*Semantic Interoperability Centre Europe*

# *Conformance Guidelines –*

# *The Path to a pan-European Asset*

*final draft*

***By example of the natural person***

# About SEMIC.EU

The Semantic Interoperability Centre Europe (SEMIC.EU) is a service provided by the European Commission. It was initiated in the framework of the programme 'Interoperable Delivery of European eGovernment Services to public Administrations, Businesses and Citizens' (IDABC).

Following the principle of harmonisation over standardisation, SEMIC.EU promotes the reuse of so-called “interoperability assets”, data exchange specifications enabling semantically unambiguous exchange of information - semantic interoperability. They are quality checked and shared with the community via a web repository. Assets are taken through a collaborative clearing process so they can be reused by other projects and organisations. The term "interoperability asset" describes a resource that supports the exchange of data in distributed information systems.

# Version History

| Date | Name, Organisation | Changes |
|---|---|---|
| **2010-05-25** | SEMIC.EU team | Initial draft |
| **2010-06-17** | SEMIC.EU team. Co-Authors | Comments, Modifications to the text; for details see the change history document. |
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# 1 Introduction and Overview

## 1.1 Audience for the SEMIC.EU Core Person

These guidelines are addressed at those projects and people working on data exchange on a pan-European level. Especially eGovernment from local administrations can benefit from using SEMIC.EU Core Concepts. In addition to this audience there are really a big number of eGovernment applications, reporting systems and implementations of European Directives that are driven by the Directorates-General of the European Commission itself.

SEMIC.EU Core Person must be seen as a first milestone on the way of setting up other Core Concepts and modules of a global European exchange format. The second milestone of course is the proof of concept, the enabling of free data exchange, and semantic interoperability throughout Europe. Therefore we expect more than 150 implementations and through this create 150 opportunities to exchange data between different eGovernment applications in Europe.

This document is dedicated especially to people who get inspired by the SEMIC.EU way of shared development and pan-European collaboration, willing to contribute with experiences, ideas, practical implementations, and mappings to improve the current version of the SEMIC.EU Core Person and to initiate further developments and Core Concepts.

## 1.2 Benefits to stakeholders from “Core Person”

Just answering the easy question: Does the implementation of the SEMIC.EU Core Person assure semantic interoperability? We have to answer: no. Using Core Concepts like the European concept of a person must be seen as a first building block to achieve interoperability and free data exchange in Europe. Stakeholders with a European focus on data exchange, initiatives and projects will find mappings and tailored implementations from other Member States initiatives or practical implementations of other domains. The availability of practical knowledge, of further implementations, and specified mappings between the SEMIC.EU Core Concept of person and its proven translations to other European languages, legal contexts and specific domains must be seen as the real genesis of benefit and the step forward in achieving interoperability throughout Europe.

# 2 Shared development

The motivation behind the shared development is that SEMIC.EU realised, that there needs to be a "European motor" which facilitates pan-European collaboration. Currently, there are many assets in the SEMIC.EU repository which are modelled from a national point of view and fulfilling national requirements towards the data model. SEMIC.EU coordinates a shared development process involving relevant stakeholders from the European member states to collect and satisfy their requirements. It is the aim of SEMIC.EU to provide guidelines and assets (in form of the SEMIC.EU Core Concepts) which foster the creation of pan-European (i.e. conformant) assets.

## 2.1 SEMIC.EU Core Concepts

The SEMIC.EU Core Concepts build the foundation of harmonised data exchange in Europe. Each SEMIC.EU Core Concept represents a domain and the attributes necessary to model resources in this domain. A Core Concept defines the semantics and naming of the attributes and gives preliminary restrictions on multiplicity and data type classes to improve interoperability without limiting reuse.

The guidelines on SEMIC.EU Core Concepts are subject of a separate document to be written.

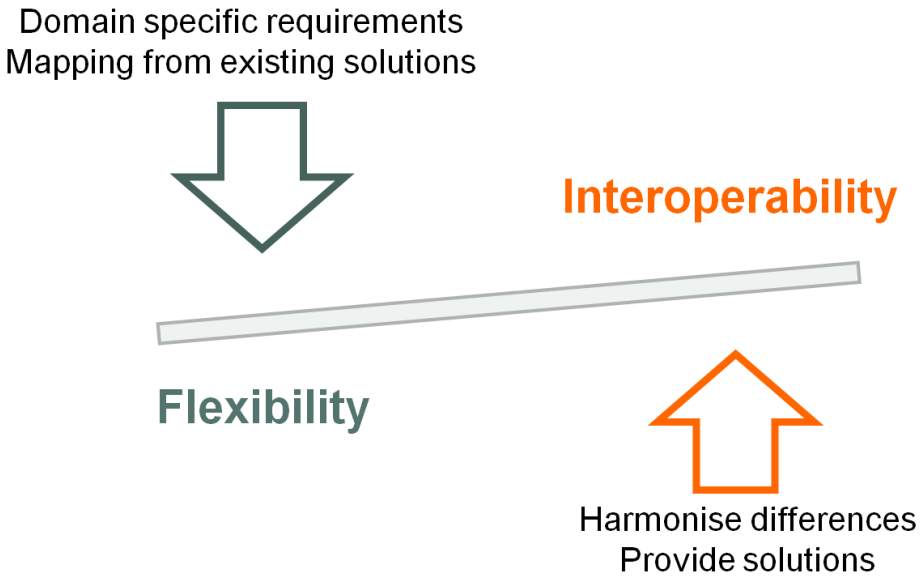


Figure 1 - Struggle between enabling interoperability and giving flexibility

Figure 1 shows that when defining a data exchange specification with a broad, almost universal audience the balance between the two extreme positions "Flexibility" and "Interoperability" has to be well defined. On the one hand harmonisation and standardisation of data can enable interoperability to a large extent. On the other hand being too restrictive may lead to an elaborated data model with an "academic semantic interoperability" that no real use case is able to implement. The authors decided to

set the balance between “Interoperability due to Standardisation” and “serviceability and acceptance thanks to certain liberty in implementing” as follows:

### 2.1.1 Scope of the normative part of the Core Concept specifications

a. Name of the elements

b. Semantic meaning

c. Multiplicity in general (Cardinalities None, One, More)

d. Suggestions for abstract data types (String, Number, Date)

### 2.1.2 Explicitly not scope of the normative part of the Core Concept specifications

a. Multilingualism (mapping to non-English names, non-English semantic statements)

b. Exact multiplicities depend on the implementing business case

c. Explicit choices to take for implementation languages (RDF vs. XSD / XSLT, RIF, other)

- Naming and Design rules (upper or lower camel case, filenames, versioning of schema, etc.) highly depend on the implementation language
- Specific data types of implementation (e.g. xs:string, xs:Datetime)

d. Business specific attributes (e.g. marital status, car license plate)

Additionally to the more generic concepts, there are business cases which address business needs using specific business attributes. From a person’s point of view, as illustrated in Figure 2, there are e.g. the concepts Person, Address, PersonID, and biometric features. The business case “voters register” uses attributes from the PersonID - an ID representing the voter, an address which specifies the voting district of the voter and attributes to identify the voter - e.g. Full Name, Gender, Date of Birth, and Citizenship.

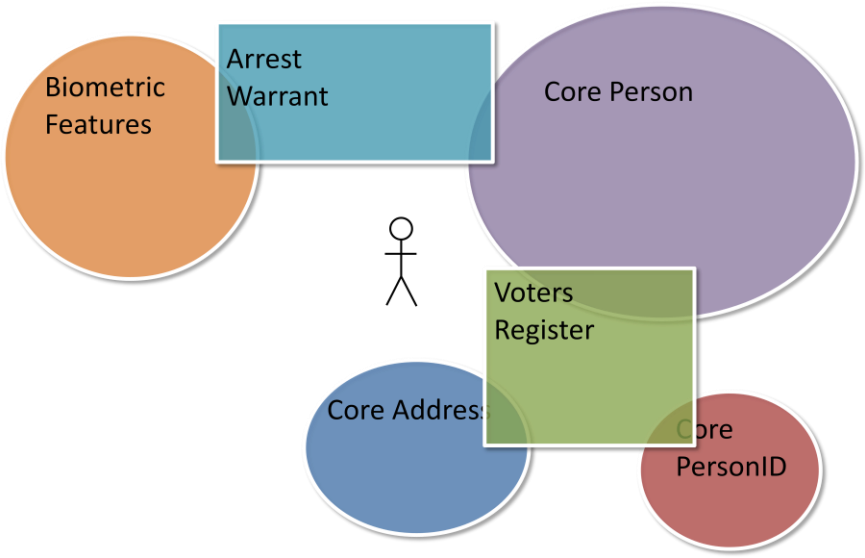


Figure 2 - Relation between concepts (circles) and business cases (rectangles)

### 2.1.3 Approach

The SEMIC.EU shared development process is a collaborative process. The quality of the deliverables of this process is ensured by the SEMIC.EU Clearing process. For a detailed explanation of the Clearing process (see (1)).

When the work on the draft version of a conformant asset is finished, the asset enters the registration status of the Clearing Process:

**First Stage: Registration**

The registration stage provides asset owners with the opportunity to participate and cooperate even at an early stage of development. Interoperability assets can be registered on the platform with only a minimal set of mandatory metadata that has to be provided.

**Second Stage: Maturity**

The goal of the maturity stage is to attest the improving quality of an asset, thereby indicating the fulfilment of dedicated quality criteria. As the development proceeds, the maturity of an asset concerning its quality and suitability for reuse in other projects should increase. Certain quality criteria are assessed and documented in an Asset Assessment Report. The branding of the asset as mature indicates the fulfilment of dedicated quality criteria.

**Third Stage: Conformance**

The goal of the Conformance stage is awarding a conformance statement and thereby recommending the asset for reuse due to its excellent quality. Mature assets, which have been finalised in development, can achieve an outstanding level of quality which is indicated by awarding a conformance statement approving the quality goals of SEMIC.EU (2) and passing a detailed review of the asset by domain experts.

An asset accepted as conform by the clearing process manager and the conformance committee – a group of domain experts – has reached the highest possible quality state, i.e. one of its releases was accepted as conformant. From a clearing process perspective, the development of an asset ends here.

For further information on the SEMIC.EU Clearing Process consult the “Vision of the Clearing Process”(1).

## 2.2 “SEMIC.EU Core Person”

The aim of this paper is to provide guidelines on how to create a conform asset based on re-using SEMIC.EU Core Concepts. The SEMIC.EU Core Person is the first implementation of a SEMIC.EU Core Concept dealing with the domain of personal data.

Personal data is a set of data used in virtually all contexts of eGovernment and public administration. SEMIC.EU chose the “natural person” because it is a very intuitive concept and multiple national assets are available in the SEMIC.EU repository, which are all modelling a person. The UN/CEFACT Core Components Library(3) alone contains 91 attributes of a person.

During the creation of a model for a person the authors realised there is actually no “Person” use case per se. That means, in each of the currently available assets modelling a natural person, the assets are in reality modelling a role that a natural person is acting out in the context of the data exchange. The focus lies on the personal details of a “natural person”. Such a natural person characterised by its biological and behavioural (biometric) traits may have one or more personalities depending on the context. These personalities described by attributes that are available and processed in administrative contexts are the focus of the SEMIC.EU Core Person. As a consequence physical features which might also identify a person (eye colour, fingerprints, DNA profile, etc.) are deliberately left out of the Core Person model. They can, however, be added in use-case specific implementations of the Core Concept or might be subject of a separate Core Concept.

This core set of attributes known as "SEMIC.EU Core Person" is abstracted so it can be utilised in a broad set of use cases. Once the purpose and use case are determined, additional specific information bearing attributes may be defined and added to create a pan-European schema for a specific use case.

# 3 SEMIC.EU Core Person Specification

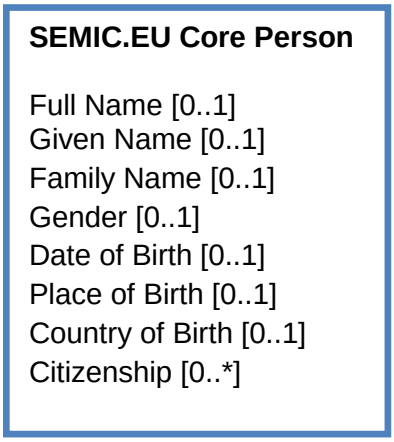


Figure 3 - UML Class diagram of the SEMIC.EU Core Person

As indicated in Figure 3, the attributes chosen for SEMIC.EU Core Person are shown in the following section.

## 3.1 Full Name

| Attribute | Abstract Data Type | Multiplicity |
|---|---|---|
| Full Name | Text | [0..1] |

### 3.1.1 Semantic Statement

The attribute "Full Name" contains the complete name of a person as one string. In addition to the content of Given Name and Family Name, this can carry additional parts of a person's name as titles, middle name or suffixes like "the third" or names which are neither a given nor a family name.

### 3.1.2 Reasoning:

A name sticks with a person for a long time period. In most European countries[1] a name may only be changed according to certain laws and life events, e.g. marriage. The name denominates a natural person even if it changes its address. Documents like birth certificate or diploma usually don't carry an address but always the name. Thus the name is one of the core attributes. However it is not sufficient to identify a person since there are combinations of very common names like Smith in the UK, Meier in Germany, or Li in China.

[1] In the UK anybody can change their name at will without seeking permission or notifying the authorities.

## 3.2 Given Name

| Attribute | Abstract Data Type | Multiplicity |
|---|---|---|
| Given Name | Text | [0..1] |

### 3.2.1 Semantic Statement:

A given name is a denominator given to a person by his/her parents at birth, part of Full Name. All given names are ordered in one field.

## 3.3 Family Name

| Attribute | Abstract Data Type | Multiplicity |
|---|---|---|
| Family Name | Text | [0..1] |

### 3.3.1 Semantic Statement

A family name is usually shared by members of a family. This attribute also carries prefixes or suffixes which are part of the Family Name, e.g. “de Boer”, “van de Putte”, “von und zu Orlow”.

## 3.4 Gender

| Attribute | Abstract Data Type | Multiplicity |
|---|---|---|
| Gender | Code | [0..1] |

### 3.4.1 Semantic Statement

A code specifying the current gender of a person such as male, female, unknown.

### 3.4.2 Reasoning:

Experiences in pan-European data exchange showed that a two-state Boolean field is not sufficient. The attribute should be able to represent also the information of an “unknown” gender or a non-applicability of this data field (e.g. in case of intersex gender). This information of a person might be subject to change.

Risk for semantic conflicts may rise from different codes for the same meaning (Male being presented as “MALE”, masculine, 1, M) etc. The team of authors recommends using a widely standardised code list, like(4).

## 3.5 Date of Birth

| Attribute | Abstract Data Type | Multiplicity |
|---|---|---|
| Date of Birth | Date | [0..1] |

### 3.5.1 Semantic statement

A date and/or time that specifies the birth date of a person.

### 3.5.2 Reasoning

The concept “birth” with its attributes date, place, and country is a permanent attribute of a person. Although a place may change its name, in combination with the date of birth, the attribute place of birth becomes unique and adds a further degree of granularity to a person in combination with the name.

In some cases the date of birth is used to encode additional information about liability of information given. To encode uncertainty one may use “00” or “??” signs to indicate a non-existing information. (e.g. born in the 1980’s: 198?-??-??). Another common practise is to use the artificial date 1980-13-1 to indicate that someone was born in the year 1980, but it is to yet be defined on which exact date.

Please notice that W3C Date Type does not allow non-numeric characters and that following (5) does not allow leaving out information inside a date string (1980-??-12 is not possible). That is for why the SEMIC.EU Core Person also allows using strings for the date, if not possible otherwise.

## 3.6 Place of Birth

| Attribute | Abstract Data Type | Multiplicity |
|---|---|---|
| Place of Birth | Text/Code | [0..1] |

### 3.6.1 Semantic Statement

The code value or text representing the name of the place where the person was born. Depending on the use case this might be a city, district, or other part of a country. Additionally it would be useful to add information about the type of place, i.e. city, region, etc. Depending on the use case geographic coordinates can be used to indicate the place of birth.

## 3.7 Country of Birth

| Attribute | Abstract Data Type | Multiplicity |
|---|---|---|
| Country of Birth | Code | [0..1] |

### 3.7.1 Semantic Statement

The code value representing the name of the country at the time the person was born.

### 3.7.2 Reasoning

Using a standardised code list for country names instead of free-form text has a lot of potential for increasing semantic interoperability: Known diversity that one has to deal with when exchanging country names between different communication partners without relying on an agreed code list are

a) Official name vs. common name (e.g. “Federal Republic of Germany” vs. Germany),

b) Different languages (Italy vs. Italia),

c) Historic name vs. Current name (Birma vs. “Myan Mar”),

d) Ambiguity of similar sounding countries (“Republic of the Congo” vs. “Democratic Republic of the Congo”)

## 3.8 Citizenship

| Attribute | Abstract Data Type | Multiplicity |
|---|---|---|
| Citizenship | Code | [0..*] |

### 3.8.1 Semantic Statement

The code value representing the name(s) of the country(ies) which issued the person a citizenship.

### 3.8.2 Reasoning

A person has one, multiple or even no citizenship. Citizenship is information needed by many cross-border use cases. In this field belongs the name of the country issuing the citizenship rights as the right to vote, to receive certain protection from the community or the issuance of a passport(6).

The reason why the authors chose the term “Citizenship” instead of “Nationality” is that nationality groups “people having a common origin, tradition and language capable of forming or actually constituting a nation-state”(7), while Citizenship is “the status of being a citizen”. Nationality is a concept which is hard to define precisely, while citizenship is a legal status.

### 3.8.3 Character Encoding

It is important to consider that in some languages characters are written and read in other directions than in the English language. Additionally almost any language uses an extended or complitely different character set or alphabet. This needs to be considered but is out of the scope of this SEMIC.EU Core Concept.

The authors recommend the use of UTF-8(8).

Among the concepts that were dropped as they seem being to business specific and not always present are:

**Address**

The concept "address" together with the name is a very good way to identify a person. However, a full qualified address can be very extensive to model depending on the granularity chosen. Thus "address" can harbour many semantic conflicts. In order to avoid discussing unnecessary details, "address" has been dropped from the SEMIC.EU Core Person. It is possible that a "SEMIC.EU Core Address" will be developed sometime in the future.

**ID**

The implementation of an ID is entirely dependent on the use case and is therefore not included in the SEMIC.EU Core Person. It is possible that a "SEMIC.EU Core PersonID" will be developed sometime in the future.

**Date of Death, Place of Death**

Even if several implementations in the health or insurance domain are in the need of data detailing the place and time of death this information entity was not considered to be "universal enough" for becoming part of the SEMIC.EU Core Person. It is understood that a certain percentage of data exchanges might need to define this entity as business specific attributes and that knowing the vital status of a person might be quite relevant for identifying an individual. However indicating information about the death of a person is not a general core attribute for a majority of today's pan-European data exchanges.

## 3.9 Description of the data types

| Abstract data type | Description | Data types for implementation (excerpt) |
|---|---|---|
| TEXT | A sequence of characters | `xs:string;` |

| | | |
|---|---|---|
| CODE | A list of predefined name-value pairs | `xs:enumeration,`<br>`xs:token,`<br>`xs:anySimpleType;` |
| DATE | The year, month and day represented in a structured format. | `xs:date;`<br><br>`xs:datetime;`<br><br>`timestamp;` |

## 3.10 Examples for mapping name related attributes to SEMIC.EU Core Person

### 3.10.1 Example I: A name consisting of two given names and a title

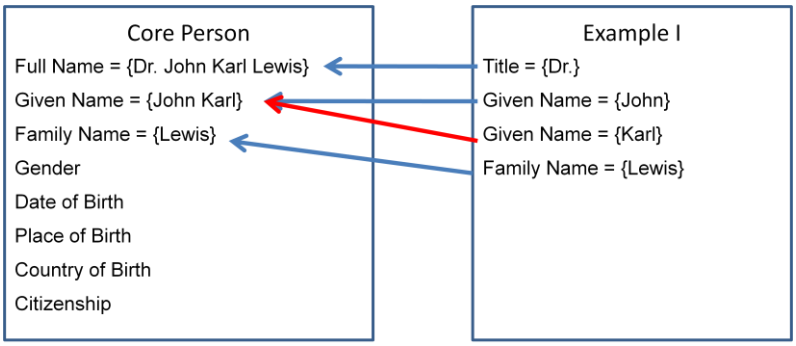


Figure 4 - Mapping between Core Person and a person with two given names

Figure 4 illustrates the mapping between Core Person and a person with a name consisting of two given names and a title.

### 3.10.2 Example II: A name consisting of a given name, patronymic and family name

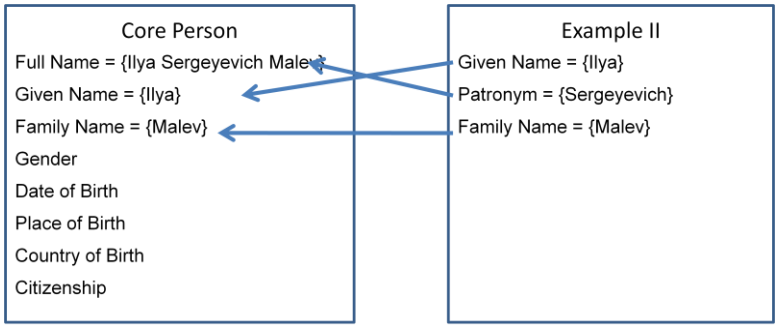


Figure 5 - Mapping between Core Person and a person with a name of a Slavic country

Figure 5 illustrates the mapping between Core Person and a person with a name consisting of a given name, a patronymic, and a family name as typically found in Russia and other Slavic countries.

### 3.10.3 Example III: A name consisting of multiple name attributes

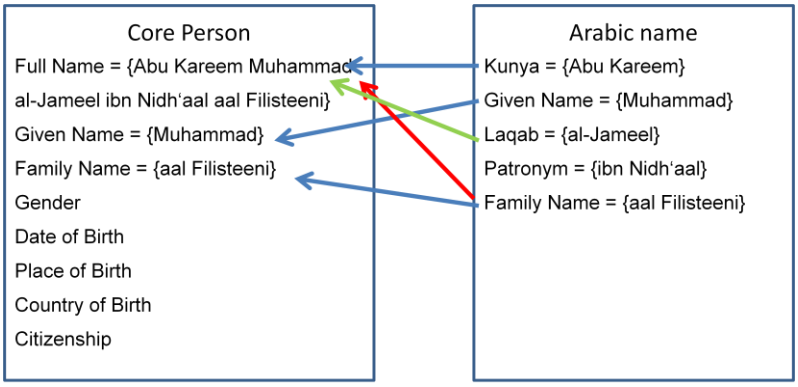


Figure 6 - Mapping between Core Person and Arabic Names

Figure 6 illustrates the mapping between Core Person and an example Arabic name(9).

# 4 Design principles for a conformant asset

In the following section the authors will explicate the main principles to develop a pan-European schema for a specific use case, a conform asset. During the implementation of a pan-European schema based on SEMIC.EU Core Person so-called design principles are identified. These design principles are lessons learned by the authors and should guide future developers of pan-European exchange formats during their work.

The development of a conformant pan-European asset implementing a Core Concept orients itself along the following design principles:

Principle 1: Define the use case

Principle 2: Reuse existing material

Principle 3: Reduce Complexity

Principle 4: Semantic Documentation

These design principles will be detailed by an example use case.

## 4.1 Principle 1: Define your Use Case

The underlying use case needs to be clearly specified, as it is used to logically validate the model against it. Which data needs to be represented – this can only be decided based on the underlying use case. Depending on the use case it needs to be clarified in which detail the multiplicity and data types are defined/restricted.

The following questions need to be answered by the data model:

- What is the scope of my data model?
- Which attributes are relevant to describe the subject I want to represent in my data model?
- Is the use case bound to certain legal frameworks and conditions?

The general conditions define the scope, granularity and multiplicity (obligatory and optional attributes), as well as the choice of data types (e.g. code lists, date/time representation) for the data model.

For each attribute it is necessary to decide whether the attribute is optional or obligatory to satisfy the requirements to the use case. This determines the multiplicity of the attributes.

## 4.2 Principle 2: Reuse existing material

Existing material should be evaluated regarding the previously specified use case. The reuse of existing models raises the acceptance of a data exchange schema. Building on widespread standards

raises the potential of reuse. Profiting from the experiences of other projects potentially raises the quality of your model and saves time.

Potential sources for existing material can be found on the SEMIC.EU website(10) listed under partner projects, in the SEMIC.EU repository(11), as well as international standardisation bodies as, e.g. ISO(12), W3C(13), and OASIS(14).

## 4.3 Principle 3: Reduce Complexity

A schema needs to be designed for a certain use case which also determines the level of complexity. To reduce the complexity of an exchange model it is important to analyse which data/information will be needed for a specific use case and which is not needed. Only data which is required for the application of the specified use case should be included into your data exchange model. This will minimize possible semantic conflicts.

## 4.4 Principle 4: Semantic Documentation

An exact semantic documentation is indispensible to guarantee the proper understanding and reuse of a model. It is important to provide semantic statements for all elements to describe their meaning as precisely as possible.

Furthermore intention and functionality of the modelled aspects should be explained. References to external information should be provided.

## 4.5 Further things to keep in mind

Ensure the disjointedness of values and use semantically unambiguous, meaningful identifiers.

Do not put any coding logic or dependencies into attributes

Use code lists wherever possible.

The accordance to Naming Design Rules is specific to the business case.

# 5 Timeline of the Conformance Process

Figure 7 illustrates the timeline within the conformance process:

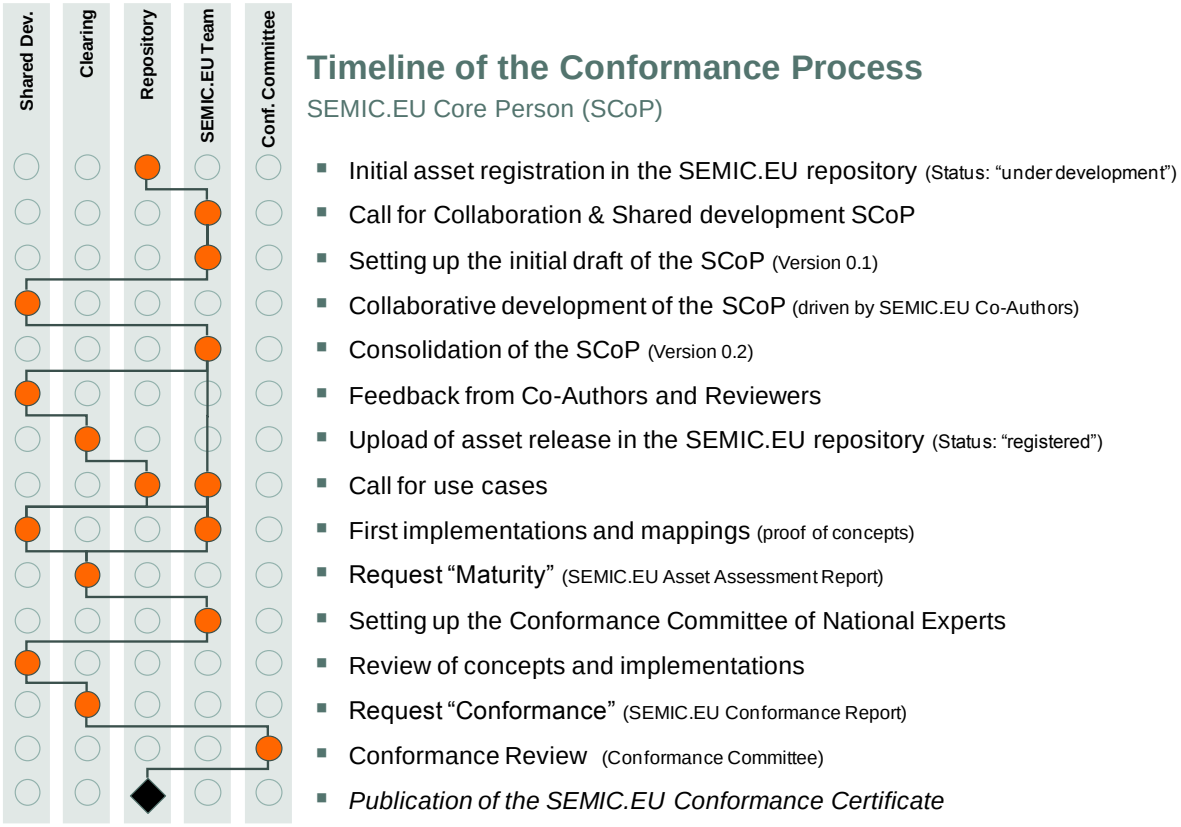


Figure 7 - Chronological activities within the conformance process

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# B. Abbreviations

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| CCL | Core Component Library |
| EAW | European Arrest Warrant |
| IDABC | Interoperable Delivery of European eGovernment Services to Public Administrations, Businesses and Citizens |
| ISA | Interoperability Solutions for European Public Administrations |
| MS | Member State |
| RDF | Resource Description Framework |
| RIF | Rule Interchange Format (W3C Recommendation) |
| SCoP | SEMIC.EU Core Person |
| SEMIC.EU | Semantic Interoperability Centre Europe |
| UN/CEFACT | United Nations Centre for Trade Facilitation and Electronic Business |
| XSD | XML Schema |
| XSLT | Extensible Stylesheet Language Transformation |

# C. Glossary

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| Asset | Assets are resources that support the exchange of data in distributed information systems. Assets may define common data structures, e.g. XML schema, or provide a central terminology to ensure that data elements are interpreted in the same way by communicating parties, e.g. taxonomies or ontologies. |
| Asset Assessment Report | The Asset Assessment Report is prepared by the SEMIC.EU Clearing management as part of the Maturity Process. It details the SEMIC.EU evaluation of an asset and can be seen as an initial input to the decisive community review. |
| Attribute | A single piece of information that is part of an information model, e.g. Given Name, Birth date. |
| Clearing Process Management | The responsible body for overseeing and coordinating the platform processes. It also acts as a mediator between the user community and the asset providers. |
| Clearing Process Manager | Member of the Clearing Process Management. |
| Conformance | The Conformance Process is the final step in SEMIC.EU's quality assurance process. It will only be initiated for assets which have completed their development. The Conformance Process will approve that the asset fulfils the functional requirements of the proposed and expected target groups. A conformant interoperability asset has high quality and is useable by a broad user community. |
| Conformance committee | The task of the Conformance Committee is to review the asset and advice required changes as part of the Conformance Process. It recommends or rejects the approval of the asset. |
| Domain | A domain is a sphere of activity(7), e.g. finance, railroad, transport. |
| Maturity | The Maturity Process is the second step in the SEMIC.EU quality assurance process after the asset registration. The maturity process approves the asset for usage in practical applications. |
| Natural Person | A natural person is a human being. As opposed to companies and organisations that in certain legal contexts are also called (legal) persons. |
| Core Concept | A SEMIC.EU Core Concept is a (small) set of attributes describing an abstract or generic idea generalized from particular instances(7). It is developed in a pan-European shared development process and provides basic building blocks for future exchange models. |

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|---|---|
| Use Case | The scenario or project context in which a SEMIC.EU Core Concept is used, e.g. a voters register as a use case of SEMIC.EU Core Person. |