

57<sup>th</sup> joint meeting of the CIDOC CRM SIG, 50<sup>th</sup> FRBF/LRMoo SIG  
and ISO/TC46/SC4/WG9

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Unité Mixte de Recherche 3495, Modèles et  
simulations pour l'Architecture et le Patrimoine,  
Campus CNRS, Bâtiment US ; 31 chemin Joseph Aiguier, 13402 MARSEILLE cedex 20

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Tuesday 10 October 2023

Issue 482 – CIDOC CRM interfacing Risk Assessment in conservation

AG walked the SIG members through the proposal to deprecate classes CR1 Vulnerability Assessment and CR2 Vulnerability Belief (and properties linking it to other classes) in favor of a more simplified model that makes use of CRMInf I5 Inference Making and I2 Belief (the latter are to be specified via an instance of E55 Type). Providing the type definitions is a work in progress.

The details of the proposal can be found [here](#).

**Discussion points:**

- I6 Belief Value should be quantifiable; however, being a subclass of E59 Primitive Value, it cannot be ascribed an E55 Type. It can be instantiated as a numeric value, or as a qualitative value (Yes, No, Unsure), but nothing in the definition precludes I6 from being quantifiable.
- The E55 Type should be moved up to the instance of I2 Belief that the I6 Belief Value is about.
- Consulted “The Assessment of Cultural Heritage in Slovenia on the case study of castles” to derive at inferences regarding risk in conservation, as there exists a large number of castles in Slovenia, but very little funds to properly restore them, which makes risk assessment really critical for this type of monuments.
- Insurance contract data have not been advised, they’re not readily accessible; plus they’re not very easy to use.

**Way to move forward:** Continue with mappings, revise definitions and enhance the typology.

Issue 321: BP11.2 connected through

AG proposed that the issue be closed and raised the following questions to the SIG:

- 1) What do we do with models that are no longer maintained?
- 2) Do we continue to enrich the model with aspects relevant for architecture and conservation or should it remain a model that only deals with building archaeology?

**Discussion points:**

- Its scope needs to be revised as well. It’s not particularly relevant if one is not treating buildings as stratigraphic units (so not an excavation archaeology perspective), but as architectural units and cultural heritage units that require preservation/restoration (risk analysis and conservation perspective). Does this expansion of scope require a whole different model, or can it be done through a revision of CRMba?
  - CRMba was not supposed to be a part of CRMarchaeo in the first place; rather it concerned free-standing monuments (typically churches), not buildings embedded in archaeological layers.
  - However, CRMba depends on 5 classes from CRMarchaeo, which makes it a de facto model about building archaeology, which is about documenting observations concerning the development of structures; for instance, looking at the wall of a building and how deeply embedded it is in the ground in the present, how high from the ground it originally stood at, etc.

- The Notre Dame case should ultimately be describable in terms of CRMba (a revision therefore is necessary).
- CRMba needs to be properly maintained and extensively reviewed to be brought into sync with CRMbase and extensions. At the moment, nobody is maintaining CRMba.
  - Wrt sustainability: if no one is interested in maintaining a certain model, then the SIG should issue some statement that *<Model Extension a> is compatible with CRMbase up to version 6.2.1 (f.i.); and <Model Extension b> up to version <x.y.z>*.
- PIN tried to use CRMba for conservation and risk analysis, but it was impossible to use. It was completely orthogonal to the perspective assumed by architects.

#### How to proceed:

- Vote to close the issue: All in favor, none against. **Motion passes**
- Contact Paola Ronzino to get additional information about the data used to validate CRMba (**HW**: AG)
- Form a group to review CRMba – in a separate issue. First create a road map, assign a time frame to do that, etc. (**HW**: TV to coordinate)

#### *Issue closed*

##### Issue 604: make SIG meetings more sustainable

The format of two hybrid meetings a year seems to work well for everyone. Wrt the points raised by TV & RS on the sig list, sound system requirements are generally met, whereas local organizers and the CIDOC CRM editors group make every effort to put together an agenda and stick to the program (with minimal deviations).

#### *Issue closed*

##### Issue 644: Update CRM templates -shortcuts

#### Discussion points:

- Where do we use italics for properties in the text? They are used somewhat inconsistently.
  - Examples: to indicate the name of the property (but in the absence of its number identifier)
  - Scope notes: wherever the name of a property appears (except for (super)|(sub) property declaration. Could be undone in the scope notes.
- The intention is to keep the shortcut vs fully developed path statements in the property scope notes. Also, to add them in declarations of fully developed paths (i.e., right above the examples).
  - The fact that many shortcuts are implicitly stated in property scope notes suggests that they should be properly and explicitly defined within property definitions. The updated template does exactly that.
- For properties shortcutting over two distinct paths:  
Where the range class can be instantiated by two different classes, which themselves stand in a (super-)|(sub-)class relation, like E1 CRM Entity.P1 is identified by: E41 Appellation vs. E42

Identifier they express different semantics, which means that all the identified fully articulated paths have to be displayed on the property definition.

- The shortcut information need not be used for the RDFS implementation, but for validation purposes.

**Decisions:** The SIG voted to adopt the proposed revision to the template:

All in favor, none against.

**Motion passes.**

**HW:** ETs to update CIDOC CRM v7.2.4 implementing the newly adopted template. This work is to carry on for extensions as well.

**Issue closed.**

Issue 628: Update the modelling constructs found under The Model\Use&Learn\Functional Overview

GB presented HW on re-expressing what lies under *Graphical representation* using CHIN's library on draw.io. The new diagrams are for CIDOC CRM v5.0.4 and the purpose of sharing them with the SIG is to solicit feedback on the proposed representation and create diagrams for the Official version.

The diagrams in the CRMbase Intro and the diagrams under Graphical representation do not form coextensional sets. There is very little overlap between the two: the CRMbase Intro only lists high-level modelling constructs, an implementation example, diagrams for events, spaces and spacetime volumes, and the temporal primitive relations. Graphical representation is about pattern-learning, i.e., teaching paths that museum experts could/should resort to, in order to document a particular kind of information.

The updated diagrams for CRMbase V5.0.4 can be found [here](#). Class/property names can be linked to the official documentation as well.

**Discussion points:**

The updated modeling constructs could be linked to SARI, LinkedArt, and other known implementations.

This is an ongoing work for Geovistory as well.

The CHIN library for draw.io could either be listed under The Model\Use&Learn (cause it's about using the CRM), or under the Templates section.

Points (B) and (C) in *Use&Learn*: are easy to implement, can be done in no time, assuming there are explicit guidelines on how to do it.

**How to proceed:**

- Determine whether the modeling constructs identified in Graphical Representation are still valid for CRMbase Official version.
- Identify missing modelling constructs that need to be added, for which to create diagrams. The diagrams in the introduction that are not present in the functional overview need to be remade,



to ensure that the entry-level information is given before one goes into depth with highly specific modeling constructs.

- *Use&Learn*: B. The **latest cross reference manual** as html hypertext/ a zip file/ a pdf file for downloading can be quickly replaced with the content of the latest representations, found under the Encodings column for V7.1.2
- *Use&Learn*: C. The authoritative text, official release of CIDOC CRM (should for now point to V7.1.2, until the ISO compatible version is released).
- Come up with a plan of work and assign HW to SIG members: GB to coordinate
  - **SdS**: can validate the diagrams for V5.0.4 (assert that they form valid copies of the original .jpg files)
  - **CEO**: can check which paths need editing and mark them down for GB to redesign.
  - **AG**: can help with the redesign and with connecting this work to the Pedagogical material.
  - **StH**: can help with the redesign
  - **FORTH**: to determine how the diagrams relevant for each version will be displayed on the site. The exports from draw.io are .xml/can be exported as .jpg (for instance).
  - **Relabel the subsections of Use&Learn**.
- Tutorial section also needs updating: Youtube channel should be linked to the tutorials, the various versions of the game could be collected.
  - Anyone who thinks that some resource/material that is relevant for learning and using the CIDOC CRM are to email ETs, suggesting where on the site it should appear under. Or email the list instead.

Issue 647: automatically detect incompatibilities between CRM extensions and the CIDOC CRM. VA shared a presentation with the SIG. The slide deck can be found [here](#).

#### Discussion points:

ETz intends to perform some additional checks upon generating the RDF files for CRMbase and extensions. OntoME could probably be extended with points 3-6, to be discussed among ETz & VA.

1. vocabulary checking regarding class and property labels
2. detection of wrong domain or range of a property
3. hierarchical cycles
4. unique hierarchical branch position (If A subClassOf B, B subClassOf C then A **cannot** be subClassOf C)
5. domain/range of a property must be subClass or equal to the domain/range of its superProperty
6. Avoid hierarchical relationships of owl:DatatypeProperties with owl:ObjectProperties, and document the cases

A resource to consult for checks could be [Oops! \(Ontology Pitfall Scanner!\)](#)

Inconsistencies can be found within a model but across its translations.

#### How to proceed:

ETz, PF, VA to continue working towards implementing the abovementioned checks.

Issue 627: explicitly document cross-references between family models

ETz walked the SIG through the HW he has undertaken (create separate gitlab repositories for CRMsci, CRMtex, FRBR/LRMoo; document RDF implementation decisions; document external references).

#### Discussion:

Trying to parse family models, ETz has identified some problems – things that need editing. He is to consult with contact people mentioned in the list, when changes need to be implemented to a given model. He should start by stable releases, not draft ones.

- Whenever the model in question has not had a stable release in a long time, then it's best to approach the editors for said model directly.

#### How to proceed:

##### HW:

- ETz to generate a PC module similarly to the CRMbase repository. In CRMarchaeo, f.i., a .2 property needs to be implemented; **AP13.2 justified** takes **AP13 has stratigraphic relation to** as its domain, and **AP11 has physical relation to** as its range.
- ETz to generate a Supplement module similarly to the CRMbase repository. In CRMsci, f.i., **O30 determined position** (D: S23 Position Determination, R: E94 Space Primitive) is declared a subproperty of O16 observed value (D:S4 Observation, R: E1 CRM Entity).

Antoine Gros: Toward a data commons for structural assessment of built heritage works  
The slide deck of the presentation can be found [here](#).

European French Translation Initiative: Translation of CIDOC CRM and XML integration  
Presentation by Raphaëlle Krumeich, Bertrand David, Anais Guillem, Muriel van Ruymbeke, Elias Tzortzakakis

The slide deck for the presentation can be found [here](#).

Stephen Hart: Geovistory, a LOD research infrastructure for historical sciences  
The slide deck of the presentation can be found [here](#).

George Bruseker: Update on the activities of the CRM-SIG and teaching the CRM in CIDOC 2023  
GB walked the SIG through the material he used during the 3-day training seminar on CIDOC CRM that took place in the Mexico conference (CIDOC 2023). The slide deck can be found [here](#).

CRM Influence: A multi-causal ontology model

A proposal for a CRM compatible extension by Dominic Oldman and Martin Doerr.

The slide deck of the presentation by DO can be found [here](#).

**Discussion points:** Following the presentation by DO, the SIG pondered on the points below:

- (a) How does the proposed model extend CIDOC CRM?
  - What is the Class: Influence a specification of?

- Does Class: Mental Attitude stand in the same hierarchical relation to E2 Temporal Entity as E4 Period and E3 Condition State? Does it overlap with E3 Condition State?
- (b) How does the proposed model differ from CRMsoc in terms of scope?
- (c) What are the next steps to admit CRM-influence as a compatible extension to CIDOC CRM, according to the procedures that the SIG has agreed on?

*(a) How does the proposed model extend CIDOC CRM*

It extends the modelling constructs around influence and causation (manifest through P15 was influenced by and P17 was motivated by, respectively).

According to the proposed hierarchy, Influence IsA Mental Attitude IsA E2 Temporal Entity. What they convey is a state of being under a particular influence or having a mental attitude towards something that persists over some time, on the basis of their perceived individual effects.

It can be used to document the set of activities that had some bearing on a particular outcome: For instance, in cases where it could not be claimed that one particular activity lead to the observed outcome, but where they all converged toward the said outcome. It's not only relevant for the domains of social history, archaeology or art in general, but can be deployed in scientific research domains as well, in cases where a research group adopts a newly applied methodological protocol in their research.

The semantics of Mental State and Influence have not been fully determined wrt their relation to E3 Condition State and E4 Period. It is an ongoing work and the reviewers' work could focus on that as well.

**HW:** DO can provide more use cases to help decide that.

*(b) Difference to CRMsoc*

CRM-Influence expresses weaker statements wrt causality: rather than identifying the one event that brought about some particular effect, it links the events known to have contributed to some degree to some particular effect, to the effect in question. The claim is that, without the {identified set of events} the effect would not have been observed.

The idea is that CRM-Influence forms an elaboration of CRMsoc by highlighting the particulars (actors, events, methods, whatnot) involved in a specific cause and effect relation.

The two models should be considered together. CRMsoc editors to be involved in the reviewing process.

*(c) Procedure to admit a model as a CRM compatible extension*

Before admitting CRM-influence as a CRM compatible extension, the ontology needs to be reviewed to determine that it is consistent with CIDOC CRM and CRMsoc. Decide on the time frame within which the review of the text should have concluded, but make sure to allow for a sufficient amount of time for a thorough reviewing.

**Decisions:**

- The review of CRM-Influence should have concluded by the CRM SIG spring 2024 meeting.
- The group of reviewers consists of: CEO, GB, AG, SdS, GH.

CIDOC CRM 101 with Notre Dame de Paris

Presentation by Anaïs Guillem that concerns reusing the tutorial put together by GB, targeted at a different audience for the use-case of the Notre Dame reconstruction.

The slide deck can be found [here](#).

Wednesday 11 October 2023

Issue 613: Inverse shortcuts

CEO gave an overview of the current state of the issue and the HW items necessary to conclude work on the issue:

- (i) examples illustrating the kinds of shortcuts mentioned in the relevant section of the CRM document
- (ii) reformulation of the statement about E13 Attribute Assignment.

*Shortcut examples:*

- **shortcut:**  
The property *P43 has dimension (is dimension of)* is a shortcut of the fully-articulated path from E18 Physical Thing through *P39i was measured by*, E16 Measurement, *P40 observed dimension* to E54 Dimension.
- **inverse shortcut:**  
The property *P186 produced thing of product type (is produced by)* is an inverse shortcut of the fully-articulated path from E12 Production *P108 has produced (was produced by)*, E24 Physical Human-Made Thing, *P2 has type*, to E55 Type
- **strong shortcut:**  
The property *P195 was a presence of (had presence)* is a strong shortcut of the fully developed path from E18 Physical Thing through *P196 defines*, E92 Spacetime Volume, *P166 was a presence of (had presence)* to E93 Presence.

**Decision:** The SIG approved the examples CEO proposed. They are to appear in the next CRM release.

*Reformulation of the statement about E13 Attribute Assignment*

Both the [original statement](#) and the proposed [reformulation \(SdS\)](#) did not read clearly, and a reformulation was necessary.

**Discussion points:**

- The statement should preclude E13 Attribute Assignment being construed as a shortcut over whatever fully articulated path.
- Initially E13 was considered to form a long path, because it added provenance information to any statements (that, in their turn, were considered as shortcuts seeing as they made no explicit reference to the attribute assignment). But it was understood that an E13 and properties could be applied trivially to any statement. Which resulted in **not** allowing E13 and properties to be shortcut from statements not mentioning it.
- A reformulation was proposed [below](#):

**Decision:** The SIG voted in favor of the [new proposal](#). It will replace the statement found in V7.2.3.

CIDOC CRM V7.2.3

The class E13 Attribute Assignment allows for the documentation of how the assignment of any property came about, and whose opinion it was, even in cases of properties not explicitly characterized as “shortcuts”.

## Reformulation by SdS

Contrary to this, E13 Attribute Assignment (and the properties it makes use of) does not form a long path over the path that is being described by the E13 Attribute Assignment, in cases where the property being so described is actually a shortcut.

## NEW

E13 Attribute Assignment (and the properties it makes use of) does not form a long path over the property instance it assigns.

### Summary of decisions:

- Update the Shortcuts section with the abovementioned examples and new statement for E13.

### Issue closed

Issue 643: P156 occupies & P7 took place at –inverse shortcuts

CEO walked the SIG through the HW he prepared –an exploration of the inferences that can be drawn from instances of P156 occupies and P7 took place at. The details of the HW (graphical representation that matches the FOL statements) can be found [here](#).

### Discussion points:

*In general:*

- The SIG needs to determine if any unidirectional implication expressed in some property's FOL can be called a "shortcut", irrespective of its complexity, or if the term can only be applied to straightforward paths. To be discussed in a [new issue](#) and to be brought at the next SIG meeting for discussion.

**HW:** CEO, WS, MD

*Wrt. P7 took place at:*

- The complexity of the axiom wrt. the instance of E18 that provides the reference space of an instance of E4 Period makes people reluctant to call it a shortcut (which to everyone's understanding should form a straightforward path). Maybe it's an implication after all and not a shortcut.
- The relation between any two instances of E53 Place, entails that the places in question need to have been defined in the same reference space.
- Any given place can be defined wrt to more than one reference space (f.i., in the case of nested reference spaces)
- The inference that one can draw from *P7 took place at* can be summed as follows:  
IF it has been documented that an instance of  $E4(x)$  Period *took place at* an instance of  $E53(y)$  Place (i.e:  $E4(x).P7:E53(y)$ ),  
THEN (based on the *spatial projection* of  $E4(x)$  to an  $E53(z)$  Place – $P161(z,x)$ ) one can deduce that the instance of  $E53(z)$  Place *P89 falls within* the instance of  $E53(y)$  (i.e.,  $E53(z).P189(z,y):E53(y)$ ).
  - This calls for enhancing the scope note of P89 falls within, but it should be done in a [new issue](#).

## Decisions:

- leave the scope note for P7 took place at as is, do not declare it an inverse shortcut.
- Enhance the scope note and FOL of P89
- Start a new issue on the complexity of axioms that constitute shortcuts

*Wrt P156 occupies*

## Decisions:

- Do not make P156 an inverse shortcut either (especially seeing as the inference is bidirectional)
- Change the scope note to make sure that either side of the axiom implies the other (“is equivalent to”). The details of the decision can be found in the appendix.

[NEW ISSUE]: What kind of inferences count as instances of shortcut properties?

The SIG needs to determine if any unidirectional implication expressed in some property’s FOL can be called a “shortcut”, irrespective of its complexity, or if the term can only be applied to straightforward paths. To be discussed in a new issue and to be brought at the next SIG meeting for discussion.

**HW:** CEO, WS, MD

[NEW ISSUE]: Reformulate the scope note of P89 falls within

The inference that one can draw from *P7 took place at* can be summed as follows:

IF it has been documented that an instance of  $E4(x)$  *Period took place at* an instance of  $E53(y)$  *Place* (i.e.:  $E4(x).P7:E53(y)$ ),

THEN (based on the *spatial projection* of  $E4(x)$  to an  $E53(z)$  *Place*  $-P161(z,x)$ ) one can deduce that the instance of  $E53(z)$  *Place* *P89 falls within* the instance of  $E53(y)$  (i.e.,  $E53(z).P189(z,y):E53(y)$ ).

This calls for enhancing the scope note of P89 falls within, and this is the new issue where to do so.

**HW:** CEO, MD

Issue 534: Representing .1 properties of full paths in shortcut properties

CEO gave a summary of where things stand.

For shortcuts:

- If there is a shortcut property (without a .1 property in it), whose fully developed path comes with a .1 property somewhere within it, then there is no problem
- If there is a shortcut property (with a .1 property in it), whose fully developed path also comes with a .1 property somewhere within it, then the implication is weakened because of the extra condition in the conclusion of the implication. The fully developed path may be true (the addition of the typed property makes no difference there), but the shortcut not necessarily so.
- The solution would be to check whether the .1 property can be added to the left-hand side

For inverse shortcuts:

- If the .1 property only appears on the shortcut property and not on the fully developed path, then there is no problem.
- If a .1 property appears in the fully developed path, the dependencies between the .1 properties in the shortcut and the fully developed path should be checked (see issue [633](#) as well)

### Discussion points:

- Consider every property appearing in a fully developed path that gets shortcut by another property for reflexivity, transitivity, symmetry in order to not permit vacuously creating infinite shortcut properties (as part of an unintended modeling set of constructs).
  - F.i. if one has a gazetteer with multiple P89's, they wouldn't want to write down everything that is implied by them. They can be interpreted, but still wouldn't do them. The answer would be similar to that.
- List of shortcuts – fully developed paths with .1 properties –has been put together by CEO for the meeting in Luxembourg.

It is an ongoing discussion between CEO, WS & MD. To be concluded by the next meeting in Paris.

### Issue 633: Inheritance of strong and weak shortcuts

CEO suggested that *P32 used general technique* [D: E7 Activity, R: E55 Type] might a shortcut over a fully developed path that goes through *P33 used specific technique* [D: E7 Activity, R: E29 Design or Procedure] and *P2 has type*.

MD countered that proposal with an alternative, i.e.:

- make *P32 used general technique* [D: E7 Activity, R: E55 Type] *IsA* *P2 has type* [D: E1 CRM Entity, R: E55 Type], and
- disengage P32 from P125 altogether (to be dealt with in a new issue). The general technique may not imply any used object -despite the fact that the full path for P125 goes through *P16 used specific object*: E70 Thing (so any enduring really).

### Decision:

Start a new issue about disengaging P32 from P125

Nb. The decision does not resolve the original question of there being no registered instance of a technique over which P32 is shortcutting

[NEW ISSUE]: *P32 used general technique* is not a subproperty of *P125 used object of type*  
Reformulate the scope note of P32 (clarify how it is a subproperty of *P2 has type* and not *P125 used object of type*).

**HW:** MD in collaboration with CEO. (SdS & TV to proofread).

### Issue 570: FOL statements in prose (appropriate section of class/property definitions)

MD presented HW: a guide on

- the color-coding & fonts used to represent logical constants, variables & quantifiers mentioned throughout the FOL expressions (text in the [appendix](#))
- the stereotypical expressions by which said FOL axioms are rendered in prose (examples in the [appendix](#))

## Discussion points:

- there have been opposing proposals on where the FOL axioms should appear under: within class/property definitions vs. an appendix or a separate guideline document. The form of the document will be determined once that question has been settled:
  - if it appears as a standalone document, then it will need to incorporate guidelines on how to use it, rather than it being a list of FOL axioms rendered in prose
  - if the textual renditions appear within class/property definitions, then the “how to read them” should become part of the ***About the logical expressions used in the CIDOC CRM*** section in the Introduction of the CRM.
    - Also: the CRMbase and family models template will have to be updated accordingly (specify fonts and indentation for FOL rendition)
- The SIG needs to determine which expressions will be rendered in prose: will the textual renditions of only involve
  - complex FOL expressions (like super|sub)-property relations, shortcut vs fully articulated path inferences, and other property inferences that depend on the instances of classes they connect?
  - or every FOL expression there is in the text?

If the former, then the guidelines on how to read the simpler FOL statements (super|sub)-(class|property) and simple (transitivity|reflexivity|symmetry) (plus their converse) statements should appear in in the ***About the logical expressions used in the CIDOC CRM*** section of the Introduction to the CRM.

If the latter, the guideline should only be about the notation used in the transcriptions of FOL into prose.

- A standard reading of the FOL expressions, according to practices in logical handbooks, might work well for the shorter FOL expressions, like  $P11(x,y) \Rightarrow E5(x)$ , but it doesn't yield well-formed English sentences for the more intricate axioms, like the one for P161:  $(\exists u) [E92(x) \wedge P157(x,u) \wedge E53(y) \wedge E53(z) \wedge E18(u) \wedge P157(y,u) \wedge P157(z,u) \wedge P161(x,y) \wedge P161(x,z) ] \Rightarrow (z = y)$ .
  - A shorthand notation glossing over some easily inferred information can be beneficiary to people wanting to understand the FOL axioms but lack the proper training: for instance, omit:
    - “an instance of Exx” (in favor of the simpler “an Exx”)
  - Modal statements expressing necessity are once more disputed (in the sense that “what is necessarily true, is true”; and because renditions become more verbose and cumbersome to read through)
  - The color coding is not universally acknowledged as the best way to represent the relations between variables and what they refer back to, or the logical constants & quantifiers used in the axioms

## Decisions:

The SIG voted in favor of the following, and assigned HW.

- The shorter versions are preferred over the “standard, complete” versions
- The domain-range statements are excluded from the textual renditions of property FOLs



- The textual renditions of FOL statements are to be put right below the FOL expressions in the definitions.

#### **HW assignments:**

- MD to finish drafting the textual renditions to appear in the document and share them with the SIG to be reviewed (and voted upon). Any suggestions for improvements should be given then.
- SdS to update the text in the introduction with a “how to read the FOL renditions in prose” section, stemming from [MDs guideline](#).
- TV to update the template (specify fonts, indentation, etc.) for textual renditions of FOL expressions. The decision to inform Issue [644](#).

Issue 492: Spatiotemporal formalization about the presence of parts  
WS presented HW. Details in the [appendix](#).

#### **Discussion points:**

The document describes what it means to have a part addition for the spatiotemporal relations of the thing that gets added to another thing.

Describing these relations can get pretty messy, whence stems the need to change the formalism used to represent FOL axioms (especially the ones with the more intricate semantics), to use functions and named FOL clusters to do so. Alternatively, rendering the relations in prose seems to work quite well.

#### **Decisions:**

- The change of the formalism is a different issue. It can be discussed among MD, CEO, and WS as a separate issue.
- **HW:** CEO and MD to revise the document, summarize it for the broader audiences. Maybe color code it as well.

RCC8 for CIDOC CRM: semantic modeling of mereological and topological spatial relations in Notre Dame de Paris.

Presentation by Anaïs Guillem. The slide deck can be found [here](#).

#### **Discussion points:**

- Interesting to see the interface with CRMgeo, introduce suchlike relations therein.
- CRMgeo interfaces with GeoSparql and these properties have been implemented in GeoSparql already. It would be interesting to check which version to take into consideration. And also CRMgeo needs to be reviewed extensively to be harmonized with CRMbase.

Issue 601: Publish the research questions on the website

The SIG reviewed and admitted the chunks of text that were introduced as a description to the various sections of the [link](#) **Methodology and research questions supporting ontology building**.

### **Discussion points:**

The scope notes and not their formal representations are the definitions of classes and properties. When we translate the CRM, it is the scope notes that we translate, not the labels or the FOLs. The FOLs in and of themselves do not have a meaning unless they are linked to the scope notes.

The clause below (used as an executive summary) was lifted from the *Guidelines for writing scope notes and annotated examples* to. It needs to undergo editing, but this will be handled in a [separate](#) issue.

- Scope notes are not formal modelling constructs (e.g. they cannot be used directly for machine implementations), but are provided to help explain the intended meaning of the CIDOC CRM's classes and properties, and where they apply."

### **Decision:**

Remove the chunk in parentheses in the text above from the description on the site.

### **Issue closed**

[NEW ISSUE]: [update the Guidelines for writing scope notes document](#)

### **Background**

This new issue is about reexpressing the relation that the scope notes stand in with respect to the constructs defined in the ontology.

The clause "Scope notes are not formal modelling constructs (e.g. they cannot be used directly for machine implementations), but are provided to help explain the intended meaning of the CIDOC CRM's classes and properties, and where they apply.", which was lifted from the text accompanying the *Guidelines for writing scope notes and annotated examples* and was used as a summary of what the text is about needs to undergo editing in the Guidelines [document](#).

Once the Guidelines document has been updated, the description under methodology will be redone.

[Issue 614: Definition of I4 Proposition Set and what an instance of I2 Belief is about](#)

MD walked the SIG through a proposal on how to connect an I4 Proposition Set to a content model.

His proposal involved the following:

- Introduce a set of properties pointing from I4 Proposition Set to E62 String, E73 Information Object, E25 Human-Made Feature and provide their definitions.
- Define the relationship of an I4 to reality through I2 Belief.
- Define E13, which forms a single property assignment, as a specific case of I4 Proposition Set through FOL.
- Define S4, which forms a single observation, as a specific case of I11 Situation through FOL.
- Adjust the scope notes for I4, S4

### **Discussion points:**

- Concerning the relation to reality: the KB should allow one to express statements that were previously considered to be true, but are now considered to be false by its maintainers, as this allows one to observe the evolution of the statements within the KB. The alternative of creating

snapshots of the KB (instances of E73) and linking to them through the content model is OK, but should not be the only choice.

- Content model seems a bit obscure as a term. It needs to be properly defined.

#### **Decisions:**

The SIG voted in favor of introducing a content model (analogous to P190) and discuss the I4 Proposition Set's relationship to reality as sketched in MDs HW and provide the scope notes for the properties.

**HW:** PF (to lead), MD, GH, AGr, & SdS (to proofread).

#### Issue 640: Statements about statements

GH presented HW (a visualization of the statements in the example regarding the whereabouts of Nero during the Great Fire of Rome belief, which contains two contradicting beliefs, i.e., the belief of Suetonius that Nero was in Rome, and the belief of Tacitus, that Nero was in Antium). The content of the beliefs of Suetonius and Tacitus are represented as named graphs.

More details for the presentation, files used in the implementation and outputs can be found [here](#).

MD shared a document outlining considerations for making statements about statements as part of a knowledge graph. The document can be found [here](#).

#### **Discussion points:**

- No standard manner to represent Named Graphs. For this example, there would be a Jxx linking to the "Propositions of Suetonius" to whatever lies in its scope (set of properties).
  - Through reification, one can only individually enumerate each proposition. But they cannot refer back to the entire set and determine its truth/falsehood (qua set).
  - The attribute assignment reification cannot substitute the named graph construct, cannot negate sets of statements.

#### **Decision:**

The SIG voted in favor of the approach put forth by MD. The document will be further elaborated as proposed.

#### **How to move forward:**

- Assuming that the SIG considers named graphs necessary to evaluate a set of propositions bundled together (i.e., that are considered true or false taken together, rather individually), to assist MD with the document:
- **HW** assignment:
  - **AG:** Share the graphical annotation in draw.io to represent the statements about statements that form part of the named graph (maybe define a default way to circumscribe the statements at hand), that can be picked up by the implementation that ETz has put together to derive triples from the draw.io diagrams.
  - **PF:** will assist with drafting the text, will also take a look at other reification approaches
  - **AK:** will collaborate for the text.

### Issue 645: Negating I2 Belief

MD presented HW: various scenarios of someone adopting a belief (fully, partially, or not at all) as a trust on the source of the belief in question.

#### **Proposal:**

- Widen the meaning of I7 Belief Adoption to include rejecting a belief (in the sense that it is a negative adoption of a belief), or modifying it (hence adopting it partially).
- Additional property necessary for the adopted the belief (for the degree of adoption).

#### **Discussion points:**

- Is “unknown” really a rejection of the original belief?

#### **Decision:**

**HW:** PF to rewrite the scope note for I7 Belief Adoption and to draft the scope note for the property that assigns a degree of adoption.

Mapping Medieval Vienna; The social topography of Vienna in the 15<sup>th</sup> century  
Presentation by Wolfgang Schmidle. The slide deck can be found [here](#).

#### **Discussion – questions:**

- To automate the process, one can use old fashioned KWIC and take a quick look on what is documented, maybe add a few annotations (for formulaic expressions and things they would be on the lookout for, depending on the project), and perform lexical searches or searches using regular expressions taking into account the annotations (or even make them completely text-driven).
- Topological relations in medieval documents are expressed differently than we're used to. But the Lynch's theory comes very close to it.

Issue 568: Incorporate changes in the model implemented by the ISO group to the versioning pipeline of the SIG

Update by Philippe Michon and Erin Canning on the ISO submission process.

The slide deck of their presentation can be found [here](#).

Issue 626: “Official” status for FRBR/LRMoo

The SIG accepted the definition that PR proposed for the Official status concerning IFLA standards. The text can be found below.

#### Official (IFLA)

A revised and complete community version of the compatible model fully approved by IFLA. It forms a stable release of the standard and can be used for implementation, reference and any other official purpose. The document is final and will undergo no further change. This release is accompanied by an RDFS and other serializations.

**Decision:**

This status concerns FRBRoo V2.4, PRESSoo V1.3. It will also be applied to LRMoo V1.0 (following its release and endorsement by IFLA).

**Issue closed**

Issue 360: LRMoo

Update by Pat Riva on the IFLA approval procedure.

The slide deck of the presentation can be found [here](#).

Nb. With the release of LRMoo V1.0 the issue will close.

Regarding the harmonization of PRESSoo with CIDOC CRM V7.1.2 and LRMoo V1.0, a WG has formed, but only Gordon Dunsire is involved from the original group. PR has volunteered to liaise with said group and the SIG.

Issue 523: Didactic material for the properties of E93 Presence

GH shared some slides with the SIG concerning the documentation of A von Humboldt's trip to Venezuela. The slide deck can be found [here](#).

**How to move forward:**

The presentation of the reasoning about the whereabouts of A. von Humboldt should be presented on a par with the reasoning concerning Nero's whereabouts during the Great Fire of Rome.

Aside the visualizations, the overall document should consist of an introduction that summarizes the goals and structure of the document (plus basic premises where necessary). This has been done in part by AG, who has drafted a document that does exactly that. It can be found [here](#).

The document should appear under Methodology.

**HW:** GH to collate the introduction, graphics and serialization, in collaboration with AG.

Thursday 12 October 2023

Issue 630: Redraft the scope note of P38 deassigned

The SIG went through with reviewing the scope note of P38 deassigned (HW by MD & SdS). The details of the redrafted scope note can be found in the [appendix](#).

**Decision:**

The SIG resolved to admit the proposed redrafting of P38

WS was appointed to provide an example about referencing a deprecated identifier in a gazetteer as an instance of the property. To be done in a [separate issue](#).

**Issue closed**

[NEW ISSUE]: Examples of P38 deassigned

**HW:** WS was appointed to provide an example about referencing a deprecated identifier in a gazetteer as an instance of the property.

## Issue 556: Content of the minimal vocabularies for restricting the CIDOC CRM Types

- Restricting types for STVs and Periods
- GBIF & Iconclass for P136.1 and P62.1

### *Restricting types for STVs and Periods*

MD presented HW concerning the types of period making use of different kinds of phenomena as a means to restrict the types of E4 Period or information on STV in general. The distinctions proposed by MD form abstractions from the Alexandria Gazetteer place types, and include the following:

- A. Distinct spaces defined by geomorphological forms (continents, islands, mountain ranges, water bodies, volcanos)
- B. Distinct habitats defined by life form (kinds of vegetation etc.)
- C. Coherent, evolving human-maintained spaces (settlements, roads, areas formed by agriculture or other exploitation)
- D. Spaces defined by inhabitation/stay of a specific cultural group of people (town population, tribe, language group)
- E. Areas determined by execution of political power (nation, country, administrative unit, protection zone)
- F. Possibly evolving areas defined by theoretical declaration motivated by scientific, social or political interests.

MD maintains that points (A) & (F) can only characterize STV information, whereas (B) through (E) can be applied to characterize instances of E4 Period.

### **Discussion points:**

Defining the kind of phenomena that are used to identify instances of E4 Period is useful, but should be further elaborated on -one could talk about phenomenal and declarative space.

This distinction is useful to the extent that it eliminates ambiguity. Rome, or Greece, for instance, can be associated with different spatiotemporal boundaries. The idea is that a very small set of distinctions (essentially points A through F) suffices to tease apart the various spatiotemporal phenomena that evolve differently. These high-level concepts that are mentioned, are relevant from the CRM perspective.

Examples are needed and the hierarchies need to be expanded.

### **How to move forward:**

**HW:** GH & MD to collaborate on proposing the terms and hierarchies for the categories identified

**HW:** GH, MD, AK, AG can try and map the terms for place types found in Alexandria, TGN & Geonames

### *GBIF & Iconclass for P136.1 and P62.1*

AK proposed types to restrict P136.1 and P62.1 –details below:

- **“P136.1: type of taxonomic role”** corresponds to the GBIF Specimen “type status” and DarwinCore “type status”  
[\[Nomenclatural Type Status Vocabulary – Vocabulary \(gbif.org\)\]](#), Remsen, David P, Robertson,

Tim, & Döring, Markus. (2010). GBIF GNA Profile Reference Guide for Darwin Core Archives (Version 1.2)]

- **“P62.1 mode of depiction”** conforms to the ICONCLASS “KEY” (which is added to the “Notation” of the Iconographic Concept), see definition and examples  
[Angelika Grund, [Iconclass. On Subject Analysis of Iconographic Representations of Works of Art](#). In: Knowledge Organization 20 (1993) No. 1, pp 20-29) **page 23**]

#### **How to proceed:**

**HW:** TV to consolidate these items to the list, also to draft a text that states what has been done and the resources that have been used in the process.

Issue 476: Pxxx represents entity of type

The issue was not discussed because RS was not present. It will either be discussed in his presence during the 58<sup>th</sup> SIG meeting in Paris, or it will be resolved as MD & TV suggested (FOL modification).

Restriction of the use of E55 Type by FOL statements

NEW issue, MD to expand on it.

Issue 576: About entity of type

The group that had been assigned to work on this issue only shared with the SIG a proposal on how to resolve the issue minutes before the start of the session. The SIG decided that they had not been given enough time to go through it.

It was postponed for the next meeting.

Issue 650: scope-note update for typed properties

Issue 556 had identified at least 4 scope notes for typed properties that were poorly understood (62.1, P67.1, P138.1, P189.1). In the 56<sup>th</sup> meeting, the SIG had resolved to start an issue the goal of which would be to properly define said properties first, and then possibly redraft the scope notes for the other typed properties as well, but forgot to assign the HW.

#### **Decision:**

MD took up the HW of properly defining the scope notes for typed properties.

Issue 490: how to model a file

MD gave a summary of the discussions that have taken place among the members of the group that have been tasked with working on the issue and proposed to introduce a property whereby to refer to the content of an information object via an external copy, via a URL or archival identifier.

The details of the property definition can be found in the [appendix](#).

#### **Discussion points:**

- The last paragraph needs to be redrafted as an observation, not as an instruction. Could be turned into an example instead.
- The label also needs to be reconsidered.
- It was proposed that, in order to avoid duplicating P128i, the proposed property could be turned into a guideline. The SIG did not accept this proposal, as this property is analogous to P190

(which in its turn is considered incomplete without the new property) but also much more specific than E73.

#### **Decision:**

The SIG voted in favor of adding the property, but assigned CEO, MD, and SdS to redraft its scope note to read as an observation, and also to come up with a less controversial label.

**HW:** MD, CEO, SdS

#### Issue 550: Time-span for instances of I11 Situation

The SIG reviewed the proposed definition for property *Jxx1* held at least for, whereby an instance of I11 Situation is connected to the instance of E52 Timespan over which it held over (HW by MD).

The details of the property definition can be found in the [appendix](#)

#### **Discussion points:**

- The difference btw E3 Condition State and I11 Situation is not particularly clear. And in that sense, it's not 100% clear what the added value of the timespan of an I11 Situation offers.
- The SIG should explore and carefully define the relation between E3 Condition State and I11 Situation.
  - In principle, *Jxxx1 held at least for* seems to work well with E3 Condition state, which means that there could be implications for the hierarchical relations of I11 and E3.

#### **How to move forward:**

- Determine the constraints put on an instance of I4 Proposition Set (and/or I11 Situation) in the sense of defining the properties that can form part of the I4 instance. This should apply to subclasses of I4 (so if E3 is considered *IsA* I4, it would apply to it too).
- In determining the relation between I11 Situation and E3 Condition State, we must keep in mind that while it is the case that E3 *IsA* E2 Temporal Entity, it is **not** the case that I11 *IsA* E2 (I11 can be placed in the future).
- The relation of the modelling constructs around I11 Situation need to take into consideration S23 Position Determination and O31 has validity time-span as well.

#### **Decisions:**

- The SIG voted in favor of admitting the proposed property to CRMInf. Hence it will be part of CRMInf v. 1.1
- **HW:** The scope note needs editorial changes, SdS to implement them (in a new issue).
- Start a new issue where to explore the connection between I11 Situation, S23 Position Determination, and E3 Condition State.

**HW:** MD, WS.

#### [NEW ISSUE]: Scope note of *Jxxx1* held at least for

The scope note proposed by MD (issue 550) needs to undergo editing to read better. We also have to supply examples for it too.

**HW:** SdS



[NEW ISSUE]: Explore the connection among I11 Situation, S23 Position Determination, and E3 Condition State

The difference btw E3 Condition State and I11 Situation is not particularly clear. And in that sense, it's not 100% clear what the added value of the timespan of an I11 Situation offers.

The SIG should explore and carefully define the relation between E3 Condition State and I11 Situation.

- In principle, *Ixxx1 held at least for* seems to work well with E3 Condition state, which means that there could be implications for the hierarchical relations of I11 and E3.

Determine the constraints put on an instance of I4 Proposition Set (and/or I11 Situation) in the sense of defining the properties that can form part of the I4 instance. This should apply to subclasses of I4 (so if E3 is considered IsA I4, it would apply to it too).

In determining the relation between I11 Situation and E3 Condition State, we must keep in mind that while it is the case that E3 IsA E2 Temporal Entity, it is **not** the case that I11 IsA E2 (I11 can be placed in the future).

- The relation of the modelling constructs around I11 Situation need to take into consideration S23 Position Determination and O31 has validity time-span as well.

**HW:** MD, WS to work on that.

Issue 602: determine the interface btw CRMsci and CRMInf

The SIG reviewed the decision of the 56<sup>th</sup> SIG's meeting to adopt (c) out of the three alternatives below, that were proposed by AK and concerned the integration the Argumentation model of CRMsci with CRMInf:

- a) Deprecate S5; keep I5 in CRMInf; keep S6, S7 in CRMsci and declare them subclasses of E13; move S8 to CRMInf
- b) Deprecate S5; keep I5 in CRMInf; keep S6, S7 in CRMsci, declare them subclasses of I5 -not E13; move S8 to CRMInf
- c) Deprecate S5; keep I5 in CRMInf and extend it by S6, S7, S8 (that are all moved to CRMInf and declared subclasses of I5); make I5 isA E13.

**Discussion points:**

- E13 Attribute Assignment does not work well with making arguments, in the sense that it is about one statement at the time (i.e., it describes one single assignment).
- Resolving this issue is dependent on [614](#), that proposes to explicitly make the connection between a single proposition (i.e., a specific case of I4 Proposition Set) and an attribute assignment
- What we need is to have an instance of I4 that contains a reification construct. It could be achieved through specialization of I4 (like Ixxx Singleton Proposition Set), which would come with a content model describable by a reification construct (assigned, assigned attribute to, assigned property type).

### How to proceed:

- Define a subclass of I4 Proposition Set, namely Ixxx Singleton Proposition Set (label up for debate). Express the connection to the Attribute Assignment instance through FOL. To be dealt with in a new issue.  
**HW:** MD & PF. AK will collaborate.
- Once the point above has been settled, we can revisit the I5/S5 relation and the place of S6, S7, and S8 in CRMsci or CRMinf.
- For the next releases of CRMsci and CRMinf, the previous decisions in 602 are undone.

[NEW ISSUE]: Define Ixxx Singleton Proposition Set

The SIG appointed PF & MD to define a class Ixxx Singleton Proposition Set. Details in Issue 602.

Issue 316: Coreference statements for CRMinf

MD walked the SIG through the proposal to modify the coreference statement in a way that does not create contradictions with the completely redesigned modelling constructs around I7 Belief Adoption.

**Proposal:** Determine a modelling construct or a guideline concerning whatever author x meant by text y and assigning a URI to its real-world referent (to be associated with the intended meaning of y).

### Discussion points:

- An identity assumption about a number of entities (same, not same, possibly same), can be enhanced with a belief model (a justification of one's belief concerning the identities of said objects). For any identifiable object that is mentioned in an identity assumption, it follows that it must be referenced by an instance of E73 Information Object.
- Examples needed to clarify the proposal.

### Decision:

- **HW:** PF, MD, AG (can provide material), AK, SdS (to proofread) to determine whether this relationship requires a link btw classes or if it only takes a guideline to express. And how to specify that the identity of a URI, is restricted to what it originally stood for.
  - Use examples of locations to examine this.
  - Consider a typology applied to the URIs (especially relevant for locations)

Issue 609: Interfacing the closed-world assumption of NTPs with CRMinf

The SIG went through MD's HW on defining the conditions for an investigation to be considered complete -i.e., one that justifies the lack of observations for a given feature to be considered valid and trustworthy.

**Proposal:** Proofread and enrich the document (see [appendix](#)) with links to ([Velios et al. 2023](#)),<sup>1</sup> and to elaborate the set of properties necessary to express the three conditions identified therein, based on archaeological data and conservation data.

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<sup>1</sup> Velios, A., Meghini, C., Doerr, M. and Stead, S., 2023. Typed properties and negative typed properties: Dealing with type observations and negative statements in the CIDOC CRM. *Semantic Web*, (Preprint), pp.1-21.

## Decisions:

The document should serve as a guideline or comment to the use and meaning of NTPs (to be consulted in combination with Velios et al., 2023). It should also appear on the CRM website.

**HW:** SdS to proofread the text link to Velios et al., 2023

**HW:** SdS, GH, MD, TV to elaborate the properties needed to express the temporal validity of the lack of observations for a given feature, based on data from archaeology (GH to provide datasets on prehistoric surveys, SdS to provide datasets from archaeological excavations) and conservation (TV to provide them).

Issue 579: [How to model the focus or view of an observation](#)

The SIG accepted the proposal by MD to continue working towards modelling the area of an observation and consider whether it is generally broader than the measurement.

The mappings of Aioli (a service created by MAP, which generates 3D models of objects/buildings from photographs and propagates the metadata of the photographs –like area, orientation, distance, angle, etc., and technical metadata as well, –to the overall 3D representation) to CRM can be referenced for the HW. They need to be updated.

**HW:**

- AG to review the Aioli mapping (which is also relevant for the CRMdig cleanup)
- SdS will be sharing sample data with AG, will also contact Martijn van Leusen in order to get access to some survey data.
- AK will look at the Semantic Sensor Network Ontology ([SSN](#))

Issue 635: [property quantifier mismatches](#)

Two subtopics:

- The idea that a dimension can pertain to multiple timespans, only holds if these timespans are identified by temporal primitives.
  - This can be conveyed in CRM through the property quantification (1,1:0,n), taken together with an FOL statement relaying that the condition that n only pertains to declarative timespans.
  - The FOL constraint should be rendered in prose in the scope note. Redrafting the scope note of P191 to be handled in a [separate issue](#).
- The property quantifications of P43 has dimension, O12 has dimension (and possibly P179 had sales price) have incongruent semantics with the specific case of relative dimension. Harmonizing them is to be explored in a [separate issue](#).

**Issue closed**

[NEW ISSUE]: [redefine the scope note and FOL of P191 had duration](#)

A new issue where to redefine the scope-note and FOL of P191, taking into consideration the following:

- The idea that a dimension can pertain to multiple timespans, only holds if these timespans are identified by temporal primitives.

- This can be conveyed in CRM through the property quantification (1,1:0,n), taken together with an FOL statement relating that the condition that n only pertains to declarative timespans. The FOL should be rendered in prose in the scope note.

**HW:** MD & WS to work on the redefinition

**HW:** AK to contribute with examples

[NEW ISSUE]: Harmonize the quantification of P43 & O12 has dimension (also P179 had sales price)

**HW:** MD & WS need to rework the property quantifications and FOL statements, to allow for E54 Dimension to cover dimensions of individual things and relative dimensions (that are calculated as distances and angles between things).

**HW:** MD & WS to work on the property quantifications and FOL statements for P43, O12, P179

**HW:** AK to contribute with examples

Issue 622: Redraft and update the introduction of CRMarchaeo

CEO walked the SIG through the updates in the newest release of CRMarchaeo, and proposed that it be assigned the status “Stable”. The document can be found [here](#).

**Discussion points:**

- The Allen operators are rendered through multiple material implications temporal primitives, not equivalences. If they can be rendered as equivalences this is to be dealt through a separate issue.
- Further improvements and enrichments of the CRMarchaeo document do not prohibit CRMarchaeo V2.0 from being assigned the status “Stable”

Everyone in agreement with CEO’s proposal.

***Issue closed***

[NEW ISSUE]: Allen operators rendered through equivalences

This issue stems from [622](#).

**HW:** WS to review the temporal primitive properties that are given as superproperties to the Allen Operators that have been introduced in CRMarchaeo and see how they can be represented as equivalences rather than material implications.

Any changes that may result to CRMarchaeo will go to a next release (not the stable one).

[NEW ISSUE]: hierarchical dependencies between extensions or through CRMbase?

The SIG resolved to start a new issue where to discuss whether hierarchical dependencies should be declared between extensions or between a given extension and the CIDOC CRM instead.

For some context, see the definition of [J2 concluded that](#) in CRMInf.

- Specifically, based on the decisions concerning issue [469](#), in October 2020 ***J2 concluded that*** was declared a subproperty of *P116 starts (is started by)*.

- Subsequently, *P116 starts (is started by)* moved to CRMarchaeo (in v2.0: it has been assigned the number ID *AP24 starts (is started by)*).
- Among its superproperties feature
  - P175 starts before or with the start of (starts after or with the start of)
  - P175i starts after or with the start of (starts before or with the start of)
  - P185 ends before the end of (ends after the end of)
 These properties also feature in the migration instructions for P116 (from 7.1.1 onwards I think, but definitely in v7.1.2)
- We should not be listing both [AP24 starts] AND [P175, P175i, P185], given that the former is declared a subproperty of the latter set., but the SIG needs to determine which link to state for the superproperty of *J2 concluded that*.

**HW:** CRM Editors to determine the best way to go about it

#### CRM URIs

Presentation by Pavlos Fafalios.

The slide deck can be found [here](#).

The SIG provided some feedback to PF, and decided:

- URIs that do not contain the class/property label (only the number id) should redirect to the official/last stable version
- HTML pages only include URIs to the last stable version. For older versions: “This URI always resolves to the latest version”
- Substitute “URI (backwards direction)” with “URI (inverse direction)”.
- Include a section (a link under “The Model”) called “Namespaces and URIs”

#### Generating RDF triples from draw.io diagrams

Presentation by Elias Tzortzakakis

The slide deck can be found [here](#).

The service has a didactic aspect as well. It should be contextualized better and displayed on the website under this kind of resources, once the site has been redone.

**HW:** StH to communicate with GB in order to publicize the service ETz has created.

Issue 588: Common policy/method for implementing the .1 properties of base and extensions in RDF

PF shared the HW (implementation guideline). Details of the proposal in the [appendix](#).

The SIG approved the statement.

***Issue closed***

Issue 638: Implementing .2 properties in RDF

PF proposed to:

- Provide the corresponding PC constructs when implementing CRMarchaeo (as we do with .1 properties in all models)
- Close this issue and discuss George's and Martin's aspects about possible hidden ontological entities, as well as other solutions on implementing .1 and .2 properties), in [Issue 640](#) (statements about statements)
- Raise a new issue IF it seems that a different approach might need to be analyzed and discussed for the case of CRMarchaeo (e.g. modeling state instead of having a .2 property, etc.), and assign homework

**Discussion points:**

- Not clear how hidden entities in .1 property constructs relate to statements about statements (issue 640). The question originally posed had to do with n-ary relations (where  $n < 2$ ) expressed in rdf as containing a hidden entity.

**Decisions:**

Issue closed, start new issue.

If new issue never takes off, then it will be deleted.

[NEW ISSUE]: distinction of entities and n-ary relationships

Move the discussions on distinguishing entities and n-ary relationships from 640 to that issue.

No HW assignment for the moment.

Friday 13 October 2023

Issue 250: CRMgeo for Getty TGN representation

There is substantial overlap (in terms of outputs) with Issue 556 (and a place-type hierarchy that will be eventually created therein). Also, no work has been produced for 250 in over 8 years.

The SIG voted to close the issue; it has been inactive for more than 8 years.

***Issue closed***

Issue 274: Archetypical sounds

The SIG decided to not close the issue for now. Instead, it assigned GB and SdS to review the empirical evidence gathered until now, review the class and property definitions by GB dating back to 2019, and bring them up for a vote in the next meeting, in Paris.

**HW:** GB, SdS to summarize the proposal and bring to a decidable form in time for Paris 2024.

Issue 365: A top-level ontology on which CRM and all its extensions will be depended

The SIG resolved to close the issue. In a sense, the decision to create gitlab repositories for CRMbase and extensions provides automated solutions for keeping updated the class/property hierarchy tables expressing dependencies across modes.

And in the meantime, the SIG has not expressed an interest in creating CRMsuper, so it makes no sense to keep the issue open –especially since the people originally involved in the HW have stopped working on it.

### ***Issue closed***

Issue 429: P72 has language

A group (GB, PR, TV, MR) had formed to work on an “ability/aptitude” property in May 2022. They have not shared any HW with the SIG since, namely: examples pointing to the relevance for the scope of CRM.

The SIG resolved to not close the issue for the moment, since none of the group were present at the discussion. The group will be given some more time (until the spring 2024 meeting in Paris) to prepare the HW. If no HW is drafted by then, the issue will close. If there is HW available at the time, the SIG will decide accordingly.

Issue 457: harmonization of graphical documentation about CRM

The issue has trivially been resolved by means of adopting the style guide by CHIN in order to:

- redo the diagrams in the Functional Overview for the ISO version (5.0.4 and 7.1.3) and Official Community versions (7.1.2 at the moment)
- standardize the derivation of rdf triples from draw.io diagrams (see presentation by ETz).

To the SIGs mind, however, the style guide used in the representations of modeling constructs under Functional Overview (HW by GB for [628](#)) and in FORTH’s implementation (presentation by ETz) are not identical to CHIN’s library. Furthermore, AG mentioned that she intends to update the library for instances.

The SIG decided to not close the issue, despite the points it raises having been rendered moot:

- the color-code used is that of CHIN (also features in projects like SARI, the CRMgame –card & digital version), and
- the use of a double line arrow to designate IsA relations has been abandoned, since the diagrams are not done in ppt anymore.

The issue has now drifted to making sure that the CHIN library gets enhanced with class/property instance representations and that the color code used in FORTHs implementation is in fact identical to that of CHIN.

The diagrams in the CRMbase will eventually have to be redone.

Group to settle this once and for all: PM, AG, GB, MD, ETz.

Issue 509: Modify art objects

The SIG resolved to close the issue on the grounds of not having received empirical evidence / datasets that support drafting additional classes to express the modification of art to yield new classes for more than 3 years.

### ***Issue closed***

Issue 519: Keep or deprecate P54 and P48?

Despite a vote having taken place, where the SIG expressed the will to keep the two properties, it then appointed RS & PR to provide evidence on the use of P48 to consider Nomens/Name Use Statements.

The issue can be dropped, however, given that RS has expressed his disinterest in pursuing it further in the proposed direction.

***Issue closed***

Issue 382: where to stop documenting the provenance

MDs text has been reviewed by GB and it now has many unresolved comments. The intention was that the text be reviewed by a group of people (not just GB), that any comments-feedback would get incorporated in it, and it would be brought to the SIG to be voted on and published on the website.

**How to move forward:**

Contact the people involved in the HW (MD, GB, RS, PM, ML, NC, OE) and ask them to finalize the text in time for the spring 2024 meeting. If they do not, then the issue will be closed.

Things have not been properly documented (?) in CIDOC CRM V7.2.x strand

Comments and changes that have not been accepted thus far appear on the document, which makes it illegible.

However, it's only for draft versions.

Issue 349: Belief Values

The issue was not discussed because none of the people involved in the HW could make it in the session.

Issue 408: Rights Model Enriched

The last development in that issue is when MD shared some bibliography on IPR with the CRMsoc group. At the time, GB didn't have the time to look at it before the 50<sup>th</sup> SIG meeting. However, any progress in the SIG has been blocked by lack of developments in CRMsoc.

There are other issues that have been blocked as a result of that, and the SIG needs to determine how to proceed with respect to issues stemming from CRMsoc.

MF, GH, CEO (to name but a few) have expressed a need for a stable version of CRMsoc.

According to GB a large block of work is ready, and he is willing and able to share it with the SIG to be reviewed.

**HW:** GH, CEO will be reading the documentation and datasets that support the modeling constructs in CRMsoc and the model as a whole will be reviewed in the spring 2024 meeting.

Be on the lookout for points of conversion with CRMinfluence.

Issue 439: Approximate Dimensions

The overall sentiment in LinkedArt is that from the perspective of Museums approximating dimensions is not particularly relevant. But for working with GIS it becomes highly relevant.



**How to move forward:**

Contact the people involved in the HW (RS, MD) and ask them to propose a decidable solution in time for the spring 2024 meeting. If they do not, then the issue will be closed.

**Issue 461: Attribute Assignment of .1 properties**

The problem that adding P177 assigned property type was meant to resolve, was to allow an instance of E13 Attribute Assignment construct to not only link an instance of E1 CRM Entity that the E13 was about with some other thing, but what it said about the E1 in question.

It turned out that there are .1 properties involved in the assigned properties, for instance “in the role of” could not be accommodated in the structures allowed now. The issue aimed at discussing the means to provide the now missing .1 qualification.

**Discussion:**

Since E13 can assign more than one property between a domain and a range at the same time, there is no way to tell which property we’re talking about. The scope note should probably change to only allow one property assignment per E13. The quantification should change, and the scope note should reflect that.

**How to move forward:**

**HW:** CEO, SdS and WS to propose:

- diagrams sketching the proposal to assign one property per E13 instance (as opposed to the alternative for assigning multiple propositions at once, which could be handled through CRMinf),
- property quantification that allows only one property assignment per E13
- a scope note alteration in P177 that reflects the statement above

**Issue 505: Winkelmann Graphics –a prototype for diagrams exemplifying STVs and reasoning**  
ML was supposed to produce an animation depicting the Winkelmann meets Laocoon example, but the HW has not been submitted since 2020 and it doesn’t look promising that it will be submitted in the future.

The SIG resolved to close the issue despite this last piece of HW not having been received, because it does not have a bearing on the evolution of the ontology.

If there is an offer by someone else to provide an animation for the example, the SIG will start a new issue where to provide requirements and feedback.

***Issue closed*****Issue 527: Modeling provenance of Intangible Heritage**

The issue packs a lot of information in a HW assignment that creates unrealistic expectations, which is probably why no real progress has been made since it started.

At the same time, a [proposal](#) has been made at the CIDOC 2023 conference by the Intangible Cultural Heritage WG<sup>2</sup> about a method for documentation and a model to do so that uses CIDOC CRM.

They could be invited to the next SIG meeting to present their work (contact person would be Trilce Navarrete Hernandez), but we should also make sure to properly introduce the issue at hand, in order to not miss the connection with the work by the Intangible Heritage WG.<sup>3</sup>

Issue 542: Groups and carried out by

The issue is dependent on CRMsoc developments. It will be left open, and GB will share pointers to the relevant set of classes/properties that document carrying out an activity on behalf of someone else with CEO & GH when he shares the revised copy of CRMsoc with them.

Issue 544: CRMtex: Fragment Ordering Reconstruction

The issue description reads as follows:

I propose a new class Txxxx Fragment Order Reconstruction:

"This class comprises activities of arranging physical text fragments in a way that attempts to reconstruct their original position in a text fragmented and often only partially preserved. It includes evident from shape, material structure and the sense that reading makes. It may even use as argument similar, more completely preserved texts."

Comment: I was shown in a conservation lab the ordering of sequences of Chinese characters, worm-bitten in a way that each character was isolated on another fragment. The ancient ink actually contained an insecticide.

There have been no other developments in this issue, none of the maintainers of CRMtex have followed up on it, so the SIG is to assess the proposal and decide what to be done.

#### **Discussion:**

Overall preference for using CRMinf to arrange physical text fragments.

It is not much different from the reasoning involved in archaeological restorations, or rearranging sherds, or statues, buildings, papyri etc. The same principles of inferring would apply to solving a jigsaw. It should be a more generic construct expressed in CRMinf.

The class is understood to be only useful in an ad hoc case.

#### **Decision:**

Close the issue and if anyone wants to start a new issue about reconstructions in general, for CRMinf, they should do so. But it should be brought to a decidable form, before we start introducing classes.

***Issue closed***

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<sup>2</sup> Intangible Cultural Heritage & Museums Project: <https://www.ichandmuseums.eu/en>

<sup>3</sup> **RECORDING AND PRESENTATIONS: CIDOC ICH WORKING GROUP**  
<https://immaterieelerfgoed.be/nl/nieuws/recording-and-presentations-cidoc-ich-working-group>

### CIDOC CRM SIG 2024 autumn meeting

A proposal was made by GB to host the SIG meeting in Plovdiv (Bulgaria), in late September 2024. There will be no conflict with the CIDOC 2024 Conference, which will take place in November 2024.

The week in question is 23-27 September 2024.

The SIG agreed to that proposal. The details will be announced later on.

### Feedback for the organizers:

- Being able to stay on the premises where the meeting took place (CNRS MAP Campus) was ideal, it meant not having to waste time commuting.
- The introductory sessions were very helpful. It calls on a lot of resources from the local organizers to hold a workshop that newcomers will benefit from. It would be nice if we could standardize introductory workshops for all meetings, but it greatly depends on the host's ability to allocate resources to it.
  - Let's reserve a day for introductory activities as a rule (Monday before the start of the meeting), and see how we fill it in.
- Always reserve a slot for feedback.

## Appendices

### I: List of abbreviated names

| <b>Abbreviation</b> | <b>Name</b>        |
|---------------------|--------------------|
| AG                  | Anaïs Guillem      |
| AGr                 | Antoine Gros       |
| AK                  | Athina Kritsotaki  |
| CEO                 | Christian-Emil Ore |
| DO                  | Dominic Olman      |
| ETs                 | Eleni Tsouloucha   |
| ETz                 | Elias Tzortzakakis |
| GB                  | George Bruseker    |
| GH                  | Gerald Hiebel      |
| MD                  | Martin Doerr       |
| MF                  | Mark Fichtner      |
| ML                  | Matteo Lorenzini   |
| MR                  | Mélanie Roche      |
| NC                  | Nicola Carboni     |
| OE                  | Oyvind Eide        |
| PF                  | Pavlos Fafalios    |
| PM                  | Philippe Michon    |
| RS                  | Rob Sanderson      |
| SdS                 | Stephen Stead      |
| StH                 | Stephen Hart       |
| TV                  | Thanasis Velios    |
| VA                  | Vincent Alamercery |
| WS                  | Wolfgang Schmidle  |

## II: Amendments

Issue 643

*P156 scope note adjustment*

(NEW)

### **P156 occupies (is occupied by)**

Domain:

E18 Physical Thing

Range:

E53 Place

Subproperty of:

E18 Physical Thing. P53 has former or current location (is former or current location of): E53 Place

E18 Physical Thing. P157i provides reference space for: E53 Place

Quantification:

many to one (0,1:0,n)

Scope note:

This property describes the largest volume in space, an instance of E53 Place, that an instance of E18 Physical Thing has occupied at any time during its existence, with respect to the reference space relative to the physical thing itself. This allows for describing the thing itself as a place that may contain other things, such as a box that may contain coins. In other words, it is the volume that contains all the points which the thing has covered at some time during its existence. The reference space for the associated place must be the one that is permanently at rest (*P157 is at rest relative to*) relative to the physical thing. For instances of E19 Physical Objects it is the one which is at rest relative to the object itself, i.e., which moves together with the object. For instances of E26 Physical Feature it is one which is at rest relative to the physical feature itself and the surrounding matter immediately connected to it. Therefore, there is a 1:1 relation between the instance E18 Physical Thing and the instance of E53 Place it occupies. We include in the occupied space the space filled by the matter of the physical thing and all its inner spaces.

This property is equivalent to the fully developed path from E18 Physical Thing through *P196 defines*, E92 Spacetime Volume, *P161 has spatial projection* to E53 Place. However, in contrast to *P156 occupies*, the property *P161 has spatial projection* does not constrain the reference space of the referred instance of E53 Place.

In contrast to *P156 occupies*, for the property *P53 has former or current location* the following holds:

It does not constrain the reference space of the referred instance of E53 Place.

It identifies a possibly wider instance of E53 Place at which a thing is or has been for some unspecified time-span.

If the reference space of the referred instance of E53 Place is not at rest with respect to the physical thing found there, the physical thing may move away after some time to another place and/or may have been at some other place before. The same holds for the fully developed path

from E18 Physical Thing through *P196 defines*, E92 Spacetime Volume, *P161 has spatial projection* to E53 Place.

Examples:

- The Saint Titus reliquary (E22) *occupies* the space of the Saint Titus reliquary (E53). [The reliquary is currently kept in the Saint Titus Church in Heraklion, Crete since 1966 and contains the skull of Saint Titus.] (Fisher & Garvey, 2010)
- Burg Eltz near Koblenz, Germany (E24) *occupies* the space within the 1661AD outer walls of Burg Eltz (E53). [The castle (English name: Eltz Castle) underwent a series of expansions starting in the 12<sup>th</sup> century until it reached its current extent in 1661AD and contains buildings from various periods.]

In first-order logic:

$P156(x,y) \Rightarrow E53(y)$

$P156(x,y) \Rightarrow E18(x)$

$P156(x,y) \Leftrightarrow (\exists z) [E18(x) \wedge E53(y) \wedge P196(x,z) \wedge P161(z,y) \wedge P157(y,x)]$

(OLD)

**P156 occupies (is occupied by)**

Domain:

E18 Physical Thing

Range:

E53 Place

Subproperty of:

E18 Physical Thing. P53 has former or current location (is former or current location of): E53 Place

E18 Physical Thing. P157i provides reference space for: E53 Place

Quantification:

many to one (0,1:0,n)

Scope note:

This property describes the largest volume in space, an instance of E53 Place, that an instance of E18 Physical Thing has occupied at any time during its existence, with respect to the reference space relative to the physical thing itself. This allows for describing the thing itself as a place that may contain other things, such as a box that may contain coins. In other words, it is the volume that contains all the points which the thing has covered at some time during its existence. The reference space for the associated place must be the one that is permanently at rest (*P157 is at rest relative to*) relative to the physical thing. For instances of E19 Physical Objects it is the one which is at rest relative to the object itself, i.e., which moves together with the object. For instances of E26 Physical Feature it is one which is at rest relative to the physical feature itself and the surrounding matter immediately connected to it. Therefore, there is a 1:1 relation between the instance E18 Physical Thing and the instance of E53 Place it occupies. We include in the occupied space the space filled by the matter of the physical thing and all its inner spaces.

This property implies the fully developed path from E18 Physical Thing through *P196 defines*, E92 Spacetime Volume, *P161 has spatial projection* to E53 Place. However, in contrast to *P156*

*occupies*, the property *P161 has spatial projection* does not constrain the reference space of the referred instance of E53 Place.

In contrast to *P156 occupies*, for the property *P53 has former or current location* the following holds:

It does not constrain the reference space of the referred instance of E53 Place.

It identifies a possibly wider instance of E53 Place at which a thing is or has been for some unspecified time-span.

If the reference space of the referred instance of E53 Place is not at rest with respect to the physical thing found there, the physical thing may move away after some time to another place and/or may have been at some other place before. The same holds for the fully developed path from E18 Physical Thing through *P196 defines*, E92 Spacetime Volume, *P161 has spatial projection* to E53 Place.

Examples:

- The Saint Titus reliquary (E22) *occupies* the space of the Saint Titus reliquary (E53). [The reliquary is currently kept in the Saint Titus Church in Heraklion, Crete since 1966 and contains the skull of Saint Titus.] (Fisher & Garvey, 2010)
- Burg Eltz near Koblenz, Germany (E24) *occupies* the space within the 1661AD outer walls of Burg Eltz (E53). [The castle (English name: Eltz Castle) underwent a series of expansions starting in the 12<sup>th</sup> century until it reached its current extent in 1661AD and contains buildings from various periods.]

In first-order logic:

$P156(x,y) \Rightarrow E53(y)$

$P156(x,y) \Rightarrow E18(x)$

$P156(x,y) \Leftrightarrow (\exists z) [E18(x) \wedge E53(y) \wedge P196(x,z) \wedge P161(z,y) \wedge P157(y,x)]$

Issue 570

### *First Order Logic Reading Guide*

For those not trained in mathematics, formal logical expressions are hard to decipher and comprehend. In this text, we have chosen a particularly compact symbolic form, in order to visualize more clearly the essential inferences that the expressions describe.

However, all logical expressions can be brought into a sufficiently comprehensible linguistic form resolving the logical symbols by stereotype parts of speech when reading them. This works particularly well for short logical expressions.

For more complex logical expressions, an explicit linguistic form may become too extended, and the reader may again lose track of the overall meaning. Logical expressions use variables in different parts to refer to any item for which that part of the expression applies. Sometimes, a natural language rendering may become more comprehensible when relative pronouns (e.g. who, which, whose) are introduced in order to connect such items within an expression in a more compact form. Also, "instance of" can be replaced by "a"/"an". Using the latter, we show below some more explicit versus more compact reading alternatives.

Note when reading FOL statements that they are ontological, i.e., they refer to how the assumed reality must be as premise, as far as the referred CRM concepts are applicable to this reality, regardless whether we have knowledge of this reality or not.

In the following, we explain the (English) reading method by example of sample definitions from the CIDOC CRM text. Instead of explaining the rules of correspondence between logical symbolism and parts of speech in words, we use blue to denote phrases corresponding to FOL syntactic elements, red and green for variables, black for concept labels, and red for “there exists”. We expand the concept identifiers by the full labels.

The “if...then...must be..” constitutes the inference described by and in the direction of the “ $\Rightarrow$ ” arrow (also reading as “implies”).

#### *FOL annotated examples*

##### (super|sub)property FOLS

- **P11(x,y)  $\Rightarrow$  P12(x,y)**
  - If an **E5 Event x** (P11) had participant an **E39 Actor y**, then this **x** (P12) occurred in the presence of **y**

##### complex axiom FOLS

- **P8(x,y)  $\Leftarrow$  ( $\exists z$ ) [E53(z)  $\wedge$  P7i(z,x)  $\wedge$  P156i(z,y)]**
  - The last statement above interprets the paragraph highlighted in yellow in the scope note above as a FOL statement.
  - For reading this properly, you need the property names of P7i, P156i, and their domain and range conditions.
  - Start reading in the direction of the “ $\Rightarrow$ ” arrow
    - **$\Leftarrow$  ( $\exists z$ ) [E53(z)  $\wedge$  P7i(z,x)  $\wedge$  P156i(z,y)]**
    - If there exists an **E53 Place z** which (P7i) witnessed an **E4 Period x** and (P156i) is occupied by an **E18 Physical Thing y**, then this **x** (P8) took place on or within this **y**  
Note that we use in the parentheses above the domain – range conditions of P7 and P156.

#### Issue 492:

This is what I attempt to do here. For example, I try to describe what a property such as “P111 added” means for the physical extents of the thing that is added and the thing it is added to.

#### **P8, P12, P110, P111, P112, P113**

A little refresher for the properties mentioned in issue 492:

P12, P110, P111, P112, P113 in the property hierarchy:

E18 Physical Thing P31i was modified by E11 Modification

E18 Physical Thing **P110i was augmented by** E79 Part Addition

E18 Physical Thing **P112i was diminished by** E80 Part Removal



E5 Event **P12 occurred in the presence of** E77 Persistent Item

E7 Activity P16 used specific object E70 Thing

E79 Part Addition **P111 added** E18 Physical Thing

E80 Part Removal **P113 removed** E18 Physical Thing

Part Removal is more difficult than Part Addition, so I leave it for a continuation of this homework.

P8 and P7 are mentioned in issue 492, but neither P8 nor P7 are discussed here. For the sake of completeness:

E4 Period **P8 took place on or within** E18 Physical Thing

is a shortcut of

E4 Period **P7 took place at** E53 Place P156i is occupied by E18 Physical Thing

### Named FOL clusters

Because the axioms in this homework tend to be very long, I am defining some *named FOL clusters*. For example:

$u$  is presence of  $x$  during  $t \Leftrightarrow E18(x) \wedge E52(t) \wedge E93(u) \wedge P195i(x,u) \wedge P164(u,t)$

(Physical Thing *P195i* had presence Presence *P164* is temporally specified by Time-Span)

$y$  is physically part of  $x$  during  $t$

$\Leftrightarrow E18(x) \wedge E18(y) \wedge E52(t) \wedge$  the presence of  $y$  is within the presence of  $x$  during  $t$

$\Leftrightarrow E18(x) \wedge E18(y) \wedge E52(t) \wedge (\exists u,w) [u \text{ is presence of } x \text{ at } t \wedge w \text{ is presence of } y \text{ at } t \wedge P10(w,u)]$

$\Leftrightarrow E18(x) \wedge E18(y) \wedge E52(t) \wedge (\exists u,w) [E93(u) \wedge P195i(x,u) \wedge P164(u,t) \wedge E93(w) \wedge P195i(y,w) \wedge P164(w,t) \wedge P10(w,u)]$

Note:

- As can be seen in this example, duplicate class definitions can be removed.

### P46 is composed of

E18 Physical Thing P46 is composed of (forms part of) E18 Physical Thing

### The existing axiom

The existing axiom:

$P46(x,y) \Rightarrow (\exists u,z,w) [E93(u) \wedge P195i(x,u) \wedge E52(z) \wedge P164(u,z) \wedge E93(w) \wedge P195i(w,y) \wedge P164(w,z) \wedge P10(w,u)]$

If one moves  $(\exists u, w)$  into the  $(\exists t)$  bracket to minimise the scopes of the quantifiers, it can be written as

$$P46(x, y) \Rightarrow (\exists t) [E52(t) \wedge (\exists u, w) [E93(u) \wedge P195i(x, u) \wedge P164(u, t) \wedge E93(w) \wedge P195i(y, w) \wedge P164(w, t) \wedge P10(w, u)]]$$

With named FOL clusters, it is equivalent to

$$P46(x, y) \Rightarrow (\exists t) [y \text{ is physically part of } x \text{ during } t]$$

### Avoiding edge cases that can make the axiom meaningless

FOL axioms in CIDOC CRM tend to be self-contained. For example, there is no general statement about the conditions under which the spatial projection of a period exists in a given reference space. However, a concrete statement such as “x P7 took place at y” implies not only that the spatial projection z (in the same reference space as y) is within y, but also that this z does indeed exist.

Likewise, there are no general statements about the existence or non-existence of empty time-spans or empty presences. The right-hand side of the P46 axiom is trivially true if empty time-spans and empty presences are allowed. Thus, we need to rule out that the time-span is empty or outside the existence of y. (This implies that it is also within the existence of x, and that the presences of x and y are non-empty.)

$$P46(x, y) \Rightarrow (\exists t) [t \text{ has positive duration} \wedge t \text{ is within the existence of } y \wedge y \text{ is physically part of } x \text{ during } t]$$

Additional named FOL clusters:

$$t \text{ has positive duration} \Leftrightarrow E52(t) \wedge (\exists r) [E52(r) \wedge P86(r, t) \wedge \neg(r=t)]$$

$$t \text{ is within the existence of } y \Leftrightarrow E52(t) \wedge E18(y) \wedge (\exists s) [s \text{ is the duration of the existence of } y \wedge P86(t, s)]$$

$$s \text{ is the duration of the existence of } y \Leftrightarrow E52(s) \wedge E18(y) \wedge (\exists v) [E92(v) \wedge P196(y, v) \wedge P160(v, s)]$$

The resulting self-contained axiom:

$$P46(x, y) \Rightarrow (\exists t) [E52(t) \wedge (\exists r) [E52(r) \wedge P86(r, t) \wedge \neg(r=t)] \wedge (\exists s) [E52(s) \wedge (\exists v) [E92(v) \wedge P196(y, v) \wedge P160(v, s)] \wedge P86(t, s)] \wedge (\exists u, w) [E93(u) \wedge P195i(x, u) \wedge P164(u, t) \wedge E93(w) \wedge P195i(y, w) \wedge P164(w, t) \wedge P10(w, u)]]$$

Since we already know that s and v exist (and are unique) for any physical thing y, we can move them to the left-hand side, i.e. turning the  $(\exists s)$  on the right-hand side into an implicit  $(\forall s)$  on the left-hand side:

$$P46(x, y) \wedge E92(v) \wedge P196(y, v) \wedge E52(s) \wedge P160(v, s) \Rightarrow (\exists t) [E52(t) \wedge (\exists r) [E52(r) \wedge P86(r, t) \wedge \neg(r=t)] \wedge P86(t, s) \wedge (\exists u, w) [E93(u) \wedge P195i(x, u) \wedge P164(u, t) \wedge E93(w) \wedge P195i(y, w) \wedge P164(w, t) \wedge P10(w, u)]]$$

(i.e. if  $P46(x, y)$  and v is the Spacetime volume of y with duration s  $\Rightarrow$  ... )

- Alternatively, we can require the presence of y to be non-empty. Then the presence of x is also non-empty, and t must have positive duration and be within the existence of y. This could be written like this:  
$$P46(x, y) \Rightarrow (\exists t) [E52(t) \wedge (\exists w, u) [E93(w) \wedge P195i(y, w) \wedge P164(w, t) \wedge (\exists r) [E52(r) \wedge P86(r, t) \wedge \neg(r=t)] \wedge E93(u) \wedge P195i(x, u) \wedge P164(u, t) \wedge P10(w, u)]]$$

However, I find the version with the conditions for t instead of w conceptually more clear.

### Using symbols

The sheer length of the self-contained axiom would make it desirable to move at least some part of the heavy lifting elsewhere. For example, one could introduce a symbol “ $\emptyset$ ” in P86 with

$$E52(\emptyset) \wedge (\forall r) [E52(r) \Rightarrow P86(\emptyset, r)]$$

and

$$t \text{ has positive duration} \Leftrightarrow \neg(t=\emptyset)$$

$$P46(x, y) \wedge E92(v) \wedge P196(y, v) \wedge E52(s) \wedge P160(v, s) \Rightarrow (\exists t) [E52(t) \wedge \neg(t=\emptyset) \wedge P86(t, s) \wedge (\exists u, w) [E93(u) \wedge P195i(x, u) \wedge P164(u, t) \wedge E93(w) \wedge P195i(y, w) \wedge P164(w, t) \wedge P10(w, u)]]$$

(Or state that there is no time-span with this property.)

→ Martin during the presentation: let's generally state that time-spans have non-zero length

Was it in E52 or in P86? Conceptually it seems to belong in E52, but in addition to the statement in a scope note we need an axiom like

$$E52(t) \Rightarrow (\exists r) [E52(r) \wedge P86(r, t) \wedge \neg(r=t)]$$

which would be the first non-trivial axiom in the FOL of any class.

### Using functions

We could also get rid of the  $(\exists u, w)$ . With a minimal, uncontroversial existence axiom for presences, namely

$$E92(x) \wedge E52(s) \wedge P160(x, s) \wedge E52(t) \wedge \neg(t=\emptyset) \wedge P86(t, s) \Rightarrow (\exists u) [E93(u) \wedge P195i(x, u) \wedge P164(u, t)]$$

(i.e. for a Spacetime Volume x with duration s and a non-empty time-span t within s, the presence of x for the time-span t exists; in fact, it is also non-empty)

Since presences are always unique, we can define a function

$$\text{Presence } u = F195(\text{Physical Thing } x, \text{Time-Span } t)$$

whose domain includes at least all  $(x, t)$  where t is non-empty and within s, which is sufficient for the P46 axiom. Thus we can write it as:

$$P46(x, y) \wedge E92(v) \wedge P196(y, v) \wedge E52(s) \wedge P160(v, s) \Rightarrow (\exists t) [E52(t) \wedge \neg(t=\emptyset) \wedge P86(t, s) \wedge P10(F195(y, t), F195(x, t)) ]$$

With an additional function for the duration of the Spacetime Volume of a Physical Thing, which also exists and is unique:

$$\text{duration } s = F160(\text{Physical Thing } y)$$

$$P46(x, y) \Rightarrow (\exists t) [E52(t) \wedge \neg(t=\emptyset) \wedge P86(t, F160(y)) \wedge P10(F195(y, t), F195(x, t)) ]$$

This way we can avoid introducing variables such as v and s that we are not really interested in.

### **P46 is a shortcut of a E79 Part Addition**

P46 is a shortcut with the long path via E79 Part Addition:

$P46(x,y) \Leftarrow (\exists z) [\text{part addition } z \text{ has added } y \text{ to } x]$

part addition  $z$  has added  $y$  to  $x \Leftrightarrow E79(z) \wedge E18(x) \wedge E18(y) \wedge P110i(x,z) \wedge P111(z,y)$

$P46(x,y) \Leftarrow (\exists z) [E79(z) \wedge P110i(x,z) \wedge P111(z,y)]$

Note:

- $(\exists z)$  is generally not needed in non-strong shortcuts, so it could also be written as  $P46(x,y) \Leftarrow E79(z) \wedge P110i(x,z) \wedge P111(z,y)$
- P46 is probably \*not\* a shortcut of E80 Part Removal since the conditions for the existence of  $y$  are different: There doesn't have to be a time when  $y$  exists and forms part of  $x$ .

### **Analysis of E79 Part Addition**

“part addition  $z$  has added  $y$  to  $x$ ” implies:

at start of  $z$ :

- $x$  and  $y$  already exist ( $y$  is not created in the Part Addition)
- $y$  is not part of  $x$  (in the sense of P46)

at end of  $z$ :

- $x$  and  $y$  still exist
- $y$  is part of  $x$  (in the sense of P46)

Taken together:

- $z$  is temporally (properly) within the “existence” condition states of  $x$  and  $y$
- $y$  has a non-empty “part of  $x$ ” condition state  $p$ :
  - $p$  is within the existence of  $x$  and  $y$
  - $p$  includes or starts with the end of  $z$  (i.e. starts after the start but before or with the end of  $z$ , ends after the end of  $z$ )
  - $y$  is physically part of  $x$  during  $p$

For now, I leave out the “not part of  $x$ ” condition state.

## The self-contained axiom

part addition z has added y to x

$\Rightarrow (\exists c) [c \text{ is "existence" condition state of } x \wedge z \text{ is properly within } c]$

$\wedge (\exists d) [d \text{ is "existence" condition state of } y \wedge z \text{ is properly within } d]$

$\wedge (\exists p) [y \text{ has non-empty ("part of } x\text{") condition state } p]$

$\wedge p \text{ starts after the start of } z \wedge p \text{ starts before or with the end of } z \wedge p \text{ ends after the end of } z$

$\wedge y \text{ is physically part of } x \text{ during } p]$

c is "existence" condition state of x

$\Leftrightarrow x \text{ defines STV with duration } t \wedge E3(c) \wedge P44(x,c) \wedge E55(\text{existence}) \wedge P2(c, \text{existence}) \wedge P4(c,t)$

x defines STV with duration s

$\Leftrightarrow E92(v_x) \wedge P196(x, v_x) \wedge E52(s) \wedge P160(v_x, s) \Leftrightarrow s = F160(x)$

y has ("part of x") condition state p

$\Leftrightarrow E18(y) \wedge E3(p) \wedge P44(y,p) \wedge p \text{ has positive duration} \wedge p \text{ is within } c$

(P44 has condition, P2 has type, P4 has time-span)

In all, the axiom looks somehow like this:

$P46(x,y) \wedge E79(z) \wedge P110i(x,z) \wedge P111(z,y)$

$\wedge E92(v_x) \wedge P196(x, v_x) \wedge E52(s) \wedge P160(v_x, s)$

$\wedge E92(v_y) \wedge P196(y, v_y) \wedge E52(t) \wedge P160(v_y, t)$

$\Rightarrow$

$(\exists c,d,p,u) [E3(c) \wedge P44(x,c) \wedge P4(c,s) \wedge P176i(z,c) \wedge P185(z,c)$

$\wedge E3(d) \wedge P44(y,d) \wedge P4(d,t) \wedge P176i(z,d) \wedge P185(z,d)$

$\wedge E3(p) \wedge E52(u) \wedge P160(p,u) \wedge \neg(u=\emptyset) \wedge P44(y,p) \wedge P175i(p,d) \wedge P184(p,d)$

$\wedge P176i(p,z) \wedge P173(p,z) \wedge P185i(p,z)$

$\wedge P10(F195(y,u), F195(x,u)) ]$

Note:

- “z is within the existence of x and y” could be expressed via their time-spans, but even then it is difficult to catch the fact that z is properly within the existence of x and y. (I use “properly within” in the sense of “starts after the start AND ends before the end”, which is not the mathematical meaning, which is closer to “starts after the start OR ends before the end”. The mathematical meaning could still be expressed with time-spans.)
- Account for the possibility that e.g. a button can be part of a jacket several times.
- I haven’t found a way of comparing the temporal relationships of p and z without temporal primitives and only via their time-spans. Thus I needed to find a way from a physical thing to something where temporal primitives are allowed. E2 Temporal Entity would have worked, but E3 Condition State seemed more fitting since it is a state after an event. However, I am not sure, and this might be abusing the respective classes.

To be continued.

Issue 630

*NEW*

### **P38 deassigned (was deassigned by)**

Domain:

E15 Identifier Assignment

Range:

E42 Identifier

Subproperty of:

E13 Attribute Assignment. P141 assigned (was assigned by): E1 CRM Entity

Quantification:

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

Scope note:

This property associates an instance of E42 Identifier with the instance of E15 Identifier Assignment that deassigned it from an instance of E1 CRM Entity.

De-assignment of an identifier (recorded through an instance of E15 Identifier Assignment) means that the actor, typically an organisation, has decided to no longer use the identifier for an item which has been in its possession or was referred to in a context under the actor’s control.

Reasons to do so include: when an item is taken out of the collection; when items are merged or split up in a collection, an object is acquired under the identifier of another, donor, institution or if a new numbering system is introduced.

Depending on such cases, the de-assignment may also be associated with the assignment of a new identifier (via *P37 assigned (was assigned by)*) within the same instance of E15 Identifier Assignment.

The same identifier may be deassigned on more than one occasion.

Examples:

- The identifier assignment on 31<sup>st</sup> July 2001 of the silver cup OXCMS:2001.1.32 (E15) *deassigned* “232” (E42). (fictitious)

In first-order logic:

$P38(x,y) \Rightarrow E15(x)$

$P38(x,y) \Rightarrow E42(y)$

$P38(x,y) \Rightarrow P141(x,y)$

*OLD*

### **P38 deassigned (was deassigned by)**

Domain:

E15 Identifier Assignment

Range:

E42 Identifier

Subproperty of:

E13 Attribute Assignment. P141 assigned (was assigned by): E1 CRM Entity

Quantification:

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

Scope note:

This property associates an instance of E42 Identifier that was deassigned from an instance of E1 CRM Entity by an instance of E15 Identifier Assignment.

De-assignment of an identifier means that the actor, typically an organisation, carrying out the respective instance of E15 Identifier Assignment, has decided no more to use the respective identifier for an item which has been in its possession or was referred to in a context under the actor’s control. Reasons to do so may be, besides others, when an item is taken out of an inventory, items are merged or split up in a collection, an object is acquired under reference to the identifier of the giving institution or a new numbering system is introduced. Depending on such cases, de-assignment may be associated with the assignment of a new identifier (P37 assigned (was assigned by)) in the same instance of E15 Identifier Assignment.

The same identifier may be deassigned on more than one occasion.

Examples:

- The identifier assignment on 31<sup>st</sup> July 2001 of the silver cup OXCMS:2001.1.32 (E15) *deassigned* “232” (E42). (fictitious)

In first-order logic:

$P38(x,y) \Rightarrow E15(x)$

$P38(x,y) \Rightarrow E42(y)$

$P38(x,y) \Rightarrow P141(x,y)$

Issue 490

## **Pxxx has representative copy ()**

Domain:

E90 Symbolic Object

Range:

E25 Human-Made Feature

Subproperty of:

E90 Symbolic Object. P128i is carried by (carries): E18 Physical Thing

Quantification:

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

Scope note:

This property associates an instance of E90 Symbolic Object with a complete, identifying representation of its content in the form of a sufficiently readable instance of E25 Human-Made Feature, including, in particular, representations on electronic media, regardless whether they reside internally in clusters of electronic machines, such as in so-called cloud services, or on removable media.

This property only applies to instances of E73 Information Object that can completely be represented by discrete symbols, in contrast to analogue information. The representing object may be more specific than the symbolic level defining the identity condition of the represented. This depends on the type of the information object represented. For instance, if a text has type "Sequence of Modern Greek characters and punctuation marks", it may be represented in a formatted file with particular fonts on a particular machine, meaning however only the sequence of Greek letters. Any additional analogue elements contained in the representing object will not be regarded to be part of the represented.

As another example, if the represented object has type "English words sequence", American English or British English spelling variants may be chosen to represent the English word "colour" without defining a different symbolic object.

In a knowledge base, typically, the represented object will appear as a URI without a corresponding file, whereas the representing one may appear by the URL of a binary encoded file existing outside the knowledge base proper, or by the archival identifier of a paper edition. A URL for identifying the copy itself in a knowledge base should only be used as long as the providers support the persistence of that copy under this URL, as it is current practice for "Linked Open Data". Associating the referred copy with a checksum in the knowledge base may help safeguarding the maintainers against unexpected change of content under this URL. If more than one representative copy is referred to, the maintainers should control their mutual consistency at the symbolic level of the object intended to be represented.

Examples:

- Definition of the CIDOC Conceptual Reference Model Version 7.1.1 (E73) /has representative copy/ The content under [https://cidoc-crm.org/sites/default/files/cidoc\\_crm\\_v.7.1.1\\_0.pdf](https://cidoc-crm.org/sites/default/files/cidoc_crm_v.7.1.1_0.pdf) (E25) on the sever of ICS-FORTH in Heraklion, Greece.

[The edition 7.1.1 of the CIDOC CRM is registered under the public URI



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In first-order logic:

Issue 550 :

### **Jxx1 held at least for (is least validity of)**

Domain:

I11 Situation

Range:

E52 Time-Span

Superproperty of:

Quantification:

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

Scope note:

This property associates an instance of I11 Situation with the instance of E52 Time-Span that defines the minimal time of asserted validity of the property instances constituting this situation. The associated time-span constitutes a necessary part of the identity of this situation. Any different association of a time-span even to the same constituting propositions of this situation will identify another instance of I11 Situation.

Note that the respective situation may have had shorter duration than the one given by the property *P82 at some time within* to the associated time-span, but the same propositions may quite well have prevailed for longer and other times. In order to make a statement about how long at least the propositions of that situation uninterruptedly prevailed, the property *P81 ongoing throughout* should be used for the associated time-span. There is no means to declare that the propositions of that situation did not occur again outside the given time-span.

There are two typical cases for the determination of the related instance of E52 Time-Span. In the first, it is the temporal extent of some instance of E2 Temporal Entity, such as an observation activity, and documented with *P4 has time-span (is time-span of)*: this then documents the validity of the asserted instance of I11 Situation for the complete duration of the instance of E2 Temporal Entity, even if the actual time-span is not known, and can be regarded as a phenomenal time-span. In the second, the instance of E52 Time-Span is a date range declared in or derived from historical sources or provided by dating methods: then it is a declarative timespan.

Examples:

▪

In first-order logic:

Issue 609:

### HW by MD

I have promised to present some ideas we had discussed in the past in the context of biodiversity, about observation proving that some species is extinct, or in archaeology, about the absence of some phenomenon.

Typical examples are the **unnoticed survival** of the sea otter in the Monterey area of California in a small bay, and the so far **unique find** of gears from whole antiquity in the Antikythera Mechanism - people would not have put such things in graves.

Another example is the lack of fish bones in Minoan culture - they are simply not preserved in the Cretan climate. The Negative Typed Property states that the domain has no relation to **any instance** of the referred **type**.

We can argue, that a reasonable assessment of non-existence should imply:

**A)** the respective potential instances must have a reasonable likelihood to be **preserved** to the time of observation at least in traces.

**B)** the applied method of observation must be suitable to **detect** them, in particular traces.

**C)** the domain instance, the one lacking the relation, must be observed with sufficient **density and coverage**.

**C1)** In case of species, there are arguments about minimal populations and the areas they would roam about, so that the observation density needs not be complete coverage. Similar arguments may apply to archaeological object types.

The issue second to be discussed is the time of validity.

**A)** Eternal:

**A1)** The domain object under investigation has never had such a relation since its beginning of existence. This is a question of temporal coverage, or of proof that traces would still exist, or that that the object had not the possibility until the end of observation. These senses produce a sort of being "current", up to the time of last observation.

**A2)** The domain object under investigation has never had such a relation since its begin of existence and will not have until its end, such as putting wheels on a piece of cloth, or putting leaf markers in ancient books in a museum, or in investigating remains of past objects or a past activity/ extinct culture, or the **instances of the related type** do no more exist.

**B)** From some time on: The domain object under investigation has lost such a relation. This is characteristic for extinction. The species cannot be recreated. Similarly, for any type with instances that do no more exist after the referred time of loss and end of observation.

**C)** For the period of observation only.

For the time being, we can state that the meaning is always at least C), and there may be arguments for more.

If a negative property held before some time, we have to think more about it.

Probably, a good practice will be to associate an observation with the negative property.

It appears that an observation of “nothing” needs an area of coverage, the intended kind to be found, and the “scanning method”. The inferred time beyond that of observing seems to be an additional inference making with background knowledge. A set of “non’-observations may be associated with an inference about a likelihood of non-existence, as in biodiversity.

Issue 588:

\*\*\* Implementation Recommendation\*\*\*

The instantiation of a property class in a knowledge base implies that the original property (represented by the property class) is also instantiated in the knowledge base. I.e. (for the case of PC14\_carried\_out\_by):

$$PC14(x) \wedge P01(x, a) \wedge P02(x,b) \wedge P14.1(x,c) \Rightarrow P14(a,b)$$

Therefore, do not instantiate the property class without instantiating the property itself. This may be achieved manually or by an automated procedure.