
**Information and documentation —
A reference ontology for the interchange
of cultural heritage information**

*Information et documentation — Une ontologie de référence pour
l'échange d'informations du patrimoine culturel*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 21127 was prepared by Technical Committee ISO/TC 46, *Information and documentation*, Subcommittee SC 4, *Technical interoperability*, in collaboration with the International Council of Museums Committee for Documentation (ICOM CIDOC).

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Introduction

This International Standard is the culmination of more than a decade of standards development work by the International Committee for Documentation (CIDOC) of the International Council of Museums (ICOM). Work on this International Standard began in 1996 under the auspices of the ICOM-CIDOC Documentation Standards Working Group. Throughout its development, the model has been known as the "CIDOC Conceptual Reference Model" or CRM. References to the CRM can be considered throughout as synonymous with ISO 21127.

The primary purpose of this International Standard is to offer a conceptual basis for the mediation of information between cultural heritage organizations such as museums, libraries and archives. This International Standard aims to provide a common reference point against which divergent and incompatible sources of information can be compared and, ultimately, harmonized.

ISO 21127 is a domain ontology¹⁾ for cultural heritage information: a formal representation of the conceptual scheme, or "world view", underlying the database applications and documentation systems that are used by cultural heritage institutions. It is important to note that this International Standard aims to clarify the logic of what cultural heritage institutions do in fact document; it is not intended as a normative specification of what they *should* document. The primary role of this International Standard is to enable information exchange and integration between heterogeneous sources of cultural heritage information. It aims to provide the semantic definitions and clarifications needed to transform disparate, localized information sources into a coherent global resource, be it within an institution, an intranet or on the Internet.

The specific aims of this International Standard are to:

- Serve as a common language for domain experts and IT developers when formulating requirements.
- Serve as a formal language for the identification of common information contents in different data formats; in particular to support the implementation of automatic data transformation algorithms from local to global data structures without loss of meaning. These transformation algorithms are useful for data exchange, data migration from legacy systems, data information integration, and mediation of heterogeneous sources.
- Support associative queries against integrated resources by providing a global model of the basic classes and their associations to formulate such queries.
- Provide developers of information systems with a guide to good practice in conceptual modelling.

The CRM ontology is expressed as a series of interrelated concepts with definitions. This presentation is similar to that used for a thesaurus. However, the ontology is not intended as a terminology standard and does not set out to define the terms that are typically used as data in cultural heritage documentation. Although the presentation provided here is complete, it is an intentionally compact and concise presentation of the ontology's 80 classes and 130 unique properties. It does not attempt to articulate the inheritance of properties by subclasses throughout the class hierarchy (this would require the declaration of several thousand properties, as opposed to 130). However, this definition does contain all the information needed to infer and automatically generate a full declaration of all properties, including inherited properties.

1) In the sense used in computer science, i.e. it describes in a formal language the relevant explicit and implicit concepts and the relationships between them^[1].

Information and documentation — A reference ontology for the interchange of cultural heritage information

1 Scope

This International Standard establishes guidelines for the exchange of information between cultural heritage institutions. In simple terms this can be defined as the curated knowledge of museums.

A more detailed definition can be articulated by defining both the intended scope, a broad and maximally inclusive definition of general principles, and the practical scope, which is defined by reference to a set of specific museum documentation standards and practices.

The intended scope of this International Standard is defined as the exchange and integration of heterogeneous scientific documentation relating to museum collections. This definition requires further elaboration:

- The term “scientific documentation” is intended to convey the requirement that the depth and quality of descriptive information that can be handled by this International Standard need be sufficient for serious academic research. This does not mean that information intended for presentation to members of the general public is excluded, but rather that this International Standard is intended to provide the level of detail and precision expected and required by museum professionals and researchers in the field.
- The term “museum collections” is intended to cover all types of material collected and displayed by museums and related institutions, as defined by ICOM²⁾. This includes collections, sites, and monuments relating to fields such as social history, ethnography, archaeology, fine and applied arts, natural history, history of sciences and technology.
- The documentation of collections includes the detailed description of individual items within collections, groups of items and collections as a whole. This International Standard is specifically intended to cover contextual information (i.e. the historical, geographical, and theoretical background that gives museum collections much of their cultural significance and value).
- The exchange of relevant information with libraries and archives, and harmonization with their models, falls within the intended scope of this International Standard.
- Information required solely for the administration and management of cultural institutions, such as information relating to personnel, accounting and visitor statistics, falls outside the intended scope of this International Standard.

The practical scope³⁾ of this International Standard is the set of reference standards for museum documentation that have been used to guide and validate its development. This International Standard covers the same domain of discourse as the union of these reference documents; this means that data correctly encoded according to any of these reference documents can be expressed in a compatible form, without any loss of meaning.

2) The ICOM Statutes provide a definition of the term “museum” at <<http://icom.museum/statutes.html#2>>.

3) The practical scope of the CIDOC CRM, including a list of the relevant museum documentation standards, is discussed in more detail on the CIDOC CRM website at <<http://cidoc.ics.forth.gr/scope.html>>.

2 Conformance

Users intending to take advantage of the semantic interoperability offered by this International Standard should ensure conformance with the relevant data structures. Conformance pertains either to data to be made accessible in an integrated environment, or to contents intended for transport to other environments. Any encoding of data in a formal language that preserves the relations of the classes, properties and inheritance rules defined by this International Standard is regarded as conformant.

Conformance with this International Standard does not require complete matching of all local documentation structures, nor that all concepts and structures present in this International Standard be implemented. This International Standard is intended to allow room both for extensions, needed to capture the full richness of cultural information, and for simplification, in the interests of economy. A system will be deemed partially conformant if it supports a subset of subclasses and subproperties defined by this International Standard. Designers of the system should publish details of the constructs that are supported.

The focus of this International Standard is on the transport and mediation of structured information. It does not provide or require interpretation of unstructured free-text information into a structured, logical form. Free-text information, while supported, falls outside the scope of conformance considerations.

Any documentation system will be deemed conformant with this International Standard, regardless of the internal data structures it uses, if a deterministic logical algorithm can be constructed that transforms data contained in the system into a directly compatible form without loss of meaning. No assumptions are made as to the nature of this algorithm. "Without loss of meaning" signifies that designers and users of the system are satisfied that the data representation corresponds to the semantic definitions provided by this International Standard.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply. We have selected these terms for ease of understanding by non-computer experts from the various terminologies in use for object-oriented models.

3.1

class

category of items that share one or more common properties

NOTE Class properties serve as criteria to identify items that belong to the class. These properties need not be explicitly formulated in logical terms, but can be described in a text (called a scope note) that refers to a common conceptualisation of domain experts. The sum of these properties is called the intension of the class. A class can be the domain or range of none, one, or more properties formally defined in a model. The formally defined properties need not be part of the intension of their domains or ranges: such properties are optional. An item that belongs to a class is called an instance of this class. A class is associated with an open set of real-life instances, known as the extension of the class. Here "open" is used in the sense that it is generally beyond our capabilities to know all instances of a class in the world and, indeed, that the future can bring new instances into being at any time (Open World). Therefore a class cannot be defined by enumerating its instances. A class plays a role analogous to a grammatical *noun*, and can be completely defined without reference to any other construct (unlike properties, which need to have an unambiguously defined domain and range). For example, "Person" is a class. A "Person" can have the property of being a *member of* a "Group", but this is not a necessary condition for being a "Person". We will never know all "Persons" who have lived in the past, and there will be more "Persons" in the future. Classes are usually organized as a *class hierarchy*. The relationship between a subclass and its superclass is known as the *IsA* relationship (a concatenation of the words "is a"). For example, a ship *IsA* vehicle.

3.2

complement

(of a class A) set of all instances of its superclass, B, that are not instances of class A

NOTE In terms of set theory, the complement of a class is the extension of the superclass minus the extension of the class. Compatible extensions of this International Standard need not declare any class as the complement of one or more other classes. To do so would violate the goal of describing an Open World. For example, for all possible cases of human *gender*, "male" need not be declared as the complement of "female" or vice versa.

3.3**disjoint**

having no common instances in any possible world

NOTE 1 Classes are disjoint if the intersection of their extensions is necessarily an empty set.

NOTE 2 See also 5.4.

3.4**domain**

class for which a property is formally defined

NOTE Instances of a property are applicable to instances of its domain class. A property needs to have exactly one domain, though the domain class can always contain instances for which the property is not instantiated. The domain class is analogous to the grammatical *subject* of a phrase while the property is analogous to the *verb*. Which class is selected as the domain and which as the range is arbitrary, as is the choice between active or passive voice. Property names in the CRM are designed to be semantically meaningful and grammatically correct when read from domain to range. The inverse property name, given in parentheses, is also designed to be semantically meaningful and grammatically correct when read from range to domain.

3.5**extension**

set of all real life instances belonging to a class that fulfil the criteria of its intension

NOTE 1 The extension of a class is an “open” set in the sense that it is generally beyond our capabilities to know all instances of a class in the world. The future can bring new instances into being at any time (Open World). An information system may at any point in time refer to some instances of a class, which form a subset of its extension.

NOTE 2 See also 5.6.

3.6**inheritance**

duplication of properties from a class to its subclasses

NOTE Inheritance of properties from superclasses to subclasses entails that if an item x is an instance of a class A , then all properties that need hold for the instances of any of the superclasses of A need also hold for item x , and that all optional properties that can hold for the instances of any of the superclasses of A can also hold for item x .

3.7**instance**

item having properties that meet the criteria of the intension of the class

NOTE “The Mona Lisa” is an instance of the class of “physical man-made objects”. An instance of a property is a factual relation between an instance of the domain and an instance of the range of the property that matches the criteria of the intension of the property. For example, “the Louvre *is current owner of* the Mona Lisa” is an instance of the property “is current owner of”. The number of instances of a class declared in an information system is usually less than the total number of instances in the real world. For example, although *you* are an instance of “person”, you are not mentioned in all information systems describing “persons”.

3.8**intension**

intended meaning of a class

NOTE The intension of a class consists of one or more common properties, or traits shared by all instances of the class. These properties need not be explicitly formulated in logical terms, but can simply be described in a text (a scope note) that refers to a conceptualization shared by domain experts.

3.9**interoperability**

capability of different information systems to communicate some of their contents

NOTE Interoperability can imply that

- a) two systems can exchange information, and/or
- b) multiple systems can be accessed with a single method.

Generally, *syntactic* interoperability is distinguished from *semantic* interoperability. *Syntactic* interoperability means that the information encoding and the access protocols of the relevant systems are compatible, so that information can be processed as described above without error. However, syntactic interoperability alone does not ensure that each system processes the data in a manner consistent with the intended meaning. For example, one system can use a table called "Actor" and another one called "Agent". Data from the two tables might remain separated, even though they can have exactly the same meaning. To overcome this situation, *semantic* interoperability has to be added. The CRM relies on existing *syntactic* interoperability and is concerned only with adding *semantic* interoperability.

3.10 monotonic

⟨of a knowledge base⟩ having a set of conclusions derived via inference rules that does not reduce, irrespective of the whatever additional propositions can be inserted

NOTE 1 Monotonic reasoning is a term derived from knowledge representation. In practical terms, as experts enter correct statements to an information system, the system need not regard any of the existing statements as invalid. The CRM ontology is designed for monotonic reasoning and so enables conflict-free merging of huge stores of knowledge.

NOTE 2 See also 5.1.

3.11 multiple inheritance

possibility for a class to have more than one immediate superclass

NOTE The extension of a class with multiple immediate superclasses is a subset of the intersection of all extensions of its superclasses. The intension of a class with multiple immediate superclasses extends the intensions of all its superclasses, i.e. its *traits* are more restrictive than any of its superclasses. If multiple inheritance is used, the resulting "class hierarchy" is a directed graph and not a tree structure. If it is represented as an indented list, then some classes will inevitably be repeated at different positions in the hierarchy. For example, "person" is both an "actor" and a "biological object".

3.12 open world

assumption that the information stored in a knowledge base is incomplete with respect to the universe of discourse it aims to describe

NOTE A term derived from knowledge representation. The incompleteness of a knowledge base can be due to the inability of the maintainer to provide sufficient information, or to more fundamental problems of cognition in the system's domain. Such problems are characteristic of cultural information systems since our records about the past are necessarily incomplete. In addition, some items cannot be clearly assigned to a given class. In particular, the absence of a certain property for an item described in the system does not necessarily entail that the item does not possess the property. For example, if one item is described as "biological object" and another as "physical object", this does not imply that the latter is not also a "biological object". Therefore, complements of a class with respect to a superclass cannot be *derived* in general from an information system based on the open world assumption.

3.13 primitive concept

concept that is declared and for which the meaning is clear, but which cannot be derived from other concepts

NOTE Primitive concept is a term derived from knowledge representation. For example, *mother* can be described as a female who has given birth to a child, so *mother* is not a primitive concept. *Event* however is a primitive concept. The CRM is composed primarily of primitive concepts.

3.14 property

defining characteristic that serves to define a relationship of a specific kind between two classes

NOTE A property is characterized by an intension, which is conveyed by a scope note. A property plays a role analogous to a *verb* in that it need be defined with reference to both a domain and range, which are analogous to the *subject* and *object* in a phrase (unlike classes, which can be defined independently). Which class is selected as the domain and which as the range, is arbitrary, as is the choice between active and passive voice. In other words, a property can be interpreted in both directions, with two distinct but related interpretations. Properties can themselves have properties that relate to other classes. (This feature is used in this model only in order to describe dynamic subtyping of properties.) Properties can also be *specialized* in the same manner as classes, resulting in *IsA* relationships between subproperties and their superproperties. For example, “physical man-made thing *depicts* CRM entity” is equivalent to “CRM entity *is depicted by* physical man-made thing”.

3.15

query containment

query *X* contains another query *Y* if, for each possible population of a database, the answer set to query *X* also contains the answer set to query *Y*

NOTE If query *X* and *Y* were classes, then *X* would be a superclass of *Y*.

3.16

range

class that comprises all the potential values of a property

NOTE Instances of a property can only link to instances of its range class. A property needs to have exactly one range, though the range class can also contain instances that are not values of the property. The range class is analogous to the grammatical *object* of a phrase, while the property is analogous to the *verb*. Which class is selected as domain, and which as range, is arbitrary, as is the choice between active and passive voice. Property names in the CRM are designed to be semantically meaningful and grammatically correct when read from domain to range. The inverse property name, given in parentheses, is designed to be semantically meaningful and grammatically correct when read from range to domain.

3.17

scope note

textual description of the intension of a class or property

NOTE Scope notes are not formal modelling constructs but are provided to help explain the intended meaning and application of the CRM's classes and properties. Basically, they refer to a conceptualization shared by domain experts and disambiguate different possible interpretations. Illustrative examples of classes and properties are also provided with the scope notes for explanatory purposes.

3.18

shortcut

formally defined single property that represents a *deduction* or *join* of a data path in the CRM

NOTE 1 The scope notes of shortcut properties provide a verbal description of the equivalent deduction. Shortcuts are introduced for those cases where common documentation practice refers only to the deduction rather than to the fully developed path. For example, museums often only record the “dimension” of an object without documenting the E16 measurement activity that observed it. The CRM allows shortcuts as cases of less detailed knowledge, while preserving in its schema the relationship to the full information.

NOTE 2 See also 5.3.

3.19

strict inheritance

properties inheritance that allows no exceptions

NOTE Some systems can declare that “elephants are grey”, and regard a white elephant as an exception. Under strict inheritance rules it would hold that if all elephants were indeed grey, then a white elephant could not be an elephant. Obviously not all elephants are grey; being grey is not part of the intension of the concept elephant but an optional property. The CRM applies strict inheritance as a normalization principle.

3.20

subclass

specialization of another class, i.e. the superclass

NOTE A subclass inherits *all* the properties of its superclass (i.e. strict inheritance), in addition to having none, one, or more additional properties of its own. A subclass can have more than one immediate superclass, and consequently inherits the properties of all of its superclasses (i.e. multiple inheritance). A subclass has an *IsA* relationship to its superclass(es): every instance of the subclass is also, by definition, an instance of the superclass(es). For example, every “person” *IsA* “biological object”.

3.21

subproperty

specialization of another property, i.e. the superproperty

NOTE 1 All instances of a subproperty are also instances of its superproperty. The intension of a subproperty extends the intension of its superproperty, i.e. its *traits* are more restrictive than that of its superproperty. The domain of a subproperty is a subclass of the domain of its superproperty. The range of a subproperty is a subclass of the range of its superproperty. Instances of a subproperty inherit the definition of *all* of the properties declared for its superproperty without exceptions (strict inheritance), in addition to having none, one, or more properties of their own.

NOTE 2 A subproperty can have more than one immediate superproperty and consequently inherits the properties of all of its superproperties (multiple inheritance). The *IsA relationship* or *specialization* between two or more properties gives rise to the structure we call a *property hierarchy*. The *IsA relationship* is transitive and can not be cyclic. In some object-oriented languages, including C++, there is no equivalent to the specialization of properties.

3.22

superclass

generalization of one or more other classes, i.e. the subclasses

NOTE A superclass *subsumes* all instances of its subclasses, and can also have additional instances that do not belong to any of its subclasses. The intension of the superclass is less restrictive than any of its subclasses. The *subsumption relationship* or *generalization* is the inverse of the *IsA relationship* or *specialization*. In some contexts (e.g. the programming language C++) the term *parent class* is used synonymously with superclass. For example, “biological object *subsumes* person” is synonymous with “biological object is a *superclass* of person”. Fewer properties are needed to identify an item as a “biological object” than to identify it as a “person”.

3.23

superproperty

generalization of one or more other properties, i.e. the subproperties

NOTE A superproperty *subsumes* all instances of its subproperties, and can also have additional instances that do not belong to any of its subproperties. The intension of the superproperty is less restrictive than any of its subproperties. The *subsumption relationship* or *generalization* is the inverse of the *IsA relationship* or *specialization*.

4 Structure and presentation

4.1 Property quantifiers

Quantifiers for properties are provided for the purpose of semantic clarification only, and should *not* be treated as implementation recommendations. This International Standard has been designed to accommodate alternative opinions and incomplete information; *all* properties should therefore be implemented as optional and repeatable for their domain and range (“many to many (0,n:0,n)”). The term “cardinality constraints” is avoided here as it typically pertains to implementations.

Table 1 lists all possible property quantifiers occurring in this document according to their notation, together with a textual explanation. In order to provide optimal clarity, two widely accepted notations are used in this International Standard, i.e. one verbal, the other numerical. The verbal notation uses phrases such as “one to many”, and the numerical notation expressions such as “(0,n:0,1)”. The terms “one”, “many” and “necessary” are fairly intuitive; the term “dependent” is less obvious. It denotes a situation where a range instance cannot exist without an instance of the respective property. In other words, the property is “necessary” for its range.

Table 1 — Property quantifiers

Quantifier	Description
many to many (0,n:0,n)	Unconstrained: an individual domain instance and range instance of this property can have zero, one, or more instances of the property. In other words, the property is optional and repeatable for its domain and range.
one to many (0,n:0,1)	An individual domain instance of this property can have zero, one, or more instances of the property, but an individual range instance cannot be referenced by more than one instance of this property. In other words, the property is optional for its domain and range, but repeatable for its domain only. This situation is sometimes called a “fan-out”.
many to one (0,1:0,n)	An individual domain instance of this property can have zero or one instance of the property, but an individual range instance can be referenced by zero, one, or more instances of the property. In other words, the property is optional for its domain and range, but repeatable for its range only. This situation is sometimes called a “fan-in”.
many to many, necessary (1,n:0,n)	An individual domain instance of this property can have one or more instances of the property, but an individual range instance can have zero, one, or more instances of the property. In other words, the property is necessary and repeatable for its domain, and optional and repeatable for its range.
one to many, necessary (1,n:0,1)	An individual domain instance of this property can have one or more instances of the property, but an individual range instance cannot be referenced by more than one instance of the property. In other words, the property is necessary and repeatable for its domain, and optional but not repeatable for its range. This situation is sometimes called a “fan-out”.
many to one, necessary (1,1:0,n)	An individual domain instance of this property shall have exactly one instance of the property, but an individual range instance can be referenced by zero, one, or more instances of the property. In other words, the property is necessary and not repeatable for its domain, and optional and repeatable for its range. This situation is sometimes called a “fan-in”.
one to many, dependent (0,n:1,1)	An individual domain instance of this property can have zero, one, or more instances of the property, but an individual range instance shall be referenced by exactly one instance of the property. In other words, this property is optional and repeatable for its domain, but necessary and not repeatable for its range. This situation is sometimes called a “fan-out”.
one to many, necessary, dependent (1,n:1,1)	An individual domain instance of this property can have one or more instances of the property, but an individual range instance shall be referenced by exactly one instance of the property. In other words, the property is necessary and repeatable for its domain, and necessary but not repeatable for its range. This situation is sometimes called a “fan-out”.
many to one, necessary, dependent (1,1:1,n)	An individual domain instance of this property shall have exactly one instance of the property, but an individual range instance can be referenced by one or more instances of the property. In other words, this property is necessary and not repeatable for its domain, and necessary and repeatable for its range. This situation is sometimes called a “fan-in”.
one to one (1,1:1,1)	An individual domain instance and range instance of this property shall have exactly one instance of the property. In other words, the property is necessary and not repeatable for its domain and for its range.
NOTE Some properties are defined as being necessary for their domain or as being dependent on their range. If such properties are not specified for an instance of the respective domain or range, it means that the property exists, but that the value on one side of the property is unknown. In the case of optional properties, no distinction is made between a value being unknown or the property not being applicable at all. For example, one can know that an object has an owner, but not know who the owner is, or know that an object has no owner. The model makes no distinction between these two cases. A textual note can be used for clarification if needed.	

4.2 Naming conventions

The following naming conventions have been applied hereafter:

- Classes are identified by numbers⁴⁾ preceded by the letter “E” (historically classes were sometimes referred to as “Entities”), and are named using noun phrases (nominal groups) in title case (initial capitals). For example, *E63 Beginning of Existence*.
- Properties are identified by numbers preceded by the letter “P,” and are named in both directions, using verbal phrases in lower case. Properties with the character of states are named in the present tense, such as “has type”, whereas properties relating to events are named in past tense, such as “carried out”. For example, *P126 employed (was employed by)*.
- Property names should be read in their non-parenthetical form for the domain-to-range direction, and in parenthetical form for the range-to-domain direction.
- Properties with a range that is a subclass of *E59 Primitive Value* (such as *E1 CRM Entity.P2 has note: E62 String*) have no parenthetical name form as reading the property name in the range-to-domain direction is not regarded as meaningful.
- Properties that have identical domain and range are either symmetric or transitive. Instantiating a symmetric property implies that the relation holds for both the domain-to-range and the range-to-domain directions. An example of this is *E53 Place.P122 borders with: E53 Place*. The names of symmetric properties have no parenthetical form, because reading in the range-to-domain direction is the same as the domain-to-range reading. Transitive asymmetric properties, such as *E4 Period. P9 consists of (forms part of): E4 Period*, do have a parenthetical form that relates to the meaning of the inverse direction.
- The choice of property domains, and hence the order of their names, is established in accordance with the following priority list:
 - 1) Temporal Entity and its subclasses;
 - 2) Thing and its subclasses;
 - 3) Actor and its subclasses;
 - 4) Other.

5 Modelling principles

5.1 Monotonicity

Because this International Standard's primary role is the meaningful integration of information in an Open World, it aims to be monotonic in the sense of Domain Theory. Existing constructs, and deductions made from them, shall always remain valid and well-formed, i.e. even if new constructs and extensions are added.

For example, one may add a subclass of *E7 Activity* to describe the use of a certain name for a place over a certain time-span by a particular group. By this extension, no existing *IsA Relationships* or property inheritances are compromised.

In addition, this International Standard aims to enable the formal preservation of monotonicity when augmenting a compatible system. Existing instances, their properties, and deductions made from them, should always remain valid and well-formed even as new instances are added to the system.

4) Some gaps are present in the numbering sequence used for classes and properties. This is intentional: numbers assigned in previous versions of the CRM to deprecated classes and properties have not been re-used.

For example, if someone describes correctly that an item is an instance of *E19 Physical Object* and, subsequently, it is correctly characterized as an instance of *E20 Biological Object*, the system should not stop treating it as an instance of *E19 Physical Object*.

In order to formally preserve monotonicity in cases where opinions diverge, all formally defined properties should be implemented with unconstrained cardinality (many:many) so that conflicting instances of properties are merely accumulated. Knowledge stored in a conformant system can thus serve as a research base, accumulating relevant alternative opinions around well-defined entities. Conclusions about the truth or falsehood of the instances stored remain the subject of open-ended scientific or scholarly hypothesis building.

For example, “El Greco” and even “King Arthur” should be treated as instances of *E21 Person* and be dealt with as existing within the domain of discourse once they are entered into a knowledge base. Alternative opinions about properties, such as their birthplace and the details of their lives, may be accumulated without decisions concerning their veracity being required during data compilation.

5.2 Minimality

Although the scope of this International Standard is very broad, the ontology itself is constructed as economically as possible.

- A class is not declared unless it is required as the domain or range of a property not appropriate to its superclass, or it is a key concept in the *practical scope*.
- Classes and properties that share a superclass are *non-exclusive* by default. For example, an object may be both an instance of *E20 Biological Object* and *E22 Man-made Object*.
- Classes and properties are either primitive, or constitute key concepts in the practical scope.
- Complements of classes are not declared.

5.3 Shortcuts

Some properties are declared as shortcuts of longer, more comprehensively articulated paths that connect the same domain and range classes as the shortcut property via one or more intermediate classes. For example, the property *E18 Physical Thing* *P52 has current owner*: *E39 Actor*, is a shortcut for a fully articulated path from *E18 Physical Thing* through *E8 Acquisition* to *E39 Actor*. An instance of the fully-articulated path always implies an instance of the shortcut property. However, the inverse may not be true; an instance of the fully-articulated path cannot always be inferred from an instance of the shortcut property.

5.4 Disjointness

Classes are disjoint if they share no common instances in any possible world. There are many examples of disjoint classes in the CRM.

A comprehensive declaration of all possible disjoint class combinations afforded by the CRM has not been provided here; it would be of questionable practical utility and would easily become inconsistent with the goal of providing a concise definition. However, the two following examples of disjoint class pairs are fundamental to an effective comprehension of the CRM ontology.

5.4.1 E2 Temporal Entity is disjoint from E77 Persistent Item

Instances of the class *E2 Temporal Entity* perish, whereas instances of the class *E77 Persistent Item* endure. Even though instances of *E77 Persistent Item* have a limited existence in time, they are fundamentally different in nature from instances of *E2 Temporal Entity* because they preserve their identity between events. Declaring enduring and perishing entities as disjoint classes is consistent with the distinctions made in data structures that fall within the CRM's practical scope.

5.4.2 E18 Physical Thing is disjoint from E28 Conceptual Object

Instances of *E18 Physical Thing* and *E28 Conceptual Object* differ in many fundamental ways; for example, the production of instances of *E18 Physical Thing* implies the incorporation of physical material, whereas the production of instances of *E28 Conceptual Object* does not. Similarly, instances of *E18 Physical Thing* cease to exist when destroyed, whereas an instance of *E28 Conceptual Object* perishes only when it is forgotten and its last physical carrier is destroyed.

5.5 Types

Virtually all structured descriptions of museum objects begin with a unique object identifier and information about the “type” of the object, often in a set of fields with names like “Object Type”, “Object Name”, “Category”, “Classification”, etc. All these fields are used for terms that declare the object to be a member of a particular class or category of items, and are described by the CRM as instances of *E55 Type*. Since the instances of this class are themselves classes, *E55 Type* is in fact a *metaclass*.

The class *E1 CRM Entity* is the domain of the property *P2 has type (is type of)*, which has the range *E55 Type*. Consequently, every class in the CRM, with the exception of *E59 Primitive Value*, inherits the property *P2 has type (is type of)*. This provides a general mechanism for refining the classification of CRM instances to any level of detail, by linking to external vocabulary sources, thesauri, classification schema, or ontologies that function as *extensions* to the class and property hierarchies. These external vocabularies do not themselves fall within the scope of the CRM ontology.

The class *E55 Type* also serves as the range of properties that relate to categorical knowledge commonly found in cultural documentation. For example, the property *P125 used object of type (was type of object used in)* enables the CRM to express statements such as “this casting was produced using a mould”, meaning that an unknown or unmentioned instance of “mould” was used. This enables the specific instance of the casting to be associated with the entire class of manufacturing devices known as moulds. Further, objects of type “mould” can be related via *P2 has type (is type of)* to the same term. This indirect relationship may actually help in detecting an unknown object in an integrated environment. On the other hand, a particular mould may be directly associated with a casting via *P16 used specific object (was used for)*. Statistical questions as to how many objects in a certain collection were made with moulds can be answered correctly by following both paths through P16-P2 and P125. This consistent treatment of categorical knowledge significantly enhances the ontology's ability to integrate cultural information.

Some properties in this International Standard are associated with an additional property. These are numbered with a “.1” extension. These do not appear in the property hierarchy list but are included as part of the property declarations and referred to in the class declarations. For example, *P62.1 mode of depiction: E55 Type* is associated with *E24 Physical Man-made Thing*. *P62 depicts (is depicted by): E1 CRM Entity*. The range of these properties of properties always falls within the type hierarchy *E55 Type*. Their purpose is to allow dynamic extensions to their parent property through the use of property subtypes declared as instances of *E55 Type*. This function is analogous to that of the *P2 has type (is type of)* property, which all classes inherit from *E1 CRM Entity*. System implementations and schemas that do not support properties of properties may use dynamic subtyping of the parent properties instead.

Finally, types play a central role in the history of human understanding; they are intellectual products, and documentation about their history and justification by physical evidence (particularly in disciplines such as archaeology and natural history) falls squarely within the intended scope of the CRM ontology. Therefore types are modelled as “conceptual objects”, in parallel with their structural role as metaclasses. This approach elegantly addresses the dual nature of types in a manner consistent with material culture and natural history documentation.

5.6 Extensions

Since the intended scope of this International Standard is a subset of the “real” world, it is potentially unlimited. Consequently, the model has been designed to be extensible through the linkage of compatible external type hierarchies.

For extensions with the CRM ontology to remain compatible, data structured using an extension shall also remain valid as an instance of an existing class or property. In practical terms this implies query containment: any query based on concepts defined by this International Standard should retrieve the same result set, whether or not extensions have been implemented. For example, a query such as “list all events” should recall all instances that fall within the scope of *E5 Event*, regardless of how they are classified by extended semantics.

A sufficient condition for the compatibility of an extension to this International Standard is that existing classes subsume all classes of the extension, and that all properties of the extension are either subsumed by existing properties, or are part of a path for which an existing property is a shortcut.

5.7 Coverage of intended scope

Of necessity, some concepts covered by this International Standard are less thoroughly elaborated than others: *E39 Actor* and *E30 Right*, for example. This is a natural consequence of staying within the practical scope in an intrinsically unlimited domain of discourse. These “underdeveloped” concepts can be considered as hooks for compatible extensions.

The CRM ontology provides a number of mechanisms to ensure that coverage of the intended scope is nonetheless complete.

- a) Existing high-level classes can be extended, either structurally as subclasses or dynamically using the type hierarchy.
- b) Existing high-level properties can be extended, either structurally as subproperties or in some cases dynamically, using properties of properties that allow subtyping.
- c) Additional information that falls outside the semantics formally defined by this International Standard can be recorded as unstructured data using *E1 CRM Entity.P3 has note: E62 String*.

With mechanisms a) and b), the existing concepts subsume and thereby cover the extensions.

With mechanism c), information is accessible at the appropriate point in the respective knowledge base. This approach is preferable when detailed, targeted queries are not expected. In general, only those concepts used for formal querying need to be explicitly modelled.

6 Class declarations

All classes are declared in this clause using the following format:

- Class names are presented as headings in bold face, preceded by the class' unique identifier.
- The line **Subclass of** declares the superclass of the class from which it inherits properties.
- The line **Superclass of** is a cross-reference to the subclasses of this class.
- The line **Scope note** contains the textual definition of the concept the class represents.
- The line **Properties** declares the list of the class' properties.
- Each property is represented by its unique identifier, its forward and reverse names, and the range class that it links to, separated by a colon.
- Inherited properties are not represented.
- Properties of properties are shown indented and in parentheses beneath their respective domain property.

E1 CRM Entity

Subclass of	
Superclass of	E2 Temporal Entity E52 Time-Span E53 Place E54 Dimension E77 Persistent Item
Scope note	This class comprises all things in the universe of discourse of the CIDOC Conceptual Reference Model. It is an abstract concept providing for three general properties: - Identification by name or appellation. - Classification by type, allowing further refinement of the specific subclass to which an instance belongs. - Attachment of free text for the expression of anything not captured by formal properties. With the exception of E59 Primitive Value, all other classes within the CRM are directly or indirectly specializations of E1 CRM Entity.
Examples	The earthquake in Lisbon 1755 (E5)
Properties	P1 is identified by (identifies): E41 Appellation P2 has type (is type of): E55 Type P3 has note: E62 String (P3.1 has type: E55 Type)

E2 Temporal Entity

Subclass of	E1 CRM Entity
Superclass of	E3 Condition State E4 Period
Scope note	This class comprises all phenomena, such as instances of E4 Period and E5 Event, which happen over a limited extent in time. In some contexts, these are also called perdurants. This class is disjoint from E77 Persistent Item. E2 Temporal Entity is an abstract class and has no direct instances. It is specialized into E4 Period, which applies to a particular geographic area (defined with a greater or lesser degree of precision), and E3 Condition State, which applies to instances of E18 Physical Thing.
Examples	Bronze Age (E4) The earthquake in Lisbon 1755 (E5) The Peterhof Palace near Saint Petersburg being in ruins from 1944 to 1946 (E3)
Properties	P4 has time-span (is time-span of): E52 Time-Span P114 is equal in time to: E2 Temporal Entity P115 finishes (is finished by): E2 Temporal Entity P116 starts (is started by): E2 Temporal Entity P117 occurs during (includes): E2 Temporal Entity P118 overlaps in time with (is overlapped in time by): E2 Temporal Entity P119 meets in time with (is met in time by): E2 Temporal Entity P120 occurs before (occurs after): E2 Temporal Entity

E3 Condition State

Subclass of	E2 Temporal Entity
Superclass of	
Scope note	This class comprises the states of objects characterized by a certain condition over a time-span. It describes the prevailing physical condition of any material object or feature during a specific E52 Time Span. The nature of that condition can be described using <i>P2 has type</i>. For example, the E3 Condition State “condition of the SS Great Britain between 22 September 1846 and 27 August 1847” can be characterized as E55 Type “wrecked”.
Examples	The “Amber Room” in Tsarskoje Selo being completely reconstructed from summer 2003 until now The Peterhof Palace near Saint Petersburg being in ruins from 1944 to 1946 The condition of my turkey in the oven at 14:30 on 25 December, 2002 (P2 has type E55 Type “still not cooked”)
Properties	P5 consists of (forms part of): E3 Condition State

E4 Period

Subclass of	E2 Temporal Entity
Superclass of	E5 Event
Scope note	This class comprises sets of coherent phenomena or cultural manifestations bounded in time and space. It is the social or physical coherence of these phenomena that identify an E4 Period and not the associated spatio-temporal bounds. These bounds are a mere approximation of the actual process of growth, spread and retreat. Consequently, different periods can overlap and coexist in time and space, such as when a nomadic culture exists in the same area as a sedentary culture. Typically this class is used to describe prehistoric or historic periods such as the "Neolithic Period", the "Ming Dynasty", or the "McCarthy Era". There are however no assumptions about the scale of the associated phenomena. In particular all events are seen as synthetic processes consisting of coherent phenomena. Therefore E4 Period is a superclass of E5 Event. For example, a modern clinical E67 Birth can be seen as both an atomic E5 Event and as an E4 Period that consists of multiple activities performed by multiple instances of E39 Actor. Artistic style may be modelled as E4 Period. There are two different conceptualisations of "style", defined either by physical features or by historical context. For example, "Impressionism" can be viewed as a period lasting from approximately 1870 to 1905 during which paintings with particular characteristics were produced by a group of artists that included (among others) Monet, Renoir, Pissarro, Sisley and Degas. Alternatively, it can be regarded as a style applicable to all paintings sharing the characteristics of the works produced by the Impressionist painters, regardless of historical context. The first interpretation is consistent with E4 Period, and the second defines morphological object types that fall under E55 Type. Another specific case of an E4 Period is the set of activities and phenomena associated with a settlement, such as the populated period of Nineveh.
Examples	Jurassic European Bronze Age Italian Renaissance Thirty Years War Sturm und Drang Cubism
Properties	P7 took place at (witnessed): E53 Place P8 took place on or within (witnessed): E19 Physical Object P9 consists of (forms part of): E4 Period P10 falls within (contains): E4 Period P132 overlaps with: E4 Period P133 is separated from: E4 Period

E5 Event

Subclass of	E4 Period
Superclass of	E7 Activity E63 Beginning of Existence E64 End of Existence
Scope note	This class comprises changes of states in cultural, social, or physical systems, regardless of scale, brought about by a series or group of coherent physical, cultural, technological, or legal phenomena. Such changes of state will affect instances of E77 Persistent Item or its subclasses. The distinction between an E5 Event and an E4 Period is partly a question of the scale of observation. Viewed at a coarse level of detail, an E5 Event is an “instantaneous” change of state. At a fine level, the E5 Event can be analysed into its component phenomena within a space and time frame, and as such can be seen as an E4 Period. The reverse is not necessarily the case: not all instances of E4 Period give rise to a noteworthy change of state.
Examples	The birth of Cleopatra (E67) The destruction of Lisbon by earthquake in 1755 (E6) World War II (E7) The Battle of Stalingrad (E7) The Yalta Conference (E7) My birthday celebration 28-6-1995 (E7) The falling of a tile from my roof last Sunday The CIDOC Conference 2003 (E7)
Properties	P11 had participant (participated in): E39 Actor P12 occurred in the presence of (was present at): E77 Persistent Item

E6 Destruction

Subclass of	E64 End of Existence
Superclass of	
Scope note	This class comprises events that destroy one or more instances of E18 Physical Thing such that they lose their identity as the subjects of documentation. Some destruction events are intentional, while others are independent of human activity. Intentional destruction may be documented by classifying the event as both an E6 Destruction and E7 Activity. The decision to document an object as destroyed, transformed or modified is context-sensitive. a) If the matter remaining from the destruction is not documented, the event is modelled solely as E6 Destruction. b) An event should also be documented using E81 Transformation if it results in the destruction of one or more objects and the simultaneous production of others using parts or material from the original. In this case, the new items have separate identities. Matter is preserved, but identity is not. c) When the initial identity of the changed instance of E18 Physical Thing is preserved, the event should be documented as E11 Modification.
Examples	The destruction of Lisbon by earthquake in 1755 The destruction of Nineveh (E6, E7) The breaking of a champagne glass yesterday by my dog The shooting of the last wolf in Germany in 1729 (E6, E7)
Properties	P13 destroyed (was destroyed by): E18 Physical Thing

E7 Activity

Subclass of	E5 Event
Superclass of	E8 Acquisition E9 Move E10 Transfer of Custody E11 Modification E13 Attribute Assignment E65 Creation E66 Formation
Scope note	This class comprises actions intentionally carried out by instances of E39 Actor that result in changes of state in the cultural, social, or physical systems documented. This notion includes complex, composite, and long-lasting actions such as the building of a settlement or a war, as well as simple, short-lived actions such as the opening of a door.
Examples	The Battle of Stalingrad The Yalta Conference My birthday celebration 28-6-1995 The writing of "Faust" by Goethe (E65) The formation of the Bauhaus 1919 (E66)
Properties	P14 carried out by (performed): E39 Actor (P14.1 in the role of: E55 Type) P15 was influenced by (influenced): E1 CRM Entity P16 used specific object (was used for): E70 Thing (P16.1 mode of use: E55 Type) P17 was motivated by (motivated): E1 CRM Entity P19 was intended use of (was made for): E71 Man-Made Thing (P19.1 mode of use: E55 Type) P20 had specific purpose (was purpose of): E7 Activity P21 had general purpose (was purpose of): E55 Type P125 used object of type (was type of object used in): E55 Type P134 continued (was continued by): E7 Activity

E8 Acquisition

Subclass of	E7 Activity
Superclass of	
Scope note	This class comprises transfers of legal ownership from one or more instances of E39 Actor to one or more other instances of E39 Actor. The class also applies to the establishment or loss of ownership of instances of E18 Physical Thing. It does not, however, imply changes of any other instances of E30 Right. Nor does it require the donor and/or recipient to be included, known or even to exist. Depending on the circumstances, it may describe a) the beginning of ownership, b) the end of ownership, c) the transfer of ownership, d) the acquisition from an unknown source, or e) the loss of title due to destruction of the item. It may also describe events where a collector appropriates legal title, for example by annexation or field collection. The interpretation of the museum notion of “accession” differs between institutions. The CRM therefore models legal ownership and physical custody separately. Institutions will then model their specific notions of accession and deaccession as combinations of these.
Examples	The collection of a hammer-head shark, <i>genus Sphyrna</i> (Carchariniformes), by John Steinbeck and Edward Ricketts at Puerto Escondido in the Gulf of Mexico on March 25th, 1940 The acquisition of El Greco's “The Apostles Peter and Paul” by the State Hermitage in Saint Petersburg The loss of my stuffed <i>Fringilla coelebs</i> due to insect damage last year
Properties	P22 transferred title to (acquired title through): E39 Actor P23 transferred title from (surrendered title of): E39 Actor P24 transferred title of (changed ownership by): E18 Physical Thing

E9 Move

Subclass of	E7 Activity
Superclass of	
Scope note	This class comprises changes of the physical location of the instances of E19 Physical Object. Note that the class E9 Move inherits the property P7 took place at (witnessed): E53 Place. This property should be used to describe the trajectory or a larger area within which a move takes place, whereas the properties P26 moved to (was destination of), P27 moved from (was origin of) describe the start and end points only. Moves may also be documented to consist of other moves (via P9 consists of (forms part of)), in order to describe intermediate stages on a trajectory. In that case, start and end points of the partial moves should match appropriately between each other and with the overall event.
Examples	The relocation of London Bridge from the UK to the USA The movement of the exhibition “Treasures of Tutankhamen” 1976 to 1979
Properties	P25 moved (moved by): E19 Physical Object P26 moved to (was destination of): E53 Place P27 moved from (was origin of): E53 Place

E10 Transfer of Custody

Subclass of	E7 Activity
Superclass of	
Scope note	This class comprises transfers of physical custody of objects between instances of E39 Actor. E10 Transfer of Custody does not require the donor and/or recipient to be included, known or even to exist. Depending on the circumstances it may describe: a) the beginning of custody, b) the end of custody, c) the transfer of custody, or d) the declared loss of an object. The distinction between the legal responsibility for custody and the actual physical possession of the object should be expressed using the property <i>P2 has type (is type of)</i>. A specific case of transfer of custody is theft. The interpretation of the museum notion of “accession” differs between institutions. The CRM therefore models legal ownership and physical custody separately. Institutions will then model their specific notions of accession and deaccession as combinations of these.
Examples	The delivery of the paintings by Secure Deliveries Inc. to the National Gallery The return of Picasso’s “Guernica” to Madrid’s Prado in 1981
Properties	P28 custody surrendered by (surrendered custody through): E39 Actor P29 custody received by (received custody through): E39 Actor P30 transferred custody of (custody transferred through): E18 Physical Thing

E11 Modification

Subclass of	E7 Activity
Superclass of	E12 Production E79 Part Addition E80 Part Removal
Scope note	This class comprises all instances of E7 Activity that create, alter, or change E24 Physical Man-Made Thing. This class includes the production of an item from raw materials, and other so far undocumented objects, and the preventive treatment or restoration of an object for conservation. Since the distinction between modification and production is not always clear, modification is regarded as the more generally applicable concept. This implies that some items may be consumed or destroyed in a modification event, and that others may be produced as a result of it. An event should also be documented using E81 Transformation if it results in the destruction of one or more objects and the simultaneous production of others using parts or material from the originals. In this case, the new items have separate identities. If the instance of the E29 Design or Procedure utilized for the modification prescribes the use of specific materials, they should be documented using properties of the design or procedure, rather than via P126 employed (was employed in) E57 Material.
Examples	The construction of the SS Great Britain (E12) The impregnation of the Vasa warship in Stockholm for preservation after 1956 The transformation of the Enola Gay into a museum exhibit before 1995 (E11, E81) The last renewal of the gold coating of the Toshogu shrine in Nikko, Japan
Properties	P31 has modified (was modified by): E24 Physical Man-Made Thing P32 used general technique (was technique of): E55 Type P33 used specific technique (was used by): E29 Design or Procedure P126 employed (was employed in): E57 Material

E12 Production

Subclass of	E11 Modification E3 Beginning of Existence
Superclass of	
Scope note	This class comprises activities that are designed to, and succeed in, creating one or more new items. It specializes the notion of modification into production. The decision as to whether or not an object is regarded as new is context-sensitive. Normally, items are considered “new” if there is no obvious overall similarity between them and the consumed items and material used in their production. In other cases, an item is considered “new” because it becomes relevant to documentation by a modification. For example, the scribbling of a name on a potsherd may make it a voting token. The original potsherd may not be worth documenting, in contrast to the inscribed one. This entity can be collective, e.g. the printing of a thousand books would normally be considered a single event. An event should also be documented using E81 Transformation if it results in the destruction of one or more objects and the simultaneous production of others using parts or material from the originals. In this case, the new items have separate identities and matter is preserved, but identity is not.
Examples	The construction of the SS Great Britain The recasting of the Little Mermaid at the harbour of Copenhagen The seventh edition of Rembrandt's etching “Woman sitting half-dressed beside a stove”, 1658, Bartsch Number 197
Properties	P108 has produced (was produced by): E24 Physical Man-Made Thing

E13 Attribute Assignment

Subclass of	E7 Activity
Superclass of	E14 Condition Assessment E15 Identifier Assignment E16 Measurement E17 Type Assignment
Scope note	This class comprises the actions of making assertions about properties of an object or any relation between two items or concepts. This class allows the documentation of how the respective assignment came about, and whose opinion it was. All the attributes or properties assigned in such an action can also be seen as directly attached to the respective item or concept, possibly as a collection of contradictory values. All cases of properties in this model that are also described indirectly through an action are characterized as “shortcuts” of this action. This redundant modelling of two alternative views is preferred because many implementations may have good reasons to model either the action or the shortcut, and the relation between both alternatives can be captured by simple rules. In particular, the class describes the actions of people making propositions and statements during certain museum procedures, e.g. the person and date when a condition statement was made, an identifier was assigned, the museum object was measured, etc. Which kinds of such assignments and statements need to be documented explicitly in structures of a schema rather than free text, depends on if this information should be accessible by structured queries.
Examples	The assessment of the current ownership of Martin Doerr's silver cup in February 1997
Properties	P140 assigned attribute to (was attributed by): E1 CRM Entity P141 assigned (was assigned by): E1 CRM Entity

E14 Condition Assessment

Subclass of	E13 Attribute Assignment
Superclass of	
Scope note	This class describes the act of assessing the state of preservation of an object during a particular period. The condition assessment may be carried out by inspection, measurement or through historical research. This class is used to document circumstances of the respective assessment that may be relevant to interpret its quality at a later stage, or to continue research on related documents.
Examples	Last year's inspection of humidity damage to the frescos in the St. George chapel in our village
Properties	P34 concerned (was assessed by): E18 Physical Thing P35 has identified (identified by): E3 Condition State

E15 Identifier Assignment

Subclass of	E13 Attribute Assignment
Superclass of	
Scope note	This class comprises actions assigning or deassigning object identifiers. Examples of such identifiers include Find Numbers and Inventory Numbers. Documenting the act of identifier assignment and deassignment is especially useful when objects change custody or the identification system of an organization is changed. In order to keep track of the identity of an object in such cases, it is important to document by whom, when and for what purpose an identifier is assigned to an object.
Examples	Replacement of the inventory number TA959a by GE34604 for a 17th century lament cloth at the Museum Benaki, Athens
Properties	P36 registered (was registered by): E19 Physical Object P37 assigned (was assigned by): E42 Object Identifier P38 deassigned (was deassigned by): E42 Object Identifier

E16 Measurement

Subclass of	E13 Attribute Assignment
Superclass of	
Scope note	This class comprises actions measuring physical properties and other values that can be determined by a systematic procedure. Examples include measuring the monetary value of a collection of coins or the running time of a specific video cassette. The E16 Measurement may use simple counting or tools, such as yardsticks or radiation detection devices. The interest is in the method and care applied, so that the reliability of the result may be judged at a later stage, or research continued on the associated documents. The date of the event is important for dimensions, which may change value over time, such as the length of an object subject to shrinkage. Details of methods and devices are best handled as free text, whereas basic techniques such as "carbon 14 dating" should be encoded using P2 has type (is type of) E55 Type.
Examples	Measurement of height of silver cup 232 on the 31st August 1997 The carbon 14 dating of the Neolithic spear NE1974-5032 in 1991
Properties	P39 measured (was measured by): E70 Thing P40 observed dimension (was observed in): E54 Dimension

E17 Type Assignment

Subclass of	E13 Attribute Assignment
Superclass of	
Scope note	This class comprises the actions of classifying items of whatever kind. Such items include objects, specimens, people, actions, and concepts. This class allows for the documentation of the context of classification acts in cases where the value of the classification depends on the personal opinion of the classifier, and the date that the classification was made. This class also encompasses the notion of “determination,” i.e. the systematic and molecular identification of a specimen in biology.
Examples	The first classification of object GE34604 as Lament Cloth, October 2nd The determination of a cactus in Martin Doerr’s garden as <i>Cereus hildmannianus</i> K.Schum., July 2003
Properties	P41 classified (was classified by): E1 CRM Entity P42 assigned (was assigned by): E55 Type

E18 Physical Thing

Subclass of	E72 Legal Object
Superclass of	E19 Physical Object E24 Physical Man-Made Thing E26 Physical Feature
Scope note	This class comprises all persistent physical items with a relatively stable form, man-made or natural. Depending on the existence of natural boundaries of such things, the CRM distinguishes the instances of E19 Physical Object from instances of E26 Physical Feature, such as holes, rivers, pieces of land, etc. Most instances of E19 Physical Object can be moved (if not too heavy), whereas features are integral to the surrounding matter. The CRM is generally not concerned with amounts of matter in fluid or gaseous states.
Examples	The Cullinan Diamond (E19) The cave “Ideon Andron” in Crete (E26) The Mona Lisa (E22)
Properties	P44 has condition (condition of): E3 Condition State P45 consists of (is incorporated in): E57 Material P46 is composed of (forms part of): E18 Physical Thing P49 has former or current keeper (is former or current keeper of): E39 Actor P50 has current keeper (is current keeper of): E39 Actor P51 has former or current owner (is former or current owner of): E39 Actor P52 has current owner (is current owner of): E39 Actor P53 has former or current location (is former or current location of): E53 Place P58 has section definition (defines section): E46 Section Definition P59 has section (is located on or within): E53 Place

E19 Physical Object

Subclass of	E18 Physical Thing
Superclass of	E20 Biological Object E22 Man-Made Object
Scope note	This class comprises items of a material nature that are units for documentation and have physical boundaries that separate them completely in an objective way from other objects. The class also includes all aggregates of objects made for functional purposes of whatever kind, independent of physical coherence, such as a set of chessmen. Typically, instances of E19 Physical Object can be moved (if not too heavy). In some contexts, such objects, except for aggregates, are also called “bona fide objects” [2], i.e. naturally defined objects. The decision as to what is documented as a complete item, rather than by its parts or components, may be purely administrative or may be a result of the acquisition history of the item.
Examples	John Smith Aphrodite of Milos The Palace of Knossos The Cullinan Diamond Apollo 13 at the time of launch
Properties	P47 is identified by (identifies): E42 Object Identifier P48 has preferred identifier (is preferred identifier of): E42 Object Identifier P54 has current permanent location (is current permanent location of): E53 Place P55 has current location (currently holds): E53 Place P56 bears feature (is found on): E26 Physical Feature P57 has number of parts: E60 Number

E20 Biological Object

Subclass of	E19 Physical Object
Superclass of	E21 Person
Scope note	This class comprises individual items of a material nature, which live, have lived or are natural products of or from living organisms. Artificial objects that incorporate biological elements, such as Victorian butterfly frames, can be documented as both instances of E20 Biological Object and E22 Man-Made Object.
Examples	Me Tutankhamen Boukephalas Petrified dinosaur excrement PA1906-344
Properties	

E21 Person

Subclass of	E20 Biological Object E39 Actor
Superclass of	
Scope note	This class comprises real persons who live or are assumed to have lived. Legendary figures that may have existed, such as Ulysses and King Arthur, fall into this class if the documentation refers to them as historical figures. In cases where doubt exists as to whether several persons are in fact identical, multiple instances can be created and linked to indicate their relationship. The CRM does not propose a specific form to support reasoning about possible identity.
Examples	Tutankhamen Nelson Mandela
Properties	

E22 Man-Made Object

Subclass of	E19 Physical Object E24 Physical Man-Made Thing
Superclass of	E84 Information Carrier
Scope note	This class comprises physical objects purposely created by human activity. No assumptions are made as to the extent of modification required to justify regarding an object as man-made. For example, an inscribed piece of rock or a preserved butterfly are both regarded as instances of E22 Man-Made Object.
Examples	Mallard (the World's fastest steam engine) The Portland Vase The Coliseum
Properties	

E24 Physical Man-Made Thing

Subclass of	E18 Physical Thing E71 Man-Made Thing
Superclass of	E22 Man-Made Object E25 Man-Made Feature E78 Collection
Scope note	This class comprises all persistent physical items that are purposely created by human activity. This class comprises man-made objects, such as a swords, and man-made features, such as rock art. No assumptions are made as to the extent of modification required to justify regarding an object as man-made. For example, a “cup-and-ring” carving on bedrock is regarded as instance of E24 Physical Man-Made Thing.
Examples	The Forth Railway Bridge (E22) The Channel Tunnel (E25) The Historical Collection of the Museum Benaki in Athens (E78)
Properties	P62 depicts (is depicted by): E1 CRM Entity (P62.1 mode of depiction: E55 Type) P65 shows visual item (is shown by): E36 Visual Item P128 carries (is carried by): E73 Information Object

E25 Man-Made Feature

Subclass of	E24 Physical Man-Made Thing E26 Physical Feature
Superclass of	
Scope note	This class comprises physical features that are purposely created by human activity, such as scratches, artificial caves, artificial water channels, etc. No assumptions are made as to the extent of modification required to justify regarding a feature as man-made. For example, rock art or even a “cup-and-ring” carving on bedrock is regarded as instance of E25 Man-Made Feature.
Examples	The Manchester Ship Canal Michael Jackson’s nose following plastic surgery
Properties	

E26 Physical Feature

Subclass of	E18 Physical Thing
Superclass of	E25 Man-Made Feature E27 Site
Scope note	This class comprises identifiable features that are physically attached in an integral way to particular physical objects. Instances of E26 Physical Feature share many of the attributes of instances of E19 Physical Object. They may have a one-, two- or three-dimensional geometric extent, but there are no natural borders that separate them completely in an objective way from the carrier objects. For example, a doorway is a feature but the door itself, being attached by hinges, is not. Instances of E26 Physical Feature can be features in a narrower sense, such as scratches, holes, reliefs, surface colours, reflection zones in an opal crystal or a density change in a piece of wood. In the wider sense, they are portions of particular objects with partially imaginary borders, such as the core of the Earth, an area of property on the surface of the Earth, a landscape or the head of a contiguous marble statue. They can be measured and dated, and it is sometimes possible to state who or what is or was responsible for them. They cannot be separated from the carrier object, but a segment of the carrier object may be identified (or sometimes removed) carrying the complete feature. This definition coincides with the definition of “fiat objects” [2], with the exception of aggregates of “bona fide objects”.
Examples	The temple in Abu Simbel before its removal, which was carved out of solid rock Albrecht Durer's signature on his painting of Charles the Great The damage to the nose of the Great Sphinx in Giza Michael Jackson's nose prior to plastic surgery
Properties	

E27 Site

Subclass of	E26 Physical Feature
Superclass of	
Scope note	This class comprises pieces of land or sea floor. In contrast to the purely geometric notion of E53 Place, this class describes constellations of matter on the surface of the Earth or other celestial body, which can be represented by photographs, paintings, and maps. Instances of E27 Site are composed of relatively immobile material items and features in a particular configuration at a particular location.
Examples	The Amazon river basin Knossos The Apollo 11 landing site Heathrow Airport The submerged harbour of the Minoan settlement of Gournia, Crete
Properties	

E28 Conceptual Object

Subclass of	E71 Man-Made Thing
Superclass of	E30 Right E55 Type E73 Information Object
Scope note	This class comprises non-material products of our minds, in order to allow for reasoning about their identity, circumstances of creation and historical implications. 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 need not have a particular carrier, but may be found on several different carriers, such as paper, electronic signals, marks, audio media, paintings, photos, human memory, etc. They cannot be destroyed as long as they exist on at least one carrier or in memory. Their existence ends when the last carrier is lost. A finer distinction can be made between products having a clear identity, such as a specific text, or photographs, and the ideas and concepts shared and traded by groups of people.
Examples	Beethoven's "Ode to Joy" The definition of "ontology" in the Oxford English Dictionary The knowledge about the victory at Marathon carried by the famous runner
Properties	

E29 Design or Procedure

Subclass of	E73 Information Object
Superclass of	
Scope note	This class comprises documented plans for the execution of actions in order to achieve a result of a specific quality, form, or contents. In particular it comprises plans for deliberate human activities that result in the modification or production of instances of E24 Physical Man-Made Thing. Instances of E29 Design or Procedure can be structured in parts and sequences or depend on others. This is modelled using P69 is associated with. Designs or procedures can be seen as one of the following: — a schema for the activities it describes; — a schema of the products that result from their application; — an independent intellectual product that may have never been applied, such as Leonardo da Vinci's famous plans for flying machines. Because designs or procedures may never be applied or only partially executed, the CRM models a loose relationship between the plan and the respective product.
Examples	The ISO standardization procedure The musical notation for Beethoven's "Ode to Joy" The architectural drawings for the Kölner Dom in Cologne, Germany Folio 860 of the Codex Atlanticus from Leonardo da Vinci, 1486 to 1490, kept in the Biblioteca Ambrosiana in Milan
Properties	P68 usually employs (is usually employed by): E57 Material P69 is associated with: E29 Design or Procedure

E30 Right

Subclass of	E28 Conceptual Object
Superclass of	
Scope note	This class comprises legal privileges concerning material and immaterial things or their derivatives. These include reproduction and property rights.
Examples	Copyright held by ISO on ISO 21127 Ownership of the “Mona Lisa” by the Louvre
Properties	

E31 Document

Subclass of	E73 Information Object
Superclass of	E32 Authority Document
Scope note	This class comprises identifiable immaterial items that make propositions about reality. These propositions may be expressed in text, graphics, images, audiograms, and videograms or by other similar means. Documentation databases are regarded as a special case of E31 Document. This class should not be confused with the term “document” in Information Technology, which is compatible with E73 Information Object
Examples	The Encyclopaedia Britannica (E32) The photo of the Allied Leaders at Yalta published by UPI, 1945 The Doomsday Book
Properties	P70 documents (is documented in): E1 CRM Entity

E32 Authority Document

Subclass of	E31 Document
Superclass of	
Scope note	This class comprises encyclopaedia, thesauri, authority lists, and other documents that define terminology or conceptual systems for consistent use.
Examples	Webster's Dictionary The Getty Art and Architecture Thesaurus The CIDOC Conceptual Reference Model
Properties	P71 lists (is listed in): E55 Type

E33 Linguistic Object

Subclass of	E73 Information Object
Superclass of	E34 Inscription E35 Title
Scope note	This class comprises identifiable expressions in natural language or languages. Instances of E33 Linguistic Object can be expressed in many ways: e.g. as written texts, recorded speech, or sign language. However, the CRM treats instances of E33 Linguistic Object independently from the medium or method by which they are expressed. Expressions in formal languages, such as computer code or mathematical formulae, are not treated as instances of E33 Linguistic Object by the CRM. These should be treated as instances of E73 Information Object.
Examples	The text of the Ellesmere Chaucer manuscript The lyrics of the song "Blue Suede Shoes" The text of the Jabberwocky by Lewis Carroll The text of "Doktoro Jekyll kaj Sinjoro Hyde" (an Esperanto translation of Dr. Jekyll and Mr. Hyde)
Properties	P72 has language (is language of): E56 Language P73 has translation (is translation of): E33 Linguistic Object

E34 Inscription

Subclass of	E33 Linguistic Object E37 Mark
Superclass of	
Scope note	This class comprises recognizable, short texts that may be attached to instances of E24 Physical Man-Made Thing. The transcription of the text can be documented in a note by <i>P3 has note E62 String</i> . The alphabet used can be documented by <i>P2 has type E55 Type</i> . This class does <i>not</i> intend to describe the idiosyncratic characteristics of an individual physical embodiment of an inscription, but the underlying prototype. The physical embodiment is modelled in the CRM as E24 Physical Man-Made Feature. The relationship of a physical copy of a book to the text it contains is modelled using <i>E84 Information Carrier</i> . <i>P128 carries (is carried by): E33 Linguistic Object</i>
Examples	"Keep off the grass" as found on signs placed in the lawns of Balliol College. The text published in Corpus Inscriptionum Latinarum V 895 "Kilroy was here"
Properties	

E35 Title

Subclass of	E33 Linguistic Object E41 Appellation
Superclass of	
Scope note	This class comprises the names assigned to works, such as texts, artworks, or pieces of music. Titles are proper noun, phrases or verbal phrases, and should not be confused with generic object names such as “chair”, “painting”, or “book” (the latter are common nouns and are modelled in the CRM as instances of E55 Type). Titles may be assigned by the creator of the work itself, or by a social group. This class also comprises the translations of titles that are used as surrogates for the original titles in different social contexts.
Examples	“The Merchant of Venice” “Mona Lisa” “La Pie” or “The Magpie” “Lucy in the Sky with Diamonds”
Properties	

E36 Visual Item

Subclass of	E73 Information Object
Superclass of	E37 Mark E38 Image
Scope note	This class comprises the intellectual or conceptual aspects of recognizable marks and images. This class does not intend to describe the idiosyncratic characteristics of an individual physical embodiment of an inscription, but the underlying prototype. For example, a mark such as the ICOM logo is generally considered to be the same logo when used on any number of publications. The size, orientation, and colour may change, but the logo remains uniquely identifiable. The same is true of images that are reproduced many times. This means that visual items are independent of their physical support. The E36 Visual Item class provides a means of identifying and linking together instances of E24 Physical Man-Made Thing that carry the same visual symbols, marks, or images etc. The property <i>P62 depicts (is depicted by)</i> between E24 Physical Man-Made Features and depicted subjects (E1 CRM Entity) can be regarded as a shortcut of an intermediate instance of E36 Visual Item capturing the optical features of the depiction.
Examples	The visual appearance of Monet’s “La Pie” (E38) The Coca-Cola logo (E34) The Chi-Rho (E37) The communist red star (E37)
Properties	P138 represents (has representation): E1 CRM Entity (P138.1 mode of representation: E55 Type)

E37 Mark

Subclass of	E36 Visual Item
Superclass of	E34 Inscription
Scope note	This class comprises symbols, signs, signatures, or short texts applied to instances of E24 Physical Man-Made Thing by arbitrary techniques in order to indicate the creator, owner, dedications, purpose, etc. This class specifically excludes features that have no semantic significance, such as scratches or tool marks. These should be documented as instances of E25 Man-Made Feature.
Examples	Minoan double axe mark © ☺
Properties	

E38 Image

Subclass of	E36 Visual Item
Superclass of	
Scope note	This class comprises distributions of form, tone, and colour that may be found on surfaces such as photos, paintings, prints, and sculptures or directly on electronic media. The degree to which variations in the distribution of form and colour affect the identity of an instance of E38 Image depends on a given purpose. The original painting of the Mona Lisa in the Louvre may be said to bear the same instance of E38 Image as reproductions in the form of transparencies, postcards, posters, or T-shirts, even though they may differ in size and carrier and may vary in tone and colour. The images in a “spot the difference” competition are not the same with respect to their context, however similar they may at first appear.
Examples	The front side of all Swiss 20 CHF notes The image depicted on all reproductions of the Mona Lisa
Properties	

E39 Actor

Subclass of	E77 Persistent Item
Superclass of	E21 Person E74 Group
Scope note	This class comprises people, either individually or in groups, who have the potential to perform intentional actions for which they can be held responsible. The CRM does not attempt to model the inadvertent actions of such actors. Individual people should be documented as instances of E21 Person, whereas groups should be documented as instances of either E74 Group or its subclass E40 Legal Body
Examples	London and Continental Railways (E40) The Governor of the Bank of England in 1975 (E21) Sir Ian McKellen (E21)
Properties	P74 has current or former residence (is current or former residence of): E53 Place P75 possesses (is possessed by): E30 Right P76 has contact point (provides access to): E51 Contact Point P131 is identified by (identifies): E82 Actor Appellation

E40 Legal Body

Subclass of	E74 Group
Superclass of	
Scope note	This class comprises institutions or groups of people that have obtained a legal recognition as a group and can act collectively as agents. This means that they can perform actions, own property, create or destroy things and can be held collectively responsible for their actions like individual people. The term "personne morale" is often used for this in French.
Examples	Greenpeace Open World Systems The National Museum of Denmark
Properties	

E41 Appellation

Subclass of	E77 Persistent Item
Superclass of	E35 Title E42 Object Identifier E44 Place Appellation E49 Time Appellation E75 Conceptual Object Appellation E82 Actor Appellation
Scope note	This class comprises all proper names, words, phrases or codes, either meaningful or not, that are used or can be used to identify a specific instance of some class within a certain context. Instances of E41 Appellation do not identify objects by their meaning but by convention, tradition, or agreement. From an implementation point of view, the E41 Appellation class is unlike most others, whose instances in a database can be considered as surrogates or references to real-world entities, in that each instance is nothing other than the E41 Appellation itself, i.e. the instance of E41 Appellation "Martin" is nothing other than the name "Martin" which should not be confused with any instance of E21 Person or persons called Martin. Because of this, there are no properties linking to values of E41 Appellation. Specific subclasses of E41 Appellation should be used when instances of E41 Appellation of a characteristic form are used for particular objects. Instances of E49 Time Appellation, for example, which take the form of instances of E50 Date, can be easily recognized. E41 Appellation should not be confused with the act of naming something. Compare E15 Identifier Assignment.
Examples	"Martin" "The Forth Bridge" "The Merchant of Venice" (E35)
Properties	P139 has alternative form: E41 Appellation

E42 Object Identifier

Subclass of	E41 Appellation
Superclass of	
Scope note	This class comprises codes assigned to objects in order to identify them uniquely within the context of one or more organizations. Such codes are often known as inventory numbers, registration codes, etc. and are typically composed of alphanumeric sequences. The class E42 Object Identifier is not normally used for machine-generated identifiers, used for automated processing, unless these are also used by human agents.
Examples	"MM.GE.195" "13.45.1976" "DPS_1000" "OXCMS:1997.4.1"
Properties	

E44 Place Appellation

Subclass of	E41 Appellation
Superclass of	E45 Address E46 Section Definition E47 Spatial Coordinates E48 Place Name
Scope note	This class comprises any sort of identifier characteristically used to refer to an E53 Place. Instances of E44 Place Appellation may vary in their degree of precision and their meaning may vary over time, i.e. the same instance of E44 Place Appellation may be used to refer to several places, either because of cultural shifts, or because objects used as reference points have moved around. Instances of E44 Place Appellation can be extremely varied in form: postal addresses, instances of E47 Spatial Coordinate, and parts of buildings can all be considered as instances of E44 Place Appellation.
Examples	“Vienna” “CH-1211, Genève” “Aquae Sulis Minerva” “Bath” “Cambridge” “The Other Place” “The City”
Properties	

E45 Address

Subclass of	E44 Place Appellation E51 Contact Point
Superclass of	
Scope note	This class comprises mainly postal addresses used for mailing. An E45 Address can be considered both as the name of an E53 Place and as an E51 Contact Point for an E39 Actor. This dual aspect is reflected in the multiple inheritance. However, some forms of mailing addresses, such as a postal box, are only instances of E51 Contact Point, since they do not identify any particular Place. These should not be documented as instances of E45 Address.
Examples	“1-29-3 Otsuka, Bunkyo-ku, Tokyo, 121, Japan” “Rue David Dufour 5, CH-1211, Genève”
Properties	

E46 Section Definition

Subclass of	E44 Place Appellation
Superclass of	
Scope note	This class comprises areas of objects referred to in terms specific to the general geometry or structure of its kind. The “prow” of the boat, the “frame” of the picture, and the “front” of the building are all instances of E46 Section Definition. The class highlights the fact that parts of objects can be treated as locations. This holds in particular for features without natural boundaries, such as the “head” of a marble statue made out of one block (compare. E53 Place). In answer to the question “where is the signature?” one might reply “on the lower left corner”. (Section Definition is closely related to the term “segment” in Reference [3].)
Examples	“The entrance lobby to the Ripley Center” “The poop deck of H.M.S. Victory” “The Venus de Milo’s left buttock” “Left inner side of my box”
Properties	

E47 Spatial Coordinates

Subclass of	E44 Place Appellation
Superclass of	
Scope note	This class comprises the textual or numeric information required to locate specific instances of E53 Place within schemes of spatial identification. Coordinates are a specific form of E44 Place Appellation, that is, a means of referring to a particular E53 Place. Coordinates are not restricted to longitude, latitude, and altitude. Any regular system of reference that maps onto an E19 Physical Object can be used to generate coordinates.
Examples	“6°5’29”N 45°12’13”W” “Black queen’s bishop 4”
Properties	

E48 Place Name

Subclass of	E44 Place Appellation
Superclass of	
Scope note	This class comprises particular and common forms of E44 Place Appellation. Place Names may change their application over time: the name of an E53 Place may change, and a name may be reused for a different E53 Place. Instances of E48 Place Name are typically subject to place name gazetteers ^[4].
Examples	“Greece” “Athens” “Geneva” “Lac Léman”
Properties	

E49 Time Appellation

Subclass of	E41 Appellation
Superclass of	E50 Date
Scope note	This class comprises all forms of names or codes, such as historical periods, and dates, which are characteristically used to refer to a specific E52 Time-Span. The instances of E49 Time Appellation may vary in their degree of precision, and they may be relative to other time frames, "Before Christ" for example. Instances of E52 Time-Span are often defined by reference to a cultural period or an event, e.g. "the duration of the Ming Dynasty".
Examples	"Meiji" "1st half of the 20th century" "Quaternary" "1215 Hegira" "Last century"
Properties	

E50 Date

Subclass of	E49 Time Appellation
Superclass of	
Scope note	This class comprises specific forms of E49 Time Appellation. Dates may vary in their degree of precision.
Examples	"1900" "4-4-1959" "19-MAR-1922" "19640604"
Properties	

E51 Contact Point

Subclass of	E77 Persistent Item
Superclass of	E45 Address
Scope note	This class comprises identifiers used to communicate with instances of E39 Actor. These include e-mail addresses, telephone numbers, post office boxes, fax numbers, etc. Most postal addresses can be considered both as instances of E44 Place Appellation and E51 Contact Point. The E45 Address subclass should be used in such cases.
Examples	+41 22 418 5571 weasel@paveprime.com
Properties	

E52 Time-Span

Subclass of	E1 CRM Entity
Superclass of	
Scope note	This class comprises abstract temporal extents, in the sense of Galilean physics, having a beginning, an end, and a duration. Time Span has no other semantic connotations. Time-Spans are used to define the temporal extent of instances of E4 Period, E5 Event, and any other phenomena valid for a certain time. An E52 Time-Span may be identified by one or more instances of E49 Time Appellation. Since our knowledge of history is imperfect, instances of E52 Time-Span can best be considered as approximations of the actual Time-Spans of temporal entities. The properties of E52 Time-Span are intended to allow these approximations to be expressed precisely. An extreme case of approximation, might, for example, define an E52 Time-Span having unknown beginning, end, and duration. Used as a common E52 Time-Span for two events, it would nevertheless define them as being simultaneous, even if nothing else was known. Automatic processing and querying of instances of E52 Time-Span is facilitated if data can be parsed into an E61 Time Primitive.
Examples	1961 From 12-17-1993 to 12-8-1996 14h30 to 16h22 4th July 1945 9.30 am 1.1.1999 to 2.00 pm 1.1.1999 duration of the Ming Dynasty.
Properties	P78 is identified by (identifies): E49 Time Appellation P79 beginning is qualified by: E62 String P80 end is qualified by: E62 String P81 ongoing throughout: E61 Time Primitive P82 at some time within: E61 Time Primitive P83 had at least duration (was minimum duration of): E54 Dimension P84 had at most duration (was maximum duration of): E54 Dimension P86 falls within (contains): E52 Time-Span

E53 Place

Subclass of	E1 CRM Entity
Superclass of	
Scope note	This class comprises extents in space, in particular on the surface of the earth, in the pure sense of physics, i.e. independent from temporal phenomena and matter. The instances of E53 Place are usually determined by reference to the position of “immobile” objects such as buildings, cities, mountains, rivers, or dedicated geodetic marks. A Place can be determined by combining a frame of reference and a location with respect to this frame. It may be identified by one or more instances of E44 Place Appellation. It is sometimes argued that instances of E53 Place are best identified by global coordinates or absolute reference systems. However, relative references are often more relevant in the context of cultural documentation and tend to be more precise. In particular, we are often interested in position in relation to large, mobile objects, such as ships. For example, the Place at which Nelson died is known with reference to a large mobile object, i.e. H.M.S Victory. A resolution of this Place in terms of absolute coordinates would require knowledge of the movements of the vessel and the precise time of death, either of which may be revised, and the result would lack historical and cultural relevance. Any object can serve as a frame of reference for E53 Place determination. The model foresees the notion of a “section” of an E19 Physical Object as a valid E53 Place determination.
Examples	The extent of the UK in the year 2003 The position of the hallmark on the inside of my wedding ring The place referred to in the phrase: “Fish collected at three miles north of the confluence of the Arve and the Rhone” Here -> <-
Properties	P87 is identified by (identifies): E44 Place Appellation P88 consists of (forms part of): E53 Place P89 falls within (contains): E53 Place P121 overlaps with: E53 Place P122 borders with: E53 Place

E54 Dimension

Subclass of	E1 CRM Entity
Superclass of	
Scope note	This class comprises quantifiable properties that are measured by some calibrated means and can be approximated by numerical values. An instance of E54 Dimension is thought to be the true quantity, independent from its numerical approximation, e.g. in inches or in centimetres. The properties of the class E54 Dimension allow for expressing the numerical approximation. It is recommended to record all numerical approximations of instances of E54 Dimension as intervals of indeterminacy. Numerical approximations in archaic instances of E58 Measurement Unit used in historical records should be preserved. Equivalents corresponding to current knowledge should be recorded as additional instances of E54 Dimension as appropriate.
Examples	Currency: £26,00 Length: 3,9 cm to 4,1 cm Diameter: 26 mm Weight: 150 lbs Density: 0,85 g/cm³ Luminescence: 56 ISO lumens Tin content: 0,46 % Height: 15 hands Calibrated C14 date: 2 460 years to 2 720 years, etc.
Properties	P90 has value: E60 Number P91 has unit (is unit of): E58 Measurement Unit

E55 Type

Subclass of	E28 Conceptual Object
Superclass of	E56 Language E57 Material E58 Measurement Unit
Scope note	This class comprises arbitrary concepts (universals) and provides a mechanism for organizing them into a hierarchy. This hierarchy is intended to duplicate the names of all the classes present in the model. This allows additional refinement, through subtyping, of those classes which do not require further analysis of their formal properties, but which nonetheless represent typological distinctions important to a given user group. It should be noted that the Model does not make the distinction between classes and types known from some knowledge representation systems and object-oriented programming languages. The E55 Type class can be regarded as a metaclass (a class whose instances are universals), used to denote a user-defined specialization of some class or property of the Model, without introducing any additional formal properties for this specialization. It reflects the characteristic use of the term “object type” for naming data fields in museum documentation and particularly the notion of typology in archaeology. It has however nothing to do with the term “type” in Natural History (compare E83 Type Creation), but it includes the notion of a “taxon”. Ideally, instances of the E55 Type class should be organized into thesauri, with scope notes, illustrations, etc. to clarify their meaning. In general, it is expected that different domains and cultural groups will develop different thesauri in parallel. Consistent reasoning on the expansion of subterms used in a thesaurus is possible insofar as it conforms to both the classes and the hierarchies of the model. E56 Language, E57 Material and E58 Measurement Unit have been defined explicitly as elements of the E55 Type hierarchy because they do not correspond to an explicit class in the Model, e.g. the property instance “consists of gold” does not refer to a particular instance of gold.
Examples	Mass, length, and depth are types of Dimensions Portrait, sketch, animation could be types of depictions French, English and German are languages Excellent, good, poor could be types of Condition States Ford Model T and chop stick are types of E22 Man-Made Object Cave, doline, scratch are types of E26 Physical Feature Poem and short story are types of E33 Linguistic Object Wedding, earthquake, skirmish are types of E5 Event.
Properties	P127 has broader term (has narrower term): E55 Type P137 is exemplified by (exemplifies): E1 CRM Entity P137.1 in the taxonomic role: E55 Type

E56 Language

Subclass of	E55 Type
Superclass of	
Scope note	This type comprises all natural languages as concepts. ISO codes should be used (ISO 639, Codes for the representation of names of languages^[6]). This type does not correspond to an explicit class in the Model.
Examples	el Greek en English eo Esperanto es Spanish fr French
Properties	

E57 Material

Subclass of	E55 Type
Superclass of	
Scope note	This type comprises all materials as concepts. Terms for instances of E57 Material may denote properties of matter before its use, during its use, and as incorporated in an object, such as ultramarine powder, tempera paste, reinforced concrete. Internationally used codes and terminology are recommended. Discrete pieces of raw materials kept in museums, such as bricks, sheets of fabric, or pieces of metal should be modelled individually in the same way as other objects. Discrete used or processed pieces, such as the stones from Nefer Titi's temple, should be modelled as parts (compare P46 is composed of). This type does not correspond to an explicit class in the Model.
Examples	Brick Gold Aluminium Polycarbonate Resin
Properties	

E58 Measurement Unit

Subclass of	E55 Type
Superclass of	
Scope note	This type provides the authority list for all types of measurement units: feet, inches, centimetres, litres, lumens, etc. The International System (SI) of units or internationally recognized non-SI terms should be used whenever possible (see ISO 1000^[7]). Archaic measurement units used in historical records should be preserved. This type does not correspond to an explicit class in the Model.
Examples	cm centimetre km kilometre m meter m/s meters per second A ampere GRD Greek Drachma °C
Properties	

E59 Primitive Value

Subclass of	
Superclass of	E60 Number E61 Time Primitive E62 String
Scope note	This class comprises primitive values used as documentation elements, which are not further elaborated upon within the model. As such they are not considered as elements within our universe of discourse. No specific implementation recommendations are made.
Examples	ABCDEF G 3.14 0 1921-01-01
Properties	

E60 Number

Subclass of	E59 Primitive Value
Superclass of	
Scope note	This class comprises any encoding of computable (algebraic) values such as integers, real numbers, complex numbers, vectors, tensors, etc., including intervals of these values to express limited precision. Numbers are fundamentally distinct from identifiers in continua, such as instances of E50 Date and E47 Spatial Coordinate, even though their encoding may be similar. Instances of E60 Number can be combined with each other in algebraic operations to yield other instances of E60 Number, e.g. $1 + 1 = 2$. Identifiers in continua may be combined with numbers expressing distances to yield new identifiers, e.g. 1924-01-31 + 2 days = 1924-02-02. Compare E54 Dimension.
Examples	5 $3+2i$ $1,5 \times 10^{-04}$ (0,5, -0,7, 88)
Properties	

E61 Time Primitive

Subclass of	E59 Primitive Value
Superclass of	
Scope note	This class comprises instances of E59 Primitive Value for time that should be implemented with appropriate validation, precision, and interval logic to express date ranges relevant to cultural documentation. E61 Time Primitive is not further elaborated upon within the model.
Examples	1994 to 1997 13 May 1768 2000/01/01 00:00:59,7 85th century BC
Properties	

E62 String

Subclass of	E59 Primitive Value
Superclass of	
Scope note	This class comprises the instances of E59 Primitive Values used for documentation such as free text strings, bitmaps, vector graphics, etc. E62 String is not further elaborated upon within the model
Examples	The quick brown fox jumps over the lazy dog. 6F 6E 54 79 70 31 0D 9E
Properties	

E63 Beginning of Existence

Subclass of	E5 Event
Superclass of	E12 Production E65 Creation E66 Formation E67 Birth E81 Transformation
Scope note	This class comprises events that bring into existence any E77 Persistent Item. It may be used for temporal reasoning about things (intellectual products, physical items, groups of people, living beings) beginning to exist; it serves as a hook for both a <i>terminus post quem</i> and a <i>terminus ante quem</i> .
Examples	The birth of my child The birth of Snoopy, my dog The formation of the iceberg that sank the Titanic The construction of the Eiffel Tower
Properties	P92 brought into existence (was brought into existence by): E77 Persistent Item

E64 End of Existence

Subclass of	E5 Event
Superclass of	E6 Destruction E68 Dissolution E69 Death E81 Transformation
Scope note	This class comprises events that end the existence of any E77 Persistent Item. It may be used for temporal reasoning about things (physical items, groups of people, living beings) ceasing to exist; it serves as a hook for <i>termini postquem</i> and <i>antequem</i> . In cases where substance from an E77 Persistent Item continues to exist in a new form, the process should be documented by E81 Transformation.
Examples	The death of Snoopy, my dog The melting of the snowman The burning of the Temple of Artemis in Ephesos by Herostratos in 356 BC
Properties	P93 took out of existence (was taken out of existence by): E77 Persistent Item

E65 Creation

Subclass of	E7 Activity E63 Beginning of Existence
Superclass of	E83 Type Creation
Scope note	This class comprises events that result in the creation of conceptual items or immaterial products, such as legends, poems, texts, music, images, movies, laws, classes, etc.
Examples	The framing of the U.S. Constitution The drafting of U.N. resolution 1441
Properties	P94 has created (was created by): E28 Conceptual Object

E66 Formation

Subclass of	E7 Activity E63 Beginning of Existence
Superclass of	
Scope note	This class comprises events that result in the formation of a formal or informal E74 Group of people, such as a club, society, association, corporation, or nation. E66 Formation does not include the arbitrary aggregation of people who do not act as a collective
Examples	The formation of the CIDOC CRM Special Interest Group The formation of the Soviet Union The conspiring of the murderers of Caesar
Properties	P95 has formed (was formed by): E74 Group

E67 Birth

Subclass of	E63 Beginning of Existence
Superclass of	
Scope note	This class comprises the birth of human beings. E67 Birth is a biological event focussing on the context of people coming into life. (E63 Beginning of Existence comprises the coming into life of any living beings). Twins, triplets, etc. are brought into life by the same E67 Birth event. The introduction of the E67 Birth event as a documentation element allows the description of a range of family relationships in a simple model. Suitable extensions may describe more details and the complexity of motherhood since the advent of modern medicine. In this model, the biological father is not seen as a necessary participant in the E67 Birth event
Examples	The birth of Alexander the Great
Properties	P96 by mother (gave birth): E21 Person P97 from father (was father for): E21 Person P98 brought into life (was born): E21 Person

E68 Dissolution

Subclass of	E64 End of Existence
Superclass of	
Scope note	This class comprises the events that result in the formal or informal termination of an E74 Group of people. If the dissolution was deliberate, the Dissolution event should also be instantiated as an E7 Activity.
Examples	The fall of the Roman Empire The liquidation of Enron Corporation
Properties	P99 dissolved (was dissolved by): E74 Group

E69 Death

Subclass of	E64 End of Existence
Superclass of	
Scope note	This class comprises the deaths of human beings. If the E21 Person was killed, the E69 Death event should also be instantiated as an E7 Activity. The death or perishing of other living beings should be documented using E64 End of Existence.
Examples	The assassination of Julius Caesar The death of Senator Paul Wellstone
Properties	P100 was death of (died in): E21 Person

E70 Thing

Subclass of	E77 Persistent Item
Superclass of	E71 Man-Made Thing E72 Legal Object
Scope note	This general class comprises usable discrete, identifiable, instances of E77 Persistent Item that are documented as single units. They can be either intellectual products or physical things, and are characterized by relative stability. They may for instance either have a solid physical form, an electronic encoding, or they may be a logical concept or structure.
Examples	My photograph collection (E78) The design of the no-smoking sign (E29) The cave of Dirou, Mani, Greece (E27)
Properties	P43 has dimension (is dimension of): E54 Dimension P101 had as general use (was use of): E55 Type P130 shows features of (features are also found on): E70 Thing (P130.1 kind of similarity: E55 Type)

E71 Man-Made Thing

Subclass of	E70 Thing
Superclass of	E24 Physical Man-Made Thing E28 Conceptual Object
Scope note	This class comprises discrete, identifiable man-made items that are documented as single units. These items are either intellectual products or man-made physical things, and are characterized by relative stability. They may for instance have a solid physical form, an electronic encoding, or they may be logical concepts or structures.
Examples	Beethoven's 5th Symphony (E73) Michelangelo's David Einstein's Theory of General Relativity (E73) The taxon <i>Fringilla coelebs</i> (E55)
Properties	P102 has title (is title of): E35 Title (P102.1 has type: E55 Type) P103 was intended for (was intention of): E55 Type

E72 Legal Object

Subclass of	E70 Thing
Superclass of	E18 Physical Thing E73 Information Object
Scope note	This class comprises those material or immaterial items to which instances of E30 Right, such as the right of ownership or use, can be applied. This is true for all E18 Physical Thing. In the case of instances of E28 Conceptual Object, however, the identity of the E28 Conceptual Object or the method of its use may be too ambiguous to reliably establish instances of E30 Right, as in the case of taxa and inspirations. Ownership of corporations is currently regarded as out of scope of the CRM.
Examples	The Cullinan diamond Definition of the CIDOC Conceptual Reference Model Version 2.1 (E73)
Properties	P104 is subject to (applies to): E30 Right P105 right held by (has right on): E39 Actor (P105.1 has type: E55 Type)

E73 Information Object

Subclass of	E28 Conceptual Object E72 Legal Object
Superclass of	E29 Design or Procedure E31 Document E33 Linguistic Object E36 Visual Item
Scope note	This class comprises identifiable immaterial items, such as poems, jokes, data sets, images, texts, multimedia objects, procedural prescriptions, computer program code, algorithm or mathematical formulae, that have an objectively recognizable structure and are documented as single units. An E73 Information Object does not depend on a specific physical carrier, which can include human memory, and it can exist on one or more carriers simultaneously. Instances of E73 Information Object of a linguistic nature should be declared as instances of the E33 Linguistic Object subclass. Instances of E73 Information Object of a documentary nature should be declared as instances of the E31 Document subclass. Conceptual items such as types and classes are not instances of E73 Information Object, nor are ideas without a reproducible expression.
Examples	Image, in file "BM000038850.JPG" from the Clayton Herbarium in London E. A. Poe's "The Raven" The movie "The Seven Samurai" by Akira Kurosawa The Maxwell Equations
Properties	P67 refers to (is referred to by): E1 CRM Entity (P67.1 has type: E55 Type) P106 is composed of (forms part of): E73 Information Object P129 is about (is subject of): E1 CRM Entity

E74 Group

Subclass of	E39 Actor
Superclass of	E40 Legal Body
Scope note	This class comprises any gatherings or organizations of two or more people that act collectively or in a similar way due to any form of unifying relationship. A gathering of people becomes an E74 Group when it exhibits organizational characteristics usually typified by a set of ideas or beliefs held in common, or actions performed together. These might be communication, creating some common artefact, a common purpose such as study, worship, business, sports, etc. Nationality can be modelled as membership in an E74 Group.
Examples	The Impressionists The Navajo The Greeks The peace protestors in New York City on February 15, 2003 Exxon-Mobil
Properties	P107 has current or former member (is current or former member of): E39 Actor

E75 Conceptual Object Appellation

Subclass of	E41 Appellation
Superclass of	
Scope note	This class comprises all specific identifiers of intellectual products or standardized patterns.
Examples	"ISBN 3-7913-1418-1" "ISO 2788:1986(E)"
Properties	

E77 Persistent Item

Subclass of	E1 CRM Entity
Superclass of	E41 Appellation E51 Contact Point E70 Thing
Scope note	This class comprises items that have a persistent identity, sometimes known as "endurants" in philosophy. They can be repeatedly recognized within the duration of their existence by identity criteria rather than by continuity or observation. Persistent Items can be either physical entities, such as people, animals, or things; or conceptual entities such as ideas, concepts, products of the imagination or common names. The criteria that determine the identity of an item are often difficult to establish, i.e. the decision depends largely on the judgement of the observer. For example, a building is regarded as no longer existing if it is dismantled and the materials reused in a different configuration. On the other hand, human beings go through radical and profound changes during their life-span, affecting both material composition and form, yet preserve their identity by other criteria. Similarly, inanimate objects may be subject to exchange of parts and matter. The class E77 Persistent Item does not take any position about the nature of the applicable identity criteria and if actual knowledge about identity of an instance of this class exists. There may be cases where the identity of an E77 Persistent Item is not decidable by a certain state of knowledge. The main classes of objects that fall outside the scope the E77 Persistent Item class are temporal objects such as periods, events and acts, and descriptive properties.
Examples	Leonardo da Vinci Stonehenge The hole in the ozone layer The First Law of Thermodynamics The Bermuda Triangle
Properties	

E78 Collection

Subclass of	E24 Physical Man-Made Thing
Superclass of	
Scope note	This class comprises aggregations of physical items that are assembled and maintained (“curated” and “preserved,” in museological terminology) by one or more instances of E39 Actor over time for a specific purpose and audience, and according to a particular collection development plan. Items may be added or removed from an E78 Collection in pursuit of this plan. This class should not be confused with the E39 Actor maintaining the E78 Collection who is often referred to using the name of the E78 Collection (e.g. “The Wallace Collection decided...”). Collective objects in the general sense, like a tomb full of gifts, a folder with stamps or a set of chessmen, should be documented as instances of E19 Physical Object, and not as instances of E78 Collection. This is because they form wholes either because they are physically bound together or because they are kept together for their functionality.
Examples	The John Clayton Herbarium The Wallace Collection
Properties	P109 has current or former curator (is current or former curator of): E39 Actor

E79 Part Addition

Subclass of	E11 Modification
Superclass of	
Scope note	This class comprises activities that result in an instance of E24 Physical Man-Made Thing being increased, enlarged, or augmented by the addition of a part. Typical scenarios include the attachment of an accessory, the integration of a component, the addition of an element to an aggregate object, or the accessioning of an object into a curated E78 Collection. Objects to which parts are added are, by definition, man-made, since the addition of a part implies a human activity. Following the addition of parts, the resulting man-made assemblages are treated objectively as single identifiable wholes, made up of constituent or component parts bound together either physically (for example the engine becoming a part of the car), or by sharing a common purpose (such as the 32 chess pieces that make up a chess set). This class of activities forms a basis for reasoning about the history and continuity of identity of objects that are integrated into other objects over time, such as precious gemstones being repeatedly incorporated into different items of jewellery, or cultural artefacts being added to different museum instances of E78 Collection over their life-span.
Examples	The setting of the koh-i-noor diamond into the crown of Queen Elizabeth the Queen Mother The addition of the painting “Room in Brooklyn” by Edward Hopper to the collection of the Museum of Fine Arts, Boston
Properties	P110 augmented (was augmented by): E24 Physical Man-Made Thing P111 added (was added by): E18 Physical Thing

E80 Part Removal

Subclass of	E11 Modification
Superclass of	
Scope note	This class comprises the activities that result in an instance of E18 Physical Thing being decreased by the removal of a part. Typical scenarios include the detachment of an accessory, the removal of a component or part of a composite object, or the deaccessioning of an object from a curated E78 Collection. If the E80 Part Removal results in the total decomposition of the original object into pieces, such that the whole ceases to exist, the activity should instead be modelled as an E81 Transformation, i.e. a simultaneous destruction and production. In cases where the part removed has no discernible identity prior to its removal but does have an identity subsequent to its removal, the activity should be regarded as both E80 Part Removal and Production. This class of activities forms a basis for reasoning about the history, and continuity of identity over time, of objects that are removed from other objects, such as precious gemstones being extracted from different items of jewellery, or cultural artefacts being deaccessioned from different museum collections over their life-span.
Examples	The removal of the engine from my car The disposal of object number 1976:234 from the collection
Properties	P112 diminished (was diminished by): E24 Physical Man-Made Thing P113 removed (was removed by): E18 Physical Thing

E81 Transformation

Subclass of	E63 Beginning of Existence E64 End of Existence
Superclass of	
Scope note	This class comprises the events that result in the simultaneous destruction of one E77 Persistent Item and the creation of another E77 Persistent Item that preserves recognizable substance from the first but has a fundamentally different nature and identity. Although the two instances of E77 Persistent Item are treated as discrete entities having separate, unique identities, they are causally connected through the E81 Transformation; the destruction of the first E77 Persistent Item directly causes the creation of the second using or preserving some relevant substance. Instances of E81 Transformation are therefore distinct from re-classifications (documented using E17 Type Assignment) or modifications (documented using E11 Modification) of objects that do not fundamentally change their nature or identity. Characteristic cases are reconstructions and reuse of historical buildings or ruins, fires leaving buildings in ruins, taxidermy of specimens in natural history, and the reorganization of a corporate body into a new one.
Examples	The death and mummification of Tutankhamen (transformation of Tutankhamen from a living person to a mummy)
Properties	P123 resulted in (resulted from): E77 Persistent Item P124 transformed (was transformed by): E77 Persistent Item

E82 Actor Appellation

Subclass of	E41 Appellation
Superclass of	
Scope note	This class comprises any sort of name, number, code, or symbol characteristically used to identify an E39 Actor. An E39 Actor will typically have more than one E82 Actor Appellation, and instances of E82 Actor Appellation in turn may have alternative representations. The distinction between corporate and personal names, which is particularly important in library applications, should be made by explicitly linking the E82 Actor Appellation to an instance of either E21 Person or E74 Group/E40 Legal Body. If this is not possible, the distinction can be made through the use of the <i>P2 has type</i> mechanism.
Examples	“John Doe” “Doe, J.” The U.S. Social Security Number “246-14-2304” “The Artist Formerly Known as Prince” “The Master of the Flemish Madonna” “Raphael’s Workshop” “The Brontë Sisters” “The International Council of Museums (ICOM)”
Properties	

E83 Type Creation

Subclass of	E65 Creation
Superclass of	
Scope note	This class comprises activities formally defining new classes of items. It is typically a rigorous scholarly or scientific process that ensures a class is exhaustively described and appropriately named. In some cases, particularly in archaeology and the life sciences, E83 Type Creation requires the identification of an exemplary specimen and the publication of the type definition in an appropriate scholarly forum. The activity of E83 Type Creation is central to research in the life sciences, where a type would be referred to as a “taxon,” the type description as a “protologue,” and the exemplary specimens as “original element” or “holotype”.
Examples	Creation of the taxon <i>Penicillium brefeldianum</i> Addition of class E84 Information Carrier to the CIDOC CRM
Properties	P135 created type (was created by): E55 Type P136 was based on (supported type creation): E1 CRM Entity (P136.1 in the taxonomic role: E55 Type)

E84 Information Carrier

Subclass of	E22 Man-Made Object
Superclass of	
Scope note	This class comprises all instances of E22 Man-Made Object that are explicitly designed to act as persistent physical carriers of instances of E73 Information Object. This allows a relationship to be asserted between an E19 Physical Object and its immaterial information contents. An E84 Information Carrier may or may not contain information, e.g., a diskette. Note that any E18 Physical Thing may carry information, such as an inscription. However, unless it was specifically designed for this purpose, it is not an E84 Information Carrier. Therefore the property P128 carries (is carried by) applies to E18 Physical Thing in general.
Examples	The Rosetta Stone My paperback copy of "Crime & Punishment" The computer disk at ICS-FORTH that stores the Definition of the CIDOC CRM.
Properties	

7 Property declarations

All properties are declared in this clause using the following format:

- Property names are presented as headings in bold face, preceded by unique property identifiers.
- The line **Domain** declares the class for which the property is defined.
- The line **Range** declares the class to which the property points, or that provides the values for the property.
- The line **Subproperty of** is a cross-reference to any superproperties the property may have.
- The line **Superproperty of** is a cross-reference to any subproperties the property may have.
- The line **Quantification** declares the possible number of occurrences for domain and range class instances for the property. Possible values are: 1:many, many:many, many:1.
- The line **Scope note** contains the textual definition of the concept the property represents.
- The line **Examples** provides illustrative examples showing how the property should be used.
- The line **Properties**, when present, declares sub properties of the property.

P1 is identified by (identifies)

Domain	E1 CRM Entity
Range	E41 Appellation
Superproperty of	E19 Physical Object. P47 is identified by (identifies): E42 Object Identifier E52 Time-Span. P78 is identified by (identifies): E49 Time Appellation E53 Place. P87 is identified by (identifies): E44 Place Appellation E71 Man-Made Thing. P102 has title (is title of): E35 Title E39 Actor. P131 is identified by (identifies): E82 Actor Appellation
Quantification	many to many (0,n:0,n)
Scope note	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.
Examples	The capital of Italy (E53) <i>is identified by</i> Rome (E48) Text 25014–32 (E33) <i>is identified by</i> “The Decline and Fall of the Roman Empire” (E35)

P2 has type (is type of)

Domain	E1 CRM Entity
Range	E55 Type
Quantification	many to many (0,n:0,n)
Scope note	This property allows sub-typing of CRM entities, a form of specialization, through the use of a terminological hierarchy, or thesaurus. The CRM is intended to focus on the high-level entities and relationships needed to describe data structures. Consequently, it does not specialize entities any further than is required for this immediate purpose. However, entities in the ISA hierarchy of the CRM may be specialized into any number of sub entities, which can be defined in the E55 Type hierarchy. E51 Contact Point, for example, may be specialized into “e-mail address”, “telephone number”, “post office box”, “URL” etc. none of which figures explicitly in the CRM hierarchy. Sub-typing obviously requires consistency between the meaning of the terms assigned and the more general intent of the CRM entity in question.
Examples	www.cidoc.icom.org (E51) <i>has type</i> URL (E55)

P3 has note

Domain	E1 CRM Entity
Range	E62 String
Superproperty of	E52 Time-Span. P79 beginning is qualified by: E62 String E52 Time-Span. P80 end is qualified by: E62 String
Quantification	one to many (0, <i>n</i> :0,1)
Scope note	The “has note” property is a container for all informal descriptions about an object that cannot be expressed in terms of CRM constructs. In particular, it captures the characterization of the item itself, its internal structures, appearance, etc. Like property P2, “has type”, this property is a consequence of the restricted focus of the CRM. The aim is not to capture, in a structured form, <i>everything</i> that can be said about an item; indeed, the CRM formalism is not regarded as sufficient to express everything that can be said. Good practice requires use of <i>distinct</i> note fields for different aspects of a characterization. The P2 “has type” property of “has note” allows differentiation of specific notes, e.g. “construction”, “decoration” etc. An item may have many notes, but a note is attached to a specific item.
Examples	Coffee mug, OXCMS:1983.1.1 (E19) <i>has note</i> chipped at edge of handle (E62) <i>has type</i> Condition (E55)
Properties	P3.1 has type: E55 Type

P4 has time-span (is time-span of)

Domain	E2 Temporal Entity
Range	E52 Time-Span
Quantification	many to one, necessary, dependent (1,1:1, <i>n</i>)
Scope note	This property describes the temporal confinement of an instance of an E2 Temporal Entity. The related E52 Time-Span is understood as the real Time-Span during which the phenomena were active, which make up the temporal entity instance. It does not convey any other meaning than a positioning on the “time-line” of chronology. The Time-Span in turn is approximated by a set of dates (E61 Time Primitive). A temporal entity can have in reality only one Time-Span, but there may exist alternative opinions about it, which we would express by assigning multiple Time-Spans. Related temporal entities may share a Time-Span. Time-Spans may have completely unknown dates but other descriptions by which we can infer knowledge.
Examples	The Yalta Conference (E7) <i>has time-span</i> Yalta Conference time-span (E52), <i>ongoing throughout</i> 11 February 1945 (E61)

P5 consists of (forms part of)

Domain	E3 Condition State
Range	E3 Condition State
Quantification	one to many (0,n:0,1)
Scope note	This property describes the decomposition of an E3 Condition State into discrete, subsidiary states. It is assumed that the sub-states into which the condition state is analysed form a logical whole, although the entire story may not be completely known, and that the sub-states are in fact <i>constitutive</i> of the general condition state. For example, a general condition state of “in ruins” may be decomposed into the individual stages of decay.
Examples	Degradation of the Tower of Babylon (E3) <i>consists of</i> wind-erosion phase (E3)

P7 took place at (witnessed)

Domain	E4 Period
Range	E53 Place
Superproperty of	E9 Move. P26 moved to (was destination of): E53 Place E9 Move. P27 moved from (was origin of): E53 Place
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property describes the spatial location of an instance of E4 Period. The related E53 Place should be seen as an approximation of the geographical area within which the phenomena that characterize the period in question occurred. P7 does not convey any meaning other than spatial positioning (generally on the surface of the earth). For example, the period “Révolution française” can be said to have taken place in “France”, the “Victorian” period, may be said to have taken place in “Britain” and its colonies, as well as other parts of Europe and north America. A period can take place at multiple locations.
Examples	The period “Révolution française” (E4) <i>took place at</i> France (E53)

P8 took place on or within (witnessed)

Domain	E4 Period
Range	E19 Physical Object
Quantification	many to many (0,n:0,n)
Scope note	This property describes the location of an instance of E4 Period with respect to an E19 Physical Object. P8 is a shortcut of a path defining an E53 Place with respect to the geometry of an object. Compare <i>E46 Section Definition</i>. This property is in effect a special case of P7 took place at. It describes a period that can be located with respect to the space defined by an E19 Physical Object such as a ship or a building. The precise geographical location of the object during the period in question may be unknown or unimportant. For example, the French and German armistice of 22 June 1940 was signed in the same railway carriage as the armistice of 11 November 1918.
Examples	The coronation of Queen Elizabeth II (E7) <i>took place on or within</i> Westminster Abbey (E19)

P9 consists of (forms part of)

Domain	E4 Period
Range	E4 Period
Quantification	one to many, (0,n:0,1)
Scope note	This property describes the decomposition of an instance of E4 Period into discrete, subsidiary periods. The sub-periods into which the period is decomposed form a logical whole, although the entire picture may not be completely known, and the sub-periods are <i>constitutive</i> of the general period.
Examples	Cretan Bronze Age (E4) <i>consists of</i> Middle Minoan (E4)

P10 falls within (contains)

Domain	E4 Period
Range	E4 Period
Quantification	many to many (0,n:0,n)
Scope note	This property describes an instance of E4 Period, which falls within the E53 Place and E52 Time-Span of another. The difference with <i>P9 consists of</i> is subtle. Unlike <i>P9 consists of</i>, <i>P10 falls within</i> does not imply any logical connection between the two periods and it may refer to a period of a completely different type.
Examples	The Great Plague (E4) <i>falls within</i> The Gothic period (E4)

P11 had participant (participated in)

Domain	E5 Event
Range	E39 Actor
Subproperty of	E5 Event. P12 occurred in the presence of (was present at): E77 Persistent Item
Superproperty of	E7 Activity. P14 carried out by (performed): E39 Actor E67 Birth. P96 by mother (gave birth): E21 Person E68 Dissolution. P99 dissolved (was dissolved by): E74 Group
Quantification	many to many (0,n:0,n)
Scope note	This property describes the active or passive participation of instances of E39 Actors in an E5 Event. It connects the lifeline of the related E39 Actor with the E53 Place and E52 Time-Span of the event. The property implies that the Actor was <i>involved in</i> the event but does not imply any causal relationship. The subject of a portrait can be said to have participated in the creation of the portrait.
Examples	Napoleon (E21) <i>participated in</i> The Battle of Waterloo (E7) Maria (E21) <i>participated in</i> Photographing of Maria (E7)

P12 occurred in the presence of (was present at)

Domain	E5 Event
Range	E77 Persistent Item
Superproperty of	E5 Event. P11 had participant (participated in): E39 Actor E7 Activity. P16 used specific object (was used for): E70 Thing E9 Move. P25 moved (moved by): E19 Physical Object E11 Modification. P31 has modified (was modified by): E24 Physical Man-Made Thing E11 Modification. P33 used specific technique (was used by): E29 Design or Procedure E63 Beginning of Existence. P92 brought into existence (was brought into existence by): E77 Persistent Item E64 End of Existence. P93 took out of existence (was taken out of existence by): E77 Persistent Item
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property describes the active or passive presence of an E77 Persistent Item in an E5 Event without implying any specific role. It connects the history of a thing with the E53 Place and E52 Time-Span of an event. For example, an object may be the desk, now in a museum on which a treaty was signed. The presence of an immaterial thing implies the presence of at least one of its carriers.
Examples	Deckchair 42 (E19) <i>was present at</i> The sinking of the Titanic (E5)

P13 destroyed (was destroyed by)

Domain	E6 Destruction
Range	E18 Physical Thing
Subproperty of	E64 End of Existence. P93 took out of existence (was taken out of existence by): E77 Persistent Item
Quantification	one to many, necessary (1,n:0,1)
Scope note	This property allows specific instances of E18 Physical Thing that have been destroyed to be related to a destruction event. Destruction implies the end of an item's life as a subject of cultural documentation, the physical matter of which the item was composed may in fact continue to exist. A destruction event may be contiguous with a production event that brings into existence a derived object composed partly of matter from the destroyed object.
Examples	The Tay Bridge Disaster (E6) <i>destroyed</i> The Tay Bridge (E22)

P14 carried out by (performed)

Domain	E7 Activity
Range	E39 Actor
Subproperty of	E5 Event. P11 had participant (participated in): E39 Actor
Superproperty of	E8 Acquisition. P22 transferred title to (acquired title through): E39 Actor E8 Acquisition. P23 transferred title from (surrendered title of): E39 Actor E10 Transfer of Custody. P28 custody surrendered by (surrendered custody through): E39 Actor E10 Transfer of Custody. P29 custody received by (received custody through): E39 Actor
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property describes the active participation of an E39 Actor in an E7 Activity. It implies causal or legal responsibility. The <i>P14.1 in the role of</i> property of the property allows the nature of an Actor's participation to be specified.
Examples	The painting of the Sistine Chapel (E7) <i>was carried out by</i> Michaelangelo Buonaroti (E21) <i>in the role of</i> master craftsman (E55)
Properties	P14.1 in the role of: E55 Type

P15 was influenced by (influenced)

Domain	E7 Activity
Range	E1 CRM Entity
Superproperty of	E7 Activity. P16 used specific object (was used for): E70 Thing E7 Activity. P17 was motivated by (motivated): E1 CRM Entity E11 Modification. P33 used specific technique (was used by): E29 Design or Procedure E7 Activity. P134 continued (was continued by): E7 Activity E83 Type Creation. P136 was based on (supported type creation): E1 CRM Entity
Quantification	many to many (0,n:0,n)
Scope note	This is a high-level property, which captures the relationship between an E7 Activity and anything that may have had some bearing upon it. The property has more specific subproperties.
Examples	The designing of the Sydney Harbour Bridge (E7) <i>was influenced by</i> the Tyne bridge (E22)

P16 used specific object (was used for)

Domain	E7 Activity
Range	E19 Physical Object
Subproperty of	E5 Event. P12 occurred in the presence of (was present at): E77 Persistent Item E7 Activity. P15 was influenced by (influenced): E1 CRM Entity
Quantification	many to many (0,n:0,n)
Scope note	This property describes the use of material or immaterial things in a way essential to the performance or the outcome of an E7 Activity. This property typically applies to tools, instruments, moulds and items embedded in a product. It implies that the presence of the object in question was a necessary condition for the action. For example, the activity of writing this text required the use of a computer. An immaterial thing can be used if at least one of its carriers is present. For example, the software tools on a computer.
Examples	The writing of this scope note (E7) <i>used</i> Nicholas Crofts' computer (E22) <i>mode of use</i> Typing Tool; Storage Medium (E55)
Properties	P16.1 mode of use: E55 Type

P17 was motivated by (motivated)

Domain	E7 Activity
Range	E1 CRM Entity
Subproperty of	E7 Activity. P15 was influenced by (influenced): E1 CRM Entity
Quantification	many to many (0,n:0,n)
Scope note	This property describes an item or items that are regarded as a <i>reason</i> for carrying out the E7 Activity. For example, the discovery of a large hoard of treasure may call for a celebration, an order from headquarters can start a military manoeuvre.
Examples	The resignation of the chief executive (E7) <i>was motivated by</i> the collapse of SwissAir (E68) The coronation of Elizabeth II (E7) <i>was motivated by</i> the death of George VI (E69)

P19 was intended use of (was made for)

Domain	E7 Activity
Range	E71 Man-Made Thing
Quantification	many to many (0,n:0,n)
Scope note	This property relates an E7 Activity with objects created specifically for <i>use</i> in the activity. This is distinct from the intended use of an item in some general type of activity such as the book of common prayer which was intended for use in Church of England services [see P103 was intended for (was intention of)]. <i>P19.1 mode of use</i> allows the mode of use to be refined.
Examples	Lady Diana Spencer's wedding dress (E71) <i>was made for</i> Wedding of Prince Charles and Lady Diana Spencer (E7) <i>mode of use</i> To Be Worn (E55)
Properties	P19.1 mode of use: E55 Type

P20 had specific purpose (was purpose of)

Domain	E7 Activity
Range	E7 Activity
Quantification	many to many (0,n:0,n)
Scope note	This property describes the relationship between an E7 Activity and an activity that it is intended as a preparation for. This may involve activities in preparation for other activities, or orders and other organizational activities, which lead to some other specific activity. P20 does not imply that an activity succeeded in achieving its aims. For example, dubious accounting practices may be carried out with the specific purpose of enhancing share values and enabling a take-over bid. The specific purpose remains the same even if the strategy fails and the company goes bankrupt instead.
Examples	Van Eyck's pigment grinding (E7) <i>had specific purpose</i> the painting of the Ghent alter piece (E12)

P21 had general purpose (was purpose of)

Domain	E7 Activity
Range	E55 Type
Quantification	many to many (0,n:0,n)
Scope note	This property describes an intentional relationship between an E7 Activity and some general goal or purpose. This may involve activities intended as preparation for some class of activity. For example, a musician practices an instrument in order to develop his or her musical ability, Van Eyck ground pigments and prepared oil paints in order to paint oil paintings. One travels to Oxford in order to work more effectively face-to-face rather than by e-mail and telephone. P21 differs from <i>P20 had specific purpose</i> in that no specific activity is implied as the purpose. E7 Activity does not imply that an activity succeeds in achieving its general aims.
Examples	Van Eyck's pigment grinding (E7) <i>had general purpose</i> painting (E55)

P22 transferred title to (acquired title through)

Domain	E8 Acquisition
Range	E39 Actor
Subproperty of	E7 Activity. P14 carried out by (performed): E39 Actor
Quantification	many to many (0,n:0,n)
Scope note	This property identifies the E39 Actor that acquires the legal ownership of an object as a result of an E8 Acquisition. The property will typically describe an Actor purchasing or otherwise acquiring an object from another Actor. However, title may also be acquired, without any corresponding loss of title by another Actor, through legal fieldwork such as hunting, shooting or fishing. In reality, the title is either transferred to or from someone, or both.
Examples	Acquisition of the Amoudrouz collection by the Geneva Ethnography Museum (E8) <i>transferred title to</i> Geneva Ethnography Museum (E74)

P23 transferred title from (surrendered title of)

Domain	E8 Acquisition
Range	E39 Actor
Subproperty of	E7 Activity. P14 carried out by (performed): E39 Actor
Quantification	many to many (0,n:0,n)
Scope note	This property identifies the E39 Actor or Actors who relinquish legal ownership as the result of an E8 Acquisition. The property will typically be used to describe a person donating or selling an object to a museum. In reality, title is either transferred to or from someone, or both.
Examples	Acquisition of the Amoudrouz collection by the Geneva Ethnography Museum (E8) <i>transferred title from</i> Heirs of Amoudrouz (E74)

P24 transferred title of (changed ownership by)

Domain	E8 Acquisition
Range	E18 Physical Thing
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property identifies the E18 Physical Thing or things involved in an E8 Acquisition. In reality, an acquisition needs to refer to at least one transferred item.
Examples	Acquisition of the Amoudrouz collection by the Geneva Ethnography Museum (E8) <i>transferred title of</i> Amoudrouz Collection (E78)

P25 moved (moved by)

Domain	E9 Move
Range	E19 Physical Object
Subproperty of	E5 Event. P12 occurred in the presence of (was present at): E77 Persistent Item
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property identifies the E19 Physical Object that is moved during a move event. The property implies the object's passive participation. For example, Monet's painting "Impression sunrise" was moved for the first Impressionist exhibition in 1874. In reality, a move needs to concern at least one object.
Examples	"Impression sunrise" (E22) <i>moved by</i> preparations for the First Impressionist Exhibition (E9)

P26 moved to (was destination of)

Domain	E9 Move
Range	E53 Place
Subproperty of	E4 Period. P7 took place at (witnessed): E53 Place
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property identifies the destination of an E9 Move. A move will be linked to a destination, such as the move of an artefact from storage to display. A move may be linked to many terminal instances of E53 Places. In this case the move describes a distribution of a set of objects. The area of the move includes the origin, route, and destination.
Examples	The movement of the Tutankhamen Exhibition (E9) <i>moved to</i> The British Museum (E53)

P27 moved from (was origin of)

Domain	E9 Move
Range	E53 Place
Subproperty of	E4 Period. P7 took place at (witnessed): E53 Place
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property identifies the starting E53 Place of an E9 Move. A move will be linked to an origin, such as the move of an artefact from storage to display. A move may be linked to many origins. In this case the move describes the picking-up of a set of objects. The area of the move includes the origin, route, and destination.
Examples	The movement of the Tutankhamen Exhibition (E9) <i>moved from</i> The Cairo Museum (E53)

P28 custody surrendered by (surrendered custody through)

Domain	E10 Transfer of Custody
Range	E39 Actor
Subproperty of	E7 Activity. P14 carried out by (performed): E39 Actor
Quantification	many to many (0,n:0,n)
Scope note	This property identifies the E39 Actor or Actors who surrender custody of an instance of E18 Physical Thing in an E10 Transfer of Custody activity. The property will typically describe an Actor surrendering custody of an object when it is handed over to someone else's care. On occasion, physical custody may be surrendered involuntarily, i.e. through accident, loss, or theft. In reality, custody is either transferred to someone or from someone, or both.
Examples	The Secure Deliveries Inc. crew (E40) <i>surrendered custody through</i> The delivery of the paintings by Secure Deliveries Inc. to the National Gallery (E10).

P29 custody received by (received custody through)

Domain	E10 Transfer of Custody
Range	E39 Actor
Subproperty of	E7 Activity. P14 carried out by (performed): E39 Actor
Quantification	many to many (0,n:0,n)
Scope note	This property identifies the E39 Actor or Actors who receive custody of an instance of E18 Physical Thing in an E10 Transfer of Custody activity. The property will typically describe Actors receiving custody of an object when it is handed over from another Actor's care. On occasion, physical custody may be received involuntarily or illegally, i.e. through accident, unsolicited donation, or theft. In reality, custody is either transferred to someone or from someone, or both.
Examples	Representatives of The National Gallery (E40) <i>received custody through</i> The delivery of the paintings by Secure Deliveries Inc. to the National Gallery (E10)

P30 transferred custody of (custody transferred through)

Domain	E10 Transfer of Custody
Range	E19 Physical Object
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property identifies an item or items of E18 Physical Thing concerned in an E10 Transfer of Custody activity. The property will typically describe the object that is handed over by an E39 Actor to another Actor's custody. On occasion, physical custody may be transferred involuntarily or illegally, i.e. through accident, unsolicited donation, or theft.
Examples	The delivery of the paintings by Secure Deliveries Inc. to the National Gallery (E10) <i>transferred custody of</i> paintings from The Iveagh Bequest (E19)

P31 has modified (was modified by)

Domain	E11 Modification
Range	E24 Physical Man-Made Thing
Subproperty of	E5 Event. P12 occurred in the presence of (was present at): E77 Persistent Item
Superproperty of	E12 Production. P108 has produced (was produced by): E24 Physical Man-Made Thing E79 Part Addition. P110 augmented (was augmented by): E24 Physical Man-Made Thing E80 Part Removal. P112 diminished (was diminished by): E24 Physical Man-Made Thing
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property identifies the E24 Physical Man-Made Thing modified in an E11 Modification. If a modification is applied to a non-man-made object, it is regarded as an E22 Man-Made Object from that time onwards.
Examples	Rebuilding of the Reichstag (E11) <i>has modified</i> the Reichstag in Berlin (E24)

P32 used general technique (was technique of)

Domain	E11 Modification
Range	E55 Type
Quantification	many to many (0,n:0,n)
Scope note	This property identifies the technique that was employed in an act of modification. These techniques should be drawn from an external E55 Type hierarchy of consistent terminology of general techniques such as embroidery, oil painting, etc. Specific techniques may be further described as instances of E29 Design or Procedure.
Examples	Ornamentation of silver cup 113 (E11) <i>used general technique</i> gold-plating (E55) (Design or Procedure Type)

P33 used specific technique (was used by)

Domain	E11 Modification
Range	E29 Design or Procedure
Subproperty of	E5 Event. P12 occurred in the presence of (was present at): E77 Persistent Item
	E7 Activity. P15 was influenced by (influenced): E1 CRM Entity
Quantification	many to many (0,n:0,n)
Scope note	This property identifies a specific E29 Design or Procedure used in an E11 Modification. Modification may be carried out in order to ensure the preservation of an object and not just as part of the creative process. The property differs from P32 in that the E29 Design or Procedure referred to is specific and documented rather than simply being a term in the E55 Type hierarchy. Typical examples would include intervention plans for conservation.
Examples	Ornamentation of silver cup 232 (E11) <i>used specific technique</i> "Instructions for golden chase work by A N Other" (E29) Rebuilding of Reichstag (E11) <i>used specific technique</i> Architectural plans by Foster and Partners (E29)

P34 concerned (was assessed by)

Domain	E14 Condition Assessment
Range	E18 Physical Thing
Subproperty of	E13 Attribute Assignment. P140 assigned attribute to (was attributed by): E1 CRM Entity
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property identifies the E18 Physical Thing that was assessed during an E14 Condition Assessment activity. Conditions may be assessed either by direct observation or using recorded evidence. In the latter case the E18 Physical Thing does not need to be present or even extant.
Examples	1997 condition assessment of the silver collection (E14) <i>concerned</i> silver cup 232 (E22)

P35 has identified (identified by)

Domain	E14 Condition Assessment
Range	E3 Condition State
Subproperty of	E13 Attribute Assignment. P141 assigned (was assigned by): E1 CRM Entity
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property identifies the E3 Condition State that was observed in an E14 Condition Assessment activity.
Examples	1997 condition assessment of silver cup 232 (E14) <i>has identified</i> oxidation traces were present in 1997 (E3) <i>has type</i> oxidation traces (E55)

P36 registered (was registered by)

Domain	E15 Identifier Assignment
Range	E19 Physical Object
Subproperty of	E13 Attribute Assignment. P140 assigned attribute to (was attributed by): E1 CRM Entity
Quantification	many to one, necessary (1,1:0,n)
Scope note	This property indicates the physical object to which an identifier is assigned. <i>P47 is identified by</i> , i.e. a property of an E19 Physical Object, is a shortcut of the fully developed path from E19 Physical Object through P36, E15 Identifier Assignment, <i>P37 assigned</i> to E42 Object Identifier.
Examples	01 June 1997 Identifier Assignment of the silver cup donated by Martin Doerr (E15) <i>registered</i> silver cup 232 (E19)

P37 assigned (was assigned by)

Domain	E15 Identifier Assignment
Range	E42 Object Identifier
Subproperty of	E13 Attribute Assignment. P141 assigned (was assigned by): E1 CRM Entity
Quantification	many to many (0,n:0,n)
Scope note	This property records the identifier that was assigned to an object in an Identifier Assignment activity. <i>P47 is identified by</i> , i.e. a property of an E19 Physical Object, is a shortcut of the fully developed path from E19 Physical Object through P36, E15 Identifier Assignment, <i>P37 assigned</i> to E42 Object Identifier. The same identifier may be assigned on more than one occasion. An Object Identifier might be created prior to an assignment.
Examples	01 June 1997 Identifier Assignment of the silver cup donated by Martin Doerr (E15) <i>assigned</i> 232 (E42)

P38 deassigned (was deassigned by)

Domain	E15 Identifier Assignment
Range	E42 Object Identifier
Subproperty of	E13 Attribute Assignment. P141 assigned (was assigned by): E1 CRM Entity
Quantification	many to many (0,n:0,n)
Scope note	This property records the identifier that was deassigned from an object. Deassignment of an identifier may be necessary when an object is taken out of an inventory, a new numbering system is introduced, or objects are merged or split up. The same identifier may be deassigned on more than one occasion.
Examples	31 July 2001 Identifier Assignment of the silver cup OXCMS:2001.1.32 (E15) <i>deassigned</i> 232 (E42)

P39 measured (was measured by)

Domain	E16 Measurement
Range	E70 Thing
Subproperty of	E13 Attribute Assignment. P140 assigned attribute to (was attributed by): E1 CRM Entity
Quantification	many to one, necessary (1,1:0,n)
Scope note	This property records the Thing that was the subject of an act of Measurement. A Thing may be measured more than once. Both material and immaterial Things may be measured, for example the number of words in a text.
Examples	31 August 1997 measurement of height of silver cup 232 (E16) <i>measured</i> silver cup 232 (E22)

P40 observed dimension (was observed in)

Domain	E16 Measurement
Range	E54 Dimension
Subproperty of	E13 Attribute Assignment. P141 assigned (was assigned by): E1 CRM Entity
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property records the dimension that was observed in a Measurement activity. Dimension can be any quantifiable aspect of a Thing. Weight, image colour depth, and monetary value are dimensions in this sense. One Measurement activity may determine more than one Dimension of one object. Dimensions may be determined either by direct observation or using recorded evidence. In the latter case the Physical Thing does need to be present or extant. Even though knowledge of the value of a dimension requires measurement, the dimension may be an object of discourse prior to, or even without any measurement being made.
Examples	31 August 1997 measurement of height of silver cup 232 (E16) <i>observed dimension</i> silver cup 232 height (E54) <i>P91 unit</i> mm (E58), <i>P90 has value</i> 224 (E60)

P41 classified (was classified by)

Domain	E17 Type Assignment
Range	E1 CRM Entity
Subproperty of	E13 Attribute Assignment. P140 assigned attribute to (was attributed by): E1 CRM Entity
Quantification	many to one, necessary (1,1:0,n)
Scope note	This property records the item to which a type was assigned in an E17 Type Assignment activity. Any instance of a CRM entity may be assigned a type through type assignment. Type assignment events allow a more detailed path from E1 CRM Entity through P41, E17 Type Assignment, <i>P42 assigned</i> to E55 Type for assigning types to objects compared to the shortcut offered by P2 <i>has type</i>.
Examples	31 August 1997 classification of silver cup 232 (E17) <i>classified</i> silver cup 232 (E22)

P42 assigned (was assigned by)

Domain	E17 Type Assignment
Range	E55 Type
Subproperty of	E13 Attribute Assignment. P141 assigned (was assigned by): E1 CRM Entity
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property records the type that was assigned to an entity by an E17 Type Assignment activity. Type assignment events allow a more detailed path from E1 CRM Entity through <i>P41 classified</i>, E17 Type Assignment, P42 to E55 Type for assigning types to objects compared to the shortcut offered by P2 <i>has type</i>. For example, a fragment of an antique vessel could be assigned the type "attic red figured belly handled amphora" by expert A. The same fragment could be assigned the type "shoulder handled amphora" by expert B. A Type may be intellectually constructed independent from assigning an instance of it.
Examples	31 August 1997 classification of silver cup 232 (E17) <i>assigned</i> goblet (E55)

P43 has dimension (is dimension of)

Domain	E70 Thing
Range	E54 Dimension
Quantification	one to many, dependent (0,n:1.1)
Scope note	This property records an E54 Dimension of some E70 Thing. It is a shortcut of the more fully developed path from E70 Thing through <i>P39 measured</i>, E16 Measurement <i>P40 observed dimension</i> to E54 Dimension. It offers no information about how and when an E54 Dimension was established, nor by whom. An instance of E54 Dimension is specific to an instance of E70 Thing.
Examples	Silver cup 232 (E22) <i>has dimension</i> height of silver cup 232 (E54) <i>P91 unit</i> mm (E58), <i>P90 has value</i> 224 (E60)

P44 has condition (condition of)

Domain	E18 Physical Thing
Range	E3 Condition State
Quantification	one to many, dependent (0, <i>n</i> :1,1)
Scope note	This property records an E3 Condition State for some E18 Physical Thing. It is a shortcut of the more fully developed path from E18 Physical Thing through <i>P34 concerned</i>, E14 Condition Assessment <i>P35 has identified</i> to E3 Condition State. It offers no information about how and when the E3 Condition State was established, nor by whom. An instance of E3 Condition State is specific to an instance of E18 Physical Thing.
Examples	Silver cup 232 (E22) <i>has condition</i> oxidation traces were present in 1997 (E3) <i>has type</i> oxidation traces (E55)

P45 consists of (is incorporated in)

Domain	E18 Physical Thing
Range	E57 Material
Quantification	many to many, necessary (1, <i>n</i> :0, <i>n</i>)
Scope note	This property identifies the instances of E57 Materials of which an instance of E18 Physical Thing is composed. All physical things consist of physical materials. P45 allows the different Materials to be recorded. <i>P45 consists of</i> refers here to observed Material as opposed to the consumed raw material. A Material, such as a theoretical alloy, may not have any physical instances.
Examples	Silver cup 232 (E22) <i>consists of</i> silver (E57)

P46 is composed of (forms part of)

Domain	E18 Physical Thing
Range	E18 Physical Thing
Quantification	many to many (0, <i>n</i> :0, <i>n</i>)
Scope note	This property allows instances of E18 Physical Thing to be analysed into component elements. Component elements, since they are themselves instances of E18 Physical Thing, may be further analysed into sub-components, thereby creating a hierarchy of part decomposition. An instance of E18 Physical Thing may be shared between multiple wholes, for example two buildings may share a common wall. This property is intended to describe specific components that are individually documented, rather than general aspects. Overall descriptions of the structure of an instance of E18 Physical Thing are captured by the P3 has note property. The instances of E57 Materials of which an item of E18 Physical Thing is composed should be documented using P45 consists of.
Examples	The Royal carriage (E22) <i>forms part of</i> the Royal train (E22) The "Hog's Back" (E24) <i>forms part of</i> the "Fosseway" (E24)

P47 is identified by (identifies)

Domain	E19 Physical Object
Range	E42 Object Identifier
Subproperty of	E1 CRM Entity. P1 is identified by (identifies): E41 Appellation
Superproperty of	E19 Physical Object. P48 has preferred identifier (is preferred identifier of): E42 Object Identifier
Quantification	many to many (0,n:0,n)
Scope note	This property records the E42 Object Identifier used for a particular instance of E19 Physical Object. It is intended primarily for museum identification numbers, such as object numbers, inventory numbers, registration numbers or accession (note that the identification of the E8 Acquisition is sometimes mistaken for the identification of the acquired objects themselves) numbers. P47 is a sub-property of <i>P1 identifies</i>. The range of P47 is restricted to E42 Object Identifier. The property is a shortcut that associates an E42 Object Identifier directly with an object. It says nothing about when and where an E42 Object Identifier was assigned, nor by whom. A more detailed representation can be made using the fully developed (i.e. indirect) path from E19 Physical Object through <i>P36 registered</i>, E15 Identifier Assignment, <i>P37 assigned to</i> E42 Object Identifier.
Examples	The silver cup donated by Martin Doerr (E22) <i>is identified by</i> object number OXCMS:2001.1.32 (E42)

P48 has preferred identifier (is preferred identifier of)

Domain	E19 Physical Object
Range	E42 Object Identifier
Subproperty of	E19 Physical Object. P47 is identified by (identifies): E42 Object Identifier
Quantification	many to one (0,1:0,n)
Scope note	This property records the preferred E42 Object Identifier that was used to identify the E19 Physical Object at the time this property was instantiated. More than one preferred identifier may have been assigned to an object during its history. Use of this property requires an external mechanism for assigning temporal validity to the respective CRM instance. P48, like <i>P47 is identified by</i>, is a shortcut for the path from E19 Physical Object through <i>P36 registered</i>, E15 Identifier Assignment, <i>P37 assigned to</i> E42 Object Identifier.
Examples	The pair of Lederhosen donated by Dr Martin Doerr (E22) <i>has preferred identifier</i> OXCMS:2001.1.32 (E42)

P49 has former or current keeper (is former or current keeper of)

Domain	E18 Physical Thing
Range	E39 Actor
Superproperty of	E18 Physical Thing. P50 has current keeper (is current keeper of): E39 Actor
Quantification	many to many (0..n:0..n)
Scope note	This property identifies the E39 Actor or Actors who have or have had custody of an instance of E18 Physical Thing at some time. The distinction with <i>P50 has current keeper</i> is that P49 leaves open the question as to whether the specified keepers are <i>current</i>. P49 is a shortcut for the more detailed path from E18 Physical Thing through <i>P30 transferred custody of</i>, E10 Transfer of Custody, <i>P28 custody surrendered by</i> or <i>P29 custody received by</i> to E39 Actor.
Examples	Paintings of The Iveagh Bequest (E18) <i>has former or current keeper</i> Secure Deliveries Inc. (E40)

P50 has current keeper (is current keeper of)

Domain	E18 Physical Thing
Range	E39 Actor
Subproperty of	E18 Physical Thing. P49 has former or current keeper (is former or current keeper of): E39 Actor
Quantification	many to many (0..n:0..n)
Scope note	This property identifies the E39 Actor or Actors who had custody of an instance of E18 Physical Thing at the time this property was instantiated. <i>P50 has current keeper</i> is a shortcut for the more detailed path from E18 Physical Thing through <i>P30 transferred custody of</i>, E10 Transfer of Custody, <i>P29 custody received by</i> to E39 Actor.
Examples	Paintings of The Iveagh Bequest (E18) <i>has current keeper</i> The National Gallery (E40)

P51 has former or current owner (is former or current owner of)

Domain	E18 Physical Thing
Range	E39 Actor
Superproperty of	E18 Physical Thing. P52 has current owner (is current owner of): E39 Actor
Quantification	many to many (0..n:0..n)
Scope note	This property identifies the E39 Actor that is or has been the legal owner (i.e. title holder) of an instance of E18 Physical Thing at some time. The distinction with <i>P52 has current owner</i> is that P51 does not indicate whether the specified owners are <i>current</i>. P51 is a shortcut for the more detailed path from E18 Physical Thing through <i>P24 transferred title of</i>, E8 Acquisition, <i>P23 transferred title from</i>, or <i>P22 transferred title to</i> E39 Actor.
Examples	Paintings of the Iveagh Bequest (E18) <i>has former or current owner</i> Lord Iveagh (E21)

P52 has current owner (is current owner of)

Domain	E18 Physical Thing
Range	E39 Actor
Subproperty of	E18 Physical Thing. P51 has former or current owner (is former or current keeper of): E39 Actor
Quantification	many to many (0,n:0,n)
Scope note	This property identifies the E21 Person, E74 Group or E40 Legal Body that was the owner of an instance of E18 Physical Thing at the time this property was instantiated. P52 is a shortcut for the more detailed path from E18 Physical Thing through <i>P24 transferred title of</i>, E8 Acquisition, <i>P22 transferred title to</i> E39 Actor, if and only if this acquisition event is the most recent.
Examples	Paintings of the Iveagh Bequest (E18) <i>has current owner</i> «English Heritage» (E40)

P53 has former or current location (is former or current location of)

Domain	E18 Physical Thing
Range	E53 Place
Superproperty of	E19 Physical Object. P55 has current location (currently holds): E53 Place
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property allows an instance of E53 Place to be associated as the former or current location of an instance of E18 Physical Thing. In the case of E19 Physical Objects, the property does not allow any indication of the Time-Span during which the Physical Object was located at this Place, nor if this is the current location. In the case of immobile objects, the Place would normally correspond to the Place of creation. P53 Place is a shortcut. A more detailed representation can make use of the fully developed (i.e. indirect) path from E19 Physical Object through <i>P25 moved</i>, E9 Move, <i>P26 moved to or P27 moved from</i> to E53 Place.
Examples	Silver cup 232 (E22) <i>has former or current location</i> Display Case 4, Room 23, Museum of Oxford (E53)

P54 has current permanent location (is current permanent location of)

Domain	E19 Physical Object
Range	E53 Place
Quantification	many to one (0,1:0,n)
Scope note	This property records the foreseen permanent location of an instance of E19 Physical Object at the time this property was instantiated. P54 is similar to <i>P55 has current location</i>. However, it indicates the E53 Place currently reserved for an object, such as the permanent storage location or a permanent exhibit location. The object may be temporarily removed from the permanent location, for example when used in temporary exhibitions or loaned to another institution. The object may never actually be located at its permanent location.
Examples	Silver cup 232 (E22) <i>has current permanent location</i> Shelf 3.1, Store 2, Museum of Oxford (E53)

P55 has current location (currently holds)

Domain	E19 Physical Object
Range	E53 Place
Subproperty of	E18 Physical Thing. P53 has former or current location (is former or current location of): E53 Place
Quantification	many to one (0,1:0, <i>n</i>)
Scope note	This property records the location of an E19 Physical Object at the time the property was instantiated. P55 is a shortcut. A more detailed representation can make use of the fully developed (i.e. indirect) path from E19 Physical Object through <i>P25 moved</i>, E9 Move, <i>P26 moved to</i> to E53 Place if and only if this Move is the most recent.
Examples	Silver cup 232 (E22) <i>has current location</i> Display cabinet 23, Room 4, British Museum (E53)

P56 bears feature (is found on)

Domain	E19 Physical Object
Range	E26 Physical Feature
Quantification	one to many, dependent (0, <i>n</i> :1,1)
Scope note	This property describes an E26 Physical Feature found on an E19 Physical Object. It does not specify the location of the feature on the object. P56 is a shortcut. A more detailed representation can make use of the fully developed (i.e. indirect) path from E19 Physical Object through <i>P59 has section</i>, E53 Place, <i>P53 has former or current location</i> to E26 Physical Feature. A Physical Feature can only exist on one object. One object may bear more than one Physical Feature. An E27 Site should be considered as an E26 Physical Feature on the surface of the Earth.
Examples	Silver cup 232 (E22) <i>bears feature</i> 32 mm scratch on silver cup 232 (E26)

P57 has number of parts

Domain	E19 Physical Object
Range	E60 Number
Quantification	many to one (0,1:0, <i>n</i>)
Scope note	This property documents the E60 Number of parts of which an instance of E19 Physical Object is composed. This may be used as a method of checking inventory counts with regard to aggregate or collective objects. What constitutes a part or component depends on the context and requirements of the documentation. Normally, the parts documented in this way would not be considered as worthy of individual attention. For a more complete description, objects may be decomposed into their components and constituents using <i>P46 is composed of</i> and <i>P45 consists of</i>. This allows each element to be described individually.
Examples	Chess set 233 (E22) <i>has number of parts</i> 33 (E60)

P58 has section definition (defines section)

Domain	E18 Physical Thing
Range	E46 Section Definition
Quantification	one to many, dependent, (0,n:1,1)
Scope note	This property links an area (section) named by an E46 Section Definition to the instance of E18 Physical Thing upon which it is found. The CRM handles sections as locations (instances of E53 Place) within or on E18 Physical Thing that are identified by E46 Section Definitions. Sections need not be discrete and separable components or parts of an object. This is part of a more developed path from E18 Physical Thing through P58, E46 Section Definition, <i>P87 is identified by</i> that allows a more precise definition of a location found on an object than the shortcut <i>P59 has section</i>. A particular instance of a Section Definition only applies to one instance of Physical Thing.
Examples	HMS Victory (E22) <i>has section definition</i> "poop deck of HMS Victory" (E46)

P59 has section (is located on or within)

Domain	E18 Physical Thing
Range	E53 Place
Quantification	one to many (0,n:0,1)
Scope note	This property links an area to the instance of E18 Physical Thing upon which it is found. It is typically used when a named E46 Section Definition is not appropriate. E18 Physical Thing may be subdivided into arbitrary regions. P59 is a shortcut. If the E53 Place is identified by a Section Definition, a more detailed representation can make use of the fully developed (i.e. indirect) path from E18 Physical Thing through <i>P58 has section definition</i>, E46 Section Definition, <i>P87 is identified by</i> to E53 Place. A Place can only be located on or within one Physical Object.
Examples	HMS Victory (E22) <i>has section</i> HMS Victory section B347.6 (E53)

P62 depicts (is depicted by)

Domain	E24 Physical Man-Made Thing
Range	E1 CRM Entity
Quantification	many to many (0,n:0,n)
Scope note	This property identifies something that is depicted by an instance of E24 Physical Man-Made Thing. This property is a shortcut of the more fully developed path from E24 Physical Man-Made Thing through <i>P65 shows visual item</i>, E36 Visual Item, <i>P138 represents</i> to E1 CRM Entity. <i>P62.1 mode of depiction</i> allows the nature of the depiction to be refined.
Examples	"Impression Sunrise" by Monet (E84) <i>depicts</i> sun rising over Le Havre (E5) <i>mode of depiction</i> Impressionistic (E55) A 20 pence coin (E24) <i>depicts</i> Queen Elizabeth II (E21) <i>mode of depiction</i> Profile (E55)
Properties	P62.1 mode of depiction: E55 Type

P65 shows visual item (is shown by)

Domain	E24 Physical Man-Made Thing
Range	E36 Visual Item
Subproperty of	E24 Physical Man-Made Thing. P128 carries (is carried by): E73 Information Object
Quantification	many to many (0..n:0..n)
Scope note	This property documents an E36 Visual Item shown by an instance of E24 Physical Man-Made Thing. This property is similar to <i>P62 depicts</i> in that it associates an item of E24 Physical Man-Made Thing with a visual representation. However, <i>P65 shows visual item</i> differs from the <i>P62 depicts</i> property in that it makes no claims about what the E36 Visual Item is deemed to <i>represent</i>. E36 Visual Item identifies a recognizable image or visual symbol, regardless of what this image may or may not represent. For example, all recent British coins bear a portrait of Queen Elizabeth II, a fact that is correctly documented using <i>P62 depicts</i>. Different portraits have been used at different periods, however. <i>P65 shows visual item</i> can be used to refer to a <i>particular</i> portrait. <i>P65 shows visual item</i> may also be used for Visual Items such as signs, marks and symbols, for example the “Maltese Cross” or the “copyright symbol” that have no particular representational content. This property is part of the fully developed path from E24 Physical Man-Made Thing through <i>P65 shows visual item</i>, E36 Visual Item, <i>P136 represents</i> to E1 CRM Entity which is shortcut by <i>P62 depicts</i>.
Examples	“Impression Sunrise” by Monet (E84) <i>shows visual item</i> Image-of-Impression-Sunrise-by-Monet (E36)

P67 refers to (is referred to by)

Domain	E73 Information Object
Range	E1 CRM Entity
Superproperty of	E31 Document. P70 documents (is documented in): E1 CRM Entity E32 Authority Document. P71 lists (is listed in): E55 Type E73 Information Object. P129 is about (is subject of): E1 CRM Entity E36 Visual Item. P138 represents (has representation): E1 CRM Entity
Quantification	many to many (0..n:0..n)
Scope note	An E73 Information Object may refer to any other E1 CRM Entity. This property documents that an E73 Information Object makes a statement about an instance of an E1 CRM Entity. P67 has the P67.1 has type link to an instance of E55 Type. This is intended to allow a more detailed description of the type of reference. This differs from <i>P129 is about</i>, which describes the primary subject or subjects of the E73 Information Object.
Examples	The eBay auction listing for 4 July 2002 (E73) <i>refers to</i> silver cup 232 (E22) <i>has type</i> auction listing (E55)
Properties	P67.1 has type: E55 Type

P68 usually employs (is usually employed by)

Domain	E29 Design or Procedure
Range	E57 Material
Quantification	many to many (0,n:0,n)
Scope note	This property describes an E57 Material usually employed in an E29 Design or Procedure. Designs and procedures commonly employ particular Materials. The fabrication of adobe bricks, for example, requires straw, clay, and water. This property enables this to be documented. This property is not intended for the documentation of Materials that were required on a particular occasion when a Design or Procedure was executed.
Examples	Procedure for soda glass manufacture (E29) <i>usually employs</i> soda (E57)

P69 is associated with

Domain	E29 Design or Procedure
Range	E29 Design or Procedure
Quantification	many to many (0,n:0,n)
Scope note	This symmetric property describes the association of an E29 Design or Procedure with other Designs or Procedures. Any instance of E29 Design or Procedure may be associated with other designs or procedures. The nature of the association may be whole-part, sequence, prerequisite, etc. The property is assumed to be entirely reciprocal.
Examples	Procedure for glass blowing (E29) <i>is associated with</i> procedure for glass heating (E29)

P70 documents (is documented in)

Domain	E31 Document
Range	E1 CRM Entity
Subproperty of	E73 Information Object. P67 refers to (is referred to by): E1 CRM Entity
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property describes the CRM Entities documented by instances of E31 Document. Documents may describe any conceivable entity, hence the link to the highest-level entity in the CRM hierarchy. This property is intended for cases where a reference is regarded as being of a documentary character, in the scholarly or scientific sense.
Examples	The British Museum catalogue (E31) <i>documents</i> the British Museum's Collection (E78)

P71 lists (is listed in)

Domain	E32 Authority Document
Range	E55 Type
Subproperty of	E73 Information Object. P67 refers to (is referred to by): E1 CRM Entity
Quantification	many to many (0,n:0,n)
Scope note	This property documents a source E32 Authority Document for an instance of an E55 Type.
Examples	The Art & Architecture Thesaurus (E32) <i>lists</i> alcazars (E55)

P72 has language (is language of)

Domain	E33 Linguistic Object
Range	E56 Language
Quantification	many to many, necessary (0,n:0,n)
Scope note	This property describes the E56 Language of an E33 Linguistic Object. Linguistic Objects are composed in one or more human Languages. This property allows these languages to be documented.
Examples	The American Declaration of Independence (E33) <i>has language</i> 18th Century English (E56)

P73 has translation (is translation of)

Domain	E33 Linguistic Object
Range	E33 Linguistic Object
Subproperty of	E70 Thing. P130 shows features of (features are also found on): E70 Thing
Quantification	one to many (0,n:0,1)
Scope note	This property describes the source and target of instances of E33 Linguistic Object involved in a translation. When a Linguistic Object is translated into a new language it becomes a new Linguistic Object, despite being conceptually similar to the source object.
Examples	"Les Baigneurs" (E33) <i>has translation</i> "The Bathers" (E33)

P74 has current or former residence (is current or former residence of)

Domain	E39 Actor
Range	E53 Place
Quantification	many to many (0,n:0,n)
Scope note	This property describes the current or former E53 Place of residence of an E39 Actor. The residence may be either the Place where the Actor resides, or a legally registered address of any kind.
Examples	Queen Elizabeth II (E39) <i>has current or former residence</i> Buckingham Palace (E53)

P75 possesses (is possessed by)

Domain	E39 Actor
Range	E30 Right
Quantification	many to many (0,n:0,n)
Scope note	This property identifies former or current instances of E30 Rights held by an E39 Actor.
Examples	Michael Jackson (E21) <i>possesses</i> Intellectual property rights on the Beatles' back catalogue (E30)

P76 has contact point (provides access to)

Domain	E39 Actor
Range	E51 Contact Point
Quantification	many to many (0,n:0,n)
Scope note	This property identifies an E51 Contact Point of any type that provides access to an E39 Actor by any communication method, such as e-mail or fax.
Examples	RLG (E40) <i>has contact point</i> bl.ric@rlg.org (E51)

P78 is identified by (identifies)

Domain	E52 Time-Span
Range	E49 Time Appellation
Subproperty of	E1 CRM Entity. P1 is identified by (identifies): E41 Appellation
Quantification	many to many (0,n:0,n)
Scope note	This property identifies an E52 Time-Span using an E49 Time Appellation.
Examples	The time span 1926 to 1988 (E52) <i>is identified by</i> Showa (Japanese time appellation) (E49)

P79 beginning is qualified by

Domain	E52 Time-Span
Range	E62 String
Subproperty of	E1 CRM Entity. P3 has note: E62 String
Quantification	many to one (0,1:0,n)
Scope note	This property qualifies the beginning of an E52 Time-Span in some way. The nature of the qualification may be certainty, precision, source etc.
Examples	The time-span of the Holocene (E52) <i>beginning is qualified by</i> approximately (E62)

P80 end is qualified by

Domain	E52 Time-Span
Range	E62 String
Subproperty of	E1 CRM Entity. P3 has note: E62 String
Quantification	many to one (0,1:0, <i>n</i>)
Scope note	This property qualifies the end of an E52 Time-Span in some way. The nature of the qualification may be certainty, precision, source etc.
Examples	The time-span of the Holocene (E52) <i>end is qualified by</i> approximately (E62)

P81 ongoing throughout

Domain	E52 Time-Span
Range	E61 Time Primitive
Quantification	many to one, necessary (1,1:0, <i>n</i>)
Scope note	This property describes the minimum period of time covered by an E52 Time-Span. Since Time-Spans may not have precisely known temporal extents, the CRM supports statements about the minimum and maximum temporal extents of Time-Spans. This property allows a Time-Span's minimum temporal extent (i.e. it's inner boundary) to be assigned an E61 Time Primitive value. Time Primitives are treated by the CRM as application- or system-specific date intervals, and are not further analysed.
Examples	The time-span of the development of the CIDOC CRM (E52) <i>ongoing throughout</i> 1996-2002 (E61)

P82 at some time within

Domain	E52 Time-Span
Range	E61 Time Primitive
Quantification	many to one, necessary (1,1:0, <i>n</i>)
Scope note	This property describes the maximum period of time within which an E52 Time-Span falls. Since Time-Spans may not have precisely known temporal extents, the CRM supports statements about the minimum and maximum temporal extents of Time-Spans. This property allows a Time-Span's maximum temporal extent (i.e. it's outer boundary) to be assigned an E61 Time Primitive value. Time Primitives are treated by the CRM as application- or system-specific date intervals, and are not further analysed.
Examples	The time-span of the development of the CIDOC CRM (E52) <i>at some time within</i> 1992-infinity (E61)

P83 had at least duration (was minimum duration of)

Domain	E52 Time-Span
Range	E54 Dimension
Quantification	one to one (1,1:1,1)
Scope note	This property describes the minimum length of time covered by an E52 Time-Span. It allows an E52 Time-Span to be associated with an E54 Dimension representing its minimum duration (i.e. its inner boundary) independent from the actual beginning and end.
Examples	The time span of the Battle of Issos 333 B.C.E. (E52) <i>had at least duration</i> Battle of Issos minimum duration (E54) <i>P91 unit day</i> (E58) <i>P90 has value 1</i> (E60)

P84 had at most duration (was maximum duration of)

Domain	E52 Time-Span
Range	E54 Dimension
Quantification	one to one (1,1:1,1)
Scope note	This property describes the maximum length of time covered by an E52 Time-Span. It allows an E52 Time-Span to be associated with an E54 Dimension representing its maximum duration (i.e. its outer boundary) independent from the actual beginning and end.
Examples	The time span of the Battle of Issos 333 B.C.E. (E52) <i>had at most duration</i> Battle of Issos maximum duration (E54) <i>P91 unit day</i> (E58) <i>P90 has value 2</i> (E60)

P86 falls within (contains)

Domain	E52 Time-Span
Range	E52 Time-Span
Quantification	many to many (0,n:0,n)
Scope note	This property describes the inclusion relationship between two instances of E52 Time-Span. This property supports the notion that a Time-Span's temporal extent falls within the temporal extent of another Time-Span. It addresses temporal containment only, and no contextual link between the two instances of Time-Span is implied.
Examples	The time-span of the Apollo 11 moon mission (E52) <i>falls within</i> the time-span of the reign of Queen Elizabeth II (E52)

P87 is identified by (identifies)

Domain	E53 Place
Range	E44 Place Appellation
Subproperty of	E1 CRM Entity. P1 is identified by (identifies): E41 Appellation
Quantification	many to many (0,n:0,n)
Scope note	This property identifies an E53 Place using an E44 Place Appellation. Examples of Place Appellations used to identify Places include instances of E48 Place Name, addresses, E47 Spatial Coordinates etc.
Examples	The location of the Duke of Wellington's House (E53) <i>is identified by</i> No 1 London (E45)

P88 consists of (forms part of)

Domain	E53 Place
Range	E53 Place
Quantification	many to many (0,n:0,n)
Scope note	This property identifies an E53 Place that forms part of another Place. It supports the notion that a Place can be subdivided into one or more constituent parts. It implies both spatial and contextual containment relationships between the two Places.
Examples	The area covered by the London Borough of Islington in 1976 (E53) <i>forms part of</i> the area covered by Greater London in 1976 (E53)

P89 falls within (contains)

Domain	E53 Place
Range	E53 Place
Quantification	many to many (0,n:0,n)
Scope note	This property identifies the instances of E53 Places that fall within the area covered by another Place. It addresses spatial containment only, and no “whole-part” relationship between the two places is implied.
Examples	The area covered by the World Heritage Site of Stonehenge (E53) <i>falls within</i> the area of Salisbury Plain (E53)

P90 has value

Domain	E54 Dimension
Range	E60 Number
Quantification	many to one, necessary (1,1:0,n)
Scope note	This property allows an E54 Dimension to be approximated by an E60 Number primitive.
Examples	Height of silver cup 232 (E54) <i>has value</i> 226 (E60)

P91 has unit (is unit of)

Domain	E54 Dimension
Range	E58 Measurement Unit
Quantification	many to one, necessary (1,1:0,n)
Scope note	This property shows the type of unit an E54 Dimension was expressed in.
Examples	Height of silver cup 232 (E54) <i>has unit</i> mm (E58)

P92 brought into existence (was brought into existence by)

Domain	E63 Beginning of Existence
Range	E77 Persistent Item
Subproperty of	E5 Event. P12 occurred in the presence of (was present at): E77 Persistent Item
Superproperty of	E65 Creation. P94 has created (was created by): E28 Conceptual Object E66 Formation. P95 has formed (was formed by): E74 Group E67 Birth. P98 brought into life (was born): E21 Person E12 Production. P108 has produced (was produced by): E24 Physical Man-Made Thing E81 Transformation. P123 resulted in (resulted from): E77 Persistent Item
Quantification	one to many, necessary, dependent (1,n:1,1)
Scope note	This property allows an E63 Beginning of Existence event to be linked to the E77 Persistent Item brought into existence by it. It allows a “start” to be attached to any Persistent Item being documented i.e. E70 Thing, E72 Legal Object, E39 Actor, E41 Appellation, E51 Contact Point and E55 Type.
Examples	The birth of Mozart (E67) <i>brought into existence</i> Mozart (E21)

P93 took out of existence (was taken out of existence by)

Domain	E64 End of Existence
Range	E77 Persistent Item
Subproperty of	E5 Event. P12 occurred in the presence of (was present at): E77 Persistent Item
Superproperty of	E6 Destruction. P13 destroyed (was destroyed by): E18 Physical Thing E68 Dissolution. P99 dissolved (was dissolved by): E74 Group E69 Death. P100 was death of (died in): E21 Person E81 Transformation. P123 transformed (was transformed by): E77 Persistent Item
Quantification	one to many, necessary (1,n:0,1)
Scope note	This property allows an E64 End of Existence event to be linked to the E77 Persistent Item taken out of existence by it. In the case of immaterial things, the E64 End of Existence is considered to take place with the destruction of the last physical carrier. This allows an “end” to be attached to any Persistent Item being documented i.e. instances of E70 Thing, E72 Legal Object, E39 Actor, E41 Appellation, E51 Contact Point and E55 Type. For many Persistent Items we can infer that they should have ceased to exist after a certain date if the maximum life span is known. An End of Existence event may often be assumed to have taken place even if it may have gone unnoticed (such as when the last representative of an indigenous nation forgets some secret knowledge).
Examples	The death of Mozart (E69) <i>took out of existence</i> Mozart (E21)

P94 has created (was created by)

Domain	E65 Creation
Range	E28 Conceptual Object
Subproperty of	E63 Beginning of Existence. P92 brought into existence (was brought into existence by): E77 Persistent Item
Superproperty of	E83 Type Creation. P135 created type (was created by): E55 Type
Quantification	one to many, necessary, dependent (1,n:1,1)
Scope note	This property allows a conceptual E65 Creation to be linked to the E28 Conceptual Object created by it. It represents the act of conceiving the intellectual content of the E28 Conceptual Object. It does not represent the act of creating the first physical carrier of the E28 Conceptual Object. As an example, this is the composition of a poem, not its commitment to paper.
Examples	The composition of "The Four Friends" by A. A. Milne (E65) <i>has created</i> "The Four Friends" by A. A. Milne (E28)

P95 has formed (was formed by)

Domain	E66 Formation
Range	E74 Group
Subproperty of	E63 Beginning of Existence. P92 brought into existence (was brought into existence by): E77 Persistent Item
Quantification	one to many, necessary, dependent (1,n:1,1)
Scope note	This property links the founding of E66 Formation for an E74 Group with the Group itself.
Examples	The formation of the CIDOC CRM SIG at the August 2000 CIDOC Board meeting (E66) <i>has formed</i> the CIDOC CRM Special Interest Group (E74)

P96 by mother (gave birth)

Domain	E67 Birth
Range	E21 Person
Subproperty of	E5 Event. P11 had participant (participated in): E39 Actor
Quantification	many to one, necessary (1,1:0,1)
Scope note	This property links an E67 Birth event to an E21 Person as a participant in the role of birth-giving mother. Note that biological fathers are not necessarily participants in the Birth (see P97 <i>from father (was father for)</i>). The Person being born is linked to the Birth with the property <i>brought into life (was born)</i> (P98). This is not intended for use with general natural history material, only people. There is no explicit method for modelling conception and gestation except by using extensions.
Examples	The birth of Queen Elizabeth II (E67) <i>by mother</i> Queen Mother (E21)

P97 from father (was father for)

Domain	E67 Birth
Range	E21 Person
Quantification	many to many, necessary (1,n:0,n)
Scope note	This property links an E67 Birth event to an E21 Person in the role of biological father. Note that biological fathers are not seen as necessary participants in the Birth, whereas birth-giving mothers are (see <i>by mother (gave birth)</i> (P96)). The Person being born is linked to the Birth with the property <i>brought into life (was born)</i> (P98). This is not intended for use with general natural history material, only people. There is no explicit method for modelling conception and gestation except by using extensions. A Birth event is normally (but not always) associated with one biological father.
Examples	King George VI (E21) <i>was father for</i> the birth of Queen Elizabeth II (E67)

P98 brought into life (was born)

Domain	E67 Birth
Range	E21 Person
Subproperty of	E63 Beginning of Existence. P92 brought into existence (was brought into existence by): E77 Persistent Item
Quantification	one to many, dependent (0,n:1,1)
Scope note	This property links an E67Birth event to an E21 Person in the role of offspring. Twins, triplets etc. are <i>brought into life</i> by the same Birth event. This is not intended for use with general Natural History material, only people. There is no explicit method for modelling conception and gestation except by using extensions.
Examples	The Birth of Queen Elizabeth II (E67) <i>brought into life</i> Queen Elizabeth II (E21)

P99 dissolved (was dissolved by)

Domain	E68 Dissolution
Range	E74 Group
Subproperty of	E5 Event. P11 had participant (participated in): E39 Actor E64 End of Existence. P93 took out of existence (was taken out of existence by): E77 Persistent Item
Quantification	one to many, necessary (1,n:0,n)
Scope note	This property links the disbanding or Dissolution (E68) of a Group (E74) to the Group itself.
Examples	The end of The Hole in the Wall Gang (E68) <i>dissolved</i> The Hole in the Wall Gang (E74)