



Definition of the
CIDOC
Conceptual Reference Model

Produced by the ICOM/CIDOC
Documentation Standards Group,
continued by the
CIDOC CRM Special Interest Group

Version 3.4.7

31th October 2003

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Definition of the CIDOC Conceptual Reference Model

Introduction

This document is the formal definition of the **CIDOC Conceptual Reference Model (“CRM”)**, a formal ontology intended to facilitate the integration, mediation and interchange of heterogeneous cultural heritage information. The CRM 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 the CRM itself began in 1996 under the auspices of the ICOM-CIDOC Documentation Standards Working Group. Since 2000, development of the CRM has been officially delegated by ICOM-CIDOC to the CIDOC CRM Special Interest Group, which collaborates with the ISO working group ISO/TC46/SC4/WG9 to bring the CRM to the form and status of an International Standard.

Objectives of the CIDOC CRM

The primary role of the CRM is to enable information exchange and integration between heterogeneous sources of cultural heritage information. It aims at providing the semantic definitions and clarifications needed to transform disparate, localised information sources into a coherent global resource, be it within a larger institution, in intranets or on the Internet.

Its perspective is supra-institutional and abstracted from any specific local context. This goal determines the constructs and level of detail of the CRM.

More specifically, it defines and is restricted to the **underlying semantics** of database schemata and document **structures** used in cultural heritage and museum documentation in terms of a formal ontology. It does **not** define any of the **terminology** appearing typically as data in the respective data structures; however it foresees the characteristic relationships for its use. It does **not** aim at proposing what cultural institutions **should** document. Rather it explains the logic of what they actually currently document, and thereby enables **semantic interoperability**.

It intends to provide an optimal analysis of the intellectual structure of cultural documentation in logical terms. As such, it is not optimised to implementation-specific storage and processing aspects. Rather, it provides the means to understand the effects of such optimisations to the semantic accessibility of the respective contents.

The CRM aims to support the following specific functionalities:

- Inform developers of information systems as a guide to good practice in conceptual modelling, in order to effectively structure and relate information assets of cultural documentation.
- Serve as a common language for domain experts and IT developers to formulate requirements and to agree on system functionalities with respect to the correct handling of cultural contents.
- To 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. The latter being useful for data exchange, data migration from legacy systems, data information integration and mediation of heterogeneous sources.
- To support associative queries against integrated resources by providing a global model of the basic classes and their associations to formulate such queries.
- It is further believed, that advanced natural language algorithms and case-specific heuristics can take significant advantage of the CRM to resolve free text information into a formal logical form, if that is regarded beneficial. The CRM is however not thought to be a means to replace scholarly text, rich in meaning, by logical forms, but only a means to identify related data.

Users of the CRM should be aware that the definition of data entry systems requires support of community-specific terminology, guidance to what should be documented and in which sequence, and application-specific consistency controls. The CRM does not provide such notions.

By its very structure and formalism, the CRM is extensible and users are encouraged to create extensions for the needs of more specialized communities and applications.

Scope of the CIDOC CRM

The overall scope of the CIDOC CRM can be summarised in simple terms as *the curated knowledge of museums*.

However, a more detailed and useful definition can be articulated by defining both the *Intended Scope*, a broad and maximally-inclusive definition of general application principles, and the *Practical Scope*, which is expressed by the overall scope of a reference set of specific identifiable museum documentation standards and practices that the CRM aims to encompass, however restricted in its details to the limitations of the Intended Scope.

The *Intended Scope* of the CRM may be defined as all information required for the exchange and integration of heterogeneous scientific documentation of 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 the CRM should 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 the CRM 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 ICOM¹. 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. The CRM is specifically intended to cover contextual information: 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 the harmonisation of the CRM with their models, falls within the Intended Scope of the CRM.
- 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 the CRM.

The Practical Scope² of the CRM is expressed in terms of the current reference standards for museum documentation that have been used to guide and validate the CRM’s development. The CRM covers the same domain of discourse as the union of these reference standards; this means that data correctly encoded according to any of these museum documentation standards can be expressed in a CRM-compatible form, without any loss of meaning.

Compatibility with the CRM

Users intending to take advantage of the semantic interoperability offered by the CRM may want to make parts of their data structures compatible with the CRM. The respective parts should pertain either to the associations by which users would like their data to be accessible in an integrated environment, or to contents intended for transport to other environments, so that the meaning encoded by its structure is preserved in another target system.

In that sense, the CRM is not aimed at proposing a complete matching of user documentation structures with the CRM, nor that a user should always implement all CRM concepts and associations; rather it is intended to leave room for all kinds of extensions to capture the richness of cultural information, but also for simplifications for reasons of economy.

Further, the CRM is a means to interpret structured information in a way, so that large amounts of data contents can be transformed or mediated automatically. As a consequence, the CRM aims not at resolving free text information into a formal logical form. In other terms, it does not intend to provide more structuring than the users have done before, and free text information does not fall under the scope of compatibility considerations. The CRM foresees however the associations to transport such information in relation to structured information.

¹ The ICOM Statutes provide a definition of the term “museum” at <http://icom.museum/statutes.html#2>

² 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>

The CRM is a formal ontology, expressible in terms of logic or a suitable knowledge representation language. Its concepts can be instantiated as sets of statements that form models of the assumed reality referred to in a structured document. Any encoding of CRM instances in a formal language that preserves the relations to the CRM classes, properties and inheritance rules among them is regarded a “CRM-compatible form”.

A part of a documentation structure is compatible with the CRM, if a deterministic logical algorithm can be found, that transforms any data correctly encoded in this structure into a CRM-compatible form without loss of meaning. No assumptions are made about the nature of this algorithm. It may in particular draw on other formal ontologies expressing background knowledge such as thesauri. The algorithm itself can only be found and verified intellectually by understanding the meaning intended by the designer of the data structure and the CRM concepts. By the term “correctly encoded” we mean that the data are encoded so that the meaning intended by the designer of the data structure is correctly applied to the intended meaning of the data.

Information system implementers may choose to provide **export** facilities of selected data into a CRM-compatible form. They may further choose to provide a service to **access** selected data by querying with CRM concepts. It is not regarded a loss of compatibility, if certain subclasses and subproperties of the CRM are not supported in such a service. In that case it is regarded essential that the services publishes the set of CRM concepts it supports.

Applied Form

The CRM is a domain ontology in the sense used in computer science. It has been expressed as an object-oriented semantic model, in the hope that this formulation will be comprehensible to both documentation experts and information scientists alike, while at the same time being readily converted to machine-readable formats such as RDF Schema, KIF, DAML+OIL, OWL, STEP, etc. It can be implemented in any Relational or object-oriented schema. CRM instances can also be encoded in RDF, XML, DAML+OIL, OWL and others.

Although the definition of the CRM provided here is complete, it is an intentionally compact and concise presentation of the CRM’s 81 classes and 132 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 132). However, this definition does contain all of the information necessary to infer and automatically generate a full declaration of all properties, including inherited properties.

Terminology

The following definitions of key terminology used in this document are provided both as an aid to readers unfamiliar with object-oriented modelling terminology, and to specify the precise usage of terms that are sometimes applied inconsistently across the object oriented modelling community for the purpose of this document. Where applicable, the editors have tried to consistently use terminology that is compatible with that of the Resource Description Framework (RDF)³, a recommendation of the World Wide Web Consortium. The editors have tried to find a language which is comprehensible to the non-computer expert and precise enough for the computer expert so that both understand the intended meaning.

class A class is a category of items that share one or more common *traits* serving as criteria to identify the items belonging to the class. These properties need not be explicitly formulated in logical terms, but may be described in a text (here called a **scope note**) that refers to a common conceptualisation of domain experts. The sum of these traits is called the **intension** of the class. A class may 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 may bring new instances about 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 must have an unambiguously defined **domain** and **range**). In

³ Information about the Resource Description Framework (RDF) can be found at <http://www.w3.org/RDF/>

some contexts, the terms *individual class*, *entity* or *node* are used synonymously with *class*. For example:

Person is a class. To be a *Person* may actually be determined by DNA characteristics, but we all know what a *Person* is. A *Person* may have the property of being a *member of a Group*, but it is not necessary to be member of a *Group* in order to be a *Person*. We shall never know all *Persons* of the past. There will be more *Persons* in the future.

subclass

A subclass is a **class** that is a *specialization* of another class (its **superclass**). *Specialization* or the *IsA relationship* means that:

1. all instances of the subclass are also instances of its superclass,
2. the **intension** of the subclass extends the intension of its superclass, i.e. its *traits* are more restrictive than that of its superclass and
3. the subclass *inherits* the definition of all of the **properties** declared for its superclass without exceptions (**strict inheritance**), in addition to having none, one or more properties of its own.

A subclass can have more than one immediate superclass and consequently inherits the properties of all of its superclasses (**multiple inheritance**). The *IsA relationship* or *specialization* between two or more classes gives rise to a structure known as a *class hierarchy*. The *IsA relationship* is transitive and may not be cyclic. In some contexts (e.g. the programming language C++) the term *derived class* is used synonymously with *subclass*.

For example:

Every Person *IsA* Biological Object, or Person is a *subclass* of Biological Object.

Also, every Person *IsA* Actor. A Person may *die*. However other kinds of Actors, such as companies, don't die (c.f. 2).

Every Biological Object *IsA* Physical Object. A Physical Object can be *moved*. Hence a Person can be *moved* also (c.f. 3).

superclass

A superclass is a **class** that is a *generalization* of one or more other classes (its **subclasses**), which means that it *subsumes* all **instances** of its subclasses, and that it 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. This *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”. It needs fewer *traits* to identify an item as a Biological Object than to identify it as a Person.

intension

The intension of a **class** or **property** is its intended meaning. It consists of one or more common *traits* shared by all instances of the class or property. These *traits* need not be explicitly formulated in logical terms, but may just be described in a text (here called a **scope note**) that refers to a conceptualisation common to domain experts. In particular the so-called **primitive** concepts, which make up most of the CRM, cannot be further reduced to other concepts by logical terms.

extension

The extension of a class is the set of all real life **instances** belonging to the class that fulfil the criteria of its **intension**. This set is “open” 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 may bring new instances about 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.

scope note

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

Scope notes are not formal modelling constructs, but are provided to help explain the intended meaning and application of the CRM's classes and properties. Basically, they refer to a conceptualisation common to domain experts and disambiguate between different

possible interpretations. Illustrative example **instances** of classes and properties are also regularly provided in the scope notes for explanatory purposes.

instance An instance of a **class** is an item that has the *traits* that match the criteria of the **intension** of the class.
For example:
The painting known as the “The Mona Lisa” is an instance of the class Physical Man Made Object.

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*”.

property A property serves to define a relationship of a specific kind between two **classes**. The property is characterized by an **intension**, which is conveyed by a **scope note**. A property plays a role analogous to a grammatical verb, in that it must be defined with reference to both its **domain** and **range**, which are analogous to the subject and object in grammar (unlike classes, which can be defined independently). It is arbitrary, which class is selected as the domain, just as the choice between active and passive voice in grammar is arbitrary. In other words, a property can be interpreted in both directions, with two distinct, but related interpretations. Properties may 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**.
In some contexts, the terms *attribute*, *reference*, *link*, *role* or *slot* are used synonymously with *property*.

For example:

“Physical Man-Made Stuff *depicts* CRM Entity” is equivalent to “CRM Entity *is depicted by* Physical Man-Made Stuff”.

subproperty A subproperty is a **property** that is a *specialization* of another property (its **superproperty**). *Specialization* or *IsA relationship* means that:

1. all instances of the subproperty are also instances of its superproperty,
2. the **intension** of the subproperty extends the intension of the superproperty, i.e. its *traits* are more restrictive than that of its superproperty,
3. the **domain** of the subproperty is the same as the domain of its superproperty or a **subclass** of that domain,
4. the **range** of the subproperty is the same as the range of its superproperty or a subclass of that range,
5. the subproperty *inherits* 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 its own.

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 may not be cyclic.

Some object-oriented languages, such as C++, have no equivalent to the specialization of properties.

superproperty A superproperty is a **property** that is a *generalization* of one or more other properties (its **subproperties**), which means that it *subsumes* all **instances** of its subproperties, and that it 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*.

domain The domain is the **class** for which a **property** is formally defined. This means that

instances of the property are applicable to **instances** of its domain class. A property must have exactly one domain, although the domain class may always contain **instances** for which the property is not instantiated. The domain class is analogous to the grammatical subject of the phrase for which the property is analogous to the verb. It is arbitrary, which class is selected as the domain and which as the **range**, just as the choice between active and passive voice in grammar is arbitrary. Property names in the CRM are designed to be semantically meaningful and grammatically correct when read from domain to range. In addition, the inverse property name, normally given in parentheses, is also designed to be semantically meaningful and grammatically correct when read from range to domain.

range	The range is the class that comprises all potential values of a property . That means that instances of the property can link only to instances of its range class. A property must have exactly one range, although the range class may always contain instances that are not the value of the property. The range class is analogous to the grammatical object of a phrase for which the property is analogous to the verb. It is arbitrary, which class is selected as domain and which as range, just as the choice between active and passive voice in grammar is arbitrary. Property names in the CRM are designed to be semantically meaningful and grammatically correct when read from domain to range. In addition the inverse property name, normally given in parentheses, is also designed to be semantically meaningful and grammatically correct when read from range to domain.
inheritance	Inheritance of properties from superclasses to subclasses means that if an item x is an instance of a class A, then <ol style="list-style-type: none"> 1. all properties that must hold for the instances of any of the superclasses of A must also hold for item x, and all optional properties that may hold for the instances of any of the superclasses of A may also hold for item x.
strict inheritance	Strict inheritance means that there are no exceptions to the inheritance of properties from superclasses to subclasses . For instance, some systems may declare that elephants are grey, and regard a white elephant as an exception. Under strict inheritance it would hold that: if all elephants were grey, then a white elephant could not be an elephant. Obviously not all elephants are grey. To be grey is not part of the intension of the concept elephant but an optional property. The CRM applies strict inheritance as a normalization principle.
multiple inheritance	Multiple inheritance means that a class A may have more than one immediate superclass . 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 <i>traits</i> 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, there are necessarily repetitions of the same class at different positions in the list. For example, Person is both, an Actor and a Biological Object.
instance	An instance of a class is a real world item that fulfils the criteria of the intension of the class. Note, that the number of instances declared for a class in an information system is typically less than the total in the real world. For example, you are an instance of Person, but you are not mentioned in all information systems describing Persons.
endurant, perdurant	“The difference between enduring and perduring entities (which we shall also call <i>endurants</i> and <i>perdurants</i>) is related to their behaviour in time. Endurants are <i>wholly</i> present (i.e., all their proper parts are present) at any time they are present. Perdurants, on the other hand, just extend in time by accumulating different temporal parts, so that, at any time they are present, they are only <i>partially</i> present, in the sense that some of their proper temporal parts (e.g., their previous or future phases) may be not present. E.g., the piece of paper you are reading now is wholly present, while some temporal parts of your reading are not present any more. Philosophers say that endurants are entities that <i>are in time</i> , while lacking however temporal parts (so to speak, all their parts flow with them in time). Perdurants, on the other hand, are entities that <i>happen in time</i> , and can have temporal parts (all their parts are fixed in time).” (Gangemi et al. 2002, pp. 166-181).
shortcut	A shortcut is a formally defined single property that represents a <i>deduction</i> or <i>join</i> of a data

path in the CRM. The scope notes of all properties characterized as shortcuts describe in words the equivalent deduction. Shortcuts are introduced for the 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 Measurement Event that observed it. The CRM allows shortcuts as cases of less detailed knowledge, while preserving in its schema the relationship to the full information.

monotonic reasoning	Monotonic reasoning is a term from knowledge representation. A reasoning form is monotonic if an addition to the set of propositions making up the knowledge base never determines a decrement in the set of conclusions that may be derived from the knowledge base via inference rules. In practical terms, if experts enter subsequently correct statements to an information system, the system should not regard any results from those statements as invalid, when a new one is entered. The CRM is designed for monotonic reasoning and so enables conflict-free merging of huge stores of knowledge.
disjoint	Classes are disjoint if the intersection of their extensions is an empty set. In other words, they have no common instances in any possible world.
primitive	The term primitive as used in knowledge representation characterizes a concept that is declared and its meaning is agreed upon, but that is not defined by a logical deduction from other concepts. For example, <i>mother</i> may be described as a female human with child. Then <i>mother</i> is not a primitive concept. <i>Event</i> however is a primitive concept. Most of the CRM is made up of primitive concepts.
Open World	The “Open World Assumption” is a term from knowledge base systems. It characterizes knowledge base systems that assume the information stored is incomplete relative to the <i>universe of discourse</i> they intend to describe. This incompleteness may be due to the inability of the maintainer to provide sufficient information or due to more fundamental problems of cognition in the system’s domain. Such problems are characteristic of cultural information systems. Our records about the past are necessarily incomplete. In addition, there may be items that cannot be clearly assigned to a given class . In particular, absence of a certain property for an item described in the system does not mean that this item does not have this property. For example, if one item is described as Biological Object and another as Physical Object, this does not imply that the latter may not be a Biological Object as well. Therefore complements of a class with respect to a superclass cannot be <i>concluded</i> in general from an information system using the Open World Assumption. For example, one cannot list “all Physical Objects known to the system that are not Biological Objects in the real world”, but one may of course list “all items known to the system as Physical Objects but that are not known to the system as Biological Objects”.
complement	The complement of a class A with respect to one of its superclasses B is the set of all instances of B that are not instances of A. Formally, it is the set-theoretic difference of the extension of B minus the extension of A. Compatible extensions of the CRM should not declare any class with the intension of them being the complement of one or more other classes. To do so will normally violate the desire to describe an Open World . For example, for all possible cases of human <i>gender</i> , <i>male</i> should not be declared as the complement of <i>female</i> or vice versa. What if someone is both or even of another kind?
query containment	Query containment is a problem from database theory: A query X contains another query Y, if for each possible population of a database the answer set to query X contains also the answer set to query Y. If query X and Y were classes, then X would be superclass of Y.
interoperability	Interoperability means the capability of different information systems to communicate some of their contents. In particular, it may mean that <ol style="list-style-type: none">1. two systems can exchange information, and/or2. multiple systems can be accessed with a single method. Generally, syntactic interoperability is distinguished from semantic interoperability . Syntactic interoperability means that the information encoding of the involved systems and the access protocols are compatible, so that information can be processed as described

above without error. However, this does not mean that each system processes the data in a manner consistent with the intended meaning. For example, one system may use a table called “Actor” and another one called “Agent”. With syntactic interoperability, data from both tables may only be retrieved as distinct, even though they may 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.

semantic interoperability

Semantic **interoperability** means the capability of different information systems to communicate information consistent with the intended meaning. In more detail, the intended meaning encompasses

1. the data structure elements involved,
2. the terminology appearing as data and
3. the identifiers used in the data for factual items such as places, people, objects etc.

Obviously communication about data structure must be resolved first. In this case consistent communication means that data can be transferred between data structure elements with the same intended meaning or that data from elements with the same intended meaning can be merged. In practice, the different levels of generalization in different systems do not allow the achievement of this ideal. Therefore semantic interoperability is regarded as achieved if elements can be found that provide a reasonably close generalization for the transfer or merge. This problem is being studied theoretically as the **query containment** problem. The CRM is only concerned with semantic interoperability on the level of data structure elements.

property quantifiers

We use the term *property quantifiers* for the declaration of the allowed number of **instances** of a certain **property** that an instance of its **range** or **domain** may have. These declarations are ontological, i.e. they refer to the nature of the real world described and not to our current knowledge. For example, each person has exactly one father, but collected knowledge may refer to none, one or many.

universal

The fundamental ontological distinction between *universals* and *particulars* can be informally understood by considering their relationship with *instantiation*: particulars are entities that have no **instances** in any possible world; universals are entities that do have instances. **Classes** and **properties** (corresponding to predicates in a logical language) are usually considered to be universals. (after Gangemi et al. 2002, pp. 166-181).

Property Quantifiers

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

The following table lists all possible property quantifiers occurring in this document by their notation, together with an explanation in plain words. In order to provide optimal clarity, two widely accepted notations are used redundantly in this document, a verbal and a numeric one. The verbal notation uses phrases such as “one to many”, and the numeric one, expressions such as “(0,n:0,1)”. While the terms “one”, “many” and “necessary” are quite intuitive, the term “dependent” 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.

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 this property. In other words, this 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 this property, but an individual range instance cannot be referenced by more than one instance of this property. In other words, this property is optional for its domain and range, but repeatable for its domain only. In some contexts this situation is called a “fan-out”.

many to one An individual domain instance of this property can have zero or one instance of this property,

(0,1:0,n)	but an individual range instance can be referenced by zero, one or more instances of this property. In other words, this property is optional for its domain and range, but repeatable for its range only. In some contexts this situation is 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 this property, but an individual range instance can have zero, one or more instances of this property. In other words, this 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 this property, but an individual range instance cannot be referenced by more than one instance of this property. In other words, this property is necessary and repeatable for its domain, and optional but not repeatable for its range. In some contexts this situation is called a “fan-out”.
many to one, necessary (1,1:0,n)	An individual domain instance of this property must have exactly one instance of this property, but an individual range instance can be referenced by zero, one or more instances of this property. In other words, this property is necessary and not repeatable for its domain, and optional and repeatable for its range. In some contexts this situation is 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 this property, but an individual range instance must be referenced by exactly one instance of this property. In other words, this property is optional and repeatable for its domain, but necessary and not repeatable for its range. In some contexts this situation is 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 this property, but an individual range instance must be referenced by exactly one instance of this property. In other words, this property is necessary and repeatable for its domain, and necessary but not repeatable for its range. In some contexts this situation is called a “fan-out”.
many to one, necessary, dependent (1,1:1,n)	An individual domain instance of this property must have exactly one instance of this property, but an individual range instance can be referenced by one or more instances of this property. In other words, this property is necessary and not repeatable for its domain, and necessary and repeatable for its range. In some contexts this situation is called a “fan-in”.
one to one (1,1:1,1)	An individual domain instance and range instance of this property must have exactly one instance of this property. In other words, this property is necessary and not repeatable for its domain and for its range.

The CRM defines some properties as being **necessary** for their **domain** or as being **dependent** from their **range**, following the definitions in the table above. Note that if such a property is not specified for an instance of the respective domain or range, it means that the property exists, but the value on one side of the property is unknown. In the case of optional properties, the methodology proposed by the CRM does not distinguish between a value being unknown or the property not being applicable at all. For example, one may know that an object has an owner, but the owner is unknown. In a CRM instance this case cannot be distinguished from the fact that the object has no owner at all. Of course, such details can always be specified by a textual note.

Naming Conventions

The following naming conventions have been applied throughout the CRM:

- Classes are identified by numbers preceded by the letter “E” (historically classes were sometimes referred to as “Entities”), and are named using noun phrases (nominal groups) using 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 related 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, for example) have no parenthetical name form, because 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 same 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 consist of (forms part of): E4 Period*, have a parenthetical form that relates to the meaning of the inverse direction.
- The choice of the domain of properties, and hence the order of their names, are established in accordance with the following priority list:
 - Temporal Entity and its subclasses
 - Stuff and its subclasses
 - Actor and its subclasses
 - Other

Modelling principles

The following modelling principles have guided and informed the development of the CIDOC CRM.

Monotonicity

Because the CRM's primary role is the meaningful integration of information in an Open World, it aims to be *monotonic* in the sense of Domain Theory. That is, the existing CRM constructs and the deductions made from them must always remain valid and well-formed, even as new constructs are added by extensions to the CRM.

For example:

One may add a subclass of E7Activity to describe the practice of an instance of group to use a certain name for a place over a certain time-span. By this extension, no existing *IsA Relationships* or property inheritances are compromised.

In addition, the CRM aims to enable the formal preservation of monotonicity when augmenting a particular CRM compatible system. That is, existing CRM instances, their properties and deductions made from them, should always remain valid and well-formed, even as new instances, regarded as consistent by the domain expert, are added to the system.

For example:

If someone describes correctly that an item is an instance of E19 Physical Object, and later 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 for the frequent cases of alternative opinions, all formally defined properties should be implemented as unconstrained (**many:many**) so that conflicting instances of properties are merely accumulated. Thus knowledge integrated following the CRM serves as a research base, accumulating relevant alternative opinions around well-defined entities, whereas conclusions about the truth are the task of open-ended scientific or scholarly hypothesis building.

For example:

El Greco and even King Arthur should always remain an instance of E21 Person and be dealt with as existing within the sense of our discourse, once they are entered into our knowledge base. Alternative opinions about properties, such as their birthplaces and their living places, should be accumulated without validity decisions being made during data compilation.

Minimality

Although the scope of the CRM is very broad, the model 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.
- CRM 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.
- CRM classes and properties are either primitive, or they are key concepts in the practical scope.
- Complements of CRM classes are not declared.

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 Stuff. P52 has current owner (is current owner of): E39 Actor*, is a shortcut for a fully articulated path from E18 Physical Stuff 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.

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 may easily become inconsistent with the goal of providing a concise definition. However, there are two key examples of disjoint class pairs that are fundamental to effective comprehension of the CRM:

- **E2 Temporal Entity is disjoint from E77 Persistent Item.** Instances of the class E2 Temporal Entity are perdurants, whereas instances of the class E77 Persistent Item are endurants. 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 endurants and perdurants as disjoint classes is consistent with the distinctions made in data structures that fall within the CRM's practical scope.
- **E18 Physical Stuff is disjoint from E28 Conceptual Object.** The distinction is between material and immaterial items, the latter being exclusively man-made. Instances of E18 Physical Stuff and E28 Conceptual Object differ in many fundamental ways; for example, the production of instances of E18 Physical Stuff implies the incorporation of physical material, whereas the production of instances of E28 Conceptual Object does not. Similarly, instances of E18 Physical Stuff ceases to exist when destroyed, whereas an instance of E28 Conceptual Object perishes when it is forgotten or its last physical carrier is destroyed.

About 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 that the object is 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 CRM class and property hierarchies. The external vocabularies do not themselves fall within the scope of the CRM.

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 there has been an unknown or unmentioned instance of "mould" that was actually used. This enables the specific instance of the casting to be associated with the entire class of manufacturing devices known as moulds. Further, the objects of type "mould" would be related via *P2 has type (is type of)* to this term. This indirect relationship may actually help in detecting the unknown object in an integrated environment. On the other side, some casting may refer directly to a known mould via *P16 used specific object (was used for)*. So a statistical question to how many objects in a certain collection are made with moulds could be answered correctly (following both paths through *P16 used specific object (was used for) - P2 has type Of (is type of)* and *P125 used object of type (was*

type of object used in). This consistent treatment of categorical knowledge significantly enhances the CRM's ability to integrate cultural knowledge.

Some properties in the CRM are associated with an additional property. These are numbered in the CRM documentation 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 Stuff. 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 CRM 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 the history and justification by physical evidence of types (particularly in disciplines such as archaeology and natural history) falls squarely within the intended scope of the CRM. Therefore types are modelled as "conceptual objects," in parallel to 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.

Extensions

Since the intended scope of the CRM is a subset of the "real" world and is therefore potentially infinite, the model has been designed to be extensible through the linkage of compatible external type hierarchies.

Compatibility of extensions with the CRM means that data structured according to an extension must also remain valid as a CRM instance. In practical terms, this implies *query containment*: any queries based on CRM concepts should retrieve a result set that is correct according to the CRM's semantics, regardless of whether the knowledge base is structured according to the CRM's semantics alone, or according to the CRM plus compatible extensions. For example, a query such as "list all events" should recall 100% of the instances deemed to be events by the CRM, regardless of how they are classified by the extension.

A sufficient condition for the compatibility of an extension with the CRM is that CRM classes subsume all classes of the extension, and all properties of the extension are either subsumed by CRM properties, or are part of a path for which a CRM property is a shortcut. Obviously, such a condition can only be tested intellectually.

Coverage

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

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

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

In mechanisms 1 and 2 the CRM concepts subsume and thereby cover the extensions.

In mechanism 3, the 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.

Examples

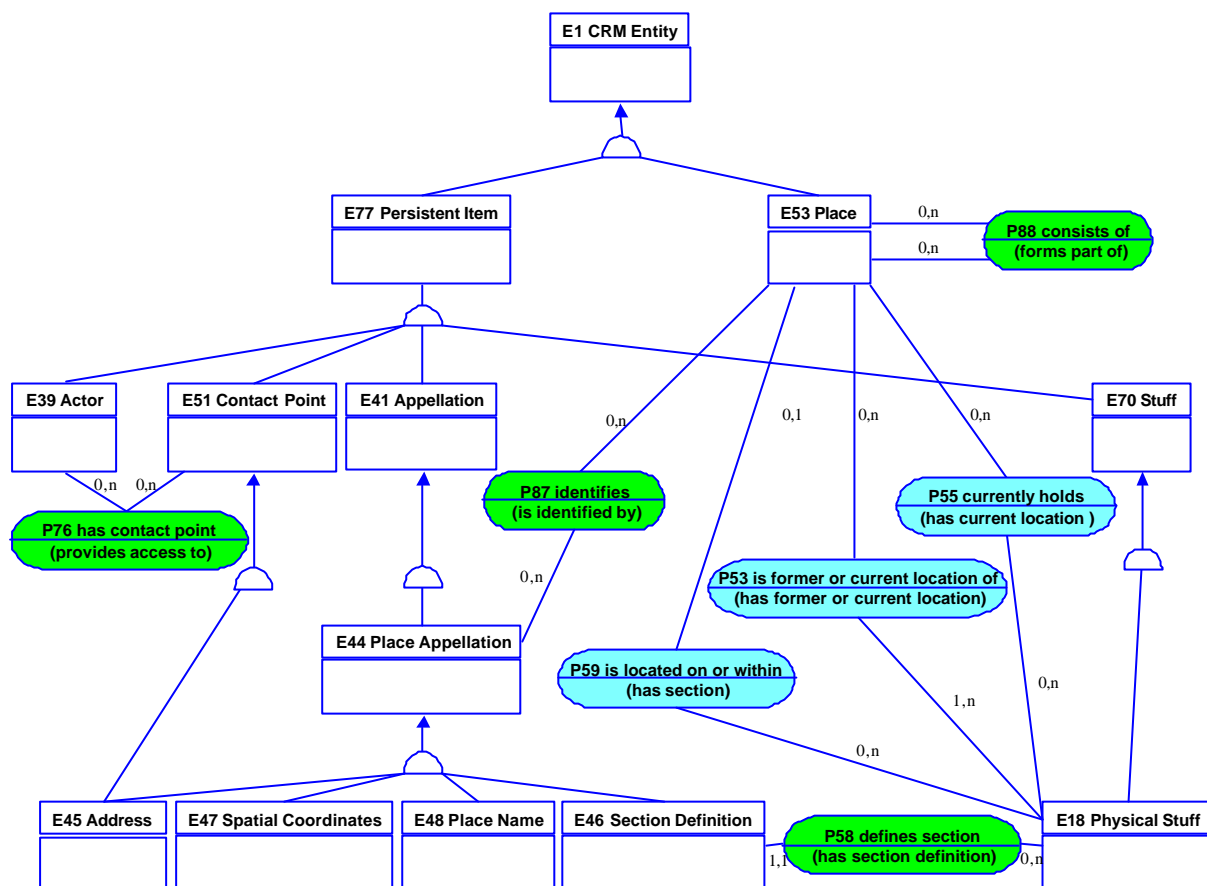


fig. 1 reasoning about spatial information

The diagram above shows a partial view of the CRM, representing reasoning about spatial information. Five of the main hierarchy branches are included in this view: E39 Actor, E51 Contact Point, E41 Appellation, E53 Place, and E70 Stuff. The relationships between these main classes and their subclasses are shown as branching lines. Properties between classes are shown as green ovals. A ‘shortcut’ property is included in this view: *P59 has section (is located on or within)* between E53 Place and E19 Physical Object is a shortcut of the path through E46 Section Definition. In some cases the order of priority for property names has been modified in order to facilitate reading the diagram from left to right.

As can be seen, an instance of E53 Place *is identified by* an instance of E44 Place Appellation, which may be an instance of E45 Address, E47 Spatial Coordinates, E48 Place Name, or E46 Section Definition such as ‘basement’, ‘prow’, or ‘lower left-hand corner.’ An instance of E53 Place may *consist of* or *form part of* another instance of E53 Place, thereby allowing a hierarchy of physical ‘containers’ to be constructed.

An instance of E45 Address can be considered both as an E44 Place Appellation—a way of referring to an E53 Place—and as an E51 Contact Point for an E39 Actor. An E39 Actor may have any number of instances of E51 Contact Point. E18 Physical Stuff is found on locations as a consequence of being created there or being moved there. Therefore the properties *P53 has former or current location (is former or current location of)* (and *P55 has current location (currently holds)*) are regarded as shortcuts of the fully articulated paths through the respective events. *P55 has current location (currently holds)* is a subproperty of *P53 has former or current location (is former or current location of)*. The latter is a container for location information in the absence of knowledge about time of validity and related events.

An interesting aspect of the model is the *P58 has section definition (defines section)* property between E46 Section Definition and E18 Physical Stuff (and the corresponding shortcut from E53 Place to E19 Physical Object). This allows an instance of E53 Place to be defined as a section of an instance of E19 Physical Object. For example, we may know that Nelson fell at a particular spot on the deck of H.M.S. Victory, without knowing

the exact position of the vessel in geospatial terms at the time of the fatal shooting of Nelson. Similarly, a signature or inscription can be located “in the lower right corner of” a painting, regardless of where the painting is hanging.

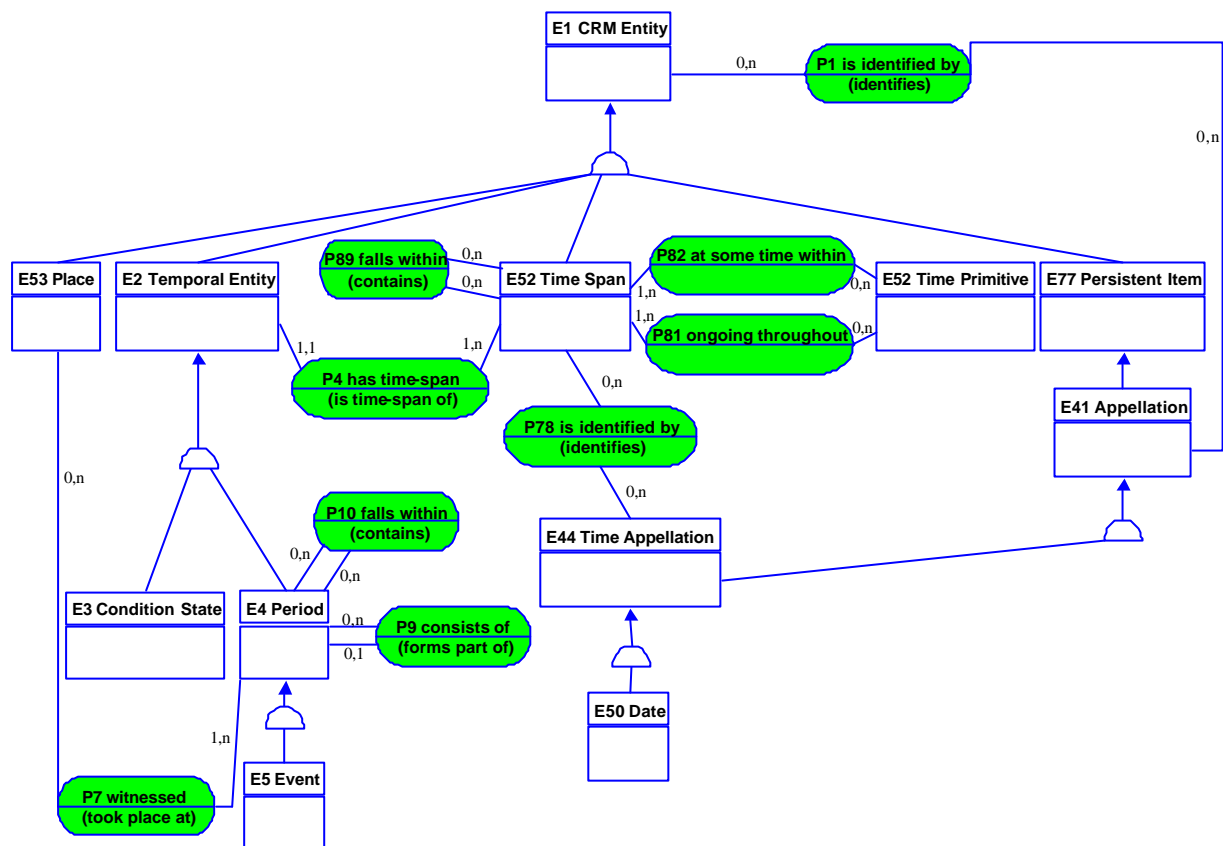


fig. 2 reasoning about temporal information

This second example shows how the CRM handles reasoning about temporal information. Four of the main hierarchy branches are included in this view: E2 Temporal Entity, E52 Time-Span, E77 Persistent Item and E53 Place.

The E2 Temporal Entity class is an *abstract class* (i.e. it has no instances) that serves to group together all classes with a temporal component, such as instances of E4 Period, E5 Event and E3 Condition State.

An instance of E52 Time-Span is simply a temporal interval that does not make any reference to cultural or geographical contexts (unlike instances of E4 Period, which *took place at* a particular instance of E53 Place). Instances of E52 Time-Span are sometimes identified by instances of E49 Time Appellation, often in the form of E50 Date.

Both E52 Time-Span and E4 Period have *transitive properties*. E52 Time-Span has the transitive property *P86 falls within (contains)*, denoting a purely incidental inclusion, whereas E4 Period has the transitive property *P9 consists of (forms part of)* that supports the decomposition of instances of E4 Period into their constituent parts. For example, the E52 Time-Span during which a building is constructed might *falls within* the E52 Time-Span of a particular government, although there is no causal or contextual connection between the two instances of E52 Time-Span; conversely, the E4 Period of the Chinese Song Dynasty *consists of* the Northern Song Period and the Southern Song Period.

Instances of E52 Time-Span are related to their outer bounds (i.e. their indeterminacy interval) by the property *P82 at some time within*, and to their inner bounds via the property *P81 ongoing throughout*. The range of these properties is the E61 Time Primitive class, instances of which are treated by the CRM as application or system specific date intervals that are not further analysed.

Class & Property Hierarchies

Although they do not provide comprehensive definitions, compact monohierarchical presentations of the class and property IsA hierarchies have been found to significantly aid comprehension and navigation of the CRM, and are therefore provided below.

The class hierarchy presented below has the following format:

- Each line begins with a unique class identifier, consisting of a number preceded by the letter “E” (originally denoting “entity,” although now replaced by convention with the term “class”).
- A series of hyphens (“-”) follows the unique class identifier, indicating the hierarchical position of the class in the IsA hierarchy.
- The English name of the class appears to the right of the hyphens.
- The index is ordered by hierarchical level, in a “depth first” manner, from the smaller to the larger subhierarchies.
- Classes that appear in more than one position in the class hierarchy as a result of multiple inheritance are shown in an italic typeface.

The property hierarchy presented below has the following format:

- Each line begins with a unique property identifier, consisting of a number preceded by the letter “P” (for “property”).
- A series of hyphens (“-”) follows the unique property identifier, indicating the hierarchical position of the property in the IsA hierarchy.
- The English name of the property appears to the right of the hyphens, followed by its inverse name in parentheses for reading in the range to domain direction.
- The domain class for which the property is declared.
- The range class that the property references.
- The index is ordered by hierarchical level, in a “depth first” manner, from the smaller to the larger subhierarchies, and by property number between equal siblings.
- Properties that appear in more than one position in the property hierarchy as a result of multiple inheritance are shown in an italic typeface.

CIDOC CRM Class Hierarchy

E1	CRM Entity
E2	- Temporal Entity
E3	- - Condition State
E4	- - Period
E5	- - - Event
E7	- - - - Activity
E8	- - - - - Acquisition Event
E9	- - - - - Move
E10	- - - - - Transfer of Custody
E11	- - - - - Modification Event
E12	- - - - - - Production Event
E79	- - - - - - Part Addition
E80	- - - - - - Part Removal
E13	- - - - - Attribute Assignment
E14	- - - - - - Condition Assessment
E15	- - - - - - Identifier Assignment
E16	- - - - - - Measurement Event
E17	- - - - - - Type Assignment
E65	- - - - - Creation Event
E83	- - - - - - Type Creation
E66	- - - - - Formation Event
E63	- - - - - Beginning of Existence
E67	- - - - - Birth
E81	- - - - - Transformation
<i>E12</i>	- - - - - <i>Production Event</i>
<i>E65</i>	- - - - - <i>Creation Event</i>
<i>E83</i>	- - - - - <i>Type Creation</i>
<i>E66</i>	- - - - - <i>Formation Event</i>
E64	- - - - - End of Existence
E6	- - - - - Destruction
E68	- - - - - Dissolution
E69	- - - - - Death
<i>E81</i>	- - - - - <i>Transformation</i>
E77	- Persistent Item
E70	- - Stuff
E72	- - - Legal Object
E18	- - - - Physical Stuff
E19	- - - - - Physical Object
E20	- - - - - - Biological Object
E21	- - - - - - - Person
E22	- - - - - - Man-Made Object
E84	- - - - - - - Information Carrier
E24	- - - - - Physical Man-Made Stuff
<i>E22</i>	- - - - - <i>Man-Made Object</i>
<i>E84</i>	- - - - - <i>Information Carrier</i>
E25	- - - - - - Man-Made Feature
E78	- - - - - - Collection
E26	- - - - - Physical Feature
E27	- - - - - - Site
<i>E25</i>	- - - - - <i>Man-Made Feature</i>
E73	- - - - - Information Object
E29	- - - - - Design or Procedure
E31	- - - - - Document
E32	- - - - - - Authority Document
E33	- - - - - - Linguistic Object

E34 - - - - - Inscription
 E35 - - - - - Title
 E36 - - - - - Visual Item
 E37 - - - - - Mark
 E34 - - - - - *Inscription*
 E38 - - - - - Image
 E71 - - - Man-Made Stuff
 E24 - - - - *Physical Man-Made Stuff*
 E22 - - - - *Man-Made Object*
 E84 - - - - *Information Carrier*
 E25 - - - - *Man-Made Feature*
 E78 - - - - *Collection*
 E28 - - - - Conceptual Object
 E73 - - - - *Information Object*
 E29 - - - - *Design or Procedure*
 E31 - - - - *Document*
 E32 - - - - *Authority Document*
 E33 - - - - *Linguistic Object*
 E34 - - - - *Inscription*
 E35 - - - - *Title*
 E36 - - - - *Visual Item*
 E37 - - - - *Mark*
 E34 - - - - *Inscription*
 E38 - - - - *Image*
 E30 - - - - Right
 E55 - - - - Type
 E56 - - - - Language
 E57 - - - - Material
 E58 - - - - Measurement Unit
 E39 - - Actor
 E74 - - - Group
 E40 - - - Legal Body
 E21 - - - *Person*
 E41 - - Appellation
 E42 - - - Object Identifier
 E44 - - - Place Appellation
 E45 - - - Address
 E46 - - - Section Definition
 E47 - - - Spatial Coordinates
 E48 - - - Place Name
 E49 - - - Time Appellation
 E50 - - - Date
 E75 - - - Conceptual Object Appellation
 E35 - - - *Title*
 E82 - - - Actor Appellation
 E51 - - Contact Point
 E45 - - - *Address*
 E52 - Time-Span
 E53 - Place
 E54 - Dimension
 E59 Primitive Value
 E60 - Number
 E61 - Time Primitive
 E62 - String

CIDOC CRM Property Hierarchy:

Property id	Property Name	Entity – Domain	Entity - Range
P1	is identified by (identifies)	E1 CRM Entity	E41 Appellation
P47	- is identified by (identifies)	E19 Physical Object	E42 Object Identifier
P48	- - has preferred identifier (is preferred identifier of)	E19 Physical Object	E42 Object Identifier
P78	- is identified by (identifies)	E52 Time-Span	E49 Time Appellation
P87	- is identified by (identifies)	E53 Place	E44 Place Appellation
P102	- has title (is title of)	E71 Man-Made Stuff	E35 Title
P131	- is identified by (identifies)	E39 Actor	E82 Actor Appellation
P2	has type (is type of)	E1 CRM Entity	E55 Type
P3	has note	E1 CRM Entity	E62 String
P79	- beginning is qualified by	E52 Time-Span	E62 String
P80	- end is qualified by	E52 Time-Span	E62 String
P4	has time-span (is time-span of)	E2 Temporal Entity	E52 Time-Span
P5	consists of (forms part of)	E3 Condition State	E3 Condition State
P7	took place at (witnessed)	E4 Period	E53 Place
P26	- moved to (was destination of)	E9 Move	E53 Place
P27	- moved from (was origin of)	E9 Move	E53 Place
P8	took place on or within (witnessed)	E4 Period	E19 Physical Object
P9	consists of (forms part of)	E4 Period	E4 Period
P10	falls within (contains)	E4 Period	E4 Period
P12	occurred in the presence of (was present at)	E5 Event	E77 Persistent Item
P11	- had participant (participated in)	E5 Event	E39 Actor
P14	- - carried out by (performed)	E7 Activity	E39 Actor
P22	- - - transferred title to (acquired title through)	E8 Acquisition Event	E39 Actor
P23	- - - transferred title from (surrendered title through)	E8 Acquisition Event	E39 Actor
P28	- - - custody surrendered by (surrendered custody through)	E10 Transfer of Custody	E39 Actor
P29	- - - custody received by (received custody through)	E10 Transfer of Custody	E39 Actor
P96	- - by mother (gave birth)	E67 Birth	E21 Person
P99	- - dissolved (was dissolved by)	E68 Dissolution	E74 Group
P16	- used specific object (was used for)	E7 Activity	E70 Stuff
P25	- moved (moved by)	E9 Move	E19 Physical Object
P31	- has modified (was modified by)	E11 Modification Event	E24 Physical Man-Made Stuff
P108	- - has produced (was produced by)	E12 Production Event	E24 Physical Man-Made Stuff
P110	- - augmented (was augmented by)	E79 Part Addition	E24 Physical Man-Made Stuff
P112	- - diminished (was diminished by)	E80 Part Removal	E24 Physical Man-Made Stuff
P33	- used specific technique (was used by)	E11 Modification Event	E29 Design or Procedure
P92	- brought into existence (was brought into existence by)	E63 Beginning of Existence	E77 Persistent Item
P94	- - has created (was created by)	E65 Creation Event	E28 Conceptual Object
P135	- - - created type (was created by)	E83 Type Creation	E55 Type
P95	- has formed (was formed by)	E66 Formation Event	E74 Group
P98	- - brought into life (was born)	E67 Birth	E21 Person
P108	- - <i>has produced (was produced by)</i>	<i>E12 Production Event</i>	<i>E24 Physical Man-Made Stuff</i>
P123	- - resulted in (resulted from)	E81 Transformation	E77 Persistent Item
P93	- took out of existence (was taken out of existence by)	E64 End of Existence	E77 Persistent Item
P13	- - destroyed (was destroyed by)	E6 Destruction	E18 Physical Stuff
P99	- - <i>dissolved (was dissolved by)</i>	<i>E68 Dissolution</i>	<i>E74 Group</i>
P100	- - was death of (died in)	E69 Death	E21 Person
P124	- - transformed (was transformed by)	E81 Transformation	E77 Persistent Item
P15	was influenced by (influenced)	E7 Activity	E1 CRM Entity
P16	- <i>used specific object (was used for)</i>	<i>E7 Activity</i>	<i>E70 Stuff</i>
P17	- was motivated by (motivated)	E7 Activity	E1 CRM Entity
P33	- <i>used specific technique (was used by)</i>	<i>E11 Modification Event</i>	<i>E29 Design or Procedure</i>
P134	- continued (was continued by)	E7 Activity	E7 Activity
P136	- was based on (supported type creation)	E83 Type Creation	E1 CRM Entity
P19	was intended use of (was made for)	E7 Activity	E71 Man-Made Stuff
P20	had specific purpose (was purpose of)	E7 Activity	E7 Activity
P21	had general purpose (was purpose of)	E7 Activity	E55 Type
P24	transferred title of (changed ownership through)	E8 Acquisition Event	E18 Physical Stuff
P30	transferred custody of (custody transferred through)	E10 Transfer of Custody	E18 Physical Stuff
P32	used general technique (was technique of)	E11 Modification Event	E55 Type
P43	has dimension (is dimension of)	E70 Stuff	E54 Dimension
P44	has condition (condition of)	E18 Physical Stuff	E3 Condition State
P45	consists of (is incorporated in)	E18 Physical Stuff	E57 Material
P46	is composed of (forms part of)	E18 Physical Stuff	E18 Physical Stuff
P49	has former or current keeper (is former or current keeper of)	E18 Physical Stuff	E39 Actor
P50	- has current keeper (is current keeper of)	E18 Physical Stuff	E39 Actor
P51	has former or current owner (is former or current owner of)	E18 Physical Stuff	E39 Actor
P52	- has current owner (is current owner of)	E18 Physical Stuff	E39 Actor
P53	has former or current location (is former or current location of)	E18 Physical Stuff	E53 Place

Property id	Property Name	Entity – Domain	Entity - Range
P55	- has current location (currently holds)	E19 Physical Object	E53 Place
P54	has current permanent location (is current permanent location of)	E19 Physical Object	E53 Place
P56	bears feature (is found on)	E19 Physical Object	E26 Physical Feature
P57	has number of parts	E19 Physical Object	E60 Number
P58	has section definition (defines section)	E18 Physical Stuff	E46 Section Definition
P59	has section (is located on or within)	E18 Physical Stuff	E53 Place
P62	depicts (is depicted by)	E24 Physical Man-Made Stuff	E1 CRM Entity
P67	refers to (is referred to by)	E73 Information Object	E1 CRM Entity
P70	- documents (is documented in)	E31 Document	E1 CRM Entity
P71	- lists (is listed in)	E32 Authority Document	E55 Type
P129	- is about (is subject of)	E73 Information Object	E1 CRM Entity
P138	- represents (has representation)	E36 Visual Item	E1 CRM Entity
P68	usually employs (is usually employed by)	E29 Design or Procedure	E57 Material
P69	is associated with	E29 Design or Procedure	E29 Design or Procedure
P72	has language (is language of)	E33 Linguistic Object	E56 Language
P74	has current or former residence (is current or former residence of)	E39 Actor	E53 Place
P75	possesses (is possessed by)	E39 Actor	E30 Right
P76	has contact point (provides access to)	E39 Actor	E51 Contact Point
P81	ongoing throughout	E52 Time-Span	E61 Time Primitive
P82	at some time within	E52 Time-Span	E61 Time Primitive
P83	had at least duration (was minimum duration of)	E52 Time-Span	E54 Dimension
P84	had at most duration (was maximum duration of)	E52 Time-Span	E54 Dimension
P86	falls within (contains)	E52 Time-Span	E52 Time-Span
P88	consists of (forms part of)	E53 Place	E53 Place
P89	falls within (contains)	E53 Place	E53 Place
P90	has value	E54 Dimension	E60 Number
P91	has unit (is unit of)	E54 Dimension	E58 Measurement Unit
P97	from father (was father for)	E67 Birth	E21 Person
P101	had as general use (was use of)	E70 Stuff	E55 Type
P103	was intended for (was intention of)	E71 Man-Made Stuff	E55 Type
P104	is subject to (applies to)	E72 Legal Object	E30 Right
P105	right held by (has right on)	E72 Legal Object	E39 Actor
P106	is composed of (forms part of)	E73 Information Object	E73 Information Object
P107	has current or former member (is current or former member of)	E74 Group	E39 Actor
P109	has current or former curator ((is current or former curator of)	E78 Collection	E39 Actor
P111	added (was added by)	E79 Part Addition	E18 Physical Stuff
P113	removed (was removed by)	E80 Part Removal	E18 Physical Stuff
P114	is equal in time to	E2 Temporal Entity	E2 Temporal Entity
P115	finishes (is finished by)	E2 Temporal Entity	E2 Temporal Entity
P116	starts (is started by)	E2 Temporal Entity	E2 Temporal Entity
P117	occurs during (includes)	E2 Temporal Entity	E2 Temporal Entity
P118	overlaps in time with (is overlapped in time by)	E2 Temporal Entity	E2 Temporal Entity
P119	meets in time with (is met in time by)	E2 Temporal Entity	E2 Temporal Entity
P120	occurs before (occurs after)	E2 Temporal Entity	E2 Temporal Entity
P121	overlaps with	E53 Place	E53 Place
P122	borders with	E53 Place	E53 Place
P125	used object of type (was type of object used in)	E7 Activity	E55 Type
P126	employed (was employed in)	E11 Modification Event	E57 Material
P127	has broader term (has narrower term)	E55 Type	E55 Type
P128	carries (is carried by)	E24 Physical Man-Made Stuff	E73 Information Object
P65	- shows visual item (is shown by)	E24 Physical Man-Made Stuff	E36 Visual Item
P130	shows features of (features are also found on)	E70 Stuff	E70 Stuff
P73	- has translation (is translation of)	E33 Linguistic Object	E33 Linguistic Object
P132	overlaps with	E4 Period	E4 Period
P133	is separated from	E4 Period	E4 Period
P137	is exemplified by (exemplifies)	E55 Type	E1 CRM Entity
P139	has alternative form	E41 Appellation	E41 Appellation
P140	assigned attribute to (was attributed by)	E13 Attribute Assignment	E1 CRM Entity
P34	- concerned (was assessed by)	E14 Condition Assessment	E18 Physical Stuff
P36	- registered (was registered by)	E15 Identifier Assignment	E19 Physical Object
P39	- measured (was measured by)	E16 Measurement Event	E70 Stuff
P41	- classified (was classified by)	E17 Type Assignment	E1 CRM Entity
P141	assigned (was assigned by)	E13 Attribute Assignment	E1 CRM Entity
P35	- has identified (identified by)	E14 Condition Assessment	E3 Condition State
P37	- assigned (was assigned by)	E15 Identifier Assignment	E42 Object Identifier
P38	- deassigned (was deassigned by)	E15 Identifier Assignment	E42 Object Identifier
P40	- observed dimension (was observed in)	E16 Measurement Event	E54 Dimension
P42	- assigned (was assigned by)	E17 Type Assignment	E55 Type

CIDOC CRM Class Declarations

The classes of the CRM are comprehensively declared in this section 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 colons;
- Inherited properties are not represented;
- Properties of properties are provided indented and in parentheses beneath their respective domain property.

E1 CRM Entity

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:

1. Identification by name or appellation
2. Classification by type, allowing further refinement of the specific subclass an instance belongs to
3. 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 specialisations 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

(former E2 Period, former E2 Things Having Time -Span)

Subclass of: ?1 CRM Entity
Superclass of: ?3 Condition State
E4 Period

Scope note: This class comprises all phenomena, such as the instances of E4 Periods, E5 Events and states, which happen over a limited extent in time.

In some contexts, these are also called perdurants. This class is disjoint from E77 Persistent Item. This is an abstract class and has no direct instances. E2 Temporal Entity 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 Stuff.

Examples:

- Bronze Age (E4)
- the earthquake in Lisbon 1755 (E5)
- the Peterhof Palace near Saint Petersburg being in ruins from 1944 – 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

Scope note: This class comprises the states of objects characterised 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 *P2 has type*. 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– 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

(former E4 Physical Context)

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 modeled 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

Scope note: This class comprises events that destroy one or more instances of E18 Physical Stuff 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:

1. If the matter remaining from the destruction is not documented, the event is modelled solely as E6 Destruction.
2. 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.
3. When the initial identity of the changed instance of E18 Physical Stuff 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 Stuff

E7 Activity

Subclass of: E5 Event
 Superclass of: E8 Acquisition Event
 E9 Move
 E10 Transfer of Custody
 E11 Modification Event
 E13 Attribute Assignment
 E65 Creation Event
 E66 Formation Event

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 (E83)
- 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 Stuff
(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 Stuff
(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 Event

Subclass of: E7 Activity

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 Stuff. 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:

1. the beginning of ownership
2. the end of ownership
3. the transfer of ownership
4. the acquisition from an unknown source
5. 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 (E8 Acquisition Event) and physical custody (E10 Transfer of 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 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 *Fringilla coelebs* due to insect damage last year

Properties:

P22 transferred title to (acquired title through): E39 Actor

P23 transferred title from (surrendered title through): E39 Actor

P24 transferred title of (changed ownership through): E18 Physical Stuff

E9 Move

Subclass of: E7 Activity

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 Tutankhamun" 1976-1979

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

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:

1. the beginning of custody
2. the end of custody
3. the transfer of custody
4. 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 *P2 has type (is type of)*. 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 Stuff

E11 Modification Event

Subclass of: E7 Activity

Superclass of: E12 Production Event
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 Stuff.

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 utilised 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 Stuff
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 Event

Subclass of: E11 Modification Event
 E63 Beginning of Existence

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: the printing of a thousand books, for example, 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 Stuff

E13 Attribute Assignment

Subclass of: E7 Activity
 Superclass of: E14 Condition Assessment
 E15 Identifier Assignment
 E16 Measurement Event
 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 characterised as "short cuts" 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 short cut, 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

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 Stuff

P35 has identified (identified by): E3 Condition State

E15 Identifier Assignment

Subclass of: E13 Attribute Assignment

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 Event

Subclass of: E13 Attribute Assignment

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 Event 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 Stuff

P40 observed dimension (was observed in): E54 Dimension

E17 Type Assignment

Subclass of: E13 Attribute Assignment

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 *Cereus hildmannianus* K.Schum., July 2003

Properties:

P41 classified (was classified by): E1 CRM Entity

P42 assigned (was assigned by): E55 Type

E18 Physical Stuff

(new)

Subclass of: E72 Legal Object

Superclass of: E19 Physical Object
E24 Physical Man-Made Stuff
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 Stuff
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

(former E18)

Subclass of: E18 Physical Stuff
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” (Smith & Varzi 2000, pp.401-420), 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

(former E19)

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
- Tut-Ankh-Amun
- Boukephalas
- petrified dinosaur excrement PA1906-344

E21 Person

(former E20)

Subclass of: E20 Biological Object

E39 Actor

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:

- Tut-Ankh-Amun
- Nelson Mandela

E22 Man-Made Object

(former E21, former E23)

Subclass of: E19 Physical Object

E24 Physical Man-Made Stuff

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

E24 Physical Man-Made Stuff

(new, former E25)

Subclass of: E18 Physical Stuff
E71 Man-Made Stuff
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 Stuff.

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

(new, former E26)

Subclass of: E24 Physical Man-Made Stuff
E26 Physical Feature

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 Physical Man-Made Feature.

Examples:

- the Manchester Ship Canal
- Michael Jackson's nose following plastic surgery

E26 Physical Feature

(new, former E27)

Subclass of: E18 Physical Stuff

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" [B.Smith & A.Varzi], 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

E27 Site

(new, former E22)

Subclass of: E26 Physical Feature

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

E28 Conceptual Object

(former E24)

Subclass of: E71 Man-Made Stuff

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 greater 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

E29 Design or Procedure

(former E25)

Subclass of: E73 Information Object

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 Stuff.

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:

1. A schema for the activities it describes
2. A schema of the products that result from their application.
3. 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 standardisation 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, 1486-1490, 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

(new, former E56)

Subclass of: E28 Conceptual Object

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/CD 21127
- ownership of the “Mona Lisa” by the Louvre

E31 Document

(former E26, former E30)

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, 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

(former E27, former E31 Normative Document)

Subclass of: E31 Document

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
- Getty Art and Architecture Thesaurus
- the CIDOC Conceptual Reference Model

Properties:

P71 lists (is listed in): E55 Type

E33 Linguistic Object

(former E28, former E32)

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 modelled 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

(former E29, former E33)

Subclass of: E33 Linguistic Object
E37 Mark

Scope note: This class comprises recognisable, short texts attached to instances of E24 Physical Man-Made Stuff.

The transcription of the text can be documented in a note by *P3 has note: E62 String*. The alphabet used can be documented by *P2 has type: E55 Type*. This class does not 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 Object.

The relationship of a physical copy of a book to the text it contains is modelled using *E84 Information Carrier. P128 carries (is carried by): E33 Linguistic Object*.

Examples:

- "keep off the grass" on a sign stuck in the lawn of the quad of Balliol College
- The text published in Corpus Inscriptionum Latinarum V 895
- Kilroy was here

E35 Title

(former E30, former E34)

Subclass of: E33 Linguistic Object
E41 Appellation

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

E36 Visual Item

(new, former E35)

Subclass of: E73 Information Object
 Superclass of: E37 Mark
 E38 Image

Scope Note: This class comprises the intellectual or conceptual aspects of recognisable 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 Visual Item class provides a means of identifying and linking together instances of E24 Physical Man-Made Stuff that carry the same visual symbols, marks or images etc. The property *P62 depicts (is depicted by)* between E24 Physical Man-Made Features and depicted subjects (E1 CRM Entity) can be regarded as a short-cut 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

(former E31, former E36)

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 Stuff 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
- ©
- ☺

E38 Image

(former E23, former E37)

Subclass of: E36 Visual Item

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 20 Swiss Frs notes
- the image depicted on all reproductions of the Mona Lisa

E39 Actor

(former E32, former E38)

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 McKellan (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

(new, former E39)

Subclass of: E74 Group

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
- Paveprime Ltd
- the National Museum of Denmark

E41 Appellation

(former E33, former E40)

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 recognised.

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

Examples:

- Martin
- the Forth Bridge
- the Merchant of Venice (E35)

Properties:

P139 has alternative form: E41 Appellation

E42 Object Identifier

(former E34, former E42)

Subclass of: E41 Appellation

Scope note: This class comprises codes assigned to objects in order to identify them uniquely within the context of one or more organisations.

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

E44 Place Appellation

(new, former E43)

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 - the same instance of E41 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

E45 Address

(new, former E44)

Subclass of: E48 Place Appellation
 E51 Contact Point

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

E46 Section Definition

(new, former E45)

Subclass of: E44 Place Appellation

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, 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 (cf. 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 Gerstl, P.& Pribbenow, S, 1996 "A conceptual theory of part – whole relations and its applications", Data & Knowledge Engineering 20 305-322, North Holland-Elsevier).

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

E47 Spatial Coordinates

(new, former E46)

Subclass of: E44 Place Appellation

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.

E48 Place Name

(new, former E47)

Subclass of: E44 Place Appellation

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.

Examples:

- Greece
- Athens
- Geneva
- Lac Léman

E49 Time Appellation

(new, former E48)

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 XX century
- Quaternary
- 1215 Hegira
- Last century

E50 Date

(new, former E49)

Subclass of: E49 Time Appellation

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

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

E52 Time-Span

Subclass of: E1 CRM Entity

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 – 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): E545 Dimension

P84 had at most duration (was maximum duration of): E54 Dimension

P86 falls within (contains): E52 Time-Span

E53 Place

(former E37: Location)

Subclass of: E1 CRM Entity

Scope note: This class comprises extents in space, in particular on the surface of the earth, in the pure sense of physics: 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 – 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

(former E38)

Subclass of: E1 CRM Entity

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 cm. 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. Equivalentents corresponding to current knowledge should be recorded as additional instances of E54 Dimension as appropriate.

Examples:

- currency: £26.00
- length: 3.9-4.1 cm
- diameter 26 mm
- weight 150 lbs
- density: 0.85 gm/cc
- luminescence: 56 ISO lumens
- tin content: 0.46 %
- taille au garot: 5 hands
- calibrated C14 date: 2460-2720 years, etc

Properties:

P90 has value: E60 Number

P91 has unit (is unit of): E58 Measurement Unit

E55 Type

(former E39, former E57)

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 organising 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 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 (cf. E83 Type Creation), but it includes the notion of a “taxon”.

Ideally, instances of the E55 Type class should be organised 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:

- weight, 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): E55 Type

P137.1 in the taxonomic role: E55 Type

E56 Language

(former E40, former E58)

Subclass of: E55 Type

Scope note: This E55 Type comprises the names identifying natural languages.

ISO codes should be used (ISO 639:1988).

This type does not correspond to an explicit class in the Model.

Examples:

- el Greek
- en English
- eo Esperanto
- es Spanish

- fr French

E57 Material

(former E41, former E59)

Subclass of: E55 Type

Scope note: This type comprises the names used to identify materials.

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, 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 (cf. *P46 is composed of*).

This type does not correspond to an explicit class in the Model.

Examples:

- brick
- gold
- aluminium
- polycarbonate
- resin

E58 Measurement Unit

(new, former E60)

Subclass of: E55 Type

Scope Note: This type provides the authority list for all types of measurement units: feet, inches, centimetres, litres, lumens, etc.

Systeme Internationale (SI) units or internationally recognized non-SI terms should be used whenever possible. (ISO 1000:1992). 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 Drachme
- °C

E59 Primitive Value

Superclass of: E60 Number
E61 Time Primitive
E62 String(new, former E61)

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:

- ABCDEFG
- 3.14
- 0
- 1921-01-01

E60 Number

(new, former E55)

Subclass of: E59 Primitive Value

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., $1924-01-31 + 2 \text{ days} = 1924-02-02$. Cf. E54 Dimension

Examples:

- 5
- $3+2i$
- $1.5e-04$
- $(0.5, -0.7, 88)$

E61 Time Primitive

(new, former E62)

Subclass of: E59 Primitive Value

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 – 1997
- 13 May 1768
- 2000/01/01 00:00:59.7
- 85th century BC

E62 String

(new)

Subclass of: E59 Primitive Value

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 Fo x Jumps Over the Lazy Dog
- 6F 6E 54 79 70 31 0D 9E

E63 Beginning of Existence

Subclass of: E5 Event

Superclass of: E12 Production Event

E65 Creation Event

E66 Formation Event

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 termini postquem and antequem.

Examples:

- the birth of my child
- the birth of Snoopy, my dog
- the calving 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 termini postquem and antequem. In cases where substance from a Persistent Item continues to exist in a new form, the process would 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 356BC

Properties:

P93 took out of existence (was taken out of existence by): E77 Persistent Item

E65 Creation Event

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 Event

Subclass of: E7 Activity
E63 Beginning of Existence

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 Event 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

Scope note: This class comprises the birth of a 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 with the intervention 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

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: E63 End of Existence

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 E69 Death or perishing of other living beings should be documented using E64 End of Existence.

Examples:

- the murder of Julius Caesar
- the death of Senator Paul Wellstone

Properties:

P100 was death of (died in): E21 Person

E70 Stuff

Subclass of: E77 Persistent Item
Superclass of: E71 Man-Made Stuff
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 logical concept or structure.

Examples:

- my photograph collection (E78)

- the pint of milk in my refrigerator
- the plan of the Stassburger Muenster
- the stuff on the top of Otto Hahn's desk
- 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 Stuff
(P130.1 kind of similarity: E55 Type)

E71 Man-Made Stuff

Subclass of: E70 Stuff
 Superclass of: E24 Physical Man-Made Stuff
 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 *Fringilla coelebs* (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 Stuff
 Superclass of: E18 Physical Stuff
 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 Stuff. 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 a 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 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 artifact, a common purpose such as study, worship, business, sports, etc. Nationality can be modeled as membership in an E74 Group (cf. HumanML markup).

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

Scope note: This class comprises all specific identifiers of intellectual products or standardized patterns.

Examples:

- ISBN 3-7913-1418-1
- ISO2788-1986 (E)

E77 Persistent Item

Subclass of: E1 CRM Entity

Superclass of: E39 Actor
E41 Appellation
E51 Contact Point
E70 Stuff

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 -; 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:

- Leonard da Vinci
- Stonehenge
- the hole in the ozone layer
- the First Law of Thermodynamics
- the Bermuda Triangle

E78 Collection

Subclass of: E24 Physical Man-Made Stuff

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 often referred to with 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 Wallance Collection

Properties:

P109 has current or former curator (is current or former curator of): E39 Actor

E79 Part Addition

Subclass of: E11 Modification Event

Scope note: This class comprises activities that result in an instance of E24 Physical Man-Made Stuff 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 artifacts being added to different museum instances of E78 Collection over their lifespan.

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 Stuff

P111 added (was added by): E18 Physical Stuff

E80 Part Removal

Subclass of: E11 Modification Event

Scope note: This class comprises the activities that result in an instance of E18 Physical Stuff 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 E12 Production Event. 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 jewelry, or cultural artifacts being deaccessioned from different museum collections over their lifespan.

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 Stuff

P113 removed (was removed by): E18 Physical Stuff

E81 Transformation

Subclass of: E63 Beginning of Existence
E64 End of Existence

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 event; 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 Event) of objects that do not fundamentally change their nature or identity. Characteristic cases are reconstructions and repurposing of historical buildings or ruins, fires leaving buildings in ruins, taxidermy of specimen in natural history and the reorganization of a corporate body into a new one.

Examples:

- the death and mummification of Tut Ankh Amun (transformation of Tut Ankh Amun 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

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 *P2 has type* 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
- ICOM
- International Council of Museums

E83 Type Creation

Subclass of: E65 Creation Event

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 'Penicillium brefeldianum'
- 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

Scope note: This class comprises all instances of E22 Man-Made Object that are explicitly designed to act as persistent physical carriers for instances 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 Stuff may carry information, such as an E34 Inscription. However, unless it was specifically designed for this purpose, it is not an Information Carrier. Therefore the property *P128 carries (is carried by)* applies to E18 Physical Stuff in general.

Examples:

- the Rosetta Stone
- my paperback copy of Crime & Punishment
- the computer disk at ICS-FORTH that stores the canonical Definition of the CIDOC CRM

CIDOC CRM Property Declarations

The properties of the CRM are comprehensively declared in this section 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 “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.

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 Stuff. 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) *is identified by* Rome (E48)
- text 25014–32 (E33) *is identified by* “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 specialisation – 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 specialise entities any further than is required for this immediate purpose. However, entities in the isA hierarchy of the CRM may be specialised into any number of sub entities, which can be defined in the E55 Type hierarchy. E51 Contact Point, for example, may be specialised 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) *has type* 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,n:0,1)

Scope note: This 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 characterisation of the item itself, its internal structures, appearance etc.

Like property *P2 has type (is type of)*, this property is a consequence of the restricted focus of the CRM. The aim is not to capture, in a structured form, everything 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 distinct note fields for different aspects of a characterisation. The *P2 has type (is type of)* property of *P3 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) *has note* chipped at edge of handle (E62) *has type* 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,n)

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) *has time-span* Yalta Conference time-span (E52), *ongoing throughout* 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 constitutive of the general condition state. For example, a general condition state of “in ruins” may be decomposed into the individual stages of decay.

Examples:

- Ruination of the Tower of Babylon (E3) *consists of* 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 characterise the period in question occurred. *P7took place at (witnessed)* 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) *took place at* 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 took place on or within (witnessed) is a short-cut of a path defining a E53 Place with respect to the geometry of an object. cf. E46 Section Definition.

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) *took place on or within* 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 constitutive of the general period.

Examples:

- Cretan Bronze Age (E4) *consists of* 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 *P9 consists of (forms part of)* is subtle. Unlike *P9 consists of (forms part of)*, *P10 falls within (contains)* 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) *falls within* 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 life-line of the related E39 Actor with the E53 Place and E50 Date of the event. The property implies that the Actor was involved in 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) *participated in* The Battle of Waterloo (E7)
- Or
- Maria (E21) *participated in* 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 Stuff
E9 Move. P25 moved (moved by): E19 Physical Object
E11 Modification Event. P31 has modified (was modified by): E24 Physical Man-Made Stuff
E11 Modification Event. 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 a persistent item in an E5 Event

without implying any specific role.

It connects the history of a thing with the E53 Place and E50 Date 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) *was present at* The sinking of the Titanic (E5)

P13 destroyed (was destroyed by)

Domain: E6 Destruction

Range: E18 Physical Stuff

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 Stuff 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) *destroyed* 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 Event. P22 transferred title to (acquired title through): E39 Actor

E8 Acquisition Event. P23 transferred title from (surrendered title through): 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 *P14.1 in the role of* property of the property allows the nature of an Actor's participation to be specified.

Examples:

- the painting of the Sistine Chapel (E7) *was carried out by* Michaelangelo Buonaroti (E21) *in the role of* 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 Stuff

E7 Activity. P17 was motivated by (motivated): E1 CRM Entity

E11 Modification Event. 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 sub properties.

Examples:

- the designing of the Sydney Harbour Bridge (E7) *was influenced by* 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, raw materials 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) *used specific object* Nicholas Crofts' computer (E22) *mode of use* 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 reason for carrying out the E7 Activity.

For example, the discovery of a large hoard of treasure may call for a celebration, an order from head quarters can start a military manoeuvre.

Examples:

- the resignation of the chief executive (E7) *was motivated by* the collapse of SwissAir (E68).
- the coronation of Elizabeth II (E7) *was motivated by* the death of George VI (E69)

P19 was intended use of (was made for):

Domain: E7 Activity

Range: E71 Man-Made Stuff

Quantification: many to many (0,n:0,n)

Scope note: This property relates an E7 Activity with objects created specifically for use 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 *P101 had as general use (was use of)*).

Examples:

- Lady Diana Spencer's wedding dress (E71) *was made for* Wedding of Prince Charles and Lady Diana Spencer (E7) *mode of use* 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 organisational activities, which lead to some other specific activity.

P20 had specific purpose (was purpose of) 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) *had specific purpose* 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. I travel to Oxford in order to work more effectively face-to-face rather than by email and telephone. *P21 had general purpose (was purpose of)* differs from *P20 had specific purpose (was purpose of)* 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) *had general purpose* painting (E55)

P22 transferred title to (acquired title through)

Domain: E8 Acquisition Event

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 Event.

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) *transferred title to* Geneva Ethnography Museum (E74)

P23 transferred title from (surrendered title through)

Domain: E8 Acquisition Event

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 Event.

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) *transferred title from* Heirs of Amoudrouz (E74)

P24 transferred title of (changed ownership through)

Domain: E8 Acquisition Event

Range: E18 Physical Stuff

Quantification: many to many, necessary (1,n:0,n)

Scope note: This property identifies the E19 Physical Object or objects involved in an E8 Acquisition Event.

In reality, an acquisition must refer to at least one transferred item.

Examples:

- acquisition of the Amoudrouz collection by the Geneva Ethnography Museum (E8) *transferred title of* 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 1870. In reality, a move must concern at least one object.

Examples:

- “Impression sunrise” (E22) *moved by* 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 a 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 Tutenkhamun Exhibition (E9) *moved to* 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 Tutenkhamun Exhibition (E9) *moved from* 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 Stuff 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 – 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) *surrendered custody through* 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 Stuff 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 – 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) *received custody through*. 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 Stuff 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 – through accident, unsolicited donation, or theft.

Examples:

- the delivery of the paintings by Secure Deliveries Inc. to the National Gallery (E10) *transferred custody of* paintings from The Iveagh Bequest (E19)

P31 has modified (was modified by)

Domain: E11 Modification Event
Range: E24 Physical Man-Made Stuff
Subproperty of: E5 Event. P12 occurred in the presence of (was present at): E77 Persistent Item
Superproperty of: E12 Production Event. P108 has produced (was produced by): E24 Physical Man-Made Stuff
E79 Part Addition. P110 augmented (was augmented by): E24 Physical Man-Made Stuff
E80 Part Removal. P112 diminished (was diminished by): E24 Physical Man-Made Stuff
Quantification: many to many, necessary (1,n:0,n)

Scope note: This property identifies the E24 Physical Man-Made Stuff modified in an E11 Modification Event.

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) *has modified* the Reichstag in Berlin (E24)

P32 used general technique (was technique of)

Domain: E11 Modification Event
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) *used general technique* gold-plating (E55) (Design or Procedure Type)

P33 used specific technique (was used by)

Domain: E11 Modification Event
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 Event.

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 used general technique (was technique of)* 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) *used specific technique* 'Instructions for golden chase work by A N Other' (E29)
- Rebuilding of Reichstag (E11) *used specific technique* Architectural plans by Foster and Partners (E29)

P34 concerned (was assessed by)

Domain: E14 Conditional Assessment
Range: E18 Physical Stuff
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 Stuff 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 Stuff does need to be present or extant.

Examples:

- 1997 condition assessment of the silver collection (E14) *concerned* silver cup 232 (E22)

P35 has identified (identified by)

Domain: E14 Conditional 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) *has identified* oxidation traces were present in 1997 (E3) *has type* 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. *P47 is identified by (identifies)* - a property of an E19 Physical Object - is a short cut of the fully developed path from E19 Physical Object through P36, E15 Identifier Assignment, *P37 assigned (was assigned by)* to E42 Object Identifier

Examples:

- 01 June 1997 Identifier Assignment of the silver cup donated by Martin Doerr (E15) *registered* 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.

P47 is identified by (identifies) - a property of an E19 Physical Object - is a short cut of the fully developed path from E19 Physical Object through P36, E15 Identifier Assignment, *P37 assigned (was assigned by)* 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) *assigned* 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) *deassigned*

P39 measured (was measured by):

Domain: E16 Measurement Event
 Range: E70 Stuff
 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 Stuff that was the subject of an act of Measurement. Stuff may be measured more than once. Both material and immaterial Stuff may be measured: for example the number of words in a text.

Examples:

- 31 August 1997 measurement of height of silver cup 232 (E16) *measured* silver cup 232 (E22)

P40 observed dimension (was observed in)

Domain: E16 Measurement Event
 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 Stuff. 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 Stuff 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) *observed dimension* silver cup 232 height (E54) *has unit* mm (E58), *has value* 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 classified (was classified)*, E17 Type Assignment, *P42 assigned (was assigned by)* to E55 Type for assigning types to objects compared to the shortcut offered by *P2 has type (is type of)*.

Examples:

- 31 August 1997 classification of silver cup 232 (E17) *classified* 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 *P41 classified (was classified by)*, E17 Type Assignment, *P42 assigned (was assigned by)* to E55 Type for assigning types to objects compared to the shortcut offered by *P2 has type (is type of)*.
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) *assigned* goblet (E55)

P43 has dimension (is dimension of)

Domain: E70 Stuff
Range: E54 Dimension
Quantification: one to many, dependent (0,n:1.1)

Scope note: This property records a E54 Dimension of some E70 Stuff.
It is a shortcut of the more fully developed path from E70 Stuff through *P39 measured (was measured by)*, E16 Measurement Event *P40 observed dimension (was observed in)* 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 Stuff.

Examples:

- silver cup 232 (E22) *has dimension* height of silver cup 232 (E54) *has unit* mm (E58), *has value* 224 (E60)

P44 has condition (condition of)

Domain: E18 Physical Stuff
Range: E3 Condition State
Quantification: one to many, dependent (0,n:1,1)

Scope note: This property records an E3 Condition State for some E18 Physical Stuff.

It is a shortcut of the more fully developed path from E18 Physical Stuff through *P34 concerned (was assessed by)*, E14 Condition Assessment *P35 has identified (identified by)* to E3 Condition State. It offers no information about how and when the E3 Condition State was established, nor by whom.

An instance of Condition State is specific to an instance of Physical Stuff.

Examples:

- silver cup 232 (E22) *has condition* oxidation traces were present in 1997 (E3) *has type* oxidation traces (E55)

P45 consists of (is incorporated in)

Domain: E18 Physical Stuff
Range: E57 Material

Quantification: many to many, necessary (1,n:0,n)

Scope note: This property identifies the instances of E57 Materials of which an instance of E18 Physical Stuff is composed.

All physical things consist of physical materials. *P45 consists of (is incorporated in)* allows the different Materials to be recorded. *P45 consists of (is incorporated in)* 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) *consists of* silver (E57)

P46 is composed of (forms part of)

Domain: E18 Physical Stuff

Range: E18 Physical Stuff

Quantification: many to many (0,n:0,n)

Scope note: This property allows instances of E18 Physical Stuff to be analysed into component elements.

Component elements, since they are themselves instances of E18 Physical Stuff, may be further analysed into sub-components, thereby creating a hierarchy of part decomposition. An instance of E18 Physical Stuff 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 Stuff are captured by the *P3 has note* property.

The instances of E57 Materials of which an item of E18 Physical Stuff is composed should be documented using *P45 consists of (is incorporated in)*.

Examples:

- the Royal carriage (E22) *forms part of* the Royal train (E22)
- the “Hog’s Back” (E24) *forms part of* 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* numbers. * (Note that the identification of the E8 Acquisition Event is sometimes mistaken for the identification of the acquired objects themselves).

P47 is identified by (identifies) is a sub-property of *P1 is identified by (identifies)*. The range of *P47 is identified by (identifies)* 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 *P36 registered (was registered by)*, E15 Identifier Assignment, *P37 assigned (was assigned by)* to E42 Object Identifier.

Examples:

- the silver cup donated by Martin Doerr (E22) *is identified by* 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 has preferred identifier (is preferred identifier of), like *P47 is identified by (identifies)* is a shortcut for the path from E19 Physical Object through *P36 registered (was registered by)*, E15 Identifier Assignment, *P37 assigned (was assigned by)* to E42 Object Identifier.

Examples:

- the pair of Lederhösens donated by Dr Martin Doerr (E22) *has preferred identifier* OXCMS:2001.1.32 (E42)

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

Domain: E18 Physical Stuff
Range: E39 Actor
Superproperty of: E18 Physical Stuff. 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 Stuff at some time.

The distinction with *P50 has current keeper (is current keeper of)* is that *P49 has former or current keeper (is former or current keeper of)* leaves open the question as to whether the specified keepers are current.

P49 has former or current keeper (is former or current keeper of) is a shortcut for the more detailed path from E18 Physical Stuff through *P30 transferred custody of (custody transferred through)*, E10 Transfer of Custody, *P28 custody surrendered by (surrendered custody through)* or *P29 custody received by (received custody through)* to E39 Actor.

Examples:

- paintings from The Iveagh Bequest (E18) *has former or current keeper* Secure Deliveries Inc. (E40)

P50 has current keeper (is current keeper of)

Domain: E18 Physical Stuff
Range: E39 Actor

Subproperty of: E18 Physical Stuff. 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 Stuff at the time this property was instantiated.

P50 has current keeper (is current keeper of) is a shortcut for the more detailed path from E18 Physical Stuff through *P30 transferred custody of (custody transferred through)*, E10 Transfer of Custody, *P29 custody received by (received custody through)* to E39 Actor.

Examples:

- paintings from The Iveagh Bequest (E18) *has current keeper* The National Gallery (E40)

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

Domain: E18 Physical Stuff

Range: E39 Actor

Superproperty of: E18 Physical Stuff. 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 Stuff at some time.

The distinction with *P52 has current owner (is current owner of)* is that *P51 has former or current owner (is former or current owner of)* does not indicate whether the specified owners are current. *P51 has former or current owner (is former or current owner of)* is a shortcut for the more detailed path from E18 Physical Stuff through *P24 transferred title of (changed ownership through)*, E8 Acquisition Event, *P23 transferred title from (surrendered title through)*, or *P22 transferred title to (acquired title through)* to E39 Actor.

Examples:

- paintings from the Iveagh Bequest (E18) *has former or current owner* Lord Iveagh (E21)

P52 has current owner (is current owner of)

Domain: E18 Physical Stuff

Range: E39 Actor

Subproperty of: E18 Physical Stuff. 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 Stuff at the time this property was instantiated.

P52 has current owner (is current owner of) is a shortcut for the more detailed path from E18 Physical Stuff through *P24 transferred title of (changed ownership through)*, E8 Acquisition Event, *P22 transferred title to (acquired title through)* to E39 Actor, if and only if this acquisition event is the most recent.

Examples:

- paintings from the Iveagh Bequest (E18) *has current owner* «English Heritage» (E40)

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

Domain: E18 Physical Stuff

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 Stuff.

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 has former or current location (is former or current location of)* is a shortcut. A more detailed representation can make use of the fully developed (i.e. indirect) path from E19 Physical Object through *P25 moved (moved by)*, E9 Move, *P26 moved to (was destination of)* or *P27 moved from (was origin of)* to E53 Place.

Examples:

- silver cup 232 (E22) *has former or current location* 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 has current permanent location (is current permanent location of) is similar to *P55 has current location (currently holds)*. 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) *has current permanent location* 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 Stuff. P53 has former or current location (is former or current location of): E53 Place
Quantification: many to one (0,1:0,n)

Scope note: This property records the location of an E19 Physical Object at the time the property was instantiated.

This property is a specialisation of *P53 has former or current location (is former or current location of)*. It indicates that the E53 Place associated with the E19 Physical Object is the current location of the object. The property does not allow any indication of how long the Object has been at the current location.

P55 has current location (currently holds) is a shortcut. A more detailed representation can make use of the fully developed (i.e. indirect) path from E19 Physical Object through *P25 moved (moved by)*, E9 Move *P26 moved to (was destination of)* to E53 Place if and only if this Move is the most recent.

Examples:

- silver cup 232 (E22) *has current location* 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,n:1,1)

Scope note: This property describes a E26 Physical Feature found on a E19 Physical Object It does not specify the location of the feature on the object.

P56 bears feature (is found on) is a shortcut. A more detailed representation can make use of the fully developed (i.e. indirect) path from E19 Physical Object through *P59 has section (is located on or within)*, E53 Place, *P53 has former or current location (is former or current location of)* 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) *bears feature* 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,n)

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 *P46 is composed of (forms parts of)* and *P45 consists of (is incorporated in)*. This allows each element to be described individually.

Examples:

- chess set 233 (E22) *has number of parts* 33 (E60)

P58 has section definition (defines section)

Domain: E18 Physical Stuff
Range: E46 Section Definition
Quantification: one to many, dependent, (0,n:1,1)

Scope note: This property links an area (section) named by a E46 Section Definition to the instance of E18 Physical Stuff upon which it is found.

The CRM handles sections as locations (instances of E53 Place) within or on E18 Physical Stuff 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 Stuff through P58, E46 Section Definition, *P87 is identified by (identifies)* that allows a more precise definition of a location found on an object than the shortcut *P59 has section (is located on or within)*.

A particular instance of a Section Definition only applies to one instance of Physical Stuff.

Examples:

- HMS Victory (E22) *has section definition* poop deck of HMS Victory (E46)

P59 has section (is located on or within)

Domain: E18 Physical Stuff
Range: E53 Place
Quantification: one to many (0,n:0,1)

Scope note: This property links an area to the instance of E18 Physical Stuff upon which it is found.

It is typically used when a named E46 Section Definition is not appropriate. E18 Physical Stuff may be subdivided into arbitrary regions.

P59 has section (is located on or within) 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 Stuff through *P58 has section definition (defines section)*, E46 Section Definition, *P87 is identified by (identifies)* to E53 Place. A Place can only be located on or within one Physical Object.

Examples:

- HMS Victory (E22) *has section* HMS Victory section B347.6 (E53)

P62 depicts (is depicted by)

Domain: E24 Physical Man-Made Stuff
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 Stuff.

This property is a shortcut of the more fully developed path from E24 Physical Man-Made Stuff through *P65 shows visual item (is shown by)*, E36 Visual Item, *P138 represents (has representation)* to E1CRM Entity. *P62.1 mode of depiction* allows the nature of the depiction to be refined.

Examples:

- “Impression Sunrise” by Monet (E84) *depicts* sun rising over Le Havre (E5) *mode of depiction* Impressionistic (E55)
- a 20 pence coin (E24) *depicts* Queen Elizabeth II (E21) *mode of depiction* Profile (E55)

Properties: P62.1 mode of depiction: E55 Type

P65 shows visual item (is shown by)

Domain: E24 Physical Man-Made Stuff
Range: E36 Visual Item
Subproperty of: E24 Physical Man-Made Stuff. 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 Stuff.

This property is similar to *P62 depicts (is depicted by)* in that it associates an item of E24 Physical Man-Made Stuff with a visual representation. However, *P65 shows visual item (is shown by)* differs from the *P62 depicts (is depicted by)* property in that it makes no claims about what the E36 Visual Item is deemed to represent. E36 Visual Item identifies a recognisable 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 *P62 depicts (is depicted by)*. Different portraits have been used at different periods, however. *P65 shows visual item (is shown by)* can be used to refer to a particular portrait.

P65 shows visual item (is shown by) 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 Stuff through *P65 shows visual item (is shown by)*, E36 Visual Item, *P138 represents (has representation)* to E1 CRM Entity which is shortcut by, *P62 depicts (is depicted by)*.

Examples:

- “Impression Sunrise” by Monet (E84) *shows visual item* Impression_Sunrise.jpg (E39)

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. *P67refers to (is referred to by)* 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 *P129 is about (is subject of)*, which describes the primary subject or subjects of the E73 Information Object.

Examples:

- the eBay auction listing for 4 July 2002 (E73) *refers to* silver cup 232 (E22) *has type* 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) *usually employs* 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) *is associated with* 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) *documents* 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) *lists* 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) *has language* 18th Century English (E56)

P73 has translation (is translation of)

Domain: E33 Linguistic Object
Range: E33 Linguistic Object
Subproperty of: E70 Stuff. P130 shows features of (features are also found on): E70 Stuff
Quantification: one to many (0,n:0,1)

Scope note: This property describes the source and target of instances of E33Linguistic 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) *has translation* “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) *has current or former residence* 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) *possesses* 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) *has contact point* 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 E49Time Appellation.

Examples:

- the time span 1926 to 1988 (E52) *is identified by* 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) *beginning is qualified by* 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,n)

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) *end is qualified by* approximately (E62)

P81 ongoing throughout

Domain: E52 Time-Span
 Range: E61 Time Primitive
 Quantification: many to one, necessary (1,1:0,n)

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) *ongoing throughout* 1996-

P82 at some time within

Domain: E52 Time-Span
 Range: E61 Time Primitive
 Quantification: many to one, necessary (1,1:0,n)

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) *at some time within* 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 it's minimum duration (i.e. it's inner boundary) independent from the actual beginning and end.

Examples:

- the time span of the Battle of Issos 333 B.C.E. (E52) *had at least duration* Battle of Issos minimum duration (E54) *has unit* day (E58) *has value* 1 (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 it's maximum duration (i.e. it's outer boundary) independent from the actual beginning and end.

Examples:

- the time span of the Battle of Issos 333 B.C.E. (E52) *had at most duration* Battle of Issos maximum duration (E54) *has unit* day (E58) *has value* 2 (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) *falls within* 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) *is identified by* 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) *forms part of* 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) *falls within* 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) *has value* 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) *has unit* 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 Event. P94 has created (was created by): E28 Conceptual Object

E66 Formation Event. P95 has formed (was formed by): E74 Group

E67 Birth. P98 brought into life (was born): E21 Person

E12 Production Event. P108 has produced (was produced by): E24 Physical Man-Made Stuff

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 Stuff, E72 Legal Object, E39 Actor, E41 Appellation, E51 Contact Point and E55 Type.

Examples:

- the birth of Mozart (E67) *brought into existence* 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 Stuff

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. E70 Stuff, E72 Legal Object, E39 Actor, E41 Appellation, E51 Contact Point and E55 Type. For many Persistent Items we know the maximum life-span and can infer, that they must have ended to exist. We assume in that case an End of Existence, which may be as unnoticeable as forgetting

the secret knowledge by the last representative of some indigenous nation.

Examples:

- the death of Mozart (E69) *took out of existence* Mozart (E21)

P94 has created (was created by)

Domain: E65 Creation Event
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 Event 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) *has created* “The Four Friends” by A. A. Milne (E28)

P95 has formed (was formed by)

Domain: E66 Formation Event
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 or E66 Formation Event for an E74 Group with the Group itself.

Examples:

- the formation of the CIDOC CRM SIG at the August 2000 CIDOC Board meeting (E66) *has formed* 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 from father (was father for)*). The Person being born is linked to the Birth with the property *P98 brought into life (was born)*. 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. This is a sub-property of *P11 had participant (participated in)*.

Examples:

- the birth of Queen Elizabeth II (E67) *by mother* 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 *P96 by mother (gave birth)*). The Person being born is linked to the Birth with the property *P98 brought into life (was born)*.

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) *was father for* 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 E67 Birth event to an E21 Person in the role of offspring.

Twins, triplets etc. are brought into life 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) *brought into life* 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 E68 Dissolution of an E74 Group to the Group itself.

Examples:

- the end of The Hole in the Wall Gang (E68) *dissolved* The Hole in the Wall Gang (E74)

P100 was death of (died in)

Domain: E69 Death
Range: E21 Person
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,n)

Scope note: This property links an E69 Death event to the E21 Person that died.

A Death event may involve multiple people, for example in the case of a battle or disaster. This is not intended for use with general Natural History material, only people.

Examples:

- Mozart's death (E69) *was death of* Mozart (E21)

P101 had as general use (was use of)

Domain: E70 Stuff

Range: E55 Type

Quantification: many to many (0,n:0,n)

Scope note: This property links an instance of E70 Stuff to an E55 Type of usage.

It allows the generic link between things, both physical and immaterial, to methods and techniques of use. Thus it can be asserted that a baseball bat had a general use for sport and a specific use for threatening people during the Great Train Robbery.

Examples:

- Tony Gill's Ford Mustang (E22) *had as general use* transportation (E55)

P102 has title (is title of)

Domain: E71 Man-Made Stuff

Range: E35 Title

Subproperty of: E1 CRM Entity. P1 is identified by (identifies): E41 Appellation

Quantification: many to many (0,n:0,n)

Scope note: This property describes the E35 Title applied to an instance of E71 Man-Made Stuff. The E55 Type of Title is assigned in a sub property.

The *P102.1 has type* property of the *P02 has title (is title of)* property enables the relationship between the Title and the stuff to be further clarified, for example, if the Title was a given Title, a supplied Title etc.

It allows any man-made material or immaterial thing to be given a Title. It is possible to imagine a Title being created without a specific object in mind.

Examples:

- the first book of the Old Testament (E33) *has title* "Genesis" (E35)
has type translated (E55)

Properties: P102.1 has type: E55 Type

P103 was intended for (was intention of)

Domain: E71 Man-Made Stuff

Range: E55 Type

Quantification: many to many (0,n:0,n)

Scope note: This property links an instance of E71 Man-Made Stuff to an E55 Type of usage.

It creates a property between specific man-made things, both physical and immaterial, to Types of intended methods and techniques of use. Note: A link between specific man-made things and a specific use activity should be expressed using *P19 was intended use of (was made for)*.

Examples:

- this plate (E22) *was intended for* being destroyed at a wedding reception (E55)

P104 is subject to (applies to)

Domain: E72 Legal Object
Range: E30 Right
Quantification: many to many (0,n:0,n)

Scope note: This property links a particular E72 Legal Object to the instances of E30 Right to which it is subject.

The Right is held by an E39 Actor as described by *P75 possesses (is possessed by)*.

Examples:

- Beatles back catalogue (E72) *is subject to* reproduction right on Beatles back catalogue (E30)

P105 right held by (has right on)

Domain: E72 Legal Object
Range: E39 Actor
Quantification: many to many (0,n:0,n)

Scope note: This property identifies the E39 Actor who holds the instances of E30 Right to an E72 Legal Object.

P105 right held by (has right on) is a shortcut of the fully developed path from E72 Legal Object through *P104 is subject to/applies to*, E30 Right, *P75 possesses (is possessed by)* to E39 Actor.

The *P105.1 has type* property of the *P105 right held by (has right on)* property enables the relationship between the E72 Legal Object and the E39 Actor to be further clarified.

Examples:

- Beatles back catalogue (E73) *right held by* Michael Jackson (E21)

Properties: P105.1 has type: Type

P106 is composed of (forms part of)

Domain: E73 Information Object
Range: E73 Information Object
Quantification: many to many (0,n:0,n)

Scope note: This property links an E73 Information Object to another E73 Information Object in a part/whole relationship.

It allows for the decomposition of an Information Object into component parts, and hence the creation of a nested hierarchy of Information Objects

Examples:

- “the love song of J. Alfred Prufrock” (E33) *forms part of* The Works of T.S. Eliot. (E33)

P107 has current or former member (is current or former member of)

Domain: E74 Group
Range: E39 Actor

Quantification: many to many (0,n:0,n)

Scope note: This property relates an E39 Actor to the E74 Group of which he or she is a member.

Groups, Legal Bodies and Persons, may all be members of Groups. A Group necessarily consists of more than one Person.

Examples:

- Moholy Nagy (E21) *is current or former member of* Bauhaus (E74)
- National Museum of Science and Industry (E40) *has current or former member* The National Railway Museum (E40)

P108 has produced (was produced by)

Domain: E12 Production Event

Range: E24 Physical Man-Made Stuff

Subproperty of: E11 Modification Event. P31 has modified (was modified by): E24 Physical Man-Made Stuff
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 identifies the E24 Physical Man-Made Stuff that came into existence as a result of an E12 Production Event.

The identity of an instance of E24 Physical Man-Made Stuff is not defined by its matter, but by its existence as a subject of documentation. An E12 Production Event can result in the creation of multiple instances of E24 Physical Man-Made Stuff.

Examples:

- The building of Rome (E12) *has produced* the Coliseum (E22)

P109 has current or former curator (is current or former curator of)

Domain: E78 Collection

Range: E39 Actor

Quantification: many to many, necessary (1,n:0,n)

Scope note: This property identifies the E39 Actor or Actors who assume or have assumed overall curatorial responsibility for an E78 Collection.

This property is effectively a short-cut. It does not allow a history of curation to be recorded. This would require use of an Event assigning responsibility for a Collection to a curator.

Examples:

- the Robert Opie Collection (E78) *has current or former curator* Robert Opie (E39)

P110 augmented (was augmented by)

Domain: E79 Part Addition

Range: E24 Physical Man-Made Stuff

Subproperty of: E11 Modification Event. P31 has modified (was modified by): E24 Physical Man-Made Stuff

Quantification: many to many, necessary (1,n:0,n)

Scope note: This property identifies the E24 Physical Man-Made Stuff that is added to (augmented) in an E79 Part Addition.

Although a Part Addition event normally concerns only one item of Physical Man-Made Stuff, it is possible to imagine circumstances under which more than one item might be added to

(augmented). For example, the artist Jackson Pollock trailing paint onto multiple canvasses.

Examples:

- the final nail-insertion Event (E79) *augmented* Coffin of George VI (E24)

P111 added (was added by)

Domain: E79 Part Addition
Range: E18 Physical Stuff
Quantification: many to many, necessary (1,n:0,n)

Scope note: This property identifies the E18 Physical Stuff that is added during an E79 Part Addition activity

Examples:

- the insertion of the final nail (E79) *added* the last nail in George VI's coffin (E18)

P112 diminished (was diminished by)

Domain: E80 Part Removal
Range: E24 Physical Man-Made Stuff
Subproperty of: E11 Modification Event. P31 has modified (was modified by): E24 Physical Man-Made Stuff
Quantification: many to many, necessary (1,n:0,n)

Scope note: This property identifies the E24 Physical Man-Made Stuff that was diminished by E80 Part Removal.

Although a Part removal activity normally concerns only one item of Physical Man-Made Stuff, it is possible to imagine circumstances under which more than one item might be diminished by a single Part Removal activity.

Examples:

- the coffin of Tut Ankh Amun (E22) *was diminished by* The opening of the coffin of Tut Ankh Amun (E80)

P113 removed (was removed by)

Domain: E80 Part Removal
Range: E18 Physical Stuff
Quantification: many to many, necessary (1,n:0,n)

Scope note: This property identifies the E18 Physical Stuff that is removed during an E80 Part Removal activity.

Examples:

- the opening of the coffin of Tut Ankh Amun (E80) *removed* The mummy of Tut Ankh Amun (E20,E22)

P114 is equal in time to

Domain: E2 Temporal Entity
Range: E2 Temporal Entity
Quantification: many to many (0,n:0,n)

Scope note: This symmetric property allows the instances of E2 Temporal Entity with the same E2 Time-Span to be equated.
This is only necessary if the time span is unknown (otherwise the equivalence can be calculated).

This property is the same as the "equal" relationship of Allen's temporal logic.

Examples:

- the destruction of the Villa Justinian Tempus (E6) *is equal in time to* the death of Maximus Venderus (E69)

P115 finishes (is finished by)

Domain: E2 Temporal Entity
Range: E2 Temporal Entity
Quantification: many to many (0,n:0,n)

Scope note: This property allows the ending point for a E2 Temporal Entity to be situated by reference to the ending point of another temporal entity of longer duration.

This is only necessary if the time span is unknown (otherwise the relationship can be calculated). This property is the same as the "finishes / finished-by" relationships of Allen's temporal logic.

Examples:

- Late Bronze Age (E4) *finishes* Bronze Age (E4)

P116 starts (is started by)

Domain: E2 Temporal Entity
Range: E2 Temporal Entity
Quantification: many to many (0,n:0,n)

Scope note: This property allows the starting point for a E2 Temporal Entity to be situated by reference to the starting point of another temporal entity of longer duration.

This is only necessary if the time span is unknown (otherwise the relationship can be calculated). This property is the same as the "starts / started-by" relationships of Allen's temporal logic.

Examples:

- Early Bronze Age (E4) *starts* Bronze Age (E4)

P117 occurs during (includes)

Domain: E2 Temporal Entity
Range: E2 Temporal Entity
Quantification: many to many (0,n:0,n)

Scope note: This property allows the entire E2 Time-Span of an E2 Temporal Entity to be situated within the Time-Span of another temporal entity that starts before and ends after the included temporal entity.

This is only necessary if the time span is unknown (otherwise the relationship can be calculated). This property is the same as the "during / includes" relationships of Allen's temporal logic.

Examples:

- Middle Saxon period (E4) *occurs during* Saxon period (E4)

P118 overlaps in time with (is overlapped in time by)

Domain: E2 Temporal Entity
Range: E2 Temporal Entity
Quantification: many to many (0,n:0,n)

Scope note: This property identifies an overlap between the instances of E52 Time-Span of two instances of E2 Temporal Entity.

It implies a temporal order between the two entities: if A overlaps in time B, then A must start before B, and B must end after A. This property is only necessary if the relevant time spans are unknown (otherwise the relationship can be calculated).

This property is the same as the "overlaps / overlapped-by" relationships of Allen's temporal logic.

Examples:

- the Iron Age (E52) *overlaps in time with* the Roman period (E52)

P119 meets in time with (is met in time by)

Domain: E2 Temporal Entity
Range: E2 Temporal Entity
Quantification: many to many (0,n:0,n)

Scope note: This property indicates that one E2 Temporal Entity immediately follows another.

It implies a particular order between the two entities: if A meets in time with B, then A must precede B. This property is only necessary if the relevant time spans are unknown (otherwise the relationship can be calculated).

This property is the same as the "meets / met-by" relationships of Allen's temporal logic.

Examples:

- Early Saxon Period (E52) *meets in time with* Middle Saxon Period (E52)

P120 occurs before (occurs after)

Domain: E2 Temporal Entity
Range: E2 Temporal Entity
Quantification: many to many (0,n:0,n)

Scope note: This property identifies the relative chronological sequence of two temporal entities.

It implies that a temporal gap exists between the end of A and the start of B. This property is only necessary if the relevant time spans are unknown (otherwise the relationship can be calculated).

This property is the same as the "before / after" relationships of Allen's temporal logic.

Examples:

- Early Bronze Age (E52) *occurs before* Late Bronze age (E52)

P121 overlaps with

Domain: E53 Place
Range: E53 Place
Quantification: many to many (0,n:0,n)

Scope note: This symmetric property allows the instances of E53 Place with overlapping geometric extents

to be associated with each other.

It does not specify anything about the shared area. This property is purely spatial, in contrast to Allen operators, which are purely temporal.

Examples:

- the territory of the United States (E53) *overlaps with* the Arctic (E53)

P122 borders with

Domain: E53 Place
Range: E53 Place
Quantification: many to many (0,n:0,n)

Scope note: This symmetric property allows the instances of E53 Place which share common borders to be related as such.

This property is purely spatial, in contrast to Allen operators, which are purely temporal.

Examples:

- Scotland (E53) *borders with* England (E53)

P123 resulted in (resulted from)

Domain: E81 Transformation
Range: E77 Persistent Item
Subproperty of: E63 Beginning of Existence. P92 brought into existence (was brought into existence by): E77 Persistent Item
Quantification: many to many, necessary (1,n:0,n)

Scope note: This property identifies the E77 Persistent Item or items that are the result of an E81 Transformation event.

New items replace the transformed item or items, which cease to exist as units of documentation. The physical continuity between the old and the new is expressed by the link to the common Transformation event.

Examples:

- the transformation of the Venetian Loggia in Heraklion into a city hall (E81) *resulted in* the City Hall of Heraklion (E22)
- the death and mummification of Tut Ankh Amun (E81) *resulted in* the Mummy of Tut Ankh Amun (E22 and E20)

P124 transformed (was transformed by)

Domain: E81 Transformation
Range: E77 Persistent Item
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 identifies the E77 Persistent Item or items that cease to exist due to a E81 Transformation event.

It is replaced by the result of the Transformation, which becomes a new unit of documentation. The continuity between both items, the new and the old, is expressed by the link to the common Transformation.

Examples:

- the transformation of the Venetian Loggia in Heraklion into a city hall (E81) *transformed* the Venetian Loggia in Heraklion (E22)
- the death and mummification of Tut Ankh Amun (E81) *transformed* the ruling Pharaoh Tut Ankh Amun (E21)

P125 used object of type (was type of object used in)

Domain: E7 Activity
Range: E55 Type
Quantification: many to many (0,n:0,n)

Scope note: This property defines the kind of objects used in an E7 Activity, when the specific instance is either unknown or not of interest, such as use of "a hammer".

Examples:

- at the Battle of Agincourt (E7), the English archers *used object of type* long bow (E55)

P126 employed (was employed in)

Domain: E11 Modification Event
Range: E57 Material
Quantification: many to many (0,n:0,n)

Scope note: This property identifies E57 Material employed in an E11 Modification Event.

The E57 Material used during the E11 Modification Event does **not** necessarily become incorporated into the E24 Physical Man-Made Stuff that forms the subject of the E11 Modification Event.

Examples:

- the repairing of the Queen Mary (E11) *employed* Steel (E57)
- distilled water (E57) *was employed in* the restoration of the Sistine Chapel (E11)

P127 has broader term (has narrower term)

Domain: E55 Type
Range: E55 Type
Quantification: many to many (0,n:0,n)

Scope note: This property identifies a super-Type to which an E55 Type is related.

It allows Types to be organised into hierarchies. This is the sense of "broader term generic (BTG)" as defined in ISO 2788

Examples:

- dime (E55) *has broader term* coin (E55)

P128 carries (is carried by)

Domain: E24 Physical Man-Made Stuff
Range: E73 Information Object
Quantification: many to many (0,n:0,n)

Scope note: This property identifies an E73 Information Object carried by an instance of E24 Physical Man-Made Stuff.

In general this would be an E84 Information Carrier *P65 shows visual item (is shown by)* is a specialisation of *P128 carries (is carried by)* which should be used for carrying visual items.

Examples:

- Matthew's paperback copy of Reach for the Sky (E84) carries the text of Reach for the Sky (E73)

P129 is about (is subject of)

Domain: E73 Information Object
Range: E1 CRM Entity
Subproperty: E28 Conceptual Object. P67 refers to (is referred to by): E1 CRM Entity
Quantification: many to many (0,n:0,n)

Scope note: This property identifies a E1 CRM Entity that is the subject of an E73 Information Object, in the sense of "aboutness" used in library science.

This differs from *P67 refers to (is referred to by)*, which refers to an E1 CRM Entity, in that it describes the primary subject or subjects of the E73 Information Object.

Examples:

- reach for the Sky (E73) *is about* Douglas Bader (E39)

P130 shows features of (features are also found on)

Domain: E70 Stuff
Range: E70 Stuff
Superproperty: E33 Linguistic Object. P73 has translation (is translation of): E33 Linguistic Object
Quantification: many to many (0,n:0,n)

Scope note: This property generalises the notions of "copy of" and "similar to" into a dynamic, asymmetric relationship, where the domain expresses the derivative, if such a direction can be established. Otherwise, the relationship is symmetric. It is a short-cut of *P15 was influenced by (influenced)* in a creation or production, if such a reason for the similarity can be verified. Moreover it expresses similarity in cases that can be stated between two objects only, without historical knowledge about its reasons.

Examples:

- the Parthenon Frieze on the Acropolis in Athens (E22) *shows features of* the Original Parthenon Frieze in the British museum (E22). *Kind of similarity:* Copy (E55)

Properties: P130.1 kind of similarity: E55 Type

P131 is identified by (identifies)

Domain: E39 Actor
Range: E82 Actor Appellation
Subproperty: E1 CRM Entity. P1 is identified by (identifies): E41 Appellation
Quantification: many to many (0,n:0,n)

Scope note: This property identifies a name used specifically to identify an E39 Actor.

This property is a specialisation of *P1 is identified by (identifies)* is identified by.

Examples:

- Tyler Withersopp IV (E39) *is identified by* US social security number 619-17-4204 (E82)

P132 overlaps with

Domain: E4 Period
Range: E4 Period
Quantification: many to many (0,n:0,n)

Scope note: This symmetric property allows instances of E4 Period that overlap both temporally and spatially to be related, i.e. they share some spatio-temporal extent.

This property does not imply any ordering or sequence between the two periods, either spatial or temporal.

Examples:

- the “Urnfield” period (E4) *overlaps with* the “Hallstatt” period (E4)

P133 is separated from

Domain: E4 Period
Range: E4 Period
Quantification: many to many (0,n:0,n)

Scope note: This symmetric property allows instances of E4 Period that do not overlap both temporally and spatially, to be related i.e. they do not share any spatio-temporal extent.

This property does not imply any ordering or sequence between the two periods either spatial or temporal.

Examples:

- the “Hallstatt” period (E4) *is separated from* the “La Tène” era (E4)

P134 continued (was continued by)

Domain: E7 Activity
Range: E7 Activity
Subproperty: E7 Activity. P15 was influenced by (influenced): E1 CRM Entity
Quantification: many to many (0,n:0,n)

Scope note: This property allows two activities to be related where the domain is considered as an intentional continuation of the range.

Used multiple times, this allows a chain of related activities to be created which follow each other in sequence.

Examples:

- the construction of the Kölner Dom (Cologne Cathedral) (E7), abandoned in the 15th century, *was continued by* construction in the 19th century adapting the initial plans so as to preserve the intended appearance (E7)

P135 created type (was created by)

Domain: E83 Type Creation
Range: E55 Type
Subproperty: E65 Creation Event. P94 has created (was created by): E28 Conceptual Object
Quantification: one to many, necessary (1,n:0,1)

Scope note: This property identifies the E55 Type, which is created in an E83Type Creation activity.

Examples:

- classification by Lineas (E83) *created type* “*Lineus bilineatus*” (E55)

P136 was based on (supported type creation)

Domain: E83 Type Creation
 Range: E1 CRM Entity
 Subproperty: E7 Activity. P15 was influenced by (influenced): E1 CRM Entity
 Quantification: many to many (0,n:0,n)

Scope note: This property identifies one or more items that were used as evidence to declare a new E55 Type.

The examination of these items is often the only objective way to understand the precise characteristics of a new Type. Such items should be deposited in a museum or similar institution for that reason. The taxonomic role renders the specific relationship of each item to the Type, such as "holotype" or "original element".

Examples:

- the taxon creation of "*Serratula glauca*" in 1753 (E83) *was based on* Object BM000576251 of the Clayton Herbarium (E20) *in the taxonomic role* original element (E55)

Properties: P136.1 in the taxonomic role: E55 Type

P137 is exemplified by (exemplifies)

Domain: E55 Type
 Range: E1 CRM Entity
 Quantification: many to many (0,n:0,n)

Scope note: This property allows an item to be declared as an example of an E55 Type or taxon.

The taxonomic role renders the specific relationship of this example to the Type, such as "prototypical", "archetypical" "lectotype", etc. The taxonomic role "lectotype" is not associated with the Type Creation (E83) itself, but selected in a later phase.

Examples:

- *Spigelia marilandica*' (E55) *is exemplified by* Object BM000098044 of the Clayton Herbarium (E20) *in the taxonomic role* lectotype

Properties: P137.1 in the taxonomic role: E55 Type

P138 represents (has representation)

Domain: E36 Visual Item
 Range: E1 CRM Entity
 Subproperty: E28 Conceptual Object. P67 refers to (is referred to by): E1 CRM Entity
 Quantification: many to many (0,n:0,n)

Scope note: This property establishes the relationship between an E36 Visual Item and the entity that it visually represents.

Any entity may be represented visually. This property is part of the fully developed path from E24 Physical Man-Made Stuff through *P65 shows visual item (is shown by)*, E36 Visual Item, *P138 represents (has representation)* to E1 CRM Entity, which is shortcut by *P62 depicts (is depicted by)*. *P138.1 mode of representation* allows the nature of the representation to be refined.

Examples:

- the design on the reverse of a Swiss coin (E36) *represents* Helvetia (E28)
mode of representation Profile (E55)

Properties: P138.1 mode of representation: E55 Type

P139 has alternative form

Domain: E41 Appellation
Range: E41 Appellation
Quantification: many to many (0,n:0,n)

Scope note: This property establishes a relationship of synonymy between two instances of E41 Appellation.

The synonymy applies to all cases of use of an instance of E41 Appellation. Multiple names assigned to an object, which, are not always synonymous should be instantiated as repeated values of the “is identified by” property. This property is symmetric but not transitive.

Examples:

- Museum Documentation Association (E41) *has alternative form* mda (E41)
- Martin Doerr (E41) *has alternative form* Martin Dörr(E41)

P140 assigned attribute to (was attributed by)

Domain: E13 Attribute Assignment
Range: E1 CRM Entity
Quantification: many to many (0,n:0,n)
Superproperty of: E14 Condition Assessment. P34 concerned (was assessed by): E18 Physical Stuff
E15 Identifier Assignment. P36 registered (was registered by): E19 Physical Object
E16 Measurement Event. P39 measured (was measured by): E70 Stuff
E17 Type Assignment. P41 classified (was classified by): E1 CRM Entity

Scope note: This property indicates the item to which an attribute or relation is assigned.

Examples:

- February 1997 Current Ownership Assessment of Martin Doerr’s silver cup (E13)
assigned attribute to Martin Doerr’s silver cup (E19)
- 01 June 1997 Identifier Assignment of the silver cup donated by Martin Doerr (E15)
registered silver cup 232 (E19)

P141 assigned (was assigned by)

Domain: E13 Attribute Assignment
Range: E1 CRM Entity
Quantification: many to many (0,n:0,n)
Superproperty of: E14 Condition Assessment. P35 has identified (identified by): E3 Condition State
E15 Identifier Assignment. P37 assigned (was assigned by): E42 Object Identifier
E15 Identifier Assignment. P38 deassigned (was deassigned by): E42 Object Identifier
E16. Measurement Event. P40 observed dimension (was observed in): E54 Dimension
E17 Type Assignment. P42 assigned (was assigned by): E55 Type

Scope note: This property indicates the attribute that was assigned or the item that was related to the item denoted by a property P140 assigned attribute to in an Attribute assignment action.

Examples:

- February 1997 Current Ownership Assessment of Martin Doerr’s silver cup (E13)
assigned Martin Doerr (E21)

- 01 June 1997 Identifier Assignment of the silver cup donated by Martin Doerr (E15)
assigned object identifier 232

References:

Gangemi, A., Guarino, N., Masolo, C., Oltramari, A., & Schneider, L. 2002, "Sweetening ontologies with DOLCE." in A. Gómez-Pérez & V. R. Benjamins (eds.), *Knowledge Engineering and Knowledge Management. Ontologies and the Semantic Web, 13th International Conference, EKAW 2002, Sigüenza, Spain, October 1-4, 2002, Proceedings*. Lecture Notes in Computer Science 2473 Springer 2002, ISBN 3-540-44268-5: pp.166-181.

Smith, B. & Varzi, A. 2000, "Fiat and Bona Fide Boundaries", *Philosophy and Phenomenological Research*, 60: 2, pp. 401–420.

International Organization for Standardization (ISO). "ISO 639. Code for the Representation of Names of Languages". Reference number: ISO 639:1988 (E/F). Geneva: International Organization for Standardization, 1988. iii + 17 pages.

International Organization for Standardization (ISO). "ISO 1000. SI units and recommendations for the use of their multiples and of certain other units." Reference number: ISO 1000:1992. Geneva: International Organization for Standardization.

APPENDIX

Editorial notes

Editors:	Nick Crofts City of Geneva, Geneva, Switzerland	Martin Doerr, ICS-FORTH, Heraklion-Crete, Greece	Tony Gill RLG, Mountain View, CA, USA	Stephen Stead, Paveprime Ltd, London UK	Matthew Stiff English Heritage Swindon, UK
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Creation Date: 11-07-1998

Last Modified: 24-10-2003

The present version of the CIDOC CRM incorporates a series of amendments to version 3.2.1, submitted to ISO and accepted as Committee Draft ISO/CD 21127. These amendments were the result of a systematic exploration of the requirements for the intended scope of the CIDOC CRM as decided in summer 2001. This includes in particular documentation in Natural History, archaeology and the ability to communicate with traditional and Digital Libraries. These amendments have been developed and approved by the CIDOC CRM Special Interest Group, ISO/TC46/SC4/WG9 in a series of meetings together with various invited experts in the period from July 2001 to October 2003.

With this version, the cycle of amendments to extend the functionality of the CIDOC CRM ends. The development team felt that the task to cover the intended scope as outlined in July 2001 and the general functionality required by members of the team up to now has been successfully fulfilled. Further amendments should only concern editorial changes to improve the clarity of the text. Therefore, the modelling constructs of the CIDOC CRM are expected to undergo no changes from this version until the final International Standard.

With version 3.3.2, we have changed the format of the Definition of the CIDOC CRM. We present:

1. A general introduction to the model (as before)
2. The hierarchy of entities as an indented list (as before)
3. The hierarchy of properties as an indented list
4. The definition of each entity
5. The definition of each property.

We took out all cross-reference information, i.e. inherited properties, direct and inherited inverse references of properties at the range entity, as well as the indices to properties, alphabetically, by range and by domain. So this document remains the pure definition, whereas the full cross-referenced text will appear as an additional hypertext document, which will be semi-automatically generated. The reason for this change are: (1) the size of the cross-referenced document exceeds what one would normally print in one document. (2) the cross-referencing does not contribute to the definition. (3) Translators of the document are forced to manually trace the consistency of the cross-referencing, a nearly impossible task. The cross-referenced document is of course the only one, that allows for fully understanding the model by reading and for using it in conceptual modelling.

We further removed the references to the metamodel under which the CIDOC CRM was initially developed. Even though the use of this metamodel has contributed a lot to the rigidity of developing the CIDOC CRM, it seems to be of minor importance for the use of the Model itself. Moreover it needs reworking, and metamodelling is still not a standard procedure in conceptual modelling. Therefore the development team decided not to make it a part of the standard to become.

We present in the Annex the amendment history from version 3.2.1 on. This, together with the meeting minutes and the “issues list” on the CIDOC CRM home page, allows for tracing the correctness of this document with respect to the decisions of the development team.

Amendments of version 3.3

In the Second Joint Meeting of ISO/TC46/SC4/WG9 and CIDOC CRM SIG the following has been decided: 3, new entities and 14 new properties have been declared, domain of 3 properties and range of 2 properties was changed and 1 property renamed

1) New Entities and their properties

- E78 Collection is curated by (curates): Actor
- E79 Part Addition added to (was augmented by): Physical Man-Made Stuff
- E79 Part Addition added (was added by): Physical Stuff
- E80 Part Removal removed from (was diminished by): Physical Man-Made Stuff
- E80 Part Removal removed (was removed by): Physical Stuff

2) New properties

- E2 Temporal Entity. removed (was removed by): Temporal Entity
- E2 Temporal Entity. equal in time: Temporal Entity
- E2 Temporal Entity. finishes (finished-by): Temporal Entity
- E2 Temporal Entity. starts (started-by): Temporal Entity
- E2 Temporal Entity. during (includes): Temporal Entity
- E2 Temporal Entity. overlaps in time (overlapped-by in time): Temporal Entity
- E2 Temporal Entity. meets in time (met-by in time): Temporal Entity
- E2 Temporal Entity. before (after): Temporal Entity
- E53 Place overlaps. with: E53 Place
- E53 Place borders. with: E53 Place

3) The Property:

- E19 Physical Object. has former or current location (is former or current location of): Place has been redirected to:
- E18 Physical Stuff. has former or current location (is former or current location of): Place

4) The Property:

- E19 Physical Object. has current permanent location (is current permanent location of): Place has been redirected to:
- E18 Physical Stuff. has current permanent location (is current permanent location of): Place

5) The Property:

- E19 Physical Object. has current location (currently holds): Place has been redirected to:
- E18 Physical Stuff. has current location (currently holds): Place

6) The Property:

- E7 Activity. was motivation for (motivated): Conceptual Object has been redirected to:
- E7 Activity. was motivation for (motivated): Man-Made Stuff

7) The Property:

- E7 Activity. motivated the creation of (was created for): Conceptual Object has been redirected and changed to:
- E7 Activity. motivated the creation of (was created because of): Man-Made Stuff

8) The property “P33 used specific technique” was declared as subproperty of “P15 took into account”

9) The property “P111 added to” was declared as subproperty of “P31 has modified”

10) The property “P113 removed from” was declared as subproperty of “P31 has modified”

11) Scope note for Actors Hierarchy, Actor and Title have been revised.

12) Scope notes for properties have been added.

Amendments to version 3.3.1

In the 3rd joint meeting of the CIDOC Special Interest Group and ISO/TC46//SC4/WG9 the following have been decided: 1 new entity and 5 new properties have been declared, domain of 4 properties was changed and 1 property renamed, 1 entity has been deleted, 7 entities were renamed.

1) New Entity and its properties

E81 Transformation resulted in (was result on): Persistent Item

E81 Transformation transformed (was transformed by): Persistent Item

2) New properties

E7 Activity. used general object (was used for): Type

E11 Modification Event. employed (was employed by): Material

E55 Type. has broader term (has narrower term): Type

3) The Property:

E19 Physical Object. has former or current keeper (is former or current keeper of): Actor
has been redirected to:

E18 Physical Stuff. has former or current keeper (is former or current keeper of): Actor

4) The Property:

E19 Physical Object. has keeper (is current keeper of): Actor

has been redirected to:

E18 Physical Stuff. has keeper (is current keeper of): Actor

5) The Property:

E19 Physical Object. has former or current owner (is former or current owner of): Actor
has been redirected to:

E18 Physical Stuff. has former or current owner (is former or current owner of): Actor

6) The Property:

E19 Physical Object. has owner (is current owner of): Actor

has been redirected to:

E18 Physical Stuff. has owner (is current owner of): Actor

7) The Property:

E7 Activity. used object (was used for): Physical Object

has been renamed to:

E7 Activity. used specific object (was used for): Physical Object

8) The entity

E76 Gender and the property P61 has gender
have been deleted

9) 7 entities have been renamed:

E8 Acquisition

E8 Acquisition Event

E11 Modification

E11 Modification Event

E12 Production

E12 Production Event

E16 Measurement

E16 Measurement Event

E65 Conceptual Creation

E65 Creation Event

E66 Formation

E66 Formation Event

E77 Existence

E77 Persistent Item

Amendments of version 3.3.2

In the 3th joined meeting of the CIDOC Special Interest Group and ISO/TC46//SC4/WG9 the following have been decided: 2 new entities and 12 new properties have been declared, 1 entity has been renamed, domain of 4 properties was changed, range of 8 properties was changed, 6 properties renamed, 7 properties has been deleted.

1) New Entities:

E82 Actor Appellation.
It was declared as subclass of E41 Appellation

E83 Type Creation.
It was declared as subclass of E65 Creation Event

2) New properties:

E23 Information Carrier. P128 is carried of (is materialized by): E73 Information Object

E73 Information Object. P129 is about (is subject of): E1 CRM Entity
It was declared as subproperty of
E28 Conceptual Object. P67 refers to (is referred to by): E1 CRM Entity

E70 Stuff. P130 shows features of (features are also found on): E70 Stuff
(kind of similarity: Type)
It was declared as superproperty of
E33 Linguistic Object. P73 has translation (is translation of): E33 Linguistic Object

E4 Period. P132 overlaps with: E4 Period

E4 Period. P133 is separated from: E4 Period

E7 Activity. P134 continued (was continued by): E7 Activity
It was declared as subproperty of
E7 Activity. P15 (was influenced by (influenced): E7 Activity

E83 Type Creation. P135 created type (was created by): E55 Type.
It was declared as subproperty of
E65 Creation Event. P94 has created (was created by): E28 Conceptual Object

E83 Type Creation. P136 was based on (supported type creation): E1 CRM Entity
(in the taxonomic role: E55 Type)
It was declared as subproperty of
E7 Activity. P15 was influenced by (influenced): E1 CRM Entity.

E55 Type. P137 is exemplified by (exemplifies): E1 CRM Entity
(in the taxonomic role: E55 Type)

E36 Visual Item. P138 visualizes (has visualization): E1 CRM Entity,
It was declared as subproperty of
E28 Conceptual Object. P67 refer to (is referred to by): E1 CRM Entity

E41 Appellation. P139 also represented by: E41 Appellation

3) The entity E23 Iconographic Object has been renamed to E23 Information Carrier

4) The domain of the following properties was changed:

The property:

E18 Physical Stuff. P43 has dimension (is dimension of): E54 Dimension
has been redirected to:

E70 Stuff. P43 has dimension (is dimension of): E54 Dimension.

The property:

E28 Conceptual Object. P67 refers to (is referred to by): E1 CRM Entity
has been redirected to:

E73 Information Object. P67 refers to (is referred to by): E1 CRM Entity

The property:

E18 Physical Stuff. P54 has current permanent location (is current permanent location of): E53 Place
has been redirected to:

E19 Physical Object. P54 has current permanent location (is current permanent location of): E53 Place

The property:

E18 Physical Stuff. P55 has current location (currently holds): E53 Place
has been redirected to:

E19 Physical Object. P55 has current location (currently holds): E53 Place

5) The ranges of the following properties were changed:

The property:

E16 Measurement Event. P39 measured (was measured by): E18 Physical Stuff
has been redirected to:

E16 Measurement Event. P39 measured (was measured by): E70 Stuff

The property:

E7 Activity. P16 used specific object (was used for): E19 Physical Object
has been redirected to:

E7 Activity. P16 used specific object (was used for): E70 Stuff

The property:

E8 Acquisition Event. P24 transferred title of (changed ownership through): E19 Physical Object
has been redirected to:

E8 Acquisition Event. P24 transferred title of (changed ownership through): E18 Physical
Stuff

The property:

E5 Event. P12 occurred in the presence of (was present at): E70 Stuff
has been redirected to:

E5 Event. P12 occurred in the presence of (was present at): E77 Persistent Item

The property:

E7 Activity. P16 used specific object (was used for): E19 Physical Object
has been redirected to:

E7 Activity. P16 used specific object (was used for): E70 Stuff

7) The property:

E7 Activity. P15 took into account (was taken into account by): E77 Persistent Item
has been renamed and redirected to:

E7 Activity. P15 was influenced by (influenced): E1 CRM Entity

8) The property:

E7 Activity. P17 was motivation for (motivated): E71 Man-Made Stuff
has been renamed and redirected to:

E7 Activity. P17 was motivated by (motivated): E1 CRM Entity

9) The property:

E24 Physical Man-Made Stuff. P62 depicts object (is depicted by): E18 Physical Stuff
has been renamed and redirected to:

E24 Physical Man-Made Stuff. P62 depicts (is depicted by): E1 CRM Entity

- 10) The property:
 E74 Group. P107 had member (was member of): E39 Actor
 has been renamed to :
 E74 Group. P107 has current or former member (is current or former member of): E39 Actor
- 11) The property:
 E52 Time-Span. P81 at least covering: E61 Time Primitive
 has been renamed to :
 E52 Time-Span. P81 ongoing throughout: E61 Time Primitive
- 12) The property:
 E52 Time-Span. P82 at most within: E61 Time Primitive
 has been renamed to :
 E52 Time-Span. P82 at some time within: E61 Time Primitive
- 13) The following properties was deleted:
 E3 Condition State. P6 falls within (contains): E3 Condition State
 E7 Activity. P18 motivated the creation of (was created because of): E71 Man-Made Stuff
 E21 Person. P60 is member of: E40 Legal Body
 E24 Physical Man-Made Stuff. P63 depicts event (is depicted by):E5 Event
 E24 Physical Man-Made Stuff. P64 depicts concept (is depicted by):E55 Type
 E28 Conceptual Object. P66 refer to concept (is referred to by): E55 Type
 E52 Time-Span. P85 consists of (forms part of): E52 Time -Span
- 14) The property:
 E5 Event. P11 had participants (participated in): E39 Actor
 has been renamed to :
 E5 Event. P11 had participant (participated in): E39 Actor
- 15) The property:
 E7 Activity. P21 had as general purpose (was purpose of): E55 Type
 has been renamed to :
 E7 Activity. P21 had general purpose (was purpose of): E55 Type
- 16) The property:
 E9 Move. P26 moved to (occupied): E53 Place
 has been renamed to :
 E9 Move. P26 moved to (was destination of): E53 Place
- 17) The property:
 E9 Move. P27 moved from (vacated): E53 Place
 has been renamed to :
 E9 Move. P26 moved from (was origin of): E53 Place
- 18) The property:
 E15 Identifier Assignment. P37 assigns (is assigned by): E42 Object identifier
 has been renamed to :
 E15 Identifier Assignment. P37 assigned (was assigned by): E42 Object identifier
- 19) The property:
 E15 Identifier Assignment. P38 deassigns (is deassigned by): E42 Object identifier
 has been renamed to :
 E15 Identifier Assignment. P38 deassigned (was deassigned by): E42 Object identifier
- 20) The property:
 E19 Physical Object. P48 preferred identifier is (is preferred identifier of): E42 Object identifier
 has been renamed to :
 E19 Physical Object. P48 has preferred identifier (is preferred identifier of): E42 Object identifier

- 21) The property:
 E32 Authority Document. P71 contains (is part of): E55 Type
 has been renamed to :
 E32 Authority Document. P71 lists (is listed in): E55 Type
- 21) The property:
 E39 Actor. P76 has contact points (provides access to): E51 Contact Point
 has been renamed to :
 E39 Actor. P76 has contact point (provides access to): E51 Contact Point
- 22) The property:
 E52 Time-Span. P83 had at least duration: E54 Dimension
 has been renamed to :
 E52 Time-Span. P83 had at least duration (was minimum duration of): E54 Dimension
- 23) The property:
 E52 Time-Span. P84 had at most duration: E54 Dimension
 has been renamed to :
 E52 Time-Span. P84 had at most duration (was maximum duration of): E54 Dimension
- 24) The property:
 E54 Dimension. P90 value: E60 Number
 has been renamed to :
 E54 Dimension. P90 has value: E60 Number
- 25) The property:
 P15 was influenced by (influenced)
 was declared as superproperty of
 P16 used specific object (was used for)
 P17 was motivated by (motivated)
 P19 was intended use of (was made for)
 P20 had specific purpose (was purpose of)
 P134 continued (was continued by)
- 26) The property:
 P11 had participant (participated in)
 was declared as subproperty of
 P12 occurred in the presence of (was present at)
- 27) The entity
 E72 Legal Object was declared as subclass of E70 Stuff
- 28) The entity
 E55 Type was declared as subclass of E28 Conceptual Object
- 29) All uses of the word “link” as synonym for “property” have been replaced by the term “property”

The following changes for internal consistency have been proposed, but they have not been decided in the Copenhagen meeting. They are incorporated in this document, in expectation of a positive decision:

- 1) The property:
 E40 Legal Body. consists of (belongs to): E40 Legal Body
 was deleted (new issue 104).
- 2) The property
 P105.2 has note: E62 String
 was deleted (new issue 106).

- 3) The property:
 P33 used specific technique
 was declared as subproperty of
 P12 occurred in the presence of (was present at)
- 4) New property
 E39 Actor. P131 is identified by (identifies): E82 Actor Appellation.
 It was declared as subproperty of
 E1 CRM Entity. P1 is identified by (identifies): E41 Appellation

Amendments of version 3.4

In the 5th joined meeting of the CIDOC Special Interest Group and ISO/TC46//SC4/WG9 the following have been decided: 3 entities were deleted and 1 new entity was declared, 24 properties has been renamed, domain of 1 property was changed, and range of 1 property was changed.

- 1) The entity:
 E23 Information Carrier
 was deleted.
- 2) New entity
 E84 Information Carrier
 was declared.
- 3) The property
 E8 Acquisition Event. P22 transferred title to (acquired title to): E39 Actor
 has been renamed to :
 E8 Acquisition Event. P22 transferred title to (acquired title through): E39 Actor
- 4) The property
 E10 Transfer of Custody. P28 custody surrendered by (surrendered custody): E39 Actor
 has been renamed to :
 E10 Transfer of Custody. P28 custody surrendered by (surrendered custody through): E39 Actor
- 5) The property
 E10 Transfer of Custody. P29 custody received by (received custody): E39 Actor
 has been renamed to :
 E10 Transfer of Custody. P29 custody received by (received custody through): E39 Actor
- 6) The property
 E10 Transfer of Custody. P30 transferred custody of (custody changed by): E19 Physical Object
 has been redirected and renamed to :
 E10 Transfer of Custody. P30 transferred custody of (custody transferred through): E18 Physical Stuff
- 7) The property
 E16 Measurement Event. P40 observed dimension (was observed): E54 Dimension
 has been renamed to :
 E16 Measurement Event. P40 observed dimension (was observed in): E54 Dimension
- 8) The property
 E19 Physical Object. P58 has section definition (defines section): E46 Section Definition
 has been redirected to:
 E18 Physical Stuff. P58 has section definition (defines section): E46 Section Definition
- 9) The property
 E52 Time-Span. P79 begins at qualify: E62 String
 has been renamed to :

E52 Time-Span. P79 beginning is qualified by: E62 String

10) The property

E52 Time-Span. P80 ends at qualify: E62 String

has been renamed to :

E52 Time-Span. P80 end is qualified by: E62 String

11) The property

E54 Dimension. P91 unit: E58 Measurement Unit

has been renamed to :

E54 Dimension. P91 has unit (is unit of): E58 Measurement Unit

12) The property

E78 Collection. P109 is curated by (curates): E39 Actor

has been renamed to :

E78 Collection. P109 has current or former curator (is current or former curator of): E39 Actor

13) The property

E79 Part Addition. P110 added to (was augmented by): E24 Physical Man-Made Stuff

has been renamed to :

E79 Part Addition. P110 augmented (was augmented by): E24 Physical Man-Made Stuff

14) The property

E79 Part Removal. P112 removed from (was diminished by): E24 Physical Man-Made Stuff

has been renamed to :

E79 Part Removal. P112 diminished (was diminished by): E24 Physical Man-Made Stuff

15) The property

E2 Temporal Entity. P114 equal in time: E2 Temporal Entity

has been renamed to :

E2 Temporal Entity. P114 is equal in time to: E2 Temporal Entity

16) The property

E2 Temporal Entity. P115 finishes (finished-by): E2 Temporal Entity

has been renamed to :

E2 Temporal Entity. P115 finishes (is finished by): E2 Temporal Entity

17) The property

E2 Temporal Entity. P116 starts (started-by): E2 Temporal Entity

has been renamed to :

E2 Temporal Entity. P116 starts (is started by): E2 Temporal Entity

18) The property

E2 Temporal Entity. P117 during (includes): E2 Temporal Entity

has been renamed to :

E2 Temporal Entity. P117 occurs during (includes): E2 Temporal Entity

19) The property

E2 Temporal Entity. P118 overlaps in time (overlapped-by in time): E2 Temporal Entity

has been renamed to :

E2 Temporal Entity. P118 overlaps in time with (is overlapped in time by): E2 Temporal Entity

20) The property

E2 Temporal Entity. P119 meets in time (met-by in time): E2 Temporal Entity

has been renamed to :

E2 Temporal Entity. P119 meets in time with (is met in time by): E2 Temporal Entity

21) The property

E2 Temporal Entity. P120 before (after): E2 Temporal Entity

has been renamed to :

E2 Temporal Entity. P120 occurs before (occurs after): E2 Temporal Entity

22) The property

E81 Transformation. P123 resulted in (was resulted on): E77 Persistent Item

has been renamed to :

E81 Transformation. P123 resulted in (resulted from): E77 Persistent Item

23) The property

E7 Activity. P125 used general object (was used for): E55 Type

has been renamed to :

E7 Activity. P125 used object of type (was type of object used in): E55 Type

24) The property

E11 Modification Event. P126 employed (was employed by): E57 Material

has been renamed to :

E11 Modification Event. P126 employed (was employed in): E57 Material

25) The property

E23 Information Carrier. P128 is carried of (is materialized by): E73 Information Object

has been redirected and renamed to :

E24 Physical Man-Made stuff. P128 carries (is carried by): E73 Information Object

26) The property

E36 Visual Item. P138 visualizes (has visualization): E1 CRM Entity

has been renamed to :

E36 Visual Item. P138 represents (has representation): E1 CRM Entity

27) The property

E41 Appellation. P139 also represented: E41 Appellation

has been renamed to :

E41 Appellation. P139 has alternative form: E41 Appellation

28) The property

P3 has note

has been declared as superproperty of

P79 beginning is qualified by

P80 end is qualified by

29) The property

P11 had participant (participated in)

was declared as superproperty of

P14 carried out by (performed)

P96 by mother (gave birth)

P99 dissolved (was dissolvedby)

30) The property

P12 occurred in the presence of (was present at)

was declared as superproperty of

P11 had participant (participated in)

P16 used specific object (was used for)

P25 moved (moved by)

P31 has modified (was modified by)

P33 used specific technique (was used by)

P92 brought into existence (was brought into existence by)

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

31) The property:

P15 was influenced by (influenced)

was declared as superproperty of
P16 used specific object (was used for)
P17 was motivated by (motivated)
P33 used specific technique (was used by)
P134 continued (was continued by)
P136 was based on (supported type creation)

32) The property:
E40 Legal Body. consists of (belongs to): E40 Legal Body
was deleted

33) The property
P105.2 has note: E62 String
was deleted

34) New property
E39 Actor. P131 is identified by (identifies): E82 Actor Appellation.
It was declared as subproperty of
E1 CRM Entity. P1 is identified by (identifies): E41 Appellation

Amendments of version 3.4.1

Introduction and Scope Notes for classes E21 – E84 have been revised, and 2 new paragraphs were inserted (CIDOC CRM Class Declarations and CIDOC CRM Property Declarations).

Amendments of version 3.4.2

Scope Notes for all entities and properties have been revised, 2 new properties was declared, 1 property was redirected and two properties was renamed:

1) New property
E13 Attribute Assignment. P140 assigned attribute to (was attributed by): E1 CRM Entity
It was declared as superproperty of
E14 Condition Assessment. P34 concerned (was assessed by): E18 Physical Stuff
E15 Identifier Assignment. P36 registered (was registered by): E19 Physical Object
E16 Measurement Event. P39 measured (was measured by): E70 Stuff
E17 Type Assignment. P41 classified (was classified by): E1 CRM Entity

2) New property
E13 Attribute Assignment. P141 assigned (was assigned by): E1 CRM Entity
It was declared as superproperty of
E14 Condition Assessment. P35 has identified (identified by): E3 Condition State
E15 Identifier Assignment. P37 assigned (was assigned by): E42 Object Identifier
E15 Identifier Assignment. P38 deassigned (was deassigned by): E42 Object Identifier
E16. Measurement Event. P40 observed dimension (was observed in): E54 Dimension
E17 Type Assignment. P42 assigned (was assigned by): E55 Type

3) The Property:
E6 Destruction. P13 destroyed (was destroyed by): E19 Physical Object
has been redirected to:
E6 Destruction. P13 destroyed (was destroyed by): E18 Physical Stuff

4) The property:
E8 Acquisition Event. P23 transferred title from (surrendered title of): E39 Actor

has been renamed to:

E8 Acquisition Event. P23 transferred title from (surrendered title through): E39 Actor

5) The property:

E8 Acquisition Event. P24 transferred title of (changed ownership by): E18 Physical Stuff

has been renamed to:

E8 Acquisition Event. P24 transferred title of (changed ownership through): E18 Physical Stuff