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Learning Objectives

→ Understand what Core Vocabularies are.
→ Understand how to extend the Core Vocabularies depending on your patterns of information exchange
→ Understand how to use and extend the Core Vocabularies in your own data models.
1. **What?** - Introduction
   - Definition: Core Vocabularies
   - Levels of abstraction: core, domain, information exchange
   - Overview of existing Core Vocabularies
   - Process and methodology for developing Core Vocabularies

2. **Why** use the Core Vocabularies?
   - Attain a minimum level of cross-domain semantic interoperability
   - Patterns of information exchange
   - Contexts of use

3. **How** to use the Core Vocabularies: Linked Data
   - Extending the Core Vocabularies to publish Linked Data
   - Best practices for publishing Linked Data
   - Example: Describe organisations in RDF using standard Vocabularies

4. **How** to create e-Document formats using the Core Vocabularies
   - Guidelines for e-Document engineering using the Core Vocabularies
   - Example: Business Activity Registration
Business need
The need for harmonising data models.

The exchange of information in the context of European Public Services is challenging and comes with many semantic interoperability conflicts.

Such interoperability conflicts are caused by discrepancies in the interpretation of administrative procedures and legislation, the lack of commonly agreed data models, the absence of universal reference data, etc.

Source: eGovernment Core Vocabularies by Vassilios Peristeras, February 2012
Definition
What is a Core Vocabulary?

Simplified, re-usable, and extensible data models that capture the fundamental characteristics of a data entity in a context-neutral fashion.

**Core Vocabulary**

Source: [https://joinup.ec.europa.eu/node/43160](https://joinup.ec.europa.eu/node/43160)
Four Core Vocabularies

- **CORE PERSON VOCABULARY**: Fundamental characteristics of a person.

- **REGISTERED ORGANIZATION VOCABULARY**: Fundamental characteristics of a legal entity, such as legal identifier, name, company type, activities.

- **CORE LOCATION VOCABULARY**: Fundamental characteristics of a location, represented as an address, a geographic name, or a geometry.

- **CORE PUBLIC SERVICE VOCABULARY**: Fundamental characteristics of a public service.
Three representation techniques
The same meaning expressed in UML, RDFS, and XSD.

Conceptual model
Reuse existing concepts in CCL, INSPIRE, etc.

RDF schema
Reuses existing RDF vocabularies

XML schema
Reuses Core Components Technical Specification (CCTS) and UBL NDR

ISA Open Metadata Licence v1.1
Registered Organisations Vocabulary Maintained by W3C (Government Linked Data Working Group)
Developed according to an open and inclusive process

Process for developing Core Vocabularies

1. Identify stakeholders
2. Form Working Group
3. Identify chair/co-chairs
4. Identify editor(s)
5. Form Review Group
6. Secure IPR
7. Establish a working environment and culture
8. Publish drafts
9. Process comments
10. Publish the Latest Call Working Draft of the vocabulary and contact the Review Group, seeking its feedback
11. Review Last Call Working Draft
12. Gather evidence of acceptance by the potential users of the vocabulary
13. The EC to submit documents to the TIE Cluster or ISA Coordination Group

Download the process and methodology for developing Core Vocabularies here:
Developed according to an open and inclusive process
Methodology for developing Core Vocabularies (1)

1. Identify the Core Vocabularies likely to meet the needs of potential users within European institutions
2. Working Group to research existing vocabularies (provenance, usage, stability)
3. Research existing published data and services, avoiding any conflicts with proposed Core Vocabulary
4. Articulate the problem(s) that the WG is trying to solve in the form of a series of use cases
5. Derive a set of requirements from the use cases
6. Publish the use cases and requirements in a single document
7. Create a concept diagram (UML)
8. Do not impose cardinality rules or domain/range restrictions on vocabulary terms unless necessary
9. Use words beginning with an upper or lower case letter or an underscore for all terms in a vocabulary
10. Use simple nouns for property names
11. Use verbs for relationship terms
12. For each relationship, include a definition of its inverse

Download the process and methodology for developing Core Vocabularies here: [https://joinup.ec.europa.eu/node/43160](https://joinup.ec.europa.eu/node/43160)
Developed according to an open and inclusive process

Methodology for developing Core Vocabularies (2)

<table>
<thead>
<tr>
<th>Step</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.</td>
<td>Use <strong>prepositions</strong> in vocabulary terms only if necessary</td>
</tr>
<tr>
<td>14.</td>
<td>Use a namespace ending with a <strong>hash character</strong> (#)</td>
</tr>
<tr>
<td>15.</td>
<td>Keep the namespace as <strong>short</strong> as possible</td>
</tr>
<tr>
<td>16.</td>
<td>Include a portion that identifies the vocabulary for human readers</td>
</tr>
<tr>
<td>17.</td>
<td>Do <strong>not include</strong> any <strong>technology-specific component</strong> in the namespace (except HTTP)</td>
</tr>
<tr>
<td>18.</td>
<td>Do <strong>not restrict</strong> pool of potential users by using a namespace declaring ‘ownership’ or <strong>geographical relevance</strong></td>
</tr>
<tr>
<td>19.</td>
<td>If necessary, consider meeting step 18 using <strong>PURLs</strong></td>
</tr>
<tr>
<td>20.</td>
<td>Create and validate the namespace documents in <strong>HTML, XML and RDF/XML</strong>.</td>
</tr>
<tr>
<td>21.</td>
<td>Either the WG or the EC must make each one available through <code>{namespace}.ext</code></td>
</tr>
<tr>
<td>22.</td>
<td>Either the WG or the EC must set up <strong>content negotiation</strong> to handle requests to the namespace itself</td>
</tr>
<tr>
<td>23.</td>
<td>When publishing the final version of the Core Vocabulary, <strong>link</strong> the HTML document to an <strong>errata</strong> document</td>
</tr>
<tr>
<td>24.</td>
<td>Include a <strong>Conformance Statement</strong></td>
</tr>
</tbody>
</table>

Download the process and methodology for developing Core Vocabularies here: [https://joinup.ec.europa.eu/node/43160](https://joinup.ec.europa.eu/node/43160)
Reuse by extension
Extend the Core Vocabularies into domain models and information exchange models

- **Core model**: a context-neutral data model that captures the fundamental characteristics of an entity.
- **Domain model**: a conceptual view of a domain that identifies the entities involved and their relationships
- **Information exchange model**: a model that defines and describes the structure and content of a specific information exchange context.
Reuse by extension
Extend the Core Vocabularies into domain models and specifications for information exchange

Domain model: Procurement
Information exchange model: Tender

Domain model: Health
Information exchange model: Patient Summary

Domain model: Customs
Information exchange model: Freight Document

Domain model: Tax
Information exchange model: Tax Declaration
Reuse by extension

Extend the Core Vocabularies into domain models and specifications for information exchange
Outline

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   - Attain a minimum level of cross-domain semantic interoperability
   - Patterns of information exchange
   - Contexts of use

3. **How** to use the Core Vocabularies: Linked Data
   - Extending the Core Vocabularies to publish Linked Data
   - Best practices for publishing Linked Data
   - Example: Describe organisations in RDF using standard Vocabularies

4. **How** to create e-Document formats using the Core Vocabularies
   - Guidelines for e-Document engineering using the Core Vocabularies
   - Example: Business Activity Registration
Why use the Core Vocabularies?
To attain a minimum level of cross-domain semantic interoperability

• The compliance of characteristics to Core Vocabulary specifications guarantees a minimum of cross-domain interoperability, while providing domain-specific communities

• Core Vocabularies offer freedom and a common starting point for drafting specializations of one’s own by adding metadata to the Core

• Increase the possibilities for reuse

• Avoid schema-level conflicts, which are caused by a different logical structure or inconsistencies in metadata

Source: eGovernment Core Vocabularies by Vassilios Peristeras, February 2012
Why use the Core Vocabularies?
To avoid schema-level conflicts

Examples of schema-level conflicts:

<table>
<thead>
<tr>
<th>Naming</th>
<th>Entity identifier</th>
<th>Schema isomorphism</th>
<th>Generalization</th>
<th>Aggregation</th>
<th>Schematic discrepancies</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Citizen information is verified against the wrong source*</td>
<td>• Citizens identified by ID card number or national number or none?</td>
<td>• Different attributes on ID cards in different states</td>
<td>• Birth certificate of one state can contain all info of birth and family certificates of another state</td>
<td>• “full name” or “surname”; “middle name”; “first name”</td>
<td>• Detailed Information cannot be exchanged due to schematic differences (ex. different xml schemas)</td>
</tr>
</tbody>
</table>

* Naming conflicts: evidence placeholders with the same name but different purpose and usage may exist in different Member States, or evidence placeholders with different names may have similar usage and hold similar evidence items.

More on semantic conflicts: V. Peristeras - [A conceptual analysis of semantic conflicts in pan-European e-government services](#)
Contexts in which the Core Vocabularies can be used

- **Development of new systems**: the Core Vocabularies can be used as a default starting point for designing the conceptual and logical data models in newly developed information systems.

- **Information exchange between systems**: the Core Vocabularies can become the basis of a context specific data model used to exchange data among existing information systems.

- **Data integration**: the Core Vocabularies can be used to integrate data that comes from disparate data sources and create a data mesh-up.

- **Open data publishing**: the Core Vocabularies can be used as the foundation of a common export format for data in base registries like cadastres, business registers and service portals.
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What is linked data?

Linked data is a set of design principles for sharing machine-readable data on the Web

The **four design principles** of Linked Data *(by Tim Berners Lee)*:

1. Use Uniform Resource Identifiers (URIs) as names for things.
2. Use HTTP URIs so that people can look up those names.
3. When someone looks up a URI, provide useful information, using the standards (RDF, SPARQL).
4. Include links to other URIs so that they can discover more things.
Linked Data: Best Practices

Use and extend the Core Vocabularies to publish Linked Data

1. Prepare stakeholders
2. Select a dataset
3. Model the data
4. Specify an appropriate licence
5. Good URIs for Linked Data
6. Use standard vocabularies
7. Convert data
8. Provide machine access to data
9. Announce new datasets
10. Recognize the social contract

Source: [http://www.w3.org/TR/ld-bp/](http://www.w3.org/TR/ld-bp/)
The Core Vocabularies abide by the Linked Data principles

• ISA’s Core Person, Core Location and Core Business Vocabularies have been taken as inputs by the Government Linked Data Working Group (GLD WG) of W3C.

• Core Vocabularies:
  o promote the use of common identifiers for organisations, people and locations in the form of URIs.
  o can be easily combined with other Linked Data vocabularies.
  o can easily be extended with new classes and attributes to fulfil new domain requirements.
Example: Describe organisations in RDF using standard Vocabularies

- Organisations can be described in RDF using a combination of the **Registered Organization Vocabulary** and the more general **Organization Ontology**.
  - Registered Organization Vocabulary: simplified, reusable and extensible data model; describes *organisations* that have gained legal entity status through a formal registration process (Registered Organizations - RegORG)
  - Organization Ontology (ORG): describes the several *parts* of an organisation.

- **Case example**: PricewaterhouseCoopers Enterprise Advisory is a registered legal entity in the Belgian company register.

Source: [https://joinup.ec.europa.eu/node/52998/](https://joinup.ec.europa.eu/node/52998/)
Example: Describe organisations in RDF using standard Vocabularies

Registered Organization Vocabulary

- Describe essential elements of a registered organisation
- Data fields in official extracts of business registers
  - the legal name of the organisation
  - the registered number of the organisation
  - the legal address of the organisation
  - the activities for which the organisation is registered for
  - the type of organisation
- Each organisation is identified by a unique URI

Source: https://joinup.ec.europa.eu/node/52998/
Example: Describe organisations in RDF using standard Vocabularies

Registered Organization Vocabulary: PricewaterhouseCoopers Enterprise Advisory

• Legal name
  <rov:Registeredorganisation rdf:about="http://kbopub.economie.fgov.be/kbopub/toonondernemingps.html?onderneming#xD;&xA;gsnummer=415622333">  
  <rov:legalName>PricewaterhouseCoopers Enterprise Advisory</rov:legalName>
  </rov:Registeredorganisation>

• Registered number
  <rov:registration rdf:about="http://example.com/Reg415622333">  
  <skos:notation>0415.622.333</skos:notation>  
  <adms:schemeAgency>Belgian Base Register for Companies</adms:schemeAgency>
  </rov:registration>

• Type
  <rov:companyType>  
  <skos:Concept rdf:about="http://example.com/Cooperatievennootschap">  
  <rdfs:label>Cooperatieve vennootschap</rdfs:label>
  </skos:Concept>
  </rov:companyType>

• Legal address
  <rov:registeredAddress>  
  <locn:Address rdf:about="http://example.com/ra415622333">  
  <locn:fullAddress>Belgium, Woluwedal 18</locn:fullAddress>
  </locn:Address>
  </rov:registeredAddress>

• Activities for which the company is registered for
  <skos:Concept rdf:about="http://example.com/ca7022">  
  <rdfs:label>Business and other management consultancy activities</rdfs:label>
  </skos:Concept>
  <skos:Concept rdf:about="http://example.com/ca74142">  
  <rdfs:label>Other business and management consultancy activities</rdfs:label>
  </skos:Concept>

Source: https://joinup.ec.europa.eu/node/52998/
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   - Guidelines for e-Document engineering using the Core Vocabularies
   - Example: Business Activity Registration
e-Document formats
Extending the Core Vocabularies

Definitions:
• e-Document: any document in electronic format containing structured data (and possibly also unstructured data) used in the context of an administrative process.
• e-Document format: is a specification that lays down the syntax (structure) and semantics of a particular type of e-Document.

⇒ The Core Vocabularies can be used as a starting point to define e-Document formats
Example: Business activity registration

Use the Core Vocabularies (i.e. Registered Organization Vocabulary) as a starting point for the e-Document ‘Business Activity Registration Request’
Methodology for e-Document engineering

- **Context & Requirements**
  1. Requirement Gathering

- **Semantics**
  2. Information modelling

- **Behaviour**
  3. Business rules definition

- **Syntax**
  4. Syntax binding
  5. Schema production

The decision to use (and extend) the Core Vocabularies is taken in these steps.

D1.2 - Guidelines on e-Document engineering for public administrations
The first step is to precisely define the objective of the business process.

- **Goals**: describe specific goals to be achieved with the exchange of e-Documents

- **Scope**: describe the scope derived from the goals

- **Key examples**: describe key examples as real-life scenarios to depict the business process flow

- **Specific requirements**: gather specific requirements that e-Documents must fulfil linked to the goals
1. Requirement gathering
Example: business activity registration

• Goals

<table>
<thead>
<tr>
<th>Goal ID</th>
<th>Goal Name</th>
<th>Goal Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>Improve Business Process Performance</td>
<td>To simplify the business activity registration procedure both for the businesses and competent authorities</td>
</tr>
<tr>
<td>G2</td>
<td>Improve Management Efficacy</td>
<td>To harmonize the business activity registration both at European level and at national level.</td>
</tr>
<tr>
<td>G3</td>
<td>Decrease Costs and save time</td>
<td>To enable competent authorities to check for validity and suitability of the information and supporting documents submitted by the businesses.</td>
</tr>
<tr>
<td>G4</td>
<td>Improve Security</td>
<td>To increase the security and reliability of the business activity registration transactions</td>
</tr>
</tbody>
</table>
1. Requirement gathering
Example: business activity registration

• Scope

**Scope statement**

A user accesses a website to get information on the documents that have to be presented in a destination country (being a foreign country or their own) in order to register a business activity. The website system provides the user with information on the documents he has to upload in order to be able to submit the business activity registration request to the destination country. It is outside of the scope the process by which the website system describes the documents to be submitted.

The website collects the electronic unstructured documents and metadata from the business.

The website creates the e-Document with the metadata about the user, the business, the activity and the documents uploaded by the user.

The website submits the e-Document instance to the destination country Point of Single Contact. The Point of Single Contact in the destination country acknowledges the business activity registration request and forwards it to the proper authority for license issuance.
1. Requirement gathering
Example: business activity registration

- Key example

<table>
<thead>
<tr>
<th>Key Example Identifier</th>
<th>Key Example Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KE1</td>
<td>A French business person browses the French PSC looking for registration his business activity in Germany.</td>
</tr>
<tr>
<td></td>
<td>The PSC website offers a page with the possible countries and activities per country he can register.</td>
</tr>
<tr>
<td></td>
<td>The French business person picks up on obtaining a license for opening a store in Germany.</td>
</tr>
<tr>
<td></td>
<td>The PSC website provides detailed information on the documents needed to obtain this license through a form.</td>
</tr>
<tr>
<td></td>
<td>The French business person uses the form to upload the requested documents.</td>
</tr>
<tr>
<td></td>
<td>The PSC website requests the French business person to log in or register in order to get information about his business.</td>
</tr>
<tr>
<td></td>
<td>The PSC website packs all documents and submits that to the German PSC</td>
</tr>
<tr>
<td></td>
<td>The PSC website sends back to the French business person the acknowledgement of reception from the German PSC</td>
</tr>
</tbody>
</table>
## 1. Requirement gathering

Example: business activity registration

- High level requirements

<table>
<thead>
<tr>
<th>Requirement identifier</th>
<th>Requirement name</th>
<th>Requirement statement</th>
<th>Rationale</th>
<th>Reference to goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>Business information</td>
<td>The business requesting the registration of the activity has to be identified</td>
<td>The receiving PSC needs to know the business requesting the business registration activity to be able to understand which are the documents he has to receive.</td>
<td>G1, G4</td>
</tr>
<tr>
<td>R2</td>
<td>Requestor</td>
<td>The person requesting the service on behalf of the business has to be identified</td>
<td>The receiving PSC has to ensure the requestor is capable of requesting the service on behalf of the business.</td>
<td>G4</td>
</tr>
<tr>
<td>R3</td>
<td>Business activity</td>
<td>The business activity to be registered has to be identified</td>
<td>The receiving PSC has to know for which business activity the requester is registering for.</td>
<td>G1, G2</td>
</tr>
<tr>
<td>R4</td>
<td>Documents</td>
<td>The provided documents have to be identified and their purpose has to be described</td>
<td>The receiving PSC has to be able to identify unstructured documents to automate the</td>
<td>G1, G2, G3</td>
</tr>
<tr>
<td>R5</td>
<td>Identification</td>
<td>The business request has to be identified</td>
<td>The business request has to be uniquely identifiable, with information about its issuance.</td>
<td>G1, G2, G3</td>
</tr>
</tbody>
</table>
2. Information modelling

This phase identifies and describes the information to be exchanged in e-Documents according to the requirements specified in the first step.

- Capture business terms in an information model describing the explicit semantics of every data element: attributes and cardinalities
- Describe the relationships between information components and requirements
- Depict information model requirements using a conceptual modelling language (ISO11179 MDR)
- Identify and reuse semantics and concepts from standard vocabularies where possible
## 2. Information modelling

### Example: business activity registration

<table>
<thead>
<tr>
<th>Information Requirement Identifier</th>
<th>Business Term Name</th>
<th>Usage</th>
<th>Reference to</th>
<th>Cardinality</th>
<th>Concept description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IR4</td>
<td>Business activity</td>
<td>Activity performed by the legal entity, which is requested for registration</td>
<td>Business Requirement Identifier</td>
<td>R3</td>
<td>1..1 Registered Organization Vocabulary. The activity of an organisation should be recorded using a controlled vocabulary. Several vocabularies exist, many of which map to the UN's ISIC codes. The preferred choice for European interoperability is NACE.</td>
</tr>
<tr>
<td>IR5</td>
<td>Business name</td>
<td>Name of the legal entity that is requesting the business activity registration</td>
<td>Business Rule Identifier</td>
<td>R1</td>
<td>1..1 Registered organisation Vocabulary. The legal name of the business. A business might have more than one legal name, particularly in countries with more than one official language.</td>
</tr>
<tr>
<td>IR6</td>
<td>Business legal form</td>
<td>Type of the legal entity that is requesting the business activity registration</td>
<td></td>
<td>R1</td>
<td>1..1 Registered Organization Vocabulary. This property records the type of company. Familiar types are SA, PLC, LLC, GmbH etc. At the time of publication, there is no agreed set of company types that crosses borders. Each jurisdiction needs a limited set of recognized company types and these should be expressed in a consistent manner.</td>
</tr>
</tbody>
</table>
3. Business rules definition

In the previous step (information modelling) the business terms and facts were described. However, there are still action **assertions**, **constraints** and **derivations** concerning some aspects of the e-Document. These business rules are described according to the goals and requirements of the first step.

- Identify integrity constraints on the information model and describe them as business rules
- Define inferences and mathematical calculations that the e-Document elements must fulfil
- Define conditional business rules and co-occurrence constraints that e-Document elements must fulfil
- Define sets of allowed values for coded data elements
3. Business rules definition

Example: business activity registration

<table>
<thead>
<tr>
<th>Business Rule ID</th>
<th>Rule</th>
<th>Refer to Information Requirements</th>
<th>Refer to High Level Requirements</th>
<th>Error level</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR1</td>
<td>The business activity must refer to a NACE activity</td>
<td>IR4</td>
<td>R3</td>
<td>Fatal</td>
</tr>
<tr>
<td>BR2</td>
<td>The legal form of the business must be recognized by the business' country of origin</td>
<td>IR7</td>
<td>R1</td>
<td>Fatal</td>
</tr>
</tbody>
</table>
4. Syntax binding (reuse)

Syntax binding is one of the options to produce physical artefacts in order to help developers implement the e-Documents according to the e-Document format rules. With syntax binding, the information requirement model is mapped to an existing syntax model and the usage guidelines are specified.

- Map the information model to a standard syntax when this syntax fulfils most of the goals and requirements of the project
- Create a usage guideline on the syntax for implementers
- Create validation artefacts for business rules and code lists
- List minor gaps and/or requirements that cannot be fulfilled using the selected syntax
5. Schema production (partial reuse)

The second option is to **produce** a **new** e-Document format. This option should be followed when there are no recognized international standards for the industry and business process the project is targeting.

- Map common information model components to available Common Vocabulary schemas (e.g. ISA Core Vocabularies, UBL common library, UN/CEFACT Core Components Library)
- Create new e-Document formats using a standard NDR to automate the schema production
- Create validation artefacts for business rules and code lists
5. Schema production (partial reuse)

Example: business activity registration

XSD Schema: BusinessActivityRegistrationRequest.xsd

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!--
Library:           Business Activity Registration Request document demonstration
Module:           xsd/mydoc/BusinessActivityRegistrationRequest.xsd
Generated on:     2014-03-06 16:31z
-->
<xsd:schema xmlns="urn:X-MyCompany:xsd:MyBusinessActivityRegistrationRequest"
xmlns:mya="urn:X-MyCompany:xsd:MyRARequestResponse:AggregateComponents"
xmlns:myb="urn:X-MyCompany:xsd:MyRARequestResponse:BasicComponents"

xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:ccts="urn:un:unece:uncefact:documentation:2"
tARGETNAMESPACE="urn:X-MyCompany:xsd:MyBusinessActivityRegistrationRequest"
elementFormDefault="qualified"
attributeFormDefault="unqualified"
version="1">
<!-- ===== Imports ===== -->
schemaLocation="MyRARequestResponseAggregateComponents.xsd"/>
<xsd:import namespace="urn:X-MyCompany:xsd:MyRARequestResponse:BasicComponents"
schemaLocation="MyRARequestResponseBasicComponents.xsd"/>
</xsd:schema>
```
## e-Document engineering

### Tools

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<tr>
<th>Tool</th>
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</tbody>
</table>
Illustration: Business Activity Request XML Schema

- CoreVocabularyBasicComponents.xsd
  (namespace prefix: cvc)
  <xsd:element type="LegalNameType" name="LegalName"/>
  <xsd:complexType name="LegalNameType">
    <xsd:simpleContent>
      <xsd:extension base="udt:TextType"/>
    </xsd:simpleContent>
  </xsd:complexType>

- BusinessActivityRegistrationRequest.xsd
  <xsd:element name="BusinessActivityRegistrationRequest" type="BusinessActivityRegistrationRequestType"/>
  <xsd:complexType name="BusinessActivityRegistrationRequestType">
    <xsd:sequence>
      ...<xsd:element maxOccurs="1" minOccurs="1" ref="cva:Cvbusiness"/>
      ...
    </xsd:sequence>
  </xsd:complexType>

- CoreVocabularyAggregateComponents.xsd
  (namespace prefix: cva)
  <xsd:element name="Cvbusiness" type="CvbusinessType"/>
  <xsd:complexType name="CvbusinessType">
    <xsd:sequence>
      ...<xsd:element maxOccurs="unbounded" minOccurs="0" ref="cvc:LegalName"/>
      ...
    </xsd:sequence>
  </xsd:complexType>

The global elements cvc:LegalName and cva:Cvbusiness can be reused in any schema.
References


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Best Practices for Publishing Linked Data, W3C, 2014

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