Project funded by the EUROPEAN UNION

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A Scientific Network for Earthquake, Landslide & Flood Hazard Prevention

Geodatabase development – Annex I
Deliverable No.: D.02.02

GA 2. GIS Development, activities 2.3 & 2.5

RESPONSIBLE: TEI of Central Macedonia (LP)

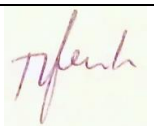
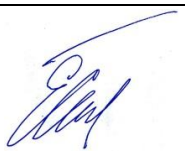
INVOLVED PARTNERS: ALL

Project Details

Programme	**Black Sea JOP**
Priority and Measure	Priority 2 (Sharing resources and competencies for environmental protection and conservation), Measure 2.1. (Strengthening the joint knowledge and information base needed to address common challenges in the environmental protection of river and maritime systems)
Objective	Development of a Scientific Network
Project Title	**A Scientific Network for Earthquake, Landslide and Flood Hazard Prevention**
Project Acronym	**SCInet NatHaz**
Contract No	MIS-ETC 2614
Lead Partner	TEI OF KENTRIKI MAKEDONIA, GREECE
Total Budget	700.000,00 Euro (€)
Time Frame	
Start Date – End Date	01/05/2013 – 30/04/2015

Book Captain: **K. PAPATHEODOROU (TEI KENTRIKI MAKEDONIA)**
Contributing Authors: **D. Kotzinos, K. Papatheodorou, K. Ntouros, K. Evangelidis, K. Konstantinidou (EPPO)**

Document Release Sheet

Book captain:	**K. PAPATHEODOROU (TEI CENTRAL MACEDONIA)**		**11.07.2014**
Approval	**K. PAPATHEODOROU (TEI CENTRAL MACEDONIA)**		**11.07.2014**
Approval	**A.ANSAL (IPA – BU-KOERI)**	 M.Atilla Ansal	**11.07.2014**
Approval	**N. KLIMIS (Partner 1 - DUTH)**	 Nikolaos Klimis	**11.07.2014**
Approval	**V. MARGARIS (Partner 2 - EPPO)**	 Basil N. Margaris	**11.07.2014**
Approval	**V. NENOV (Partner 3 - Burgas Assen Zlatarov University)**		**11.07.2014**
Approval	**L. TOFAN (Partner 4 - Ovidius University of Constanta)**		**11.07.2014**
Approval	**A.SIDORENKO (Partner 5 – IEEN "D.GHITU" Of Academy Of**		**11.07.2014**
Approval	**K. STEPANOVA (Partner 6 - Ukranian Environmental Academy Of Sciences, Black Sea**		**11.07.2014**
Approved by the Project Coordinator:	**K. PAPATHEODOROU**		**11.07.2014**
Distribution:	**ALL PARTNERS**		

RECORD of REVISIONS

Issue/Rev	Date	Page(s)	Description of Change	Release
	11.07.2014	69	Release of version 0.5	0.5
	11.07.2014	50	Release of version 0.4	0.4
	31.05.2014	25	Release of version 0.3 (internal – More Models)	0.3
	31.03.2014	10	Release of version 0.2 (internal – Core Model)	0.2
	31.12.2013	3	Release of version 0.1 (internal - TOC)	0.1

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1 BACKGROUND OF THE DOCUMENT

1.1 SUMMARY

This document provides an overview of the geodata modeling activities in the project. The project adopted and extended substantially already existing data and metadata models that is used to describe geospatial events and the geoscientific observations and measurements around them, targeting especially natural hazards phenomena like floods, earthquakes and landslides.

This is an event driven model, which allows for the description of natural geospatial phenomena as events and associates them with the place and the time span of their occurrence. This allows for an exact and rich modeling of the information. Additionally the model is built in a way that facilitates information integration, which allows the integration of data coming from the different partners, which can follow a different structure and a different format. Moreover it is suitable for answering queries about the data modeled with this model in a fast and efficient way.

Finally this conceptual model is extensible (which was proven since we extended it to cover concepts not existing in the original version) and can be easily updated to cover additional areas around natural hazards.

1.2 SCOPE AND OBJECTIVES (FOR THE ANNEX)

The document aims at describing information integration issues with emphasis on geospatial information and specifically the area of natural hazards' management. This is a critical are since the proper management of such events highly affects the lives of individuals. The management of such information in an integrated way is critical for the successful reaction and management of such phenomena. So the main objective of this document is to describe an integrated conceptual model that allows researchers to integrate different kind of information that might need to manage together, i.e. the management of tsunami events after an earthquake becomes more and more common; for the successful management of such integrated events, integrated models as the proposed one are needed.

This Annex to the document actually contains detailed descriptions for the classes and properties used for the modeling of information.

So this document is a detailed description of all the concepts of the model (including the three main themes described by it) and the properties that associate the different concepts. This detailed description includes also the subsumption relationships both for concepts (classes) and properties and thus details the hierarchy that the model supports. This is a useful tool for those who will apply the model in a production environment.

1.3 RELATED DOCUMENTS

1.3.1 Input

List of former deliverables acting as inputs to this document

Document ID	Descriptor
D.2.01	Data collection and data processing

1.3.2 Output

List of other deliverables for which this document is an input.

Document ID	Descriptor
D.2.03	WebGIS Development

2 THE (GEO) SCIENTIFIC OBSERVATION MODEL (GSOM) AND ITS EXTENSIONS

2.1 INTRODUCTION

2.1.1 Introducing CIDOC

Since the model reuses, wherever appropriate, parts of ISO21127, the CIDOC Conceptual Reference Model, provides a comprehensive list of all constructs used from ISO21127, together with their definitions following the version 5.0.4 maintained by CIDOC.

This document is the definition of the object-oriented version, harmonized with CIDOC CRM, hereafter referred to, as a formal ontology intended to capture and represent the underlying semantics of geoscientific information and to facilitate the integration, mediation, and interchange of this kind of information. Such a common view is necessary to provide interoperable information systems for those users interested in accessing common or related content. It applies empirical analysis and ontological structure to the entities and processes associated with boreholes, aquifer systems, features, earthquakes and shock recordings, scientific measurements, their properties, and the relationships among them.

The CIDOC CRM model declares no "attributes" at all (except implicitly in its "scope notes" for classes), but regards any information element as a "property" (or "relationship") between two classes. The semantics are therefore rendered as properties, according to the same principles as the CIDOC CRM model.

2.1.2 Naming Conventions

All the classes declared were given both a name and an identifier constructed according to the conventions used in the CIDOC CRM model. For classes that identifier consists of the letter S followed by a number. Resulting properties were also given a name and an identifier, constructed according to the same conventions. That identifier consists of the letter O followed by a number, which in turn is followed by the letter "B" every time the property is mentioned "backwards", i.e., from target to domain. "S" and "O" do not have any other meaning. They correspond respectively to letters "E" and "P" in the CIDOC CRM naming conventions, where "E" originally meant "entity" (although the CIDOC CRM "entities" are now consistently called "classes"), and "P" means "property". Whenever CIDOC CRM classes are used in our model, they are named by the name they have in the original CIDOC CRM.

Letters in red colour in CRM Classes and properties are additions/extensions coming by the scientific observation model.

2.2 CLASS AND 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 in the comprehension and navigation of the model, 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 "S", or "E".
- 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 sub hierarchies.
- 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 "O".
- 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.
- The domain class for which the property is declared.

2.2.1 GSOM Classes Hierarchy aligned with (part of) CIDOC CRM Classes Hierarchy[1]

E1 CRM Entity
E2 - Temporal Entity
S34 - - State
E53 - Place
S127 - - ***Catchment Area***
S100 - - ***Station***
S30 - - - GeophStation
S101 - - - ***Gauging Station***
S102 - - - ***Meteorological Station***
S130 - - ***Urban Area***
S131 - - ***Port***
S132 - - ***Airport***
E54 - Dimension

[1] Notation information: bold italics were used to denote newly introduced classes.

S20 - - Scalar Dimension
S32 - Landslide
S19 - Observable Entity
E5 - - Event
E63 - - - Beginning of Existence
S35 - - - - Feature Genesis
S32 - - - Landslide
S22 - - - Seismic Phenomenon
S23 - - - - Earthquake
S24 - - - - Cluster
S25 - - - - Shock
S27 - - - - - Mainshock
S26 - - - - Shockwave
S31 - - - - - *Shockwave Recording*
E7 - - - Activity
S1 - - - - Matter Removal
E80 - - - - - *Part Removal*
S2 - - - - - Sample Taking
S3 - - - - - - *Sample Taking-Measurement*
E13 - - - - Attribute Assignment
S4 - - - - - Observation
E16 - - - - - - Measurement
S103 - - - - - - ***- Hydrometric Measurement***
S104 - - - - - - ***- Meteorological Measurement***
S3 - - - - - - *Sample Taking-Measurement*
S31 - - - - - - *Shockwave Recording*
S5 - - - - - Inference Making
S6 - - - - - - Data Evaluation
S31 - - - - - - *Shockwave Recording*
S7 - - - - - - Simulation-Prediction
S8 - - - - - - Categorical Hypothesis Building
S137 - - - ***Inundation***
E70 - Thing
S10 - - *Material Substantial*
S37 - - - Section Matter
S14 - - - Fluid Body
S12 - - - - *Amount of Fluid*
S15 - - - - *Aquifer Concept*
S11 - - - Amount of Matter
S12 - - - - *Amount of Fluid*
S13 - - - - Sample
E18 - - - Physical Thing
S28 - - - - GeophSensorNetwork
S29 - - - - Accelerometer
E47 - - - - Spatial Coordinates
S33 - - - - - Relative Depth

E26 - - - - *Physical Feature*
S15 - - - - - *Aquifer Concept*
S105 - - - - - ***Hydraulic Structure***
S106 - - - - - ***- Levee***
S107 - - - - - ***- Culvert***
S108 - - - - - ***- Dewatering Canal***
S109 - - - - - ***- Pumping Station***
S110 - - - - - ***- High Water Diversions***
S111 - - - - - ***- Bank Protection***
S112 - - - - - ***- Outlet Structure***
S113 - - - - - ***- Gated Spillways***
S114 - - - - - ***- Weirs***
S115 - - - - - ***- Dam***
S116 - - - - - ***- Bridge***
S138 - - - - - ***- Spillway***
S126 - - - - - ***Hydrographic Network***
S125 - - - - - ***Cross Section***
S122 - - - - - ***HN Element***
S123 - - - - - ***- Water Body***
S124 - - - - - ***- Stream***
S16 - - - - - Borehole
S17 - - - - - Borehole Collar
S36 - - - - - Landslide Feature
E36 - - Visual Item
S18 - - - Map
S117 - - - - ***Geologic Map***
S118 - - - - ***Flood Hazard Calibration Map***
S119 - - - - ***Precipitation Map***
S120 - - - - ***Flood Hazard Map***
S121 - - - - ***Topographic Map***
E55 - - Type
S9 - - - Property Type
E73 - - Information Object
S21 - - - Spatial Distribution Model
S129 - ***Topographic Entity***
S133 - - ***Digital Elevation Model***
S134 - - ***Land Cover***
S135 - - ***Network***
S136 - - - ***Road Network***
S137 - - - ***Railway Network***

2.2.2 GSOM PROPERTIES Hierarchy[2]

Property id	Property Name	Entity – Domain	Entity - Range

[2] Notation information: normal not colored font was used to denote newly introduced properties.

Property id	Property Name	Entity – Domain	Entity - Range
O1	diminished	**S1** Matter Removal	***S10*** Material Substantial
O2	removed	**S1** Matter Removal	**S11** Amount of Mater
O3	sampled from	**S2** Sample Taking	***S10*** Material Substantial
O4	sampled at	**S2** Sample Taking	E53 Place
O5	removed	**S2** Sample Taking	S13 Sample
O8	forms former or current part	***S12*** Amount of Fluid	**S14** Fluid Body
O9	contains or confines	E53 Place	E53 Place
O10	observed	**S4** Observation	**S19** Observable Entity
O11	observedProperty	**S4** Observation	**S9** Property Type
O12	has upper vertical limit	E53 Place	E47 Spatial Coordinates
O13	has lower vertical limit	E53 Place	E47 Spatial Coordinates
O14	assigned dimension	**S6** Data Evaluation	E54 Dimension
O15	is bounded by	**S20** Scalar Dimension	E60 Number
O16	described	**S6** Data Evaluation	**S19** Observable Entity
O17	has dimension	**S19** Observable Entity	E54 Dimension
O18	has validity	E54 Dimension	E62 String
O19	has preferred type	E1 CRM Entity	E55 Type
O20	has value	**S33** Relative Depth	E60 Number
O21	triggers	E5 Event	E5 Event
O22	initializes	E5 Event	**S34** State
O23	modified	**S35** Feature Genesis	E26 Physical Feature
O24	generated	**S35** Feature Genesis	E18 Physical Thing
O25	generated feature	**S32** Landslide	**S36** Landslide Feature
O26	is section of	**S37** Section Matter	E18 Physical Thing
O27	at place	**S37** Section Matter	E53 Place
O28	occupied	**S10** Material Substantial	E53 Place
P100	records measurement	S100 Station	E16 Measurement

2.3 SCIENTIFIC OBSERVATION MODEL CLASS DECLARATION

The classes are comprehensively declared in this section using the following format:

- Class names are presented as headings in bold face, preceded by the class's 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 "Examples:" contains a bulleted list of examples of instances of this class.
- The line "Properties:" declares the list of the class's properties;
- Each property is represented by its unique identifier, its forward name, and the range class that it links to, separated by colons;
- Inherited properties are not represented;
- Properties of properties, if they exist, are provided indented and in parentheses beneath their respective domain property.

Classes are divided into two parts: Part A includes classes imported from the original GSOM model which account for concepts related to earthquakes and landslides and has been directly imported from "Deliverable 2.2: Interface of Web Services and models of data (D2.2) and its ANNEX" available at http://www.ingeoclouds.eu/sites/default/files/D2.2-INGC_IntfWSandDatamodels-V1-ANNEX_Approved.pdf, while Part B contains new descriptions introduced by the SciNet NatHaz project that refer to concepts related to flood management.

2.4 CLASSES

2.4.1 Part A: Classes from the original GSOM model

S1 Matter Removal

Subclass of: E7 Activity
Superclass of: *E80* Part Removal
S2 Sample Taking

Scope note: This class comprises the activities that result in an instance of S10 Material Substantial being decreased by the removal of an amount of matter.

Typical scenarios include the removal of a component or piece of a physical object, removal of an archaeological or geological layer, taking a tissue sample from a body or a sample of fluid from a body of water. The removed matter may acquire a persistent identity of different nature beyond the act of its removal, such as becoming a physical object in the narrower sense. Such cases should be modeled by using multiple instantiation with adequate concepts of creating the respective items.

Properties:

O2 removed: **S11** Amount of Matter
O1 diminished: **S10** Material Substantial

S2 Sample Taking

Subclass of: **S1** Matter Removal
Superclass of ***S3*** Sample Taking-Measurement

Scope note: This class comprises the activity that results in taking an amount of matter as sample for further analysis from a material substantial such as a body of water, a geological formation or an archaeological object. The removed matter may acquire a persistent identity of different nature beyond the act of its removal, such as becoming a physical object in the narrower sense. The sample is typically removed from a physical feature, which is used as a frame of reference, the place of sampling. In case of non-rigid Material Substantials, the source of sampling may be regarded as not to be modified by the activity of sample taking

Properties:

O5 removed: **S13** Sample
O3 sampled from: **S10** Material Substantial
O4 sampled at: E53 Place

S3 Sample Taking – Measurement

Subclass of: **S2** Sample Taking
E16 Measurement

Scope note: This class comprises activities of taking a sample and measuring-analyzing it as one managerial unit of activity. The sample needs not be identified and be preserved beyond the context of this activity. Instances of this class are constrained to describe the taking of exactly one sample, in general not further identified, and the dimensions observed by the respective measurement are implicitly understood to describe the same sample. Therefore the class "Sample Taking and Measurement" inherits the properties of "Sample Taking": "O3 sampled from: S10 Material Substantial" and "O4 sampled at: E53 Place", and the properties of E16 Measurement "P40 observed dimension: E54 Dimension", due to multiple IsA, whereas it needs not instantiate the properties "O5 removed: S13 Sample" and "P39 measured: E70 Thing", if the sample is not documented beyond the context of the activity.

S4 Observation

Subclass of: E13 Attribute Assignment
Superclass of: E16 Measurement

Scope note: This class comprises scientific knowledge about particular states of physical reality gained by empirical evidence, by observations, experiments and by measurements. We define observation in the sense of natural sciences, as a kind of human activity: at some ***Place*** and within some ***Time-Span***, certain ***Physical Things*** and their behavior and interactions are observed, either directly by human sensory impression, or enhanced with tools and measurement devices. The output of the internal processes of measurement devices that do not require additional human interaction are in general regarded as part of the observation and not as additional inference. Manual *recordings* may serve as *additional evidence*. Observations result in a *factual proposition belief*. Data from measurement devices can be interpreted as propositions believed to be true to the tolerances and degree of reliability of the device. Observations represent the *transition* between *reality* and *propositions* in the form of instances of a formal ontology. Measurements and witnessing of *events* are special cases of observations

Properties:

O10 observed: **S19** ObservableEntity
O11 observedProperty: **S9** PropertyType

S5 Inference Making

Subclass of: E13 Attribute Assignment
Superclass of: **S6** Data Evaluation
S7 Simulation-Prediction
S8 Categorical Hypothesis Building

Scope note: This class comprises the action of making propositions and statements about particular states of affairs in reality or categorical descriptions of reality by using inferences from other statements based on hypotheses and any form of formal or informal logic. It includes evaluations, calculations, and interpretations based on mathematical formulations and propositions

Properties:

S6 Data Evaluation

Subclass of: **S5** Inference Making
Superclass of: **S31** Shockwave Recording

Scope note: This class comprises the action of concluding propositions on a respective reality from observational data by making evaluations based on mathematical inference rules and calculations using established hypotheses.

Examples: calculation of earthquake epicenter.

Properties:
O14 assigned dimension: E54 Dimension
O16 described: **S19** Observable Entity

S7 Simulation-Prediction

Subclass of: **S5** Inference Making

Scope note: This class comprises the action of making predictions and simulation models about the behaviors and the properties of things by using mathematical formulations and calculations. These predictions-simulations are made in order to confirm a theory or to show the difference from another theory.

Properties:

S8 Categorical Hypothesis Building

Subclass of: **S5** Inference Making

Scope note: This class comprises the action of making propositions and categorical hypothesis based on inference rules and theories; these hypotheses describe factors that define the behavior of things.

Properties:

S9 Property Type

Subclass of: E55 Type

Scope note: This class comprises any property concept that is used in scientific propositions about reality. Typically, instances of S9 Property Type would be taken from an ontology or terminological system

Properties:

S10 Material Substantial

Subclass of: E70 Thing
S19 Observable Entity
Superclass of: **S14** Fluid Body
S11 Amount of Matter
E18 Physical Thing
S37 Section Matter

Scope note: This class comprises constellations of matter with a relative stability of any form sufficient to associate them with a persistent identity, such as being confined to certain extent, having a relative stability of form or structure, or containing a fixed amount of matter. In particular, it comprises physical things in the narrower sense and fluid bodies. It is an abstraction of physical substance for solid and non-solid things of matter.

Properties:
P44 has condition (is condition of): E3 Condition State
P45 consists of (is incorporated in): E57 Material
P46 is composed of (forms part of): **S10** Material Substantial

S11 Amount of Matter

Subclass of: **S10** Material Substantial
Superclass of: **S12** Amount of Fluid
S13 Sample

Scope note: This class comprises fixed amounts of matter specified as some air, some water, some soil, etc., defined by the total and integrity of their material content.

S12 Amount of Fluid

Subclass of: **S11** Amount of Matter
S14 Fluid Body

Scope note: This class comprises fixed amounts of fluid defined by the total of its material

content, typically molecules. They frequently acquire identity in laboratory practice by the fact of being kept or handled together within some adequate containers.

Properties:

O8 forms former or current part: **S14** Fluid Body

S13 Sample

Subclass of: **S11** Amount of Matter

Scope note: This class comprises instances of S11 Amount of Matter taken from some instance of S10 Material Substantial with the intention to be representative for some material qualities of the instance of S10 Material Substantial or part of it it was taken from for further analysis. We typically regard a sample as ceasing to exist when the respective representative qualities become corrupted, such as the purity of a water sample or the layering of a bore core.

S14 Fluid Body

Subclass of: **S10** Material Substantial
Superclass of: **S12** Amount of Fluid
S15 Aquifer Concept

Scope note: This class comprises a mass of matter in fluid form environmentally constraint in some persistent form allowing for identifying it for the management or research of material phenomena, such as a part of the sea, a river, the atmosphere or the milk in a bottle. Fluids are generally defined by the continuity criterion which is characteristic of their substance: their amorphous matter is continuous and tends to flow. Therefore, contiguous amounts of matter within a fluid body may stay contiguous or at least be locally spatially confined for a sufficiently long time in order to be temporarily identified and traced. This is a much weaker concept of stability of form than the one we would apply to what one would call a physical object. In general, an instance of Fluid Body may gain or lose matter over time through so-called sources or sinks in its surface, in contrast to physical things, which may lose or gain matter by exchange of of pieces such as spare parts or corrosion.

S15 Aquifer Concept

Subclass of: E26 Physical Feature
S14 Fluid Body

Scope note: This class describes an underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, or silt) from which groundwater can be usefully extracted using a water well. The class S15 Aquifer Concept comprises the notions of Aquifer Systems and their components, such as

Aquitards , Aquicludes or Aquifer regions, but also Intakes at boreholes.

Properties:

S16 Borehole

Subclass of: E26 Physical Feature

Scope note: This class comprises narrow shafts drilled in the ground, either vertically or horizontally.

Properties:

S17 Borehole Collar

Subclass of: E26 Physical Feature

Scope note: This class comprises a feature corresponding to the start point of a borehole. It is part of a borehole, also frequently used as a location, a place of geographic reference to it.

.

Properties:

S18 Map

Subclass of: **S21** Spatial Distribution Model

Scope note: This class comprises graphical maps that are used as visual representations of sites, places, physical features, etc., such as geologic maps that represent geologic features or the geologic layers of the ground area where a drilling was employed. They use to illustrate by colors or symbols relevant features found on a selected surface or area.

S19 Observable Entity

Superclass of: E5 Event
S10 Material Substantial

This class comprises of physical things, their behavior and interactions or events that are observed, either directly by human sensory impression, or enhanced with tools and measurement devices.

Properties:

O17 has dimension: E54 Dimension

S20 Scalar Dimension

Subclass of: E54 Dimension
Scope note: This class comprises a quantity which can be described by a single number, unlike vectors, tensors, etc. which are described by several numbers which describe magnitude and direction.
Properties:
O15 is bounded by: E60 Number

S21 Spatial Distribution Model

Subclass of: E73 Information Model
Superclass of: **S18** Map

Scope note: This class comprises propositions about the spatial distribution of phenomena typical on, above or below the surface of the earth. The distribution model may have a statistical nature in the sense that statistical aggregations like sums or means have been calculated for predefined space time volumes. A spatial distribution model uses some kind of spatial coordinate reference system that relate the propositions of the model to real world locations. The propositions may refer to actual phenomenon that have been observed or may have predictional character.
The methods and source data (observations or other input) to obtain the spatial distributen model from should be sufficiently documented in order to be able to rerun the modeling process from the source data and reproduce the same results. In particular this may include algorithms or software. One spatial distribution model may have various manifestations like paper maps, Web Mapping Services or output in the form of tabular data or charts.
Examples: The SRTM elevation model for Italy
The CORINE land use model for Europe
The geological model of Denmark
The temperature forecast model for Austria for tomorrow
The shock wave model for Greece on 11.11.20012

Properties:
dc:creator
dc:date
dc:subject
dc:format
dc:coverage

S22 Seismic Phenomenon

Subclass of: E5 Event
Superclass of: **S23** Earthquake
S24 Cluster
S25 Shock
S26 Shockwave

Scope note: This class comprises a phenomenon of shaking and vibration at the surface of the earth resulting from underground movement along a fault plane of from volcanic activity. It is an event that generates seismic waves.

Properties:

S23 Earthquake

Subclass of: **S22** Seismic Phenomenon

Scope note: This class comprises all the shakings and vibrations on the earth. It is defined by the total of tectonics displacements and ground oscillations that follow.

Properties:

S24 Cluster

Subclass of: **S22** Seismic Phenomenon

Scope note: This class specifies the evidence of the main shock in the sequence (groups). This may be useful for creating a special archive page for a particular sequence of earthquakes.

Properties:

S25 Shock

Subclass of: **S22** Seismic Phenomenon
Superclass of: **S27** Mainshock

Scope note: This class comprises an instance of a shock which is a part of an earthquake.

Properties:

S26 Shockwave

Subclass of: **S22** Seismic Phenomenon
Superclass of: **S31** Shockwave Recording

Scope note This class comprises an earth vibration generated by an earthquake, an elastic shockwave that travels through the earth.

Properties:

S27 Mainshock

Subclass of: **S25** Shock

Scope note: This class comprises the earthquake with the largest magnitude in an earthquake cluster. A main shock may be redefined as a foreshock, if an earthquake that occurs later in the same cluster has a greater magnitude.

Properties:

S28 GeophSensorNetwork

Subclass of: E18 Physical Thing

Scope note: This class comprises a network of sensors, accelerometers and components.

Properties:

S29 Accelerometer

Subclass of: E18 Physical Thing

Scope note: This class comprises a sensor and recording instrument for earthquakes.

Properties:

S30 GeophStation

Subclass of: S100 Station

Scope note: This class comprises the physical location of the instrument. Stations have many physical parameters (geological, geophysical, geotechnical) related to the specific location such as velocity dimension.

Properties:

S31 Shockwave Recording

Subclass of: E16 Measurement
S26 Shockwave
S6 Data Evaluation

Scope note: This class comprises the recording of a shockwave which is a measurement of e.g. an intensity dimension, using an accelerometer and at the same time it is a data evaluation event, a process filtering the raw data of measurements, using a specific software, which produces derivatives. Seismic waves produced by an earthquake are also part of an earthquake. A Shockwave Recording starts with the phenomenon of a shockwave; the recording is coherent with the part of the shockwave reaching in the instrument.
So all of these referred above are shock wave recordings (multiple classification).

Properties:
CRMdig: L12 happened on device: **S29** Accelerometer

S32 Landslide

Subclass of: **S35** Feature Genesis

Scope note: This class comprises rapid downward sliding of a mass of earth and rock. Landslides usually move over a confined area. Many kinds of events can trigger a landslide, such as the over steepening of slopes by erosion

associated with rivers, glaciers, or ocean waves; heavy snowmelt which saturates soil and rock; or earthquakes that lead to the failure of weak slopes.

Properties:

O25 generated feature: **S36** Landslide Feature

S33 Relative Spatial Value

Subclass of: E47 Spatial Coordinates

Scope note: This class comprises the spatial interval e.g inside a borehole, defined in the vertical axis of a depth or of an altitude or a distance defined in horizontal axis. This is the notion of data analysis on spatial level.

Properties:

O20 has value: E60 Number

S34 State

Subclass of: E2 Temporal Entity

Scope note: This class comprises the persistence of a particular value range of the properties of a particular thing or things over a time-span.

S35 Feature Genesis

Subclass of: E63 Beginning of Existence
Superclass of: **S32** Landslide

Scope note: This class comprises events that create (generate) new geologic features. The creation of a new feature, at the same time, modifies the earth or part of it; consequently, it is a feature generation event and at the same time, it is a modification event.

Properties:

O23 modified: E18 Physical Thing
O24 generated: E26 Physical Feature

S36 Landslide Feature

Subclass of: E26 Physical Feature

Scope note: This class comprises the new feature created by a landslide event, the geomorphic matter found on earth (physical feature) that is created and modified by a landslide (displaced mass and un-displaced).

S37 Section Matter

Subclass of: S10 Material Substantial

Scope note: This class comprises sections, spatial areas of object in a material form.

Properties:

O26 is section of: E18 Physical Thing
O27 at place: E53 Place

2.4.2 Part B: New classes introduced

S100 Station

Subclass of: E53 Place
Superclass of: S30 Geoph Station, S101 Gauging Station, S101 Meteorological Station

Scope note: This class comprises the physical location of the station where specific measurements will take place. Stations have many (inherited) physical parameters (geological, geophysical, geotechnical) related to the specific location such as velocity dimension.

Properties:

P100 records measurement: **E16** Measurement

S101 Gauging Station

Subclass of: S100 Station

Scope note: A gauging station is a location used to monitor and test terrestrial bodies of water. Hydrometric measurements of water surface elevation ("stage") and/or volumetric discharge (flow) are recorded and observations of biota and water quality may also be made.

.
Properties:

S101 Meteorological Station

Subclass of: S100 Station

Scope note: A meteorological station is a location used to monitor and measure meteorological information. Meteorological measurements of water ("precipitation") may be made.

Properties:

S103 Hydrometric Measurement

Subclass of: E16 Measurement

Scope note: Hydrometric measurements refer to measurements of water surface elevation ("stage") and/or volumetric discharge (flow) and observations of biota and water quality may also be made.

Properties:

S104 Meteorological Measurement

Subclass of: E16 Measurement

Scope note: Meteorological measurements refer to measurements of water that is originated from rain, snow or other physical phenomena.

Properties:

S105 Hydraulic Structure

Subclass of: E26 Physical Feature

Scope note: A hydraulic structure in general, is a construction that can be used to divert, restrict, stop, or otherwise manage the natural flow of terrestrial water.

Properties:

P43F has dimension: **E54** Dimension
P1F is identified by: **E42** Identifier
P67i is referred to by: **E29** Design or Procedure
P90F has value: **S33** Relative Spatial Value
P67i is referred to by: **E73** Information Object
P2 has type: **E55** Type

S106 Levee

Subclass of: E26 Hydraulic Structure

Scope note: A levee is an elongated ridge or artificially constructed fill or wall, which regulates water levels. It is usually earthen and often parallel to the course of a stream in its floodplain or along low-lying coastlines.

Properties:

S107 Culvert

Subclass of: E26 Hydraulic Structure

Scope note: A culvert is a structure that allows water to flow under a road, railroad, trail, or similar obstruction. Typically embedded so as to be surrounded by soil. A structure that carries water above land is known as an aqueduct. They may also cross a river or steam. They carry rainfall water, sewage etc. Culverts may be used to form a bridge-like structure to carry traffic. Culverts come in many sizes and shapes including round, elliptical, flat-bottomed, pear-shaped, and box-like constructions.

S108 Dewatering Canal

Subclass of: E26 Hydraulic Structure

Scope note: Dewatering channels are used and are effective in streams that present a high risk of sedimentation and flooding.

Properties:

S109 Pumping Station

Subclass of: E26 Hydraulic Structure

Scope note: Pumping stations are used for pumping fluids from one place to another. They are used for a variety of infrastructure systems, such as the supply of water to canals etc. (many times for flooding relief or for transporting flooding water in to another place, land drainage).

Properties:

S110 High Water Diversions

Subclass of: E26 Hydraulic Structure

Scope note: Diversion channels or floodways are structures built to offer a different route for excess water to flow further mitigating the effects of flooding and restoring rivers to their natural water level. Typically, diversion channels are built around communities or economic centres to prevent extensive flood damage. Diversion channels are built around cities and towns to mitigate the effects of flooding in communities and urban centres.

Properties:

S111 Bank Protection

Subclass of: E26 Hydraulic Structure

Scope note: Bank protection structures represent a widespread typology of hydraulic works along the river course. Their construction is usually planned along torrent stretches with bank erosive problems that can produce instability conditions both on natural, artificial banks and on steep slopes. Protection works include concrete walls, cemented stone and brick and play a significant role in the modification of the hydraulic aspect of the discharge values and in the interference in the water dynamics of erosive and depositional phenomena both upstream and downstream.

Properties:

S112 Outlet Structure

Subclass of: E26 Hydraulic Structure

Scope note: An outlet structure can serve for various purposes: filling of the reservoir, drawdown of the reservoir, flushing of sediments discharging surplus water; it is a safety structure.

Properties:

S113 Gated Spillways

Subclass of: E26 Hydraulic Structure

Scope note: Various structures that deal with water management in an area.

Properties:

S114 Weirs

Subclass of: S113 Gated Spillways

Scope note: A Weir is a structure across a streamline designed to alter its flow characteristics. Weirs usually pool water behind them while allowing it to flow steadily over their tops. Weirs are commonly used to alter stream flow to prevent flooding, measure discharge etc.

Properties:

S115 Dam

Subclass of: S113 Gated Spillways

Scope note: A Dam is a structure that impounds water or underground streams. Dams serve the purpose of retaining water.

Properties:

S116 Bridge

Subclass of: S113 Gated Spillways

Scope note: A bridge is a structure that allows crossing over water. Bridges are designed to fulfil both the *structural* and *hydraulic* requirements for the stream crossing.

Properties:

S117 Geologic Map

Subclass of: S18 Map

Scope note: A geologic map or geological map is a special-purpose map made to show geological features. Rock units or geologic strata formations are shown

Properties:

P2 has type: **E55** Type

S118 Flood Hazard Calibration Map

Subclass of: S18 Map

Scope note: A Flood Hazard Calibration Map is used for correlation calibration of Flood Hazard Maps based on inundation (already flooded) areas in the past.

Properties:

S119 Precipitation Map

Subclass of: S18 Map

Scope note: A precipitation map is the result of rainfall datasets analysed through hydrological analysis.

Properties:

S120 Flood Hazard Map

Subclass of: S18 Map

Scope note: A combination of floodplain mapping, land use, potential damage etc. showing the degree of flood risk and flood hazard potential.

Properties:

S121 Topographic Map

Subclass of: S18 Map

Scope note: A topographic map is a type of map characterized by large-scale detail and quantitative representation of relief, using contour lines etc.

Properties:

S122 HN Element

Subclass of: E26 Physical Feature
S14_Fluid_Body

Scope note: This class aggregates the different water bodies like streams, rivers, etc.

Properties:

P43F has dimension: **E54** Dimension

S123 Water Body

Subclass of: S122 HN Element

Scope note: This class aggregates the different water bodies like streams, rivers, etc.

Properties:

S124 Stream

Subclass of: S122 HN Element

Scope note: This class aggregates the different water bodies like streams, rivers, etc.

Properties: **P46F** is composed of: **S125** Cross Section

S125 Cross Section

Subclass of: E26 Physical Feature

Scope note: A cross section of a stream is the intersection of a stream figure in a 2-dimensional space with a line. It is the product of the width of the channel, and the average depth of the river. The cross section of a river explains the discharge and efficiency of a river.

Properties:

S126 Hydrographic Network

Subclass of: E26 Physical Feature

Scope note: A hydrographic network is the total of water bodies and streams on a specific land (rivers, lakes, swamps, and water reservoirs).

Properties:

S127 Catchment Area

Subclass of: E26 Physical Feature

Scope note: A catchment is a basin shaped area of land, bounded by natural features such as hills or mountains from which surface and sub surface water flows into streams, rivers and wetlands. Water flows into, and collects in, the lowest areas in the landscape. The system of streams, which transport water, sediment and other material from a catchment is called the hydrographic drainage network. The outline is the boundary of the catchment.

Properties:

P43F has dimension: **E54** Dimension

S130 Urban Area

Subclass of: E53 Place

Scope note: An urban area is characterized by higher population density and extended human features in comparison to the areas surrounding it. Urban areas may be cities, towns or conurbations.

Properties:

S131 Port

Subclass of: E53 Place

Scope note: The location of port infrastructure in an area of interest.

Properties:

S132 Airport

Subclass of: E53 Place

Scope note: The location of airport infrastructure in an area of interest.

.

Properties:

S137 Inundation

Subclass of: E5 Event

Scope note: This class refers to the event of flooding an area. This includes the actual flood itself described as an event which takes place in a specific place and at a specific time.

Properties:

S138 Spillway

Subclass of: S113 Gated Spillways

Scope note: A Spillway is a structure used to control the release of flows from a dam or levee into a downstream area, typically being the river-stream that was dammed.

Properties:

S129 Topographic Entity

Subclass of: E1 CRM Entity

Scope note: A Topographic Entity is a class that represents all entities that can represent topographic features.

Properties:

P43F has dimension: **E54** Dimension

S133 Digital Elevation Model

Subclass of: Topographic Entity

Scope note: A digital elevation model is the representation of continuous elevation values over a topographic surface by a regular array of z-values, referenced to a common datum. DEMs are typically used to represent terrain relief.

Properties:

S134 Land Cover

Subclass of: Topographic Entity

Scope note: A land cover is the physical material at the surface of the earth. Land covers include grass, asphalt, trees, bare ground, water, etc. Land use involves the management and modification of natural environment or wilderness into built environment such as settlements and semi-natural habitats such as arable fields, pastures, and managed woods.

Properties:

S135 Network

Subclass of: S129 Topographic Entity
Superclass of: S136 Road Network
S137 Railway Network

Scope note: A network represents a set of nodes and links that connect these nodes. It can be further specialized.

Properties:

S136 Road Network

Subclass of: S129 Topographic Entity

Scope note: A road is a route, or way on land between two places. A road network is the sum of all roads in an area.

Properties:

S137 Railway Network

Subclass of: S129 Topographic Entity

Scope note: A railway is a route, or way on land between two places. A railway network is the sum of all rail in an area.

Properties:

2.5 SCIENTIFIC OBSERVATION MODEL PROPERTY DECLARATION

The properties 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 "Scope note:" contains the textual definition of the concept the property represents;
- The line "Examples:" contains a bulleted list of examples of instances of this property.

Properties are divided into two parts: Part A includes Properties imported from the original GSOM model which account for Properties related to earthquakes and landslides and has been directly imported from "Deliverable 2.2: Interface of Web Services and models of data (D2.2) and its ANNEX" available at http://www.ingeoclouds.eu/sites/default/files/D2.2-INGC_IntfWSandDatamodels-V1-ANNEX_Approved.pdf, while Part B contains new descriptions introduced by the SciNet NatHaz project that refer to Properties related to flood management.

2.6 PROPERTIES

2.6.1 PART A: Properties imported from the original GSOM model

O1 diminished

Domain: **S1** Matter Removal
Range: **S10** Material Substantial

Scope note: This property identifies the Material Substantial that was diminished by a Matter Removal.

O2 removed

Domain: **S1** Matter Removal
Range: **S11** Amount of Matter

Scope note: This property identifies the Amount of Matter that is removed during a

Matter Removal activity.

O3 sampled from

Domain: **S2** Sample Taking
Range: **S10** Material Substantial

Scope note: This property identifies a Material Substantial from which a sample was taken. This may be a feature or a fluid body from which a sample was removed.

O4 sampled at

Domain: **S2** Sample Taking
Range: E53 Place

Scope note: This property identifies the spatial location of an instance of a Sample Taking activity. It describes the positioning in the area within which this type of activity occurred.

O5 removed

Domain: **S2** Sample Taking
Range: **S13** Sample

Scope note: This property identifies a Sample that is removed during a Sample Taking activity. The sample is identified by a unique identifier.

O8 forms former or current part

Domain: **S12** Amount of Fluid
Range: **S14** Fluid Body

Scope note: This property allows instances of Fluid Body to be analyzed into elements of Amounts of Fluid.

O9 contains or confines

Domain: E53 Place
Range: E53 Place

Scope note: This property identifies a spatial containment between places or features. It declares a type of a feature which has a kind of spatial containment. Features such as layers defined as a Place that are contained or confined by a E26 Physical Feature behaving as a place. A place-feature that is defined by its environmental area, by another place; it conforms to the outline of its container.

Examples: The Wadis rivers contained or confined by riverbed/riverside. (they are rivers that are dry year round except after a rain)

O10 observed

Domain: **S4** Observation
Range: **S19** Observable Entity

Scope note: This property identifies a thing, a feature, a phenomenon or its reaction that is observed by an activity of Observation.

O11 observedProperty

Domain: **S4** Observation
Range: **S9** Property Type

Scope note: This property identifies a Property type that is observed by an activity of Observation. It describes types of making assertions about properties of things.

O12 has upper vertical limit

Domain: E53 Place
Range: **S33** Relative Spatial Value

Scope note: This property identifies the top vertical limit of a place dimension e.g a depth, defined as a spatial interval, placed by coordinates.

O13 has lower vertical limit

Domain: E53 Place
Range: **S33** Relative Spatial Value

Scope note: This property identifies the lower vertical limit of a place dimension, e.g depth, defined as a spatial interval, placed by coordinates.

O14 assigned dimension

Domain: **S6** Data Evaluation
Range: E54 Dimension

Scope note: This property records the dimension that was assigned by a Data Evaluation event. In that case, dimensions may be determined by making evaluations on observational data based on mathematical inference rules and calculations.

O15 is bounded by

Domain: **S20** Scalar Dimension
Range: E60 Number

Scope note: This property identifies the boundaries of a detection limit given for a scalar dimension.

O16 described

Domain: **S6** Data Evaluation
Range: **S19** Observable Entity

Scope note: This property identifies the S19 Observable Entity that is described by a Data Evaluation event. This description (a type of observation) of any Observable Entity is based on data evaluations.

O17 has dimension

Domain: **S19** Observable Entity
Range: E54 Dimension

Scope note: This property records an E54 Dimension of a S19 Observable Entity.
It is a shortcut of the more fully developed path from a S19 Observable Entity through *P39 measured (was measured by)*, E16 Measurement *P40 observed dimension (was observed in)* to E54 Dimension. It offers no information about how and when an E54 Dimension was established.

O18 has validity

Domain: E54 Dimension
Range: E62 String

Scope note: This property expresses the valid possible values of a dimension.

O19 has preferred type

Domain: E1 CRM Entity
Range: E55 Type

Scope note: This property records the preferred type that was assigned to an instance of E1 CRM Entity. This property is a specialization of has type– through the use of a terminological hierarchy, or thesaurus.

O20 has value

Domain: **S33** Relative Depth
Range: E60 Number

Scope note: This property identifies a numeric approximation of the value assigned to a relative depth interval.

O21 triggers

Domain: E5 Event
Range: E5 Event

Scope note: This property identifies the interaction between events: an event can activate (trigger) other event/s; in that sense it is interpreted as the cause, the triggering factor of a situation in tension (a system); a reaction between events.

O22 initializes

Domain: E5 Event
Range: **S34** State

Scope note: This property identifies the states that are initialized by an event; these states are described as the results, consequences of an E5 Event.

O23 modified

Domain: **S35** Feature Genesis
Range: E18 Physical Thing

Scope note: This property identifies an instance of E18 Physical Thing to be modified by a S35 Feature Genesis event.

O24 generated

Domain: **S35** Feature Genesis
Range: E26 Physical Feature

Superproperty of: **S32** Landslide. **O25** generated feature: **S36** Landslide Feature

Scope note: This property allows a S35 Feature Genesis to be linked to the E26 Physical Feature generated by it.

O25 generated feature

Domain: **S32** Landslide
Range: **S36** Landslide Feature

Subproperty of: **S35** Feature Genesis. **O24** generated: E26 Physical Feature

Scope note: This property allows a S32 Landslide to be linked to the S36 Landslide Feature generated by it.

O26 is section of

Domain: **S37** Section Matter
Range: E18 Physical Thing

Scope note: This property describes the material segments of a physical thing (the area of

a matter).

O27 at place

Domain: **S37** Section Matter
Range: E53 Place

Scope note: This property associates the section matter of a feature (thing) with the place of it.

O28 occupied

Domain: **S10** Material Substantial
Range: E53 Place

Scope note: This property describes the space filled (occupied) by a physical matter. This property is
the development of the shortcut expressed in the proposition of classification: "E26 Feature" isA "E53 Place"

CRMdig:3L12 happened on device

Domain: **S31** Shock Wave Recording
Range: **S29** Accelerometer

Scope note: This property associates an instance of a S31 Shock Wave Recording with an object, the Device, the accelerometer which happened with. This property is a specialization of CIDOC CRM: P16 used specific object (was used for).

2.6.2 PART B: Properties introduced by SciNet NatHaz

P100 records measurement

Domain: **S100 Station**

Range: **E16 Measurement**

Scope note: This property describes a measurement made by a S100_Station object. This property is there to allow the capturing of a measurement and its storage within the knowledge base. The type of measurement is further specialized by using a specialized class as both domain and range.

[3] CRMDig schema is an extension of CIDOC CRM model documenting digitization events and processes and provenance information. In CRMdig schema "L12 happened on device" has domain: "D7 Digital Machine Event" and range: "D8 Digital Device".

2.7 REFERRED CIDOC CRM CLASSES AND PROPERTIES

Since our model refers to and reuses, wherever appropriate, large parts of ISO21127, the CIDOC Conceptual Reference Model, this section provides a comprehensive list of all constructs used from ISO21127, together with their definitions following version 5.0.4 maintained by CIDOC. The complete definition of the CIDOC Conceptual Reference Model can be found in its official site: http://www.cidoc-crm.org/official_release_cidoc.html.

2.7.1 Referred CIDOC CRM Classes

This section contains the complete definitions of the classes of the CIDOC CRM Conceptual Reference Model version 5.0.4 referred to by the model. The properties within these class definitions which are referred to SCIENTIFIC OBSERVATION MODEL are presented in bold face.

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, and in particular by a preferred identifier
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 specializations of E1 CRM Entity.

Examples:

- the earthquake in Lisbon 1755 (E5)

Properties:

P1 is identified by (identifies): E41 Appellation
P2 has type (is type of): E55 Type
P3 has note: E62 String
(P3.1 has type: E55 Type)
P48 has preferred identifier (is preferred identifier of): E42 Identifier
P137 exemplifies (is exemplified by): E55 Type
(P137.1 in the taxonomic role: E55 Type)
O19 has preferred type: E55 **Type**

E2 Temporal Entity

Subclass of: E1 CRM Entity
Superclass of: E3 Condition State
E4 Period
S34 State

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 Thing.

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

E4 Period

Subclass of: E2 Temporal Entity
Superclass of: E5 Event

Scope note: This class comprises sets of coherent phenomena or cultural manifestations bounded in time and space.

It is the social or physical coherence of these phenomena that identify an E4 Period and not the associated spatio-temporal bounds. These bounds are a mere approximation of the actual process of growth, spread and retreat. Consequently, different periods can overlap and coexist in time and space, such as when a nomadic culture exists in the same area as a sedentary culture.

Typically this class is used to describe prehistoric or historic periods such as the "Neolithic Period", the "Ming Dynasty" or the "McCarthy Era". There

are however no assumptions about the scale of the associated phenomena. In particular all events are seen as synthetic processes consisting of coherent phenomena. Therefore E4 Period is a superclass of E5 Event. For example, a modern clinical E67 Birth can be seen as both an atomic E5 Event and as an E4 Period that consists of multiple activities performed by multiple instances of E39 Actor.

There are two different conceptualizations of 'artistic 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 an 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
S19 Observable Entity

Superclass of: E7 Activity
E63 Beginning of Existence
E64 End of Existence
S22 Seismic Phenomenon

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 Herculaneum by volcanic eruption in 79 AD (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

E7 Activity

Subclass of: E5 Event
Superclass of: E8 Acquisition
E9 Move
E10 Transfer of Custody
E11 Modification
E13 Attribute Assignment
E65 Creation
E66 Formation
E85 Joining
E86 Leaving
E87 Curation Activity
S1 Matter Removal

Scope note: This class comprises actions intentionally carried out by instances of E39 Actor that result in changes of state in the cultural, social, or physical systems documented.

This notion includes complex, composite and long-lasting actions such as the building of a settlement or a war, as well as simple, short-lived actions such as the opening of a door.

Examples:

- the Battle of Stalingrad
- the Yalta Conference
- my birthday celebration 28-6-1995
- the writing of "Faust" by Goethe (E65)

- the formation of the Bauhaus 1919 (E66)
- calling the place identified by TGN '7017998' 'Quyunjig' by the people of Iraq

Properties:

P14 carried out by (performed): E39 Actor
(P14.1 in the role of: E55 Type)
P15 was influenced by (influenced): E1 CRM Entity
P16 used specific object (was used for): E70 Thing
(P16.1 mode of use: E55 Type)
P17 was motivated by (motivated): E1 CRM Entity
P19 was intended use of (was made for): E71 Man-Made Thing
(P19.1 mode of use: E55 Type)
P20 had specific purpose (was purpose of): E5 Event
P21 had general purpose (was purpose of): E55 Type
P32 used general technique (was technique of): E55 Type
P33 used specific technique (was used by): E29 Design or Procedure
P125 used object of type (was type of object used in): E55 Type
P134 continued (was continued by): E7 Activity

E13 Attribute Assignment

Subclass of: E7 Activity
Superclass of: E14 Condition Assessment
E15 Identifier Assignment
E16 Measurement
E17 Type Assignment
S4 Observation
S5 Inference Making

Scope note: This class comprises the actions of making assertions about properties of an object or any relation between two items or concepts.

This class allows the documentation of how the respective assignment came about, and whose opinion it was. All the attributes or properties assigned in such an action can also be seen as directly attached to the respective item or concept, possibly as a collection of contradictory values. All cases of properties in this model that are also described indirectly through an action are characterized as "short cuts" of this action. This redundant modeling 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

E16 Measurement

Subclass of: E13 Attribute Assignment
S4 Observation
Superclass of: **S3** Sample Taking – Measurement
S31 Shockwave Recording

Scope note: This class comprises actions measuring physical properties and other values that can be determined by a systematic procedure.

Examples include measuring the monetary value of a collection of coins or the running time of a specific video cassette.

The E16 Measurement may use simple counting or tools, such as yardsticks or radiation detection devices. The interest is in the method and care applied, so that the reliability of the result may be judged at a later stage, or research continued on the associated documents. The date of the event is important for dimensions, which may change value over time, such as the length of an object subject to shrinkage. Details of methods and devices are best handled as free text, whereas basic techniques such as "carbon 14 dating" should be encoded using *P2 has type (is type of:) E55 Type*.

Examples:

- measurement of height of silver cup 232 on the 31st August 1997
- the carbon 14 dating of the "Schoeninger Speer II" in 1996 [an about 400.000 years old Palaeolithic complete wooden spear found in Schoeningen, Niedersachsen, Germany in 1995]

Properties:

P39 measured (was measured by): E70 Thing
P40 observed dimension (was observed in): E54 Dimension

E18 Physical Thing

Subclass of: **S10** Material Substantial
E72 Legal Object
Superclass of: E19 Physical Object
E24 Physical Man-Made Thing
E26 Physical Feature
S28 GeophSensorNetwork
S29 Accelerometer

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 (is condition of): E3 Condition State
P45 consists of (is incorporated in): E57 Material
P46 is composed of (forms part of): E18 Physical Thing
P49 has former or current keeper (is former or current keeper of): E39 Actor
P50 has current keeper (is current keeper of): E39 Actor
P51 has former or current owner (is former or current owner of): E39 Actor
P52 has current owner (is current owner of): E39 Actor
P53 has former or current location (is former or current location of): E53 Place
P58 has section definition (defines section): E46 Section Definition
P59 has section (is located on or within): E53 Place

E26 Physical Feature

Subclass of: E18 Physical Thing
E53 Place
Superclass of: E25 Man-Made Feature
E27 Site
S15 Aquifer Concept
S16 Borehole
S17 Borehole Collar
S36 Landslide Feature

Scope Note: This class comprises identifiable features that are physically attached in an integral way to particular physical objects. This class also comprises places occupied by features.

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" (Smith & Varzi, 2000, pp.401-420), 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 Duerer'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

E29 Design or Procedure

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 may result in the modification or production of instances of E24 Physical Thing.

Instances of E29 Design or Procedure can be structured in parts and sequences or depend on others. This is modeled 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 standardization procedure
- the musical notation for Beethoven's "Ode to Joy"
- the architectural drawings for the Kölner Dom in Cologne, Germany
- The drawing on the folio 860 of the Codex Atlanticus from Leonardo da Vinci, 1486-1490, kept in the Biblioteca Ambrosiana in Milan

Properties:

P68 foresees use of (use foreseen by): E57 Material
P69 is associated with: E29 Design or Procedure
(P69.1 has type: E55 Type)

E31 Document

Subclass of: E73 Information Object
Superclass of: E32 Authority Document

Scope note: This class comprises identifiable immaterial items that make propositions about reality.

These propositions may be expressed in text, graphics, images, audiograms, 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

E35 Title

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 that stand for 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

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 a visual item, 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 class E36 Visual Item provides a means of identifying and linking together instances of E24 Physical Man-Made Thing that carry the same visual symbols, marks or images etc. The property *P62 depicts (is depicted by)* between E24 Physical Man-Made Thing and depicted subjects (E1 CRM Entity) can be regarded as a short-cut of the more fully developed path from E24 Physical Man-Made Thing through *P65 shows visual item (is shown by)*, E36 Visual Item, *P138 represents (has representation)* to E1CRM Entity, which in addition captures 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)

E39 Actor

Subclass of: E77 Persistent Item
Superclass of: E21 Person
E74 Group

Scope note: This class comprises people, either individually or in groups, who have the potential to perform intentional actions for which they can be held responsible.

The CRM does not attempt to model the inadvertent actions of such actors. Individual people should be documented as instances of E21 Person, whereas groups should be documented as instances of either E74 Group or its subclass E40 Legal Body.

Examples:

- London and Continental Railways (E40)
- the Governor of the Bank of England in 1975 (E21)
- Sir Ian 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

E41 Appellation

Subclass of: E90 Symbolic Object
Superclass of: E35 Title
E42 Identifier
E44 Place Appellation
E49 Time Appellation
E51 Contact Point
E75 Conceptual Object Appellation
E82 Actor Appellation

Scope note: This class comprises all sequences of signs of any nature, either meaningful or not, that are used or can be used to refer to and identify a specific instance of some class within a certain context.

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

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)
- "*Spigelia marilandica* (L.) L." [not the species, just the *name*]
- "information science" [not the science itself, but the name through which we refer to it in an English-speaking context]

Properties:

P139 has alternative form: E41 Appellation
(P139.1 has type: E55 Type)

E42 Identifier

Subclass of: E41 Appellation

Scope note: This class comprises strings or codes assigned to instances of E1 CRM Entity in order to identify them uniquely and permanently 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 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"
- "OXCMS: 1997.4.1"
- ISSN "0041-5278"
- ISRC "FIFIN8900116"
- Shelf mark "Res 8 P 10"
- "Guillaume de Machaut (1300?-1377)" [a controlled personal name heading that follows the French rules]

E44 Place Appellation

Subclass of: E41 Appellation
Superclass of E45 Address
E46 Section Definition
E47 Spatial Coordinates
E48 Place Name

Scope Note: This class comprises any sort of identifier characteristically used to refer to an E53 Place.

Instances of E44 Place Appellation may vary in their degree of precision and their meaning may vary over time - the same instance of E44 Place Appellation may be used to refer to several places, either because of cultural shifts, or because objects used as reference points have moved around. Instances of E44 Place Appellation can be extremely varied in form: postal addresses, instances of E47 Spatial Coordinate, and parts of buildings can all be considered as instances of E44 Place Appellation.

Examples:

- "Vienna"
- "CH-1211, Genève"
- "Aquae Sulis Minerva"
- "Bath"
- "Cambridge"
- "the Other Place"
- "the City"

E47 Spatial Coordinates

Subclass of: E44 Place Appellation
Superclass of: **S33** Relative Depth

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" [chess coordinate]

E48 Place Name

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"

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): E54 Dimension
P84 had at most duration (was maximum duration of): E54 Dimension
P86 falls within (contains): E52 Time-Span

E53 Place

Subclass of: E1 CRM Entity

Superclass of: E26 Physical Feature
S30 GeophStation

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
P89 falls within (contains): E53 Place
P121 overlaps with: E53 Place
P122 borders with: E53 Place

O9 contains or confines: E53 Place
O12 has upper vertical limit: E47 Spatial Coordinates
O13 has lower vertical limit: E47 Spatial Coordinates

E54 Dimension

Subclass of: E1 CRM Entity

Superclass of: **S20 Scalar Dimension**

Scope note: This class comprises quantifiable properties that can be measured by some calibrated means and can be approximated by values, i.e. points or regions in a mathematical or conceptual space, such as natural or real numbers, RGB values etc.

An instance of E54 Dimension represents 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 of the values of an instance of E54 Dimension. If the true values belong to a non-discrete space, such as spatial distances, it is recommended to record them as approximations by intervals or regions of indeterminacy enclosing the assumed true values. For instance, a length of 5 cm may be recorded as 4.5-5.5 cm, according to the precision of the respective observation. Note, that interoperability of values described in different units depends critically on the representation as value regions.

Numerical approximations in archaic instances of E58 Measurement Unit used in historical records should be preserved. Equivalents corresponding to current knowledge should be recorded as additional instances of E54 Dimension as appropriate.

Examples:

- currency: £26.00
- length: 3.9-4.1 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
O18 has validity: E62 String

E55 Type

Subclass of: E28 Conceptual Object
Superclass of: E56 Language

E57 Material
E58 Measurement Unit
S9 Property Type

Scope note: This class comprises concepts denoted by terms from thesauri and controlled vocabularies used to characterize and classify instances of CRM classes. Instances of E55 Type represent concepts in contrast to instances of E41 Appellation which are used to name instances of CRM classes.

E55 Type is the CRM's interface to domain specific ontologies and thesauri. These can be represented in the CRM as subclasses of E55 Type, forming hierarchies of terms, i.e. instances of E55 Type linked via P127 has broader term (has narrower term). Such hierarchies may be extended with additional properties.

Examples:

- weight, length, depth [types of E54]
- portrait, sketch, animation [types of E38]
- French, English, German [E56]
- excellent, good, poor [types of E3]
- Ford Model T, chop stick [types of E22]
- cave, doline, scratch [types of E26]
- poem, short story [types of E33]
- wedding, earthquake, skirmish [types of E5]

Properties: P127 has broader term (has narrower term): E55 Type
P150 defines typical parts of(define typical wholes for): E55 Type

E58 Measurement Unit

Subclass of: E55 Type

Scope Note: This class is a specialization of E55 Type and comprises the types of measurement units: feet, inches, centimeters, liters, lumens, etc.

This type is used categorically in the model without reference to instances of it, i.e. the Model does not foresee the description of instances of instances of E58 Measurement Unit, e.g.: "instances of cm".

Système International (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.

Examples:

- cm [centimetre]
- km [kilometre]
- m [meter]
- m/s [meters per second]
- A [Ampere]
- GRD [Greek Drachme]
- °C [degrees centigrade]

E60 Number

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 days = 1924-02-02. Cf. E54 Dimension

Examples:

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

E62 String

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 Fox 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
E65 Creation
E66 Formation
E67 Birth
E81 Transformation
S35 Feature Genesis

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 determination of a terminus post quem and ante quem.

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

E70 Thing

Subclass of: E77 Persistent Item
Superclass of: E71 Man-Made Thing
E72 Legal Object
S10 Material Substantial

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 bottle of milk in my refrigerator (E22)
- the plan of the Strassburger Muenster (E29)
- the thing on the top of Otto Hahn's desk (E19)
- the form of the no-smoking sign (E36)
- the cave of Dirou, Mani, Greece (E27)

Properties

P43 has dimension (is dimension of): E54 Dimension
P101 had as general use (was use of): E55 Type
P130 shows features of (features are also found on): E70 Thing
(P130.1 kind of similarity: E55 Type)

E73 Information Object

Subclass of: E89 Propositional Object
E90 Symbolic Object
Superclass of: E29 Design or Procedure
E31 Document
E33 Linguistic Object
E36 Visual Item
S21 Spatial Distribution Model

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:

E80 Part Removal

Subclass of: E11 Modification
S1 Matter Removal

Scope note: This class comprises the activities that result in an instance of E18 Physical Thing being decreased by the removal of a part.

Typical scenarios include the detachment of an accessory, the removal of a component or part of a composite object, or the deaccessioning of an object from a curated E78 Collection. If the E80 Part Removal results in the total decomposition of the original object into pieces, such that the whole ceases to exist, the activity should instead be modelled as an E81 Transformation, i.e. a simultaneous destruction and production. In cases where the part removed has no discernible identity prior to its removal but does have an identity subsequent to its removal, the activity should be regarded as both E80 Part Removal and E12 Production. This class of activities forms a basis for reasoning about the history, and continuity of identity over time, of objects that are removed from other objects, such as precious gemstones being extracted from different items of 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): E18 Physical Thing
P113 removed (was removed by): E18 Physical Thing

2.7.2 Referred CIDOC CRM Properties

This section contains the complete definitions of the properties of the CIDOC CRM Conceptual Reference Model version 5.0.4 referred to. We apply the same format conventions as in mentioned above.

P1 is identified by (identifies)

Domain: E1 CRM Entity
Range: E41 Appellation
Superproperty of: E1 CRM Entity. P48 has preferred identifier (is preferred identifier of): E42 Identifier
E52 Time-Span. P78 is identified by (identifies): E49 Time Appellation
E53 Place. P87 is identified by (identifies): E44 Place Appellation
E71 Man-Made Thing. P102 has title (is title of): E35 Title
E39 Actor. P131 is identified by (identifies): E82 Actor Appellation
E28 Conceptual Object.P149 is identified by (identifies): E75 Conceptual Object 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
Superproperty of. E1 CRM Entity.P137 exemplifies (is exemplified by): E55 Type
Quantification: many to many (0,n:0,n)

Scope note: This property allows sub typing of CRM entities - a form of specialization – through the use of a terminological hierarchy, or thesaurus.

The CRM is intended to focus on the high-level entities and relationships needed to describe data structures. Consequently, it does not specialize entities any further than is required for this immediate purpose. However,

entities in the isA hierarchy of the CRM may by specialized into any number of sub entities, which can be defined in the E55 Type hierarchy. E51 Contact Point, for example, may be specialized into "e-mail address", "telephone number", "post office box", "URL" etc. none of which figures explicitly in the CRM hierarchy. Sub typing obviously requires consistency between the meaning of the terms assigned and the more general intent of the CRM entity in question.

Examples:

"enquiries@cidoc-crm.org" (E51) *has type* e-mail address (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 have not been expressed in terms of CRM constructs.

In particular it captures the characterization of the item itself, its internal structures, appearance etc.
Like property *P2 has type (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 characterization. The *P3.1 has type* 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)

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)

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)

P12 occurred in the presence of (was present at)

Domain: E5 Event
Range: E77 Persistent Item

Superproperty of: E5 Event. P11 had participant (participated in): E39 Actor
E7 Activity. P16 used specific object (was used for): E70 Thing
E9 Move. P25 moved (moved by): E19 Physical Object
E11 Modification. P31 has modified (was modified by): E24 Physical Man-Made Thing
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
E79 Part Addition.P111 added (was added by): E18 Physical Thing
E80 Part Removal.P113 removed (was removed by): E18 Physical Thing
Quantification: many to many, necessary (1,n:0,n)

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

It connects the history of a thing with the E53 Place and 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)

P14 carried out by (performed)

Domain: E7 Activity
Range: E39 Actor
Subproperty of: E5 Event. P11 had participant (participated in): E39 Actor
Superproperty of: E8 Acquisition. P22 transferred title to (acquired title through): E39 Actor
E8 Acquisition. P23 transferred title from (surrendered title 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) *carried out by* Michaelangelo Buonaroti (E21) *in the role of* master craftsman (E55)

Properties: P14.1 in the role of: E55 Type

P16 used specific object (was used for)

Domain: E7 Activity
Range: E70 Thing
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
E7 Activity.P33 used specific technique (was used by):E29 Design or Procedure
E15 Identifier Assignment. P142 used constituent (was used in):E41 Appellation
E79 Part Addition. P111 added (was added by):E18 Physical Thing
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.

Another example is the use of a particular name by a particular group of people over some span to identify a thing, such as a settlement. In this case, the physical carriers of this name are at least the people understanding its use.

Examples:

- the writing of this scope note (E7) *used specific object* Nicholas Crofts' computer (E22) *mode of use* Typing Tool; Storage Medium (E55)
- the people of Iraq calling the place identified by TGN '7017998' (E7) used specific object "Quyunjig" (E44) *mode of use Current*; Vernacular (E55)

Properties: P16.1 mode of use: E55 Type

P32 used general technique (was technique of)

Domain: E7 Activity
Range: E55 Type
Subproperty of: E7 Activity. P125 used object of type (was type of object used in): 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: E7 Activity
Range: E29 Design or Procedure
Subproperty of: E7 Activity. P16 used specific object (was used for): E70 Thing
Quantification: many to many (0,n:0,n)

Scope note: This property identifies a specific instance of E29 Design or Procedure in order to carry out an instance of E7 Activity or parts of it.

The property differs from P32 used general technique (was technique of) in that P33 refers to an instance of E29 Design or Procedure, which is a concrete information object in its own right rather than simply being a term or a method known by tradition.

Typical examples would include intervention plans for conservation or the construction plans of a building

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)

P39 measured (was measured by)

Domain: E16 Measurement
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 associates an instance of E16 Measurement with the instance of E1 CRM Entity to which it applied. An instance of E1 CRM Entity may be measured more than once. Material and immaterial things and processes may be measured, e.g. the number of words in a text, or the duration of an event.

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
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 an E16 Measurement Event.

E54 Dimension can be any quantifiable aspect of E70 Thing. Weight, image color 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 measured Thing does not 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)

P43 has dimension (is dimension of)

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

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

Examples:

- silver cup 232 (E22) *has dimension* height of silver cup 232 (E54) *has unit (P91)* mm (E58), *has value (P90)* 224 (E60)

P44 has condition (is condition of)

Domain: E18 Physical Thing
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 Thing.

It is a shortcut of the more fully developed path from E18 Physical Thing through *P34 concerned (was assessed by)*, E14 Condition Assessment *P35 has identified (was 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 Thing.

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 Thing
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 Thing 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 Thing
Range: E18 Physical Thing
Superproperty of: E19 Physical Object. P56 bears feature (is found on): E26 Physical Feature
Quantification: many to many (0,n:0,n)

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

Component elements, since they are themselves instances of E18 Physical Thing, may be further analyzed into sub-components, thereby creating a hierarchy of part decomposition. An instance of E18 Physical Thing may be shared between multiple wholes, for example two buildings may share a common wall.

This property is intended to describe specific components that are individually documented, rather than general aspects. Overall descriptions of the structure of an instance of E18 Physical Thing are captured by the *P3 has note* property.

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

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

Domain: E18 Physical Thing
Range: E53 Place
Superproperty of: E19 Physical Object. P55 has current location (currently holds): E53 Place
Quantification: many to many, necessary (1,n:0,n)

Scope note: This property allows an instance of E53 Place to be associated as the former or current location of an instance of E18 Physical Thing.

In the case of E19 Physical Objects, the property does not allow any indication of the Time-Span during which the Physical Object was located at

this Place, nor if this is the current location.

In the case of immobile objects, the Place would normally correspond to the Place of creation.
P53 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)

P67 refers to (is referred to by)

Domain: E89 Propositional 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): E1 CRM Entity
E89 Propositional Object. P129 is about (is subject of): E1 CRM Entity
E36 Visual Item. P138 represents (has representation): E1 CRM Entity
E29 Design or Procedure.P68 foresees use of (use foreseen by): E57 Material
Quantification: many to many (0,n:0,n)

Scope note: This property documents that an E89 Propositional Object makes a statement about an instance of E1 CRM Entity. *P67 refers 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 E89 Propositional Object.

Examples:

the eBay auction listing of 4 July 2002 (E73) *refers to* silver cup 232 (E22) *has type* item for sale (E55)

Properties: P67.1 has type: E55 Type

P70 documents (is documented in)

Domain: E31 Document
Range: E1 CRM Entity
Subproperty of: E89 Propositional 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)

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. its 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* 1996-2002 (E61)

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. its 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)

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)

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)

P101 had as general use (was use of)

Domain: E70 Thing
Range: E55 Type
Quantification: many to many (0,n:0,n)

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

It allows the relationship between particular things, both physical and immaterial, and general methods and techniques of use to be documented.

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)

P113 removed (was removed by)

Domain: E80 Part Removal
Range: E18 Physical Thing
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 E18 Physical Thing 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)

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)

2.8 REFERRED DUBLIN CORE ELEMENTS

2.8.1 Properties

Term Name: coverage

URI: http://purl.org/dc/elements/1.1/coverage

Label: Coverage

Definition: The spatial or temporal topic of the resource, the spatial applicability of the resource, or the jurisdiction under which the resource is relevant.

Comment: Spatial topic and spatial applicability may be a named place or a location specified by its geographic coordinates. Temporal topic may be a named period, date, or date range. A jurisdiction may be a named administrative entity or a geographic place to which the resource applies. Recommended best practice is to use a controlled vocabulary such as the Thesaurus of Geographic Names [TGN]. Where appropriate, named places or time periods can be used in preference to numeric identifiers such as sets of coordinates or date ranges.

References: [TGN] http://www.getty.edu/research/tools/vocabulary/tgn/index.html

Has Range: http://purl.org/dc/terms/LocationPeriodOrJurisdiction

Term Name: creator

URI: http://purl.org/dc/elements/1.1/creator

Label: Creator

Definition: An entity primarily responsible for making the resource.

Comment: Examples of a Creator include a person, an organization, or a service. Typically, the name of a Creator should be used to indicate the entity.

Has Range: http://purl.org/dc/terms/Agent

Term Name: date

URI: http://purl.org/dc/elements/1.1/date

Label: Date

Definition: A point or period of time associated with an event in the lifecycle of the resource.

Comment: Date may be used to express temporal information at any level of granularity. Recommended best practice is to use an encoding scheme, such as the W3CDTF profile of ISO 8601 [W3CDTF].

References: [W3CDTF] http://www.w3.org/TR/NOTE-datetime

Has Range: http://www.w3.org/2000/01/rdf-schema#Literal

Term Name: format

URI: http://purl.org/dc/elements/1.1/format

Label: Format

Definition: The file format, physical medium, or dimensions of the resource.

Comment: Examples of dimensions include size and duration. Recommended best practice is to use a controlled vocabulary such as the list of Internet Media Types [MIME].

References: [MIME] http://www.iana.org/assignments/media-types/

Has Range: http://purl.org/dc/terms/MediaTypeOrExtent

Term Name: subject

URI:http://purl.org/dc/elements/1.1/subject

Label: Subject

Definition: The topic of the resource.

Comment: Typically, the subject will be represented using keywords, key phrases, or classification codes. Recommended best practice is to use a controlled vocabulary.

2.8.2 Classes

Term Name: MediaTypeOrExtent

URI:http://purl.org/dc/elements/1.1/subject http://purl.org/dc/terms/MediaTypeOrExtent

Label: Media Type or Extent

Definition: A media type or extent.

Term Name: LocationPeriodOrJurisdiction

URI:http://purl.org/dc/elements/1.1/subject
http://purl.org/dc/terms/LocationPeriodOrJurisdiction

Label: Location, Period, or Jurisdiction

Definition: A location, period of time, or jurisdiction.

Term Name: Agent

URI:http://purl.org/dc/elements/1.1/subject http://purl.org/dc/terms/Agent

Label: Agent

Definition: A resource that acts or has the power to act.

Comment: Examples of Agent include person, organization, and software agent.

**** End of the document ****