# Guideline for Writing Scope Notes

“A scope note is a textual description of the **intension** of a **class** or **property.**

Scope notes are not formal modelling constructs, but are provided to help explain the intended meaning and application of the CIDOC CRM’s classes and properties. Basically, they refer to a conceptualisation common to domain experts and disambiguate between different possible interpretations. Illustrative example **instances** of classes and properties are also regularly provided in the scope notes for explanatory purposes.”

In simple words, the scope notes for classes should make sure that users communicating information via a machine, rather than via clarifying dialogues, can refer to identical items and have a shared understanding of a their kinds, i.e., the classes they belong to.

For each class, the ontology formally declares which properties can apply to an instance of that class. Consequently, the property scope notes should make sure that the users have a shared understanding what these properties mean, in contrast to others.

The CIDOC CRM has adopted the term “scope note” from terminologies systems, in particular the AAT of the Getty Research Institute, rather than talking about a “definition”, because for many fundamental concepts, also for biological species, definitions in a logical sense are hardly possible. Therefore, it is often sufficient in a scope note to remind widely common concepts, to clarify border cases and non-obvious applications. The following guidelines should be understood as a check list, if the respective aspects are obvious from a given scope or need additional clarification, and not as a formal template.

The criteria should be not more precise than useful for the intended discourse. Suitable specialization may refine more general consideration. For instance, defining an instance of E21 Person to exist until death for a cultural historical discourse, does not require to determine precisely the conditions for being dead.

A scope note should clearly position the described class or property in all their traits as being a specialization of their superclasses or superproperties, but not unnecessarily repeat what has been said in the scope notes of their generalizations.

References to related literature, in particular for non-obvious applications, are regarded as useful.

## Guideline for Writing Class Scope Notes

A scope note for the description of a class (in the following “class A”) should make the user understand the necessary traits for recognizing an instance of this class by addressing the following aspects:

1. Substance:

What are instances of class A made of?

Some typical substances are solid-state matter, logical arrangements of symbols, behaviour of things in time, people in their capacity to act intentionally. Substances may be structured or not. For instances of many classes, the form is characteristic. Typically, the substance is the same or a refinement of that the superclass. For instance, the substance of a living organism is a refinement of that of a physical object, a digital object is a refinement of a logical arrangements of symbols. The scope note may refer to an intuitive or common sense understanding of the substance of a well-known and understood category of things, such as that of a human being. Understanding the substance is necessary for providing identity criteria.

1. Traits and Potential:

Which traits justify that an item is instance of class A? With what can an instance of class A interact, have or establish a relationship?

For some classes it is possible to define explicitly the necessary characteristic traits, such as a text consisting of a fixed sequence of characters of an alphabet. For other classes, in particular natural kinds, prototypical examples may be more effective. It may be helpful to refer to an enumeration of characteristic subclasses for making the reader better understand the common traits of a class, but a class **must not** be defined as an enumeration of classes without essential common traits. Necessary characteristic traits often have to do with a variety of forms of the respective substance fit for functionality some purpose, such as a “material sample”, or capabilities. In case of processes, they may have to do with kinds of interaction and outcome or others.

Since the descriptional properties are formally declared in the ontology, the scope note should only provide an understanding on the general contexts of interaction, which often need to be represented by multiple formally declared properties.

1. Identity criteria:

What makes you tell one instance of class A apart from another? (synchronic identity).

This is nearly trivial and intuitive for persons, but can be demanding for other classes, such as buildings in an urban conglomerate. It must not be confused with classification, i.e., finding a characteristic class for something at our attention! It must also not be confused with identification criteria, i.e., what known characteristics may be enough to determine an instance, such as a social security number for a citizen of some state.

What makes an instance be the same after some time? (diachronic identity).

This is nearly trivial and intuitive for persons between birth and death. The existence of mummies may cause confuse the answer to this question. For companies, it may be a matter of legal dispute. Similarly, repair, spare part replacement reconstruction, transformations and decay may confuse the diachronic identity of physical things.

Which changes will be regarded not to affect identity is not a question of absolute insight in the nature of things, but a deliberate choice for analyzing certain kinds of problems. Each choice corresponds to a different class, which may coexist for some time on the same item.

Identity criteria are one of the most powerful consideration for effective ontological distinctions.

1. Unity criteria:

What makes some extent of substance be part of an instance of class A?

For instance, a set of chessmen forms a functional whole in the well-known configuration of figures in the same style. In contrast, a single king chessman should be physically coherent and have an integrity of form to be recognizable and stand well.

What makes activities be part of a meeting? Is a sleeping participant taking part? Meetings are typically spatially and temporally confined. Therefore, a sleeping participant may be defined as being participating.

Unity criteria may interplay with synchronic identity. For instance, a built complex may be one coherent built structure, but distinct habitations. Depending on the criteria given for the class, the complex is considered to be one thing or multiple things. In such cases, the multiple things may be part of the one thing.

1. Existence:

What kinds of processes make an instance of class A come into existence and what make it to end existing?

For instance:

Meetings typically start and end by agreement.

A blood sample starts to exist when taken, and may be consider to end existing when its content is denaturized.

A set of chessmen will start to exist when the figures are put together, for packaging or direct use. One may consider that it ends to exist when it is no more functional, i.e., when one of the figures is destroyed or lost beyond the reach of its owner. If figures of the same style are available, they may be replaced.

In a museum perspective, it may be regarded to exist as long as all kinds of figures are still present or as long as at least one figure exists. Replacement may not be regarded as permitted.

Existence criteria may interplay with diachronic identity. When the diachronic identity ends, whatever substance remains must be regarded to be something else, possibly constituting instances of other classes.

Existence criteria are also critical for making and understanding ontological distinctions. If multiple classes are applied to the same instances, either via IsA or multiple instantiation, all involved classes must have compatible identity and existence criteria.

1. Further clarifications:

It is often helpful to clarify the distinction of a class from other classes for a better understanding of the traits necessary for the instances of a class. Note that distinct classes may nevertheless share some common instances, and the substance of instances of some class may even be instances of another class for some phase of existence or carriers of instances of other classes. For example, the substance of a bottle for liquids may be a labelled blood sample for some time. A magnetic disc may be carrier of some text for some time.

It is important to point the reader to non-obvious applications, borderline cases and important application contexts.

Examples of instances should be given in the foreseen separate section and therefore should, in general, not appear in the scope note proper. The scope note may however refer to some characteristic kinds of things as examples in order to illustrate traits and contexts. In some cases it may nevertheless be useful to include the example of a particular instance in a description of a more complex application context.

## Guideline for Writing Property Scope Notes

With respect to the nature of the property itself, writing property scope notes is less complex than writing class scope notes, but often need justifying more formal logical constructs specific to properties. A scope note for the description of a property (in the following “property A”) should make the user understand the necessary traits for recognizing an instance of this property and its applicability by addressing the following aspects:

1. Role or Interaction:

What role or interaction describes property A between an instance of its domain and another of its range?

The scope note should clarify the nature of the relation, under which circumstances it applies and which incidental or essential conditions qualify instances to be related by property A, and in which way it specializes its superproperties, if there are any. It is useful to differentiate from other, similar properties and properties with similar label, and closely cases but out of the scope of this model.

The scope note should further clarify important applications and non-obvious interpretations, such as the presence of immaterial objects in events via possibly anonymous material carriers (see *P12 occurred in the presence of*), or the location of a Move (E9) as the whole trajectory of the thing moved and those moving it.

1. Existence

What brings the property instance into existence, and what limits its existence?

Some properties may be essential to either domain or range, i.e., the property instance must exist as long as the respective class instance exists. E.g., the relationship of a part of a text to the whole text exists as long as the whole exists, because the part forms part of the identity of the whole text (see *P106 is composed of* ).

A case of more limited existence are some forms of parthood of material things. They may come into being either with the emergence of the respective whole, or by later addition. They may end either together with the whole or by earlier removal from the whole. Similarly, ownership may start and end with business transaction, or start as heritage and end with the death of the owner.

Physical Human-Made Object (E24) is related to the Production activity (E12) by which it was produced for a time-span up to the end of the Production activity (see *P108 has produced*). Even though the Production activity determines the identity of the object once and forever, as Birth determines the identity of a human being, the property is a historical fact, but nevertheless no more existing after the respective event. The persistence of historical facts regardless if remembered or not by someone must not be confused with the period of existence of the respective reality.

In the modelling paradigm of the CRM, properties with limited existence are not associated with secondary properties of validity. Rather, the CRM aims at modelling explicitly the processes that bring a property instance about or end its validity.

Existence criteria may interplay with quantification, as described below.

1. Inferences

Which properties or sequences of properties are logically related with property A?

Many properties in the CIDOC CRM are characterized as “shortcuts”, i.e., deductions from property paths. The scope note should describe if the property A participates in any such path, or can be inferred from certain property paths. The latter case should also be documented in First Order Logic in the respective section.

In some cases very likely consequences, rather than logical necessities, of other relationships for the existence of property A may be noteworthy.

1. Formal traits: Quantification, Symmetry, Transitivity

The following traits are declared in separate sections of a property description, but the scope note should motivate which phenomena of reality justify these properties, or how they restrict the meaning of property A:

How many instance of property A are possible for one domain and one range instance?

This has important implications for understanding the property and the related items. For instance, if a property is necessary and exactly one for an instance of some class, the existence of this instance depends on that of the related item. Vice-versa, the consequences of the nature of property A for the quantification must be carefully investigated.

Further, if the domain and range classes of property A are identical, does it have the same meaning in both directions (symmetry)?

Does a path consisting of a chain of property A imply property A between beginning and end of any such path?

# APPENDIX

Collection of annotated property scope notes:

Nature of relationship, P.1 properties, duration non-obvious interpretations(e.g.,immaterial participation) implied superprops out-of-scope cases, not implied meaning, differentiation from other properties, in particular sub/general/specific. important applications, deductions, quantification, shortcut expansion, references, symmetry, transitivity,

P1:

This property describes the naming or identification of any real world item by a name or any other identifier.

This property is intended for identifiers in general use, which form part of the world the model intends to describe, and not merely for internal database identifiers which are specific to a technical system, unless these latter also have a more general use outside the technical context. This property includes in particular identification by mathematical expressions such as coordinate systems used for the identification of instances of E53 Place. The property does not reveal anything about when, where and by whom this identifier was used. A more detailed representation can be made using the fully developed (i.e. indirect) path through E15 Identifier Assignment.

P2:

This property allows sub typing of CIDOC CRM entities - a form of specialisation – through the use of a terminological hierarchy, or thesaurus.

The CIDOC CRM is intended to focus on the high-level entities and relationships needed to describe data structures. Consequently, it does not specialise entities any further than is required for this immediate purpose. However, entities in the isA hierarchy of the CIDOC CRM may by specialised into any number of sub entities, which can be defined in the E55 Type hierarchy. E41 Appellation, for example, may be specialised into “e-mail address”, “telephone number”, “post office box”, “URL” etc. none of which figures explicitly in the CIDOC CRM hierarchy. A comprehensive explanation about refining CIDOC CRM concepts by E55 Type is given in the section “About Types” in the section on “Specific Modelling Constructs” of this document.

P4:

This property associates an instance of E2 Temporal Entity with the instance of E52 Time-Span during which it was on-going. The associated instance of E52 Time-Span is understood as the real time-span during which the phenomena making up the temporal entity instance were active. More than one instance of E52 Temporal Entity may share a common instance of E52 Time-Span only if they come into being and end being due to an identical declarations or events.

P7:

This property describes the spatial location of an instance of E4 Period.

The related instance of E53 Place should be seen as a wider approximation of the geometric area within which the phenomena that characterise the period in question occurred, see below. P7 took place at (witnessed) does not convey any meaning other than spatial positioning (frequently on the surface of the earth). For example, the period “Révolution française” can be said to have taken place in “France in 1789”; the “Victorian” period may be said to have taken place in “Britain from 1837-1901” and its colonies, as well as other parts of Europe and North America. An instance of E4 Period can take place at multiple non-contiguous, non-overlapping locations

It is a shortcut of the more fully developed path from E4 Period through *P161 has spatial projection*, E53 Place, *P89 falls within*  to E53 Place. E4 Period is a subclass of E92 Spacetime Volume. By the definition of *P161 has spatial projection* an instance of E4 Period takes place on all its spatial projections, that is, instances of E53 Place. Something happening at a given place can also be considered to happen at a larger place containing the first. For example, the assault on the Bastille July 14th 1789 took place in the area covered by Paris in 1789 but also in the area covered by France in 1789.

 Scope note: This property associates an instance of E4 Period with another instance of E4 Period that is defined by a subset of the phenomena that define the former. Therefore the spacetime volume of the latter must fall within the spacetime volume of the former.

This property is transitive.

This property describes the active or passive participation of instances of E39 Actors in an instance of E5 Event.

It documents known events in which an instance of E39 Actor has participated during the course of that actor’s life or history. The instances of E53 Place and E52 Time-Span where and when these events happened provide us with constraints about the presence of the related instances of E39 Actor in the past. Collective actors, i.e., instances of E74 Group, may physically participate in events via their representing instances of E21 Persons only. The participation of multiple actors in an event is most likely an indication of their acquaintance and interaction.

The property implies that the actor was involved in the event but does not imply any causal relationship. For instance, someone having been portrayed can be said to have participated in the creation of the portrait.

This property describes the active or passive presence of an E77 Persistent Item in an instance of E5 Event without implying any specific role.

It documents known events in which an instance of E77 Persistent Item was present during the course of its life or history. For example, an object may be the desk, now in a museum on which a treaty was signed. The instance of E53 Place and the instance of E52 Time-Span where and when these events happened provide us with constraints about the presence of the related instance E77 Persistent Item in the past. Instances of E90 Symbolic Object, in particular information objects, are physically present in events via at least one of the instances of E18 Physical Thing carrying them. Note, that the human mind can be such a carrier. A precondition for a transfer of information to a person or another new physical carrier is the presence of the respective information object and this person or physical thing in one event.

## Annoted class scope notes

Substance traits and potential identity existence unity further clarifications

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### E28 Conceptual Object

Subclass of: [E71](#_E71_Man-Made_Thing) Human-Made Thing

Superclass of: [E55](#_E55_Type) Type

[E89](#_E89_Propositional_Object) Propositional Object

[E90](#_E90_Symbolic_Object) Symbolic Object

Scope note: This class comprises non-material products of our minds and other human produced data that have become objects of a discourse about their identity, circumstances of creation or historical implication. The production of such information may have been supported by the use of technical devices such as cameras or computers.

Characteristically, instances of this class are created, invented or thought by someone, and then may be documented or communicated between persons. Instances of E28 Conceptual Object have the ability to exist on more than one particular carrier at the same time, such as paper, electronic signals, marks, audio media, paintings, photos, human memories, etc.

They cannot be destroyed. They exist as long as they can be found on at least one carrier or in at least one human memory. Their existence ends when the last carrier and the last memory are lost.

### E41 Appellation

Subclass of: [E90](#_E90_Symbolic_Object) Symbolic Object

Superclass of: [E35](#_E35_Title) Title

[E42](#_E42_Object_Identifier) Identifier

Scope note: This class comprises signs, either meaningful or not, or arrangements of signs following a specific syntax, that are used or can be used to refer to and identify a specific instance of some class or category within a certain context.

Instances of E41 Appellation do not identify things by their meaning, even if they happen to have one, but instead by convention, tradition, or agreement. Instances of E41 Appellation are cultural constructs; as such, they have a context, a history, and a use in time and space by some group of users. A given instance of E41 Appellation can have alternative forms, i.e., other instances of E41 Appellation that are always regarded as equivalent independent from the thing it denotes.

Different languages may use different appellations for the same thing, such as the names of major cities. Some appellations may be formulated using a valid noun phrase of a particular language. In these cases, the respective instances of E41 Appellation should also be declared as instances of E33 Linguistic Object. Then the language using the appellation can be declared with the property P72 has language: E56 Language.

Instances of E41 Appellation may be used to identify any instance of E1 CRM Entity and sometimes are characteristic for instances of more specific subclasses E1 CRM Entity, such as for instances of E52 Time-Span (for instance “dates”), E39 Actor, E53 Place or E28 Conceptual Object. Postal addresses and E-mail addresses are characteristic examples of identifiers used by services transporting things between clients.

Even numerically expressed identifiers for extents in space or time are also regarded as instances of E41 Appellation, such as Gregorian dates or  spatial coordinates, even though they allow for determining some time or location by a known procedure starting from a reference point and by virtue of that fact play a double role as instances of E59 Primitive Value.

E41 Appellation should not be confused with the act of naming something. Cf. E15 Identifier Assignment

### E24 Physical Human-Made Thing

Subclass of: [E18](#_E18_Physical_Thing) Physical Thing

 [E71](#_E71_Man-Made_Thing) Human-Made Thing

Superclass of: [E22](#_E22_Man-Made_Object) Human-Made Object

[E25](#_E25_Man-Made_Feature) Human-Made Feature

[E78](#_E78_Collection) Collection

Scope Note: This class comprises all persistent physical items of any size that are purposely created by human activity. This class comprises, besides others, Human-Made objects, such as a swords, and Human-Made features, such as rock art. For example, a “cup and ring” carving on bedrock is regarded as instance of E24 Physical Human-Made Thing.

Instances of Human-Made thing may be the result of modifying pre-existing physical things, preserving larger parts or most of the original matter and structure, which poses the question if they are new or even Human-Made, the respective interventions of production made on such original material should be obvious and sufficient to regard that the product has a new, distinct identity and intended function and is human-made. Substantial continuity of the previous matter and structure in the new product can be documented by describing the production process also as instance of E81 Transformation.

Whereas interventions of conservation and repair are not regarded to produce a new Human-Made thing, the results of preparation of natural history specimen that substantially change their natural or original state should be regarded as physical Human-Made things, including the uncovering of petrified biological features from a solid piece of stone. On the other side, scribbling a museum number on a natural object should not be regarded to make it Human-Made. This notwithstanding, parts, sections, segments, or features of a physical Human-Made thing may continue to be non-Human-Made and preserved during the production process, for example natural pearls used as a part of an eardrop.

### E89 Propositional Object

Subclass of: [E28](#_E28_Conceptual_Object) Conceptual Object

Superclass of: [E73](#_E73_Information_Object) Information Object

 [E30](#_E30_Right) Right

Scope note: This class comprises immaterial items, including but not limited to stories, plots, procedural prescriptions, algorithms, laws of physics or images that are, or represent in some sense, sets of propositions about real or imaginary things and that are documented as single units or serve as topic of discourse.

This class also comprises items that are “about” something in the sense of a subject. In the wider sense, this class includes expressions of psychological value such as non-figural art and musical themes. However, conceptual items such as types and classes are not instances of E89 Propositional Object. This should not be confused with the definition of a type, which is indeed an instance of E89 Propositional Object.