications for a specific product
in a machine-readable format

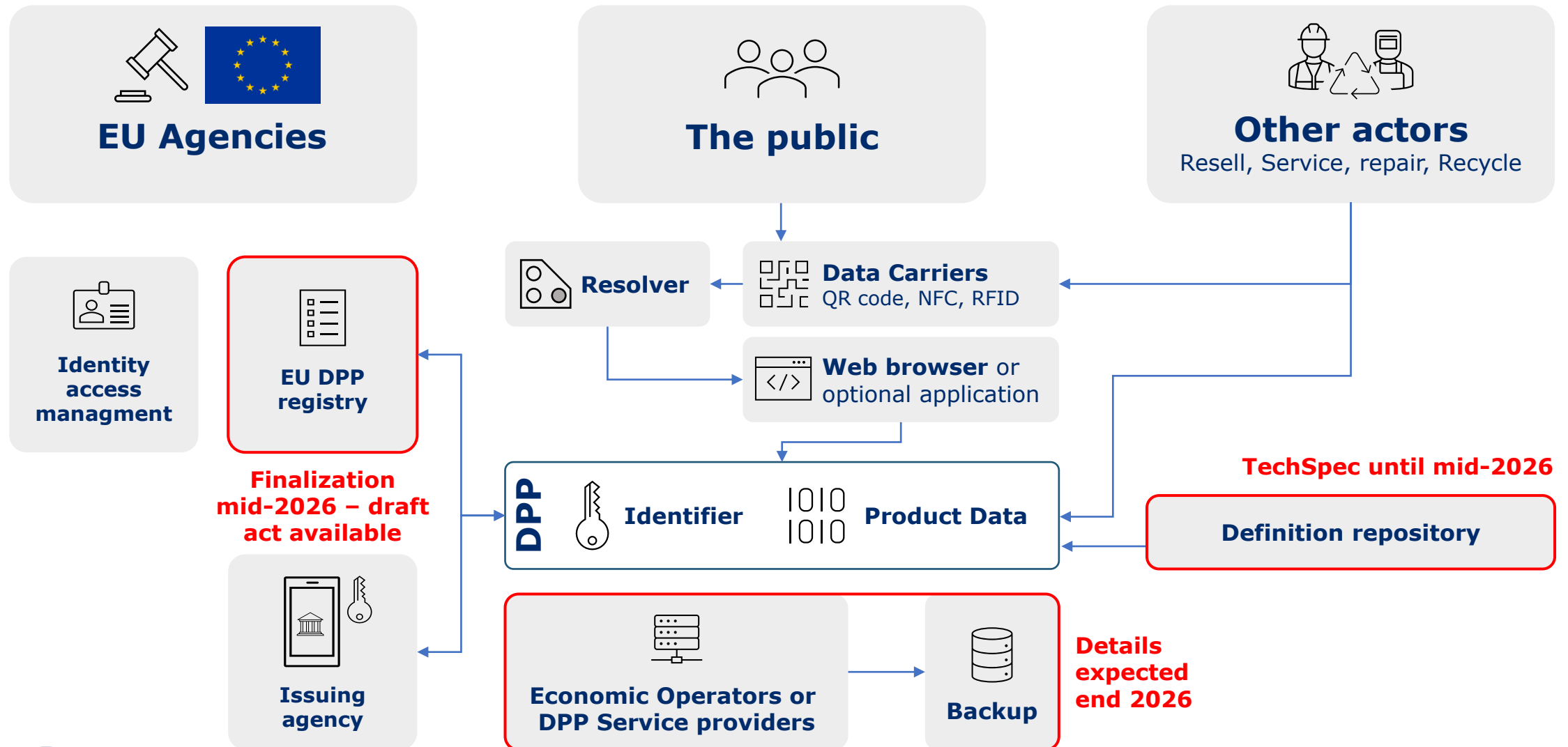


References

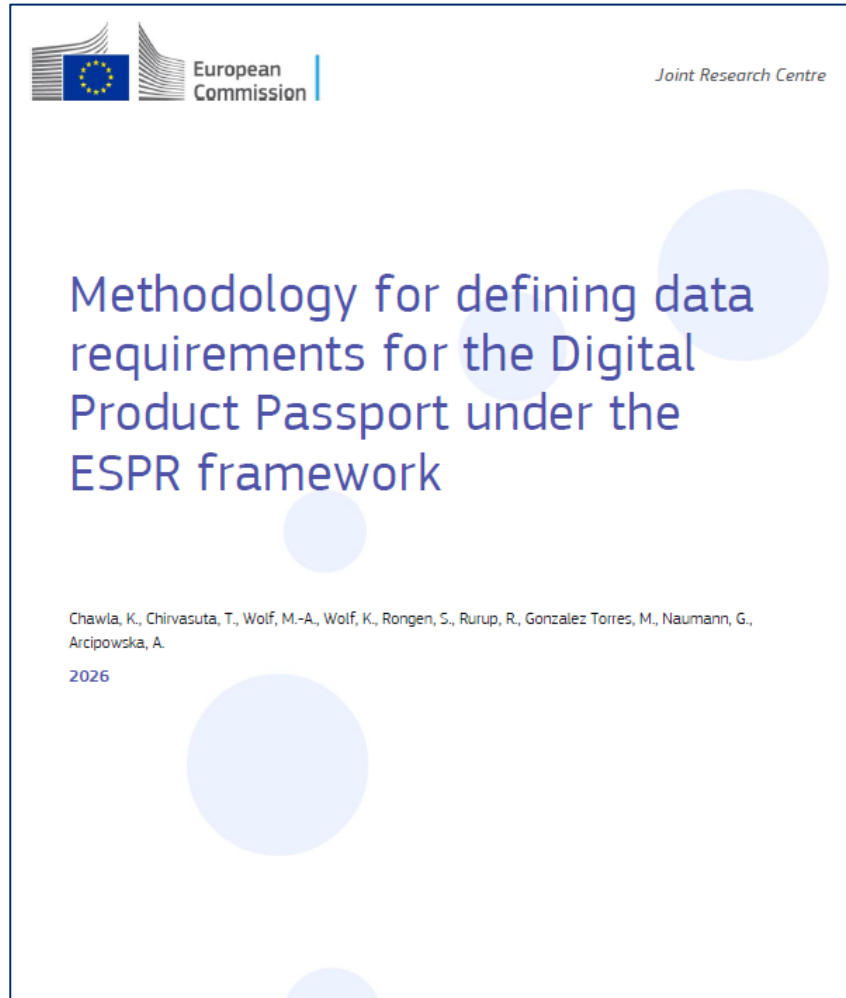
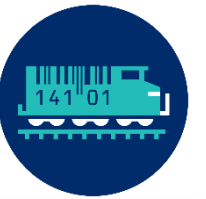
References to **other DPPs** or
open web-vocabularies



Technical Framework of the DPP



EU Methodology for defining data requirements for the DPP

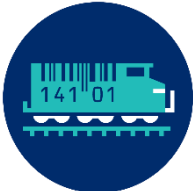


Defines a **preference for open, free-to-use** and **well documented ontologies**, and establishes a subsidiarity principle:

- **Reuse** wherever possible **existing vocabularies**
- Only, **where this is not possible: Adaptation** or **extension** of **existing** vocabularies
- Only, **where this is not possible: Development of new** vocabularies

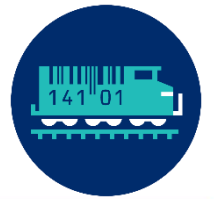
Legal basis lies in Eco-Design for Sustainable Products Regulation (ESPR), article 10 (1)(d)

ESPR 10(1)(d)



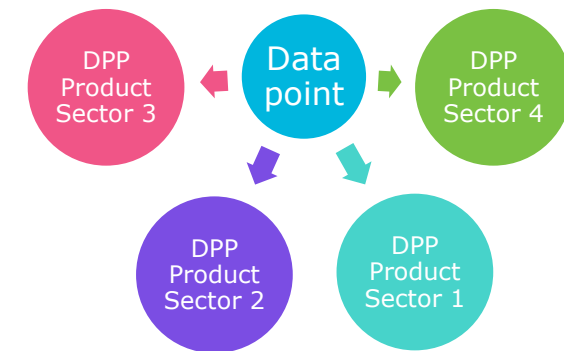
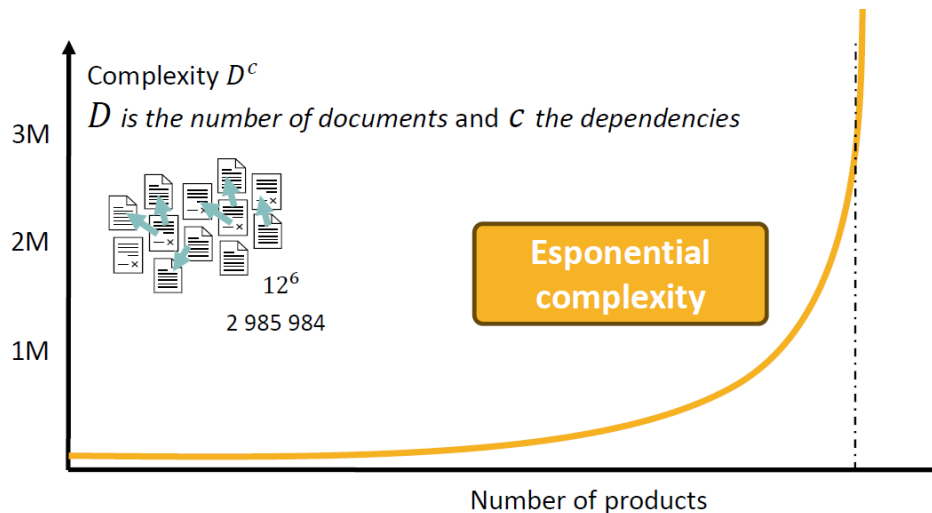
Interoperability and format requirements	
ESPR.10.1.d.	DPP data shall be based on open standards.
ESPR.10.1.d.	DPP data shall use an interoperable format.
ESPR.10.1.d.	DPP data shall be machine-readable as appropriate.
ESPR.10.1.d.	DPP data shall be structured as appropriate.
ESPR.10.1.d.	DPP data shall be searchable as appropriate.
ESPR.10.1.d.	DPP data shall be transferable through an open interoperable data exchange network without vendor lock-in.

Simplicity and modularity are absolute key

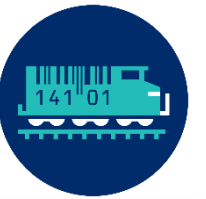


Many manufacturers and thereby **DPP issuers will have to:**

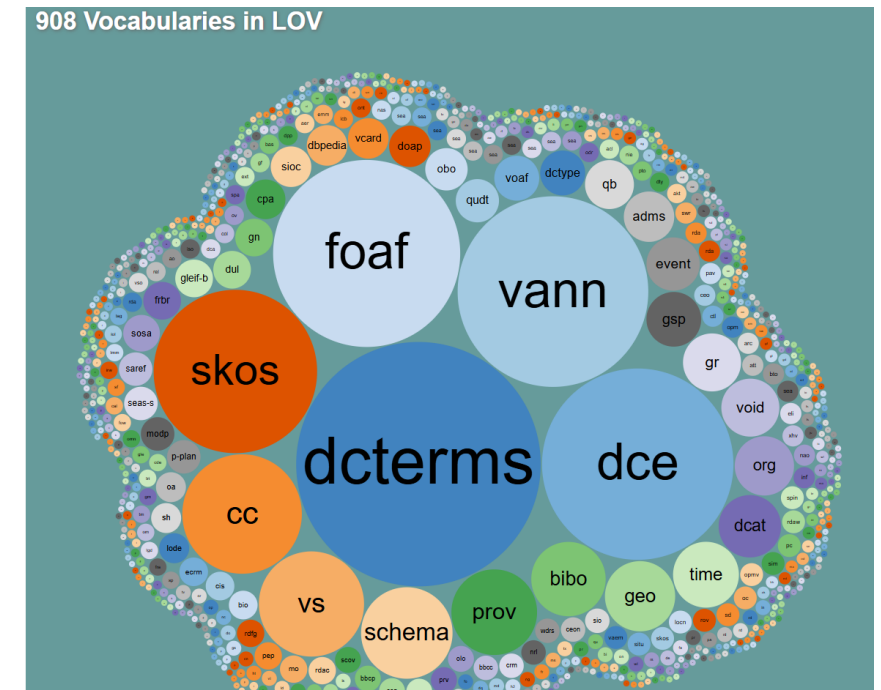
- **Serve manifold product sectors**
- Sectors, with **tendency to create their own vocabulary**
- **Re-usage of data points / vocabularies** is paramount **to avoid exponential effects** with rising number of served product sectors.
- To control rising complexity a **hub-and-spoke linked data** model is the **model choice**

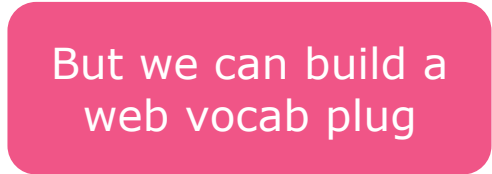
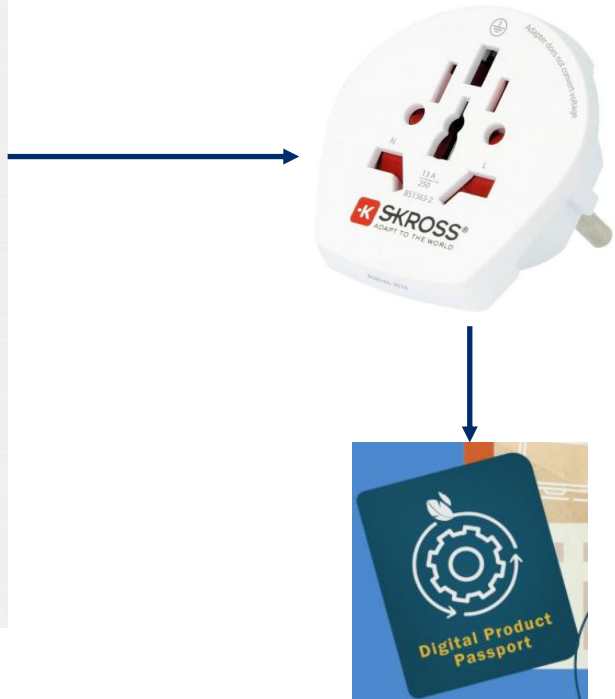
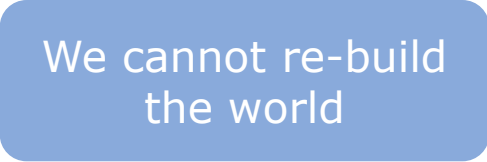


Incompatibility as challenge and opportunity

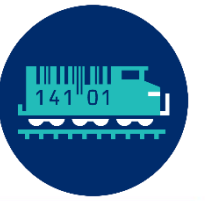


- A **plethora of machine readable vocabularies** already exists.
- Just **one example out of many**:
<https://lov.linkeddata.es/dataset/lov/>
- The challenge is **not insufficient vocabularies**.
- The **solution is neither** to create one «**catch all**» **ontology** nor to **make the vocabularies uniform**.
- Uniformity **stifles innovation**, **slows down** and **creates unnecessary cost**.
- What is required is a «**uniform vocabulary plug**», not uniform vocabularies.





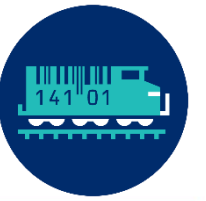
What would a «uniform vocab plug» require



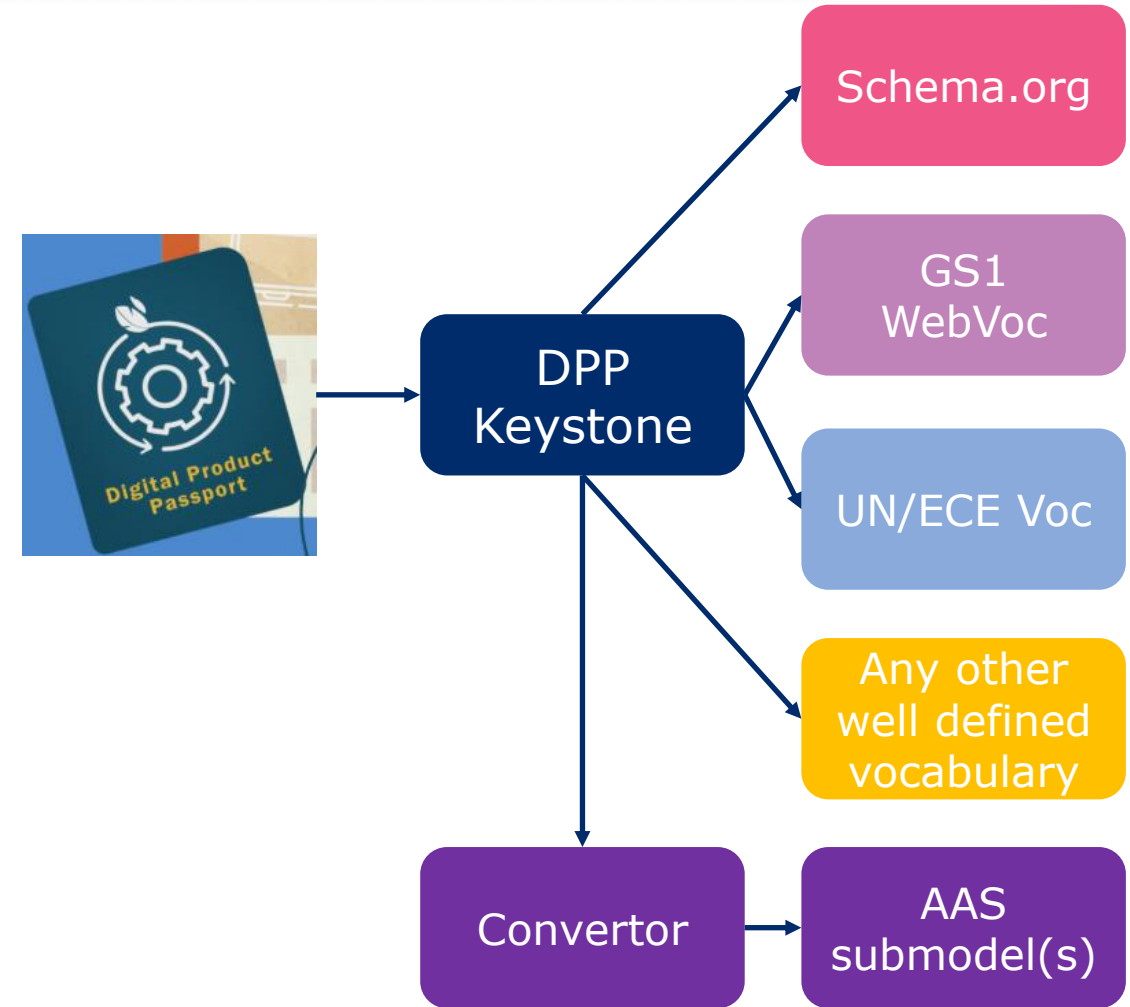
A set of “**sufficiently good**” requirements to be met by vocabularies

- Each **data point reachable and resolvable** by machines
- **Unique global address / identifier** e.g. (<https://www.gs1.org/gs1-web-vocabulary>)
- **Living change log**, versioning and **management**
- **Label/name** (multilanguage, not required to be unique, possibility for synonyms/multiple names)
- **Formal definition** (multilanguage, mandatory, well-formed definition)
- **Descriptions/examples** (multilanguage, recommended/optional)
- **Source/reference** (Reference to standards, documents etc.)
- **Data type**
- **Unit of measurement** (where applicable)
- **Physical quantity and/or dimension** (where applicable)

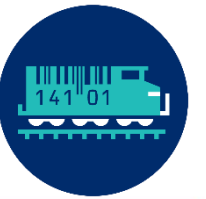
An application example – «DPP Keystone»



- If the above mentioned conditions are met, **numerous initiatives can thrive.**
- **A beautiful example** would be «<https://dpp-keystone.org/>»
- **A pro-bono initiative**, which **builds on existing, open web-vocabularies** (such as schema.org, GS1 WebVocabulary, UN-Definitions, etc.)
- **DPP Keystone** is building a **single place of context resolving** to **ease complexity for DPP developers** without defining new terms.
- **First convertors** also appearing to **translate to specialized industry vocabularies**, such as AAS submodels



«DPP Keystone» at work with a steel part



- The **machine readable JSON-LD** as per EN 18223 has a simple **@context**
- The simple **@context** expands to the Keystone **namespace dppk:**
- Which in turn **creates an equivalency map** to well known ontologies.
- Easy **@context, complexity moved out of the DPP**

▼ 11:

@id:

"dppk:organizationName"

@type:

"owl:DatatypeProperty"

rdfs:label:

"Organization Name"

rdfs:comment:

"The official legal name of the organization."

▶ rdfs:domain:

{ "@id": "dppk:Organization" }

▶ rdfs:range:

{ "@id": "xsd:string" }

▼ owl:equivalentProperty:

▶ 0:

{ "@id": "schema:name" }

▶ 1:

{ "@id": "gs1:organizationName" }

▶ 2:

{ "@id": "unece:name" }

cbamReportId

CBAM-REP-2026Q1-0A1B2C3D

Physical Properties

weight

38.133 kg

▼ https://dpp-keystone.org/spec/v1/terms#manufacturer:

▼ 0:

▶ https://dpp-keystone.org/spec/v1/terms#additionalOrganizationId:

▶ https://dpp-keystone.org/spec/v1/terms#additionalOrganizationIdType:

▶ https://dpp-keystone.org/spec/v1/terms#address:

▶ https://dpp-keystone.org/spec/v1/terms#email:

▶ https://dpp-keystone.org/spec/v1/terms#gln:

▶ https://dpp-keystone.org/spec/v1/terms#organizationName:

▶ https://dpp-keystone.org/spec/v1/terms#telephone:

▶ https://dpp-keystone.org/spec/v1/terms#tradingName:

▶ https://dpp-keystone.org/spec/v1/terms#website:

status

Active

facilityId

https://id.gs1.org/414/7649997749009

lotNumber

3432

▼ @context:

0:

"https://dpp-keystone.org/spec/contexts/v1/dpp-iron-steel.context.jsonld"

1:

"https://dpp-keystone.org/spec/contexts/v1/dpp-general-product.context.jsonld"

digitalProductPassportId:

"https://pepadocs.com/fr/openWindow/Documents/byCode/9b7a71bbe7e65542721b05b817"

uniqueProductIdentifier:

"https://id.gs1.ch/01/07649997749528/10/3432"

Thank you for your attention



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