# 46th CRM-SIG – Athens February 2020

## ISSUE 474: Editorial check of changes in CRMarcheo

The sig went through the editorial changes proposed by CEO, AF and GH ([version 1.5.0 – draft](http://www.cidoc-crm.org/crmarchaeo/ModelVersion/version-1.5.0)) with Editorial status: **In progress since [21/2/2020]**. A summary of the changes accepted and relevant discussion points can be found below. The proposed examples in the above document are accepted in principle. Changes in the scope notes/examples/quantification of properties etc. are thoroughly listed under Appendix.

#### A1 Excavation Process Unit:

**DECISION:** The sig accepted CEO’s edit to add the reference to the class in the example and fix the reference to AP10 destroyed. The details can be found in the [Appendix](#_A1_Excavation_Process).

**PROPOSAL:** SS proposed that the label of this class be changed to A1 Excavation Processing Unit to better capture that the class is a specialization of E7 Activity. The sig members present were in favor of this change.

**DECISION**: The change of the label is to be put up for an email vote.

#### A7 Embedding:

**DECISION**: to be dealt with in the designated issue ([447](http://www.cidoc-crm.org/Issue/ID-447-a7-embedding-as-a-physical-feature-like-entity)), not part of the editorial work.

#### A8 Stratigraphic Volume:

**DECISION**: FOL representations for inferences regarding its superclasses (E26 Physical Feature and E53 Place) need be added.   
**HW** to CEO.

#### A9 Archaeological Excavation

**Editorial change accepted about the** fact that the range of property *AP3 investigated (was investigated by).*  The details can be found in the [Appendix](#_A9_Archaeological_Excavation).

#### A10 Excavation Interface

**Editorial change accepted about the deletion of** *AP4 produced surface (was surface produced by)* from the associated properties listed under *A10 Excavation Interface*

#### AP2 discarded into (was discarded by)

The sig reviewed the changes proposed by CEO and did some editorial work on the scope note. The edited scope notes (can be found in the [Appendix](#_AP2_discarded_into).

**DECISION**: The sig accepted CEO’s proposal to change the label of AP2 from “discarded into” to “discarded” –given that the property makes no claim regarding the direction towards which the removed amount of material was discarded (which is also consistent with the definition of its superproperty).

**DECISION**: Upon reviewing the quantification of AP2, the sig decided to move this discussion in a [new issue](#_NEW_ISSUE:_Quantification). The quantification of the property must explore the following possibilities:

1. many instances of S11 Amount of Matter are removed and discarded into one heap (in which case it must be differentiated form O2 removed and from O5 removed (this one for sample taking).
2. the exact amount of matter that was removed in the course of an excavation process unit. However, if the amounts of matter are subsequently discarded in a heap, and this move is documented for some reason, then another property will have to be coined, that lumps the amounts of matter together.
3. the amount of matter discarded instantiates the heap, which means that AP2 should be used to document the excavation process units that fed into the heap.

#### AP4 produced surface (was surface produced by)

**DECISION**: The sig accepted CEO’s proposal to change the range of AP4 from S20 Rigid Physical Feature to A10 Excavation Interface

Also CEO proposed the AP4 to be subproperty of P108 has produced (was produced by): E24 Physical Human-Made Thing. In this case we should make A10 Excavation Interface a subclass of E24 Physical Human-Made Thing and A1 Excavation Process Unit a subclass of E12 Production . There was no decision on this proposal since it is pending the discussion in the [issue 446](http://cidoc-crm.org/Issue/ID-446-the-nature-of-a1-excavation-process-unit).

#### AP5 removed part or all of (was totally or partially removed by)

**DECISION**: the sig will start a new issue regarding the superproperty of **AP5**. Candidates involve P31 has modified (D: E11 Modification; R: E18 Physical Thing). Any decision will affect the definition of A1 Excavation Process[ing] Unit ( see [issue 446](http://cidoc-crm.org/Issue/ID-446-the-nature-of-a1-excavation-process-unit)).

The new issue should be of a more general interest than the particulars of AP5’s superproperty, and address the question of declaring superproperties in the CRMbase exclusively (to the extent it’s possible) or across family models.

**HW**: CEO (?) to check the CRMbase properties that generalize to CRM extensions. (this is the content of new issue)

#### AP6 intended to approximate (was approximated by)

The sig reviewed the example of AP6 and made the following changes:

From:

The stratigraphic Excavation Process Unit excavating the Stratigraphic Volume Unit (2) intended to approximate Stratigraphic Interface [19].

To:

The excavation in ancient Akrotiri (A1) *intended to approximate* the various interfaces witnessing the sequences of eruption of ancient Santorini’s volcano (A3) (see Fig. 8).

#### AP9 took matter from (provided matter to).

**DECISION**: The sig appointed AF and MD to provide the missing scope note for AP9 and rewrite the example to express the forward property instead of its inverse. SS will proofread **(HW)**.

#### AP10 destroyed (was destroyed by)

To resolve this issue, the sig proposed to make A1 a subclass of E81 Transformation. The argumentation is that every time you have an A1 Excavation Process Unit activity something is destroyed in its identity and something is created with a new identity. No decision is taken since it is pending the discussion of [issue 446](http://cidoc-crm.org/Issue/ID-446-the-nature-of-a1-excavation-process-unit)

#### AP11 has physical relation (is physical relation of)

**DECISION**: The scope note needs be redrafted to include a clause that any two A8 Stratigraphic Units linked through the property should share an interface. There was a question about generalization in terms of geology and a suggestion to look for a property in CRMsci that would cover also geological relations of this type.

In what concerns the example: it must be added the AP11.1 property (the type of adjacency observed btw two instances of A8).

HW assigned to **MD** to redraft the scope note. **SS** will edit.Also **M**D appointed himself with providing relevant examples.

#### AP12 confines (is confined by)

An example is missing. No HW assignment.

#### AP13 has stratigraphic relation (is stratigraphic relation of)

**DECISION**: in what concerns the example, it must be made explicit that \*earlier\* is an inferred relation instantiating an AP13.1 property. The example needs editing. NO HW assignment.

#### AP14 justified (is justification of)

**DECISION**: the sig will revise the Domain and Range for AP14 in [a new issue](#_NEW_ISSUE:_AP14). AP14 could either connect instances of physical adjacency and stratigraphic relations or it should be replaced by some construct in CRMinf.

The sig **decided** to make a new issue for re discussion about the Domain and Range of AP14, since connecting the type to the type does not seem correct. It should point to the instance of the relations (the reified property) or the whole thing could be replaced by some CRMinf construct. SS suggests to put square brackets around the first and second relations and how they relate.

MD should make a proposal.

#### AP15 is or contains remains of (is or has remains contained in)

The following example proposed by CEO and AF is accepted:

The posthole, Dilling 2AS34019, (A2) *is or contains remains of (is or has remains contained in)* the rotten bottom part of a pole (S10).

#### AP16 assigned attribute to (was attributed by)

The following example proposed by CEO and AF is accepted:

The excavator declaration that the post holes [7] and [8] to be part of one building (A6) assigned attribute to the post holes [7] and [8] (E18) (see fig. 4)

#### Properties AP17 is found by, AP18 is embedding of, AP19 is embedding in and AP20 is embedding at

were not discussed because they are to be considered in the context of [Issue 447: A7 Embedding as a Physical Feature like entity](http://www.cidoc-crm.org/Issue/ID-447-a7-embedding-as-a-physical-feature-like-entity).

#### AP22 is equal in time to

**DECISION**: The sig ratified the result of the e-vote to deprecate **P114 is equal in time to** from CRMbase and introduce it as **AP22 is equal in time to** in CRMarchaeo. The proposal to delete the reference to E52 Time-Span from the scope note and other editorial changes were approved. The details can be found in the [Appendix](#_AP22_is_equal).

#### AP23 finishes (is finished by)

**DECISION**: The sig ratified the result of the e-vote to deprecate **P115 finishes (is finished by)** from CRMbase and introduce it as **AP23 finishes (is finished by)** in CRMarchaeo.

The definition can be found in the [Appendix](#_AP23_finishes_(is).

#### AP24 starts (is started by)

The sig ratified the result of the e-vote to deprecate **P116 starts (is started by)** from CRMbase and introduce it as **AP24 starts (is started by)** in CRMarchaeo. The proposal to delete the reference to E52 Time-Span from the scope note and other editorial changes were approved. The details can be found in the [Appendix](#_AP24_starts_(is).

#### AP25 occurs during (includes)

**DECISION**: The sig ratified the result of the e-vote to deprecate **P117 occurs during (includes)** from CRMbase and introduce it as **AP25 occurs during (includes)** in CRMarchaeo. Editorial changes suggested were approved. The details can be found in the [Appendix](#_AP25_occurs_during).

**HW**: SS was appointed to reformulate the scope note and remove the references to E52 Time-Span from the definition.

#### AP26 overlaps in time with (is overlapped in time by)

**DECISION**: The sig ratified the result of the e-vote to deprecate **P118 overlaps in time with (is overlapped in time by)** from CRMbase and introduce it as **AP26 overlaps in time with (is overlapped in time by)** in CRMarchaeo. Editorial changes suggested were approved. The details can be found in the [Appendix](#_AP22_is_equal_1).

**HW**: SS was appointed to reformulate the scope note and remove the references to E52 Time-Span from the definition. The sig should invite for email vote the result for phrasing.

#### AP27 meets in time with (is met in time by)

**DECISION**: The sig ratified the result of the e-vote to deprecate **P119 meets in time with (is met in time by)** from CRMbase and introduce it as **AP27 meets in time with (is met in time by)** in CRMarchaeo. Editorial changes suggested were approved. The details can be found in the [Appendix](#_AP27_meets_in)

#### AP28 occurs before (occurs after)

**DECISION**: The sig ratified the result of the e-vote to deprecate **P120 occurs before (occurs after)** from CRMbase and introduce it as **AP28 occurs before (occurs after)** in CRMarchaeo. The details can be found in the [Appendix](#_AP28_occurs_before)

### NEW ISSUE: Quantification of AP2 discarded (was discarded by). ([issue 478](http://cidoc-crm.org/Issue/ID-478-quantification-of-ap2-discarded-into-was-discarded-by))

Upon reviewing the quantification of AP2 (issue 474), the sig decided to move this discussion in a new issue. The quantification of the property must explore the following possibilities:

1. many instances of S11 Amount of Matter are removed and discarded into one heap (in which case it must be differentiated form O2 removed and from O5 removed (this one for sample taking).
2. the exact amount of matter that was removed in the course of an excavation process unit. However, if the amounts of matter are subsequently discarded in a heap, and this move is documented for some reason, then another property will have to be coined, that lumps the amounts of matter together.
3. the amount of matter discarded instantiates the heap, which means that AP2 should be used to document the excavation process units that fed into the heap.

### NEW ISSUE: superproperties of family models in CRMbase and/or across extensions. ([issue 479](http://cidoc-crm.org/Issue/ID-479-policy-for-defining-superproperties-of-family-models-properties))

**DECISION**: the sig will start a new issue regarding the superproperty of **AP5**. Candidates involve P31 has modified (D: E11 Modification; R: E18 Physical Thing). Any decision will affect the definition of A1 Excavation Process[ing] Unit (instead of E12 Production or S1 Matter Removal; see issue 446) and should inform issue 446.

The new issue should be of a more general interest than the particulars of AP5’s superproperty, and address the question of declaring superproperties in the CRMbase exclusively (to the extent it’s possible) or across family models.

**HW**: CEO (?) to check the CRMbase properties that generalize to CRM extensions. Family model classes/properties should be used when there is no appropriate class/property in CRMbase.

### NEW ISSUE: AP14 justified (us justification of) ([issue 480](http://cidoc-crm.org/Issue/ID-480-ap14-justified-is-justification-of))

The sig decided to start a new issue regarding how to link the inference that two stratigraphic volumes in a given topological relation of physical adjacency justify a stratigraphic (i.e. temporal) relation between the events that produced them.

Proposed alternatives for AP14: it either connects instances of physical adjacency and stratigraphic relations or it should be replaced by some construct in CRMinf.

## APPENDIX classes and properties scope notes changes.

#### A1 Excavation Process Unit.

##### from

**A1 Excavation Processing Unit**

Subclass of: S1 Matter Removal

S4 Observation

Scope Note: This class comprises activities of excavating in the sense of archaeology, which are documented as a coherent set of actions of progressively recording and removing matter from a pre-specified location under specific rules. Typically, an excavation process unit would be terminated if significant discontinuities of substance or finds come to light, or if the activity is interrupted due to external factors, such as end of a working day. In other cases, the termination would be based on predefined physical specifications, such as the boundaries of a maximal volume of matter to be excavated in one unit of excavation.

Depending on the methodology, an instance of A1 Excavation Process Unit may intend to remove matter only within the boundaries of a particular stratigraphic unit, or it may follow a pre-declared spatial extent such as a trench. It may only uncover, clean or expose a structure or parts of it.

The process of excavation results in the production of a set of recorded (documentation) data that should be sufficient to provide researchers enough information regarding the consistence and spatial distribution of the excavated Segment of Matter and things and features embedded in it. Some parts or all of the removed physical material (S11 Amount of Matter) may be dispersed, whereas others may be kept in custody in the form of finds or samples, while others (such as parts of walls) may be left at the place of their discovery. The data produced by an instance of excavation process unit should pertain to the material state of matter at excavation time only and should be clearly distinguished from subsequent interpretation about the causes for this state of matter.

Examples:

* The activity taking place on 21.9.2007 between 12:00 and 13:00 that excavated the Stratigraphic Volume Unit (2) of Figure 4 and created the surface S1
* The activity that excavated the first 20 cm of a spit excavation on 21.7.2007 created the surface S2 in Figure 4.

In First Order Logic:

A1(x) ⊃ S1(x)

A1(x) ⊃ S4(x)

Properties:

AP1 produced (was produced by): S11 Amount of Matter

AP2 discarded (was discarded by): S11 Amount of Matter

AP4 produced surface (was surface produced by): A20 Rigid Physical Feature

[AP5](#_AP5_removed_part) removed part or all of (was partially or totally removed by): [A8](#_A8_Stratigraphic_Unit) Stratigraphic Unit

[AP6](#_AP6_intended_to) intended to approximate (was approximated by): [A3](#_A3_Stratigraphic_Interface) Stratigraphic Interface

[AP10](#_AP10_destroyed_(was) destroyed (was destroyed by): [S22](#_S22_Segment_of) Segment of Matter (Segment of Matter that happened to be at the Excavated Place)

##### to

**A1 Excavation Processing Unit**

Subclass of: S1 Matter Removal

S4 Observation

Scope Note: This class comprises activities of excavating in the sense of archaeology, which are documented as a coherent set of actions of progressively recording and removing matter from a pre-specified location under specific rules. Typically, an excavation process unit would be terminated if significant discontinuities of substance or finds come to light, or if the activity is interrupted due to external factors, such as end of a working day. In other cases, the termination would be based on predefined physical specifications, such as the boundaries of a maximal volume of matter to be excavated in one unit of excavation.

Depending on the methodology, an instance of A1 Excavation Process Unit may intend to remove matter only within the boundaries of a particular stratigraphic unit, or it may follow a pre-declared spatial extent such as a trench. It may only uncover, clean or expose a structure or parts of it.

The process of excavation results in the production of a set of recorded (documentation) data that should be sufficient to provide researchers enough information regarding the consistence and spatial distribution of the excavated Segment of Matter and things and features embedded in it. Some parts or all of the removed physical material (S11 Amount of Matter) may be dispersed, whereas others may be kept in custody in the form of finds or samples, while others (such as parts of walls) may be left at the place of their discovery. The data produced by an instance of excavation process unit should pertain to the material state of matter at excavation time only and should be clearly distinguished from subsequent interpretation about the causes for this state of matter.

Examples:

* The activity taking place on 21.9.2007 between 12:00 and 13:00 that excavated the Stratigraphic Volume Unit (2) of Figure 4 and created the surface S1 (A10)
* The activity that excavated the first 20 cm of a spit excavation on 21.7.2007 created the surface S2 in Figure 4.

In First Order Logic:

A1(x) ⊃ S1(x)

A1(x) ⊃ S4(x)

Properties:

AP1 produced (was produced by): S11 Amount of Matter

AP2 discarded (was discarded by): S11 Amount of Matter

AP4 produced surface (was surface produced by): A10 Excavation Interface

[AP5](#_AP5_removed_part) removed part or all of (was partially or totally removed by): [A8](#_A8_Stratigraphic_Unit) Stratigraphic Unit

[AP6](#_AP6_intended_to) intended to approximate (was approximated by): [A3](#_A3_Stratigraphic_Interface) Stratigraphic Interface

[AP10](#_AP10_destroyed_(was) destroyed (was destroyed by): [S22](#_S22_Segment_of) Segment of Matter

#### A9 Archaeological Excavation

##### from:

**A9 Archaeological Excavation**

Subclass of: [S4](#_S1_Argumentation) Observation

Scope Note: This class describes the general concept of archaeological excavation intended as a coordinated set of activities performed on an area considered as part of a broader topographical, rural, urban, or monumental context. An archaeological excavation is usually under the responsibility of a coordinator, officially designated, which is legally and scientifically responsible for all the activities carried out within each of the Excavation Processing Units and is also responsible for the documentation of the whole process.

Examples:

* 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). [Μιχαηλίδου 2001, p. 41] [Palyvou 200].

In First Order Logic:

A9(x) ⊃ S4(x)

Properties:

[AP3](#_AP3_investigated_(was) investigated (was investigated by): E53 Place

##### to:

**A9 Archaeological Excavation**

Subclass of: [S4](#_S1_Argumentation) Observation

Scope Note: This class describes the general concept of archaeological excavation intended as a coordinated set of activities performed on an area considered as part of a broader topographical, rural, urban, or monumental context. An archaeological excavation is usually under the responsibility of a coordinator, officially designated, which is legally and scientifically responsible for all the activities carried out within each of the Excavation Processing Units and is also responsible for the documentation of the whole process.

Examples:

* The archaeological excavation (A9) of the West House (E24) that took place at the archaeological site of Akrotiri, Thera (E27) during the years (1967-1973) (E52) by the archaeologist Sp. Marinatos (E39). [Μιχαηλίδου 2001, p. 41] [Palyvou 200].

In First Order Logic:

A9(x) ⊃ S4(x)

Properties:

[AP3](#_AP3_investigated_(was) investigated (was investigated by): E27 Site

#### AP2 discarded into (was discarded by)

##### version 1.4.8

**AP2 discarded into (was discarded by)**

Domain: [A1](#_A1_Excavation_Process) Excavation Process Unit

Range: [S11](#_S11_Amount_of) Amount of Matter

Subproperty of: [O2](#_O2_removed_(was) removed (was removed by)

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

Scope note: This property identifies the S11 Amount of Matter (e.g. a heap) into which material from an A1 Excavation Process Unit is discarded.

Examples:

* The Excavation Process Unit excavating the Stratigraphic Volume Unit (2) discarded an amount of matter into the waste heap of the excavation.

In First Order Logic:

AP2(x,y) ⊃ A1(x)

AP2(x,y) ⊃ S11(y)

AP2(x,y) ⊃ O2(x,y)

##### version 1.5.0

**AP2 discarded (was discarded by)**

Domain: [A1](#_A1_Excavation_Process) Excavation Process Unit

Range: [S11](#_S11_Amount_of) Amount of Matter

Subproperty of: [O2](#_O2_removed_(was) removed (was removed by)

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

Scope note: This property identifies the S11 Amount of Matter discarded (e.g. onto the spoil heap) by A1 Excavation Processing Unit.

Examples:

* The stratum of ash, pumice and other volcanic material removed (S11) *was* *discarded by* the excavation of Villa of the Mysteries in Pompeii, Italy (A1).

In First Order Logic:

AP2(x,y) ⊃ A1(x)

AP2(x,y) ⊃ S11(y)

AP2(x,y) ⊃ O2(x,y)

#### AP22 is equal in time to

Domain: E2 Temporal Entity

Range: E2 Temporal Entity

Subproperty of: E2 Temporal Entity.P175 starts before or with the start of (starts after or with the start of):

E2 Temporal Entity

E2 Temporal Entity. P184 ends before or with the end of (ends with or after the end of): E2 Temporal Entity

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

Scope note: This property symmetrically identifies a situation in which the starting point and the ending point for an instance of E2 Temporal Entity is equal to the starting point and the ending point respectively of another instance of E2 Temporal Entity.

This property is only necessary if the time span is unknown (otherwise the equivalence can be calculated).

This property is the same as the "equal" relationship of Allen’s temporal logic (Allen, 1983, pp. 832-843).

This property is transitive.

Example: The destruction of the Villa Justinian Tempus (E6) is equal in time to the death of Maximus Venderus (E69)

In First Order Logic:

AP22(x,y) ⊃ E2(x)

AP22(x,y) ⊃ E2(y)

AP22(x,y) ⊃ P175(y,x)

AP22(x,y) ⊃ P184(y,x)

#### AP23 finishes (is finished by)

Domain: [E2](#_E2_Temporal_Entity) Temporal Entity

Range: [E2](#_E2_Temporal_Entity) Temporal Entity

Subproperty of: [E2](#_E2_Temporal_Entity) Temporal Entity.[P184](#_P184_ends_before) ends before or with the end of (ends with or after the end of):[E2](#_E2_Temporal_Entity) Temporal Entity

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

Scope note: This property identifies a situation in which the ending point of an instance of E2 Temporal Entity is equal to the ending point of another temporal entity of longer duration. There is no causal relationship implied by this property.

This property is only necessary if the time span is unknown (otherwise the relationship can be calculated). This property is the same as the "finishes / finished-by" relationships of Allen’s temporal logic (Allen, 1983, pp. 832-843).

This property is transitive.

Example: Late Bronze Age (E4) *finishes* Bronze Age (E4)

In First Order Logic:

AP23(x,y) ⊃ E2(x)

AP23(x,y) ⊃ E2(y)

AP23(x,y) ⊃ P184(x,y)

#### AP24 starts (is started by)

Domain: [E2](#_E2_Temporal_Entity) Temporal Entity

Range: [E2](#_E2_Temporal_Entity) Temporal Entity

Subproperty of: [E2](#_E2_Temporal_Entity) Temporal Entity.[P185](#_P185_ends_before) ends before the end of (ends after the end of):[E2](#_E2_Temporal_Entity) Temporal Entity

[E2](#_E2_Temporal_Entity) Temporal Entity.[P175](#_P175_starts_before) starts before or with the start of (starts after or with the start of):[E2](#_E2_Temporal_Entity) Temporal Entity

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

Scope note: This property identifies a situation in which the starting point for an instance of E2 Temporal Entity is equal to the starting point of another instance of E2 Temporal Entity of longer duration

This property is only necessary if the time span is unknown (otherwise the relationship can be calculated). This property is the same as the "starts / started-by" relationships of Allen’s temporal logic (Allen, 1983, pp. 832-843).

This property is transitive.

Example: Early Bronze Age (E4) *starts* Bronze Age (E4)

In First Order Logic:

AP24(x,y) ⊃ E2(x)

AP24(x,y) ⊃ E2(y)

AP24(x,y) ⊃ P175(x,y)

AP24(x,y) ⊃ P185(x,y)

#### AP25 occurs during (includes)

Domain: [E2](#_E2_Temporal_Entity) Temporal Entity

Range: [E2](#_E2_Temporal_Entity) Temporal Entity

Subproperty of: [E2](#_E2_Temporal_Entity) Temporal Entity.[P185](#_P185_ends_before) ends before the end of (ends after the end of):[E2](#_E2_Temporal_Entity) Temporal Entity

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

Scope note: This property identifies a situation in which the entire instance of E52 Time-Span of an instance of E2 Temporal Entity is within the instance of E52 Time-Span of another instance of E2 Temporal Entity that starts before and ends after the included temporal entity.

This property is only necessary if the time span is unknown (otherwise the relationship can be calculated). This property is the same as the "during / includes" relationships of Allen’s temporal logic (Allen, 1983, pp. 832-843).

This property is transitive.

Example: Middle Saxon period (E4) *occurs during* Saxon period (E4)

In First Order Logic:

AP25(x,y) ⊃ E2(x)

AP25(x,y) ⊃ E2(y)

AP25(x,y) ⊃ P185(x,y)

#### AP26 overlaps in time with (is overlapped in time by)

Domain: E2 Temporal Entity

Range: E2 Temporal Entity

Subproperty of: E2 Temporal Entity.P176 starts before the start of (starts after the start of): E2Temporal Entity

E2 Temporal Entity.P185 ends before the end of (ends after the end of):E2 Temporal Entity

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

Scope note: This property identifies a situation in which there is an overlap between the instances of E52 Time-Span of two instances of E2 Temporal Entity.

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

This property is the same as the "overlaps / overlapped-by" relationships of Allen’s temporal logic (Allen, 1983, pp. 832-843).

Example: the Iron Age (E4) overlaps in time with the Roman period (E4)

In First Order Logic:

AP26(x,y) ⊃ E2(x)

AP26(x,y) ⊃ E2(y)

AP26(x,y) ⊃ P176(x,y)

AP26(x,y) ⊃ P185(x,y)

#### AP27 meets in time with (is met in time by)

Domain: E2 Temporal Entity

Range: E2 Temporal Entity

Subproperty of: E2 Temporal Entity.P182 ends before or with the start of (starts after or with the end of):E2 Temporal Entity

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

Scope note: This property identifies a situation in which one instance of E2 Temporal Entity immediately follows another instance of E2 Temporal Entity.

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

This property is the same as the "meets / met-by" relationships of Allen’s temporal logic (Allen, 1983, pp. 832-843).

Example: Early Saxon Period (E4) meets in time with Middle Saxon Period (E4)

In First Order Logic:

AP27(x,y) ⊃ E2(x)

AP27(x,y) ⊃ E2(y)

AP27(x,y) ⊃ P182(x,y)

#### AP28 occurs before (occurs after)

Domain: E2 Temporal Entity

Range: E2 Temporal Entity

Subproperty of: E2 Temporal Entity. P183 ends before the start of (starts after the end of): E2 Temporal Entity

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

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

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

This property is the same as the "before / after" relationships of Allen’s temporal logic (Allen, 1983, pp. 832-843).

This property is transitive..

Example: The destruction of the Villa Justinian Tempus (E6) is equal in time to the death of Maximus Venderus (E69)

In First Order Logic:

AP22(x,y) ⊃ E2(x)

AP22(x,y) ⊃ E2(y)

AP22(x,y) ⊃ P175(y,x)

AP22(x,y) ⊃ P184(y,x)