# Guideline for Writing Scope Notes

A scope note is a textual description of the **intension** of a **class** or **property. Intension refers to the common traits serving as criteria to identify items belonging to the class or property.**

Scope notes are not formal modelling constructs (e.g. they cannot be used directly for machine implementations), but are provided to help explain the intended meaning of the CIDOC CRM’s classes and properties, and where they apply. They refer to a conceptualisation commonly understood by 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 multiple users communicating information via a machine, rather than via clarifying dialogues, can refer to the same particular item and have a shared understanding of the item’s kind, i.e., the kinds of characteristics that it must and that it may have.

For instance, if a user enters data about the Mona Lisa, (s)he should be able to distinguish the physical art object from the visual appearance and the depicted lady, just by understanding the scope note and applying the adequate class. Otherwise, assigning a URI to "da Vinci's Mona Lisa" would be ambiguous in all properties assigned to the particular and not comparable to each other. The respective ontological distinctions should be sufficient to characterize the instance as **one identifiable it**em, so that CRM properties applied in a description may be verified by others[[1]](#footnote-1). Note, that even though this seems obvious, there exist enough examples from museum documentation confusing depictions with objects, and particular in gazetteers notoriously confusing administrational units with settlement structures and populations (see also Low & Doerr 2010: "A Postcard is not a Building"). In human communication, this problem normally does not arise, when the context of previous speech disambiguates the intended category and thereby identity.

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, and how they differ from other, possibly similar properties, in particular those with similar labels.

The CIDOC CRM has adopted the term “scope note” from terminology systems, in particular the AAT of the Getty Research Institute, rather than talking about a “definition”, because for many fundamental concepts, but 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, non-obvious applications and counterexamples. 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 precise to the extent that it is useful for the intended discourse. Suitable specialization may refine more general consideration. For instance, defining an instance of E21 Person, for a cultural historical discourse, to exist until death, does not require to determine precisely the conditions for being dead.

## Guideline for Writing Class Scope Notes

A scope note for the description of a class (let’s call it “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 of 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 for class E21 Person. Understanding the substance is necessary for providing identity criteria (see item C below).

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, such as biological species, prototypical examples may be more effective. It may be helpful to refer to an enumeration of characteristic subclasses for helping the reader understand the common traits of a class. However, a class **must not** be defined as an enumeration of classes without essential common traits. Necessary traits often have to do with a variety of forms, in which the the respective substance of an item may appear, that is determined by its functionality or capabilities for some purpose, such as a “hammer”, a “material sample” or an “information object”. In the case of processes, necessary traits may have to do with kinds of interaction and outcome or others.

The descriptional properties of a class are formally declared in the ontology and therefore described separately. This may not be sufficient to understand how formally declared properties of class A should be related to represent a particular context of an instance of class A. Theforefore, the scope note of the class should provide an understanding of the general contexts these properties relate to, but not repeat their individual definition.

1. Identity criteria:

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

This is nearly trivial and intuitive for persons, but can be quite demanding for other classes, such as buildings in an urban conglomerate, with overlapping boundaries, evolving, merging and splitting in the course of their history. It must not be confused with classification, i.e., finding a characteristic class for something at our attention, such as calling “this is a wineglass” to be the item’s identity! 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 even if these necessarily apply to a single instance of the class (in this example an instance of E21 Person).

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 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. For instance, if a fork is turned into a bracelet, the reworking and radical change of function can be regarded as creating a new object consuming another one under the definitions of a class centering identity on built-in functionality and the correcsponding social contexts. The same bracelet, continuing to exhibit substantial feautures of the original fork, can be seen as the same object as the fork, under the definitions of a different class focussig on the continuity of a distinct, contiguous piece of matter.

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 considered to end existing when its content is consumed in the chemical reactions of the medical analysis or its is rendered useless by preservation failure, i.e. being no more representative for its source by its current composition

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 specify when a class is distinct 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 cases where the class applies, borderline cases and important applicable contexts.

Examples of instances should be given in the foreseen separate section (see example template instructions) 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 (let’s call it “property A”) should make the reader 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: a) the nature of the relation, b) under which circumstances it applies c) which incidental or essential conditions qualify instances to be related by property A and d) in which way it specializes its superproperties, if any. It is useful to differentiate from other, similar properties and properties with similar label, and closely related cases, including ones 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* ).

Cases 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 inheritance 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 CIDOC CRM, properties with a period of existence potentially smaller than the coexistence of their domain and range, such as being a physical part of a physical object, are not associated with properties of properties expressing temporal validity. Rather, the CIDOC CRM aims at modelling explicitly the processes that bring a property instance about or end its validity, such as part addition and part removal.

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 shortcut by another property, or can be inferred as shortcut from certain property paths. The latter case should also be documented in First Order Logic in the respective section.

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

1. Formal traits: Quantification, Symmetry, Transitivity, Reflexivity

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

Quantification: How many instances 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.

Symmetry: If the instances of the domain and range classes of property A are swapped, does the property have the same meaning?

Transitivity: For a path consisting of a chain of multiple instances of property A, is property A between beginning and end of any such path implied?

Reflexivity: Can an instance of property A have the same instance of a class as both domain and range?

LOW, J.T., & Doerr, M. (2010). A Postcard is Not a Building - Why we Need Museum Information Curators. /, In Proc. of the CIDOC 2010 Conference : Museums in intercultural dialogue - New Practices in Knowledge Sharing and Information Integration/, Shangai, China, November. (<https://publications.ics.forth.gr/\_publications/CIDOC\_2010\_low\_martin.pdf>).

1. For the interested reader, a full analysis of this concept of identity can be found in David Wiggin’s “Sameness and Substance Renewed”, Cambridge University Press; 2nd edition, 12 Jan. 2008 [↑](#footnote-ref-1)