The 39th joined meeting of the CIDOC CRM SIG and ISO/TC46/SC4/WG9 and the 32nd FRBR - CIDOC CRM Harmonization meeting
ICS-FORTH

N. Plastira 100, Vassilika Vouton Heraklion - Crete

Room: Stelios Orphanoudakis (1st floor)

Date: October 09-12, 2017

Marta Acierno (Sapienza University of Rome, IT), Vicent Almercery (CNRS-University de Lyon, FR), Chyrssoula Bekiari (ICS-FORTH, GR), Francesco Beretta(Laboratoire de Recherche Historique Rhones-Alpes- CNRS, FR), George Bruseker (ICS-FORTH, GR), Maria Daskalaki (ICS-FORTH, GR), Martin Doerr (ICS-FORTH, GR), Achille Felicetti (VAST-LAB / PIN Scrl, IT), Donatella Fiorani (Sapienza University of Rome, IT), Ilenia Gallucio (VAST-LAB / PIN Scrl, IT), Siegfried Krause (GNM, DE), Athina Kritsotaki (ICS-FORTH, GR), Christian-Emil Ore (University of Oslo, NO), Pat Riva (Concordia University, CA), Melanie Roche (Bibliotheque National de France, FR), Alex Siedlecki (Museo di Arte -Cultura Orientale , IT), Richard Smiraglia(University of Wisconsin Milwaukee, USA), Stephen Stead (Paveprime Ltd, UK), Maria Theodoridou (ICS-FORTH, GR), Thanasis Velios (UKL / Ligatus, UK), Maja Zumer (University of Ljubljana, SI)

Patrick Le Boeuf (BNF,FR) through Skype

Monday 9/10/2017
ISSUE 351 Modelling Principles
We started with Martin Presentation. "What do we describe and why". Then Martin presented the text about methodology.

We voted: the crm-sig accepted the draft document, Googledocs for reading and adding notes and comments. HW assigned to Christina Emil, Thanasis, Marta, Achille, Alex, Steve

We put the text on the site in an issue format

ISSUE 352 Administrative Issue about CIDOC CRM-SIG membership
After break, we started with administrative issues. GB explained and explained the updated excel with the membership

  a) The information is correct
  b) The Institution are interested in supporting CRM-SIG

The crm-sig accepted the update of the list. The email will go to representative. We will keep other members

ISSUE 353 - About data sets in CRM site
GB put the relative slide on the board. We will send an email to provide datasets to be presented in the crm-site. Then GB presented the "curating pattern" from Parthenos. GB showed the Dataset Minimal Metadata according to Parthenos.

Velios set a question about using 3M instead for this.

We should add the provenance data and send email

ISSUE 354 Management of issues and workflow
workflow of proposal and attribution
George presented a proposal about issues management and workflow. The crm-sig asked him to formulate a proposal should   in lectical form to be answered by yes or no

Proposed Metadata Enrichments

In the last meeting, we discussed about the procedure of merge and split issue. It is decided, but not documented, to create another category of open issues. The decisions are:

- • Any sig member can raise an issue and can ask for voting by email
- • Any crm sig members can ask for veto
- • We should describe this procedure on the site.
- • Any decision taken in a meeting cannot be undone to the same meeting

The crm-sig asked GB to write the procedure

ISSUE 345: properties having domain or range deprecated classes
The discussion was about what we do   with the properties that their domain or range are deprecated classes. The decisions are

- MD, will make a proposal to delete the P58, to be decided by email vote,
- HW, MD and CEO will go over all deprecated classes and MD will formulate a list to which properties have problem
- Martin will coordinate this issue.

OWL versions to CRM in the releases
The sig decided the owl versions of Erlangen CRM to be accessible from the CIDOC CRM site

ISSUE 340 Classes without properties
Then crm-sig considering that CRM is not a suggestion of what to document but it tries to cover what people do document, discussed about classes without properties and how to decide about which of them are useful and which of them are useless . Martin proposed to define profiles for specific use cases. Up to now, we distinguished two cases of classes:

(1) Completely useless
(2) Useful for data entry or useful for querying

Points of the discussion are:

- ✓ CEO proposed to ask Robert to formulate their case profile.
- ✓ MD: proposed to invite people from a particular domain to give proposals on what classes that they would need

- ✓ To foresee for the web site a place where someone can document profiles,
- ✓ Steven: IEEE has a particular format for doing profiles, have a document for how to lay out a profile.
- ✓ It is decided to
  - create the cases profile and to mark useful classes for data entry or for querying, by Steve and Francesco,
  - to make space on the crm-sig site
- ✓ Then we reviewed the CRM graphs in <Use and learn> part of the site. A comment was to change the jpg to png

Title	Related Entities	Related Properties	Custom text
CIDOC CRM Class Hierarchy	All CRM Entities	None	(.jpg)
Time-Span Information	E1 CRM Entity, E2 Temporal Entity, E3 Condition State, E4 Period, E5 Event, E41 Appellation, E49 Time Appellation, E50 Date, E52 Time-Span, E53 Place, E59 Primitive Value	P1 is identified by, P4 has time-span, P5 consists of, P7 took place at, P9 consists of, P10 falls within, P78 is identified by, P79 beginning is qualified by, P80 end is	(.jpg)

E20 Biological Object:
Class is branching point, that's why we keep it

E40 Legal Body
We should discuss Legal body from the perspective of the library concept. The identity conditions for legal body is clear enough and useful or the libraries have another conditions that maybe useful for identity conditions.

Distinguishes certain types of groups and other groups

For the leaf node, they are important matching points with particular communities - someone who extends this will have properties for

E37 Mark & E34 Inscription
Considering that Eagle model proposed as a standard It is assigned to Achille to ask the Epigraphic community, to work together in harmonizing the eagle model with CIDOC CRM

Participated in congress of epigraphy… presented a poster about this…. But Eagle people still have not adopted CRM

Inscription and mark to considered with epigraphic

E45 Address, E47 Spatial Coordinate and E48 Place Name
To keep for community reasons

E50 Date
has already been deleted

E84 Information Carrier
To remove E84 -295 issue

Martin proposes: Reasons for Classes to Be:

- A. has a property in or out
- B. structural to IsA hierarchy

C. if a leaf is important matching point to some community that would map to and extend where properties would be added

Decision: make the statement described above, write a justification for each of existing classes that we will keep.

HW is assigned to

- Thanasis to write a text on key concepts (can also go in principles document and in introduction),
- Steve –to write text about profiles

ISSUE 276 FOL representation

The sig decided to close this issue, since
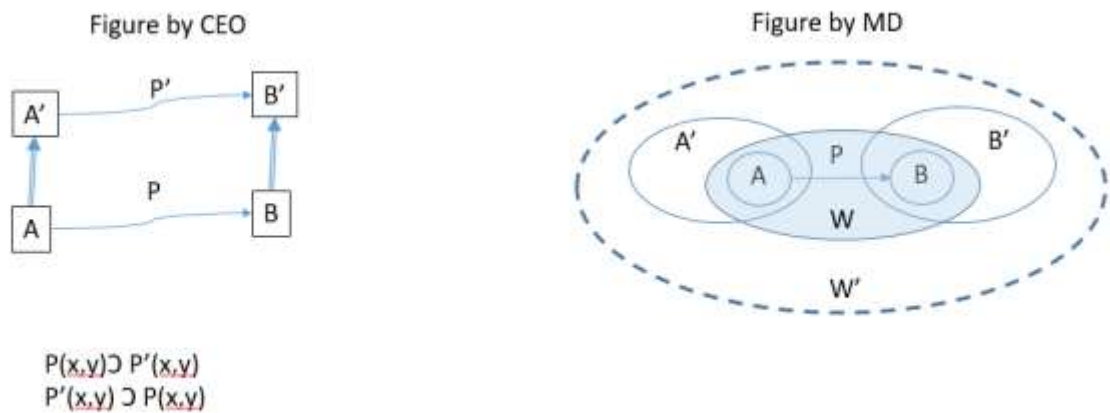
the (a) and (b) have been done.

(c) and (e) should form a new issue.

(d) It is obsolete since there are no strong shortcuts in the CRMtexts anymore.

Also SIG assigned to CEO to add all shortcut FOL formulations

ISSUE 336 Assistance for reducing to core CRM model

CEO presented the solution and Martin the problem. Both of them drew the following figures on the flipchart.

Figure by CEO

$$P(x,y) \supset P'(x,y)$$
$$P'(x,y) \supset P(x,y)$$

Figure by MD

Then sig decided that we need a text and explanation diagram to be appear in super properties in terminology section. CEO will write the text, and Korina will make the graphics by the next meeting.

ISSUE 295 Digital libraries as physical objects

Following Martin's proposal to remove class E84 since it does not satisfy the requirements proposed on issue 340, the sig proposed the examples of material carrier of a digital object to be moved to E24 of an E25 digital feature and possibly to E78 or put example for E78 of Server holding Digital Asset Management.

Finally, the sig asked Martin to make an example. The issue will be complete with examples. It is decided to be created a new issue for covering the discussion about E84 staying or going

ISSUE 341 Aggregates of features and counting
It is closed.

Open discussion about timed relations
Then Martin open a discussion about timed relations. Some comments of the discussion are:

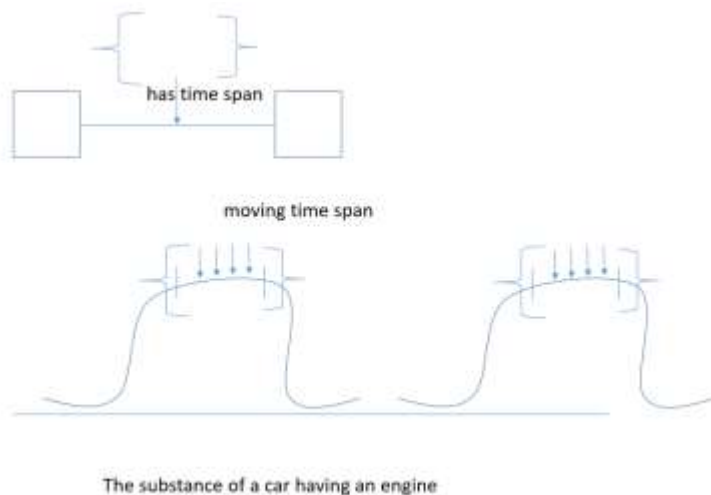All properties having non-trivial validity in time to make timespan.

If we have nary relationship we make a class.

State is relationship that have time

If we make an extension I have a least temporality observed.

MD: Within the time frame I see a bird flying. The place is the place of observation, when I want to document I need a more detailed description of place.

A friendship is an ongoing process. MD drew the following diagram on the board

To document the temporality of such properties we introduce activities and not PC classes

For those properties that we regard as true relationships we should make use of PC classes.

Then going through different cases about Franscesco examples (see Appendix D)

E5 Event scope note states that there is a change of state. But this is wrong. It needs to be rewritten.

Finally Martin presented a list of types of substance of relations (issue 329 appendix E) and sig decided to work on substance of relationships

HW assigned to Steve, CEO, Francesco, MD, Achille, Maria to review and think about the list of properties and see if they can be pc, activity or something else.

ISSUE 294 E55 Type relations

The sig accepted Martin's proposal for creating the following relationships:

a) "E55 Type. restricted to : E4 Period", many-to-one. , IsA appears in

b) "E55 Type. typical for : E4 Period", many-to-one, Isa appears in

c) "E55 Type. appears in : E4 Period", many-to-many.

d) CRMarcheo or CRMSci may define "first appears in", "last appears in".   "restricted to" and "typical for" should be moved to CRMarcheo or CRMSci.

ISSUE 309 Time Primitives

The sig accepted the captions proposed by Lida. The HW about the guidelines will resolved in issue 336. The examples are still missing.

ISSUE 191 Range of P31

Postpone the discussion

ISSUE 288 Issue about P82 and P81 usage

The sig assigned homework to Martin to write a statement about the use of a & b of properties P81 and P82 along with the results of issue 309.

ISSUE 346 E28 Examples

The examples of conceptual object are accepted. The sig decided that it should be an explanation note on the examples from Martin. The issue stays open until the explanation note will be written. Steve should check.

ISSUE 342 3d Model example in P138

The sig accepted the changes in the examples. The issue is closed

Tuesday 10/10/2017

We started with the presentations of Donatella and then continue with CRMarchaeo.

CRMarchaeo Issues

Achille Felicetti presented how the model was received by different communities and in specific from Maastricht EAA meeting, CIDOC 2017 conference in Tbilisi, Georgia and XVth International Congress of Greek and Latin Epigraphy in Vienna.

ISSUE 302 Examples of A6 Group Declaration Event, A7 Embedding, A8 Stratigraphic Unit

Then Eleni Christaki presented the revised examples about A6, A7 and A9 classes. The crm-sig accepted them with the addition also of the relevant references:

Example on A6: "During the excavation process of Room 5 (A1) of the West House (E24) a slab surface (E18) was found on deposit (A8) located on the upper storey (E53), as well as several individual slabs

(E19) on deposit (A8) located on the ground floor (E53); these were declared, by the excavators, to be parts of the same object, that is the original paved floor (E19) of the upper storey" (Michailidou 2001).

Example on A7*:* "The individual fallen slabs (E19) that were discovered (S19) during the excavation process of Room 5 (A1) of the West House in Akrotiri, Thera, were embedded (A7) in an almost vertical position (E55) within deposit (A8) on the ground floor (E53)" (Michailidou 2001).

Example on A9*:* Example A9: "The archaeological excavation (A9) of the West House (E24) that took place at the archaeological site of Akrotiri, Thera (E53) during the years (1967-1973) (E52) by the archaeologist Sp. Marinatos (E39)" (Michailidou 2001, Palyvou 2005).

ISSUE 306 Examples for CRMarchaeo

Within the framework of the same presentation, the crm-sig reviewed other examples proposed by Eleni Christaki and made the following comments:

Example on A2 and A3*:* "A collapsed part of the roof of the West House was found in a horizontal position on the first floor during the excavation of Room 3. It is made of a number of successive layers, the principal ones being the thick layer "A" (A2) consisting of gray soil and small tuff stones and the thinner layer "B" (A2) consisting of brownish red soil and marine pebbles (Michailidou 2001). The two layers are separated by a stratigraphic interface (A3).

The example is accepted. The relevant photo must be added with corrections at the CRMarchaeo document.

Example on A4 and A8*:* "At the time of the destruction of the Room 5 of the West House, the upper storey's floor splited (A4) and some of its slabs were found embedded at the deposit (A8) of the ground floor" (Michailidou 2001, Christaki *et all* 2016).

"In the excavation of Akrotiri, Thera, five distinct layers (A2) of pumice create a level (A8) about one metre thick which covers the ruins caused by the earthquake (A4). Above the pumice, the deposition (A8) of successive layers (A2) of volcanic ash created a level which even today, despite the millenia of erosion is 8-10m. thick" (Doumas 2015, 24).

The two examples are accepted. The model schema must be added at the introduction of the CRMarchaeo document. The first example must be rephrased in order to include all the relevant information.

Example on A5: "The illicit excavation that took part at the '60 at Zominthos Central Building, caused disruption (A5) of archaeological layers and destruction of architectural elements of Rooms 49,28 and 19" (Sakellaraki 2013).

Stephen Stead suggested this example to be replaced by three new ones concerning the stratigraphic disturbance due to a) animals, b) pedoturbation and c) partial excavation.

ISSUE 338 Excavation Area and plans

The crm-sig decided that there is no need to be created a new class for the Excavation Area since the property AP3 defines the place of investigation. The excavation area must be integrated with the model for plans.

The next version of the CRMarchaeo document must be presented at the next crm-sig meeting in Cologne, Germany. Also the crm-sig assigned to Achille Felicetti and Eleni Christaki to make the proposed changes and to Stephen Stead to correct and edit them.

ISSUE 332 Properties of S10 Material Substantial of CRMsci

The sig reviewed the examples in CRMsci proposed by MD and decided to add bibliography in APA style in footnotes. The sig made the following comments during the discussion

- On S10: New proposal accepted: S10 O25 contains S10 would be super property of P46
- About observation.
  - Shall we move observation to CRMbase? The decision is to make first a logical theory how we constrain a proposition set to certain things - a logical theory of schema for properties that can go into a named graph and when we have this then we discuss if observable entity goes to CRM base. Now we could leave observation in CRMsci.
  - To make a definition to CRMinf about observation.
- Situation is a construct of how to look in world and should go in CRMinf
- State is a construct of how long a thing did not change and should go to CRMinf
- We should make a second order theory for CRMsci
- The CRMsci should be focus over observation

HW assigned to check editing issues Athena, Achile , Thanasis

CEO will communicate with Carlo

ISSUE 323: Quantification of properties of CRMsci

The sig reviewed and accepted the proposed quantifiers for O1, O2, O3, O4, O5, O6, O7, O25 the rest quantifiers will be defined. Some properties can only finally be defined when the move on not move of Observable Entity is decided and when the sense of "State" is decided.

LRM- FRBRoo

We started with the harmonization of LRM and FRBRoo

Manifestation is problematic; it is missing the product at manufacturing level.

(about the work): The scope note of FRBRoo should answer the five questions

The substance, the identity criteria, … what potential properties these confines.

Martin gave an example "Audio books there is no punctuation" what expression is contained. The identity conditions that we have for symbolic objects are the sequence they produce

F2 expression to be revised under the view in which semantic level the symbols are interpreted.

Wednesday 11/10/2017

Fragment vs. Expression

For all expressions, assume a wholeness

Fragments and that they are not expressions, they are symbolic objects

A fragment in any case is a symbolic object. We can regarded as E73 Information Object

If a fragment contains an expression then it contains a fragmentary evidence in fragment.

We have three cases

- Extant
- Fragment
- Lost

If extant then identity on the symbol and there are different levels of symbolic representation

If fragment available, symbolic content of fragment as well

If lost then your claim based on historical evidence

A fragment is composed of another fragment

Issue for CRM base: tools are not agents

- Fundamental question of representation of symbolic things…
- an issue for CRM based (with reference to discussion on R33 content): Just need definition of encoding type and what is the relevant symbolic level to give it an identity
- If solved in FRBR then solved in base, should be more explicit
- Should have equivalent of R33 in CRMbase

Issue for E42 of CRM: move the good examples of F50 into CRM base, review the appellation examples

ITEM

Item= physically separately borrowlly piece (what a library can borrow). The item has the intension of the creation. Item = intentive form that actually has been achieved.

In FRBRoo the item will be the result of a repeatable processs : it is decided.

LRM Agent = Actor

NOMEN

We have 3 choices:

1. To take the NOMEN
2. To make mapping to identification relationship with name use activity,
3. The identity condition is at script level. Then we need to make an explicit class to FRBR for LRM string

To move the examples, to review the examples of Appellation in CRMbase

We continued with Entities (the comments are in the text of FRBRoo) see the APPENDIX C.

Then we started with relationships of LRM.

- For all symbolic objects we should have a symbolic set. We need a property for all symbolic objects which says what is the symbolic representation. R33.1 should be replaced by a property with range E90.

- We should find out what the symbol set is.

Publication creation…

We should make a class to FRBRoo that matches to distribution event of LRM.

There are three things.

(a) The publication event
(b) The distribution
(c) Manufacturing

Relations from work to work

Relations derivations between expressions of the same work exist

Used specific object

Thursday 12/10/2017

Relation RES with RES: can be interpreted as annotation

- To check if make interpretation as annotation if adequate

LRM-R30 is member of

5.3.6	Corporate Body: Sequential relationship		a) conference series: each "conference" is a member of the series; the formation of one is "P120 occurs before" the formation of the next
			b) change of name: see F52 Name Use Activity
			c) group merging or splitting: instance of E81 Transformation

It causes a question to E81. Pay attention to its use

- ***Issue for CRMbase: E81 has transformation of all persistent items but this then applies to actors and that is not really obvious***
- The identity of a group may imply a statement of mission. Changing the mission may change the identity.
- The same thing we can make with KOS..

Modelling of aggregates
- Complements are different publication
- Aggregates are the same publication
- The decision is to delete the container work and have the aggregation work
- Publication work can be a container work? Or Perfromance work can be a container work ?

LRMoo version 0.1

Will be the first version of LRMoo

HW assigned to Pat, Maja, Trond, Chryssoula , Patrick, Melanie on setting the new LRMoo 0.1. Mapping in (b) FRBROo to LRMoo, (a) LRMer – LRMoo

Issue 333 Model for Plans

- The crm-sig reviewed the changes proposed by Steve. Comments are:
- Activity Plan should not 'refer to' the activity (as per diagram)
- CEO points out that E29 will then be out of match with Activity Plan so scope note should be revised. MD thinks that E29 can be generalized to cover the plan, CEO will revise the scope note of E29.
- Intention to Apply as child of S16 is problematic because we still don't understand them, we still do not decide if it could be transferred in CRMbase perhaps putting it in core creates incompatibilities, perhaps putting it in core creates incompatibilities
- Intention to Apply goes directly under E2 temporal entity since actually it is not active and does not change things
- The E5 should be revised. with regard to changes of state (no assignment)
- A comment by Francesco is, if you change fundamentally the meaning of the class, then perhaps you have to change the class #
- We deleted the expression of intention, since it is not necessary. Just use E31 Document. That's enough
- P189 needs new example, example bad
- P190 is missing quantification must fix (no assignment)
- Issue: update examples in E73 with the correct subclass , update the example with Maxwell equations… formulation of the equations is an E73 not the equation itself (E28) (no assignment)
- p191 example must be reformulated properly
- P192 needs examples
- How to find pattern language to formulate the examples of plans? We should use a pattern language that would replicate these things without repeating the properties of CRM. CEO volunteers.
- LRMoo will have to be declared as subclass of E100 and not E29
- Performance plan is an activity plan
- For P193. SS: The two cases do not match. We need a case of something causing the end like passing a new law. The second case in the text is the loss of the last carrier.Suggestion: add to scope note how an event or an activity could bring about an end to the intention. For instance earthquake or volcanic eruption makes possibility fo realization impossible. Potentially add example form architecture and city planning Anais. Also change of precondition should be in example SS will do it
- Example makes no sense must be fixed
- Scope notes accepted, notwithstanding contradicting opinions about law, HW: SS will do examples
- Question is there a distinction between the law and the activity plan that carries it out
- Reactive or active plan? Laws would be reactive

- Is a law correctly seen as activity plan, Law is not plan for Gangemi because it does not have specific plan
- Should make formal comparison with Gangemi plan, Ask Gangemi for opinion - ask for comment on definition
- It is decided to add a new issue for discussing the Law in relation to planned activities) (no assignment)
- Actions: find expert, ask Gangemi MD will do, Mda will ask political philosophers, any expert to find ,
- MD: plan taken up by competing actors
- HW: add examples of Laws
- Decided: closed but to document

ISSUE 347 Dimension and Data sets

We start talking about Dimension. Comments are:

- Should dimension be a subclass of dataset?
- Problem: Dimensions from Evaluation in CRMSci
- HW: need to revise Dimension (because data evaluation creates an approximation of a dimension)
- All dimensions are approximations if we talk about discrete phenomena and can be measured up to the limit of the ambiguity of the definition of the phenomenon itself
- The sig decided to be proposed better model of how dimensions related to values from measurements and from evaluation
- Assign to MD , Steve, find a conservation person, Mark Pollard in Oxford (ss to talk to), Thanasis should say something.

George understand and send an email what to do about the versions of CRMtext

The meeting will be available in any format

Every produces a dot 3 number, a dot 2.

Published but not closed

ISSUE 275 Space primitive

The sig reviewed the scope note provided by GH and decided to accept in principle but need to add a .1 property before installed in standard and to look at how it relates to measurement… is it a shortcut?. The revised text is in the appendix A. No homework assignment.

ISSUE 256 groups and relations between persons

The sig discussed about this issue in in relation to the question of the development of an extension of CIDOC CRM for history. The question of social relations that are explored in the question of prosopography were argued to go beyond the scope of CRMBase. The issues themselves, however, are of ontological and practical interest for socio-historical research. This raised the question of whether there should be an extension for history itself.It was argued that since CRM, at base, deals with historical issues, there is no sense in a historical extension as such. That being said, issues of interest to historians inter alia, such as prosopography, may call for a new extension. Thus this issue can be closed waiting for further input and eventually looked at within the context of an extension for social/anthropological

questions, a potential 'CRMsoc'. Meanwhile, the work being done with regards to the application of CRM by historians, spearheaded by F. Beretta, can be considered to be the creation of various application profiles for the creation of data using CRM. Application profiles would be specific selections of concepts and relations from CRMBase and its extensions for describing/documenting different historical phenomena. The work on these profiles in turn will generate modelling questions that will affect both CRMBase and the potential CRMSoc extension, while not constituting an extension in themselves.

ISSUE 334 Scholarly Reading

The sig discussed Martin's proposal and made the following comments:

- The figure should be updated
- I9 Citation the scope note does not give birth and death of the conviction
- Authenticity - see something, its a something that carries the same stuff as what originally happened
- I10 we need not necessarily instantiate the provenance in a many cases

HW assigned to MD to revise it.

ISSUE 329 States and Situations

The sig reviewed and accepted Martin's proposal (see the appendix) for state and situation and the need to create properties for state and situation based on the given definitions. Situation would be the range of an observation.

Decision on these:

- Martin will continue to look at models of situations together with temporality of property
- The class situation will go to CRMinf

ISSUE 313 assistance on mappings

The sig reviewed the Mapping language specification document (see Appendix B) and agreed to expose it as a draft.

Next meeting

Francesco proposed to be the next meeting (41rst) in Lyon and the sig accepted.

APPENDIX A

@ Gerald: the crm-sig assigned to you to write up a new issue to be discussed in the next meeting about places that are indefinitely related in common documentation practice.
In common documentation practice, find or encounter spots e.g. in archaeology, botany or zoology are often related to the closest village, river or other named place without detailing the relation, e.g. if it is located within the village or in a certain distance of the specified place. In this case the stated "phenomenal" place found in the documentation can be seen as approximation of the actual encounter spot without more specific knowledge.

In more recent documentation often point coordinate information is provided that originates from GPS measurements or georeferencing from a map. This point coordinate information does not state the actual place of the encounter spot but tries to approximate it with a "declarative" place. The accuracy depends on the methodology used when creating the coordinates. It may be dependent on technical limitations like GPS accuracy but also on the method where the GPS location is taken in relation to the measured feature. If the methodlogy is known a maximum deviation from the measured point can be calculated and the encounter or feature may be related to the resulting circle using the *P171 at some place within* property.

For this reason I would propose a property "Pxxx approximates" that allows to make this relation. The range is E53 Place as phenomenal as well as declarative Places can be used to make the approximation.

Pxxx approximates

Domain: E53 Place

Range: E53 Place

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

Scope note: This property associates an instance of E53 Place with another instance of E53 Place, which is defined in the same reference space, and which is used to approximate the former. The property does not necessarily state the quality or accuracy of this approximation, but rather indicates the use of the first instance of place to approximate the second.
In common documentation practice, find or encounter spots e.g. in archaeology, botany or zoology are often related to the closest village, river or other named place without detailing the relation, e.g. if it is located within the village or in a certain distance of the specified place. In this case the stated "phenomenal" place found in the documentation can be seen as approximation of the actual encounter spot without more specific knowledge.

In more recent documentation often point coordinate information is provided that originates from GPS measurements or georeferencing from a map. This

point coordinate information does not state the actual place of the encounter spot but tries to approximate it with a "declarative" place. The accuracy depends on the methodology used when creating the coordinates. It may be dependent on technical limitations like GPS accuracy but also on the method where the GPS location is taken in relation to the measured feature. If the methodlgy is known a maximum deviation from the measured point can be calculated and the encounter or feature may be related to the resulting circle using the *P171 at some place within* property.

S16 State. *My new scope note is the following:*

"This class comprises persistence of particular value ranges of properties of a particular thing or things over a time-span. The identity of an instance of S16 State is given by prescribing the properties and value ranges under consideration, such as "me being in my office". From this prescription of properties results the ability to observe the time-span, and possibly the spatial area, for which the specified properties held. In general, there are no natural boundaries to the combination of property values under consideration in the definition of a state. Therefor this class is only epistemological in nature, describing arbitrary units of considering the world"

"Martin Doerr and Maria Daskalaki were at ICS-FORTH, Heraklion 4/10/2017 from 14:00 to 16:15"

SXX situation. My new scope note is the following:

"*This class comprises the persistence of particular value ranges of the properties of a particular thing or things over a time-span. The identity of an instance of SXX Situation is given by prescribing kinds of properties and a particular time-span and possibly the spatial area. From this prescription of properties results the ability to observe the values of the kinds of properties, which hold in the specified time-span and spatial area. An instance of SXX Situation can be considered as a snapshot of an instance of SXX State defined by the property values observed in the respective situation. In other words, any instance of SXX Situation can be expanded into a State describing the maximal extent in time and space for which the combination of property values observed in a particular situation held. In general, there are no natural boundaries to the combination of kinds of properties, the space and the time-span under consideration in the definition of a situation other than the interest and ability of an observer. Therefor this class is only epistemological in nature, describing arbitrary units of considering the world*"

Example:

"Martin Doerr and Maria Daskalaki were at ICS-FORTH, Heraklion 4/10/2017 15:22:05"

"Martin Doerr and Maria Daskalaki and George Bruseker were at ICS-FORTH, Heraklion, in the Stelios Orphanoudakis Room at 4/10/2017 14:44"

APPENDIX B

Mapping Language Specifications

Mapping cultural-historical data to semantic networks is relatively simple since i) specialist/primary information databases frequently employ a flat schema, reducing complex relationships into simple fields ii) cardinality constraints need not be enforced and iii) specialized source fields frequently map to composite paths under the CRM (or any other target schema), making semantics explicit using a small set of primitives more easy to learn. Another positive effect of mapping to composite paths is the use of intermediate nodes that frequently offer themselves as "hooks" for integration with other complementary sources, such as a production event between object and technique.

Mapping consists of three steps:

1. Schema matching: declarations of equivalence of source schema constructs with target schema constructs.
2. Instance generation policy: declarations how identifiers of nodes and numerical data types of data sets transformed into the target schema have to be generated from information elements in the source data sets. Step 1) and 2) form the mapping definition.
3. Transformation: Executing instructions of the mapping definition in order to transform a set of source data sets automatically into target data sets.

Domain experts that are aware of the meaning of the target schema can learn with reasonable effort and without IT skills how to perform schema matching, since they are aware of the meaning of the source schema. IT experts may not understand the meaning of either schema or underestimate it leading to errors and labor-intensive, time-consuming correction processes.

To assist domain experts on performing the mapping activity and the IT experts on performing the data transformation process, a Mapping Definition Language and a set of compatible tools are required.

The basic principles that the language and the tools should comply with are:

➢ The transformation should be possible by executing specifications given in the Mapping Definition Language by an *automatic interpreter* without human intervention. The schema matching should be expressed in a *declarative way*, in order to be readable by both domain experts and machines.

➢ The language should be *symmetric* with respect to the way equivalent source and target schema paths are declared, and moreover *potentially invertible* allowing bidirectional interaction between providers and aggregator and thus supporting not only a rich aggregators' repository but also corrections and improvements in the providers' databases.

➢ Schema mappings should be defined in such a way that they can be *collaboratively created* and discussed by experts. Emphasis should be given on establishing a *standardized mapping description* which lends itself to collaboration and a sufficient specification for the transformation of each instance of a source schema into an instance of a target schema while preserving as much as possible its initial 'meaning'.

➤ The Schema Matching and the Instance Generation policies should comprise different distinct steps in the data provision workflow. Instance Generation is more technical and does not require deep understanding of domain knowledge. Therefore it is more likely that is better understood by an IT expert than by a domain expert and the language should ***decouple the Instance Generation*** from the schema matching and to completely separate the definition of the schema matching from the actual execution.

➤ The Schema Matching declarations should allow for declaring the connectivity of the target graph in **a symbolic way** comprehensible to the domain expert, i.e., which entities reoccurring in the declarations will be transformed into the same identical per source data unit (record, parent tag etc.). Connectivity of the target graph should not be achieved by "smart" instance generation policies.

➤ ***Domain experts*** should be capable of testing the semantics, reading and validating the schema matching with adequate tools. Therefore there should be a distinction between mapping information from the domain experts who know and provide the data and information created by the IT technicians who actually implement data translation and integration solutions, and serves as an interface between both.

➤ There should be the capability to keep the ***schema mappings*** between different systems ***harmonized*** by semiautomatic comparisons of schema matching instructions.

Specifically, regarding **CIDOC-CRM** as target schema, the language should support

▪ interpretation of source schema as semantic model (nodes and links)

▪ mapping each element of that to an equivalent target schema path, such that each instance of an element of the source semantic model can be converted into a valid construct of the target schema with the same meaning.

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APPENDIX C

Draft comments from the LRM discussion

FRBRoo classes

F1 Work

Subclass of: E89 Propositional Object

Superclass of: F14 Individual Work (deprecate)

                   F15 Complex Work (deprecate)

                   F16 Container Work

                   F21 Recording Work

Scope note: This class comprises distinct concepts or combinations of concepts identified in artistic and intellectual expressions, such as poems, stories or musical compositions. Such concepts may appear in the course of the coherent evolution of an original idea into one or more expressions that are dominated by the original idea. The conceptual content of a Work can evolve over time, such as through revised editions. A Work may be elaborated by one or more Actors simultaneously or over time. The substance of Work is ideas. A Work may have members that are works in their own right.

                 ~~A Work can be either *individual* or *complex*. If it is individual its concept is completely realised in a single F22 Self-Contained Expression. If it is complex its concept is embedded in an F15 Complex Work. An F15 Complex Work consists of alternative members that are either F15 Complex Works themselves or F14 Individual Works~~.

                 [To get rid off the F14 and F15 and then to revixe the scope note]

                 The work is alwas explicit to expression and to make a statement that it isntaisted if we encounter more than one expression of the same work

A work comes into existence with the creation of its first expression. A work only exists ~~if exists~~if at lea~~i~~st one expression exists. Additional expressions of the work can continue to be created over time.

~~to~~

…….

Properties:	R1 is logical successor of (has successor): F1 Work
	(it should be added a relation it is inspired by)
	R2 is derivative of (has derivative): F1 Work (we should revise this since we don't have the F14)
	We should clarify since it might be recognizable pieces)
(R2.1 has type: E55 Type)	
	R3 is realised in (realises): F22 Self-Contained Expression (this is exactly the same)
	R40 has representative expression (is representative expression for): F22 Self-Contained Expression we should preserve in some form

F2 Expression

Subclass of:	E73 Information Object
Superclass of:	F22 Self-Contained Expression [revise F2 to merge with F22—all expressions are self-contained]
	F23 Expression Fragment [deprecate F23, use E90 instead, as the fragment is not actually an expression—Patrick: This might have consequences on the SAWS project http://www.ancientwisdoms.ac.uk/]~~(we should revise the F23)~~ to check the emails "what is the ontological notion of page" is it a fragment or is it a compliment of a self contained expression; is it a manifetastaion level concept]
	F34 KOS (just check)
	F35 Nomen Use Statement (it was the presctive part)
	F43 Identifier Rule (just check to see along with linked open data rules)

Scope note:	This class comprises the intellectual or artistic realisations of *works* in the form of identifiable immaterial objects, such as texts, poems, jokes, musical or choreographic notations, movement pattern, sound pattern, images, multimedia objects, or any combination of such forms that have objectively recognisable structures. The substance of F2 Expression is signs.
	Expressions cannot exist without a physical carrier, but do not depend on a specific physical carrier and can exist on one or more carriers simultaneously. Carriers may include human memory. . (an interesting thing to solve is how we deal with parts of expressions?)

Inasmuch as the form of F2 Expression is an inherent characteristic of the F2 Expression, any change in form (e.g., from alpha-numeric notation to spoken word, a poem created in capitals and rendered in lower case) is a new F2 Expression. Similarly, changes in the intellectual conventions or instruments that are employed to express a *work* (e.g., translation from one language to another) result in the creation of a new F2 Expression. Thus, if a text is revised or modified, the resulting F2 Expression is considered to be a new F2 Expression. Minor changes, such as corrections of spelling and punctuation, etc., are normally considered variations within the same F2 Expression. On a practical level, the degree to which distinctions are made between variant *expressions* of a *work* will depend to some extent on the nature of the F1 Work itself, and on the anticipated needs of users (its identical with the new text).

The genre of the work may provide an indication of which features are essential to the expression. In some cases, aspects of physical form, such as typeface and page layout, are not integral to the intellectual or artistic realisation of the *work* as such, and therefore are not distinctive criteria for the respective expressions. For another work, features such as layout may be essential. For instance, the author or a graphic designer may wrap a poem around an image.

[The identity of an expression has different levels, and depend on the level at which the symbols are relevant—to cover the criteria varying depending on characteristics. More specific identity criteria can be included in less specific criteria. The level of specificity of symbols cannot be globally defined (typeface, etc is not globally significant, nor is spelling]

[Expressions may be extant, fragmentary or lost. This affects how we determine identity conditions: if extant, we use the symbolic content of the expression; if fragmentary: we are reconstructing based on the fragments we have; if expressions are lost, we have only evidence in historical sources]

An expression of a work may include expressions of other works within it. For instance, an anthology of poems is regarded as a work in its own right that makes use of expressions of the individual poems that have been selected and ordered as part of an intellectual process. This does not make the contents of the aggregated expressions part of this work, but only parts of the resulting expression. (this paragraph is problematic, we need to clarify, to revise to rephrase, to look at the manifestation product type) to check as an example needs to document the book of the dead

[Critical edition: we should take a position for digital humanties. It is needed to be described that this work is the bridge between library work and scholarly work, we need to find someone to apply FRBRoo to critical editions—Christian-Emil]

If an instance of F2 Expression is of a specific form, such as text, image, etc., it may be simultaneously instantiated in the specific classes representing these forms in CIDOC CRM. Thereby one can make use of the more specific properties of these classes, such as language (which is applicable to instances of E33 Linguistic Object only).

[At the last meeting it was said that Manifestation is both a subclass of Publication Expression and Product Type. So it is a sub-subclass of Expression (plus a subclass of sthing else)]

[Issue of paging, relevant to digitisation, finding the identity criteria—matching the page to the expression that it belongs to. Can use P106 is composed of, to relate the text on a page to the whole. The text found on a page breaks at symbol boundaries, not necessarily at word or sentence boundaries. It is an E90. Relates to the F24 Publication Expression. Two structure systems ongoing: symbolic structuring (pages, lines etc) and also logical structuring (chapters, paragraphs, sections of content)]

Properties: R4 carriers provided by (comprises carriers of): F3 Manifestation Product Type

R5 has component (is component of): F22 Self-Contained Expression

R15 has fragment (is fragment of): F23 Expression Fragment

R41 has representative manifestation product type (is representative manifestation product type for): F3 Manifestation Product Type (it might be not needed)

F3 Manifestation Product Type

It seems to be identical with the manifestation in LRM, we should include something about manifestation singleton as in LRM

Whatever manuscript we have there is a manifestation. If we consider production planning we may have problem.

In LRM manifestation is a publication expression

[Revise scope notes to combine F24 Publication Expression with F3]

Subclass of: E55 Type [actually can now go to E99 Product type]

E72 Legal Object

Scope note: This class comprises the definitions of publication products.

An instance of F3 Manifestation Product Type is the "species", and all copies of a given object are "specimens" of it. An instance of F3 Manifestation Product Type defines all of the features or traits that instances of F5 Item normally display in order that they may be recognised as copies of a particular publication. However, due to production problems or subsequent events, one or more instances of F5 Item may not exhibit all these features or traits; yet such instances still retain their relationship to the same instance of F3 Manifestation Product Type.

The features that characterise a given instance of F3 Manifestation Product Type include: one instance of F24 Publication Expression, containing one or more than one instance of F2 Expression, reflecting the authors' content of the manifestation and all additional input by the publisher; and the appropriate types of physical features for that form of the object. For example, hardcover and paperback are two distinct publications (i.e. two distinct instances of F3 Manifestation Product Type) even though authorial and editorial content are otherwise identical in both publications. The activity of cataloguing aims at the most accurate listing of features or traits of an instance of F3 Manifestation Product Type that are sufficient to distinguish it from another instance of F3 Manifestation Product Type.

Examples: ……

Properties: …….

CLR6 should carry (should be carried by): F24 Publication Expression [not needed if F3 and F24 are merged]

F4 Manifestation Singleton

We may get rid of this—2017-10: either deprecate this or make it a subclass of F5 Item and revise scope of F5: no, the class hierarchy makes this not work! Once F3 is merged with F24, it is not so obvious to also merge with F4. Conclusion: do not change it]

Subclass of: E24 Physical Man-Made Thing

Scope note: This class comprises physical objects that each carry an instance of F2 Expression, and that were produced as unique objects, with no siblings intended in the course of their production. It should be noted that if all but one copy of a given publication are destroyed, then that copy does not become an instance of F4 Manifestation Singleton, because it was produced together with sibling copies, even though it now happens to be unique. Examples of instances of F4 Manifestation Singleton include manuscripts, preparatory sketches and the final clean draft sent by an author or a composer to a publisher.

Examples: The manuscript known as 'The Book of Kells'

The manuscript score of Charles Racquet's 'Organ fantasy', included in Marin Mersenne's personal copy of his own 'Harmonie universelle' [Marin Mersenne planned a second edition of his 'Harmonie universelle' after it had been first published in 1636, and he asked the composer Charles Racquet to compose his organ fantasy especially for that planned second edition; but Mersenne died before he could finish and publish the second edition and Racquet's score remained until the 20th century as a manuscript addition to Mersenne's copy, held in Paris by the Library of the Conservatoire national des arts et métiers]

Marin Mersenne's personal copy, held in Paris by the Library of the Conservatoire national des arts et métiers, of his own 'Harmonie universelle', containing all of his manuscript additions for a planned second edition that never took place before his death, but that served as a basis for the modern reprint published in 1986

[to handle the bound-with "manifestations", prefer to bring the Storage Unit class from PRESSoo into FRBRoo, so that the combination or splitting of items from different manifestations is handled outside the WEMI stack]

Properties: R42 is representative manifestation singleton for (has representative manifestation singleton): F2 Expression we don't need it as with the R41

F5 Item
We may distinguish items that are compatible with the manistation and items that are not

[Items may be made up of multiple Storage Units.]

[PLB: I'm realizing that with the introduction of Storage Unit, Item is in a sense no longer physical, it's still a merely bibliographical entity (the "idea" of a complete exemplar of a given publication of which all exemplars are supposed to be in 2 volumes). The only physical thing is Storage Unit.

MD: but items are still physical, made of materials. Consider a pen+cap, it is 2 pieces, but they are intended to stay together]

[Patrick Le Boeuf: What I meant about Item/Storage Unit was that it now occurs to me that the original Item notion in FRBR tended to put together the legal notion of "holdings" and the physical notion of exemplar. If we regard "Item" not as a physical exemplar but as the right we have on a given physical exemplar, then Item is not a class of physical things but rather a subclass of E30 Right. Even when a Storage Unit is lost, we still claim that we "hold" the exemplar (i.e., that we have a right of property on it), and we still publish that information in our catalogues. Regarding Item as a particular subtype of Right might solve the "Digital Item" issue. Clémdnt Oury argued that defining the Item of digital publications as a segment of a hard disk was irrelevant and that what was important about digital items was the metadata added to Publication Expression and stating who owned the digital item. However, I don't want to slow down the discussion. We lived very well during 20 years with the idea that Item was physical, and we ca go on like that...]

[Indicate how an instance comes into existence, and how it is destroyed: it is not destroyed as long as it is functional wrt the expression embodied, even if modified considerably. So a palimpsest is the

destruction of the item of the original item to allow the creation of a new item. Any reuse of the carrier (recording of the cassette) destroyed the item. Also the actual destruction of the physical carrier.

Modification of Items can also result in distinct Storage Units (e.g. "bound with" or interleaved exemplars) this is not destruction.

Subclass of: F54 Utilised Information Carrier

Scope note: This class comprises physical objects (printed books, scores, CDs, DVDs, CD-ROMS, etc.) that carry a F24 Publication Expression and were produced by an industrial process involving an F3 Manifestation Product Type. [any repeatable production process, including hand-press printing]

....

F9 Place

Equal to: E53 Place [revise this scope note, so that LRM-E10 Place = E53. In the previous practice, classes were created in FRBRoo for all the major FR classes, even when equal to a CRMbase class. Propose to stop this practice, and thus deprecated F9 Place, now exactly equal to E53. In consequence also deprecate F10 Person as it is equal to E21. Also do not create an FRBRoo class for Time-span. Review that the examples retained in CRMbase are adequate, or determine whether the additional examples should only be in the FRBRoo document, in the referred to CRM classes, having extra examples.]

F10 Person

Equal to: E21 Person [based on decision to not repeat in FRBRoo the LRM classes that are exactly equal to CRMbase, F9 should be deprecated.]

         ....

F12 Nomen [= LRM-E9 Nomen]

Subclass of: E41 Appellation

Superclass of: F13 Identifier

Scope note: This class comprises any sign or arrangements of signs following a specific syntax (sequences of alphanumeric characters, chemical structure symbols, sound symbols, ideograms etc.) that are used or can be used to refer to and identify a specific instance of some class or category within a certain context. The scripts or type sets for the types of symbols used to compose an instance of F12 Nomen have to be explicitly specified. The identity of an instance of F12 Nomen is given by the order of its symbols and their individual role with respect to their scripts, regardless of the semantics of the larger structural components it may be built from. Structural tags occurring in the nomen string are regarded as symbols constituting the nomen. Spelling variants are regarded as different nomina, whereas the use of different fonts (visual representation variants) or different digital encodings do not change the identity.

[The identity condition is not the same the LRM-E9 Nomen is a reified relationship, not just the arrangement of symbols. Identity condition for the LRM string is at the script level, not font. The LRM string (LRM-E9-A1) is a different class than the CRM E62 String, which also includes representation.]

……

F13 Identifier

Subclass of: F12 Nomen

Superclass of: F50 Controlled Access Point [not needed as an entity/class, a type of LRM-E9 Nomen]

Equal to: E42 Identifier [deprecate F13, since it is not in LRM and equal to E42. Check if we want to used these examples in E42 or F12]

……….

F16 Container Work [this node may not be needed-or prefer this definition?]
Subclass of: F1 Work

……

F17 Aggregation Work [merge this with F16 Container work, match with LRM "aggregating work"]
Subclass of: F14 Individual Work

                F16 Container Work

………….

F19 Publication Work
Subclass of: F16 Container Work

Superclass of: F18 Serial Work

Scope note: This class comprises works that have been planned to result in a manifestation product type or an electronic publishing service and that pertain to the rendering of expressions from other works.

[Revise to clarify that the substance of F19 is in the features of the Manifestation that is to result, and that it is an aggregating/container work, even in the cases where it is very minimal. The Publication Expression has to have a work. The focus is more on the aggregating expression.]

……….

F22 Self-Contained Expression
Subclass of: F2 Expression [should be subsumed under F2 Expression, all real expressions must be self-contained and express an F1 Work]

…………

F23 Expression Fragment
Subclass of: F2 Expression [the fragment is not an F2 Expression as it does not express any F1 Work, thus it must be a subclass of E90 Symbolic object. Do not need this class, just use E90 directly as the range of R15]

[link the E90 to an expression: F2 has fragment (some characters) E90. It can be an E73 Linguistic Object (if the fragment has readable words). Fragments can contain smaller fragments

………

Examples: The only remnants of Sappho's poems [Sappho fragments have to be dealt with as a substitute for a SCExpression, for lack of a "more complete whole" Steve: the evidence for the expression is fragmentary, but not the expression itself (which we do not fully know). I agree with Steve, but what I mean is that what we do have are the "complete set of fragments" of Sappho's poems]

The words 'Beati pauperes spiritu' (excerpted from Matthew's Gospel 5,3 in Latin translation)

F24 Publication Expression

[Scope covers much the same topics as F3, but note that F24 is a subclass of F2 Expression, F3 is also an E55 Type. Then the distinction with F4 is that there is no publication expression related to those singletons, F4 does not include publication processes that stop (or are stopped) after producing only a single item.

Distinction between publication expressions that in the end were not (or not yet) actually used to create any Items, do we need two classes to cover this? No, it exists regardless or whether any items were produced. Each item results from only one publication expression/manifestation.]

………

F27 Work Conception

[NB that this class does NOT correspond to LRM-R5 work creation, which is the completion of the creation (via a first expression) and not the beginning of the Work Conception]

………

F28 Expression Creation [=LRM-R6 Expr created by Agent]

[LRM-R5 Work creation = the creation of the first expression in FRBRoo. Add this to the scope note of F28]

[LRM-R24 expression derivation: F28 Expression creation. Used specific object (the expression derived from)]

Need a logical rule to restrict the two expressions to being expressions of the same work. And an inference that there is causality in the creation of the second expression. NB: Can make a derivative using more than 1 specific previous source. (translation, of the Quarto and Folio versions of Hamlet, But these are two distinct Expressions In the Hamlet example, the translations were distinct: they were published together, but as two distinct texts.]

[PLB: But the case does exist: in the modern edition of Guillaume de Machaut's works, the versions from 2 distinct manuscripts are edited as one version (which is sometimes performed as such, despite the harsh dissonances it results in!)]

[Critical editions often merge variant readings into one text]

Subclass of: E12 Production

                   E65 Creation

Superclass of: F29 Recording Event

                   F30 Publication Event

Scope note: This class comprises activities that result in instances of F2 Expression coming into existence. This class characterises the externalisation of an Individual Work. [F1 Work]

                   ....

F30 Publication Event [=LRM-R7 manifestation creation]
[Need to distinguish publication from distribution (LRM-R9). FRBRoo does not presently have anything to cover distribution. The 3rd example (online distribution), belongs to the distribution action. The publication event is not the creation of the publication expression, it uses it.]

[PLB: Originally FRBRoo dealt with distribution as a Right granted to an Actor by the publisher. The event to be accounted for is the granting of the right to distribute rather than the distribution process itself]

[The distribution facts are of interest for obtaining items. This could fall under a general services model. Could identify the LRM-R9 with the setting of the distribution service.]

Need to get a copy of the service model from Parthenos project.

Subclass of: F28 Expression Creation

Scope note: This class comprises the activities of publishing. Such an event includes the creation of an F24 Publication Expression and setting up the means of production. The end of this event is regarded as the date of publication, regardless of whether the carrier production is started. Publishing can be either physical or electronic. Electronic publishing is regarded as making an instance of F24 Publication Expression available in electronic form on a public network. Electronic Publishing does not mean producing a physical instance of F5 Item by partially electronic means. Making an electronic file available on a physical carrier can be regarded as equivalent to setting up the means of production; downloading the file is regarded as the electronic equivalent of F32 Carrier Production Event.

Examples: Publishing Amerigo Vespucci's 'Mundus novus' in Paris ca. 1503-1504

                   Establishing in 1972 the layout, features, and prototype for the publication of 'The complete poems of Stephen Crane, edited with an introduction by Joseph Katz' (ISBN '0-8014-9130-4'), which served for a second print run in 1978

                   Making available online the article by Allen Renear, Christopher Phillippe, Pat Lawton, and David Dubin, entitled 'An XML document corresponds to which FRBR Group 1 entity?' <http://conferences.idealliance.org/extreme/html/2003/Lawton01/EML2003Lawton01.html>

Properties: R23 created a realisation of (was realised through): F19 Publication Work [not right]

                   R24 created (was created through): F24 Publication Expression [not right]

                   R66 included performed version of (had a performed version through): E89 Propositional Object

F32 Carrier Production Event [= LRM-R8 manufactured]

……………

Properties**:** R26 produced things of type (was produced by): F3 Manifestation Product Type

R27 used as source material (was used by): F24 Publication Expression [revise R27 and R26 as both will have the publication expression/manifestation product type as their range]

R28 produced (was produced by): F54 Utilised Information Carrier

F33 Reproduction Event [relate here LRM-R27 and LRM-R28]
[Make 3 distinctions: reproduction of a specific, identified item, b) reproduction likely based on an item but without identifying it (considering it an ideal representative item) c) reproduction via reuse with very small modifications of the Publication Expression]

……..

F35 Nomen Use Statement [=LRM-R14 Agent assigns Nomen, and this is the evidence of the explicit assignment]
Subclass of: F2 Expression

E29 Design or Procedure

Scope note: This class comprises statements relating a Thema with a particular Nomen and its usage in the context of a common Complex Work realized by one or more KOS.

[LRM-E9 Nomen could be seen to match F35, with a broadened scope note, ie, not just in a KOS, but in any contextual domain.]

………

F50 Controlled Access Point
[Delete this class, in LRM these are just Nomens. Transfer examples to either F12 or E42]

……..

Examples: 'Maxwell equations' [preferred subject access point from LCSH, http://lccn.loc.gov/sh85082387, as of 19 November 2012]

'Equations, Maxwell' [variant subject access point, from the same source]

'Gončarova, Natal'â Sergeevna (1881-1962)' [preferred access point for a personal name, from the authority file of the National Library of France, http://catalogue.bnf.fr/ark:/12148/cb119547494/PUBLIC, as of 15 June 2012]

'Гончарова, Наталья Сергеевна (1881-1962)' [parallel access point from the same source]

'Goncharova, Natalia (1881-1962)' [variant access point from the same source]

F52 Name Use Activity [related to LRM-R14 Agent assigned Nomen]

Subclass of: E13 Attribute Assignment [PLB: I'm wondering if we were right to declare F52 as a subclass of E13 Attribute Assignment, To be discussed! As the nomen is not an attribute. The Assignment happens once, using the assigned attribute is continuous. The LRM-R14 assignment is the beginning of the time period for the name use activity]

....

F54 Utilised Information Carrier

Subclass of: E84 Information Carrier

Superclass of: F53 Material Copy

F5 Item

[Use of the Storage Unit class to also express the situation when the Item is "smaller" than the physical object, as in multiple digital files on a single medium. It's also the "bound with" situation]

Scope note: This class comprises physical objects that carry one or more instances of F24 Publication Expression.

Properties

R1 is logical successor of (has successor) [=LRM-R19]

Domain:	F1 Work
Range:	F1 Work
Subproperty of:	E70 Thing. P130 shows features of (features are also found on): E70 Thing
Quantification:	(0,n:0,n)
Scope note:	This property associates an instance of F1 Work which logically continues the content of another instance of F1 Work with the latter.
Examples:	Albrecht Dürer's woodcut from 'The Large Woodcut Passion' entitled 'The Agony in the Garden' (F1, conceived ca 1496-98) *R1 is logical successor of* Albrecht Dürer's woodcut from 'The Large Woodcut Passion' entitled 'The Last Supper' (F1, dated 1510)
	The first 'Star wars' trilogy (F15, 1977-1983) *R1 is logical successor of* The second 'Star wars' trilogy (F15, 1999-2005) *[Note that the* logical *order does not follow, in either of these two examples, the* chronological *order]*

R2 is derivative of (has derivative) [=LRM-R22 Work transformation]

Domain:	F1 Work
Range:	F1 Work
Subproperty of:	E70 Thing. P130 shows features of (features are also found on): E70 Thing
Quantification:	(0,n:0,n)
Scope note:	This property associates an instance of F1 Work which modifies the content of another instance of F1 Work with the latter. The property *R2.1 has type* of this property allows for specifying the kind of derivation, such as adaptation, summarisation etc.
Examples:	William Schuman's orchestration of Charles Ives's 'Variations on America' (F15) *R2 is derivative of* Charles Ives's 'Variations on America' (F15) *R2.1 has type* orchestration (E55)
	Charles Ives's musical work entitled 'Variations on America' (F15) *R2 is derivative of* the musical work titled 'America' (F15) *R2.1 has type* variations (E55)
	The musical work entitled 'America' (F15) *R2 is derivative of* the musical work entitled 'God save the King' (F15) *R2.1 has type* same tune with different lyrics (E55)
Properties:	R2.1 has type: E55 Type

R3 is realised in (realises) [=LRM-R4]

Domain:	F1 Work
Range:	F22 Self-contained Expression [adjust to F2]
Superproperty of:	F14 Individual Work. R9 is realised in (realises): F22 Self-Contained Expression [deleted]
	F20 Performance Work. R12 is realised in (realises): F25 Performance Plan

F21 Recording Work. R13 is realised in (realises): F26 Recording

F1 Work. R40 has representative expression (is representative expression for): F22 Self-Contained Expression

Subproperty of: E70 Thing. P130 shows features of (features are also found on): E70 Thing

Quantification: (0,n:1,1)

Scope note: This property associates an instance of F22 Self-Contained Expression with an instance of F1 Work.

This property expresses the association that exists between an expression (F22) and the work that this expression conveys. The semantics of the association will be different depending on what specific subtype of F1 Work the work is an instance of. If the work is an instance of F14 Individual Work, the F22 Self-Contained Expression completely conveys the individual work. If the work is an instance of F15 Complex Work, the F22 Self-Contained Expression conveys an alternative member of the complex work.

Our factual knowledge of how a given work is realised into an expression is often limited and this property makes it possible to express the association between instances of F22 Self-Contained Expression and the work it conveys without using the more developed paths.

The property *R3.1 has type:* E55 Type allows for specifying the role played by the referred to expression in the overall bibliographic history of the work (e.g., 'progenitor expression', on which all other expressions of the same work are based; 'reference for canonical citations', in the sense of the HuCit ontology developed by Matteo Romanello and Michele Pasin; 'earliest draft', 'intermediate draft', 'final clean draft', 'princeps edition', etc.).

Examples: Dante's work entitled 'Inferno' (F15) *R3 is realised in* the Italian text of Dante's 'Inferno' as found in the authoritative critical edition *La Commedia secondo l'antica vulgata a cura di Giorgio Petrocchi*, Milano: Mondadori, 1966-67 (= Le Opere di Dante Alighieri, Edizione Nazionale a cura della Società Dantesca Italiana, VII, 1-4) (F22) *R3.1 has type* authoritative critical edition (E55)

Mozart's work entitled 'Il dissoluto punito ossia il Don Giovanni' (F15) *R3 is realised in* the notated music of the Prague version, as found on manuscript Ms 1548 of the National Library of France (F22) *R3.1 has type* autograph version (E55)

Properties: R3.1 has type: E55 Type

R4 carriers provided by (comprises carriers of)
Domain: F2 Expression

Range: F3 Manifestation Product Type [revise based on how F3/F24 are worked out. In CRMbase, P165: PLB I'd prefer to use the "is incorporated in" Publication Expression/Manifestation structure. Might deprecate R4]

Superproperty of: F2 Expression. R41 has representative manifestation product type (is representative manifestation product type for): F3 Manifestation Product Type

Subproperty of: E73 Information Object. P128 is carried by: E24 Physical Man-Made Thing. P2 has type: E55 Type

Quantification: (1,n:0,n)

Scope note: This property associates a publication, i.e. an instance of F3 Manifestation Product Type, with an instance of F2 Expression, which all exemplars of that publication should carry, as long as they are recognised as complete exemplars of that publication. Typically, this property is observed on one exemplar of a publication, and extrapolated to all other exemplars of the same publication.

This property is a shortcut of: F2 Expression *P165i is incorporated in* F24 Publication Expression *CLR6i should be carried by* F3 Manifestation Product Type.

Examples: The text of Marin Mersenne's 'Harmonie universelle' (F22) *R4 carriers provided by* publication identified by ISBN '2-222-00835-2' (F3)

A recording of the Atrium Musicæ Ensemble's performance of a fragment of Euripides' textual and musical work entitled 'Orestes' (F26) *R4 carriers provided by* the CD entitled 'Musique de la Grèce antique = Ancient Greek music = Griechische Musik der Antike', released in 2000 and identified by UPC/EAN '794881601622' (F3)

R7 is example of (has example) [=LRM-R4]

Domain: F5 Item

Range: F3 Manifestation Product Type

Subproperty of: E1 CRM Entity. P2 has type (is type of): E55 Type

Quantification: (1,1:0,n)

Scope note: This property associates a publication with one of its exemplars.

It is a shortcut of the more developed path: F5 Item *R28i was produced by* F32 Carrier Production *R26 produced things of type (was produced by):* F3 Manifestation Product Type.

Examples: The item held by the National Library of France and identified by shelf mark 'Res 8 P 10' (F5) *R7 is example of* the edition of Amerigo Vespucci's textual and cartographic work entitled 'Mundus novus' issued in Paris ca. 1503-1504 (F3)

R8 consists of (forms part of)
[Not needed, E42 Identifier is retained, related to E90]

Domain: F13 Identifier

Range: E90 Symbolic Object

Subproperty of: E90 Symbolic Object. P106 is composed of (forms part of): E90 Symbolic Object

Quantification: (0,n:0,n)

Scope note: This property associates an instance of F13 Identifier with one of the non-syntactic instances of E90 Symbolic Object which form part of it.

Examples: Controlled access point 'The Adoration of the Shepherds (Coventry)' (F50) *R8 consists of* 'The Adoration of the Shepherds' (E35), and *R8 consists of* 'Coventry' (E48)

Controlled access point 'Rite of spring (Choreographic Work : Bausch)' (F50) *R8 consists of* 'Rite of spring' (E35), *R8 consists of* 'Choreographic Work' (F12), and *R8 consists of* 'Bausch' (F12)

Controlled access point 'King Kong (1933)' (F50) *R8 consists of* 'King Kong' (E35), and *R8 consists of* '1933' (E50)

Controlled access point 'Guillaume, de Machaut, ca. 1300-1377' (F50) *R8 consists of* 'Guillaume, de Machaut' (F12), and *R8 consists of* 'ca. 1300-1377' (E90)

Controlled access point 'Univerza v Ljubljani. Oddelek za bibliotekarstvo' (F50) *R8 consists of* 'Univerza v Ljubljani' (F12), and *R8 consists of* 'Oddelek za bibliotekarstvo' (F12)

ISBN '978-002-002-0' (F13) *R8 consists of* '978' (E90) indicating the Nigerian ISBN Agency, *R8 consists of* '002' (E90) indicating the Nigerian Institute of International Affairs, *R8 consists of* '002' (E90) used for the publication entitled 'Nigeria's international economic relations', and *R8 consists of* '0' (E90)

R15 has fragment (is fragment of)

Domain: F2 Expression

Range: F23 Expression Fragment [or should have range E90 directly, then do not need F23]

Subproperty of: E90 Symbolic Object. P106 is composed of (forms part of): E90 Symbolic Object

Quantification: (0,n:0,n)

Scope note: This property associates the fragment of an expression and the expression of which it is a fragment.

Examples: The ancient Greek text of the four stanzas from an ode by Sappho that were quoted by Pseudo-Longinus in his textual work entitled 'On the sublime' (F23) *R15 is fragment of* the complete ancient Greek text, now irremediably lost, of Sappho's ode currently identified as Sappho's poem #2 (F22)

The statement 'fasc. 111' (abridgement for 'fascicle no. 111') indicating the sequential position of the publication identified by ISBN '2-7018-0037-4' within the series entitled 'Bibliothèque des Écoles françaises d'Athènes et de Rome' and identified by ISSN '0257-4101' (F23) *R15 is fragment of* the overall content of the publication identified by ISBN '2-7018-0037-4' (F24)

R26 produced things of type (was produced by)

Domain: F32 Carrier Production Event

Range: F3 Manifestation Product Type

Subproperty of: E12 Production. P108 has produced: E24 Physical Man-MadeThing. P2 has type: E55 Type

Quantification: (1,n:0,n)

Scope note: This property associates an instance of F32 Carrier Production Event with the instance of F3 Manifestation Product Type it produced items of.

Examples: The production of copies of the publication entitled 'Codex Manesse: die Miniaturen der großen Heidelberger Liederhandschrift, herausgegeben und erläutert von Ingo F. Walther unter Mitarbeit von Gisela Siebert', 3rd edition, Insel-Verlag, 1988 (F32) *R26 produced things of type* the publication identified as 'Codex Manesse: die Miniaturen der großen Heidelberger Liederhandschrift, herausgegeben und erläutert von Ingo F. Walther unter Mitarbeit von Gisela Siebert', 3rd edition, Insel-Verlag, 1988 (F3)

The production of copies of the publication entitled 'Ordnance Survey Explorer Map 213, Aberystwyth & Cwm Rheidol', ISBN '0-319-23640-4' (folded), 1:25,000 scale, released in May 2005 (F32) *R26 produced things of type* the publication identified by ISBN '0-319-23640-4' (F3)

The production of copies of the sound recording entitled 'The Glory (????) of the human voice', RCA Victor Gold Seal GD61175, containing recordings of musical works performed by Florence Foster Jenkins (F32) *R26 produced things of type* the publication entitled 'The Glory (????) of the human voice' and identified by the label and label number 'RCA Victor Gold Seal GD61175' (F3)

The production of a second print run, in 1978, of the publication titled 'The complete poems of Stephen Crane, edited with an introduction by Joseph Katz' (identified by ISBN '0-8014-9130-4') (F32) *R26 produced things of type* the publication, dated 1972, entitled 'The complete poems of Stephen Crane, edited with an introduction by Joseph Katz' (identified by ISBN '0-8014-9130-4') (F3)

R33 has content

Domain: F12 Nomen

Range: E62 String

Subproperty of: E1 CRM Entity. P3 has note: E62 String

Quantification: (1,n:0,n)

Scope note: This property associates an instance of F12 Nomen with one or more equivalent serialized content models for it. In digital form the symbol arrangement constituting an instance of F12 Nomen can only be represented through a particular encoding, for example ASCII or Latin1 for the Latin script. We call such a representation a content model. The property *R33.1 has encoding:* E55 Type allows for specifying the encoding of a particular associated content model. Together with this specification, a content model allows for unambiguously defining a nomen independently from the encoding used for representing the content.

Examples: The term 'earth' encoded as ASCII (F12) *R33 has content* '0x65 0x61 0x72 0x74 0x68' (E62) *R33.1 has encoding* ASCII (E55)

The term 'earth' encoded as UNICODE UTF16 (F12) *R33 has content* '0x0065 0x0061 0x0072 0x0074 0x0068' *R33.1 has encoding* UNICODE UTF16 (E55)

The term 'earth' in Latin Arial font (F12) *R33 has content* 'earth' (E62) *R33.1 has encoding* printed Latin Arial (E55) [should this example say: The term 'earth' in printed Latin script (F12) *R33 has content* …. Specifying size? Question: is the in CRMbase? Should it be? E90 referring to P3].

Properties: R33.1 has encoding: E55 Type [R33.1 (in its current form) has to be replaced by a property with domain E90. The E90 has identity relative to/is defined based on (symbol set)]

Referred to CIDOC CRM classes.

E15 Identifier Assignment [= LRM-R14 Agent assigns Nomen]

Subclass of: E13 Attribute Assignment

Scope note: This class comprises activities that result in the allocation of an identifier to an instance of E1 CRM Entity. An E15 Identifier Assignment may include the creation of the identifier from multiple constituents, which themselves may be instances of E41 Appellation. The syntax and kinds of constituents to be used may be declared in a rule constituting an instance of E29 Design or Procedure.

Examples of such identifiers include Find Numbers, Inventory Numbers, uniform titles in the sense of librarianship and Digital Object Identifiers (DOI). Documenting the act of identifier assignment and deassignment is especially useful when objects change custody or the identification system of an organization is changed. In order to keep track of the identity of things in such cases, it is important to document by whom, when and for what purpose an identifier is assigned to an item.

The fact that an identifier is a preferred one for an organisation can be expressed by using the property *E1 CRM Entity. P48 has preferred identifier (is preferred identifier of): E42 Identifier*. It can better be expressed in a context independent form by assigning a suitable E55 Type, such as "preferred identifier assignment", to the respective instance of E15 Identifier Assignment via the *P2 has type* property.

Examples:

- Replacement of the inventory number TA959a by GE34604 for a 17th century lament cloth at the Museum Benaki, Athens
- Assigning the author-uniform title heading "Goethe, Johann Wolfgang von, 1749-1832. Faust. 1. Theil." for a work (E28)
- On June 1, 2001 assigning the personal name heading "Guillaume, de Machaut, ca. 1300-1377" (E42,E82) to Guillaume de Machaut (E21)

Properties:

P37 assigned (was assigned by): E42 Identifier

P38 deassigned (was deassigned by): E42 Identifier

P142 used constituent (was used in): E90 Symbolic Object

E36 Visual Item

Subclass of: E73 Information Object

Superclass of: E37 Mark

                  E38 Image

Scope Note: This class comprises the intellectual or conceptual aspects of recognisable marks and images.

                  This class does not intend to describe the idiosyncratic characteristics of an individual physical embodiment of a visual item, but the underlying prototype. For example, a mark such as the ICOM logo is generally considered to be the same logo when used on any number of publications. The size, orientation and colour may change, but the logo remains uniquely identifiable. The same is true of images that are reproduced many times. This means that visual items are independent of their physical support.

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

Examples:
    ▪   the visual appearance of Monet's "La Pie" (E38)
    ▪   the Coca-Cola logo (E34)
    ▪   the Chi-Rho (E37)
    ▪   the communist red star (E37)

Properties:

                  P138 represents (has representation): E1 CRM Entity

                  (P138.1 mode of representation: E55 Type)

E39 Actor [=LRM-E6 Agent]

Subclass of: E77 Persistent Item

Superclass of: E21 Person

                  E74 Group

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

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

Examples:

    ▪   London and Continental Railways (E40)

    ▪   the Governor of the Bank of England in 1975 (E21)

    ▪   Sir Ian McKellan (E21)

Properties:

P74 has current or former residence (is current or former residence of): **E53** Place

P75 possesses (is possessed by): **E30** Right

P76 has contact point (provides access to): E51 Contact Point

P131 is identified by (identifies): **E82** Actor Appellation

E41 Appellation[=LRM-E9-A1 nomen string]

Subclass of: E90 Symbolic Object

Superclass of: E35 Title

E42 Identifier

E44 Place Appellation (deprecated)

E49 Time Appellation (deprecated)

E51 Contact Point

E75 Conceptual Object Appellation

E82 Actor Appellation (deprecated)

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

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

Specific subclasses of E41 Appellation should be used when instances of E41 Appellation of a characteristic form are used for particular objects. Instances of E49 Time Appellation, for example, which take the form of instances of E50 Date, can be easily recognised.

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

Examples:

- "Martin"
- "the Forth Bridge"
- "the Merchant of Venice" (E35)
- "*Spigelia marilandica* (L.) L." [not the species, just the *name*]
- "information science" [not the science itself, but the name through which we refer to it in an English-speaking context]
- "安" [Chinese "an", meaning "peace"]

Properties:

P139 has alternative form: E41 Appellation

P139.1 has type: E55 Type

E73 Information Object

Subclass of: E89 Propositional Object

E90 Symbolic Object

Superclass of: E29 Design or Procedure

E31 Document

E33 Linguistic Object

E36 Visual Item

Scope note: This class comprises identifiable immaterial items, such as a poems, jokes, data sets, images, texts, multimedia objects, procedural prescriptions, computer program code, algorithm or mathematical formulae, that have an objectively recognizable structure and are documented as single units.

An E73 Information Object does not depend on a specific physical carrier, which can include human memory, and it can exist on one or more carriers simultaneously.

Instances of E73 Information Object of a linguistic nature should be declared as instances of the E33 Linguistic Object subclass. Instances of E73 Information Object of a documentary nature should be declared as instances of the E31 Document subclass. Conceptual items such as types and classes are not instances of E73 Information Object, nor are ideas without a reproducible expression.

Examples:

- image BM000038850.JPG from the Clayton Herbarium in London
- E. A. Poe's "The Raven"
- the movie "The Seven Samurai" by Akira Kurosawa
- the Maxwell Equations

Properties: P165 incorporates (is incorporated in): E90 Symbolic Object

E74 Group [= LRM-E8 Collective Agent!]
[However, the first 4 examples under E74 Group are NOT recognized as valid LRM-E8 Collective Agents, as they are not seen as having a sufficient level of responsibility.

Define an FRBRoo entity for LRM-E8 Collective Agent, with the LRM definition and examples, but declare the equivalence with E74]

[Decide on whether to retain F11 Corporate body as a subclass, as it is smaller than LRM-E8—do not follow the path documented in April 2017 of just renaming F11 to Collective Agent]

Subclass of: E39 Actor

Superclass of: E40 Legal Body

Scope note: This class comprises any gatherings or organizations of two or more people that act collectively or in a similar way due to any form of unifying relationship. In the wider sense this class also comprises official positions which used to be regarded in certain contexts

as one actor, independent of the current holder of the office, such as the president of a country.

A gathering of people becomes an E74 Group when it exhibits organizational characteristics usually typified by a set of ideas or beliefs held in common, or actions performed together. These might be communication, creating some common artefact38ulgate38, a common purpose such as study, worship, business, sports, etc. Nationality can be modelled 38ulgate38 as membership in an E74 Group (cf. HumanML markup). Married couples and other concepts of family are regarded as particular examples of E74 Group.

Examples:

- the impressionists
- the Navajo
- the Greeks
- the peace protestors in New York City on February 15 2003
- Exxon-Mobil
- King Solomon and his wives
- The President of the Swiss Confederation

Properties:

P107 has current or former member (is current or former member of): E39 Actor

       (P107.1 kind of member: E55 Type)

Referred to CIDOC CRM Properties

This section contains the complete definitions of the properties of the CIDOC CRM Conceptual Reference Model version 6.0 referred to by FRBR$_{OO}$. We apply the same format conventions as in section 2.7.

P1 is identified by (identifies) [+ P2 has string = LRM-R13 has appellation]
[Need to check and clean up the subproperties "is identified by" due to deprecation of the specific types of appellation classes in CRMbase]

Domain: E1 CRM Entity

Range: E41 Appellation

Superproperty of: E1 CRM Entity. P48 has preferred identifier (is preferred identifier of): E42 Identifier

               E52 Time-Span. P78 is identified by (identifies): E49 Time Appellation

               E53 Place. P87 is identified by (identifies): E44 Place Appellation

               E71 Man-Made Thing. P102 has title (is title of): E35 Title

               E39 Actor. P131 is identified by (identifies): E82 Actor Appellation

               E28 Conceptual Object. P149 is identified by (identifies): E75 Conceptual Object Appellation

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

Scope note: This property describes the naming or identification of any real world item by a name or any other identifier.

This property is intended for identifiers in general use, which form part of the world the model intends to describe, and not merely for internal database identifiers which are specific to a technical system, unless these latter also have a more general use outside the technical context. This property includes in particular identification by mathematical expressions such as coordinate systems used for the identification of instances of E53 Place. The property does not reveal anything about when, where and by whom this identifier was used. A more detailed representation can be made using the fully developed (i.e. indirect) path through E15 Identifier Assignment.

Examples:

- the capital of Italy (E53) *is identified by "*Rome" (E48)
- text 25014–32 (E33) *is identified by* "The Decline and Fall of the Roman Empire" (E35)

P15 was influenced by (influenced) [=LRM-R21 work inspiration, the work creation of the new work was influenced by the existing work]

Domain: E7 Activity

Range: E1 CRM Entity

Superproperty of: **E7 Activity. P16 used specific object (was used for): E70 Thing**

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

E7 Activity. P134 continued (was continued by): E7 Activity

E83 Type Creation. P136 was based on (supported type creation): E1 CRM Entity

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

Scope note: This is a high level property, which captures the relationship between an E7 Activity and anything that may have had some bearing upon it.

The property has more specific sub properties.

Examples:

- the designing of the Sydney Harbour Bridge (E7) *was influenced by* the Tyne bridge (E22)

P16 used specific object (was used for)

[LRM-R20 Work accompanies /complements Work: includes the case of supplements. There is an intention in the Work Conception itself that the conceived Work will accompany the other Work

In the FRBR-to-FRBRoo mapping we wrote (p. 107 of version 2.4): Work supplements Work => F1 Work P16i was used for (P16.1 mode of use E55 Type "supplemented work") F27 Work Conception R16 initiated F1 Work.

There is a distinct mapping for Work has a complement" on tje same page]

Domain: E7 Activity

Range: E70 Thing

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

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

Superproperty of: E7 **Activity. P33 used specific technique (was used by): E29 Design or Procedure**

E15 Identifier Assignment. P142 used constituent (was used in): E41 Appellation

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

Scope note: This property describes the use of material or immaterial things in a way essential to the performance or the outcome of an E7 Activity.

This property typically applies to tools, instruments, moulds, raw materials and items embedded in a product. It implies that the presence of the object in question was a necessary condition for the action. For example, the activity of writing this text required the use of a computer. An immaterial thing can be used if at least one of its carriers is present. For example, the software tools on a computer.

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

Examples:

- the writing of this scope note (E7) *used specific object* Nicholas Crofts' computer (E22) *mode of use* Typing Tool; Storage Medium (E55)

- the people of Iraq calling the place identified by TGN '7017998' (E7) used specific object "Quyunjig" (E44) *mode of use Current*; Vernacular (E55)

Properties: P16.1 mode of use: E55 Type

P31 has modified (was modified by) [=LRM-R11]

Domain: E11 Modification

Range: E24 Physical Man-Made Thing

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

Superproperty of: **E12 Production. P108 has produced (was produced by): E24 Physical Man-Made Thing**

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

E80 Part Removal. P112 diminished (was diminished by): E24 Physical Man-Made Thing

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

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

If a modification is applied to a non-man-made object, it is regarded as an E22 Man-Made Object from that time onwards.

Examples:

- rebuilding of the Reichstag (E11) *has modified* the Reichstag in Berlin (E24)

P51 has former or current owner (is former or current owner of) [=LRM-R10 Item ownership]

Domain: E18 Physical Thing

Range: E39 Actor

Superproperty of: E18 Physical Thing. P52 has current owner (is current owner of): E39 Actor

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

Scope note: This property identifies the E39 Actor that is or has been the legal owner (i.e. title holder) of an instance of E18 Physical Thing at some time.

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

Examples:

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

P107 has current or former member (is current or former member of) [LRM-R30 is part of this]
[This covers both membership and structural parts, these are distinct in LRM, need to expand]

[In the has part rltnship there is no implicit Joining event. Look at the examples: the Library of China joined IFLA, the cataloguing Section never did, it was formed as structural part of the organization.

A member existed prior to the Joining event. The has part relationship starts with the Formation event

Although a part can leave the broader structure and become autonomous...

Group merging and splitting: see E81 Transformation, domain is Persistent Item. Consider this as LRM-R32 is restricted to Collective Agents, not Persons. See P151 for Mergers]

Domain: E74 Group

Range: E39 Actor
Quantification: many to many (0,n:0,n)

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

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

This property is a shortcut of the more fully developed path from E74 Group through P144 joined with (gained member by), E85 Joining, P143 joined (was joined by) to E39 Actor.

The property P107.1 *kind of member* can be used to specify the type of membership or the role the member has in the group.

Examples:

- Moholy Nagy (E21) *is current or former member of* Bauhaus (E74)
- National Museum of Science and Industry (E40) *has current or former member* The National Railway Museum (E40)
- The married couple Queen Elisabeth and Prince Phillip (E74) *has current or former member* Prince Phillip (E21) with P107.1 *kind of member* husband (E55 Type)

Properties: P107.1 *kind of member*: E55 Type

P129 is about (is subject of) [=LRM-R12 has as subject]
Domain: E89 Propositional Object

Range: E1 CRM Entity

Subproperty: **E89 Propositional Object. P67 refers to (is referred to by): E1 CRM Entity**

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

Scope note: This property documents that an E89 Propositional Object has as subject an instance of E1 CRM Entity.

This differs from P67 refers to (is referred to by), which refers to an E1 CRM Entity, in that it describes the primary subject or subjects of an E89 Propositional Object.

Examples:

- The text entitled 'Reach for the sky' (E33) *is about* Douglas Bader (E21)

P130 shows features of (features are also found on)
[NB: need to check the current text in CRMbase]

[In mapping, used for alternates. The P130.1 could be used to type the level of similarity based on the functional definition of alternates]

Domain: E70 Thing

Range: E70 Thing

Superproperty: E33 Linguistic Object. P73 has translation (is translation of): E33 Linguistic Object

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

Scope note: This property generalises the notions of "copy of" and "similar to" into a dynamic, asymmetric relationship, where the domain expresses the derivative, if such a direction can be established.

Otherwise, the relationship is symmetric. It is a shortcut of *P15 was influenced by (influenced)* in a creation or production, if such a reason for the similarity can be verified. Moreover it expresses similarity in cases that can be stated between two objects only, without historical knowledge about its reasons.

Examples:

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

Properties: P130.1 kind of similarity: E55 Type

P142 used constituent (was used in) [related to LRM-R16 Nomen has part Nomen, also LRM-R17 nomen derivation]
[Actually string of nomen-A *used constituent* string of nomen-B] But the domain of P142 is E15 Identifier Assignment, here we just deal with Nomens. The idea is the same as in Lewis Carroll's portmanteau

Domain: E15 Identifier Assignment

Range: E90 Symbolic Object

Subproperty of: **E7 Activity. P16 used specific object (was used for): E70 Thing**

Quantification: (0,n:0,n)

Scope note: This property associates the event of assigning an instance of E42 Identifier with the instances of E90 Symbolic Object that were used as constituents of the identifier.

Examples:

- On June 1, 2001 assigning the personal name identifier "Guillaume, de Machaut, ca. 1300-1377" (E15) *used constituent* "ca. 1300-1377" (E49)
- Assigning a uniform title to the anonymous textual work known as 'The Adoration of the Shepherds'(E15) *used constituent* 'Coventry' (E48)
- Assigning a uniform title to Pina Bausch's choreographic work entitled 'Rite of spring' (E15) *used constituent* '(Choreographic Work: Bausch)'(E90)
- Assigning a uniform title to the motion picture directed in 1933 by Merian C. Cooper and Ernest B. Schoedsack and entitled 'King Kong' (E15) *used constituent* '1933' (E50)
- Assigning the corporate name identifier 'Univerza v Ljubljani. Oddelek za bibliotekarstvo' to The Department for library science of the University of Ljubljana (E15) *used constituent* 'Univerza v Ljubljani' (E42)

P151 was formed from (participated in)
[Relates to LRM-R32, Collective Agents mergers and splits (Sorry, my mistake: it only works for splits if the group that becomes autonomous did not exist within the broader one but is formed from scratch on tbe occasion of the split). As the previous Collective Agent will no longer exist]

Domain: E66 Formation

Range: E74 Group

Subproperty of: E5 Event. P11 had participant (participated in): E39 Actor

Quantification: (0,n:0:n)

Scope note: This property associates an instance of E66 Formation with an instance of E74 Group from which the new group was formed preserving a sense of continuity such as in mission, membership or tradition.

Examples:

- The formation of the House of Bourbon-Conti in 1581 (E66) *was formed from* House of Condé (E74)

APPENDIX D

Martin's Proposal historical examples

I propose the following ontological distinctions:
(1) Formal Social Binding

Domain: Actor

Range: Actor

A "temporary social binding", coming into existence and ending existence each by a unique event, normally a social decision, or events regarded by explicit social convention to initiate such a binding or to terminate it. It is the society or community's convention and will or intention to acknowledge, obey to and possibly enforce consequences of such a binding that provides substance to it. Evidence of the initializing and terminating events is the evidence for its existence. They do not merge or split. The concept does not pertain to natural kinship relations, and those derived by rules from marriage or adoption.

Witnesses referring to periods within the existence interval of the relationship must rely on the direct or indirect evidence that the relationship was initiated and not yet terminated. Members of the society may remember the relationship or keep records. It cannot be observed in the narrower sense.

This includes group membership, business contracts, adoption?, marriage?

A kind of Temporal Entity that implies a temporally indeterminate property, or just an n-ary relationship (PC...).

Includes:

- Valette, Simon - Exerce la fonction de: Membre du conseil d'administration (ou de la chambre syndicale) d'un syndicat professionnel [Association de la Fabrique lyonnaise] (1885) – Info135070
- Altobelli, Ilario - Appartenance à : Franciscains conventuels 1575-05-29 Info119569
- Teissier, Emilien - Appartenance à : Association lyonnaise pour le Libre Echange 1849-00-00 Info119344
- François Répécaud épouse Marie Louise Besson 1747-00-00 Info131318
- Tournon SA (Ets de teinture et d'impression de) - Tournon SA (Ets de teinture et d'impression de) fait partie du groupe Bianchini Férier 1942-1955 Info47228
- Bureau des hospices; Intérieur (ministère de l') France - Rattachement à une institution 1849p Info73536
- Hangest, Germain d' - Affecté au 70e RI 1904-10-00-1905-10-00 Info88946

- Belgique (Royaume de); Cool, August - Nationalité politique 1903-08-28 – Info92307
-

Similarly,

(2) Rights of Use, Ownership, power of disposal

Domain: Actor

Range: Actor

Same as above, only for "Legal Objects". May be there is a general sense of a formal social relation that is based on initiation/termination, without requiring a continued activity in order to exist.

- Casati, Barthélémy Isidore Isaac - Propriétaire du château de Saint-Fonds (Gleizé, Rhône, France) (1899) - Info15377

(3) Social Function (exercice de la) IsA E7 Activity

An extended activity providing a social service for a Group of a type foreseen by the statutes of a Group. It comes into existence and ends existence each by a unique event, normally a social decision, or events regarded by explicit social convention to initiate such a binding or to terminate it. It requires explicit acceptance of the provider of the service to execute it. Having accepted but not becoming active would still be considered activity for the sake of recall.

- Gallamini, Agostino - Exerce la fonction de Maître du Sacré Palais (1607-07 r) - Info218
- Landoz, François Louis - Président du tribunal de commerce de Lyon 1801-00-00-1806-00-00 Info9294

(4) Posséder une qualité – Acquired social role? Undirected social role?

A kind of type (IsA E55 Type), plus a temporal extension of P2_has_type. To distinguish social roles from capabilities. The individual role is based on the categorical agreement of the community or its ruling class to respect these types, and is not based on any particular relationship.

- Ducôté, Benoît - Chevalier de la Légion d'honneur 1892-01-26 Info15439
- écuyer; La Sausse, Pierre - Posséder une qualité 1782-00-00 Info91888

(5) Bilateral ? Continued Social Interaction

An extended activity. IsA E7 Activity

- François Répécaud épouse Marie Louise Besson 1747-00-00 Info131318
- Galilei, Galileo - Durant plusieurs années, Galileo Galilei a une liaison avec Marina Gamba 1599-00-00 1610-00-00 Info1355
- Galilei, Galileo; Lippi, Cesare - da Mordano - Relation entre personnes 1607-00-00 Info119538
- Galilei, Galileo; Joyeuse, François de - Relation entre personnes 1611-09-00 Info118989

(6) IsA E7 Activity

- Mercier, Pierre Jean - Service militaire actif 1875-11-04-1876-05-06 Info99821
- Hangest, Germain d' - Service militaire actif 1904-10-00-1905-10-00 Info88945
- Ferradou, André, Marie, Charles - Enseigne : Histoire du droit français, auprès de : Faculté de droit de Rennes 1898-07-26 1902-12-27 Info115262
- Aldalur, José Antonio de - Enseigne : Philosophie 1716-00-00 1719-00-00 Info31657
- Cassegrain, Théophile - Études complémentaires à Genève 1583-00-00 1584-00-00 Info118518
- Hauvette, Henri - Études en Italie 1891-12-00 1893-10-00 Info105948
- Wallis, John - Formation: Philosophie; Théologie, auprès de: Emmanuel College (Cambridge) Info35517
- La Coste - Assiste au Synode national de Vitré, 1617 1617-05-18 1617-06-18 Info96682

(7) E93 Presence

- Consiglieri, Paolo - Séjour à Venezia 1527-00-00 1536-00-00 Info95117

- Beccadelli, Ludovico - Présence 1561-09-00 1563-05-00 Info94606

  May be "domicile" is not a presence in the narrower sense:

- Napoly, Claude - Domicile : rue de l'Annonciade, n° 26, Lyon 1852-06-12–1852-06-12 Info119533

(8) Illness

IsA E5 Event, a natural process on the body.

- Cassegrain, Théophile - devient aveugle 1622-00-00 1637-00-00 Info119785

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

- La Grande Haie - Localisé par rapport à: Forêt de Mormal – Inclusion (sens géographique) 1631 – Info111870
- Camposanto - Localisé par rapport à: Duché de Modène – Inclusion (sens géographique) 1452r – Info93510
-

Original Examples by Francesco

Fonction (exercice de la)

TyIn7

- Valette, Simon - Exerce la fonction de: Membre du conseil d'administration (ou de la chambre syndicale) d'un syndicat professionnel [Association de la Fabrique lyonnaise] (1885) – Info135070

Être membre d'un acteur collectif

TyIn12

- Altobelli, Ilario - Appartenance à : Franciscains conventuels 1575-05-29 Info119569
- Teissier, Emilien - Appartenance à : Association lyonnaise pour le Libre Echange 1849-00-00 Info119344

Posséder une qualité

TyIn130

- Ducôté, Benoît - Chevalier de la Légion d'honneur 1892-01-26 Info15439
- écuyer; La Sausse, Pierre - Posséder une qualité 1782-00-00 Info91888

Union (pendant un certain laps de temps de deux personnes, pouvant donner lieu à la naissance d'enfants)

TyIn13

- François Répécaud épouse Marie Louise Besson 1747-00-00 Info131318
- Galilei, Galileo - Durant plusieurs années, Galileo Galilei a une liaison avec Marina Gamba 1599-00-00 1610-00-00 Info1355

Possession (d'un bien)

- Casati, Barthélémy Isidore Isaac - Propriétaire du château de Saint-Fonds (Gleizé, Rhône, France) (1899) - Info15377

Localisation

- Napoly, Claude - Domicile : rue de l'Annonciade, n° 26, Lyon 1852-06-12–1852-06-12 [Info119533](#)

Localisation relative d'un lieu

- La Grande Haie - Localisé par rapport à: Forêt de Mormal – Inclusion (sens géographique) 1631 – Info111870
- Camposanto - Localisé par rapport à: Duché de Modène – Inclusion (sens géographique) 1452r – Info93510

Séjour

- Consiglieri, Paolo - Séjour à Venezia 1527-00-00 1536-00-00 [Info95117](#)

Rattachement à une institution

- Tournon SA (Ets de teinture et d'impression de) - Tournon SA (Ets de teinture et d'impression de) fait partie du groupe Bianchini Férier 1942-1955 Info47228
- Bureau des hospices; Intérieur (ministère de l') France - Rattachement à une institution 1849p Info73536

Relation entre personnes

- Galilei, Galileo; Lippi, Cesare - da Mordano - Relation entre personnes 1607-00-00 [Info119538](#)
- Galilei, Galileo; Joyeuse, François de - Relation entre personnes 1611-09-00 [Info118989](#)

Location

- Maison neuve rue Bellecordière - Location 1744-08-17 Info92137
- Marion, Estienne,Valioud, Etienne - E.Marion sous loue un bien à E.Valioud 1697-1699

Affectation militaire (segment)

- Hangest, Germain d' - Affecté au 70e RI 1904-10-00-1905-10-00 Info88946

Service militaire actif – TyIn88

- Mercier, Pierre Jean - Service militaire actif 1875-11-04-1876-05-06 Info99821
- Hangest, Germain d' - Service militaire actif 1904-10-00-1905-10-00 Info88945

Nationalité politique – TyIn86

- Belgique (Royaume de); Cool, August - Nationalité politique 1903-08-28 – Info92307

Enseignement

- Ferradou, André, Marie, Charles - Enseigne : Histoire du droit français, auprès de : Faculté de droit de Rennes 1898-07-26 1902-12-27 Info115262
- Aldalur, José Antonio de - Enseigne : Philosophie 1716-00-00 1719-00-00 Info31657

Formation (suivre une)

- Cassegrain, Théophile - Études complémentaires à Genève 1583-00-00 1584-00-00 Info118518
- Hauvette, Henri - Études en Italie 1891-12-00 1893-10-00 Info105948
- Wallis, John - Formation: Philosophie; Théologie, auprès de: Emmanuel College (Cambridge) Info35517

Présence

- La Coste - Assiste au Synode national de Vitré, 1617 1617-05-18 1617-06-18 [Info96682](#)
- Beccadelli, Ludovico - Présence 1561-09-00 1563-05-00 [Info94606](#)

Maladie

[TyIn112](#)

- Cassegrain, Théophile - devient aveugle 1622-00-00 1637-00-00 [Info119785](#)

APPENDIX E

Issue 329

CRM Properties that may have shorter temporal validity than their domain and range		
Property Name	**Domain- Entity**	**Range - Entity**
P1 is identified by (identifies)	E1 CRM Entity	E41 Appellation
P2 has type (is type of)	E1 CRM Entity	E55 Type
P11 had participant (participated in)	E5 Event	E39 Actor
P12 occurred in the presence of (was present at)	E5 Event	E77 Persistent Item
P14 carried out by (performed)	E7 Activity	E39 Actor
P16 used specific object (was used for)	E7 Activity	E70 Thing
P32 used general technique (was technique of)	E7 Activity	E55 Type
P33 used specific technique (was used by)	E7 Activity	E29 Design or Procedure
P39 measured (was measured by)	E16 Measurement	E1 CRM Entity
P40 observed dimension (was observed in)	E16 Measurement	E54 Dimension
P43 has dimension (is dimension of)	E70 Thing	E54 Dimension
P45 consists of (is incorporated in)	E18 Physical Thing	E57 Material
P46 is composed of (forms part of)	E18 Physical Thing	E18 Physical Thing
P48 has preferred identifier (is preferred identifier of)	E1 CRM Entity	E42 Identifier
P49 has former or current keeper (is former or current keeper of)	E18 Physical Thing	E39 Actor
P51 has former or current owner (is former or current owner of)	E18 Physical Thing	E39 Actor
P53 has former or current location (is former or current location of)	E18 Physical Thing	E53 Place
P56 bears feature (is found on)	E19 Physical Object	E26 Physical Feature
P57 has number of parts	E19 Physical Object	E60 Number
P62 depicts (is depicted by)	E24 Physical Man-Made Thing	E1 CRM Entity
P65 shows visual item (is shown by)	E24 Physical Man-Made Thing	E36 Visual Item
P74 has current or former residence (is current or former residence of)	E39 Actor	E53 Place

P75 possesses (is possessed by)	E39 Actor	E30 Right
P76 has contact point (provides access to)	E39 Actor	E51 Contact Point
P78 is identified by (identifies)	E52 Time-Span	E49 Time Appellation
P87 is identified by (identifies)	E53 Place	E44 Place Appellation
P101 had as general use (was use of)	E70 Thing	E55 Type
P102 has title (is title of)	E71 Man-Made Thing	E35 Title
P104 is subject to (applies to)	E72 Legal Object	E30 Right
P105 right held by (has right on)	E72 Legal Object	E39 Actor
P107 has current or former member (is current or former member of)	E74 Group	E39 Actor
P109 has current or former curator (is current or former curator of)	E78 Collection	E39 Actor
P125 used object of type (was type of object used in)	E7 Acivity	E55 Type
P126 employed (was employed in)	E11 Modification	E57 Material
P128 carries (is carried by)	E18 Physical Thing	E90 Symbolic Object
P130 shows features of (features are also found on)	E70 Thing	E70 Thing
P131 is identified by (identifies)	E39 Actor	E82 Actor Appellation
P149 is identified by (identifies)	E28 Conceptual Object	E75 Conceptual Object Appellation
P152 has parent (is parent	E21 Person	E21 Person