60th joint meeting of the CIDOC CRM SIG and ISO/TC46/SC4/WG9; 53rd meeting of LRMoo SIG

1-4 April 2025

Digital Humanities, Walter Benjamin Kolleg, Universität Bern, Switzerland

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Tuesday, 1 April 2025

Application for membership at the SIG

The SIG approved the application for membership at the CIDOC CRM SIG of Dirk Wintergrün, for the the Klassik Stiftung Weimar, to be represented by himself. More info about the Klassik Stiftung Weimar can be found here, and in Anja and Dirk's presentation (link here).

Issue 682: List externally maintained CRM Compatible Extensions on a new section of the CRM site

The SIG reviewed the proposal by the editors' group to list compatible (not fully harmonized) ontologies on the website in a separate section. Said ontologies may stem from a particular project or a domain-specific application that extends the CRM. The proposal includes settling the types of extensions listed, their definitions, the metadata describing them, the procedure to launch a CRM-compatible extension, and the criteria that would determine if a certain ontology can have the SIG's seal of approval.

Discussion points:

- Compatibility should reference the CRM base (or harmonized model) version that a model is deemed compatible to
- As far as CIDOC CRM harmonized ontologies are concerned, a time-frame within which they will be aligned to CIDOC CRM and with respect to one another should be anticipated. Ideally, this time frame should not exceed a period of two years.
    - PRESSoo will get harmonized following the consolidation of LRMoo V1.0
    - CRMba will have to be demoted to CIDOC CRM Compatible Ontology with respect to CIDOC CRM V7.1.2| V7.1.3 and family models. It is not currently maintained by the SIG.
- Regarding CIDOC CRM Compatible Ontologies: The process by which they get the seal of approval by the SIG involves unpaid work (reviewing) by at least two SIG members. There were some concerns raised over this, and arguments were made in favor and against requesting some sort of payment for the service of reviewing candidate ontologies. No decision was made at the time.

Decisions:

- The SIG approved the proposal to list compatible ontologies on a designated subsite (under Resources). Declared dependencies with CRMbase and/or family models should reference the relevant version they extend.
- The SIG approved the terminology to be applied to the different kinds of models –namely: **(i)** CIDOC CRM, **(ii)** CRM compatible ontologies that are also compatible with respect to one another and are maintained by the SIG, and **(iii)** CRM compatible ontologies maintained by third parties. The terms to be used are: **CIDOC CRM Ontology**, **CIDOC CRM Harmonized Ontology**, and **CIDOC CRM Compatible Ontology**, respectively.
- The SIG approved the definitions proposed for **CIDOC CRM Harmonized Ontology** and **CIDOC CRM Compatible Ontology** summarized in the appendix.
- The SIG approved the metadata that maintainers of CIDOC CRM Compatible Ontologies need to provide to the SIG, for their ontologies to appear on the site. The metadata requirements are listed in the appendix.
    - Discuss the status of the Risk Conservation Ontology (MA, DF).

The issue was resumed on Wednesday 2 April 2024.

CIDOC CRM SIG contribution to ICOM Documentation's annual newsletter

GB informed the SIG that ICOM Documentation is issuing an annual newsletter to advertise its activities and that of the working groups operating under its auspices. A subgroup was formed to draft the document in question, but seeing as it's going to be a permanent feature of the activities of all ICOM Documentation working groups, we will probably need to sketch an outline of how such like documents should look like, both in terms of content (i.e., what kinds of activities are worth mentioning), and in terms of form.

Proposal: make sure to mention (i) new members and what they're working on, (ii) milestones achieved (model updates, translations, services, projects, papers, etc.), (iii) a summary of the presentations at SIG meetings, (iv) showcasing the connection with the museums.

The SIG agreed to the proposal, the subgroup that was formed for the task (GB, PF, ETs) will take the proposals into consideration.

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

ETz presented the HW he prepared for the issue, namely a list of errors he spotted in the draw.io tutorial diagrams for CRM, with the checks he performed (model inconsistencies –incompatible domain/range & property quantifiers –misspelled classes/properties etc.).

N.b.: ETz is trying to systematize the validation of the draw.io diagrams in a service, which takes time to accomplish.
The list of the errors spotted (and suggested edits) can be found below.

Discussion points:

- ETz needs some help with representing the equivalence of P160 has temporal projection with P4 has timespan (see slide No.4), when the domain of P160 is set to E4 Period. The equivalence is declared in the CRM specification document in the introduction (p. 41) and the definition of P160 (p.196) in v7.1.3.

List of the errors spotted plus suggested edits:

#	Diagram Page	Identified Errors	Suggested edits
1.	16_Object Number Information	E15_Identifier_Assignment is not a valid domain for P42_assigned E90_Symbolic_Object is not a valid range for P42_assigned	**Replace** E15 Identifier Assignment. *P42 assigned (was assigned by)*: E90 Symbolic Object, **with** E15 Identifier Assignment. *P142 used constituent (was used in)*: E90 Symbolic object
2.	19_Object Collection Information	E78_Curated_Holding is not a valid domain for P147_curated E87_Curation_Activity is not a valid range for P147_curated	**Reverse the direction of the arrow** in P147 curated (was curated by) connecting E87 Curation Activity and E78 Curated Holding –**so that it correctly points from E87 to E78**.
3.	28_Image Information,Objects and Carriers	E89_Propositional_Object is not a valid range for P48_has_preferred_identifier	**Replace** E89 Propositional Object. *P48 has preferred identifier (is preferred identifier of)*: E89 Propositional Object **with** E89 Propositional Object. *P148 has component (is component of)*: E89 Propositional Object,
4.	29_Group Dynamics	E85_Joining is not a valid domain for P151_was_formed_from	**Deprecate** P151 was formed from (participated in), or consider using **E66 Formation** and its properties - *P95 has formed (was formed by)*: E74 Group - *P151 was formed from (participated in)*: E47 Group
5.	30_Existence Information	E77_Persistent_Item is not a valid range for P124_transformed E77_Persistent_Item is not a valid range for P123_resulted_in	Replace **E77 Persistent Item** with **E18 Physical Thing** for: - *P123 resulted in (resulted from)* - *P124 transformed (was transformed by)*

6.	31_Documentation and References	E55_Type is not a valid domain for P71_lists	**Reverse the direction of the arrow** in *P71 lists (is listed in)* connecting E32 Authority Document and E55 Type –**so that it correctly points from E32 to E55**. Nb. Consider the range (E55 Type is valid, but the property range is declared an E1 CRM Entity).
7.	36_Changing Thing	E77_Persistent_Item is not a valid range for P123_resulted_in E77_Persistent_Item is not a valid range for P124_transformed	Replace **E77 Persistent Item** with **E18 Physical Thing** for: - *P123 resulted in (resulted from)* - *P124 transformed (was transformed by)*
8.	38_Appellation Information	E1_CRM_Entity is not a valid range for P1_is_identified_by	**Reverse the direction of the arrow** in *P1 is identified by (identifies)* connecting E1 CRM Entity and E41 Appellation –**so that it correctly points from E1 to E41**.

About the representation of the Functional Units on the website.

Proposal:

- Gradually replace the old diagrams under "Functional Overview" with those created for v7.1.3 in draw.io, as soon as they're checked and ready.
    - They can be accessed here (https://cidoc-crm.org/functional-units)
    - They are available as iframes and they can also be accessed in an editable form through draw.io.
- Keep the old diagrams (essentially for versions 5.0.1, 5.0.4) and version their respective URL (https://cidoc-crm.org/functional-units-v5).

Decision: The SIG voted in favor of the proposal and assigned the following pieces of HW:
HW: ETz to automatically extract the classes and properties referenced in each diagram
HW: CEO, AK, SdS, SH, GH to perform a semantic check on the diagrams, see if any critical piece of information is missing.
HW: GB (& ETz) to list the syntactic errors that verge on semantic ones spotted by ETz –like the case of ***P4*** and ***P160*** being equivalent if their domain is set to E4 Period.
The next step would be for the SIG to provide explicit details on how to edit the diagrams and assign someone to do the editing.

Issue 687: Review the textual descriptions to diagrams in the functional overview

GB gave an outline of the issue. The original diagrams under "Functional Overview" were specifically designed for museum documentation –they represent functional units for museum processes. Even though CIDOC CRM is by design capable to handle museum documentation, it is not necessarily limited to that, and can assume a much larger perspective.
Still, they lack descriptions: each diagram comes with a label and a list of referenced classes and properties that are not otherwise contextualized.
The diagrams were derived from the original CIDOC reference model Information Groups (1997) on which CIDOC CRM is based.
N.b.:In order to provide descriptions to the diagrams one must first establish whether they are part of the standard itself (are they normative to an extent) or if they're meant to be used as examples.

HW: GB, CEO, OE volunteered to look at the document and the diagrams and determine what needs to be added or changed in terms of descriptions etc.

RDF Creation Pipeline; A workflow to transform archaeological datasets from tabular data to RDF using RDFstar and Named Graphs

Presentation by Gerald Hiebel, Stephen Stead, Milena Peralta-Friedburg. The slide deck can be found here.

Issue 672: Quantifiers of P140, P141, P177

CEO gave an outline of the issue and the action points that the SIG need to decide on:

Proposal:
The quantifiers of (i) P140, P141, and (i) P177 need to be changed **from** (i) "many to many (0,n:0,n)" and (ii) "many to many, necessary (1,n:0,n)", **to** "many to one, necessary (1,1:0,n)", in accordance with the requirement that an instance of E13 only applies to one assigned attribute per entity that gets assigned with that attribute.

N.b.: This should feature in the migration path for E13 Attribute Assignment and the properties linking from it to other classes. The statements will be decided in a **new issue**.

N.b.: New diagrams are needed to explain the new semantics of E13 Attribute Assignment. This will be dealt with in a **new issue**.

The same should hold for their subproperties, on the grounds that the semantics of superproperties cannot be more restrictive than those of their subproperties, otherwise unwarranted inferences are allowed.
The subproperties of ***P140 assigned attribute to (was attributed by)*** in question are:

- E14 Condition Assessment. *P34 concerned (was assessed by)*: E18 Physical Thing
- E16 Measurement. *P39 measured (was measured by)*: E18 Physical Thing
- E17 Type Assignment. *P41 classified (was classified by)*: E55 Type

The subproperties of ***P141 assigned (was assigned by)*** in question are:

- E14 Condition Assessment. *P35 has identified (identified by)*: E3 Condition State
- E15 Identifier Assignment. *P37 assigned (was assigned by)*: E42 Identifier
- E16 Measurement. *P40 observed dimension (was observed in)*: E54 Dimension
- E17 Type Assignment. *P42 assigned (was assigned by)*: E55 Type

N.b.: Concerning the properties **P35** and **P40**:

- it is assumed that one and the same instance of E14 Condition Assessment and one and the same instance of E16 Measurement cannot concern multiple instances of E18 Physical Thing (i.e., group of things) and cannot assign multiple (E54) dimensions (i.e., length, width, height, weight, …) to some physical object, respectively.
- Instead, multiple E14 Condition Assessments, each applied to one particular instance of E18, can form an E7 "cluster activity". The same holds for E16: multiple instances of E16 Measurement, each applied to one particular instance of E54 Dimension can form an E7 "cluster activity".
    - **No change needed in the scope notes of P35 and P40**, but it should be added
        - as a usage instruction in the Introduction (see **new issue**, below).
        - A diagram illustrating "cluster activities" and a short text explaining it, would suffice. The diagram and description should also feature in the "Functional Overview".

N.b.: Concenrning the property P38 deassigned (was deassigned by):

- E15 Identifier Assignment. *P38 deassigned (was deassigned by)*: E42 Identifier, is to be disengaged from P141 assigned.
- Its cardinality does not have to change

N.b.: Corollaries for CRM extensions:
There are corollaries to this change in other CRM extensions (CRMsci V2.2 and CRMarchaeo V2.1.1), mentioned here briefly (but will be dealt with in different issues –mainly 679, 602):

- **(CRMsci)** S6 Data Evaluation. *O10 assigned dimension (dimension was assigned by)*: E54 Dimension has its cardinality set to: "many to many, necessary (1,n:0,n)" and would need to change to (1,1:0,n)
    - **Nb: in CRMsci V3.1 and on, this point would be rendered moot,** seeing as O10 has been disengaged from P141 –see the ISA chain for its domain class:
        - S6 Data Evaluation ISA S5/I5 Inference Making ISA I1 Argumentation

        - While it holds that E13 Attribute Assignment ISA I1 Argumentation, thus making S6 and E13 "disjoint".
- **(CRMarchaeo)** A7 Embedding. *AP17 is found by (found)*: S19 Encounter Event has its cardinality set to: "many to many, necessary (1,n:0,n)" and needs to change to (1,1:0,n)
    - **N.b.: AP17** IsA: **S4 Single Observation**. *O8 observed (was observed by)*: S15 Observable Entity
- **(CRMarchaeo)** A1 Excavation Processing Unit. *AP6 intended to approximate (was approximated by)*: A3 Stratigraphic Inference has its cardinality set to: "one to many (0,1:0,n)" and needs to change to (1,1:0,n)
    - **N.b.: AP6** IsA: **S4 Single Observation**. *O8 observed (was observed by)*: S15 Observable Entity
- **(CRMarchaeo)** A9 Archaeological Excavation. *AP3 investigated (was investigated by)*: E27 Site has its cardinality set to: "one to many (0,1:0,n)" and would need to change to (1,1:0,n)
    - **N.b.: AP3** IsA: **S4 Observation**. *O8 observed (was observed by)*: S15 Observable Entity is no longer the case in CRMsci v3.0.
    - In fact, AP3 is incompatible with O8 in that version, given the semantics of its domain class. A9 Excavation is not a subclass of an S4 Single Observation, but would fit in better with S27 Observation (i.e., a generalization over multiple observations).

Decision:
The SIG accepted the proposal by CEO. The changes are to appear in CIDOC CRM v7.3.1.

Two new issues to start:

- one about the migration instructions for E13, and
- one about the diagrams that illustrate its new semantics.

[NEW ISSUE]: Migration instructions for E13 Attribute Assignment (and subclasses) and its properties (plus their subproperties).

The new restrictive property quantifiers for the properties of E13 Attribute Assignment and their subproperties (many to one, necessary (1,1:0,n)), i.e.: an instance of E13 Attribute Assignment (and subclasses) forms a single activity applied to exactly one object and yielding one value or dimension, prohibits multiple values or dimensions as the objects of one (condition assessment | measurement | classification | observation, etc.).

This is a major model change, and new migration instructions should be provided for explaining how to bundle single E13 Attribute Assignments (and subclasses) into "cluster activities".

This particular HW was not assigned to anyone.

[NEW ISSUE]: Redo the diagram for E13 Attribute Assignment and its properties

The new restrictive property quantifiers for the properties of E13 Attribute Assignment and their subproperties (many to one, necessary (1,1:0,n)), i.e.: an instance of E13 Attribute Assignment (and subclasses) forms a single activity applied to exactly one object and yielding one value or dimension, prohibits multiple values or dimensions as the objects of one (condition assessment | measurement | classification | observation, etc.).

This is a major model change, and it should be captured in some usage instructions (in the introduction section) featuring a diagram that illustrates "cluster activities" and a short text explaining it.

The diagram and description should also feature in the "Functional Overview".

HW: This particular HW it ties in nicely with the decisions reached in issue 628, namely: CEO, AK, SdS, SH, GH to perform a semantic check on the diagrams, see if any critical piece of information is missing (see above, issue 628).

Issue 680: Adjusting properties of E54 Dimension

The SIG reviewed the HW by MD & CEO on adjusting the FOL statements, property quantifiers, and scope notes for P179 had sales price (was sales price of) and P191 had duration (was duration of) to exclude unwarranted inferences concerning the kinds of entities the dimensions in question belong to.
Namely, that

- instantiating P191 had duration (was duration of) entails that its E54 Dimension is incompatible to any instance of E18 Physical Thing or E96 Purchase,
- instantiating P179 had sales price (was sales price of) entails that the E97 Monetary Amount (isa E54 Dimension) is incompatible to any instance of E18 Physical Thing or E52 Timespan.

The details of the proposal can be found in the Appendix. Discussion points and decisions involving P191 and P179 can be found below.

Discussion points:

There was a long discussion exploring whether monetary amounts, such as "$60" could be applied universally to all situations involving that amount or if such a value would only exist as the agreed-upon figure within a specific context and moment in time, instead.

- Ideas converged around taking prices to be determined in in the context of interested parties agreeing over the price of an item or service at particular moment in time, and therefore cannot be assigned a universal identifier, much like what is the case in physical measurements, despite monetary amounts functioning differently in practice and being typically modeled simply as sales prices without further specification.
- At the same time, it was acknowledged that the term *monetary amount* can be misleading, since it does not represent a fixed quantity but rather the agreed value of, for example, "$60" given a particular context. It would therefore be reasonable to clarify this explicitly, and perhaps also note, as CIDOC CRM often does, that certain operations—such as adding or comparing numbers—fall outside its scope and must be addressed elsewhere.
  WS took upon himself to draft such a statement (in a new issue that he will start).

Decisions:

- the SIG approved the new definition for P179 and P191 proposed by MD & CEO. The details can be found in the appendix.
- HW: WS to start a new issue where he will propose a statement explaining that historical aspects of each documented value (comparisons and whatnots) do not fall within the scope of CIDOC CRM.

N.b.: the exclusion statements proposed for P43, P179, P191 were not part of this discussion
HW: MD, CEO, WS to revise them

Issue 679: Multiple objects cannot share the same instance of E54 Dimension

The issue was postponed, the HW was not ready.

Issue 681: Scope notes of P40 & P43

The SIG reviewed MD's proposal to update the definitions of P39 measured (was measured by), P40 observed dimension (was observed in), and P43 has dimension (is dimension of).
The details of the proposals can be found in the appendix (see P39, P40, P43, respectively).
A summary of the discussion points raised and the decisions of the SIG can be found below:

Discussion points:
P39 was considered quite a straightforward change and was voted in without a discussion or any objections.
Regarding the axioms in P43 and P40, the following points were raised (in particular with respect to the exclusion statements and deduction axioms mentioned in the FOL).

- Confusion around formal statements (FOL) and variable usage is recognized, emphasizing the need for clarity and careful notation (exclusion axioms for P43 mention an unbound, previously unmentioned x argument in both P179(x,z) and P191(x,z) on the left-hand side).
- The exclusion deductions for P43 are logically obvious and may not require explicit restatement, P43 would not apply to incompatible types like durations or monetary amounts (it would only be associated with E18 Physical Thing, via E16 Measurement).
- The nature of a measurement can be more complex than a single numeric value: a single measurement event can produce a matrix or set of values, representing a complex dimension rather than a simple one.

Decisions:
- P39 is accepted as proposed, following some minimal wordsmithing.
- P43:
    - The scope note is accepted as proposed, following some minimal wordsmithing.
    - The property quantifiers were approved too.
    - The exclusion statements and the deductions need to be rethought. The SIG believes that deduction axioms are redundant, so would need more convincing to agree to add them in. And there is no agreement on the utility of the exclusion axioms either.
- P40:
    - The scope note is accepted provisionally, following some minimal wordsmithing.
    - The property quantifiers were approved too.
    - The exclusion statements and the deductions need to be rethought. The SIG believes that deduction axioms are redundant, so would need more convincing to agree to add them in. And there is no agreement on the utility of the exclusion axioms either.
- **HW**: MD, CEO, WS to rethink the FOL axioms for P40, P43

Issue 627: explicitly document cross-references btw family models

Etz gave an update on the HW (tasks completed, and tasks that he would like the SIG's opinion on).
The HW can be found in the appendix. The decisions and some discussion points can be found below.

Decisions: The SIG agreed
- to include <owl:versionIRI> statements in in the rdf encoding of CRMbase and extensions (point a1)
- for family models, mint versioned IRIs following the practices of CRMbase (point a2).
- to use <owl:imports> statements to reference external ontologies (point a3).

- to replace <rdf:Description> and <rdf:type> statements in CRM extension serializations with <rdfs:Class|Property>, to match CRMbase syntax (point B)
- to include FOL and examples in the <rdfs:comment> statements (previously only used for scope notes) both for CRMbase and extensions (point C).
    - N.b.: this has been implemented for Erlangen CRM, and it works well. It is always possible that some characters are not recognized by a system, but it has worked well for them.
- to reuse the main classes and properties needed for implementing the PC module (PC01, P01, P01i, P02, P02i, P03, P04) (point e1)
    - Reification properties specific to CRM extensions will be defined using the prefix denoting the properties of the given extension (APC11_has_Physical_relation_to for PCs, AP11.1_has_type for properties of properties) (points e2, e3, respectively)
- to not disallow rdf uri resolution for draft versions of CRMbase and extensions, but to flag said models as draft (make a note that they should not be used for implementations)

N.b. Point D has been resolved by means of resolving points (a1 through a3)

Issue 692: Inverse properties in FOL

The SIG reviewed the proposal by MD & CEO to remove inverse indexes from properties in the FOL statements, and use the forward going property [PXi(x,y) ⇔ PX(y,x)] and reverse the order of the arguments instead.
There were many objections, and the SIG decided not to go through with this proposal after all.

- forward-going property identifiers, whose arguments appear in inverse form are far more difficult to read, it creates complexity for the model
- risk deriving illegible FOL statements, or meaningless ones (like the ones pointed to by WS –see appendix)

HW was assigned to WS to check:

- that the referenced inverse properties all correspond to an actual property (recall P170 and P82i)
- whether there exist any FOL axioms that mention the forward going predicate (whose arguments appear in an inversed order), rather than the inverse property predicate that should be used instead.

HW was assigned to CEO to draft a paragraph in the introduction section (part concerning the FOL expressions) about the equivalence between inverse and forward going property predicates [PXi(x,y) ⇔ PX(y,x)]

Issue 666: Allen operators rendered through equivalences

WS presented his HW, He initially proposed that the discussion of Allen operators be moved to CRMarchaeo altogether (i.e., be taken out of the CRMbase introduction and scope notes). Factoring in fuzziness or not yields interesting results and does not exactly correspond with the temporal axioms of CIDOC CRM.
The SIG did not agree with the proposal to expunge CRMbase from any mention of the Allen operators.

Decision: **HW** was assigned to WS to formulate a FAQ document (along the lines of his submitted HW).
A new issue to start, where to redraft all the small paragraphs in the temporal primitives' scope notes –see below.
SdS to share a paper that he's written on it with WS.

[NEW ISSUE]: redraft the "corresponds to" statements in the scope notes of temporal primitive properties in CRMbase

WS volunteered to redraft the scope notes of the CRMbase temporal primitive properties, in particular the "corresponds to" bits that are unclear.
CEO, SdS, OE volunteered to proofread them

Issue 699: Examples for AP22 is equal in time

WS gave a brief outline of the issue, namely that he fails to see how the example used for AP22 (The destruction of the Villa Justinian Tempus (E6) *is equal in time to* the death of Maximus Venderus (E69)) forms a good example.

- For starters, the example is very old, and also very possibly fictitious. It is unlikely that it is plausible.
- The examples of synchroneity provided by AK (for declared, phenomenal, observed) were interesting and helpful for the discussion.
- A suggestion was to replace the example with an example demonstrating phenomenal synchroneity via causality (Antonio Pigafetta recording Magellan's voyage is equal in time to the voyage (of the Victoria).)
- WS does not think that this is a good example because it allows similar examples to be drafted for different events (like the Titanic's journey). If it is of historical interest when x person died vs when y person died, assuming that their death was simultaneous with the sinking of the Titanic is not good enough. So synchroneity does not necessarily follow from causality

Discussion points:

- In general, this kind of simultaneity seems to work only with declarative events (typically marriage legally begins simultaneously or ends simultaneously in a divorce; two paintings that are part of an exhibition can be claimed to be on display for the same amount of time, as long as the exhibition is in place). So, it works better with speech acts than with an observed phenomenal reality.

It is an interesting topic, could be pursued further. And the examples always need revising.

Wednesday, 2 April 2025

Issue 697: CIDOC CRM website reorganized

The SIG reviewed the HW by PF & ETz (see here for the slide deck).

Discussion points:

- Consider accessibility for visually impaired users (FORTH specialists may advise).
- Use Zotero integration for references to keep them updated.
- Merge metadata across different types of academic papers but keep distinctions with types.
- Consider the possibility of moving from the mailing list and manual issue update to github.
- Improve **NEWS section** by linking to external channels (LinkedIn, ICOM newsletter) instead of maintaining a slow, outdated news page.

Decisions:

- The SIG approved the proposals, and agreed to their implementation.
    - Move navigation to a **consistent top menu** instead of varying left-hand menus.
    - Add a node: "**Latest official release**", where one can find the CIDOC CRM specification document, and all available serializations.
    - Remove "**to be revised/in progress**" tags and replace with "**last update: <date>**".
    - Rename "CRM Compatible Models", "**CRM-Harmonized Ontologies**", in accordance with the decisions for issue 682.
        - Once a final decision is reached for 682, rearrange models currently listed under "Compatible Models".

    - Merge/reorganize the **overlapping contents in the Activities tab** (specifically: the working groups currently listed under Related Activities, and Workshops –in the left-hand side menu for Activities). Create a new node for that, namely **"Working Groups"** –to also include the contents of the "**Activity Documentation**" node, in the Community section.
    - Merge/reorganize **References, Publications, Technical Papers** (under Resources) into one section, possibly supported by a Zotero plugin.
    - **Deprecate the node "Important theories"** (currently in the left-hand side menu for The Model and Resources). It doesn't have anything in it, nor has it ever been associated with any content.
    - **Check and update outdated content across all pages**
    - Move the **endorsement statement by IFLA** on PRESSoo from the tab "Critics" **to PRESSoo** (underneath the scope of the model). This way, all PRESSoo relevant material will be kept in one place. Then **deprecate the section "Critics"** altogether because there's nothing else in it.
- **HW**: ETz and PF to report in the next meeting on how the implementation goes, share the development site with the SIG and ask for feedback.

The SIG also decided to raise new issues, independently of 697, namely, issues concerning:

- **The accessibility**: How to address visually impaired users' needs with menus and navigation (SH, PF, ETz).
- **The future of mailing list & issues management**: The current email and Drupal workflow is outdated and manual. A suggestion to explore GitHub for issue tracking and collaboration was made (SH, GB, PF).
- **The mapping section redrafting & different placement**: Whether "Mapping, Tools, Methods" should be rewritten and moved under "Use & Learn". (GB)
- **The News strategy**: Question whether the NEWS tab is effective, or if communication should shift to LinkedIn/newsletters. (GB)

[NEW ISSUE]: CIDOC CRM website accessibility

The SIG will start a new issue, namely how to address visually impaired users' needs with menus and navigation
HW: assigned to SH, PF, ETz

[NEW ISSUE]: The future of mailing list & issues management

The SIG will start a new issue, concerning the use of the mailing list and issues management. The suggestion is to replace their use (insofar as the model maintenance is concerned) with GitHub, and that the mailing list be used for communications (modelling questions etc) instead.
HW: GB, SH to come up with a proposal.

[NEW ISSUE]: The mappings section redrafting & different placement

The SIG will start a new issue, concerning the mappings section redrafting & different placement. The work is there, but it fits more naturally under "Use & Learn" compared to "Resources". Also, it should be updated based on the new versions of 3M and other tools and services available for this work.
HW: GB to come up with a proposal

[NEW ISSUE]: The NEWS strategy

Decide on what counts as a noteworthy item. Come up with a proposal to automatically update the "What's New?" section based on X and LinkedIn posts.
HW: GB to make a proposal about the kind of content that the SIG had better share with the world.

Issue 682 (continued):

The discussion resumed from point (6) and on the **Criteria** to be met by candidate ontologies before they get listed as "CRM Compatible Ontologies", as well as the **course of action** that a candidate ontology maintainers and the SIG need to take for the candidate ontology to be admitted as an extension of CIDOC CRM in the CRM Compatible Ontologies subsite.

Discussion points: regarding the

Scope of Review

- There was a marked preference on keeping the reviewing of candidate ontologies at a technical level, on the grounds that this approach reduces the SIG's workload and avoids subjective or philosophical debates.
- Getting listed as a "CRM Compatible Ontology", is different than the SIG endorsing it to be widely used.

Documentation format:

- The SIG was in favor of the proposal that submitters provide a full documentation of the candidate ontology (its classes and properties have to be documented, with scope notes, and they have to come with a serialization).
- The SIG acknowledges that websites can be easier to use but they can change without notification. So unless an ontology documented on a website comes with an rdf or some other serialization, it cannot be considered for CRM compatibility

Review workload:

- The review process should not overburden the SIG with unpaid labor, especially for larger extensions that require a lot of effort.
- Candidate Ontology submitters must provide the RDF and metadata themselves.

Extensions and superclasses:

- Ontologies extending existing CRM-harmonized extensions (e.g., CRMsci, CRMinf, CRMarchaeo) can still qualify as compatible, provided that their subclasses remain linked to CRM base.

Decisions:
The SIG approved the course of action that candidate ontology maintainers and the SIG need to take for the candidate ontology to be admitted as an extension of CIDOC CRM in the CRM Compatible Ontologies subsite. The relevant parts are listed in the appendix.

- The Criteria and Course will be put to the test multiple times. The text as is now is agreed in principle, but will need some more refining.
- **HW:** GB to coordinate.

IFLA Updates

Pat gave an overview of the overall reception of LRMoo on the part of IFLA and the action plan followed since the 59th SIG meeting and on.
Following the approval of LRMoo v1.0 by the SIG, its publication by IFLA got delayed due to all sorts of reasons, ranging from formatting to a misnomer relating to Serials representation (see below).
In the end, it was released in the fall of 2024 and it got announced via newsletters.
As far as the LRMoo section of the IFLA site is concerned, it is still under development

With respect to the French translation of LRMoo: it is an ongoing work, which will be feature on the CIDOC CRM site, but it will also get published through IFLA.
The LRMer version received a minor update in December 2024, with version history and change notes added; namespace updates are under review for alignment.

Regarding Serials:
The proposed new serials modeling linking LRMoo to PPESSoo introduces a new class for serials . During the mid-2025 presentation, concerns were raised due to its novelty and label confusion ("container manifestation").
Next steps include reframing the proposal, allowing time for review, and re-presenting it at IFLA 2025 conference, in August. If accepted, F18 Serial Work would be deprecated, and the new class would serve as a hook for PRESSoo.
With respect to the PRESSoo update: It's still on hold, given the lack of key-persons to undertake this task. There is interest from the side of IFLA about reviving this, but it will take some time.

Issue 685: FOL statements for LRMoo

PR walked the SIG through the problems with the FOL the LRMoo group and WS & CEO identified with the proposed FOL expressions for the LRMoo properties. The slide-deck of her presentation can be found here. The list of the proposed FOL can be found here.
The topics brought to the SIG's attention involve:

- The full path that *R8 combines* is a shortcut of
- The full path that *R36 uses script conversion* is a shortcut of
- The inference concerning the *dimension* that an exemplar (F5 Item) of an F3 Manifestation can have
- The inference holding between a *R78 has alternate* and two instances of F3 Manifestation that R4 embody the same instance of F2 Expression
- The conventions used FOL expressions, namely:
    - For *declaring complex FOL axioms* (and whether classes should be declared and in what style)
    - Introducing a generic statement that disallows adding *redundant FOL statements* (if a property is asymmetric, then it is also irreflexive)
    - Headers applied to *shortcut properties* and position thereof in property definitions
- Cleaning-up the document, fixing typos etc.

The SIG agreed with PRs proposals, a summary of decisions can be found below:

R8 combines:

The proposal was to declare F12 Nomen. R8 combines (is combined to form): F12 Nomen a subproperty of E89 Propositional Object. P148 has component (is component of): E89 Propositional Object, which would allow to dispense with the reference to E62 Strings (that break the full paths).

An alternative is to define a new property in LRMoo (F12 Domain. Rxx has associated appellation (is associated appellation of): E41 Appellation), by means of which the model could explicitly refer to the string of the F12 Nomen qua E41 Appellation (which would then allow to talk about combinations of E41 Appellation that can be joined together to form a complex F12 Nomen).

- F12(1). Rxx: E41(1). P106: E41(2). Rxxi: F12(2)

Decision:

- The SIG approved declaring R8 combines a subproperty of P148 has component

- HW: PR to propose a definition for the Rxx has associated appellation at the fall meeting, because it seems to better capture the F12 Nomen to E41 Appellation connection.

R36 uses script conversion

Proposal to change:

- F12 Nomen. *R17i was created by (created)*: E65 Creation. *P33 used specific technique (was used by)*: E29 Design or Procedure

To:

- Shortcut of: F12 Nomen. ***P94i was created by (created)***: E65 Creation. *P33 used specific technique (was used by)*: E29 Design or Procedure

Because F12 Nomen is a subclass of E89 Propositional Object and is inconsistent with an F2 Expression (and an F28 Expression Creation –i.e., the domain and range of R17). P94 created (was created by) to be used instead.

Decision: The SIG agreed to the proposal.

R70 has dimension

Proposal to change the direction of the inference for the dimension of an F3 Manifestation,

- from R70(x,y) ⇐ (∃z) [F5(z) ∧ R7i(x,z) ∧ P43(z,y)],
- to R70(x,y) ⇒ (∃z) [F5(z) ∧ R7i(x,z) ∧ P43(z,y)],

on the grounds that the dimension of the item may change (for instance: a book might get rebound and as a result its height might be affected), but at some point in time, the F3 Manifestation that was R7i exemplified by an F5 Item, had that particular dimension. So, it is OK to infer from an instance of a property R70 that the associated F5 had a particular dimension (and not the other way round).

Decision: the SIG accepted the proposal

R78 has alternate

Proposal to change the inference

- from: R78(x,y) ⇔(∃z) [F2(z) ∧ R4(x,z) ∧ R4i(z,y)]
- to: R78(x,y) ⇒ (∃z) [F2(z) ∧ R4(x,z) ∧ R4i(z,y)],

on the grounds that an alternate F3 Manifestation comes with a narrower interpretation than two different F3 Manifestations embodying the same instance of F2 Expression (much like a large print book and a regular print book are not just suitable alternate manifestations of the same expression, they serve different purposes to begin with)

Conventions for declaring complex FOL axioms

PR presented some alternative styles for expressing complex FOL statements (f.i., full paths):

R2i(x,y) ⇔ (∃uzw) [F2(u) ∧ R3(x,u) ∧ F28(z) ∧ P16i(u,z) ∧ F2(w) ∧ R17(z,w) ∧ R3i(w,y)]

without the class definitions, since they can be inferred from the properties:

- R2i(x,y) ⇔ (∃uzw) [R3(x,u) ∧ P16i(u,z) ∧ R17(z,w) ∧ R3i(w,y)]

class definitions in italics to indicate that they can be inferred: (bold is only to indicate what would change)

- R2i(x,y) ⇔ (∃uzw) [F2(u) ∧ R3(x,u) ∧ F28(z) ∧ P16i(u,z) ∧ F2(w) ∧ R17(z,w) ∧ R3i(w,y)]

give the class definitions in the ∃ bracket:

- R2i(x,y) ⇔ (∃u:F2, z:F28, w:F2) [R3(x,u) ∧ P16i(u,z) ∧ R17(z,w) ∧ R3i(w,y)]
- R2i(x,y) ⇔ (∃ F2 u, F28 z, F2 w) [R3(x,u) ∧ P16i(u,z) ∧ R17(z,w) ∧ R3i(w,y)]
- R2i(x,y) ⇔ (∃u ∈ F2, z ∈ F28, w ∈ F2) [R3(x,u) ∧ P16i(u,z) ∧ R17(z,w) ∧ R3i(w,y)]

Decision: The SIG has agreed on an FOL standardized notation. New suggestions cannot be made in a sub-issue, so this cannot be resolved differently here. The first statement in boldface represents the agreed-on, standardized style.

Generic statement disallowing redundant FOL statements

Proposal: Drop redundant "irreflexive" statements if "asymmetric" already declared. Add a clause in the CIDOC CRM Introduction (either section: about the logical expressions used in the CIDOC CRM, or, the relevant spot under Terminology).

The same clause to be copied off to LRMoo.

Decision: The SIG agreed to the proposal.

HW: CEO: add explanatory note (asymmetric ⇒ irreflexive) to CRM intro docs.

Shortcut properties (header and position in document)

PR will harmonize the LRMoo documentation with CIDOC CRM, so instead of listing the full paths under the property domain and range, she will move it right after the scope note.

She will also change the header to "Full Path" instead of "Shortcut of" that it is in LRMoo.

Issue 663: Define Ixx Singleton Proposition Set

The SIG reviewed HW by MD. For some context: in the 59th SIG meeting, the class I17 One-Proposition Set, was admitted in the model (v1.1) in principle, but the SIG provided some feedback that was needed to be incorporated in the definition.

For the details of the proposal, see the appendix.

Decision: The new definition was accepted. It will appear in CRMinf v1.2. Any wordsmithing, or new examples must be provided in separate (new) issues.

Issue closed.

Heritage Digital Twin Ontology

Presentation by Maria Theodoridou (ICS-FORTH)
The slide deck can be found here

Issue 690: CRMinf reformulation of I11 Situation (with examples)

The SIG reviewed HW by MD (a proposal to declare I11 Situation a superclass of S28 Observable Situation and to update the scope note of I11). The details of the proposal can be found in the appendix.

Decision:
The proposal to declare S28 Observable Situation a subclass of I11 Situation was approved by the SIG.
The scope-note redrafting was not approved by the SIG.
HW: SdS to redraft it (collaborate with MD).

Issue 695: Observation Reorganization – Single Observation

The SIG reviewed the HW by MD & PF on the reorganization of CRMsci Observation (it being recast as a Single Observation).
The HW involves:

- Redefinition of S4, as S4 Single Observation
- Correctly define its set of properties:
    - S4 Single Observation. ***O8 observed (was observed by)***: S15 Observable Entity
    - S4 Single Observation. ***O9 observed property type (property type was observed)***: S9 Property Type
    - S4 Single Observation. ***O16 observed value (value was observed by)***: E1 CRM Entity
    - S4 Single Observation. ***O37 observed proposition (was observed by)***: S29 Observable Proposition
- Definition of new class S29 Observable Proposition (used to link S4 Single Observation to Observable Situations expressed as I17 One-Proposition Sets).
- Definition of a new property S29 Observable Proposition. *O38 has domain (is domain of)*: S15 Observable Entity

The details of the proposal can be found in the appendix.
Discussion points:

- The label for S29, i.e., "Observable Proposition" was considered problematic. The SIG agreed to let it in as a provisional label. Anyone who feels very strongly against it, is free to propose alternatives, in a new issue.
- Seeing as the property *O37 observed proposition* (the property pointing from S4 Single Observation to S29 Observable proposition) was not already part of the model, the SIG decided that a different label was more suitable [namely O37 expressed the observed as observable proposition (was observable proposition observed by)], in order to match the label of its superproperty O36 expressed the observed as (was the expression of).
- The following part in the scope note of S29 was highlighted as needing some further clarification, it was understood as referring to the example of Nero, in the sense that it is documented, irrespective of whether it has actually happened.
    - which characterizes an observable phenomenon, **regardless of whether it has happened or not**
- for the examples of S29: it would be more helpful instead of expressing them in pseudo-crmese (rdf statements made up of English words), to have one example in plain English and duplicate it using rdf triples.

Decisions:
The SIG approved:

- the new definition of S4 Single Observation,
- the redrafting of the properties O8, O9, O16,

- the introduction of the new property O37,
- the introduction of the new class S29, and
- the introduction of the property O38.

N.b.: the labels pertaining to S29 and O37 are up for debate.
The scope note of S29 has been flagged for further elaboration.
HW: MD, PF, GB.

Issue 696: Observation Reorganization – S27 Observation generalization

The SIG reviewed the HW by MD & PF on defining a generalization for Observations.
The HW involves:

- introducing a new Observation class (a generalization over observations)
- defining its set of properties:
    - O35 observed entity (was observed by)
    - O36 expressed the observed as (was the expression of)
- introducing a new class (S28 Observable Situation), as the range of O36.
- defining a property for S28: O40 refers to observable entity (is referred to in)

Decisions:
The HW was approved by the SIG.
The definitions of the new classes and properties can be found in the appendix.

Issue closed

Issue 683: New property -- Oxx7 observed dimension (was observed in)

The SIG reviewed and approved the definition of the property Oxx7 observed dimension (the details can be found in the appendix).

The property will feature in CRMsci v3.0 as *O39 observed dimension (was observed in)*.

Examples need to be provided for the new property

Thursday, 3 April 2025.

A web interface for graph data based on Oracle APEX on the example of (pre)historic mining data

Presentation by Gerald Hiebel (University of Innsbruck)

Link to the slide deck here.

A tool for the maintenance and evolution of x3ml schema mappings

Presentation by Yannis Marketakis (ICS-FORTH)

Link to the slide-deck here.

From Text to Graph; Automatic knowledge extraction and semantification of texts

Presentation by Stephen Hart (University of Bern)

Link to the slide-deck here.

Capturing the semantics of smell; The Odeuropa Data Model for Olfactory Heritage Information

Presentation by Pasquale Lisena (EURECOM)

Link to the slide-deck here.

Manuscript-AI; A dedicated ontology and AI-tool to facilitate integration and accessibility of heterogeneous catalogue data on medieval manuscripts

Presentation by Giulia Biagioni (TNO-Innovation for Life) & Shari Boodts (Radboud University)

Link to slide-deck here.

The Panorama of the Battle of Murten; A digital scholarly edition project

Presenation by Raphael Tsz Kin Chaau (École Polytechnique féfdérale de Lausanne)

Link to the slide-deck here.

Issue 646: Redraft the introduction of CRMinf

The SIG reviewed the HW by

- MD ("Scope of the CRMinf", plus "Class and property usage examples" redraft)
- GH (knowledge revision scenario -diagram), and
- AK (belief adoption scenario)

the details of which can be found in the appendix.

Some redrafting of bits and pieces took place (mainly mitigating strong statements about knowledge, and an effort to ground all statements in the relevant domain of discourse relevant for the CRMinf).

Decision: the new scope note will feature on the CRMinf V1.2 release.

Issue closed.

Using the CRM in the description of Musical Works

Presentation by Chrysi Gontikaki (University of West Attica), Sarantos Kapidakis (University of West Attica)

Link to the slide deck here.

Issue 580: CRMsoc scope redefinition

The SIG talked about the status of CRMsoc (and other incomplete models the creation of which aimed at representing aspects of social history (such as financial transactions and obligations, intellectual property rights, societal and other influences on the artistic creation process, etc.) or took a more global approach (like CRMsoc aspired to do, originally).

The problem is that since the SIG stopped to collectively maintain these models (and as work group members continued their effort individually), there are ontologies that are still featured on the CIDOC CRM site, despite having ceased to be maintained as of 2020. This is bad practice, and also a cause of confusion to audiences, who go on to use them, only to realize that they are not properly maintained, nor are they compatible with any CIDOC CRM version in particular.

With that in mind, the editors of the SIG proposed that:

- The tile of CRMsoc and all its contents be removed from the CRM-Compatible models section
- The relevant documentation (.docx, .pdf, diagrams illustrating the constructs therein) be moved under Resources/Technical Papers, with links between versions (if such versions exist)
- That the relevant issues (so not only 580) close with a statement claiming that "The SIG has resolved to discontinue work on CRMsoc (in the shape and form it was originally known), hence this issue is closed".

Discussion points:

- As far as the FRBRoo deprecated classes and properties are concerned (i.e., the ones that would be moved to CRMsoc according to issue 573), given that they are marginal to a social ontology but also to LRMoo, they could be reframed as non-obligatory additions (like an annex to LRMoo). PR and the LRMoo WG will see to that.
- Given the existence of at least three known CRM-compatible candidate models representing aspects of social relations, any effort for producing a CRM harmonized extension for social ontology should take into consideration the data on which these models are founded, and how said data has been analyzed by each model.
- Add a "Last updated, plus date" to all actively maintained ontologies, so that audiences can tell whether it's OK to use them in implementations.

Decisions:

- **HW**: PR and LRMoo group will come up with a proposal on how to represent F51 Pursuit, F52 Name Use Activity and their properties in an annexed form in LRMoo.
- Move all the contents of CRMsoc under technical papers
- Close all related issues with the statement mentioned above.

Issue closed

The SIG has resolved to discontinue work on CRMsoc (in the shape and form it was originally known), hence this issue is closed.

Issue 651: CIDOC CRM ontology extension "A multi-causal ontology model"

The SIG has resolved to discontinue work on CRMsoc (in the shape and form it was originally known), hence this issue is closed.

Issue 573: CRMsoc & F51 Pursuit & F52 Name Use Activity

The SIG has resolved to discontinue work on CRMsoc (in the shape and form it was originally known), hence this issue is closed.

Issue 413: Pursuit and Name Use Activity to CRMsoc

The SIG has resolved to discontinue work on CRMsoc (in the shape and form it was originally known), hence this issue is closed.

Issue 557: Which family model should classes (i) Proovision and (ii) Business Obligation appear under?

The SIG has resolved to discontinue work on CRMsoc (in the shape and form it was originally known), hence this issue is closed.

Issue 586: How to call the model for business transactions?

The SIG has resolved to discontinue work on CRMsoc (in the shape and form it was originally known), hence this issue is closed.

Issue 542: Groups and carried out by

The SIG has resolved to discontinue work on CRMsoc (in the shape and form it was originally known), hence this issue is closed.

Issue 408: Rights Model Enriched

The SIG has resolved to discontinue work on CRMsoc (in the shape and form it was originally known), hence this issue is closed.

The Virtual Campus Project: Modelling data for AR Histroical Tours with CIDOC CRM and the CRMgeo and CRMact extensions

Presentation by Maria Sotomayor Chicote (Department for Digital Humanities, University of Cologne)

Link to the slide deck here.

The CHExRISH Project

Presentation by Luiz do Valle Miranda (Jagiellonian University in Krakow)

Link to the slide deck here.

The LKG Ontology as an Example of LRMoo Application

Presentation by Jakub Gomułka (AGH University of Kraków)

Link to the slide deck here.

Friday 4 April 2025

Schedule the 62nd CIDOC CRM & 55th LRMoo SIG Meeting in Oxford (23-27 March 2026)

EC has volunteered to organize a SIG meeting in Oxford, in late March –the week 23-24 March 2026.

Schedule the 63rd CIDOC CRM & 56th LEMoo SIG Meeting in Cologne in the Fall of 2026

OE has volunteered to organize a SIG meeting in Cologne, in the fall of 2026.

Issue 274: Archetypical Sounds

The SIG decided to not close the issue, instead took a vote on introducing Exx Audio Item in CRMbase V7.3.1, with the id E100. The idea is to have this class at the same level as E33 Linguistic Object and E36 Visual Item. The objection that recorded sounds would fall in the scope of LRMoo was considered unfounded, in the sense that it only concerns performances, and not any random identifiable sound, which is much broader than an expression (F2) created (R17i) by the (F28) recording (R81) of a performance (F31). The details can be found in the appendix.

HW: GB, SdS, to formulate the scope notes for the properties of the class. PR to see whether there are implications for LRMoo.

The properties proposed are:

- Pxx sounded (was sounded by) D: E5 Event, R: E100 Audio Item (to use power of event modeling)

- Pxx bears recording of (is recorded by) D: E24 Physical Human-Made Thing R: E100 Audio Item (prob sub property of 'carries')
- Pxx sounds typical for D: E100 Audio Item R: E55 Type (analogy to 'payment')

Issue 316: Co-reference statements to CRMinf

The SIG reviewed issue 316, which stemmed from an old proposal to extend attribute assignment with explicit co-references in CRM. This was briefly explored for version 6.1, but the effort came to a halt due to complexity. The issue was revisited, considering whether explicit co-reference is necessary, given that it is already implicit in the system.

Proposal: A proposal made was

- to either close the issue, or,
- alternatively,
    - to treat co-reference statements through CRMinf
    - or (if anyone is interested to do so), make a research question out of it and then report to the SIG.

Decision: The group agreed that explicit co-references increase complexity, and therefore decided to **close the issue**.

Issue closed

Issue 351: Modelling Principles

The SIG revised issue 351. The issue concerned collating all known versions of the Modelling Principles document (a deliverable for the Parthenos.project), and finalizing it, referring also to use cases, checklists for issuing new modeling constructs, and guidelines on defining ones' concepts.

The document has been fully updated and consolidated by Erin, and now it appears on the site (under The Model\Use_&_Learn section).

Decision: Given that all relevant work had been completed and the issue had been superseded by subsequent developments, the SIG resolved to **close the issue**.

Issue closed

Issue 364: Create Profile Markup Language/ Schema / Ontology profiles

The SIG resolved to close the issue. The application profiles created through OntoME and the mapping patterns in Zellij could be featured under Tools in the new website.

Issue closed

Issue 457: Harmonization of graphical documentation about CRM

The SIG has standardized how to represent the classes and properties of CIDOC CRM & extensions, in terms of color-coding different classes, representing the ISA relations, multiple inheritance etc.

The issue will still remain open until ETz & PM tell us it's OK to shut it down –FORTH & CHIN are working to propose a standardized format for representing instances of classes.

HW: ETz & PM

Issue 461: Attribute Assignment of .1 properties

The SIG decided that it's not necessary to add property quantifiers to .1 properties. At least not for the moment. In principle, .1 properties link one property instance to one instance of type (although more than one instances of the domain could in principle be instantiated).

Issue closed

Issue 476: Pxx represents entity of type

The SIG assigned the label "is type of instance represented" to the inverse form of P199 represents instance of, which was missing. The SIG also resolved to fix the FOL axiom of the fully developed path that P199 shortcuts over, according to MDs suggestion (i.e.: make it reference E18 Physical Thing instead of E1 CRM Entity, to rule out that the type represented can be an abstract entity or type).

The new definition will appear in CIDOC CRM v7.3.1.

The details of the definition can be found in the appendix.

Issue closed

Issue 504: Formulate the philosophical underpinnings of crm and its relation to reality and the objectivity of observations

The SIG resolved to close the issue, on the grounds that not all open-ended discussions should necessarily get to be discussed as issues about maintaining the CRM standard.

Issue closed

Issue 533: How to disambiguate polysemous concepts used as ontological classes

There is no residual HW for this issue. It was about drafting an annex to the Modelling Principles document, a use case from epigraphy illustrating how to disambiguate the polysemous concept of inscription (qua physical aspect, scribble, content).

This has been done. The document can be found here, and also under Use & Learn (Methodology, under the subsection "Principles for Modelling Ontologies -enhanced with use-cases of bottom-up modelling").

Issue closed

Issue 538: Documenting the changes in the CRM

The SIG had assigned FORTH with automatically indexing posts on the CRM archive, in a way that it gives a quick overview of the discussions therein and any decisions reached.

For the moment the track changes mechanism can help identify when some change took place in the model. And then interested parties trying to establish how a particular change came about can consult the minutes or the issues list, to determine the thought process that lead to that change.

The SIG decided to not close the issue just yet. The proposal was to consider the possibility of providing links pointing from the URLs of the classes and properties affected by the outcome of an issue, to that issue.

HW: ETz & PF to come up with a proposal for that.

Issue 550: Time-span for instances of I11 Situation

The SIG resolved to close the issue on the grounds of there not being any residual HW left.

Issue closed

Issue 551: Argument for an Instrument Class (and its property)

The SIG resolved on closing the issue on the grounds that it has been inactive since 2021, and aside the first intention to work on the issue, there was never any HW submitted.

Issue closed

Issue 552: Add URLs to the official documentation

The SIG reviewed the old proposal by GB to introduce URLs for classes and properties in the official documentation.

Since neither GB is particularly keen on pursuing this, and the SIG didn't care much for the proposal when it was first made, the issue was closed.

N.b.: Printed documentation is meant to be different than online documentation. For LRMoo in particular this would cause additional problems, i.e., it would mean that the model would first have to be approved by IFLA, then get resolvable URIs, then the LRMoo group would have to introduce them in the documentation (thus resulting in a new release), that would still need to get approved by the IFLA, not to mention all the extra manual work this would require them to do.

Issue closed

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

The SIG resolved to close the issue on the grounds on there being no residual HW in it. CIDOC CRM 7.1.3 is the version ensuing from the ISO revision process.

Issue closed

Issue 596: Supplementary documentation

The SIG resolved to close the issue on the grounds on there being no residual HW in it.

Issue closed

Issue 603: Contextualize issues in a more informative way

The SIG has managed to contextualize the discussion of issues at meetings and on the list, moving to using and circulating google docs (and other open source formats) where, besides the HW at hand, information on the problem that the HW is supposed to help resolve, can be found.

What remained to be done was for TV to put together a proposal for one-on-one mentoring to be shared by SdS with the board of ICOM Documentation (née CIDOC), that would help newcomers understand how the SIG works. SdS would then report on ICOM Documentation's response to that. We didn't have a positive response from the board, so it stopped at that.

Given that not everybody needs the same level of formalization for approaching the SIG's work, the SIG decided to close the issue.

Issue closed

Issue 614: I4 Proposition Set and what an instance of I2 Belief is about

The SIG resolved to close the issue on the grounds of there being no residual HW in it.

Issue closed

Issue 615: scope note of E13 Attribute Assignment

HW: The SIG appointed WS to look at the issue, because no progress has been made in the past, and in the meantime new issues about the semantics of E13 have started and they do seem to have a great deal of overlap (like 694 for example).

Issue 694: E13 interpretation

HW: WS will be collaborating with MD on the issue of the interpretation of E13.

Issue 629: Ontology of substances and unity criteria

HW: WS will revisit the comments left on the guidelines for writing scope notes and report back to the SIG.

Issue 636: Update the list of property quantifiers

The SIG reviewed the issue and saw that there is pending HW, namely to draft a statement that extends existing property quantification declarations based on requirements concerning the cardinality of domain/range instances of the properties, and submit it for an evote.

HW was assigned to CEO.

Issue 639: core and application models

The SIG resolved to close the issue with a pointer to 682 (CRM and Compatible/Harmonized models), under which it is subsumed.

Issue closed

Issue 650: scope-note update for typed properties

The SIG reviewed the issue and decided against closing it.

HW: CEO to have a go at it, particularly for the properties:

- P62.1 mode of depiction
- P67.1 has type
- P138.1 mode of representation
- P189.1 has type

Issue 654: BP11.2 Connected through

The SIG decided to not close this issue, it's relevant to the CRMba revival.

HW: TV to contact people from Cultural Heritage, AG to contact people from the Nôtre Dame Restauration.

Issue 659: Examples of P38 deassigned

WS was tasked with sharing an example for P38 deassigned with the SIG.

Here's the example, it can go to an evote:

- The merge on 11th August 2023 of duplicate entries in the DAI library catalogue for the journal article "Studies on the post-boreal vegetational history of south-eastern Drenthe (Netherlands)"

deassigned https://zenon.dainst.org/Record/001483712 [this ID has been deprecated and now redirects to the other entry]

Issue 661: scope note of Jxx1 held at least for

HW: SdS was reminded of this pending HW, he will submit it at the fall SIG.

Issue 669: Link related examples

The SIG reviewed issue 669, it was a proposal to connect examples that form a set (they instantiate properties of the same class for instance).

Decision

The SIG decided against linking all examples, it's too much work for very little gain. On the other hand, in some cases it can be helpful to flag recurring examples, without having to add explanations all the time, like in CRMinf, CRMarchaeo.

Establishing such a practice should be decided on a case-by-case basis, and especially for recurring, complex examples.

Issue 671: Example for propositional objects

Decision: the SIG decided that unless presented with a concrete proposal of an example to review within 2025, the issue will be closed.

Issue 673: missing inverse labels P81, P82, P171, P172

The SIG decided to keep the issue open, given the discussion on using inverse properties in the FOL (see issue 692).

Appendices

Appendix I: List of abbreviated names

AG: Anaïs Guillem
AK: Athina Kritsotaki
CEO: Christian-Emil Ore
DF: Donatella Fiorani
ETs: Eleni Tsouloucha
ETz: Elias Tzortzakakis
GB: George Bruseker
GH: Gerald Hiebel
MA: Marta Acierno
MD: Martin Doerr
ØE: Øyvind Eide
PF: Pavlos Fafalios
PR: Pat Riva
SdS: Stephen D. Stead
TV: Thanasis Velios
WS: Wolfgang Schmidle

Appendix II: Model updates, scope note reformulations, documents

Issue 682:

Definitions for kinds of CRM Ontology Extensions

Background

The mission of the CRM SIG is to maintain the CIDOC CRM as a *standard*, improving and adjusting it to emerging needs of the user community. It is an important feature of the CIDOC CRM to be extensible, by models that are *CIDOC CRM compatible*. The rules of compatibility are laid out in the section "Extensions of CIDOC CRM" of the Definition of the CIDOC CRM. The purpose of this concept of compatibility as standard is to ensure that all compatible data can be queried and retrieved by a limited set of high-level key concepts and relationships via large-scale data integration and global access. This raises the question about the contribution of the CRM SIG to CRM compatible ontologies, their conformance and quality control. In this regard we distinguish two major categories: CIDOC CRM Harmonized Ontologies and CIDOC CRM Compatible Ontologies.

CIDOC CRM Harmonized Ontologies

For the purpose of making additional recommendations to the community as *informal standards* in more specific application areas, CRM-SIG itself currently manages a set of CIDOC CRM compatible extensions that are fully harmonized among each other, following strict intellectual and logical rules. Full harmonization means that beyond compatibility with the CIDOC CRM itself, there is no ambiguity or repetition *between the additional concepts* of all extensions and that there are specialization relations across them. The CRM-SIG further adheres to an empirically justified notion of ontological commitment and other, explicitly documented intellectual principles.

Creating and maintaining these models is an open process, any team of experts or institution is invited to collaborate and to bring in their domain knowledge. The process however requires central coordination and is deliberately slow and conservative in order to ensure its reliability and long-term reusability. A particular success of this process and the intellectual principles applied is the maintenance of backwards compatibility ("monotonicity") with very few exceptions over more than two decades of sometimes substantial revisions.

A harmonized ontology comes to be and is listed on the CRM SIG website when the CIDOC CRM SIG votes to create and maintain such an ontology. Such an ontology is listed together with other harmonized ontologies in a clearly marked section.

CIDOC CRM Compatible Ontologies

On the other side, as intended by the CRM, numerous teams have developed or are developing many CRM compatible extensions, which may or may not aim at large-scale information integration beyond what CIDOC CRM compatibility enables. Some may eventually aim to become CIDOC CRM Harmonized Ontologies. Others may be results of careful academic research and have a focussed aim for particular kinds of investigation. Finally, there is an immense number of applied data projects with limited time that need to make pragmatic decisions for concepts not readily provided by the CIDOC CRM or that should be shortcut for the performance of a particular application. Many developers, researchers or institutions using these models would like to acquire a compatibility attribute from the CRM-SIG and benefit from advice, support or advertising by the CRM-SIG. These ontologies are listed by the CIDOC CRM SIG on its website in order to provide recognition for this work, enable it to be reused and to support the community in finding common modelling patterns and strategies and identifying areas of work where harmonized ontologies over a wider field could be built or where indeed the CRM base standard itself could be responsibly evolved based on new evidence.

A CIDOC CRM Compatible Ontology will be listed on the CRM SIG website after it has passed a basic certification procedure for ensuring that it meets the technical requirements for being so listed. [See certification procedure.]

CRM Harmonized/Compatible Extensions Metadata Requirements

	Metadata	Information_Required for submission of the Ontology?	Description	Example	Requires Confirmation?	Adjudication Procedure of Conformance
Ontology Properties	Ontology Type	Yes	Harmonized Ontology or Compatible Ontology			
Ontology Properties	Ontology title	Yes				
Ontology Properties	Ontology description	Yes				
Ontology Properties	Version	Yes	The version of the ontology	1.0.1	No	
Ontology Properties	Development Repository	No	A link to the development repo of the version.	http://github.com/example_project	Yes	
Ontology Properties	CIDOC CRM base and Harmonized Extensions Compatible with	Yes	Indicate the versions of CRM and extentions for which the Ontology is designed and should be compatible.	6.1.0	Yes	
Ontology Properties	Scope of Ontology	Yes	Indicate by keyword the relevant domain of documentation	Historical Sites Management, Collections Management, Conservation Science	No	
Ontology Properties	Intended User Groups	No	Indicate by keyword intended user groups	Curators, Historians, Provenance Researchers etc.	No	
Ontology Properties	License	Yes	Indicate the licensing scheme under which the package is released	CC BY 4.0	No	

Documentation	Ontology Documentation	Yes	A link to the Ontology documentation		Yes	
Documentation	Ontology Documentation Format	No	Indicate the format of the Ontology documentation		No	
Documentation	Ontology Serialization	Yes	a link to the ontology serialization			
Organizational Characteristics	Supporting Institution	Yes	Indicate the institution supporting the Ontology.		No	
Organizational Characteristics	Supporting Institution Contact	Yes	Indicate the contact for the Ontology from the supporting institution.		No	
Organizational Characteristics	Supporting Institution Contact - Contact Details	Yes	Indicate the contact details for the contact for the Ontology from the supporting institution.		No	
Organizational Characteristics	Funding Institution	No	Indicate the institution funding the Ontology (where applicable).		No	
Organizational Characteristics	Funding Grant	No	Indicate the Grant that funded the development of the Ontology.		No	
Organizational Characteristics	Maintenance Plan	No	Please write a description of the maintenace plan for the Ontology.		No	

Use History	Adopters	No	Please indicate institutional adopters of the Ontology.		Yes	
Usage Examples	Links	Yes				

Issue 628:

Diagram 16; Object Number Information

Replace E15 Identifier Assignment. *P42 assigned (was assigned by)*: E90 Symbolic Object, **with** E15 Identifier Assignment. *P142 used constituent (was used in)*: E90 Symbolic object, on the grounds that *P42 assigned (was assigned by)* has a different domain and range (E17 Type Assignment, E55 Type), that are not relevant to the diagram's topic

Diagram 19: Object Collection Information

Reverse the direction of the arrow in P147 curated (was curated by) connecting E87 Curation Activity and E78 Curated Holding –so that it correctly points from E87 to E78.

Diagram 28: Image Information, Objects and Carriers

Replace E89 Propositional Object. *P48 has preferred identifier (is preferred identifier of):* E89 Propositional Object **with** E89 Propositional Object. *P148 has component (is component of)*: E89 Propositional Object, on the grounds that P48 is not consistent with the range (E89) in particular, nor is it relevant with the topic of the diagram.

Issue 680:

P179 had sales price (was sales price of)

Change from (OLD) definition

P179 had sales price (was sales price of)

Domain:

E96 Purchase

Range:

E97 Monetary Amount

Quantification:

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

Scope note:

This property establishes the relationship between an instance of E96 Purchase and the instance of E97 Monetary Amount that forms the compensation for the transaction. The monetary amount agreed upon may change in the course of the purchase activity.

Examples:

- The sale of Vincent van Gogh's "Still Life: Vase with Fifteen Sunflowers" 30th March 1987 (E96) *had sales price* Christies' hammer price for "Still Life: Vase with Fifteen Sunflowers" (E97).
- The purchase of 10 okka of nails by the captain A. Syrmas on 18th September 1895 (E96) *had sales price* 20 piastre (grosi) (E97). (Syrmas, 1896)

In first-order logic:

P179(x,y) ⇒ E96(x)
P179(x,y) ⇒ E97(y)

Change to (NEW) scope note

P179 had sales price (was sales price of)

Domain:

E96 Purchase

Range:

E97 Monetary Amount

Quantification:

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

Scope note:

This property establishes the relationship between an instance of E96 Purchase and the instance of E97 Monetary Amount that forms the compensation for the transaction. The monetary amount agreed upon may change in the course of the purchase activity. The instance of E97 Monetary Amount related to a purchase via *P179 had sales price (was sales price of)* should be the final one at the tune the ownership was being transferred, regardless of whether it was actually completely paid or compensated in other ways. Since the value of the same nominal monetary amount may change over time, region, or even depend on the deal itself, the instance of E97 Monetary Amount referred to by this property is regarded as specific to the domain instance, regardless of whether other transactions agree on the same nominal amount. Further, the particular instance of E97 Monetary Amount may be credited to the sellers.

Examples:

- The sale of Vincent van Gogh's "Still Life: Vase with Fifteen Sunflowers" 30th March 1987 (E96) *had sales price* Christies' hammer price for "Still Life: Vase with Fifteen Sunflowers" (E97).
- The purchase of 10 okka of nails by the captain A. Syrmas on 18th September 1895 (E96) *had sales price* 20 piastre (grosi) (E97). (Syrmas, 1896)

In first-order logic:

P179(x,y) ⇒ E96(x)
P179(x,y) ⇒ E97(y)

P191 had duration (was duration of)

Change from (OLD definition)

P191 had duration (was duration of)

Domain:

E52 Time-Span

Range:

E54 Dimension

Quantification:

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

Scope note:

This property describes the length of time covered by an instance of E52 Time-Span. It allows an instance of E52 Time-Span to be associated with an instance of E54 Dimension representing duration independent from the actual beginning and end. Indeterminacy of the duration value can be expressed by assigning a numerical interval to the property *P90 has value* of E54 Dimension.

Examples:

- The time-span of the Battle of Issos 333 B.C.E. (E52) *had duration* Battle of Issos duration (E54). (Howard, 2012)

In first-order logic:

P191(x,y) ⇒ E52(x)
P191(x,y) ⇒ E54(y)

Change to (NEW definition)

P191 had duration (was duration of)

Domain:

E52 Time-Span

Range:

E54 Dimension

Quantification:

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

Scope note:

This property describes the length of time covered by an instance of E52 Time-Span. It allows an instance of E52 Time-Span to be associated with an instance of E54 Dimension representing duration independent from the actual beginning and end. Indeterminacy of the duration value can be expressed by assigning to the property of E54 Dimension a numerical interval.

Examples:

- The time-span of the Battle of Issos 333 B.C.E. (E52) *had duration* Battle of Issos duration (E54). (Howard, 2012)

In first-order logic:

P191(x,y) ⇒ E52(x)
P191(x,y) ⇒ E54(y)

Issue 681:

P39 measured (was measured by)

Changed FROM (OLD definition)

P39 measured (was measured by)

Domain:

E16 Measurement

Range:

E18 Physical Thing

Subproperty of:

E13 Attribute Assignment. P140 assigned attribute to (was attributed by): E1 CRM Entity

Quantification:

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

Scope note:

This property associates an instance of E16 Measurement with the instance of E18 Physical Thing upon which it acted. The instance of E16 Measurement is specific to the measured object. An instance of E18 Physical Thing may be measured more than once with different results, constituting different instances of E16 Measurement.

Examples:

- The measurement of the height of silver cup 232 on 31st August 1997 (E16) *measured* silver cup 232 (E22). (fictitious)
- The carbon 14 dating of the "Schoeninger Speer II" in 1996 (E16) *measured* the "Schoeninger Speer II" (E22). [The carbon 14 dating of an approximately 400.000 year old

complete Old Palaeolithic wooden spear found in Schoeningen, Niedersachsen, Germany, in 1995. See also, E16 Measurement.] (Kouwenhoven, 1997)

In first-order logic:

P39(x,y) ⇒ E16(x)
P39(x,y) ⇒ E18(y)
P39(x,y) ⇒ P140(x,y)

Changed TO (NEW definition)

P39 measured (was measured by)

Domain:

E16 Measurement

Range:

E18 Physical Thing

Subproperty of:

E13 Attribute Assignment. P140 assigned attribute to (was attributed by): E1 CRM Entity

Quantification:

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

Scope note:

This property associates an instance of E16 Measurement with the instance of E18 Physical Thing upon which it acted. The instance of E16 Measurement is specific to the measured object. An instance of E18 Physical Thing may be measured more than once with different results, constituting different instances of E16 Measurement.

This property is part of the fully developed path from E18 Physical Thing *through P39i was measured by (measured)*, E16 Measurement, *P40 observed dimension (was observed in)*, to E54 Dimension, which is shortcut by *P43 has dimension (is dimension of)*.

Examples:

- The measurement of the height of silver cup 232 on 31st August 1997 (E16) *measured* silver cup 232 (E22). (fictitious)
- The carbon 14 dating of the "Schoeninger Speer II" in 1996 (E16) *measured* the "Schoeninger Speer II" (E22). [The carbon 14 dating of an approximately 400.000 year old complete Old Palaeolithic wooden spear found in Schoeningen, Niedersachsen, Germany, in 1995. See also, E16 Measurement.] (Kouwenhoven, 1997)

In first-order logic:

P39(x,y) ⇒ E16(x)
P39(x,y) ⇒ E18(y)
P39(x,y) ⇒ P140(x,y)

P40 observed dimension (was observed in)

Changed FROM (OLD definition)

P40 observed dimension (was observed in)

Domain:

E16 Measurement

Range:

E54 Dimension

Subproperty of:

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

Quantification:

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

Scope note:

This property records the dimension that was observed in an E16 Measurement Event.

E54 Dimension can be any quantifiable aspect of E70 Thing. Weight, image colour depth and monetary value are dimensions in this sense. One measurement activity may determine more than one dimension of one object.

Dimensions may be determined either by direct observation or using recorded evidence. In the latter case the measured Thing does not need to be present or extant.

Even though knowledge of the value of a dimension requires measurement, the dimension may be an object of discourse prior to, or even without, any measurement being made.

Examples:

- The measurement of the height of silver cup 232 on 31st August 1997 (E16) *observed dimension* silver cup 232 height (E54). [which *has unit* mm (E58), *has value* 224 (E60)] (fictitious)
- The carbon 14 dating of the "Schoeninger Speer II" in 1996 (E16) *observed dimension* the carbon 14 based temporal distance from 1996 to the growth of the wood of the "Schoeninger Speer II" (E60). [The carbon 14 dating of an approximately 400.000 year old complete Old Palaeolithic wooden spear found in Schoeningen, Niederachsen, Germany, in 1995. See also: E16 Measurement.] (Kouwenhoven, 1997)

In first-order logic:

P40(x,y) ⇒ E16(x)
P40(x,y) ⇒ E54(y)
P40(x,y) ⇒ P141(x,y)

Changed TO (NEW definition)

P40 observed dimension (was observed in)

Domain:

E16 Measurement

Range:

E54 Dimension

Subproperty of:

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

Quantification:

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

Scope note:

This property records the dimension of an instance of E18 Physical Thing that was observed in an E16 Measurement Event. The observed item should be documented using the property *P39 measured (was measured by)*.

One measurement activity only determines one dimension of an instance of E18 Physical Thing. This dimension may be any quantifiable aspect of E70 Thing. Weight, length, and chemical content are dimensions in this sense.

Dimensions of an instance of E18 Physical Thing may be determined either by direct observation or using recorded evidence. However, determination by measuring requires the presence of the measured item. Other methods may constitute instances of E13 Attribute Assignment.

Even though knowledge of the value of a dimension requires measurement, the dimension may be an object of discourse prior to, or even without, any measurement being made.

This property is part of the fully developed path from E18 Physical Thing through *P39i was measured by (measured),* E16 Measurement*, P40 observed dimension (was observed in),* to E54 Dimension, which is shortcut by *P43 has dimension (is dimension of).*

Examples:

- The measurement of the height of silver cup 232 on 31st August 1997 (E16) *observed dimension* silver cup 232 height (E54). [which *has unit* mm (E58), *has value* 224 (E60)] (fictitious)
- The carbon 14 dating of the "Schoeninger Speer II" in 1996 (E16) *observed dimension* the carbon 14 based temporal distance from 1996 to the growth of the wood of the "Schoeninger Speer II" (E60). [The carbon 14 dating of an approximately 400.000-year-old complete Old Palaeolithic wooden spear found in Schoeningen, Niederachsen, Germany, in 1995. See also: E16 Measurement.] (Kouwenhoven, 1997)

In first-order logic:

P40(x,y) ⇒ E16(x)
P40(x,y) ⇒ E54(y)
P40(x,y) ⇒ P141(x,y)

P43 has dimension (is dimension of)

Changed FROM (OLD definition)

P43 has dimension (is dimension of)

Domain:

E70 Thing

Range:

E54 Dimension

Quantification:

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

Scope note:

This property records an instance of E54 Dimension of some instance of E70 Thing.

In the case that the recorded property is a result of a measurement of an instance of E18 Physical Thing, this property is a shortcut of the more fully developed path from E18 Physical Thing through *P39i was measured by (measured),* E16 Measurement*, P40 observed dimension (was observed in)* to E54 Dimension.

It offers no information about how and when an E54 Dimension was established, nor by whom. Knowledge about an instance of E54 Dimension need not be the result of a measurement; it may be the result of evaluating data or other information, which should be documented as an instance of E13 Attribute Assignment.

An instance of E54 Dimension is specific to an instance of E70 Thing.

Full path:

E18 Physical Thing. P39i was measured by (measured): E16 Measurement. P80 observed dimension (was observed in): E54 Dimension

Examples:

- Silver cup 232 (E22) *has dimension* height of silver cup 232 (E54). [which *has unit (P91)* mm (E58), *has value (P90)* 224 (E60)] (fictitious)

In first-order logic:

P43(x,y) ⇒ E70(x)
P43(x,y) ⇒ E54(y)
P43(x,y) ⇐ (∃z) [E16(z) ∧ P39i(x,z) ∧ P40(z,y)]

Changed TO (NEW definition)

P43 has dimension (is dimension of)

Domain:

E70 Thing

Range:

E54 Dimension

Quantification:

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

Scope note:

This property records an instance of E54 Dimension of some instance of E70 Thing.

In the case that the recorded property is a result of a measurement of an instance of E18 Physical Thing, this property is a shortcut of the more fully developed path from E18 Physical Thing through *P39i was measured by (measured),* E16 Measurement*, P40 observed dimension (was observed in)* to E54 Dimension.

It offers no information about how and when an E54 Dimension was established, nor by whom. Knowledge about an instance of E54 Dimension need not be the result of a measurement; it may be the result of evaluating data or other information, which should be documented as an instance of E13 Attribute Assignment.

An instance of E54 Dimension that is referred to by this property is specific to an instance of E70 Thing.

Full path:

E18 Physical Thing. P39i was measured by (measured): E16 Measurement. P80 observed dimension (was observed in): E54 Dimension

Examples:

- Silver cup 232 (E22) *has dimension* height of silver cup 232 (E54). [which *has unit (P91)* mm (E58), *has value (P90)* 224 (E60)] (fictitious)
- The “Schoeninger Speer II” (E70)) *has dimension* the carbon 14 based temporal distance from 1996 to the growth of the wood of the “Schoeninger Speer II” (E54). [The carbon 14 dating of the “Schoeninger Speer II” in 1996 of an old complete Old Palaeolithic wooden spear found in Schoeningen, Niederachsen, Germany, in 1995 resulted in approximately 400.000 years. See also: E16 Measurement.] (Kouwenhoven, 1997)

In first-order logic:

P43(x,y) ⇒ E70(x)

$P43(x,y) \Rightarrow E54(y)$
$E18(x) \wedge P43(x,y) \Leftarrow (\exists z)\,[E16(z) \wedge P39i(x,z) \wedge P40(z,y)]$

Issue 627:

WD for 627 60th SIG meeting April 2025

Issue link: https://cidoc-crm.org/Issue/ID-627-explicitly-document-cross-references-btw-family-models

Related issues: **678 Towards CRM OWL, 460 URI Management**

The latest note of issue 627 has been recorded after the 58th CIDOC CRM and 51st FRBR/LRMoo SIG meeting. This note ended up with a promise that Etz will be implementing the proposed & agreed changes, and the issue will close.

In short, the proposed & agreed changes included the following:

- External references must point to the corresponding version of the referenced ontology
- PC Properties module needs to be implemented
- Regarding draft implementations - make obvious the note – do not use for implementation
- Change label more in Encodings column to gitlab

The updates on the agreed changes are presented later in this document. Some of them also depend some additional proposals that occured in the context of 627 which will be discussed first in Session 1.3 of the 60th CIDOC & 53rd FRBR/LRMoo SIG Meeting and are somehow relevant to issues **460 URI Management** and **678 Towards CRM OWL**

Additional Proposals

The additional proposals (a1, a2, a3, b, c) are:

(A) owl:versionIRI & owl:import

(a1) Include an owl:versionIRI statement in both CRMbase and FM encodings.

e.g. change the following

```
<rdf:Description rdf:about="http://www.cidoc-crm.org/cidoc-crm/">
   <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Ontology" />
   <owl:versionInfo>RDFs Implementation (February 2024) of CIDOC-CRM 7.1.3</owl:versionInfo>
```

to the following

```
<owl:Ontology rdf:about="http://www.cidoc-crm.org/cidoc-crm/">
   <owl:versionInfo>RDFs Implementation (February 2024) of CIDOC-CRM 7.1.3</owl:versionInfo>
   <owl:versionIRI rdf:resource="http://www.cidoc-crm.org/cidoc-crm/7.1.2/" />
   ...
```

Relevant links :

https://www.w3.org/TR/owl2-syntax/#Versioning_of_OWL_2_Ontologies

https://protege.stanford.edu/ontologies/pizza/pizza.owl

```
▼<owl:Ontology rdf:about="http://www.co-ode.org/ontologies/pizza">
   <owl:versionIRI rdf:resource="http://www.co-ode.org/ontologies/pizza/2.0.0"/>
   <dc:title xml:lang="en">pizza</dc:title>
```

(a2) support versioned uri resolution for FMs similarly to the CRMbase versioned uri resolution decision in 460 URI Management.

Currently owl:versionIRI for FMs would be supported through the following statement

<owl:versionIRI rdf:resource="https://cidoc-crm.org/extensions/crmsci/rdfs/2.0/CRMsci_v2.0.rdf“ />

The proposal is to make the required changes so that it follows CRMbase implementation so that owl:versionIRI will be supported by:

<owl:versionIRI rdf:resource="https://cidoc-crm.org/extensions/crmsci//2.0/“ />

a3) In FM rdf and owl use owl:import statements with the owl:versionIRI or the external reference ontology

e.g. change

```
<rdf:Description rdf:about="http://www.cidoc-crm.org/extensions/crmsci/">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Ontology"/>
  <owl:versionInfo xml:lang="en">CRMsci Ontology 2.0 (March, 2023) including references to CIDOC-CRM 7.1.2</owl:versionInfo>
…
```

To

```
<owl:Ontology rdf:about="http://www.cidoc-crm.org/extensions/crmsci/">
    <owl:imports rdf:resource="http://www.cidoc-crm.org/cidoc-crm/7.1.2/"/>
    <owl:versionInfo xml:lang="en">CRMsci Ontology 2.0 (March, 2023) including references to CIDOC-CRM 7.1.2</owl:versionInfo>
```

a3) In FM rdf and own use owl:versionIRI for owl:import statements

(B) Adjust the FM rdf serialization syntax to the CRMbase rdf serialization syntax.

More specifically replace the following example rdf statements

```
<rdf:Description rdf:about="http://www.cidoc-crm.org/extensions/crmarchaeo/A1_Excavation_Processing_Unit">
  <rdf:type rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
…

<rdf:Description rdf:about="http://www.cidoc-crm.org/extensions/crmarchaeo/AP1_produced">
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
…
```

With the following:

<rdfs:Class rdf:about="A1_Excavation_Processing_Unit">
…
<rdf:Property rdf:about="AP1_produced">
…

(C) Include all declaration info (examples quantification etc) in the rdfs:comment/scope note of the CRMBase and FM rdf encodings

Change the CRMBase and FM rdfs:comment/scope note patterns. One of the decisions of **678 Towards CRM OWL** included the synchronization of CRM owl rdfs:comment/scope note pattern with the pattern followed in Erlangen CRM. It basically includes all relevant declaration information for classes and properties (including examples, quantifications, etc.).

The proposal is to use the same rdfs:comment/scope note pattern for both CRMbase rdf serialization and all FM rdf serializations.

Updates on the agreed changes

The updates on the proposed & agreed statements are the following (d1,d2, e1, e2, e3, f, g)

(D) FM External References

External references must point to the corresponding version of the referenced ontology

1. For HTML it is already there – DONE e.g. http://www.cidoc-crm.org/extensions/crmarchaeo/A1_Excavation_Processing_Unit
2. For RDF currently no change as no action had been decided. Next step depends on the approval of owl:versionIRI & owl:import usage

(E) FM PC module implementation

Implement PC Properties module whenever required (See example CRMarchaero PC module proposal file)

1. The main classes and properties needed for implementing are already defined in CRMbase, but they are not resolvable.
    - PC0_Typed_CRM_Property
    - P01_has_domain
    - P02_has_range

- P02i_is_range_of
- P03_has_range_literal
- P04_represents

Question e1)

Reuse the unresolvable CRMbase PC module references or reimplement these (e.g with a different prefix) so that the PC module is not depending in unresolvable references?

2. Regarding Property Classes (e.g. like PC3_has_note, PC14_carried_out_by from CRMbase PC module).

Question e2)

should we keep the same prefix PC or perhaps define another one (e.g. **PC11**_has_physical_relation_to or **APC11**_has_physical_relation_to)?

- The FM base uri will be different so there is no chance of conflicting uris. I would propose APC11_has_physical_relation_to so that it seems more compatible to the prefixes used in the base model that it refers to

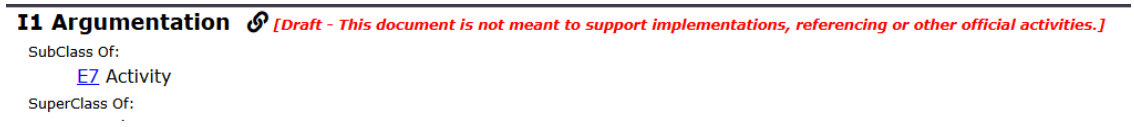
3. Similarly regarding .1 property names (e.g. like P3.1_has_type from CRMbase PC module).

Question e3) should we keep the same prefix P or perhaps define another one (e.g. **P11.1**_has_type**"** or **AP11.1**_has_type)?

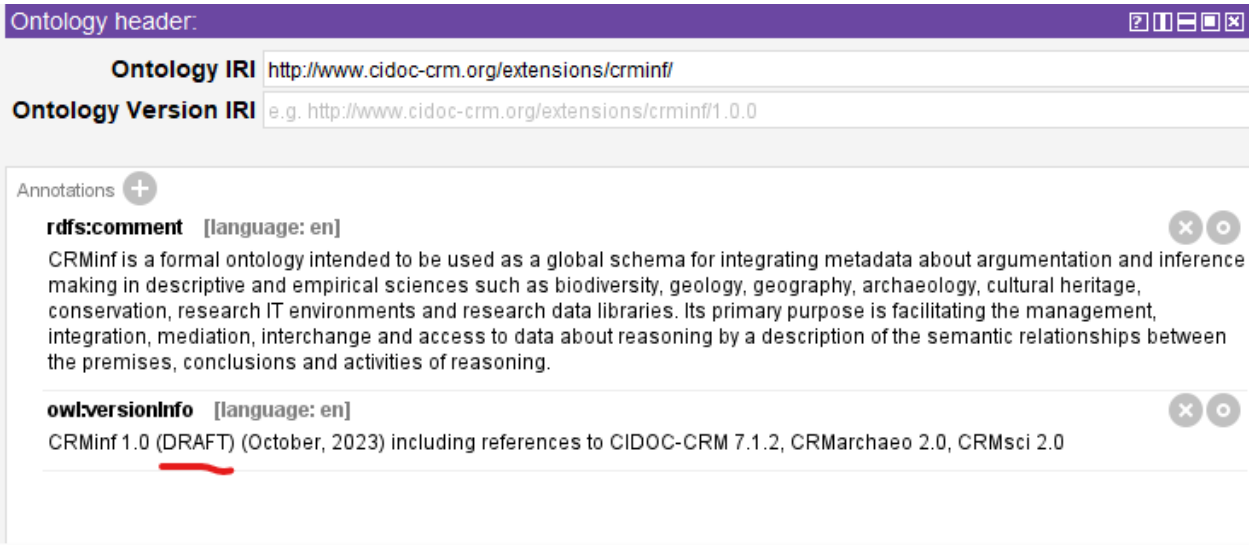
(F) Uri Resolution for Draft FMs

Regarding the existing draft implementations of FMs and the uri resolution mechanism for these extensions, it should be made obvious that they must not be used for implementation

- Encodings for Draft or obsolete versions have been removed.
- HTML uri resolution has been updated so that each resolvable link is obviously not meant to be used for implementations e.g. https://cidoc-crm.org/extensions/crminf/I1_Argumentation


I1 Argumentation *[Draft - This document is not meant to support implementations, referencing or other official activities.]*
SubClass Of:
E7 Activity
SuperClass Of:

- RDF uri resolution currently enabled – the only draft indication message is included just the at the owl:versionInfo text of the ontology



(G) Change label more in Encodings column to gitlab

DONE

Issue 692:

1. Subproperties:
P73(x,y) ⇒ P130i(x,y)
says that P73 "has translation" is a subproperty of P130i "shows features of". This feels natural to me. The alternative
P73(x,y) ⇒ P130(y,x)
would not.

2. Shortcuts:
(∃z) [E10(z) ∧ P30i(x,z) ∧ P29(z,y)]
I immediately see the flow through the long path "X custody transferred through Transfer of Custody Z custody received by Y". I don't see what is won by writing it as
(∃z) [E10(z) ∧ P30(z,x) ∧ P29(z,y)]

The P50 scope note does the same:

> This property is a shortcut for the more detailed path from E18 Physical Thing through P30i custody transferred through (transferred custody), E10 Transfer of Custody, P28 custody surrendered by (surrendered custody through) […] to E39 Actor.

Why would I use the inverse properties everywhere but avoid them in the FOL?

And the same for strong and inverse shortcuts, as well as in variations such as
P51(x,y) ⇐ (∃z) [E8(z) ∧ P24i(x,z) ∧ [P23(z,y) ∨ P22(z,y)]]

In fact, when the schema X — Z — Y doesn't apply it is a hint that there might be a mistake, as in
P195(x,y) ⇔ (∃z)[E92(z) ∧ P166(z,x) ∧ P196i(z,y)]

3. Statements about the current state:
P50(x,y) ⇐ (∃z) [[E10(z) ∧ P30i(x,z) ∧ P29(z,y)] ∧ ¬ (∃w) [E10(w) ∧ P30i(x,w) ∧ P28(w,y) ∧ P182(z,w)]]

These FOL are inadequate attempts to formalize currentness statements, but apart from that they basically consist of two simple shortcuts.

4. Other complex constructs:
P46(x,y) ⇒ (∃uzw)[E93(u) ∧ P195i (x,u) ∧ E52(z) ∧ P164(u,z) ∧ E93(w) ∧ P195i (w,y) ∧ P164(w,z) ∧ P10(w,u)]
There is a fairly obvious mistake in this FOL. I doubt that it would be easier to spot in the version without inverse properties:
P46(x,y) ⇒ (∃uzw)[E93(u) ∧ P195(u,x) ∧ E52(z) ∧ P164(u,z) ∧ E93(w) ∧ P195(y,w) ∧ P164(w,z) ∧ P10(w,u)]

6. A single strange statement:
P170(x, y) ⇒ P81i(x, y) ∧ P82i(x, y)
Technically this would make P170 a subproperty of the non-existent P81i and P82i so this needs to be tidied up. In any case, I don't see why
P170(x,y) ⇒ P81(y,x) ∧ P82(y,x)
would be any clearer than
P170i(x,y) ⇒ P81(x,y) ∧ P82(x,y)

Issue 682 (continuation)

Criteria

Background: that the CRM can and should be extended has been a part of the standard since the beginning. The theoretic criteria for compatibility are there also listed.

“as intended by the CRM, numerous teams have developed or are developing many CRM compatible extensions, which may or may not aim at large-scale information integration beyond what CIDOC CRM compatibility enables. Some may eventually aim to become CIDOC CRM Harmonized Ontologies. Others may be results of careful academic research and have a focussed aim for particular kinds of investigation. Finally, there is an immense number of applied data projects with limited time that need to make pragmatic decisions for concepts not readily provided by the CIDOC CRM or that should be shortcut for the performance of a particular application. Many developers, researchers or institutions using these models would like to acquire a compatibility attribute from the CRM-SIG and benefit from advice, support or advertising by the CRM-SIG. However, the only reviewing or certification procedure CRM-SIG has provided so far was including proposals to the list of candidate CIDOC CRM Harmonized Ontologies and starting a development process for them. This procedure finds its limits in the number of CRM-SIG members that can engage and have the necessary domain knowledge. Further, it does not address functionalities different from that of the CRM Harmonized Ontologies.

Due to the limited resources of the SIG, only a basic certification procedure by the SIG is currently regarded as feasible. In the interest of the users, it should be a fast and objective process. In the absence of any, even a simplified certification procedure is regarded as an advantage. This certification will not constitute an approval or recommendation of the semantics themselves of the certified document, but rather will indicate that control has been carried out that the reviewed ontology complies with the technical requirements that are required in order to be technically compatible. Among the certified, there may even be de facto harmonized ontologies. All certified ontologies will constitute very valuable contributions to the pool of applied experience with the CIDOC CRM and resources for recognizing emerging concepts for further standardization. The certification procedure itself may widely be carried out by teams with an expertise that has acquired the trust of the CRM SIG.”

What is important about operationalizing the criteria is to make them very explicit for the submitter and the reviewer and to make them as straight forward to follow and objective as possible.

Therefore, we propose the following document which outlines the review procedure and criteria:

Procedure & Criteria

Basic Certification for CIDOC CRM Compatible Ontologies

CIDOC CRM SIG welcomes the submission of candidate CRM compatible ontologies, for basic certification of their *formal-logical compatibility* and for subsequent listing and reference on the CIDOC CRM site. Submitted models may be results of *academic research*, of specific *communities of practice* or applied schemata of *specific projects* for the representation of *cultural-historical or history of science data*.

These models may serve as *potential solutions* for other applied projects or elicit *further development* by other teams or wider communities or as a *pool of modelling ideas* and best practices that can be shared in a decentralized manner across the community. They are welcomed *in addition* to the present scope and resources for ontology development by the CRM SIG, manifested in its present base ontology and harmonized extensions, which are guided by the goal of making standards with long-term validity for information integration under precisely defined, standardized high-level concepts. Such experience can then, in principle, feed back to the CIDOC CRM SIG for its immediate maintenance and development processes.

The basic certification procedure will define an attribute of *formal-logical compatibility*, including a *"shallow" assessment* of the semantics of the submitted model. It is however expected (1) that the model has been developed for an explicit functionality of use; (2) that it constitutes an actual result of empirical analysis of an - at least in samples - accessible body of data (3) that its development has been informed by the CRM Principles document. Note, that the certification procedure will obviously not ensure ontological consistency or ambiguity between the extended parts of different CRM compatible ontologies [i.e.: will not harmonize the ontology]. The latter is the task of "harmonization".

CIDOC CRM compatible ontologies may be contributed for listing on the CIDOC CRM website under the following principles.

1. Ontological Consistency
2. Open Source
3. External Responsibility
4. Full Documentation
5. Invitation to on-going integration efforts

Consistency

The submitted model should be aligned to the CIDOC CRM through sub and super class and property statements, joining the ontological model proposed to the overall logic and structure of the CIDOC CRM base ontology and officially approved harmonized extensions, as defined in the section "Extensions of CIDOC CRM" of the Definition of the CIDOC CRM. In this regard,

1. the sub- and super- class and property declarations must be *logically compatible* with the inferences of the CIDOC CRM data model, including quantifiers.
2. The scope notes should ontologically be compatible with the definitions of the related CIDOC CRM classes and properties.
3. New classes and properties must not cause ambiguity of instantiation with existing CRM classes. I.e., it must be decidable if an item is an instance of a new or a class of the CRM or of an official version of a harmonized extension, or instance of both.
4. They should further respect the basic disjunctions in the ontology, which are temporal events vs persistent items, conceptual objects versus physical objects, place, time and spacetime.

The logical consistency of IsA relations should be checked automatically using some ontology reasoner tools, best by the submitter. Conditions 2-4 constitute a shall semantic check that will be assessed by assigned CIDOC CRM SIG reviewers.
The formal semantics should be compatible with that of the CIDOC CRM as defined in: Meghini, C. and Doerr, M. (2018) 'A first-order logic expression of the CIDOC conceptual reference model', *International Journal of Metadata, Semantics and Ontologies*, 13(2), pp. 131–149. doi: 10.1504/IJMSO.2018.098393.

Open Source

CIDOC CRM SIG is an organization responsible for the development and maintenance of ontology standards for cultural heritage data and as such it is committed to the open source sharing and reuse of its ontological models and their potential extensions. As such, any extension proposed for listing as a compatible extension on the official website by default should be an open source document reusable by the public towards the generation of semantic data.

Therefore, every proposed extension must be accompanied by a valid open source copyright claim, such as CC BY 4.0 or a practically equivalent license.

External Responsibility

The CIDOC CRM SIG claims no responsibility for the models submitted with regards to their maintenance or longevity. Submitters of extensions take full responsibility for the maintenance and hosting of their extensions and may offer user support. Potential users of these models should consult the documentation of the model to understand the commitment of the maintainer of that model, with regards to the long term reusability and compatibility of that model.

This externality of responsibility will be noted on the CIDOC CRM site where Compatible Models are listed. Moreover, submitters of models are expected to have a description of their maintenance policy on the site where they host their ontology.

Full Documentation

The functionality of CIDOC CRM as a formal ontology for cultural heritage relies on the CRM SIG's development of a rigorous documentation methodology for creating and maintaining a well defined and transparent ontology that is first and foremost a specification document which is also elaborated as various serializations. Submitted extensions should follow the CIDOC CRM style specification document for the definition of the extensions scope, its classes and properties, at least in *its functional structure* of sections. The specification should be populated with examples for classes and properties.

Graphics should present *functional units* of related classes and properties, and a complete *graphical IsA hierarchy* of its classes should be provided.

A graphical instantiation example is also expected.

****If the submitter gives documentation that is not good enough, we will send back****

Invitation On-Going Integration Efforts

Submitters of CRM Compatible Models are assumed to wish to have reference to their work as part of an on-going community process to develop integrated, harmonized standards for semantic data construction.

Submitters of models are invited to be or become members of the SIG and participate as possible in the life of the community, but particularly in discussions regarding the development of harmonized extensions of CIDOC CRM that may provide integrated, long term CIDOC CRM approved extensions for constructs that may fall within the scope of the models they have contributed.

Submission procedure

Candidate ontology is proposed to the SIG through the following procedure:

1. Proposer fills out form with requisite metadata for the Ontology
2. Proposer officially requests listing
3. Proposed ontology is checked that it matches requirement for requested status
4. Two SIG members assigned to review
5. Report given at next SIG
6. Vote taken
7. If approved, ontology listed (in relevant section)

The review should be finished before the next CRM SIG meeting. If appointed members cannot perform it in time, they should in time find replacement.

The submitted documentation will be published simultaneously on the CRM website for open review and comments by the CRM community (on the interesting models section of the website).

The reports by the appointed members and comments from the community will be evaluated at the next SIG meeting.

Reasons *not to* approve must be clearly and objectively decidable. The SIG may recognize CRM concepts needing better disambiguation. If this comes in conflict with a proposed new class, the latter should not be regarded to violate consistency criterion 3) above.

The review should acknowledge the need of projects to provide solutions for cases which have *no obvious* solution in the CRM or shortcuts that are unambiguous in the project context. Parts of the model not falling under CRM superclasses or superproperties must be marked explicitly, as required by the CRM.

Comments by the community may be published together with the submitted model on the CRM website.

Steps that candidate ontology maintainers need to follow for it to be admitted as a CRM Compatible extension

1. Proposer fills out form with requisite metadata for the ontology
2. Proposer officially requests listing
3. Proposed ontology is checked that it matches requirement for requested status
4. Two SIG members assigned to review
5. Report given at next SIG
6. Vote taken
7. If approved, ontology listed (in relevant section)

Issue 663:

The definition of I17 One-Proposition Set, changed

FROM (OLD):

I17 One-Proposition Set

Subclass of:

I4 Proposition Set

Superclass of:

Scope note:

This class comprises proposition sets containing exactly one binary proposition which is or could, in principle be, encoded in a knowledge representation language. The identity of an instance of I17 One-Proposition Set is given by the total of its content, regardless equivalent encodings.

An instance of I17 One-Proposition Set in a Knowledge Base may alternatively be implemented by a "reification" construct, and is regarded as logically equivalent in this model. Similarly, all triples of properties declared for one class to denote the domain, type and range of another property, such as the properties of E13 Attribute Assignment and its subclasses, can be interpreted as shortcuts to an instance of I17 One-Proposition Set and its properties *J30 has domain (is domain of), J31 has range (is range of), J32 has property type (is property type of)*, or as a "reification" implicit to the declaring class.

As such, the class I17 One-Proposition Set plays the role of an important *logical interface* between different ways to document a discourse about propositions within a Knowledge Base. It is particularly relevant for implementing effective queries. For documentation, the use of simpler shortcut properties will, typically, be the preferred approach.

Examples:

- The proposition set with content:
  {The skeleton in La Tomba dell'Aryballos sospeso on the left bench (E20 Biological Object) *P2 has type* 'male' (E55 Type)} (I17) (Squires, 2013)
- The proposition set with content:
  {The skeleton in La Tomba dell'Aryballos sospeso on the left bench (E20 Biological Object) *P2 has type* 'female' (E55 Type)} (I17) (Mandolesi, 2013)
- The proposition set with content:
  {The burial arrangement in La Tomba dell'Aryballos sospeso on the left bench (E22 Human-Made Object) *is composed of* The spear found in La Tomba dell'Aryballos sospeso (E22 Human-Made Object)} (I17) (Mandolesi, 2013)
- The proposition set with content:
  {The skeleton in La Tomba dell'Aryballos sospeso on the left bench (E20 Biological Object) *forms part of* The burial arrangement in La Tomba dell'Aryballos sospeso on the left bench (E22 Human-Made Object)} (I17) (Mandolesi, 2013)

  [The skeleton found on the left bench of La Tomba dell'Aryballos sospeso, Doganaccia di Tarquinia, Tuscany, Italy, by Prof. Alessandro Mandolesi on the 21th of September 2013, was initially estimated by Prof. Mandolesi to be the remains of a male person, due to the lance found next to it, and published in the press as such. Soon after, osteological analysis carried out by the team revealed that it was of a female person, as published in the academic papers afterwards. This is a good example for a simple inference and scientific knowledge revision. We refer to this skeleton in these examples of propositions as "The skeleton on the left bench in La Tomba dell'Aryballos sospeso" and as "The burial arrangement on the left bench in La Tomba dell'Aryballos sospeso" respectively, meaning any unique identifier for the same real object.]
- The proposition set with content:
  {The book MS Sinai Greek 418 (E22 Human-Made Object) *has binding structure* 'unsupported' (E55 Type) } (Honey & Pickwoad, 2010)

['has binding structure' refers to a property, external to the CIDOC CRM, which connects a book (E22 Human-Made Object) to the type of its binding structure (E55 Type)]

In First Order Logic:

I17(x) ⇒ I4(x)
I17(x) ⇒ (∃uvw) [E1(u) ∧ J30(x,u) ∧ E1(v) ∧ J31(x,v) ∧ E55(w) ∧ J32(x,w)]

Properties:

J30 has domain (is domain of): E1 CRM Entity
J31 has range (is range of): E1 CRM Entity
J32 has property type (is property type of): E55 Type

TO (NEW):

I17 One-Proposition Set

Subclass of:

I4 Proposition Set

Superclass of:

Scope note:

This class comprises proposition sets containing exactly one proposition representing a binary relationship, which is, or could, in principle, be, encoded in a knowledge representation language. The identity of an instance of I17 One-Proposition Set is given by its entire content, regardless of equivalent encodings.

An instance of I17 One-Proposition Set in a Knowledge Base may, alternatively, be implemented by a 'reification' construct, and is regarded as logically equivalent in this model. Similarly, all triples of properties declared for one class that denote the domain, type, and range of another property, such as the properties of E13 Attribute Assignment and its subclasses, can be interpreted as shortcuts to an instance of I17 One-Proposition Set, and its properties, *J30 has domain (is domain of)*, *J31 has range (is range of)*, *J32 has property type (is property type of)*. Such property triples can also be interpreted as a 'reification' which is implicit in the declaring class.

As such, the class I17 One-Proposition Set plays the role of a logical interface between different ways to document a discourse about propositions within a Knowledge Base. It is particularly relevant for implementing effective queries. For documentation, the use of simpler shortcut properties will, typically, be the preferred approach.

Examples:

- the proposition set with content:
  {The skeleton in La Tomba dell'Aryballos sospeso on the left Bench (E20 Biological Object) *P2 has type* 'male' (E55 Type)} (I17) (Squires, 2013)
- the proposition set with content:
  {The skeleton in La Tomba dell'Aryballos sospeso on the left Bench (E20 Biological Object) *P2 has type* 'female' (E55 Type} (I17) (Mandolesi, 2013)
- the proposition set with content:
  {The burial arrangement in La Tomba dell'Aryballos sospeso on the left bench (E22 Human-Made Object) *is composed of* the spear found in La Tomba dell'Aryballos sospeso (E22 Human-Made Object)} (I17) (Mandolesi, 2013)
- the proposition set with content:
  {The skeleton in La Tomba dell'Aryballos sospeso on the left bench (E20 Biological Object)

forms part of the burial arrangement in La Tomba dell'Aryballos sospeso on the left bench (E22 Human-Made Object)} (I17) (Mandolesi, 2013)

- the proposition set with content:
  {The book MS Sinai Greek 418 (E22 Human-Made Object) *has binding structure* 'unsupported' (E55 Type)} (I17) (Honey & Pickwoad, 2010)
  ['has binding structure' refers to a property, external to the CIDOC CRM, which connects a book (E22 Human-Made Object) to the type of its binding structure (E55 Type)]

In First Order Logic:

I17(x) ⇒ I4(x)
I17(x) ⇒ (∃uvw) [E1(u) ∧ J30(x,u) ∧ E1(v) ∧ J31(x,v) ∧ E55(w) ∧ J32(x,w)]

Properties:

J30 has domain (is domain of): E1 CRM Entity
J31 has range (is range of): E1 CRM Entity
J32 has property type (is property type of): E55 Type

Issue 690:

Proposal to change I11 Situation

FROM (OLD)

I11 Situation

Subclass of:

I4 Proposition Set

Superclass of:

Scope note:

This class comprises the persistence of particular value ranges of the properties of a particular thing or things, over a timespan. The identity of an instance of I11 Situation is given by prescribing kinds of properties and a particular timespan and optionally a spatial area. This prescription of properties enables the possibility of observing the values of those properties prescribed, that hold in the specified timespan and spatial area.

In general, there are no natural boundaries to the combination of the kinds of properties or the space and the timespan under consideration upon defining a situation, other than the interest and ability of the observer to do so. Therefore, this class is purely epistemological in nature, describing arbitrary units of observation of the world

Examples:

- the persistence of the value of the pH for sample XIV during the period of the pH measurement, which took place one month after the application of $Ca(OH)_2$ dispersion to the sample (Giorgi et al., 2002).

In First Order Logic:

I11(x) ⇒ I4(x)

Properties:

J24 held at least for (is at least validity of): E52 Time-Span

TO (NEW)

I11 Situation

Subclass of:

I4 Proposition Set

Superclass of:

S28 Observable Situation

[N.b.: The scope note was not approved by the SIG – HW to SdS to redraft it.]

Scope note:

This class comprises sets of formal propositions characterizing a particular state of affairs as having certain relations between particular items or within certain ranges or kinds of related entities, over or within a timespan. The respective characterization is in general not regarded as being complete, but as constituting an aspect of interest of an actor. It may capture an observed aspect of a real situation, such as some known “persons A and B have met”, or be used for a question, such as whether “persons A and B have ever met”, or even for negation, such as “*persons A and B have met* is FALSE”.

Since many kinds of properties in the knowledge representation framework, that the CRM is based on, do not specify times of validity, a particular timespan, further constraining the concerned validity of all referred properties, can optionally be specified using the property *J24 held at least for (is at least validity of)*. The identity of an instance of I11 Situation is given its total content f propositions, regardless of encoding, or the value for the property *J24 held at least for (is at least validity of)*, if used. If an instance of I11 Situation is used to characterize an observation, its temporal validity is necessarily constrained at least to the period of observation.

Examples:

- the persistence of the value of the pH for sample XIV during the period of the pH measurement, which took place one month after the application of Ca(OH)2 dispersion to the sample (Giorgi et al., 2002)
- The situation reported by Shaykh Abu Abdallah (Ibn Battuta) about his visit to Cairo, Egypt, in 1326AD: “As for the Maristan [hospital], which lies "between the two castles" near the mausoleum of Sultan Qala'un, no description is adequate to its beauties. It contains an innumerable quantity of appliances and medicaments, and its daily revenue is put as high as a thousand dinars.”
  [After the translation by H.A.R Gibb 1926 of the travel report by Ibn Battuta, from Tanger, Marocco. The Maristan exists still today, but this is the original report about its operation by an eye witness in the year 1326. The reported revenue came from donations. The treatment was free.] (Gibb 1926, pp. 50-51)
- The situation reported by Shaykh Abu Abdallah (Ibn Battuta) about his visit to China, in 1345-1346 AD: “In every Chinese city there is a quarter for Muslims in which they live by themselves, and in which they have mosques both for the Friday services and for other religious purposes. The Muslims arc honoured and respected.”
  [After the translation by H.A.R Gibb 1926 of the travel report by Ibn Battuta, from Tanger, Marocco. Ibn Battuta visited China, at least the cities of Quanzhou and Hangzhou, in the year 1345-1346] (Gibb 1926, pp. 283)
- The situation reported by Seydi Ali Reis arriving with the remainder of his fleet in Surat, Gujarat, India in 1554AD: Sultan Ahmad Shah III, the 12-year-old new ruler of Gujarat, being at war with the usurper Nasir-ul-Mulk Khan at Burudj. Nasir-ul-Mulk Khan having allied with Portuguese colonies Goa. Melek Essed being commander of Daman, Gujarat, India and Hamza Agha commander of Surat under Sultan Ahmad. The Portuguese being at war with the Ottoman Empire over the control of the Indian Ocean. Sultan Ahmad seeking support by Seydi Ali Reis’ soldiers.

[Seydi Ali Reis (or Katib-I Rumi) (1498-1563), admiral of Egypt of the Ottoman Empire under Suleiman I was ordered to transfer a fleet of 15 galleys from Basra, Irak, to Egypt, and driven by heavy storms to the coast of Gujarat. In his book "The Mirror of Countries", 1557, he reported this expedition and his return home by land through Central Asia. This is a short summary from the German translation pp. 173-176 (Diez 1815)]

- The situation reported by Antonio Pigafetta from Magellan's voyage at 21st of October 1520, about at S 52°24' W 69°30': "This strait was a round place surrounded by mountains, as I have said, and the greater number of the sailors thought that there was no place by which to go out thence to enter into the peaceful sea. But the captain-general said that there was another strait for going out, and said that he knew it well, because he had seen it by a marine chart of the King of Portugal, which map had been made by a great pilot and mariner named Martin of Bohemia". (Pigafetta and Stanley, 1874: 58)
  [Antonio Pigafetta was the chronicler of the voyage, one of the survivors. During the expedition, he served as Magellan's assistant until Magellan's death in the Philippine Islands, and kept an accurate journal ('Antonio Pigafetta', 2024).]
- The proposition set with content:
  {The content of the La Tomba dell'Aryballos sospeso at the time of its opening (E24 Physical Human-Made Thing) is composed of The burial arrangement in La Tomba dell'Aryballos sospeso on the left bench (E22 Human-Made Object).
  The burial arrangement in La Tomba dell'Aryballos sospeso on the left bench (E22 Human-Made Object) is composed of The spear found in La Tomba dell'Aryballos sospeso (E22 Human-Made Object).
  The skeleton in La Tomba dell'Aryballos sospeso on the left bench (E20 Biological Object) forms part of The burial arrangement in La Tomba dell'Aryballos sospeso on the left bench (E22 Human-Made Object).
  The skeleton in La Tomba dell'Aryballos sospeso on the right bench (E20 Biological Object) forms part of The content of the La Tomba dell'Aryballos sospeso at the time of its opening (E24 Physical Human-Made Thing).
  The content of the La Tomba dell'Aryballos sospeso at the time of its opening (E24 Physical Human-Made Thing) has condition The condition of the content of the La Tomba dell'Aryballos sospeso from its sealing to its opening (E3 Condition State).
  The condition of the content of the La Tomba dell'Aryballos sospeso from its sealing to its opening (E3 Condition State) has type 'intact' (E55 Type).
  The condition of the content of the La Tomba dell'Aryballos sospeso from its sealing to its opening (E3 Condition State) has time-span The time-span of La Tomba dell'Aryballos sospeso from its sealing to its opening (E52 Time-Span).
  The time-span of La Tomba dell'Aryballos sospeso from its sealing to its opening (E52 Time-Span) ongoing throughout 570 BCE – 09-21-2013 CE (E61 Time Primitive).
  } (I11) (Mandolesi 2013)
  [This Situation is the strict result of an observation, except for the duration of the condition of "being intact".]

In First Order Logic:

$$I11(x) \Rightarrow I4(x)$$

Properties:

J24 held at least for (is at least validity of): E52 Time-Span

Issue 695:

S4 Single Observation

Change the definition of S4 Observation to S4 Single Observation

OLD definition

S4 Observation

[N.b., The scope, which is more compatible with a generalization of observation has been moved to a new class –according to the decisions reached in the context of the issue 696.

Subclass of:

E13 Attribute Assignment

Superclass of:

S21 Measurement
S19 Encounter Event
S23 Position Determination

Scope note:

This class comprises the activity of gaining scientific knowledge about particular states of physical reality through empirical evidence, experiments and measurements.

We define observation in the sense of natural sciences, as a kind of human activity: at some place and within some time-span, certain physical things and their behavior and interactions are observed by human sensory impression, and often enhanced by tools and measurement devices.

Observed situations or dimensions may pertain to properties confined to a single instance of S15 Observable Entity or pertain to constellations of multiple instances and relations between them, in particular distances between them.

The output of the internal processes of measurement devices that do not require additional human interaction are in general regarded as part of the observation and not as additional inference. Primary data from measurement devices are regarded in this model to be results of observation and can be interpreted as propositions believed to be true within the (known) tolerances and degree of reliability of the device.

Measurements and witnessing of events are special cases of observations. Observations result in a belief that certain propositions held at a time within the time-span of the observation. In this model, the degree of confidence in the observed properties is regarded to be “true” by default, but could be described differently by adding a property P3 has note to an instance of S4 Observation

Examples:

- the excavation of unit XI by the Archaeological Institute of Crete in 2004 (S4)
- the excavation (S4) in the NE section of the central court of the Knossos palace by the Ephorate of Antiquities of Heraklion in 1997 (S4) (Επιστημονική Επιτροπή Κνωσού, 2008)
- the observation of the density of the X-Ray image of cupid's head from the painting ‘Cupid complaining to Venus’ as ‘high density’, on the 19th of March 1963 (S4) (The National Gallery, London, 1963).
- the observation of visible light absorption of the painting ‘Cupid complaining to Venus’ as ‘having red pigment’, in 2015 (S4) (Foister, 2015)

In First Order Logic:

$S4(x) \Rightarrow E13(x)$

Properties:

O8 observed (was observed by): S15 Observable Entity
O9 observed property type (property type was observed by): S9 Property Type

O16 observed value (value was observed by): E1 CRM Entity

NEW definition

S4 Single Observation

Subclass of:

S27 Observation
E13 Attribute Assignment

Superclass of:

E16 Measurement

Scope note:

This class comprises the activity of gaining scientific knowledge about particular states of physical reality through empirical evidence, experiments, or measurements, for cases in which the observed knowledge can be described by a single binary proposition relating one instance of S15 Observable Entity to some instance of E1 CRM Entity.

Examples:

- the observation of the density of the X-Ray image of cupid's head from the painting 'Cupid complaining to Venus' as 'high density', on the 19th of March 1963 (The National Gallery, London, 1963)
- the observation of visible light absorption of the painting 'Cupid complaining to Venus' as 'having red pigment' in 2015 (Foister, 2015)

In first-order logic:

$S4(x) \Rightarrow S27(x)$
$S4(x) \Rightarrow E13(x)$
$E16(x) \Rightarrow S4(x)$

Properties:

O8 observed (was observed by): S15 Observable Entity
O9 observed property type (was property type observed): S9 Property Type
O16 observed value (value was observed by): E1 CRM Entity
O37 expressed the observed as observable proposition (was observable proposition observed by): S29 Observable Proposition

Reformulation of the properties of S4 Single Observation

O8 observed (was observed by)

OLD Definition

O8 observed (was observed by)

Domain:

S4 Observation

Range:

S15 Observable Entity

Subproperty of:

E13 Attribute Assignment. P140 assigned attribute to (was attributed by): E1 CRM Entity

Superproperty of:

S23 Position Determination. O32 determined position of (was located by): S15 Observable Entity
S21 Measurement. O24 measured (was measured by): S15 Observable Entity

Quantification:

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

Scope note:

This property associates an instance of S4 Observation with an instance of S15 Observable Entity that was observed. Specifically, it describes that a thing, a feature, a phenomenon or its reaction is observed by an activity of Observation.

Examples:

- The engineers' observation on the slope of Panagopoula coastal site, near Patras, on the 25th–26th April 1971 and the 3rd May 1971(S4) *observed* the rotational landslide at the same site (S15) (Tavoularis et al., 2017).
- The survey (S4) of Sinai MS GREEK 418 *observed* a detached triple-braided clasp strap (S15) (Honey and Pickwoad, 2010).

In First Order Logic:

O8(x,y) ⇒ S4(x)
O8(x,y) ⇒ S15(y)
O8(x,y) ⇒ P140(x,y)

NEW definition

O8 observed (was observed by)

Domain:

S4 Single Observation

Range:

S15 Observable Entity

Subproperty of:

S27 Observation. O35 observed entity (was observed by): S15 Observable Entity
E13 Attribute Assignment. P140 assigned attribute to (was attributed by): E1 CRM Entity

Superproperty of:

E16 Measurement. P39 measured (was measured by): E18 Physical Thing

Quantification:

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

Scope note:

This property associates an instance of S4 Single Observation with one instance of S15 Observable Entity that was observed. Specifically, it describes that a thing, a feature, a phenomenon or some process is observed by an activity of Observation.

This property is a strong shortcut of the fully developed path from S4 Single Observation through *O37 expressed the observed as observable proposition (was observable proposition characterized by)*, S29 Observable Proposition, *O38 has domain (is domain of)*, to S15 Observable Entity.

Full path:

S4 Single Observation. *O37 expressed the observed as observable proposition (was observable proposition characterized by)*: S29 Observable Proposition. *O38 has domain (is domain of)*: S15 Observable Entity

Examples:

- The engineers' observation (S4) on the slope of Panagopoula coastal site, near Patras, on the 3rd May 1971 *observed* the rotational landslide at the same site (E4). (Tavoularis et al., 2017)
- The survey (S4) of Sinai MS GREEK 418 *observed* a detached triple-braided clasp strap (S15). (Honey and Pickwoad, 2010)

In first-order logic:

$O8(x,y) \Rightarrow S4(x)$
$O8(x,y) \Rightarrow S15(y)$
$O8(x,y) \Rightarrow O35(x,y)$
$O8(x,y) \Rightarrow P140(x,y)$
$P39(x,y) \Rightarrow O8(x,y)$
$O8(x,y) \Leftrightarrow (\exists z)\ [S29(z) \wedge O37(x,z) \wedge O38(z,y)]$

O9 observed property type (was property type observed)

OLD Definition

O9 observed property type (was property type observed)

Domain:

S4 Observation

Range:

S9 Property Type

Subproperty of:

E13 Attribute Assignment. P177 assigned property of type (is type of property assigned): E55 Type

Quantification:

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

Scope note:

This property associates an instance of S4 Observation with the instance of S9 Property Type for which the observation provides a value or evidence, such as "concentration of nitrate" observed in the water from a particular borehole. Encoding the observed property by type, observed entity and value (properties O9, O10, O16) is a method to circumscribe the reification of the observed property by the respective instance of S4 Observation.

In an RDFS encoding, this circumscription can be transformed into an explicit representation of the observed property in terms of a formal ontology either by use of a reification construct or by the use of a Named Graph containing the observed property. The latter representation allows for more formal reasoning with the model, the former is more flexible about the kinds of observations.

Examples:

- The seismic hazard analysis and recording by EPPO in 1990 (S4), in the area of Attiki *observed property type* share wave velocity (S9) and recorded it (Lucchese et al., 2013; Kritikos et al., 2013; InGeoCloudS, 2012; InGeoCloudS, 2013)
- The Gas Chromatography analysis (S4) of the sample 'mid-blue paint from the sky' *observed property type* retention time (S9). (Foister, 2015)

In First Order Logic:

$O9(x,y) \Rightarrow S4(x)$
$O9(x,y) \Rightarrow S9(y)$
$O9(x,y) \Rightarrow P177(x,y)$

NEW definition

O9 observed property type (was property type observed)

Domain:

S4 Single Observation

Range:

S9 Property Type

Subproperty of:

E13 Attribute Assignment. P177 assigned property type (is property type assigned): E55 Type

Superproperty of:

Quantification:

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

Scope note:

This property associates an instance of S1 Matter Removal with the instance of S10 Material Substantial that this activity diminished.

Although an instance of S4 Single Observation with the instance of S9 Property Type for which the observation provides a value or evidence, such as 'concentration of nitrate' observed in the water from a particular borehole. Encoding the observed property by type, observed entity and value (namely, properties O9, O37, and O16, respectively), is a method to circumscribe the reification of the observed property by the respective instance of S4 Single Observation.

In an RDFS encoding, this circumscription can be transformed into an explicit representation of the observed property in terms of a formal ontology, either by the use of a reification construct or a Named Graph containing the observed property. The latter representation allows for more formal reasoning with the model, the former is more flexible about the kinds of observations.

This property is a strong shortcut of the fully developed path from S4 Single Observation through *O37 expressed the observed as observable proposition (was observable proposition characterized by)*, S29 Observable Proposition, *J32 has property type (is property type of)*, to S9 Property Type.

Full path:

S4 Single Observation. *O37 expressed the observed as observable proposition (was observable proposition characterized by)*: S29 Observable Proposition. *J32 has property type (is property type of)*: S9 Property Type

Examples:

- The seismic hazard analysis and recording by EPPO in 1990 (S4), in the area of Attica *observed property type* share wave velocity (S9) and recorded it. (Lucchese et al., 2013; Kritikos et al., 2013; InGeoCloudS, 2012; InGeoCloudS, 2013)
- The Gas Chromatography analysis (S4) of the sample 'mid-blue paint from the sky' *observed property type* retention time (S9). (Foister, 2015)

In first-order logic:

O9(x,y) ⇒ S4(x)
O9(x,y) ⇒ S9(y)
O9(x,y) ⇒ P177(x,y)
O9(x,y) ⇔ (∃z) [S29(z) ∧ O37(x,z) ∧ J32(z,y)]

O16 observed value (value was observed by)

OLD definition

O16 observed value (value was observed by)

Domain:

S4 Observation

Range:

E1 CRM Entity

Subproperty of:

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

Superproperty of:

S23 Position Determination. O30 determined position (was determined by): E94 Space Primitive
E16 Measurement. P40 observed dimension (was observed in): E54 Dimension

Quantification:

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

Scope note:

This property associates a value assigned to an entity observed by S4 Observation.

Examples:

- The surface survey at the bronze age site of Mitrou in east Lokris carried out by Cornell University in 1989 (S4) *observed value* 600 (of sherds) (E1) (Kramer-Hajos and O'Neill, 2008).

In First Order Logic:

O16(x,y) ⇒ S4(x)
O16(x,y) ⇒ E1(y)
O16(x,y) ⇒ P141(x,y)

NEW definition

O16 observed value (value was observed by)

Domain:

S4 Single Observation

Range:

E1 CRM Entity

Subproperty of:

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

Superproperty of:

E16 Measurement. P40 observed dimension (was observed in): E54 Dimension

Quantification:

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

Scope note:

This property associates a value assigned to an entity observed by S4 Single Observation.

This property is a strong shortcut of the fully developed path from S4 Single Observation through *O37 expressed the observed as observable proposition (was observable proposition characterized by)*, S29 Observable Proposition, *J31 has range (is range of)*, to E1 CRM Entity.

Full path:

S4 Single Observation. *O37 expressed the observed as observable proposition (was observable proposition characterized by)*: S29 Observable Proposition. *J31 has range (is range of)*: E1 CRM Entity

Examples:

- The surface survey at the bronze age site of Mitrou in East Lokris (S4), carried out by Cornell University in 1989, *observed* value 600 (of sherds) (E1). (Kramer-Hajos and O'Neill, 2008)

In first-order logic:

$O16(x,y) \Rightarrow S4(x)$
$O16(x,y) \Rightarrow E1(y)$
$O16(x,y) \Rightarrow P141(x,y)$
$P40(x,y) \Rightarrow O16(x,y)$
$O16(x,y) \Leftrightarrow (\exists z)\ [S29(z) \wedge O37(x,z) \wedge J31(z,y)]$

Addition of new properties for S4 Single Observation

O37 expressed the observed as observable proposition (was observable proposition characterized by)

Domain:

S4 Single Observation

Range:

S29 Observable Proposition

Subproperty of:

S27 Observation. O36 expressed the observed as (was the expression of): S28 Observable Situation
E13 Attribute Assignment. J33 assigned proposition (is assigned by): I17 One-Proposition Set

Superproperty of:

Quantification:

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

Scope note:

This property associates an instance of S4 Single Observation with the instance of S29 Observable Proposition that the actors carrying out the observation used to express the observed phenomenon of interest. This property forms a logical interface between observing single propositions or more generally observable situations. It is particularly relevant for implementing effective queries. For documentation, the use of the simpler shortcut properties, i.e., *O8 observed (was observed by), O9 observed property type (property type was observed by)*, and *O16 observed value (value was observed by)* will typically be the preferred approach.

The property is part of the fully developed path from S4 Single Observation through *O37 expressed the observed as observable proposition (was observable proposition characterized*

by), S29 Observable Proposition, *O38 has domain (is domain of)*, S15 Observable Entity, which is shortcut by *O8 observed (was observed by)*.

The property is part of the fully developed path from S4 Single Observation through *O37 expressed the observed as observable proposition (was observable proposition characterized by)*, S29 Observable Proposition, *J31 has range (is range of)*, E1 CRM Entity, which is shortcut by *O16 observed value (value was observed by)*.

The property is part of the fully developed path from S4 Single Observation through *O37 expressed the observed as observable proposition (was observable proposition characterized by)*, S29 Observable Proposition, *J32 has property type (is property type of)*, E55 Type, which is shortcut by *O9 observed property type (property type was observed by)*.

Full path:

Examples:

- The inspection of the burial arrangement in La Tomba dell'Aryballos sospeso on the left bench by Prof. Alessandro Mandolesi on the 21st of September 2013 (S4) *expressed the observed as observable proposition* the proposition set with content {The burial arrangement in La Tomba dell'Aryballos sospeso on the left bench (E22 Human-Made Object} (S29). (Mandolesi, 2013)

In first-order logic:

O37(x,y) ⇒ S4(x)
O37(x,y) ⇒ S29(y)
O37(x,y) ⇒ O36(x,y)
O37(x,y) ⇒ J33(x,y)

Addition of new class – S29 Observable Proposition:

S29 Observable Proposition

Subclass of:

S28 Observable Situation
I17 One-Proposition Set

Superclass of:

Scope note:

This class comprises proposition sets containing exactly one binary proposition which is, or could, in principle be, encoded in a knowledge representation language, and which characterizes an observable phenomenon, regardless of whether it has happened or not. The identity of an instance of S29 Observable Proposition is given by the total of its content, regardless of equivalent encodings.

The class S29 Observable Proposition plays the role of an important logical interface between observing single propositions or more generally observable situations. It is particularly relevant for implementing effective queries. For documentation, the use of the simpler shortcut properties of S4 Single Observation, i.e. *O35 observed entity (was observed by), O9 observed property type (property type was observed by)*, and *O16 observed value (value was observed by)* will, typically, be the preferred approach.

Examples:

- the proposition set with content:

{The burial arrangement (E22 Human-Made Object) in La Tomba dell'Aryballos sospeso on the left bench *is composed of* the spear (E22 Human-Made Object) found in La Tomba dell'Aryballos sospeso.} (Mandolesi, 2013)

- the proposition set with content:
  {The skeleton (E20 Biological Object) in La Tomba dell'Aryballos sospeso on the right bench *forms part of* the burial arrangement (E22 Human-Made Object) in La Tomba dell'Aryballos sospeso on the left bench.} (Mandolesi, 2013)
- the proposition set with content:
  {The skeleton (E20 Biological Object) in La Tomba dell'Aryballos sospeso on the left bench *P2 has type* 'female' (E55 Type).} (Mandolesi, 2013)

[The abovementioned examples form part of a scientific knowledge revision, where the original belief was formed based on a simple inference, and following a thorough scientific analysis, underwent revision.
The skeleton found on the left bench of La Tomba dell'Aryballos sospeso, at Doganaccia di Tarquinia, in Tuscany, Italy, by Prof. Alessandro Mandolesi on the 21st September 2013, was initially estimated to be the remains of a male person, due to a spear found lying next to it. In fact, the initial press release mentioned there being a skeleton of a male person in the tomb. Soon after, osteological analysis carried out by Mandolesi's team, revealed that the skeleton had belonged to a female person, a piece of information included in all scientific publications that followed the osteological analysis.
We refer to this skeleton in the examples found throughout the text as "The skeleton on the left bench in La Tomba dell'Aryballos sospeso", and to the burial arrangement as "The burial arrangement on the left bench in La Tomba dell'Aryballos sospeso", respectively.]

In first-order logic:

$S29(x) \Rightarrow S28(x)$
$S29(x) \Rightarrow I17(x)$

Properties:

O38 has domain (is domain of): S15 Observable Entity

Addition of new property for S29 (O38 has domain (is domain of))

O38 has domain (is domain of)

Domain:

S29 Observable Proposition

Range:

S15 Observable Entity

Subproperty of:

S28 Observable Situation. O40 refers to observable entity (is referred to in): S15 Observable Entity
I17 One-Proposition Set. J30 has domain (is domain of): E1 CRM Entity

Superproperty of:

Quantification:

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

Scope note:

This property associates an instance of S29 Observable Proposition with an instance of S15 Observable Entity that must appear as the only domain instance of the proposition in the content of the former.

This property is part of the fully developed path from S4 Observation through *O37 expressed the observed as observable proposition (was observable proposition characterized by)*, S29 Observable Proposition, *O38 has domain (is domain of)*, SO15 Observable Entity, which is shortcut by *O8 observed (was observed by)*.

Full path:

Examples:

- The proposition set with content:
  {The burial arrangement on the left bench in La Tomba dell'Aryballos sospeso (E22 Human-Made Object)} (S29) *has domain* the burial arrangement in La Tomba dell'Aryballos sospeso on the left bench (E22 Human-Made Object). (Mandolesi, 2013)
- The proposition set with content:
  {The skeleton on the left bench in La Tomba dell'Aryballos sospeso (E20 Biological Object) forms part of the burial arrangement on the left bench in La Tomba dell Aryballos sospeso} (S29) *has domain* the skeleton on the left bench in La Tomba dell'Aryballos sospeso (E20). (Mandolesi, 2013)

In first-order logic:

O38(x,y) ⇒ S29(x)
O38(x,y) ⇒ S15(y)
O38(x,y) ⇒ O40(x,y)
O38(x,y) ⇒ J30(x,y)

Issue 696:

New class S27 Observation

S27 Observation

Subclass of:

I1 Argumentation

Superclass of:

S4 Single Observation
S19 Encounter Event
S21 Measurement
S23 Position Determination

Scope note:

This class comprises activity of gaining scientific knowledge about particular states of physical reality through empirical evidence, experiments and measurements.

We define observation in the sense of natural sciences, as a kind of human activity: at some place and within some time-span, certain physical things and their behaviour and interactions are observed by human sensory impression, and often enhanced by tools and measurement devices.

Observed situations or dimensions may pertain to properties confined to a single instance of S15 Observable Entity or pertain to constellations of multiple instances and relations between them, in particular distances between them.

The output of the internal processes of measurement devices that do not require additional human interaction are in general regarded as part of the observation and not as additional inference. Primary data from measurement devices are regarded in this model to be results of observation and can be interpreted as propositions believed to be true within the (known) tolerances and degree of reliability of the device.

Measurements and witnessing of events are special cases of observations. Observations result in a belief that certain propositions held at a time within the time-span of the observation. In this model, the degree of confidence in the observed properties is regarded to be "true" by default, but could be described differently by adding a property *P3 has note* to an instance of S4 Observation.

Examples:

- the excavation of unit XI by the Archaeological Institute of Crete in 2004
- the excavation in the NE section of the central court of the Knossos palace by the Ephorate of Antiquities of Heraklion in 1997 (Επιστημονική Επιτροπή Κνωσού, 2008)
- the observation of the density of the X-Ray image of cupid's head from the painting 'Cupid complaining to Venus' as 'high density', on the 19th of March 1963 (S4) (The National Gallery, London, 1963)
- the observation of visible light absorption of the painting 'Cupid complaining to Venus' as 'having red pigment', in 2015 (S4)
- the inspection of the interior of La Tomba dell'Aryballos sospeso, at Doganaccia di Tarquinia, in Tuscany, Italy, by Alessandro Mandolesi on the 21st of September 2013 (Mandolesi 2013)

In first-order logic:

$S27(x) \Rightarrow I1(x)$

Properties:

O35 observed entity (was observed by): S15 Observable Entity
O36 expressed the observed as (was the expression of): S28 Observable Situation

New properties of S27 Observation

O35 observed entity (was observed by)

Domain:

S27 Observation

Range:

S15 Observable Entity

Subproperty of:

Superproperty of:

S4 Single Observation. O8 observed (was observed by): S15 Observed Entity
S21 Measurement. O24 measured (was measured by): S15 Observable Entity
S23 Position Determination. O32 determined position (was located by): S15 Observable Entity

Quantification:

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

Scope note:

This property associates an instance of S27 Observation with one of the instances of S15 Observable Entity that were observed. Specifically, it describes that a thing, a feature, a phenomenon, or some process, is observed by an activity of S27 Observation.

This property is a strong shortcut for the detailed path from S27 Observation through *O36 expressed the observed as (was the expression of)*, S28 Observable Situation, *O40 refers to observable entity (is referred to in),* to S15 Observable Entity.

Full path:

S27 Observation. *O36 expressed the observed as (was the expression of)*: S28 Observable Situation. *O40 refers to observable entity (is referred to in)*: S15 Observable Entity

Examples:

- The engineers' observation on the slope of Panagopoula coastal site, near Patras, on the 25th–26th April 1971 and the 3rd May 1971 (S4) *observed entity* the rotational landslide at the same site (E4). (Tavoularis et al., 2017)

In first-order logic:

$O35(x,y) \Rightarrow S27(x)$
$O35(x,y) \Rightarrow S15(y)$
$O35(x,y) \Leftrightarrow (\exists z)\ [S28(z) \wedge O36(x,z) \wedge O40(z,y)]$

O36 expressed the observed as (was the expression of)

Domain:

S27 Observation

Range:

S28 Observable Situation

Subproperty of:

Superproperty of:

S4 Single Observation. O37 expressed the observed as observable proposition (was observable proposition observed by): S29 Observable Proposition

Quantification:

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

Scope note:

This property associates an instance of Observation with an instance of S28 Observable Situation that the actors carrying out the observation used to express the observed phenomena of their interests. The alleged time-span of the observed situation must be equal to or within the overall time-span of the domain instance used for this property. A narrower time-span of validity for the observed situation can be documented via the property S28 Observable Situation. *J24 held at least for (is at least validity of)*: E52 Time-Span.

This property is a strong shortcut for the path from S27 Observation through *J2 concluded that (was concluded by)*, I2 Belief, *J4 that (is subject of)*, S28 Observable Situation, *J5 holds to be*, to I6 Belief Value (= "True").

Full path:

S27 Observation. *J2 concluded that (was concluded by)*: I2 Belief. *J4 that (is subject of)*: S28 Observable Situation. *J5 holds to be*: I6 Belief Value (= "True")

Examples:

- The observation between April, 25 and May, 3 1971 at the slope of the coastal region of Panagopoula (S27), *expressed the observed as* the rotational landslide on the same site (S15). (Tavoularis et al., 2017)
- The survey of Sinai MS GREEK 418 (S4) *expressed the observed as* a detached triple-braided clasp strap (S15). (Honey and Pickwoad, 2010)

In first-order logic:

$O36(x,y) \Rightarrow S27(x)$

O36(x,y) ⇒ S28(y)
O36(x,y) ⇔ S27(x) ∧ S28(y) ∧ (∃u) [I2(u) ∧ J2(x,u) ∧ J4(u,y) ∧ J5(u,'TRUE')]

New class S28 Observable Situation (range of O36)

S28 Observable Situation

Subclass of:

I11 Situation

Superclass of:

S29 Observable Proposition

Scope note:

An instance of S28 Observable Situation can be perceived as a set of formal propositions deriving from an observation event on a constellation, an interaction or a dynamic behaviour of instances of S15 Observable Entity, or sections of these instances within a particular time-span and spatial extent that lie in the past. The observation event in question either relies on human senses, or it has been enhanced or mediated by technical instruments.

The observer may be directly involved themselves, or they may be receiving signals from each observation. The focus of the observer determines the model they overlay on the observed reality, in order to describe it in terms of distinct properties and value ranges of parameters. The latter selection and projection from reality constitutes the content of a particular instance of S28 Observable Situation. Multiple observers may select different models, details and value systems to the same spatiotemporal area (i.e., views they pay attention to). Consequently, the observed situations may differ, but should, in principle, be comparable to a common reality in their overlaps.

Examples:

- the proposition set with content:
  {The burial arrangement in La Tomba dell'Aryballos sospeso on the left bench (E22 Human-Made Object) *is composed of* the spear found in La Tomba dell' Aryballos sospeso (E22 Human-Made Object)
  The skeleton in La Tomba dell'Aryballos sospeso on the left bench (E20 Biological Object) forms part of the burial arrangement on La Tomba dell'Aryballos sospeso on the left bench (E22 Human-Made Object).} (Mandolesi, 2013)
- the proposition set with content:
  {The content of the La Tomba dell'Aryballos sospeso at the time of its opening (E24 Physical Human-Made Thing) *is composed of* the burial arrangement in La Tomba dell'Aryballos sospeso on the left bench (E22 Human-Made Object).
  The burial arrangement in La Tomba dell'Aryballos sospeso on the left bench (E22 Human-Made Object) *is composed of* the spear found in La Tomba dell'Aryballos sospeso (E22 Human-Made Object).
  The skeleton in La Tomba dell'Aryballos sospeso on the left bench (E20 Biological Object) *forms part of* the burial arrangement in La Tomba dell'Aryballos sospeso on the left bench (E22 Human-Made Object).
  The skeleton in La Tomba dell'Aryballos sospeso on the right bench (E20 Biological Object) *forms part of* the content of the La Tomba dell'Aryballos sospeso at the time of its opening (E24 Physical Human-Made Thing).
  The content of the La Tomba dell'Aryballos sospeso at the time of its opening (E24 Physical Human-Made Thing) *has condition* the condition of the content of the La Tomba dell'Aryballos sospeso from its sealing to its opening (E3 Condition State).
  The condition of the content of the La Tomba dell'Aryballos sospeso from its sealing to its opening (E3 Condition State) *has type* 'intact' (E55 Type). (Mandolesi 2013)

[The abovementioned examples form part of a scientific knowledge revision, where the original belief was formed based on a simple inference, and following a thorough scientific analysis, underwent revision.
The skeleton found on the left bench of La Tomba dell'Aryballos sospeso, at Doganaccia di Tarquinia, in Tuscany, Italy, by Prof. Alessandro Mandolesi on the 21st September 2013, was initially estimated to be the remains of a male person, due to a spear found lying next to it. In fact, the initial press release mentioned there being a skeleton of a male person in the tomb. Soon after, osteological analysis carried out by Mandolesi's team, revealed that the skeleton had belonged to a female person, a piece of information included in all scientific publications that followed the osteological analysis.
We refer to this skeleton in the examples found throughout the text as "The skeleton on the left bench in La Tomba dell'Aryballos sospeso", and to the burial arrangement as "The burial arrangement on the left bench in La Tomba dell'Aryballos sospeso", respectively.]

- a triple-braided clasp strap being detached at the survey of Sinai MS GREEK 418 (Honey and Pickwoad, 2010).

In first-order logic:

$S28(x) \Rightarrow I11(x)$
$S28(x) \Rightarrow (\exists y)\ [S15(y) \wedge J28(x,y)]$

Properties:

O40 refers to observable entity (is referred to in): S15 Observable Entity

New property for S28 Observable Situation (O40 refers to observable entity (is referred to in)

O40 refers to observable entity (is referred to in)

Domain:

S28 Observable Situation

Range:

S15 Observable Entity

Subproperty of:

I4 Proposition Set. J28 contains entity reference (is referred to in): E1 CRM Entity

Superproperty of:

S29 Observable Proposition. O38 has domain (is domain of): S15 Observable Entity

Quantification:

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

Scope note:

This property associates an instance of S28 Observable Situation with an instance of S15 Observable Entity that appears as an element of one or more propositions in the content of the former.

This property serves on one side to relate an instance of S28 Observable Situation to other contexts of interest, in particular when its content is or cannot be represented as a Named Graph in the same knowledge base. On the other hand, it plays a structural role in this model for expressing a minimal formal constraint for the observability of what is referred by an instance of S28 Observable Situation.

This property is part of the fully developed path from S4 Observation through *O37 expressed the observed as observable proposition (was observable proposition characterized by)*, S29

Observable Proposition, *O38 has domain (is domain of)*, to S15 Observable Entity, which is strongly shortcut by *O8 observed (was observed by)*.

Full path:

Examples:

- The proposition set with content:
  {Nero on July 19, 64 AD (E93 Presence)
  P164 is temporally specified by: July 19, 64 AD (E52 Timespan)
  P195 was a presence of: Nero Claudius Caesar Drusus Germanicus (E21 Person)
  P167 was within the settlement of Antium (E27 Site) in 64AD
  }
  refers to the observable entity Nero Claudius Caesar Drusus Germanicus (E21, S15).

In first-order logic:

O40(x,y) ⇒ S28(x)
O40(x,y) ⇒ S15(y)
O40(x,y) ⇒ J28(x,y)

Issue 683:

O39 observed dimension (was observed in)

Domain:

S21 Measurement

Range:

E54 Dimension

Subproperty of:

Superproperty of:

E16 Measurement. P40 observed dimension (was observed in): E54 Dimension

Quantification:

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

Scope note:

This property records the dimension of an instance of S15 Observable Entity or a specific constellation of such instances that was observed in an instance of S21 Measurement. The observed items should be documented using the property *O24 measured (was measured by)*.

One measurement activity may determine only one dimension of an instance of S15 Observable Entity or a specific constellation of such instances. Such a dimension may be any observable and quantifiable aspect of the latter. Weight, length, spatial or temporal distances are characteristic kinds of dimensions in this sense.

A dimension of one or more instances of S15 Observable Entity may be determined either by direct observation or using recorded evidence. However, determination by measuring requires the presence of the measured items. Other methods may constitute other kinds of instances of I1 Argumentation.

Even though knowledge of the value of a dimension requires measurement, the dimension may be an object of discourse prior to, or even without, any measurement being made.

This property is a part of the fully developed path from S15 Observable Entity through *O24i was measured by (measured)*, S21 Measurement, *O39 observed dimension (was observed in)* to E54 Dimension.

Referring to an instance of E54 Dimension by this property is mutually exclusive to using either property *P191 had duration (was duration of)* or *P179 had sales price (was sales price)*. This follows from the same rule as for *O12 has dimension (is dimension of).*

Full path:

Examples:

- .)

In first-order logic:

O39(x,y) ⇒ S21(x)
O39(x,y) ⇒ E54(y)
O29(x,y) ⇒ (∃z) [S15(z) ∧ O24i(z,x) ∧ O39(x,y)] ⇒ ∃z O12(z,y)
P40(x,y) ⇒ O39(x,y)
P40(x,y) ⇔ O39(x,y) ∧ E18(x) ∧ ¬S25(y)

By deduction:
O39(x,y) ∧ P179(z,w) ⇒ w≠y
O39(x,y) ∧ P191(z,w) ⇒ w≠y

Issue 646:

Scope of CRMinf

Scope

CRMinf regards as “knowledge” anything someone says and can justify as “I know that X”, regardless of whether X is regarded to be true, false, probable, etc., whereas X itself is regarded as information or “data”. In this sense, knowledge resides in humans, who relate the symbols in information to states of affairs in current or past reality. “Knowledge representation” is regarded as a particular form of encoded information, for instance a CRM-compatible form. CRMinf aims at connecting the people who know something to the information representing their knowledge, and its justification. The model supposes scientific ethics and is not concerned with beliefs of people using CRMinf differently from what they state, but it can quite well be used to reason about deliberately false statements in historical sources.

The disciplines addressed by CRMinf are what (Turner, 2012) calls “historical sciences”, i.e., cultural heritage studies, human and natural history, archaeology, but also descriptive empirical sciences, such as biodiversity, ethnology, geology, cultural heritage conservation, even clinical studies, etc., in their focus on documenting particular states of affairs now and in the past.

CRMinf is inspired by the IAM model in Doerr, Kritsotaki and Boutsika (2011), which in turn draws on a background of other argumentation models under the aspect of application to *knowledge about the past*, among them being the “logicist” approach (Gardin, 2003), (Gardin & Roux, 2004) in use in France for archaeological data. Like the IAM, CRMinf deals with the sources of knowledge for facts stated in explicit propositions. It simplifies IAM by making the general theories used for inferences (such as a mathematical proof, universal properties etc.) and the belief in their correct application an implicit part of an argumentation event (possibly represented in a text). CRMinf is also less formal than IAM with respect to inference chains (i.e., using conclusions as premises for the next inference) of different granularity. As in IAM, a documented chain of inferences represents a state of knowledge at a point in time, and *not* the historical order of finding its elements. The latter is given explicitly by the time of argument making, which is taken to be a historical fact.

CRMinf makes a basic distinction between three kinds of sources of knowledge because of the way it can be acquired, justified or falsified. These are (1) observation, (2) belief adoption and (3) inference making.

Observation results in knowledge acquired by human senses or by technical devices at a particular place and time. Verification or falsification may re-examine the same environment or things, if sufficiently unaltered, examine observation protocols and the functionality of employed devices and compare with independent observations. Observation is the ultimate primary source of such historical scientific knowledge. The complexity of observation processes, in particular with calibrated means, lies outside the scope of CRMinf, which is primarily concerned with the origin and further history of the observation results, thus providing a common generalization for other CRM extensions, notably CRMsci. In particular, the generic class for observation itself is declared as "S27 Observation" in CRMsci, making use of all constructs of CRMinf for argument making in general, and the class I11 Situation defined in CRMinf.

Belief adoption is used in CRMinf as a term for the use of information someone has heard, read or seen presented in symbolic form and accepts as their own knowledge. It is the major source of all our communicated knowledge, including reports from observations. It is supported or questioned by assessing the provenance of the source and trust in its credibility. In case of inconsistencies between reported facts, a trust argument may be used to decide on the one or the other. Therefore, CRMinf has developed the concept of Belief Adoption into much more detail than IAM, and created an "articulation" (ontological connection) to the deciphering and reading of original texts addressed by the CRM extension *CRMtex*, in order to be able to represent critical methods in historical research. Subsequent activities of belief adoption form endless networks of information transfer, which are of great importance for historical research.

Inference making, the third kind of acquiring knowledge, means that one concludes from the belief in the truth or likelihood of one or more propositions, the premises, that other propositions are true or likely, using background theories, such as common logic, laws of nature or assumptions about general human behaviour. The peculiarity of this knowledge is that it is relative to the truth of the premise. Therefore, it may be verified or falsified by revising the truth of the premises and the validity of the background assumptions for the given context and the correct application of the background theory, such as the common errors in applying logic. Note that an inference may conclude that at least one of the premises must be wrong. In IAM it is described as "recursive inference", but for reasons of simplicity not distinguished in CRMinf.

The knowledge itself is represented by an instance of I2 Belief, which relates an E39 Actor to a set of propositions (I4 Proposition Set) believed forming one context and holding the same truth value (I6 Belief Value) as explicitly stated by the Actor. It comes into existence as the conclusion of an instance of I1 Argumentation (through one of its sub-classes, S27 Observation, I5 Inference Making, or I7 Belief Adoption), and ends with any modification of its truth value or propositions. Only one E39 Actor may hold a particular instance of I2 Belief, though the E39 Actor may, of course, be an instance of E74 Group. Such an instance of E74 Group may lose or gain members (via one or more instances of E85 Joining or E86 Leaving) without affecting the belief the group representatively maintains. The members supporting the common belief may not necessarily be individually convinced of it. This does not invalidate the (explicitly stated) belief of the Group as expressed, for instance, in a joint publication.

A classical definition of knowledge is that someone believes and can justify it, and it is true. Since to be actually true would require an absolute authority, documented knowledge by CRMinf constructs is regarded as something someone believes (I2 Belief) and can justify – by experience, inference or justified trust in the source. Therefore, a documented belief value, i.e., instance of I6 Belief Value, such as "TRUE", does neither mean that a set of propositions is globally true in the sense of logic, nor that the documenting user believes that they are true. Instead, it means that the documenting user believes that the actor, documented for the respective belief expressed, in its turn, in some explicit form, takes certain propositions to be true "to the best of their knowledge", as is the common scholarly assumption for all scientific publications. This sense of truth corresponds to "inference to the best explanation (IBE)" (Ladyman, 2002) and does not exclude revision when better evidence arrives. In cases where the underlying honesty of expressions by some actors cannot be assumed, it is recommended to document their statements more generally as products of E65 Creation, which applies to all

propositions, and not as instances of I2 Belief. Otherwise, using CRMinf for documenting the progress of a serious scientific discourse would be compromised. Notwithstanding, opinions about specific propositional content can analytically be documented by instances of I16 Meaning Comprehension and I7 Belief Adoption. However, documentation would equally be compromised by an unreflected global questioning of trustworthiness of any source, whereas occasional cases of "lies" in generally trusted sources can effectively be dealt with as exceptions when detected and as knowledge revisions by the documentalist about the source. In general, it is recommended to use a richer vocabulary of belief values, at least including "UNKNOWN". CRMinf does not further prescribe such a vocabulary.

If scientists and scholars, and in particular curators, documented the provenance of the immediate sources for each information source in publicly accessible systems, this partial knowledge of provenance could be "stitched together" to more and more complete networks of provenance, similar to the way these days citations in scientific publications are processed. This is one major motivation for CRMinf; the other is to make transparent how knowledge was acquired for enabling the justification of future revisions, and for documenting who is supporting contested propositions.

Class and property usage examples

Class and property usage examples

The first running example is about an important archaeological discovery, initially announced in the press, and subsequently in proper scientific archaeological publications (Mandolesi, 2013). It covers two simple events of *observation* (S27 Observation), a simple example of an *inference* (I5 Inference Making) based on a legitimate plausibility argument, and a rare published example of *knowledge revision* (I5 Inference Making) by the same author.

The skeleton found on the left bench of Tomb 6423, nicknamed Tomba dell'Aryballos sospeso, in the Doganaccia necropolis of the Etruscan city of Tarquinia, Tuscany, by Alessandro Mandolesi on the 21th of September 2013, was initially estimated by Mandolesi to be the remains of a male person, due to the spear found next to it, and was published in the press as such. Soon after, osteological analysis carried out by the team revealed that it belonged to a female person, as published in the official academic papers afterwards. This is a good example for a simple inference and scientific knowledge revision. We refer to this skeleton in the examples found throughout the text as "The skeleton on the left bench in La Tomba dell'Aryballos sospeso", and to the burial arrangement as "The burial arrangement on the left bench in La Tomba dell'Aryballos sospeso", respectively.

We continue this example further: Critical to this example is the archaeological context. When opening the tomb, Mandolesi observed that it had been untouched since the time of the last burial it contained, a very rare fact. Therefore, the arrangement found was interpreted to be the one intended by the people who had carried out the burial.

The interpretation of this example in terms of formal propositions is graphically shown in Figure 4, below; it can also be found in the examples for individual concepts throughout the class and property declarations.

The second running example is the blog post by Francesca Bologna concerning Nero, and, in particular, his whereabouts during the Great Fire of Rome (Bologna, 2021). It demonstrates a case of understanding and citing two contradictory historical sources (I10 Provenance Statement), without explicitly believing them (I13 Intended Meaning Belief). Bologna proceeds with making a scholarly argument for trusting the one (I7 Belief Adoption) over the other, which she disbelieves (I5 Inference Making). The argument she makes is based on plausibility, the provenance of the information that the author of each source had, and an assumed bias on the part of one of the sources, which she contextually justifies.

Here are the relevant citations from Bologna (2021):

On 19 July AD 64, a fire started close to the Circus Maximus. The flames soon encompassed the entire city of Rome and the fire raged for nine days. Only four of the fourteen districts of the capital were spared, while three were completely destroyed.

Later historians blamed Nero for the event, claiming that he set the capital ablaze in order to clear land for the construction of a vast new palace. According to Suetonius and Cassius Dio, Nero took in the view of the burning city from the imperial residence while playing the lyre and singing about the fall of Troy. This story, however, is fictional.

Most of what we know about Nero comes from the surviving works of three historians –Tacitus, Suetonius, and Cassius Dio. All written decades after Nero's death, their accounts have long shaped our understanding of this emperor's rule. However, far from being impartial narrators presenting objective accounts of past events, these authors and their sources wrote with a very clear agenda in mind. Nero's demise brought forward a period of chaos and civil war –one that ended only when a new dynasty seized power, the Flavians. Authors writing under the Flavians had all an interest in legitimizing the new ruling family by portraying the Julio-Claudians in the worst possible light, turning history into propaganda. These accounts became the 'historical' sources used by later historians, therefore perpetuating a fabricated image of Nero, which has survived all the way to the present.

The interpretation of this example in terms of formal propositions is graphically shown in Figure 5, below; it can also be found in the examples for individual concepts throughout the class and property declarations.

Diagram depicting a knowledge revision process by A. Mandolesi

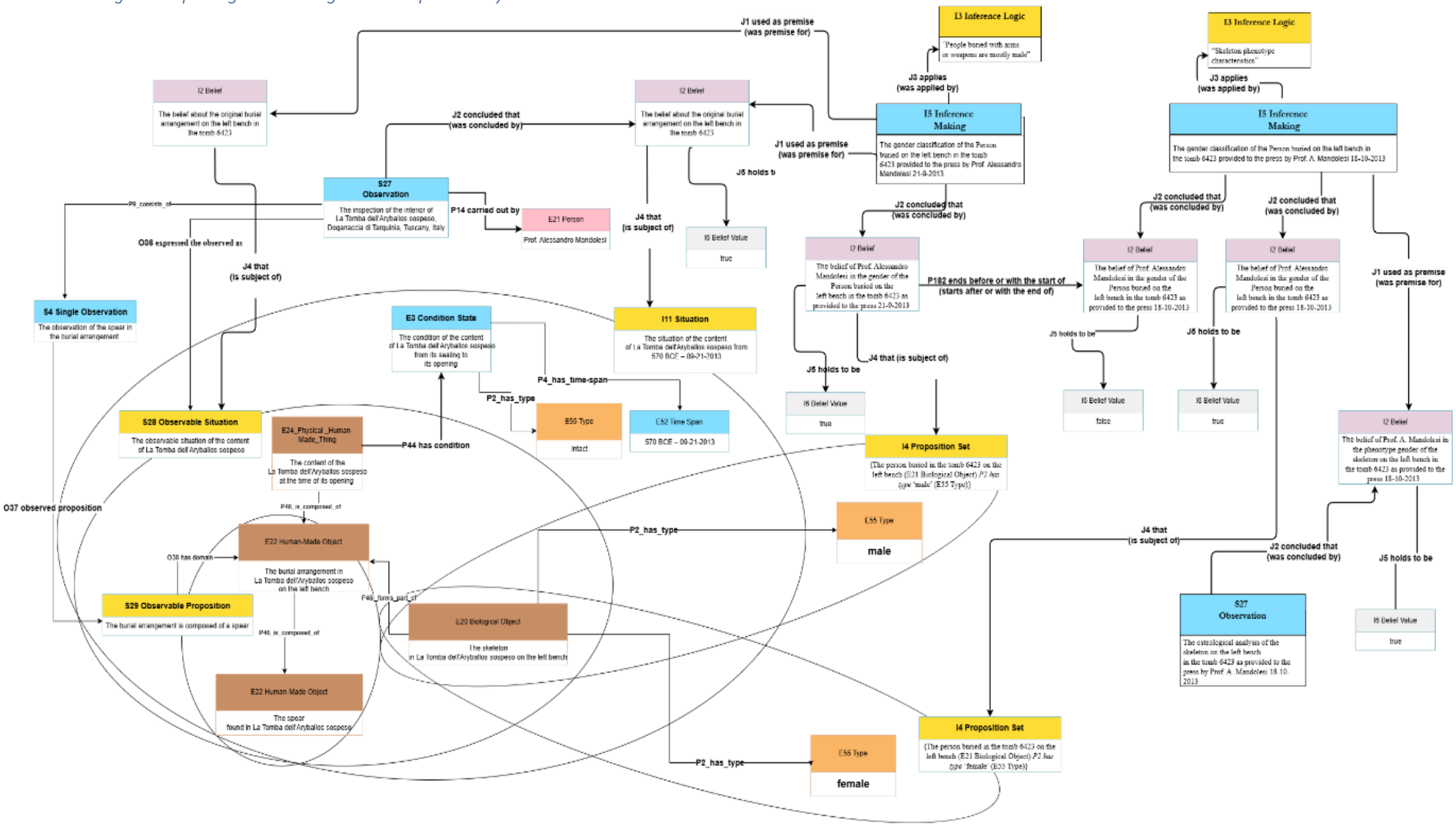


Figure 1: La Tomba dell'Aryballos sospeso; a case of knowledge revision

Diagram depicting a belief adoption by F. Bologna

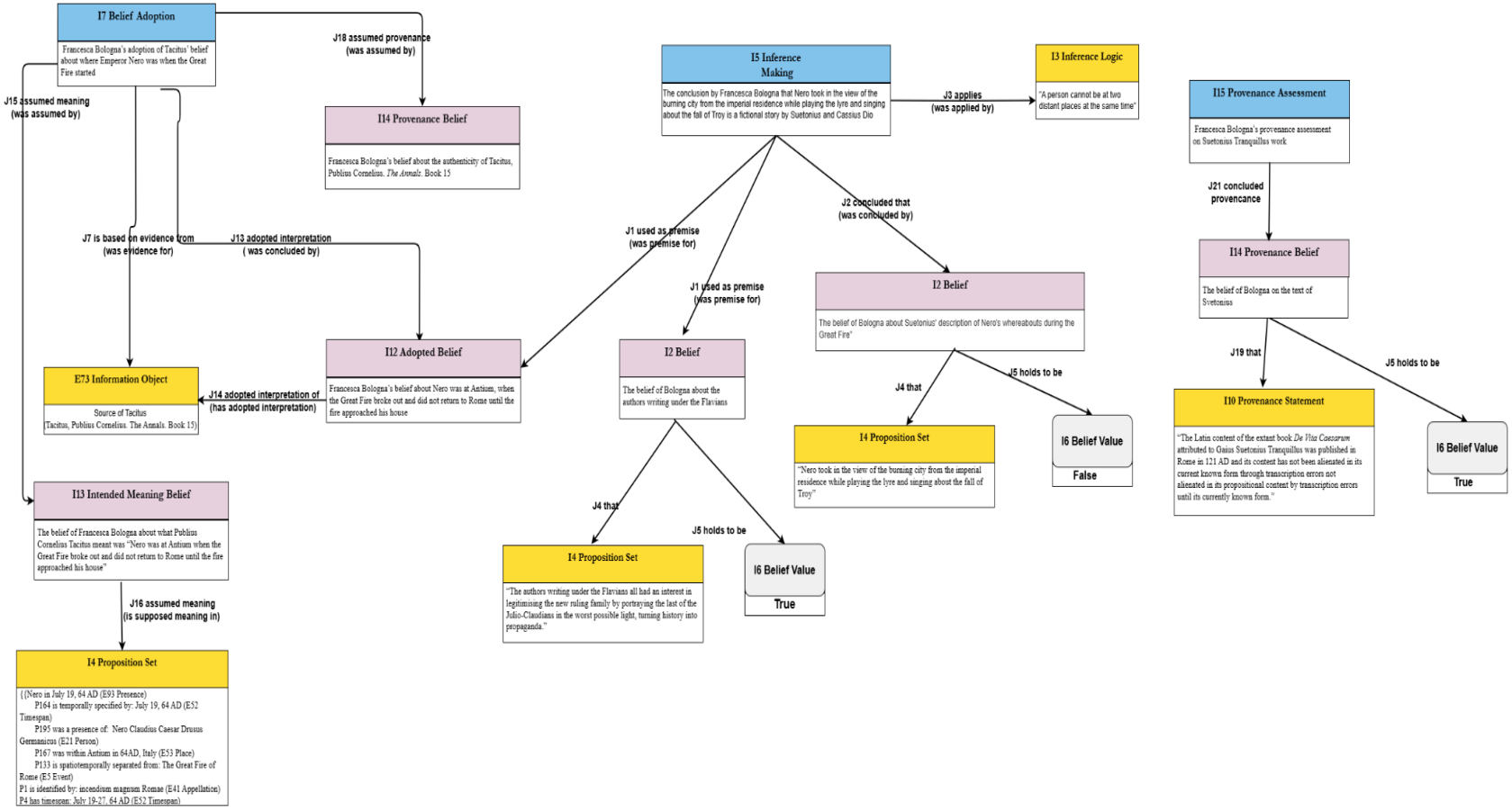


Figure 2: A scholarly argument concerning Nero's whereabouts during the Great Fire of Rome

Issue 274:

E100 Audio Item

Subclass of:

E73 Information Object

Scope note:

This class comprises the intellectual or conceptual aspects of recognisable sounds and compositions.

The substance of an audio item is a recognizable pattern of vibration in a medium as perceivable by an auditory system. Sounds in and of themselves are not human constructs, instances of audio item, however, are. Specifically, they are the identifiable and recognizable vibratory patterns which have become objects of discourse within given cultures and societies and act as symbolic markers and can be the basis for contemplation, discourse and reasoning inter alia.

This class does not intend to describe the idiosyncratic characteristics of an individual occurrence of a particular sound, performance or playback of sound, but rather the underlying prototype. For example, a sound such as Walter Werzowa's Intel sonic logo is generally considered to be the same logo when played in any number of adverts or media. The tone may change, but the logo remains uniquely identifiable. The same is true of music or speeches which are performed many times. While individual characteristics of the performance or speech may incidentally change, a basic, identical form can be recognized across performance instances. This means that an instance of audio item is independent of performance.

Aside from sounds following a particular composition, sounds captured from the environment (natural or human) and recognizable within a certain society or culture can be instances of audio item. Examples would include the sound of a tuned Porsche Carrera engine revving at 3000 rpm, the warble of the common Loon, or the David Frost Interviews with Nixon.

The class E100 Audio Item provides a means of identifying and linking together instances of E5 Event in which the same sounds, compositions or utterances etc. can be identified to have occurred, using P100 sounded (was sounded by), E100 Audio Item. Further an instance of E100Audio Item may be recorded and then can be indicated as *PXX is recorded on (bears recording of)* E24 Physical Human-Made Thing.

Examples:

- Walter Werzowa's Intel sonic logo
- Francisco Tárrega's Nokia tune [Grande Valse]
- a recording of the Greater Horned Toad
- the sound of the Porsche 911 engine revved at 3000 rpm

In first-order logic:

$E100(x) \Rightarrow E73(x)$

Properties:

Pxx is recorded on (bears recording of): E24 Physical Human-Made Thing

Issue 476:

The definition changed

FROM (OLD)

P199 represents instance of type

Domain:

E36 Visual Item

Range:

E55 Type

Subproperty of:

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

Quantification:

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

Scope note:

This property establishes the relationship between an instance of E36 Visual Item and an instance of E55 Type that characterises the thing depicted. This property is used when the identity of the thing depicted is unknown or unrecorded, but is clearly a particular thing of that type. If the instance of E36 Visual Item directly depicts the concept of the E55 Type rather than an instance of a thing of that type, then this should be represented using E36 Visual Item *P138 represents (has representation)* E55 Type.

This property is a strong shortcut of the more fully developed path from E36 Visual Item through *P138 represents (has representation)*, E1 CRM Entity, *P2 has type (is type of)* to E55 Type.

Full path:

E36 Visual Item. P138 represents (has representation): E1 CRM Entity. P2 has type (is type of): E55 Type

Examples:

- The visual content of photograph gri_2012_m_2_b001_f001_d01_e005_0148 (E36) *represents instance of type* automobile (E55)
  [Reference: https://www.getty.edu/research/collections/object/10062J]
- The top right image on page 87 in the book 'Pharaoh's Birds' by John Miles (E36*) represents instance of type* hoopoe (Upupa epops) (E55).
  [This image is a reproduction of a photograph. The same book shows at the top of page 35 an image representing an unnamed ancient Egyptian relief depicting a hoopoe and other 'Birds of the Marshes'. In contrast to the photograph, the latter image of the ancient Egyptian depiction shows intentionally typical rather than individual characteristics of the respective species, and should therefore be associated with the property *P138* represents with the species name hoopoe (Upupa epops)]. (Miles, 1998)
- The visual content of Monet's painting from 1868-1869 held by Musée d'Orsay, Paris, under inventory number RF 1984 164 (E36) *represents instance of type* magpie (Pica pica) (E55).
  [The editors give this example under the assumption that Claude Monet, as impressionist, created the painting following a real impression of a particular magpie. It was clearly not meant as a prototypical representation of this bird] (Musée d'Orsay, 2020)
- The top image on page 44 in the book 'Wildblumen Kretas' by Vangelis Papiomytoglou (E36) *represents instance of type* Cistus creticus L. (E55). [This image is a reproduction of a

photograph. The plant produces an aromatic resin that has been exported from Crete to Egypt and other areas since the Bronze Age] (Papiomytoglou, 2006)

In first-order logic:

P199(x,y) ⇒ E36(x)
P199(x,y) ⇒ E55(y)
P199(x,y) ⇐ (∃z)[E1(z) ∧ P138(x,z) ∧ P2(z,y)]

TO (NEW)

P199 represents instance of type (is type of instance represented)

Domain:

E36 Visual Item

Range:

E55 Type

Subproperty of:

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

Quantification:

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

Scope note:

This property establishes the relationship between an instance of E36 Visual Item and an instance of E55 Type that characterises the thing depicted. This property is used when the identity of the thing depicted is unknown or unrecorded, but is clearly a particular thing of that type. If the instance of E36 Visual Item directly depicts the concept of the E55 Type rather than an instance of a thing of that type, then this should be represented using E36 Visual Item *P138 represents (has representation)* E55 Type.

This property is a strong shortcut of the more fully developed path from E36 Visual Item through *P138 represents (has representation)*, E1 CRM Entity, *P2 has type (is type of)* to E55 Type.

Full path:

E36 Visual Item. P138 represents (has representation): E1 CRM Entity. P2 has type (is type of): E55 Type

Examples:

- The visual content of photograph gri_2012_m_2_b001_f001_d01_e005_0148 (E36) *represents instance of type* automobile (E55)
  [Reference: https://www.getty.edu/research/collections/object/10062J]
- The top right image on page 87 in the book 'Pharaoh's Birds' by John Miles (E36*) represents instance of type* hoopoe (Upupa epops) (E55).
  [This image is a reproduction of a photograph. The same book shows at the top of page 35 an image representing an unnamed ancient Egyptian relief depicting a hoopoe and other 'Birds of the Marshes'. In contrast to the photograph, the latter image of the ancient Egyptian depiction shows intentionally typical rather than individual characteristics of the respective species, and should therefore be associated with the property *P138* represents with the species name hoopoe (Upupa epops)]. (Miles, 1998)
- The visual content of Monet's painting from 1868-1869 held by Musée d'Orsay, Paris, under inventory number RF 1984 164 (E36) *represents instance of type* magpie (Pica pica) (E55).

[The editors give this example under the assumption that Claude Monet, as impressionist, created the painting following a real impression of a particular magpie. It was clearly not meant as a prototypical representation of this bird] (Musée d'Orsay, 2020)

- The top image on page 44 in the book 'Wildblumen Kretas' by Vangelis Papiomytoglou (E36) *represents instance of type* Cistus creticus L. (E55). [This image is a reproduction of a photograph. The plant produces an aromatic resin that has been exported from Crete to Egypt and other areas since the Bronze Age] (Papiomytoglou, 2006)

In first-order logic:

$P199(x,y) \Rightarrow E36(x)$
$P199(x,y) \Rightarrow E55(y)$
$P199(x,y) \Leftarrow (\exists z)[E18(z) \wedge P138(x,z) \wedge P2(z,y)]$