

REPRÉSENTATION DES CONNAISSANCES

NICOLA CARBONI



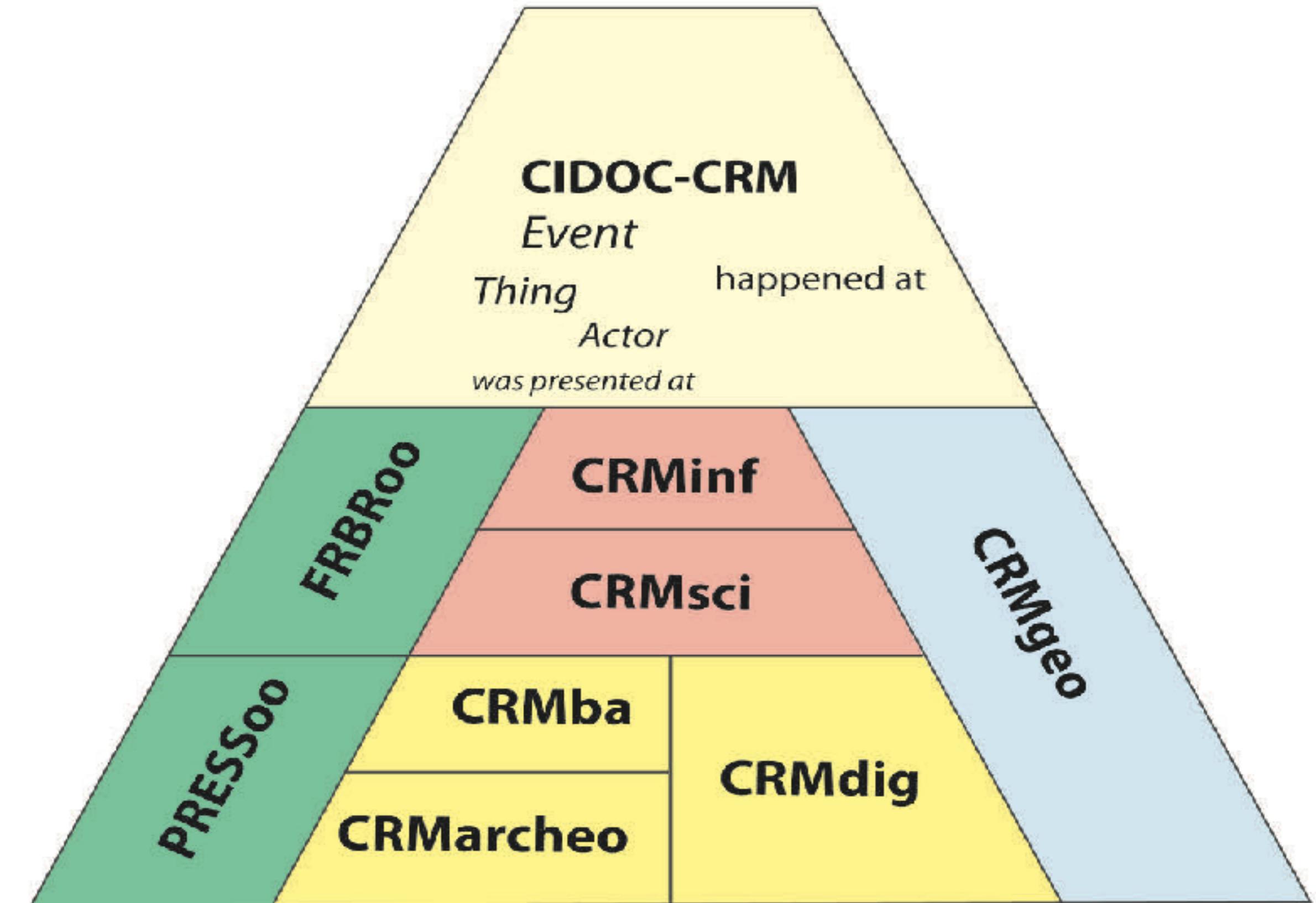
international
council
of museums

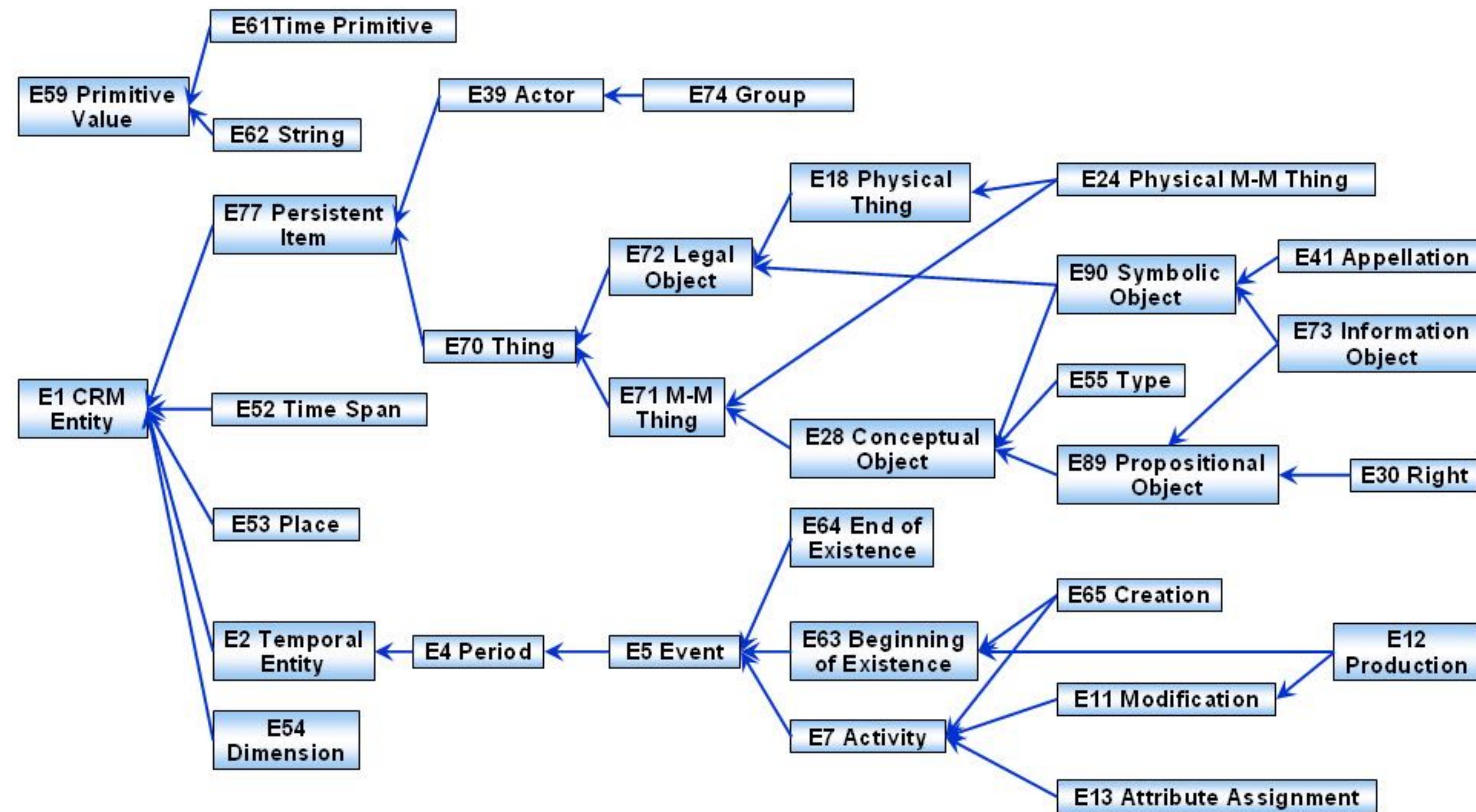
CIDOC
CRM

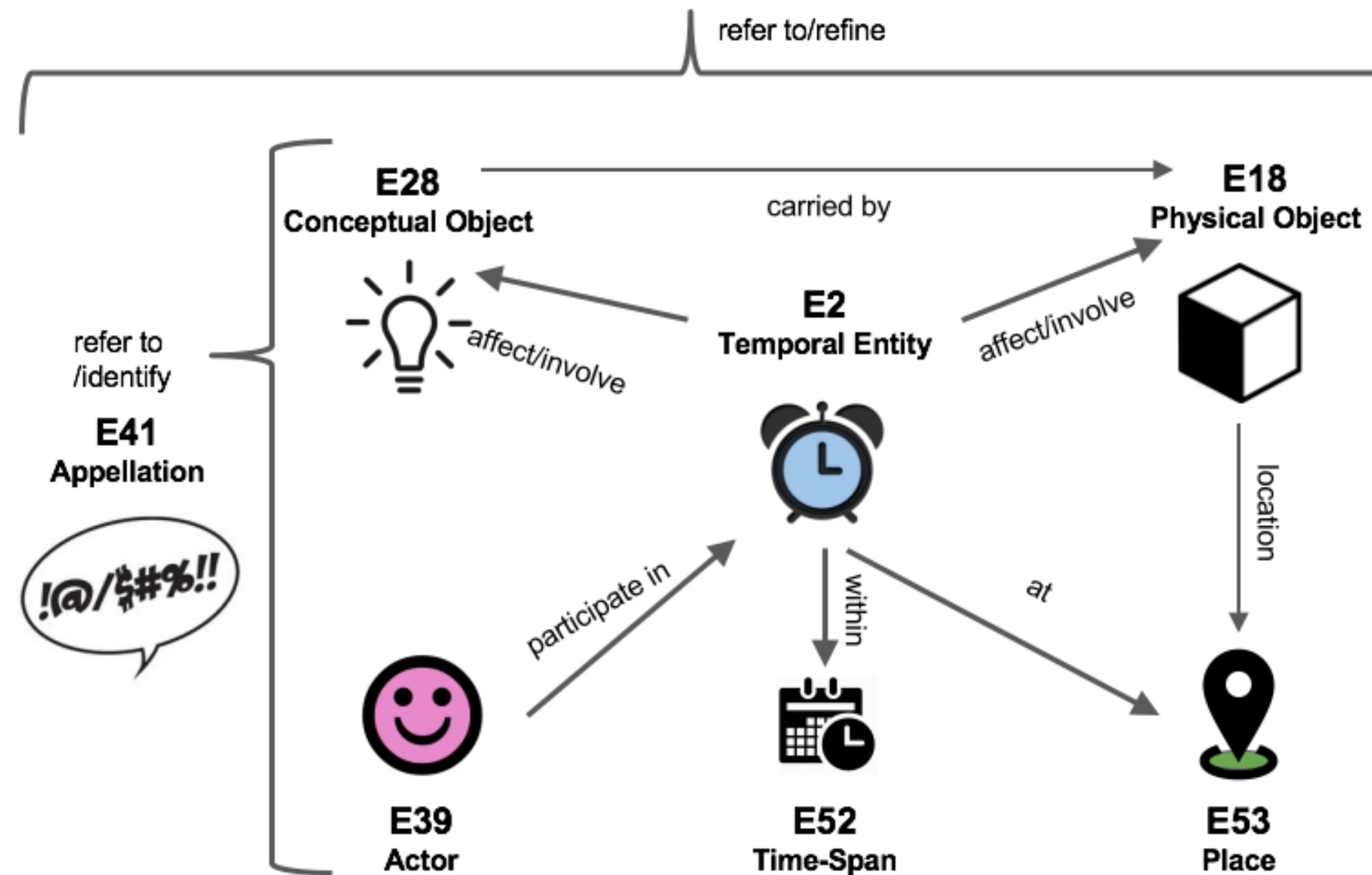


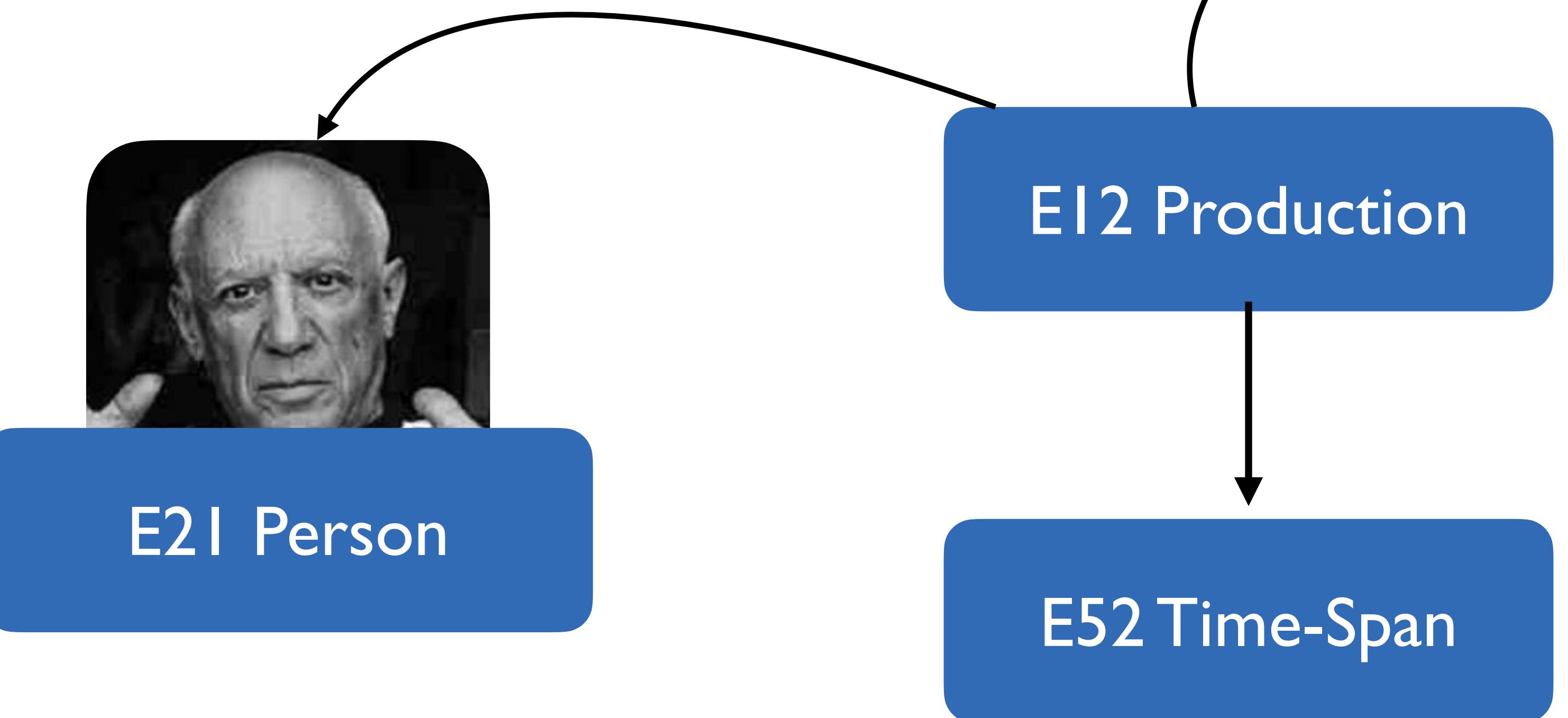
- Developed by the **CRM Special Interest Group of the International Committee for Documentation (CIDOC)** of the International Council of Museums (ICOM), following an initiative of ICS-FORTH, Heraklion, Crete.
- a **core ontology** describing the underlying semantics of over a hundred database schemata and structures from all museum disciplines, archives and libraries.
- Recognized **ISO Standard** since 2006 (ISO21127:2006)
- the **result of 20 years** of interdisciplinary work and agreement
- a **generic model of recording of “what has happened”** in human scale
- **generates huge, meaningful networks of knowledge by a simple abstraction:** history as meetings of people, things and information.

Type	Top Level Ontology
Scope	Cultural Heritage and E-Sciences
Classes	90+-
Relations	150+-
Version	6
Maintained by	CIDOC CRM SIG
Official Extensions	8
Access	http://www.cidoc-crm.org/

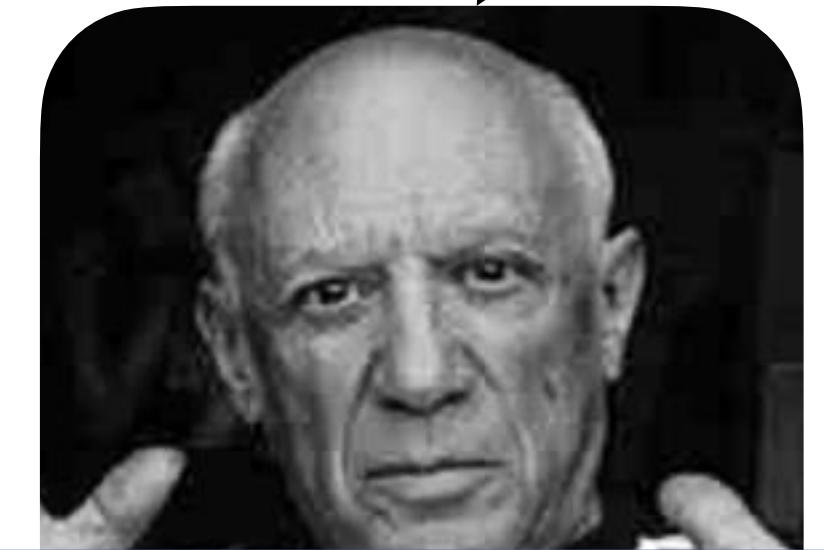








E24 Human Made Thing



E21 Person

P14 carried out by

E12 Production

P4 has time-span

E52 Time-Span

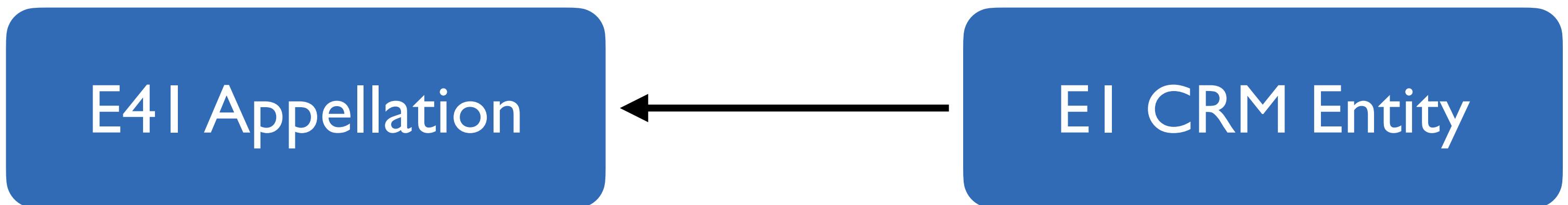
P108 has produced



E24 Human Made Thing

1937

PI is identified by

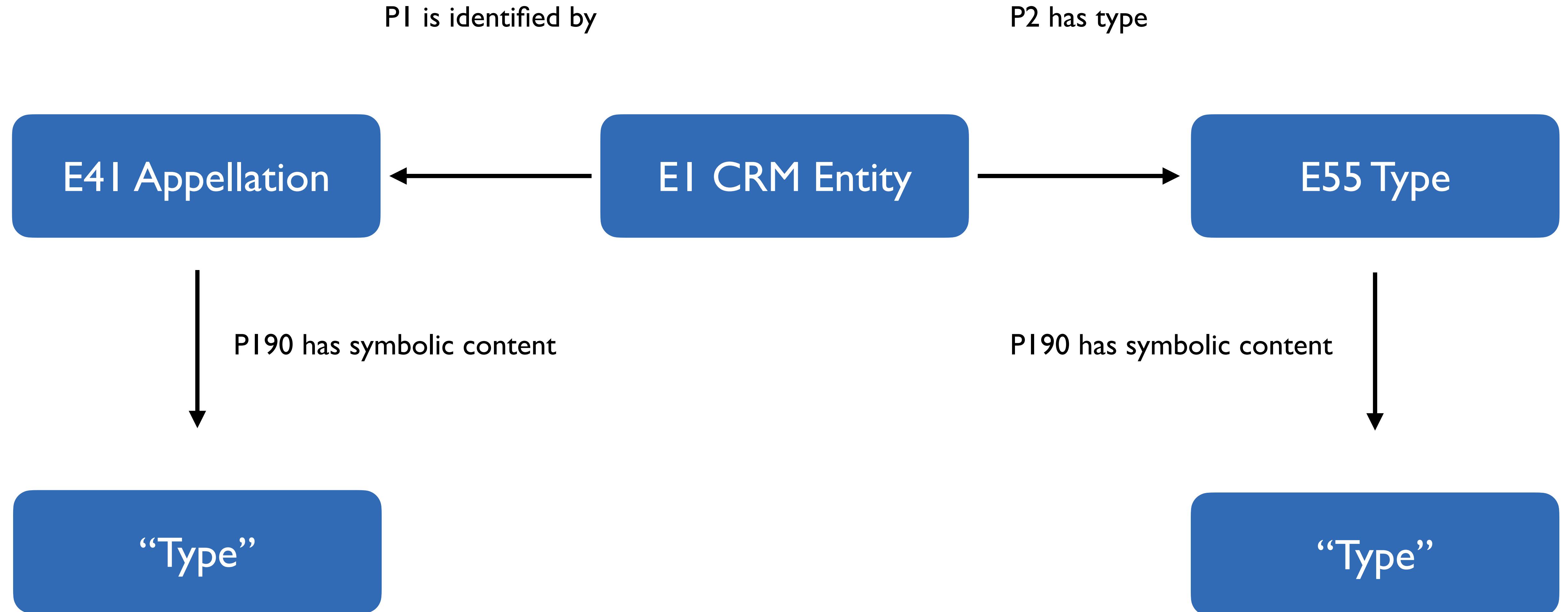


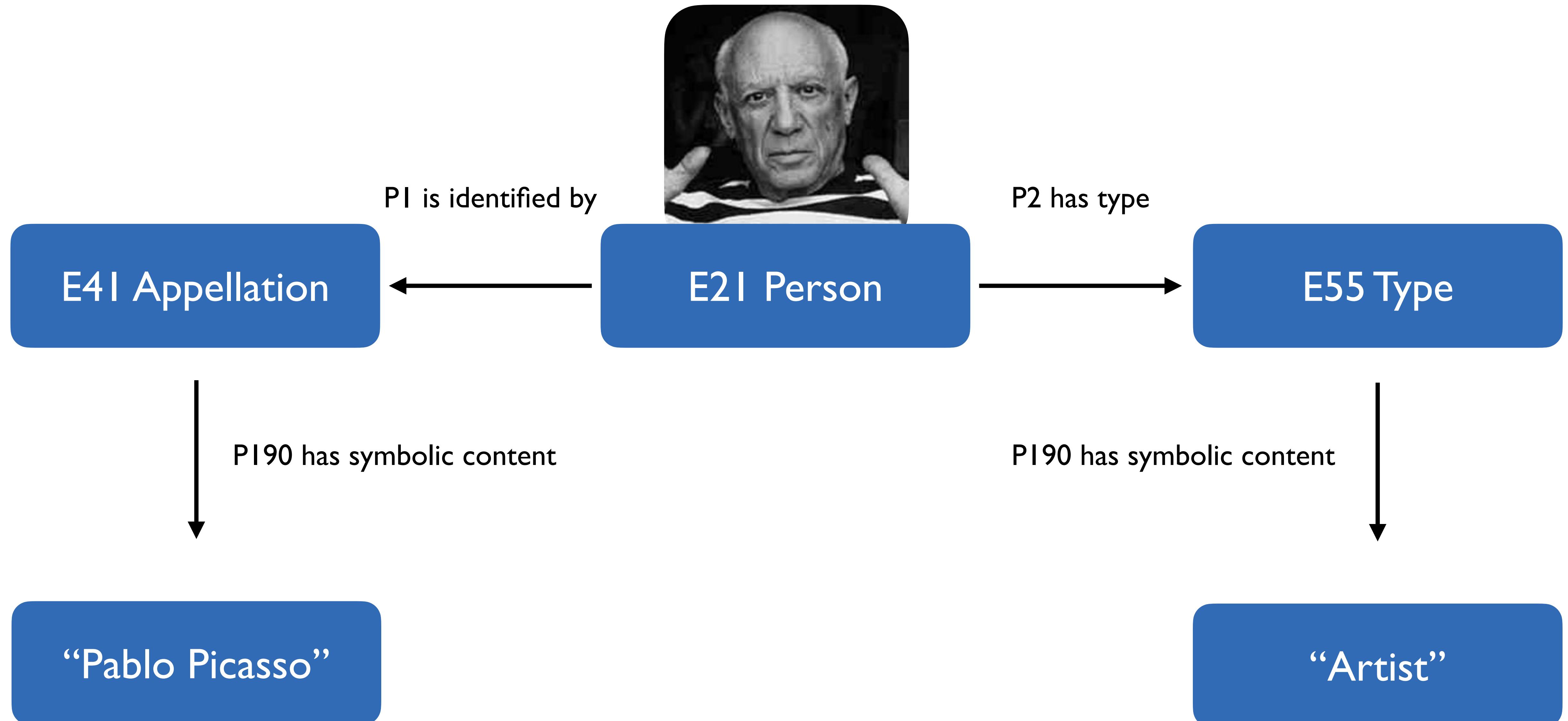


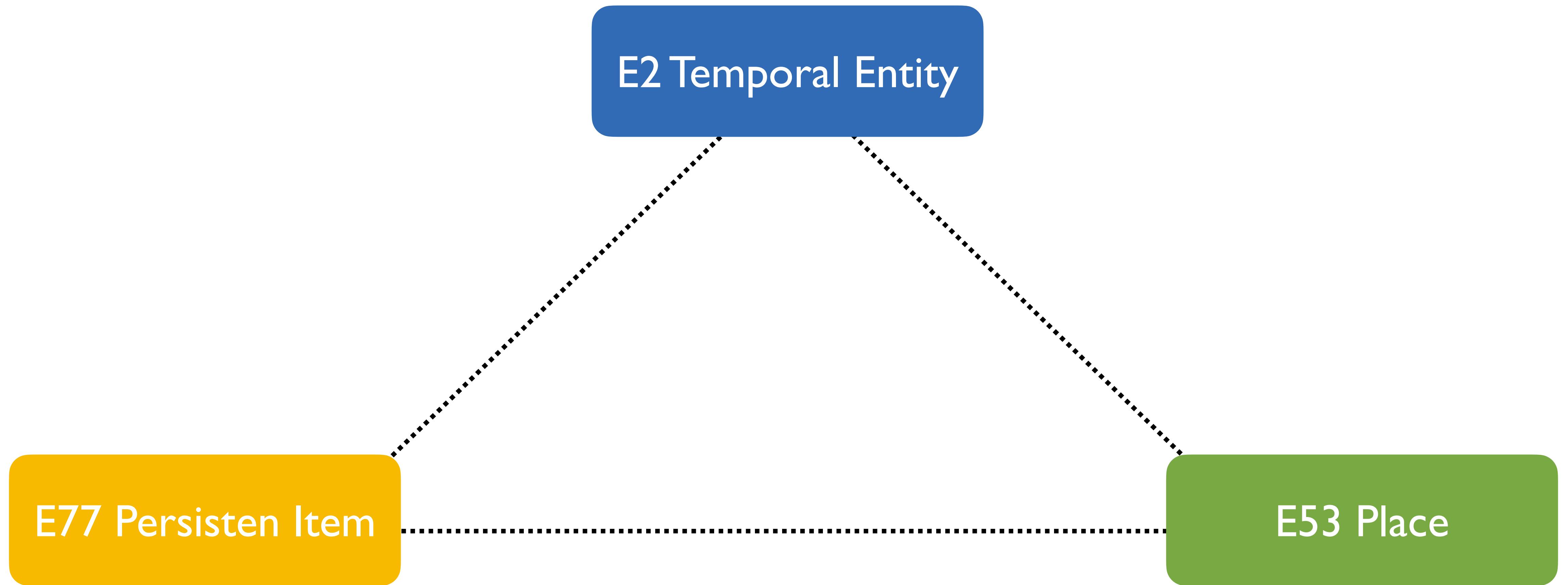
P1 is identified by

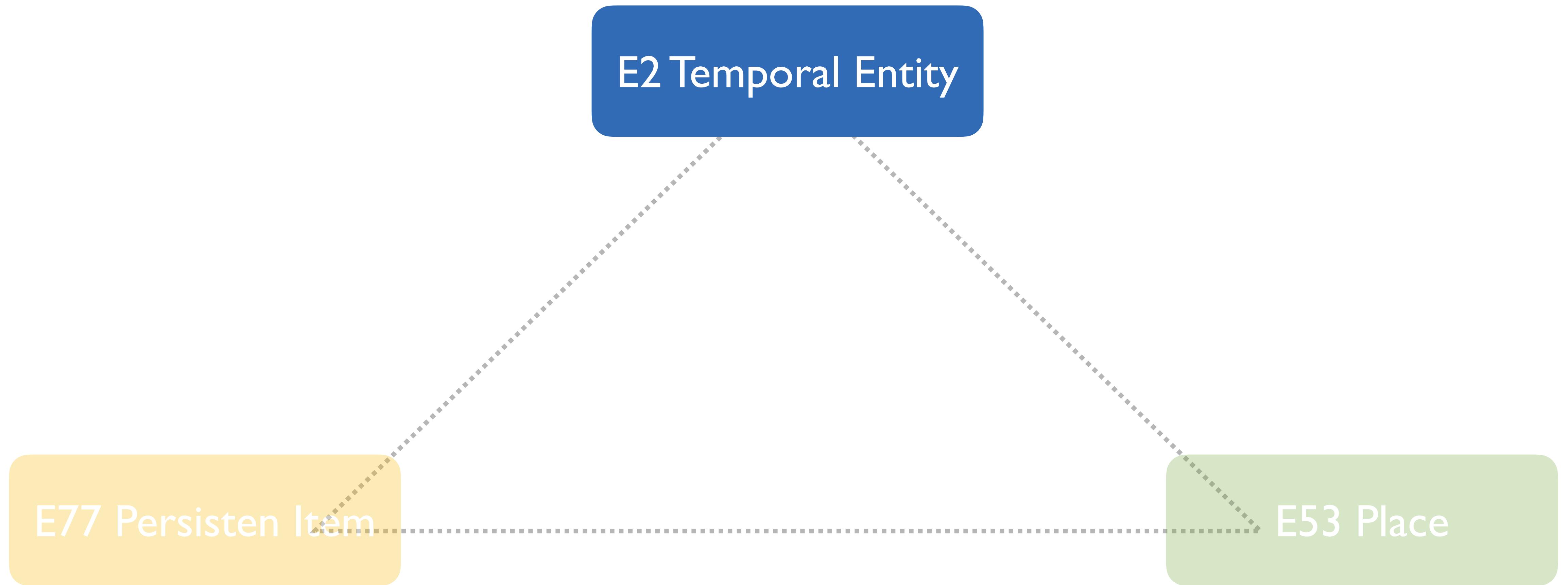
P2 has type

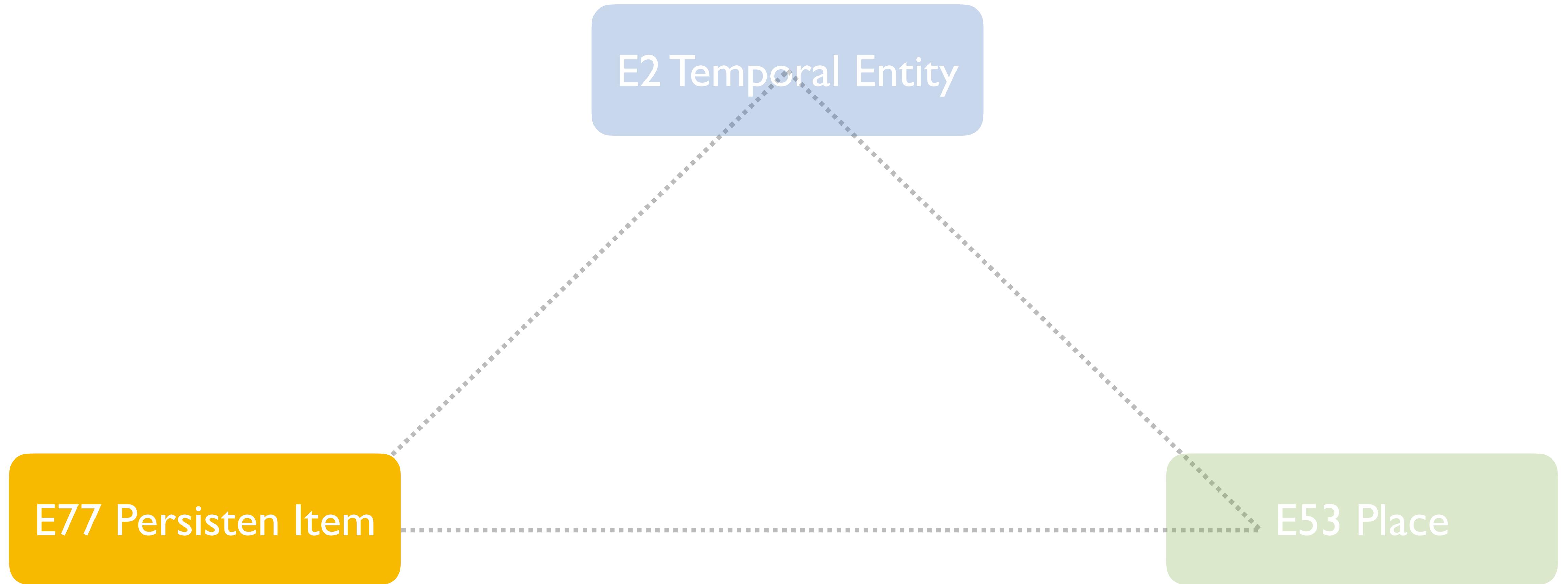
P190 has symbolic content

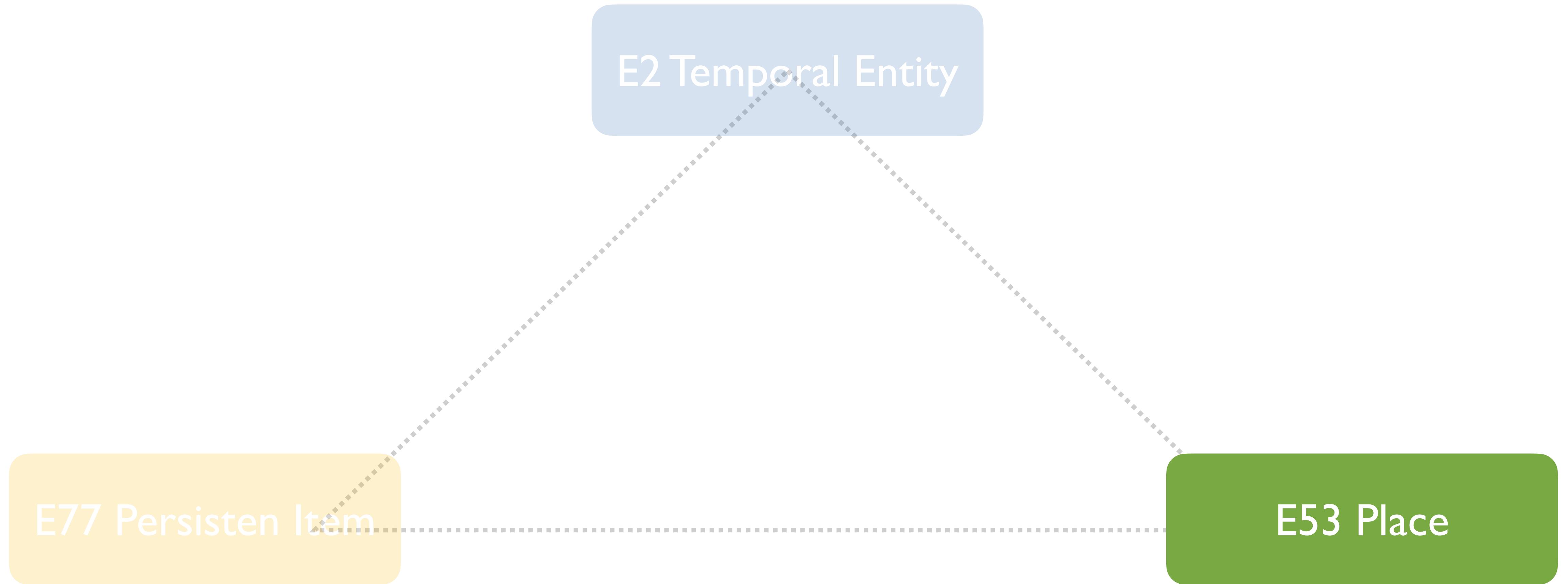


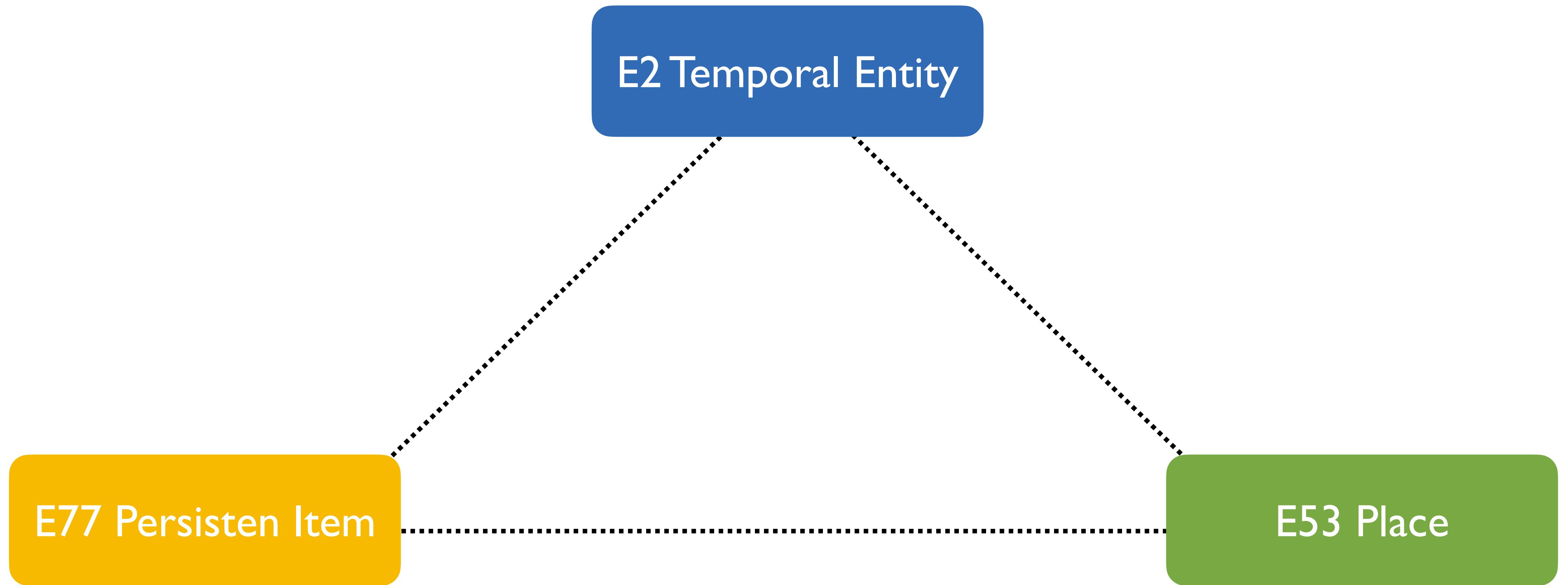


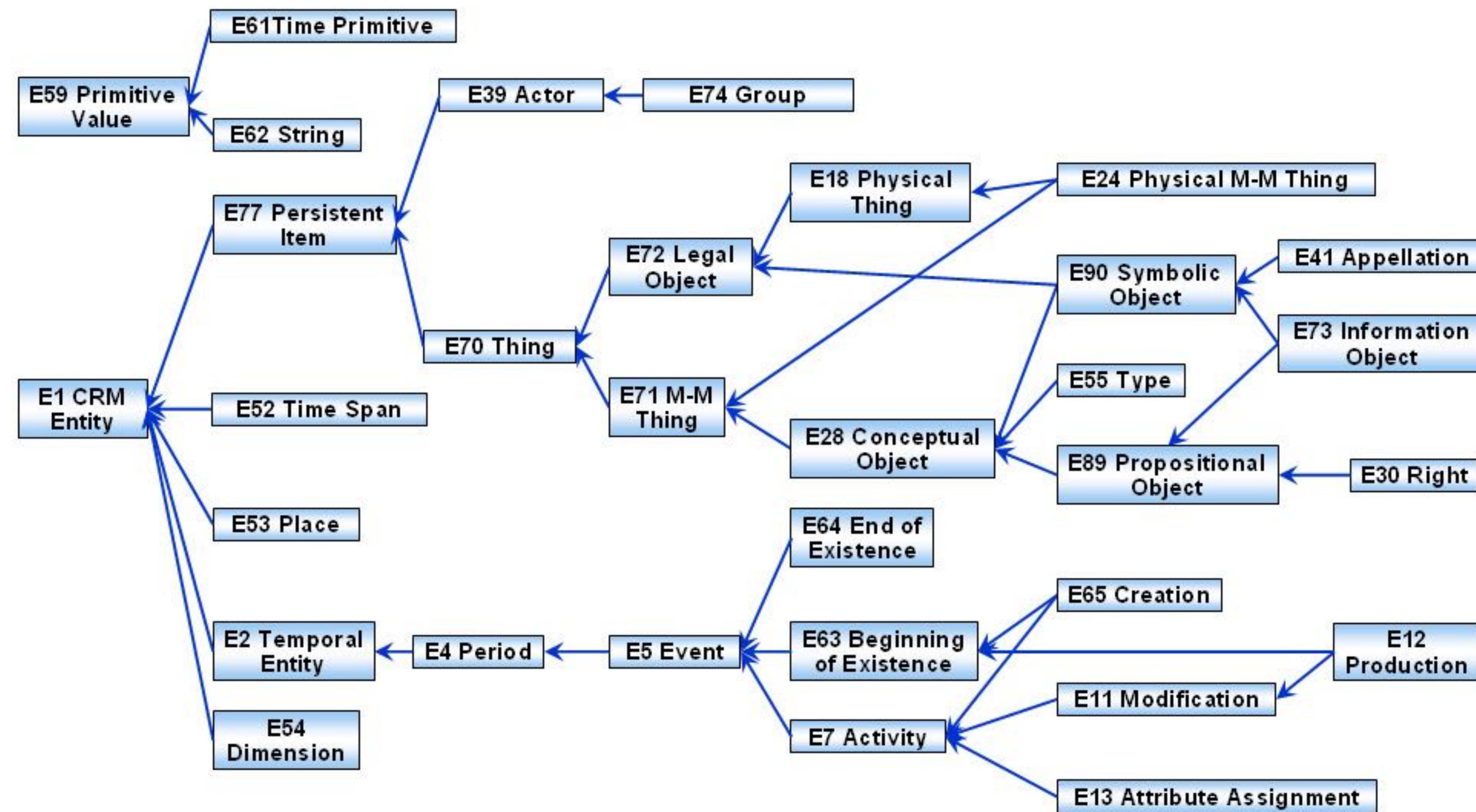


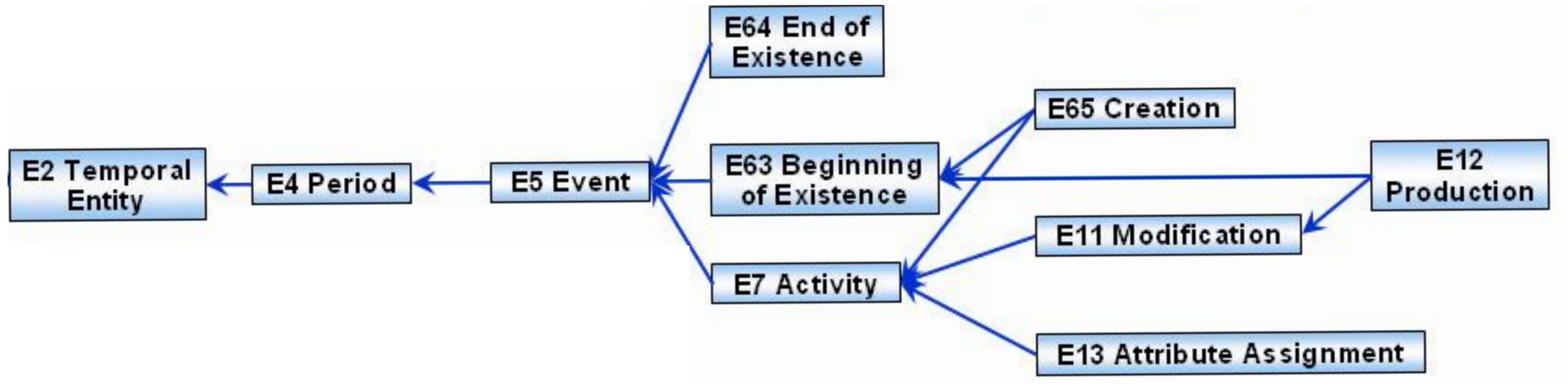


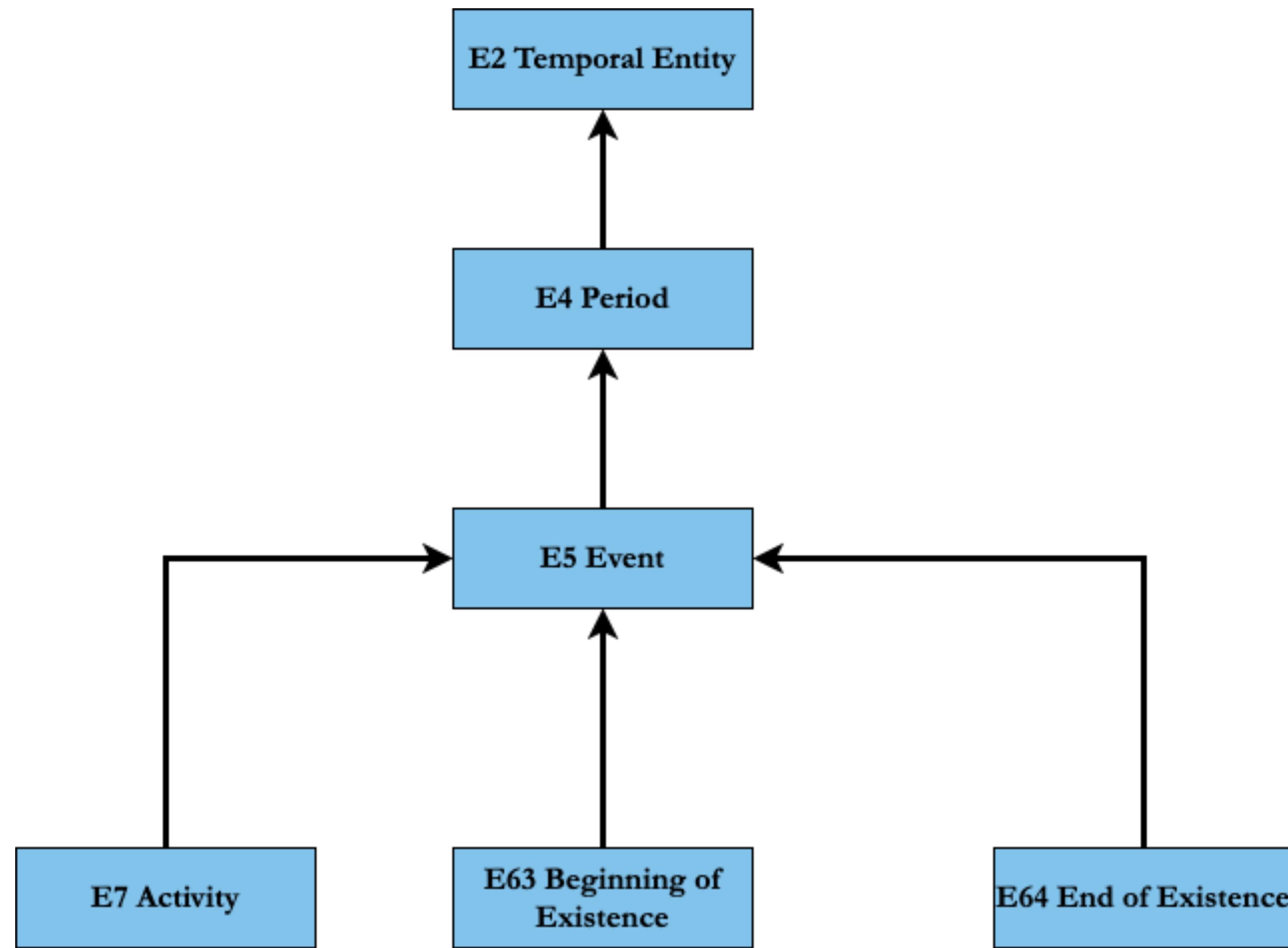


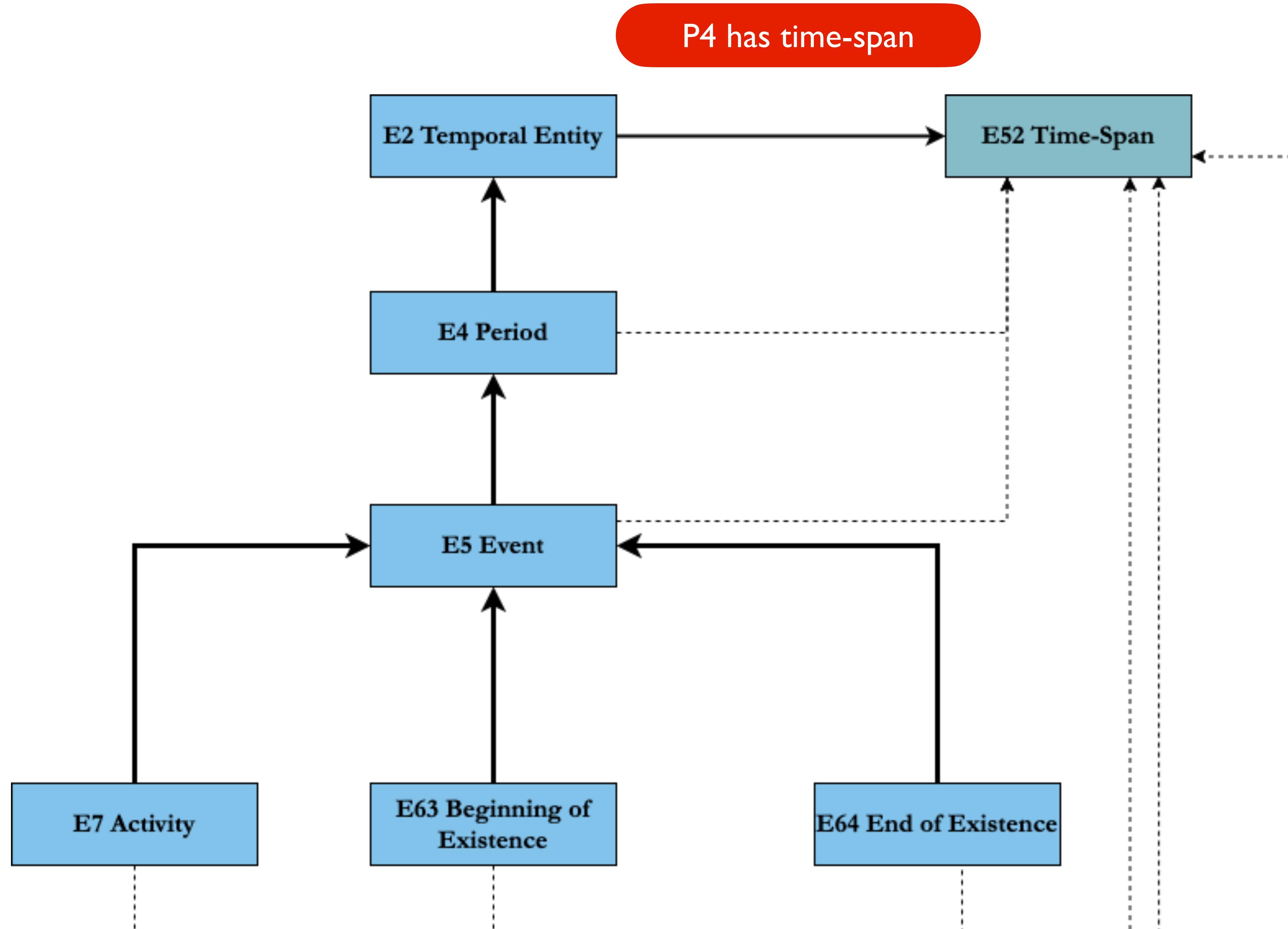


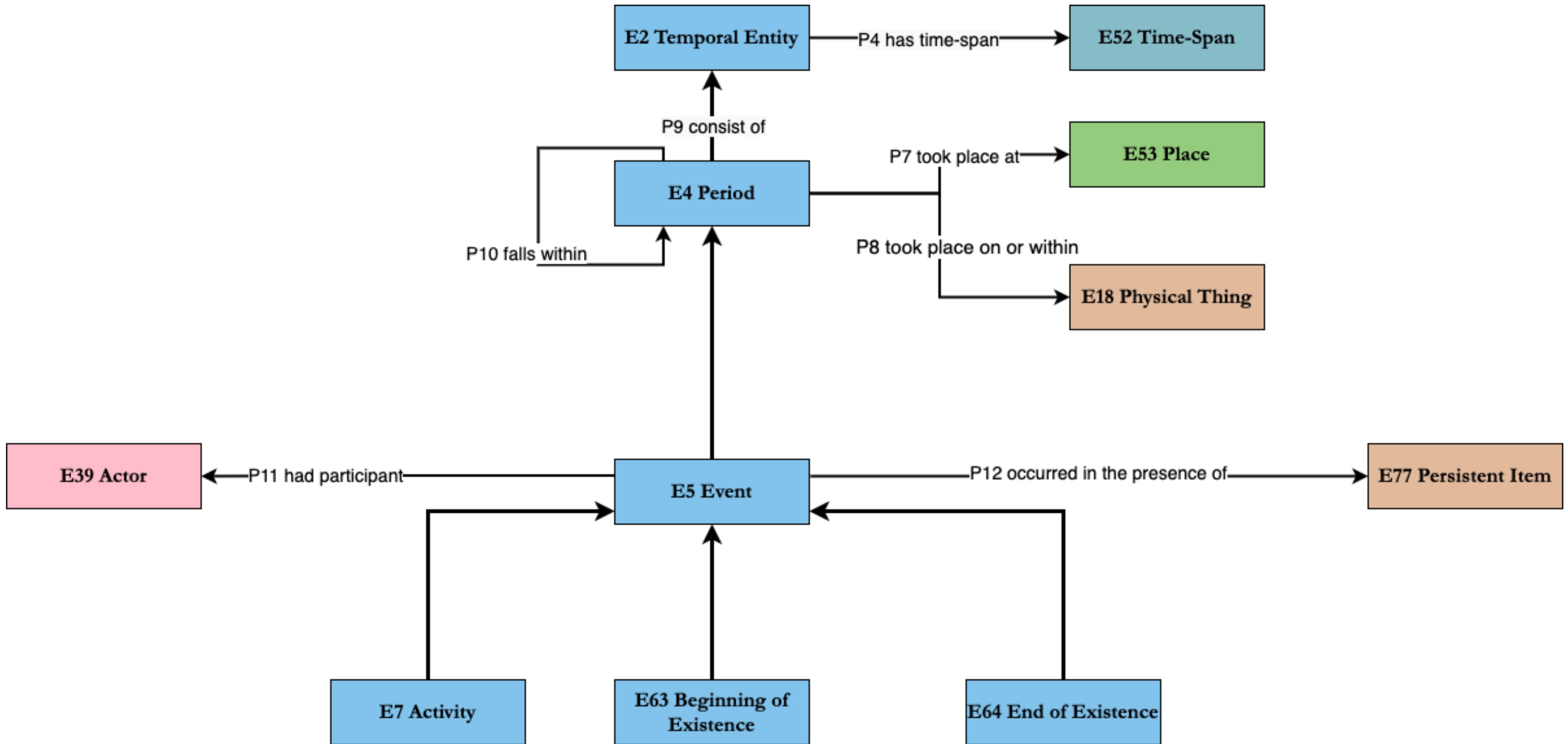


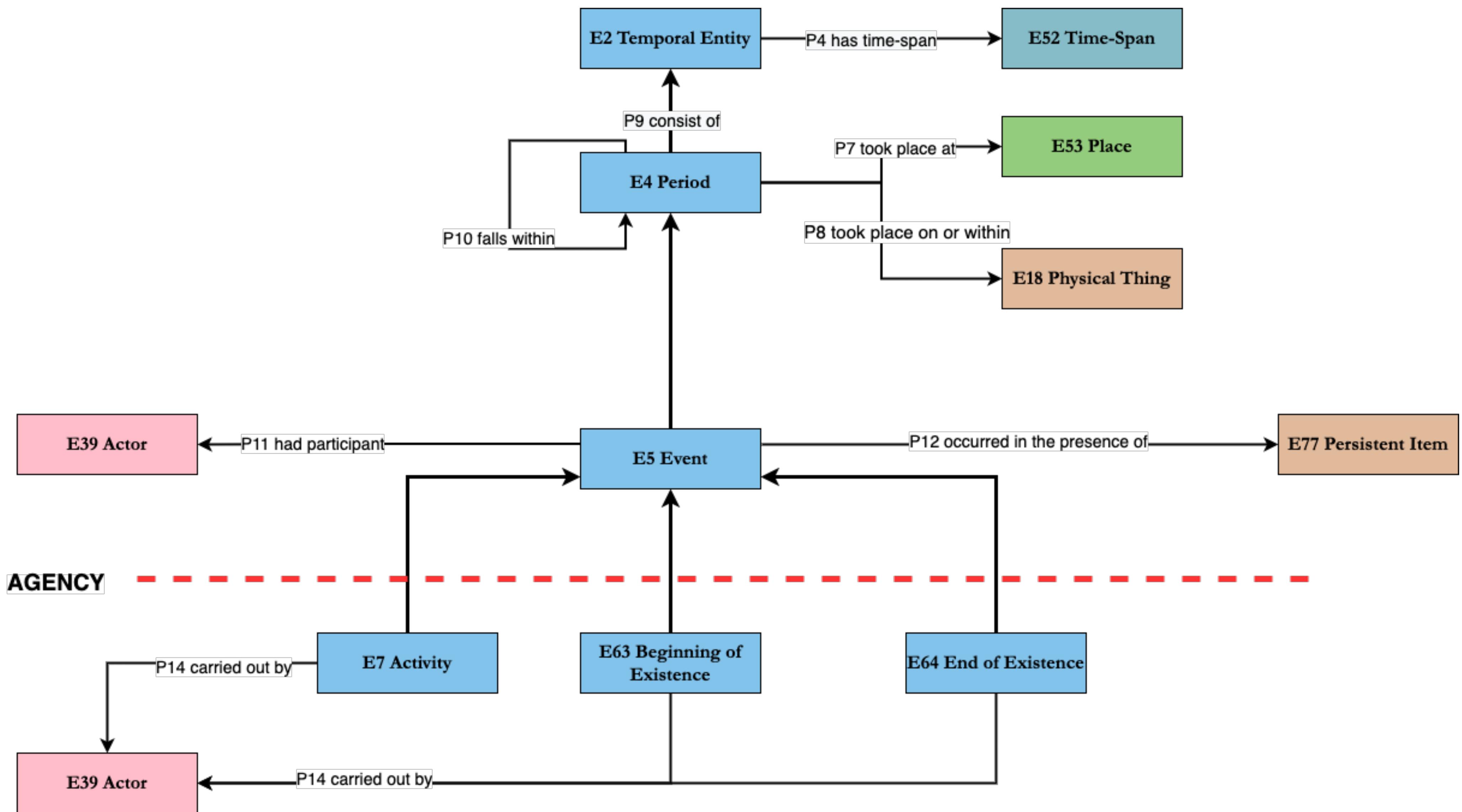


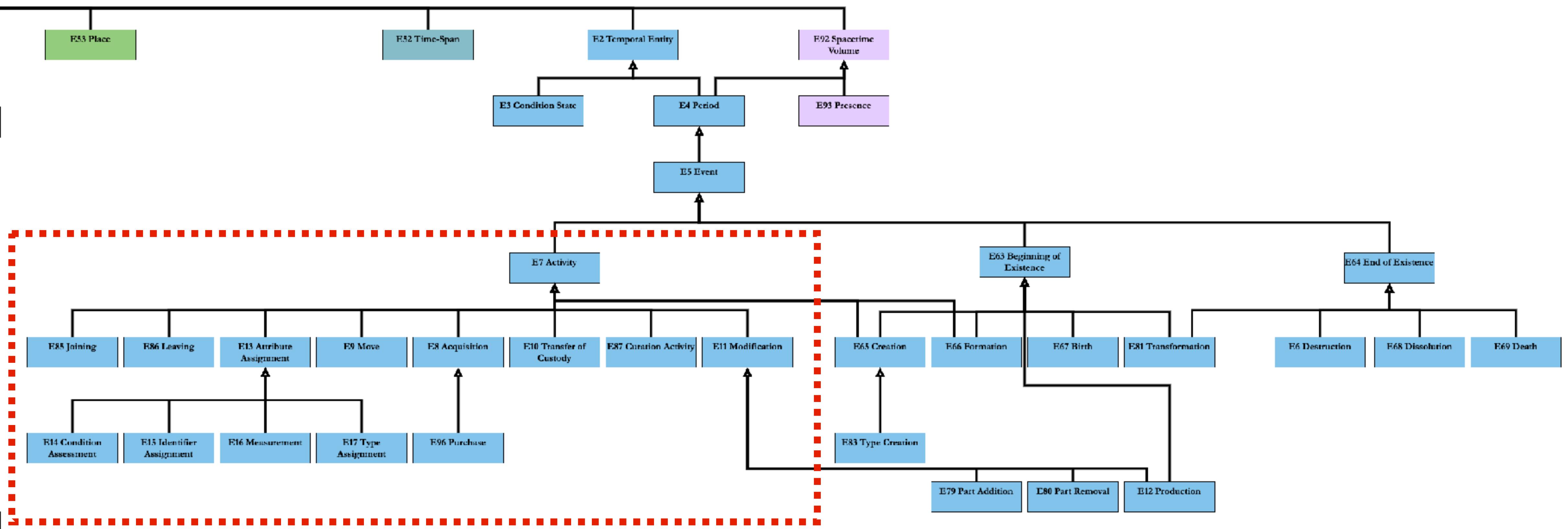


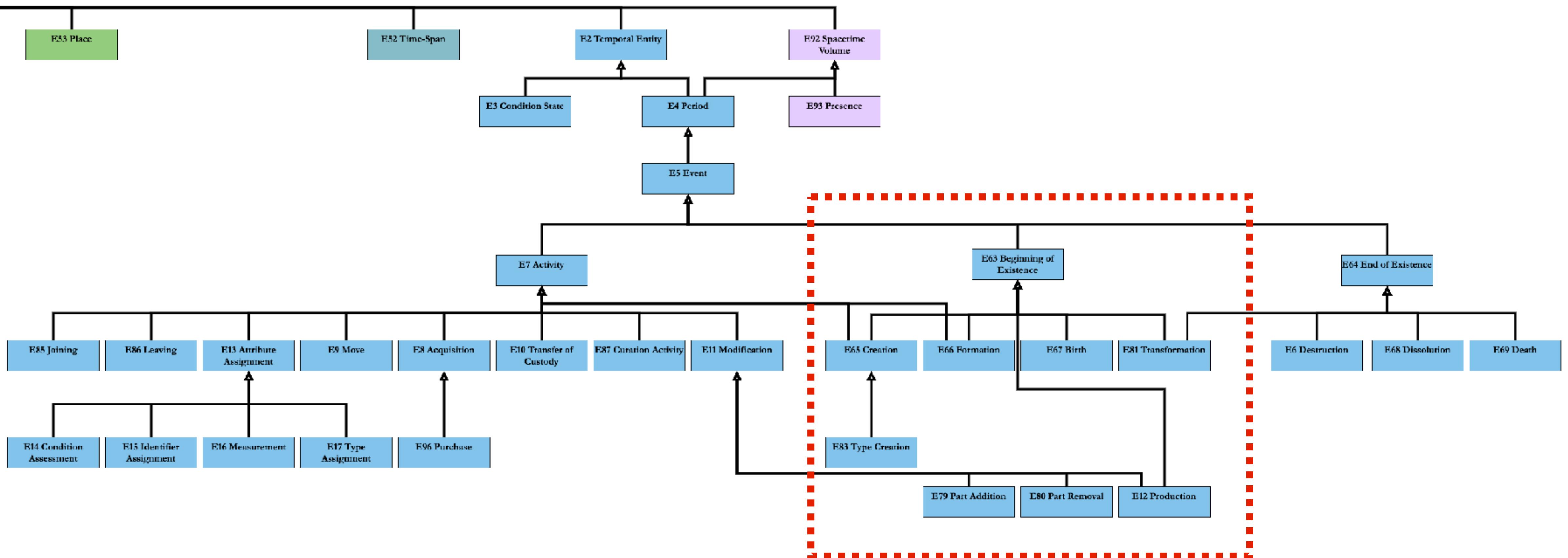


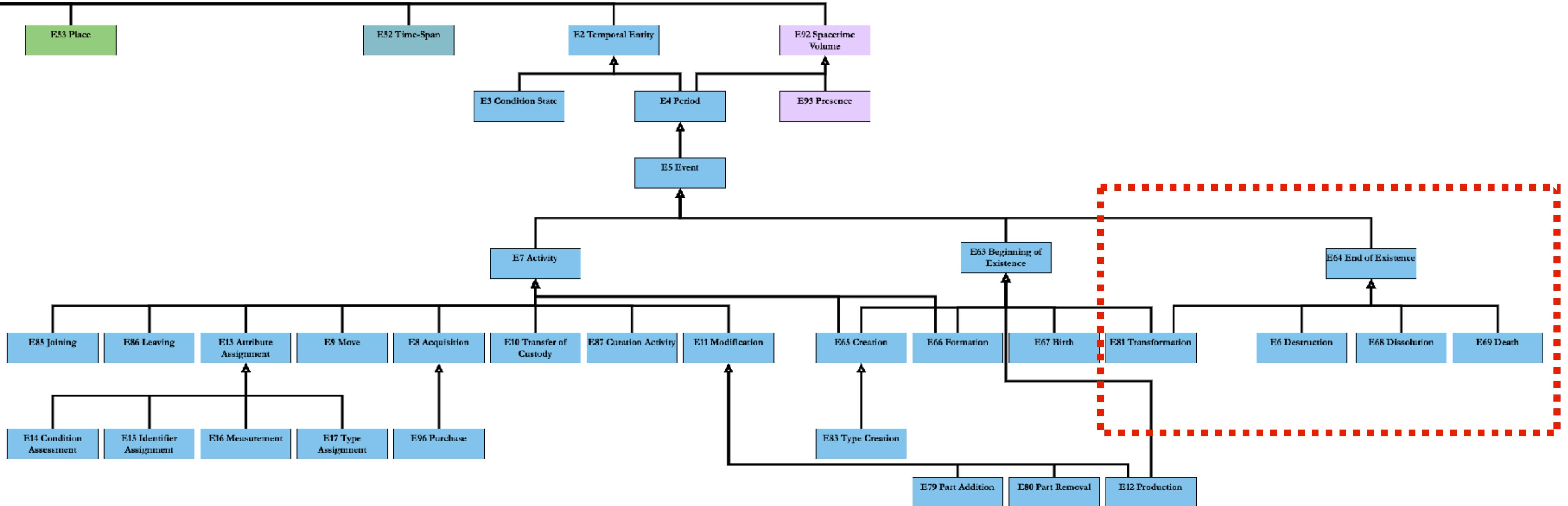


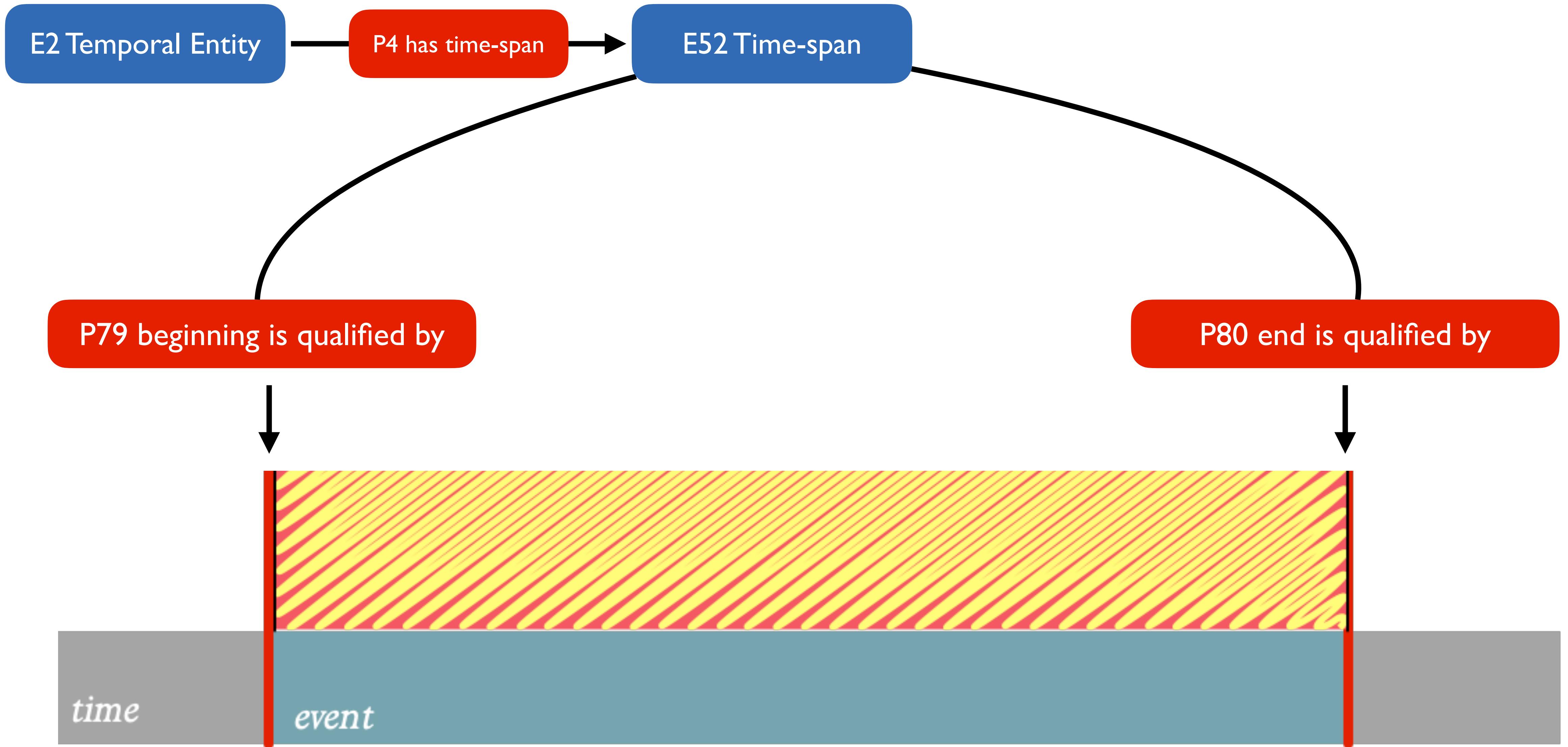


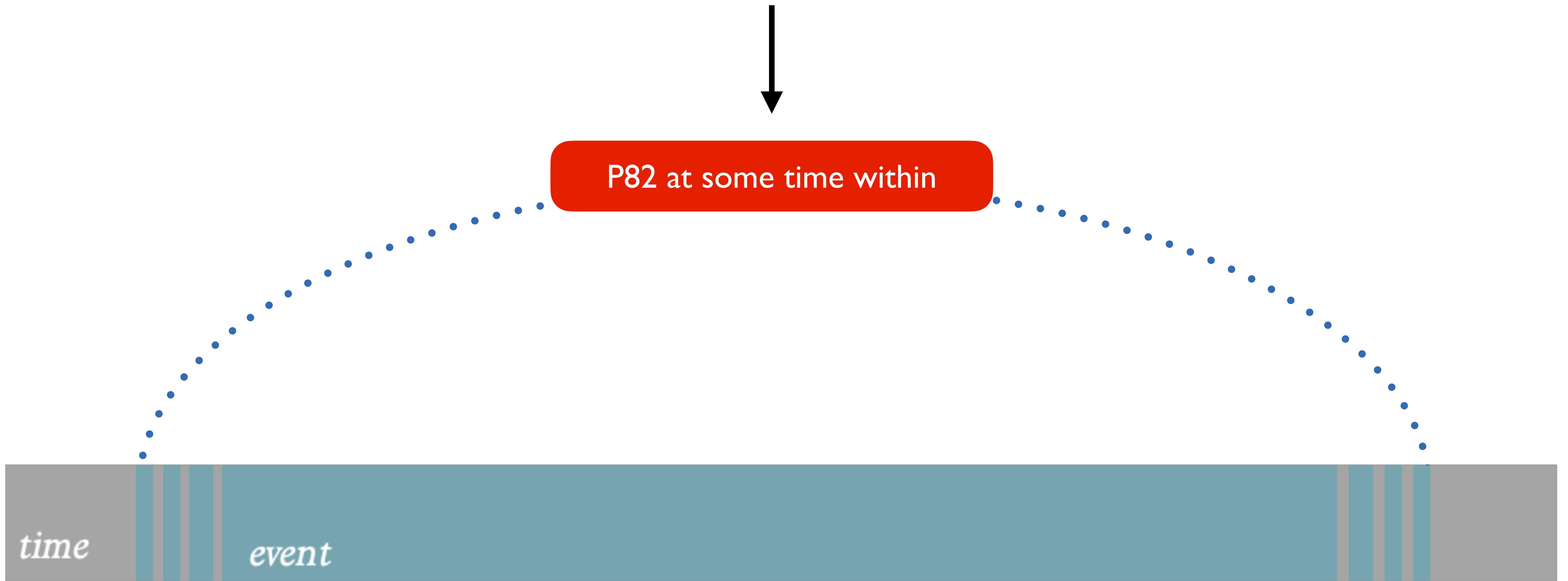


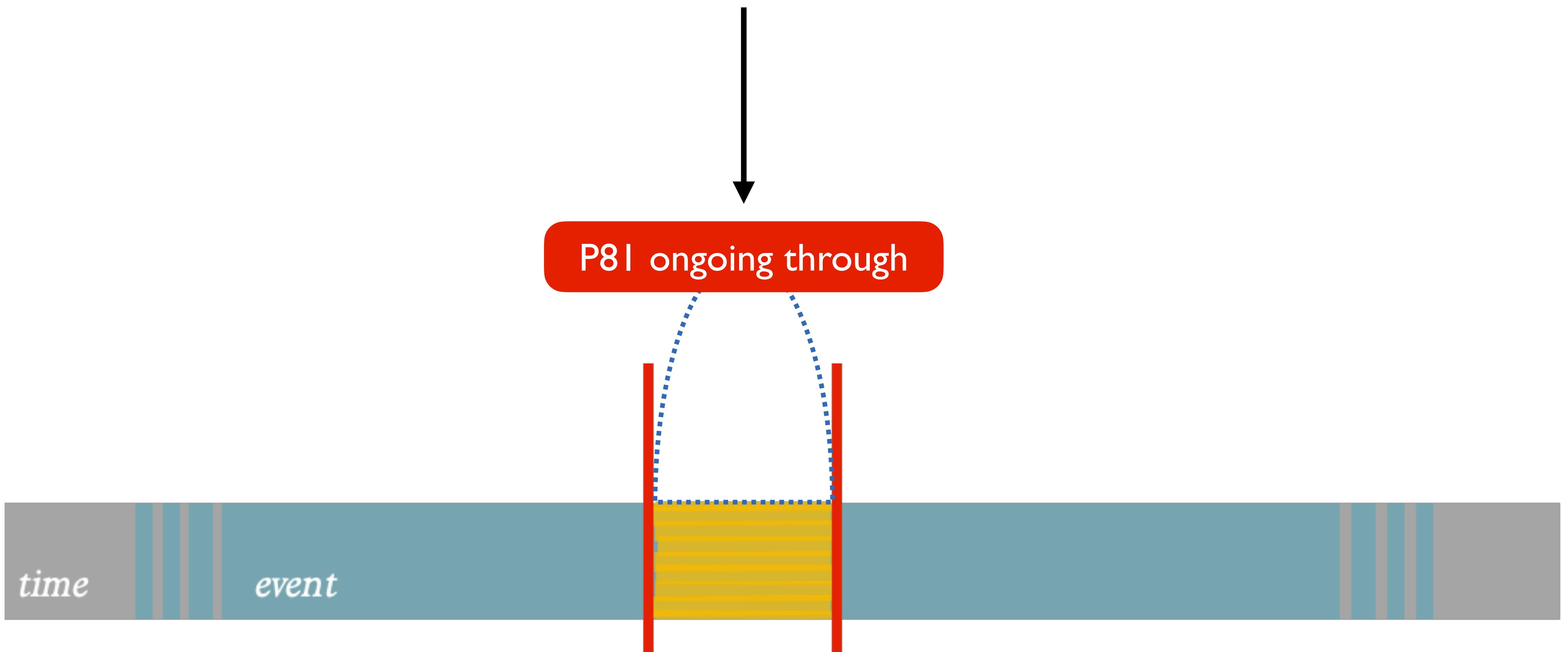


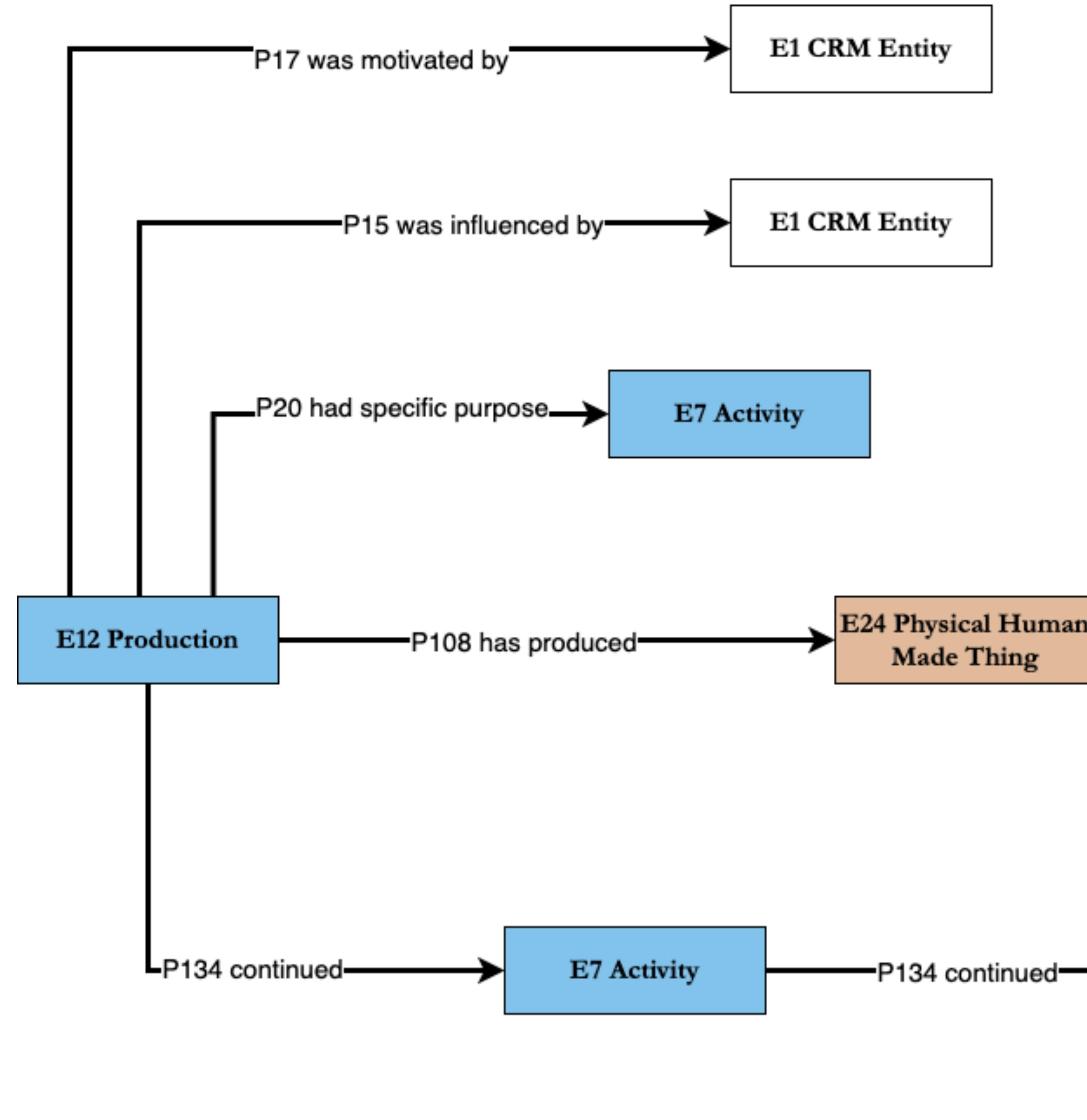


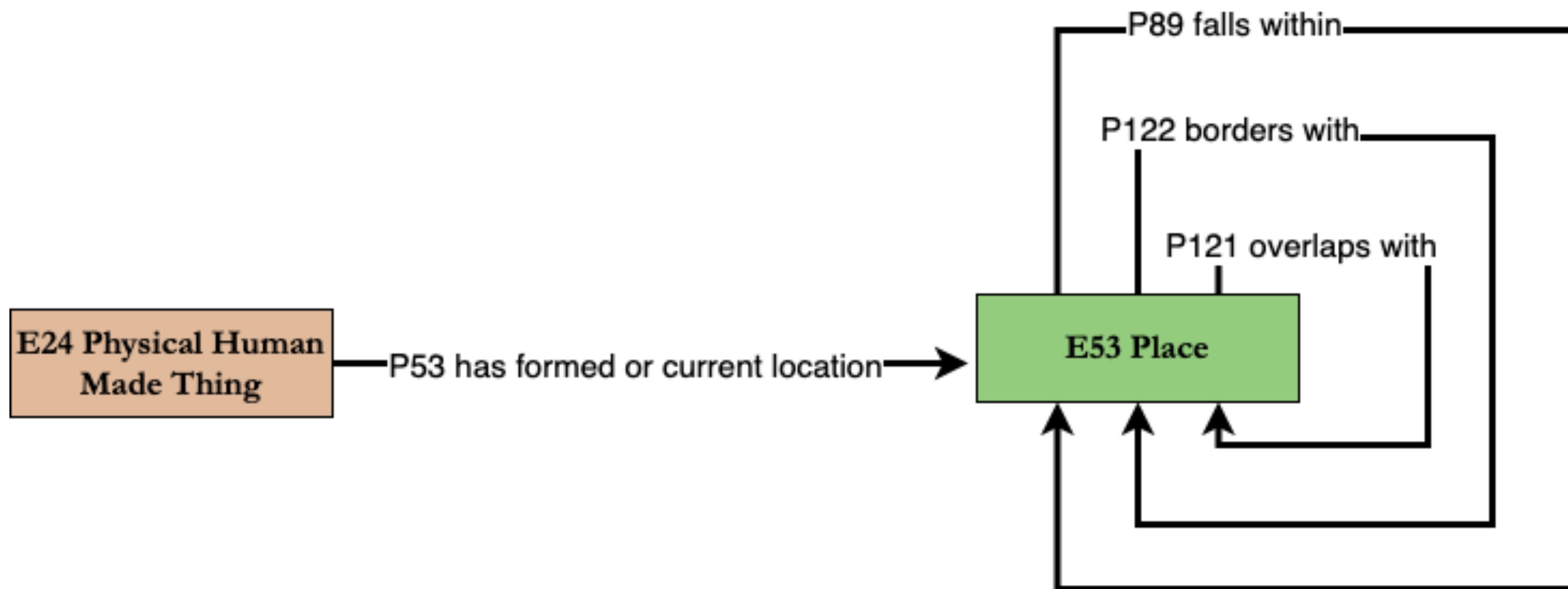


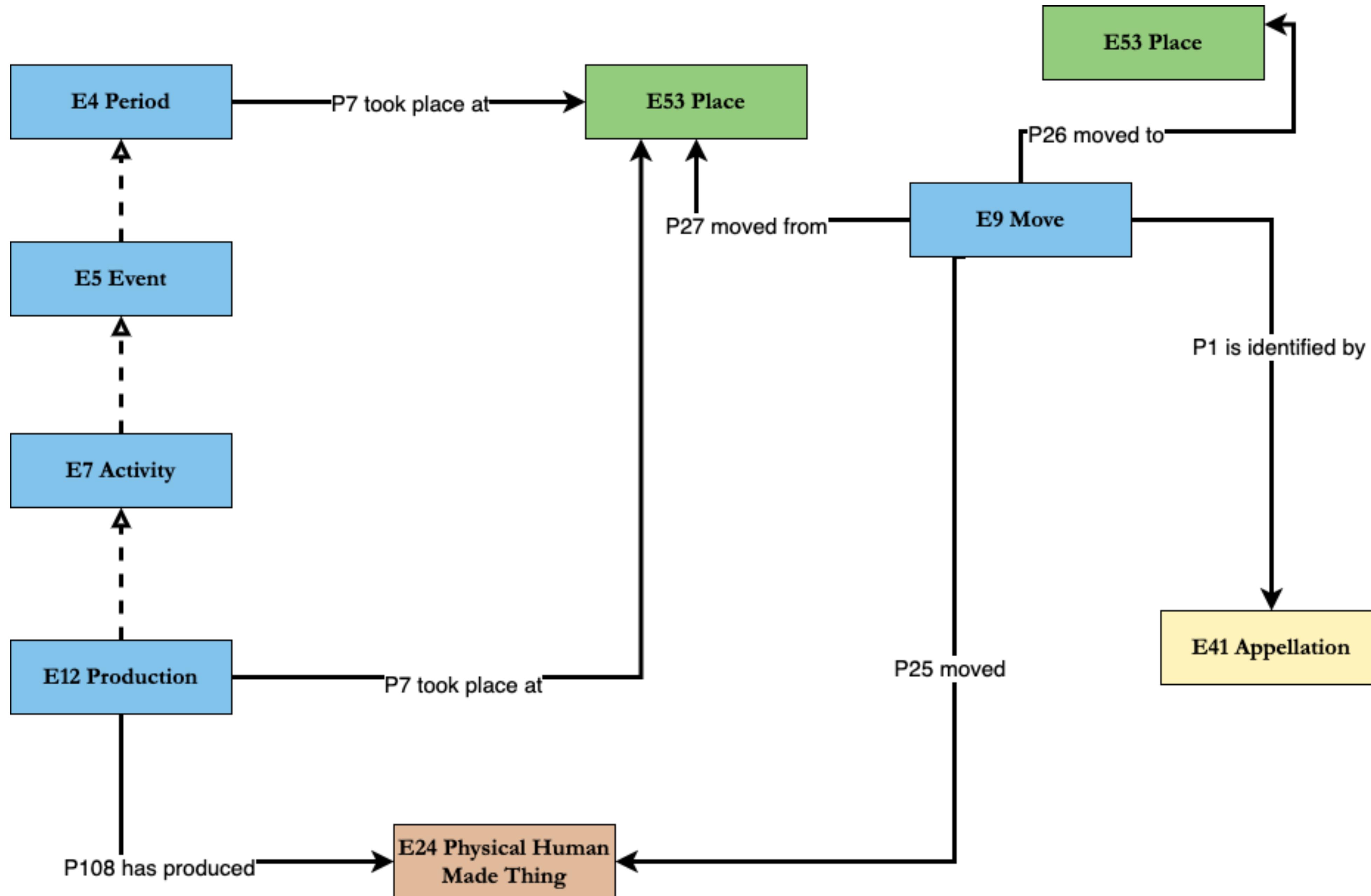


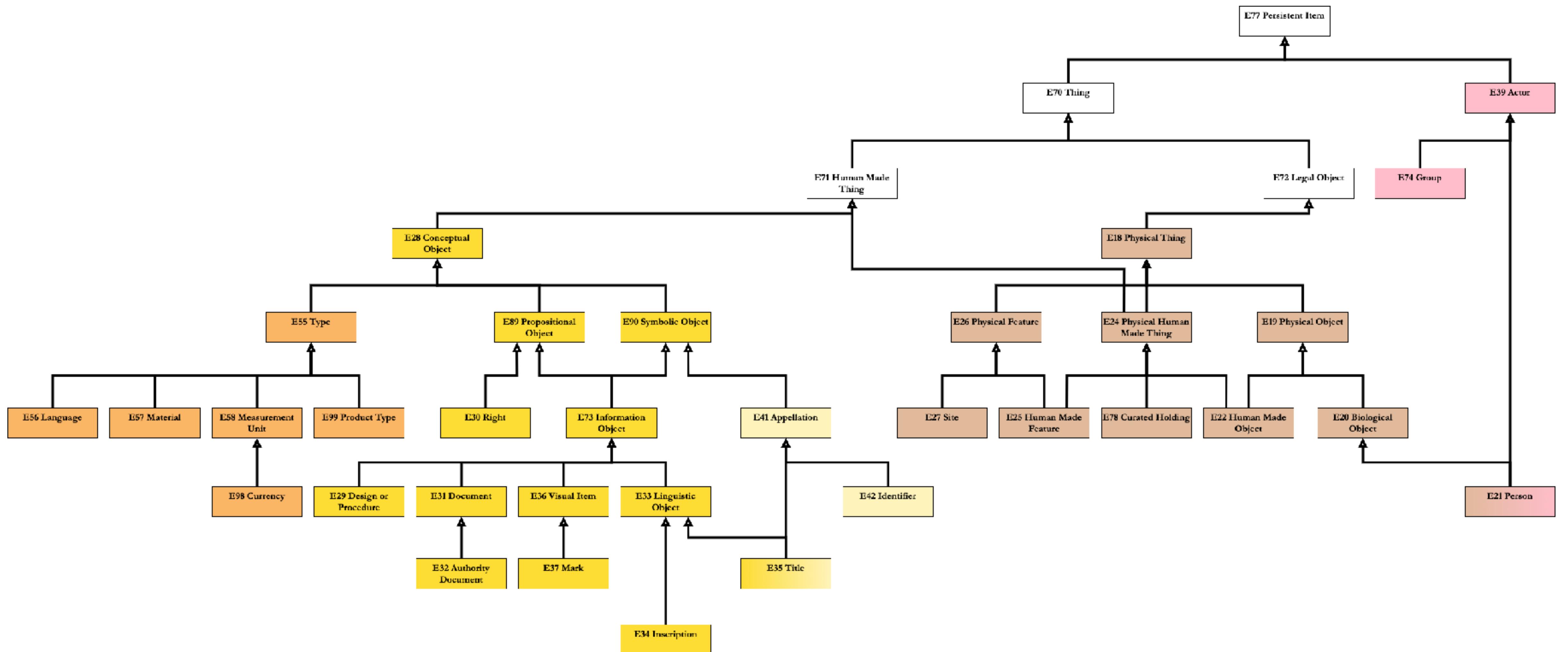


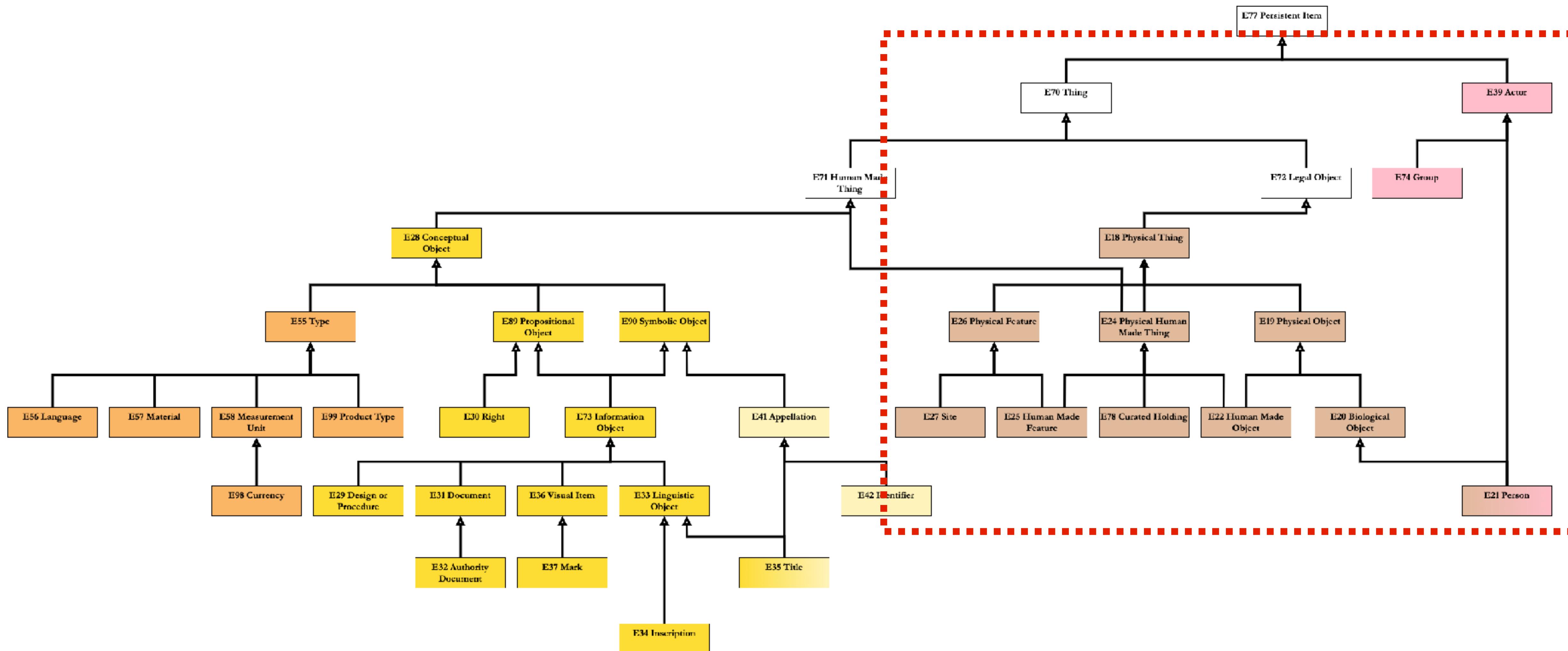


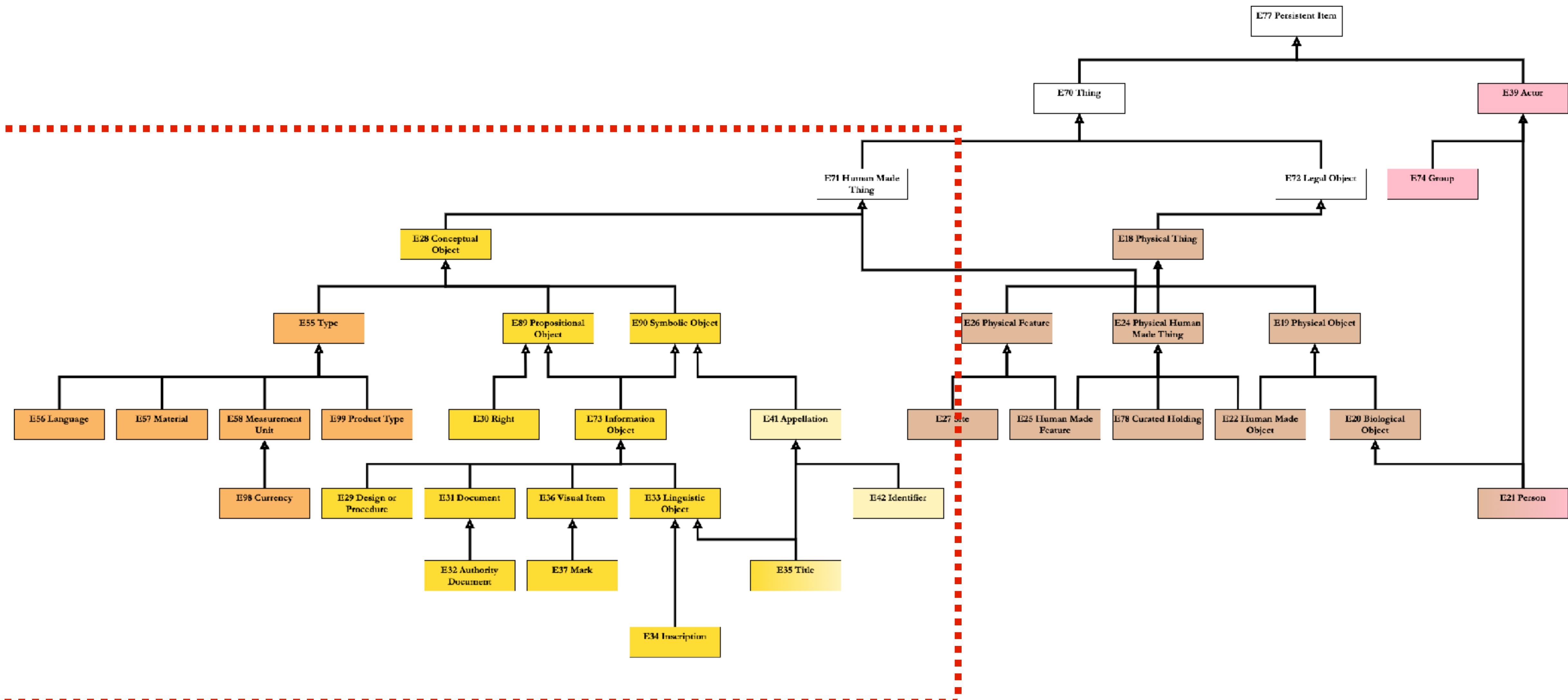




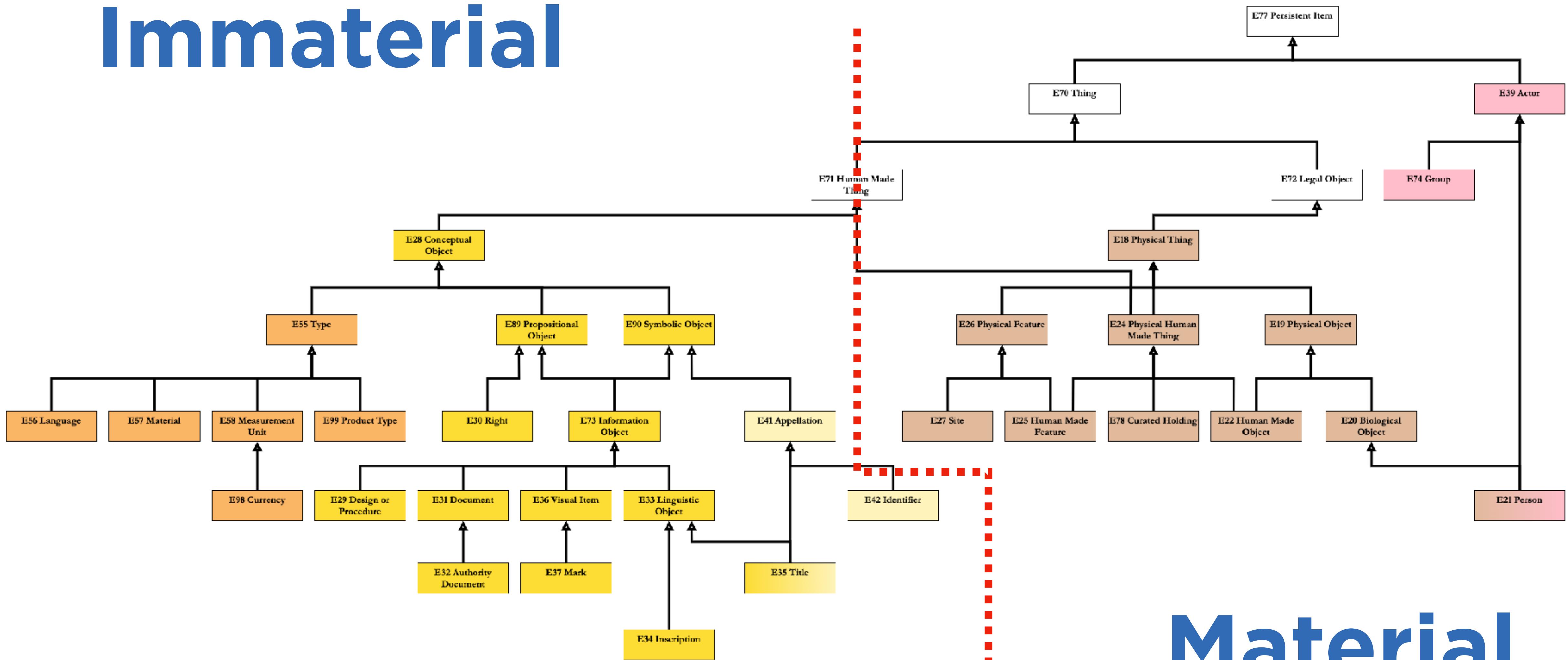




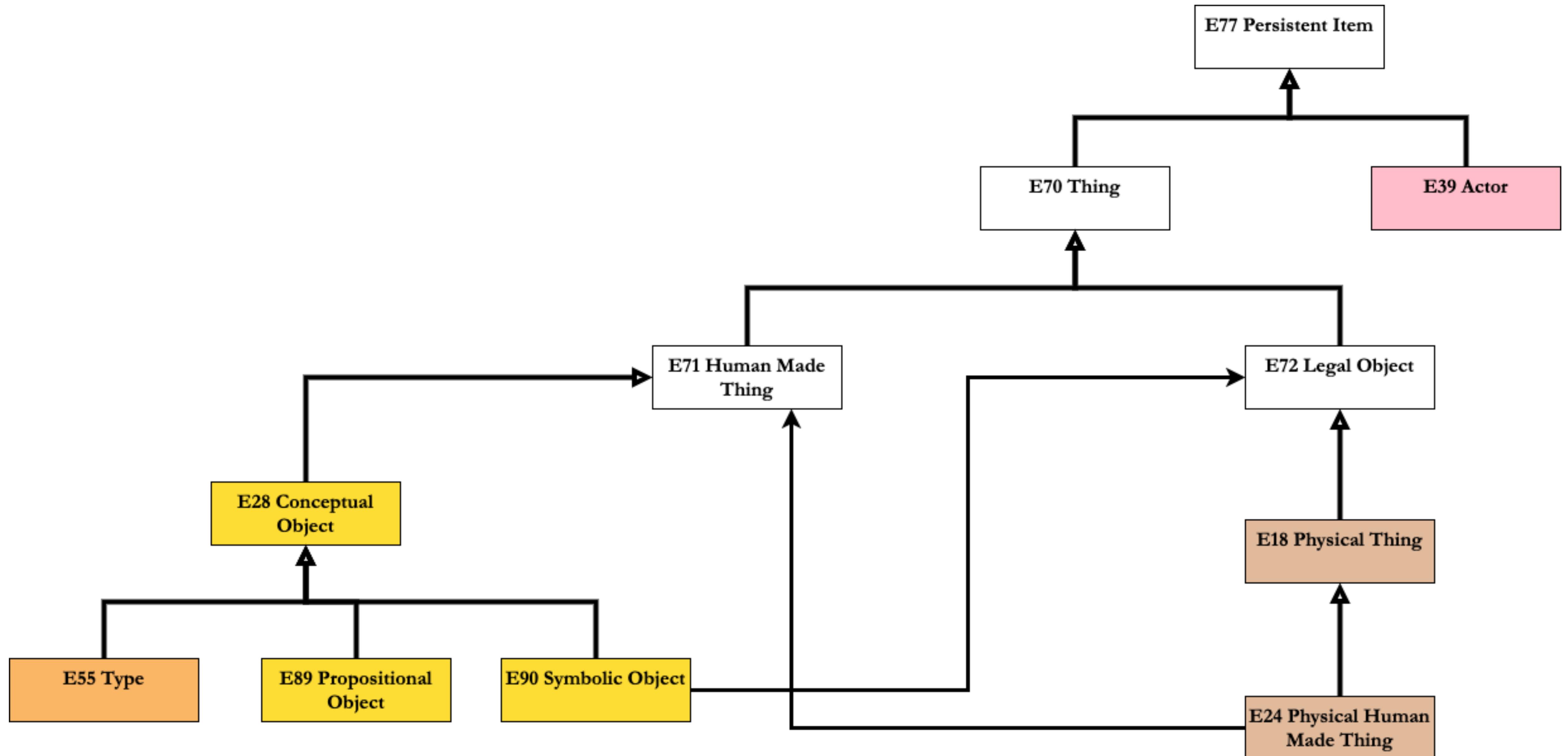


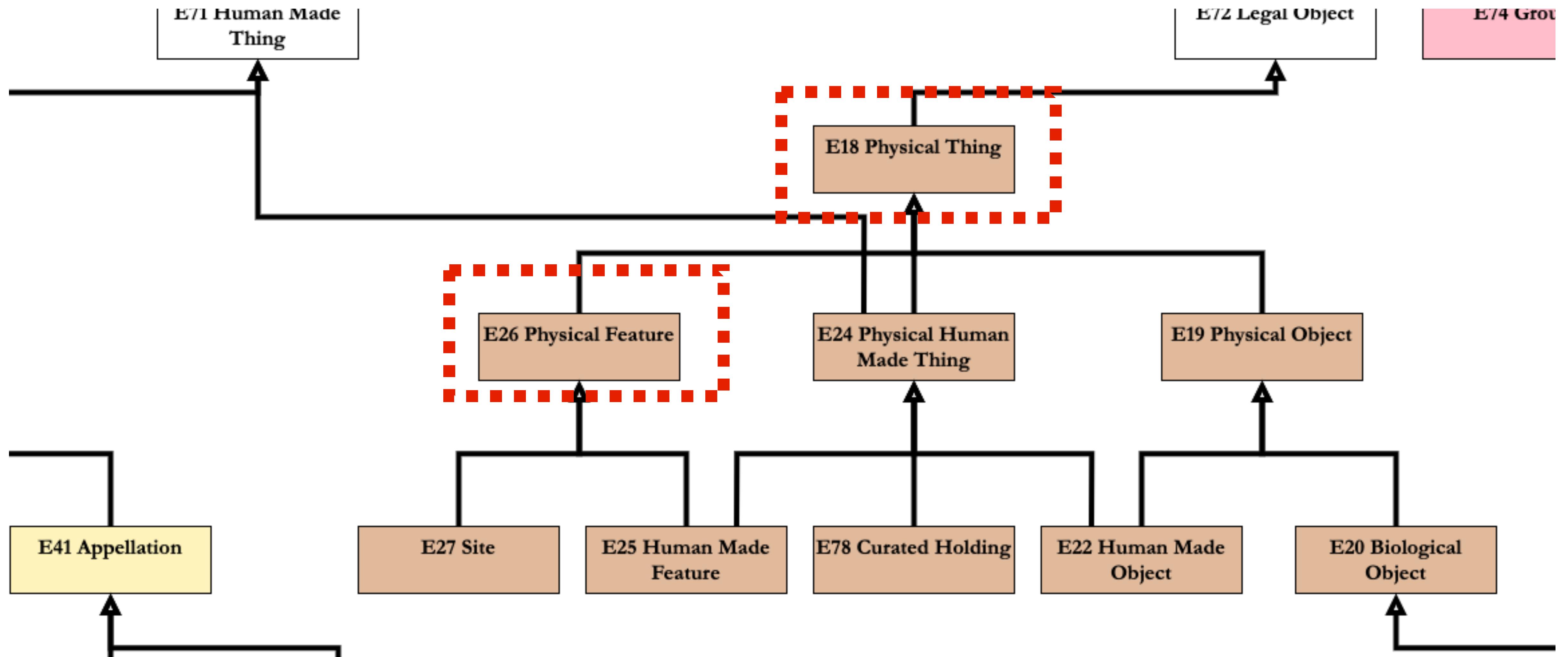


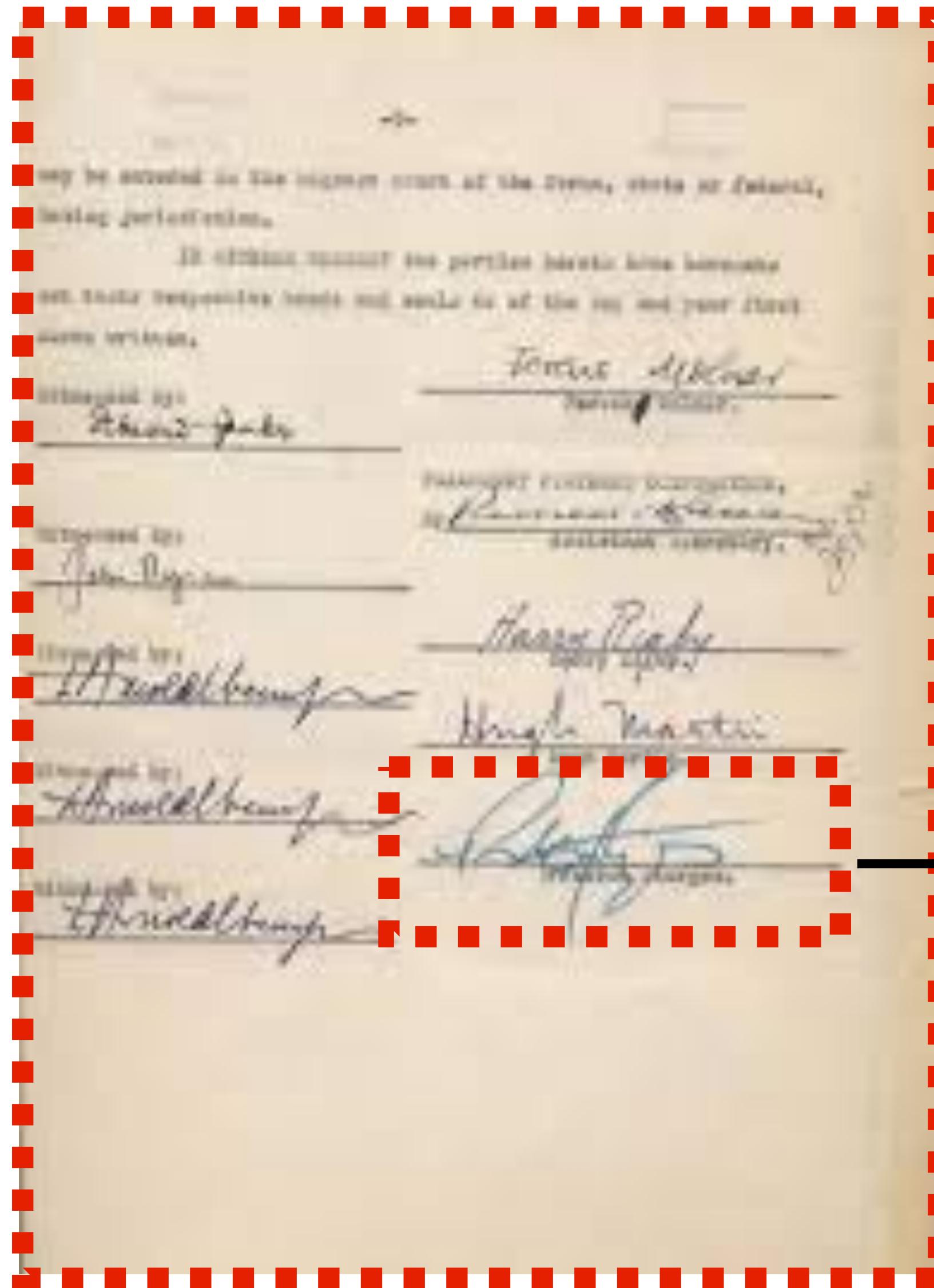
Immateriel



Material







E26 Physical Feature

E25 Human Made Feature

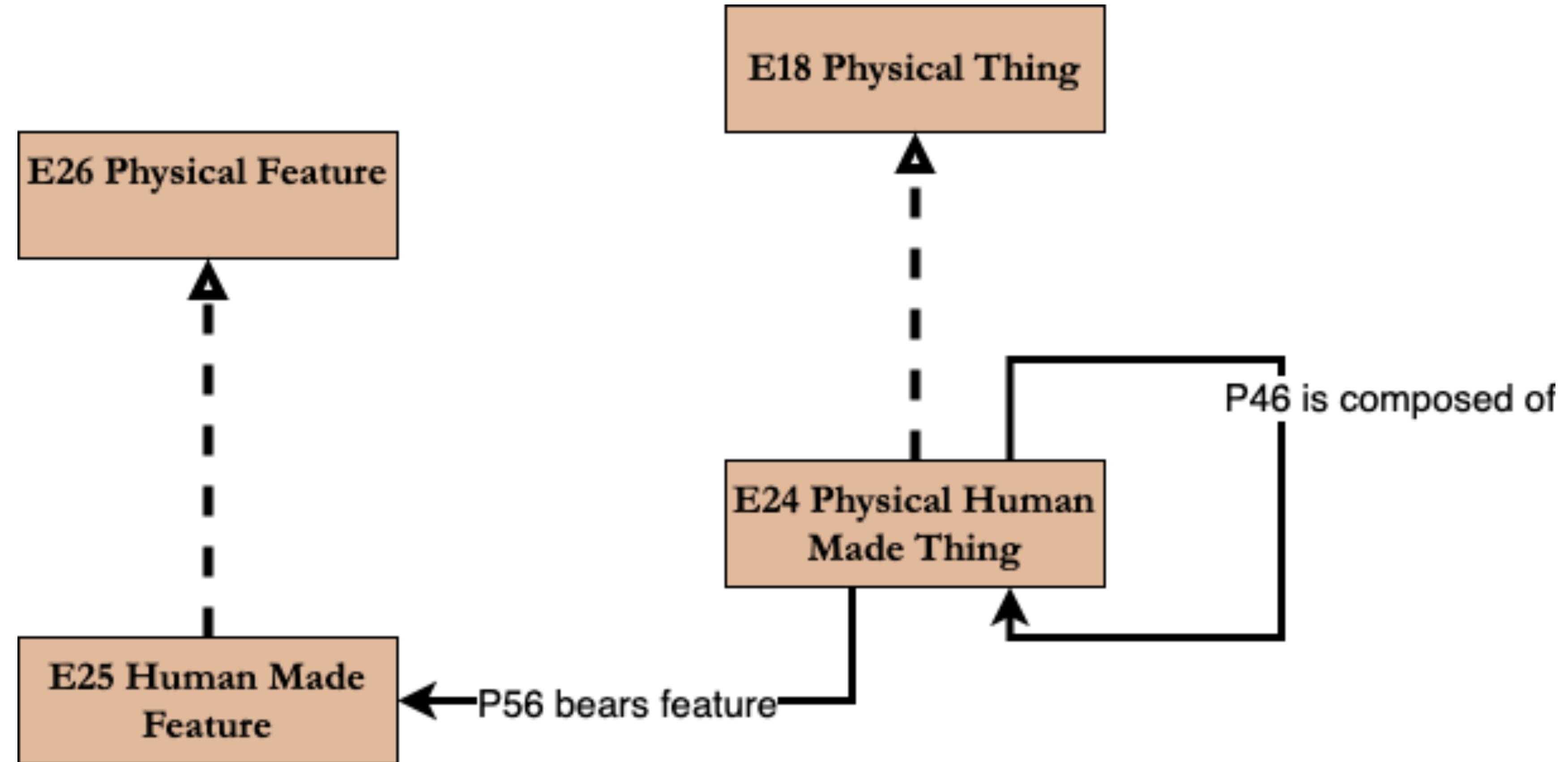
E18 Physical Thing

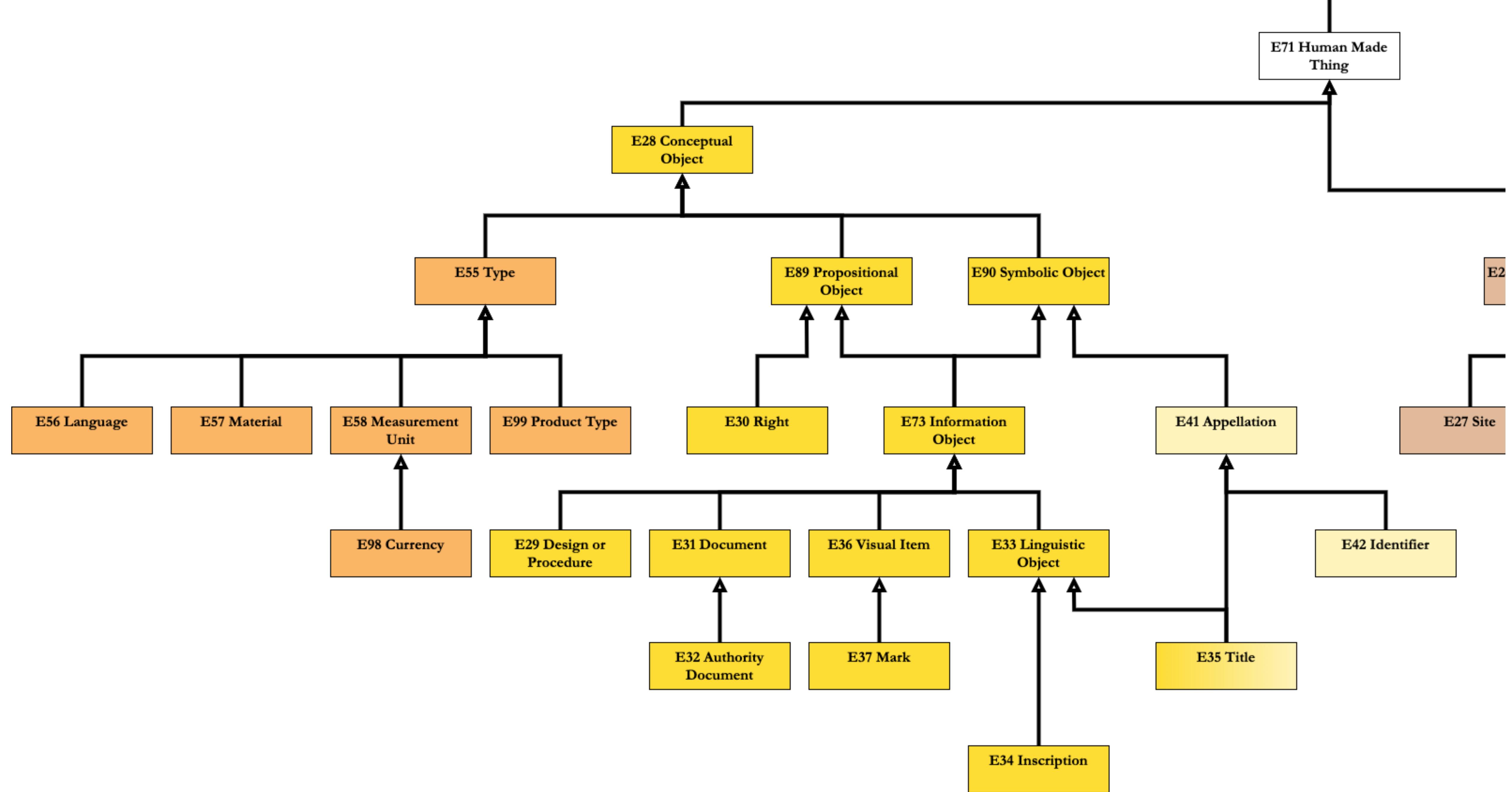
E24 Physical Human
Made Thing

E26 Physical Feature

E25 Human Made Feature

E24 Physical Human
Made Thing





Conceptual object

This class comprises non-material products of our minds and other human produced data that have become objects of a discourse about their identity, circumstances of creation or historical implication. The production of such information may have been supported by the use of technical devices such as cameras or computers.

Symbolic object

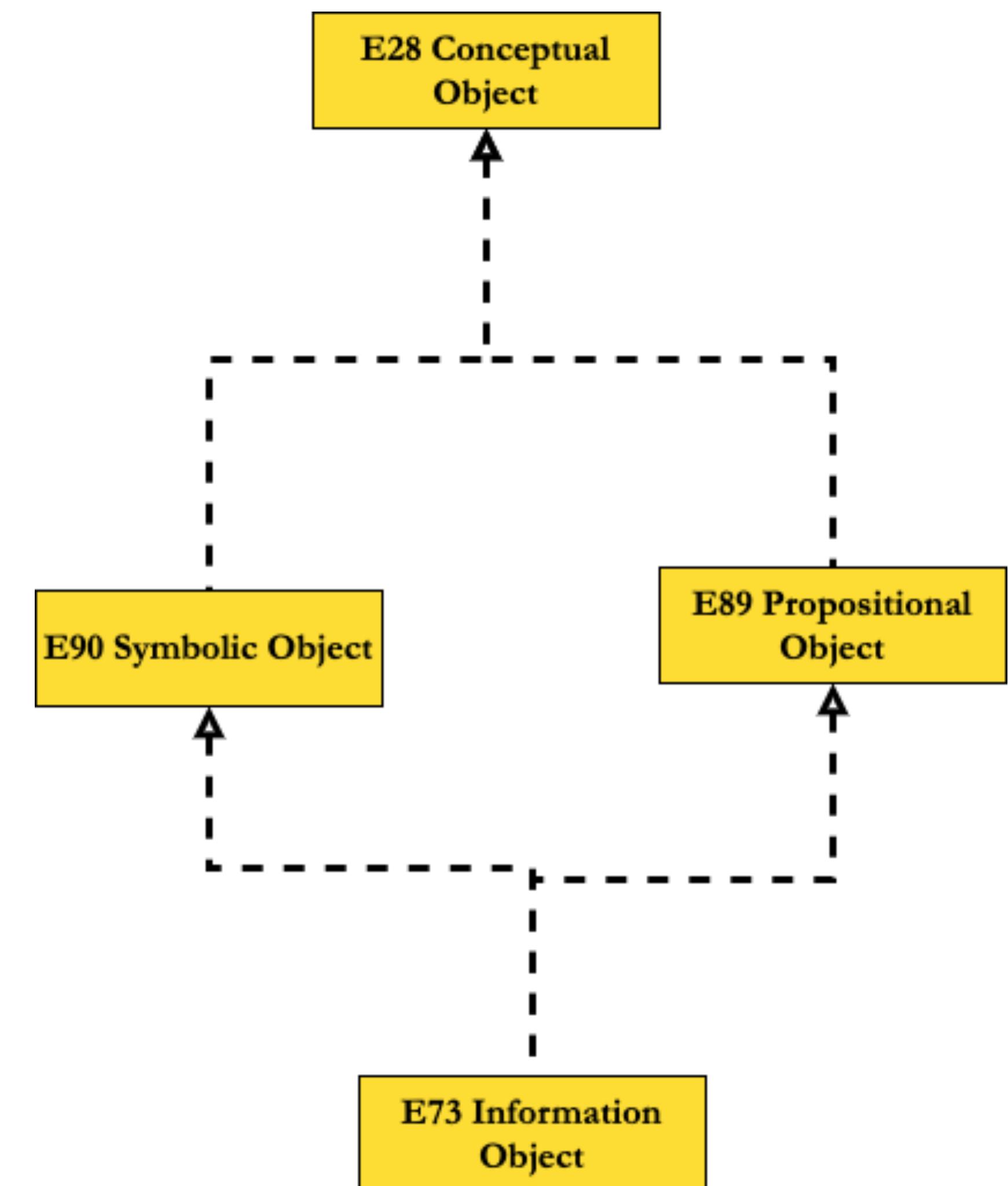
This class comprises identifiable symbols and any aggregation of symbols, such as characters, identifiers, traffic signs, emblems, texts, data sets, images, musical scores, multimedia objects, computer program code or mathematical formulae that have an objectively recognizable structure and that are documented as single units.

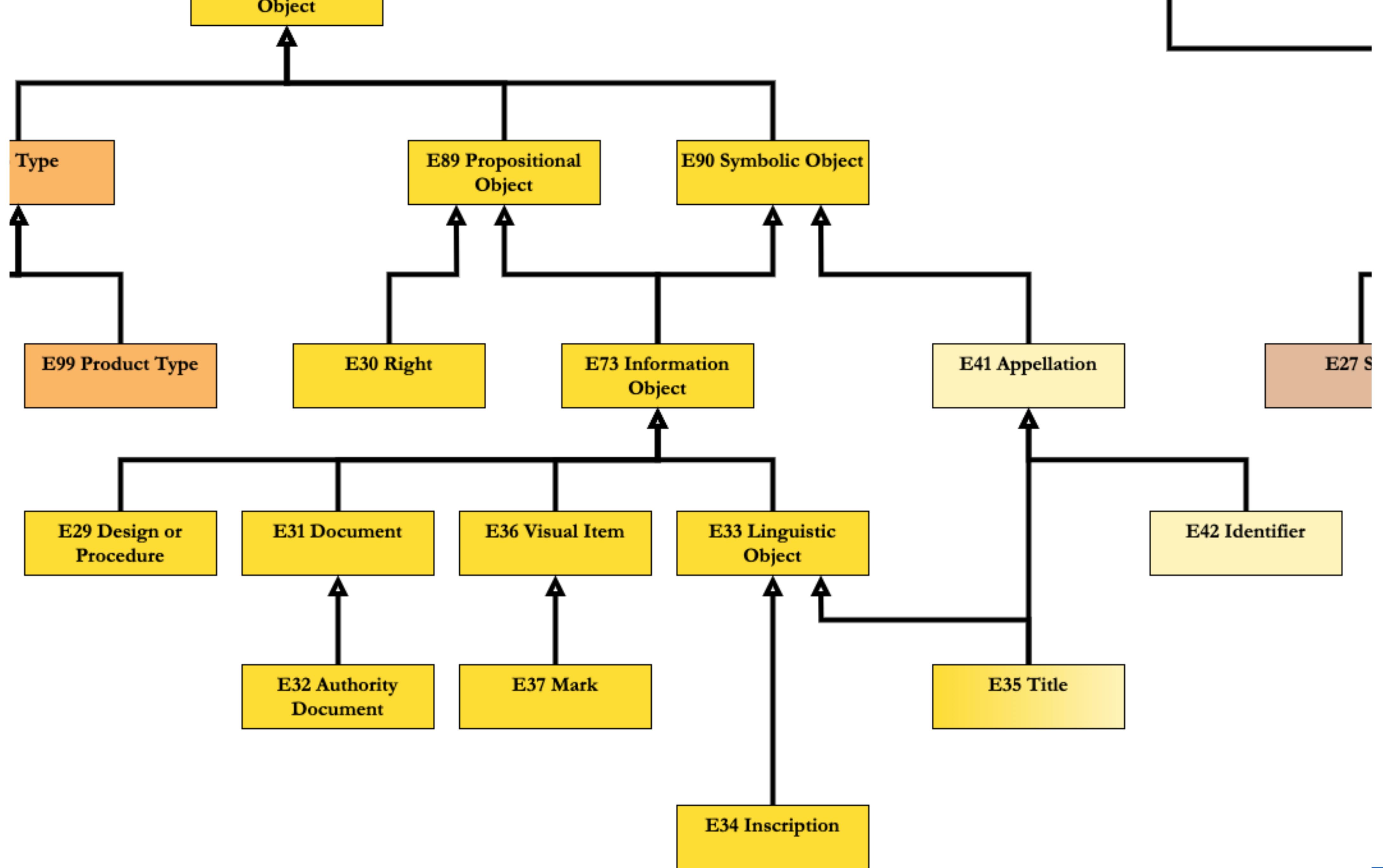
Propositional object

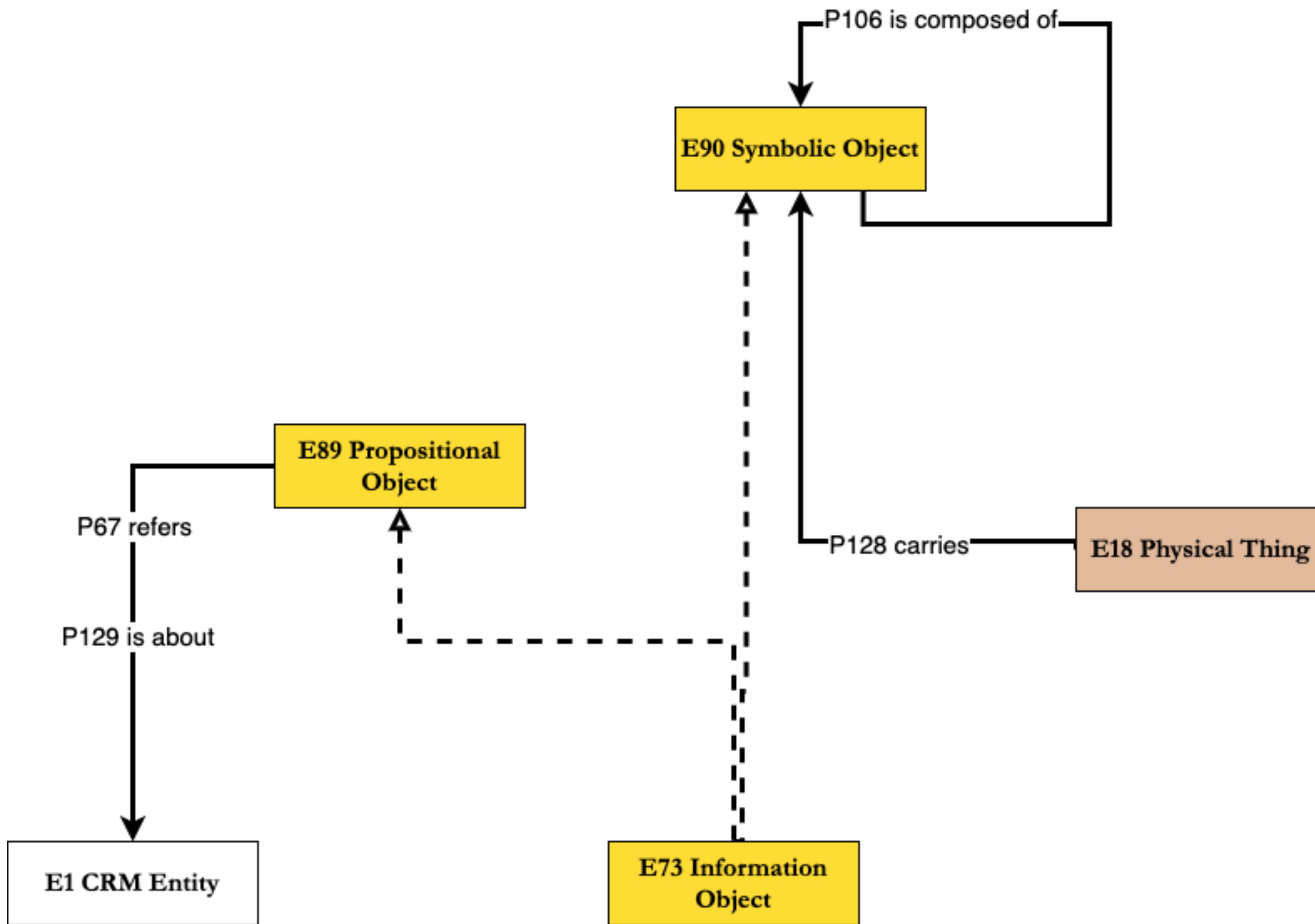
This class comprises immaterial items, including but not limited to stories, plots, procedural prescriptions, algorithms, laws of physics or images that are, or represent in some sense, sets of propositions about real or mental things and that are documented as single units or serve as topic of discourse.

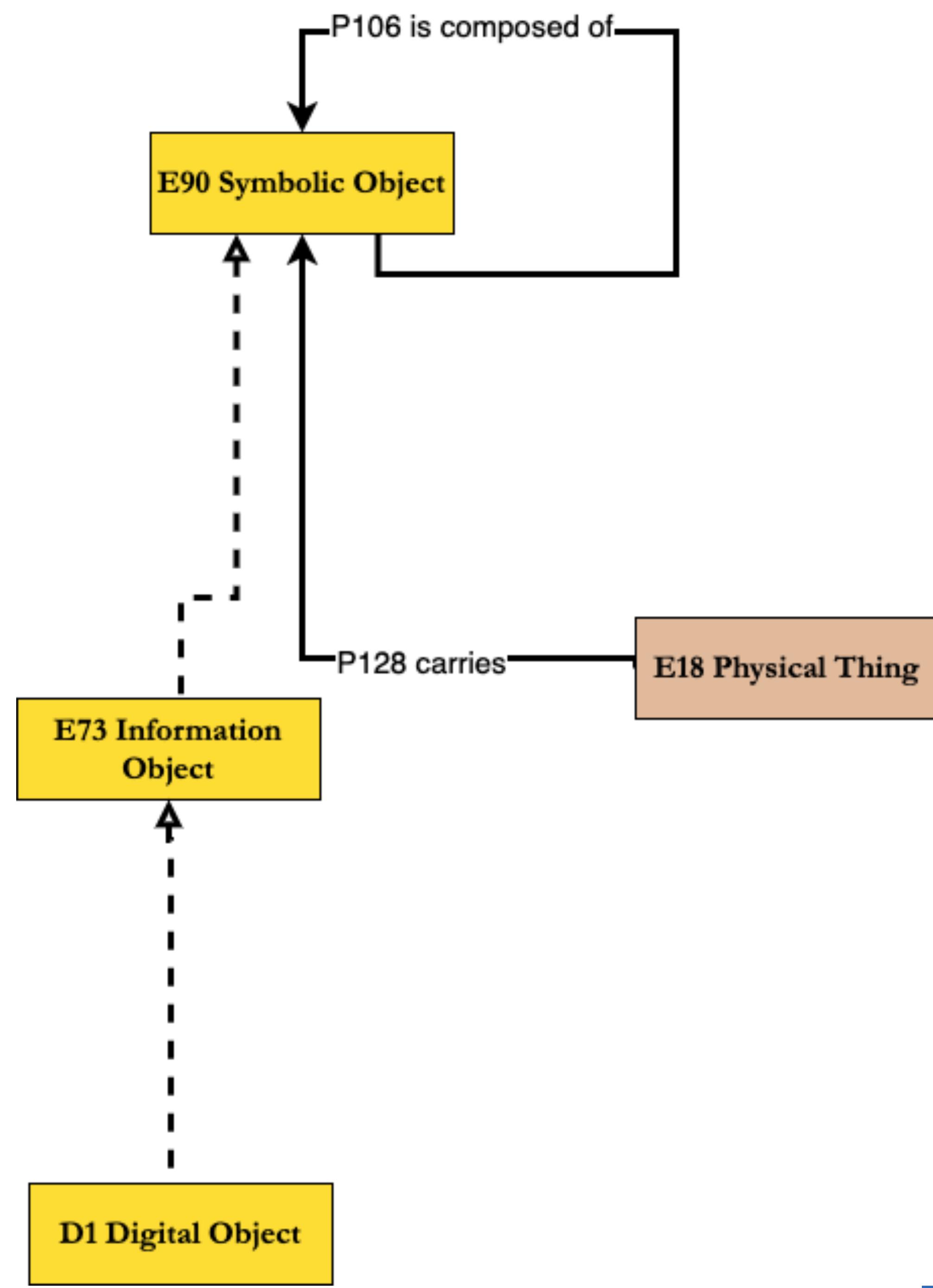
Information object

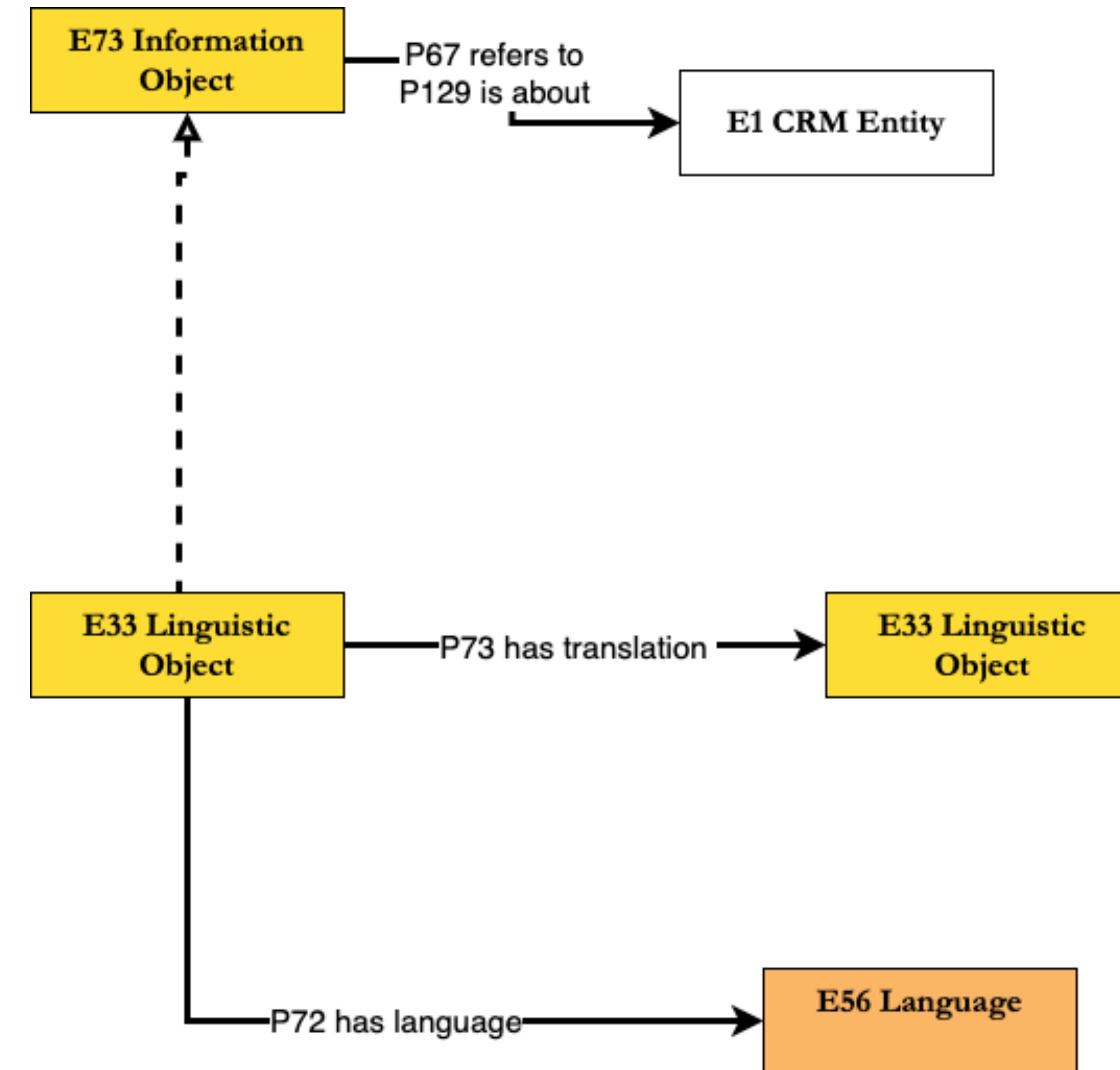
This class comprises identifiable immaterial items, such as poems, jokes, data sets, images, texts, multimedia objects, procedural prescriptions, computer program code, algorithm or mathematical formulae, that have an objectively recognizable structure and are documented as single units

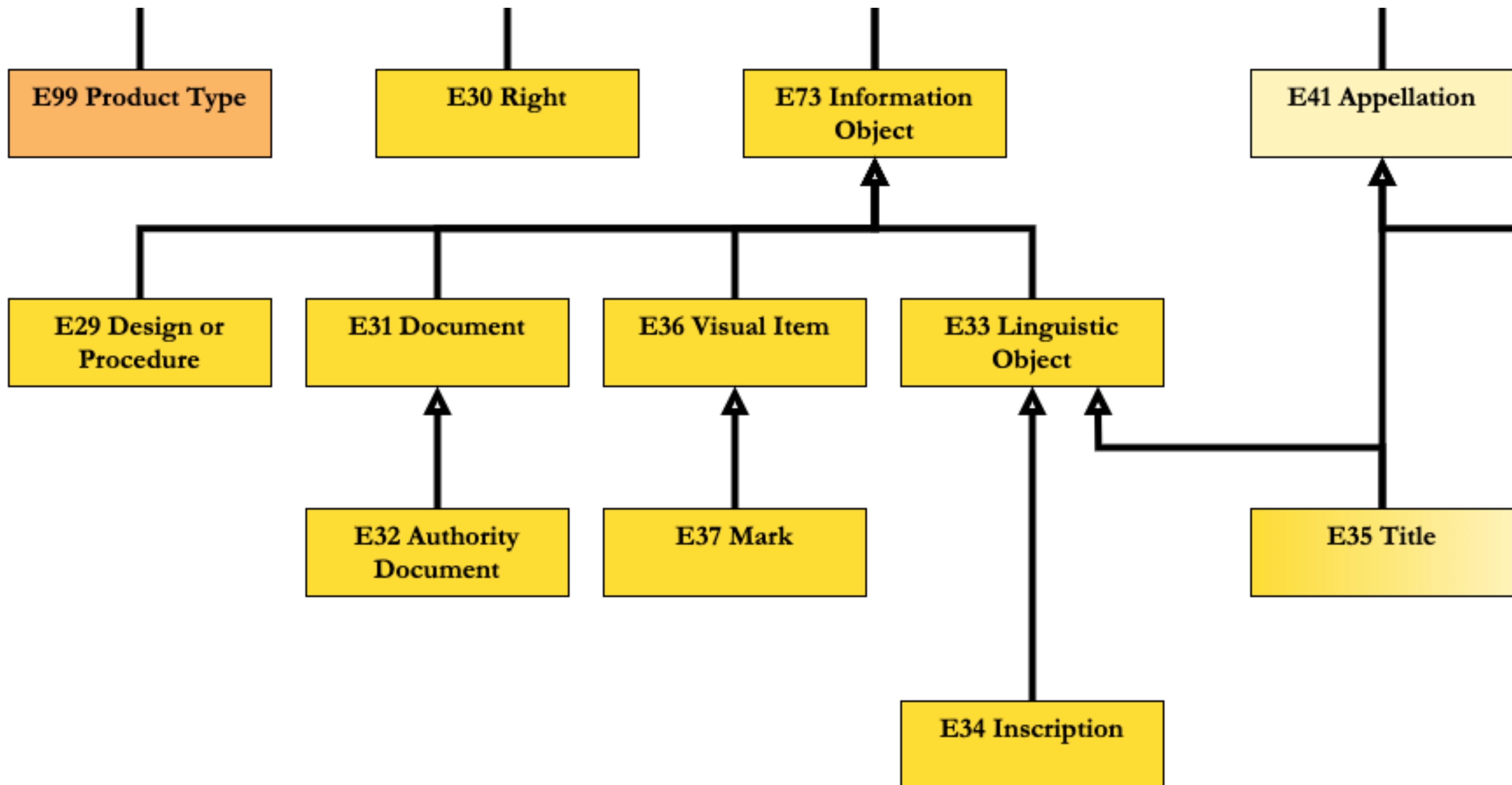


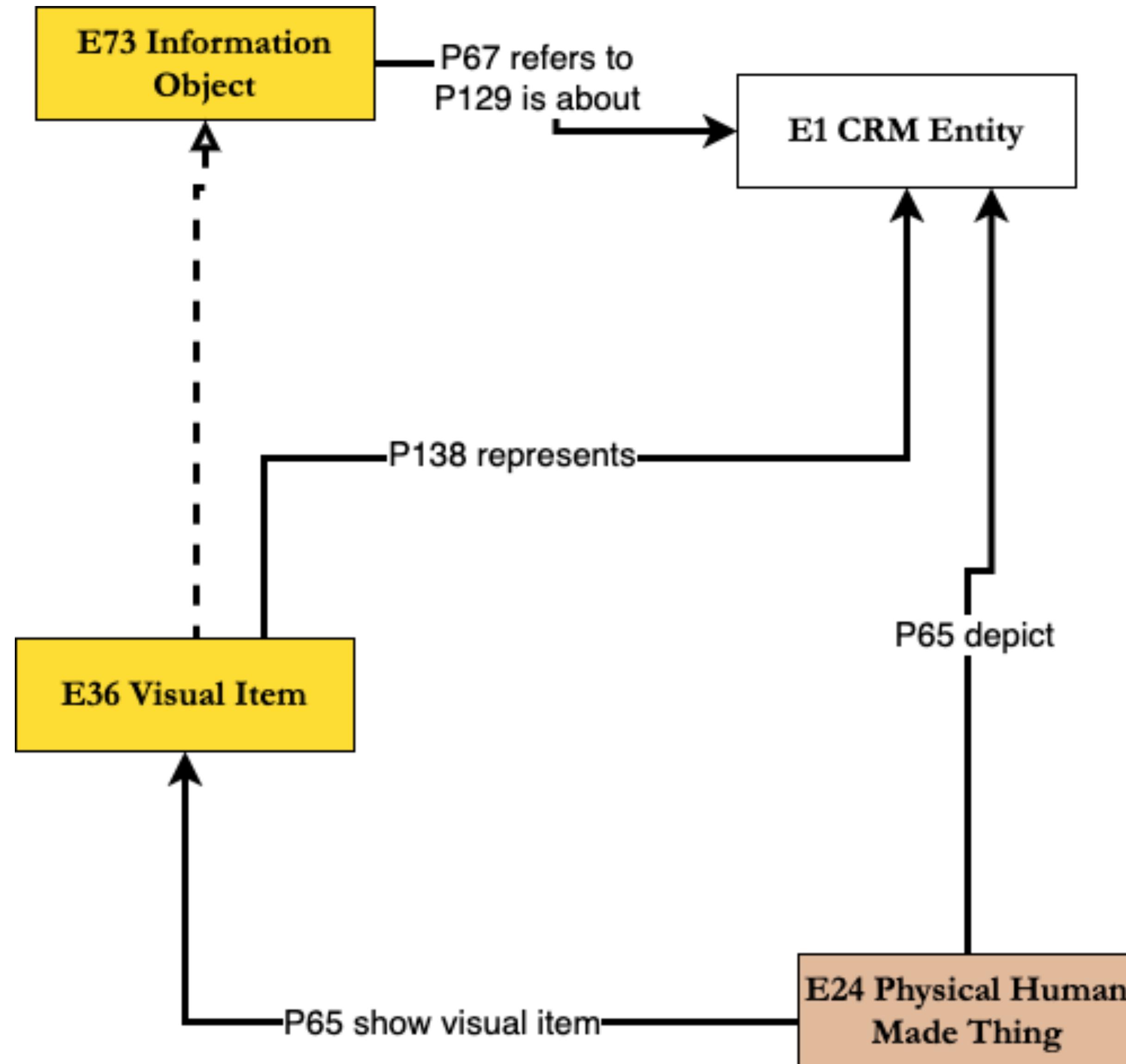




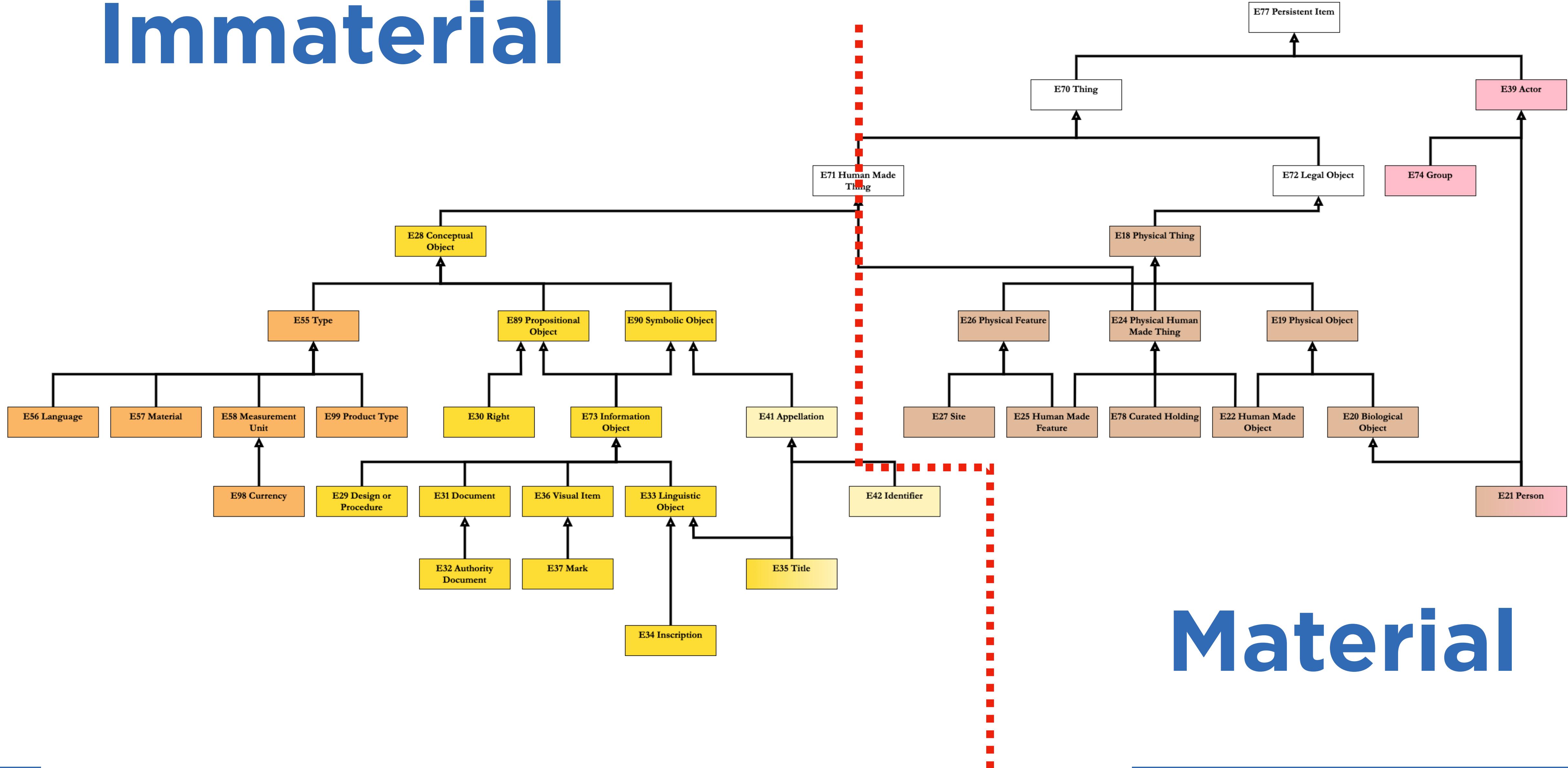








Immaterial



Material





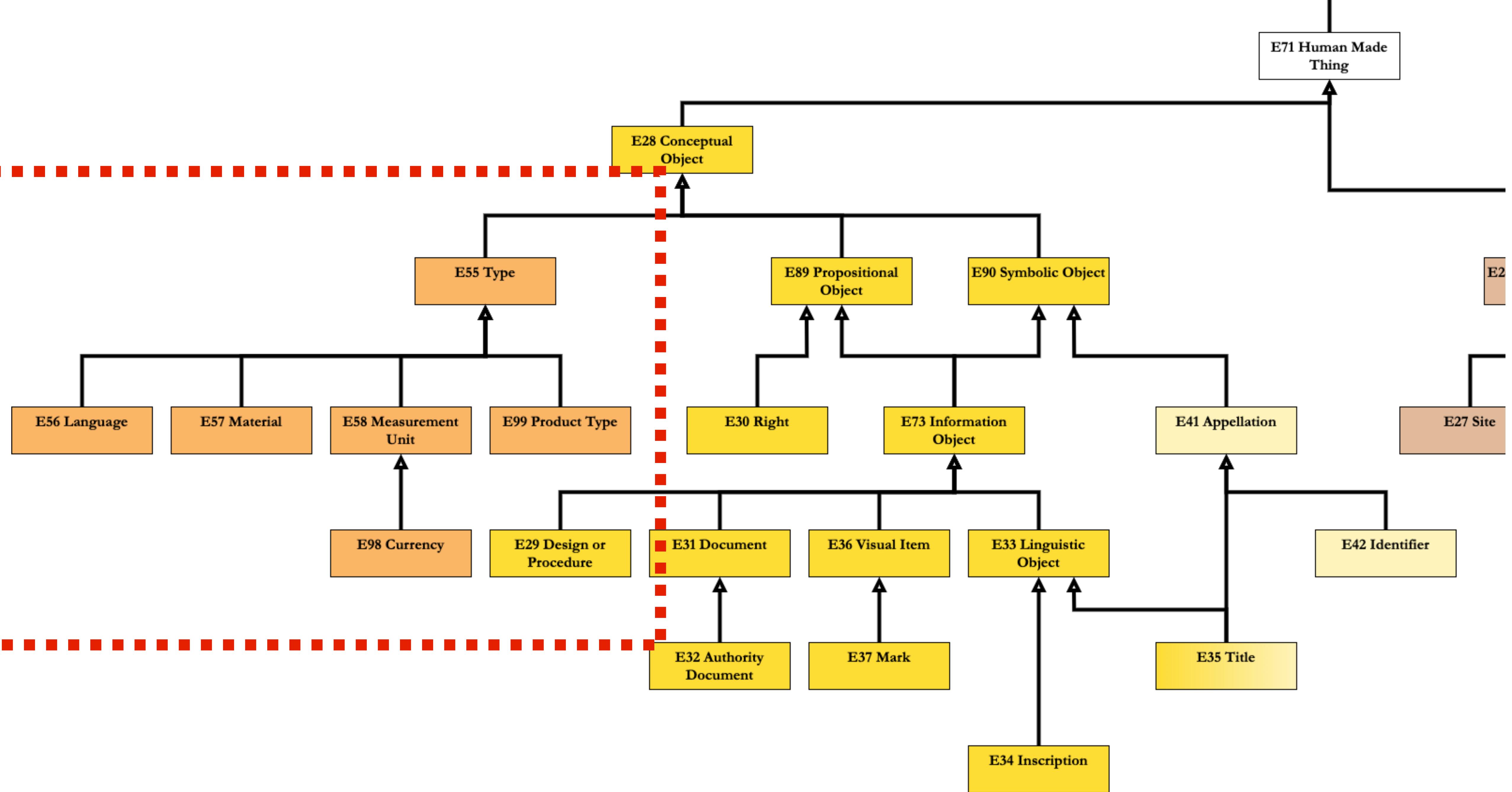
E24 Physical Human
Made Thing

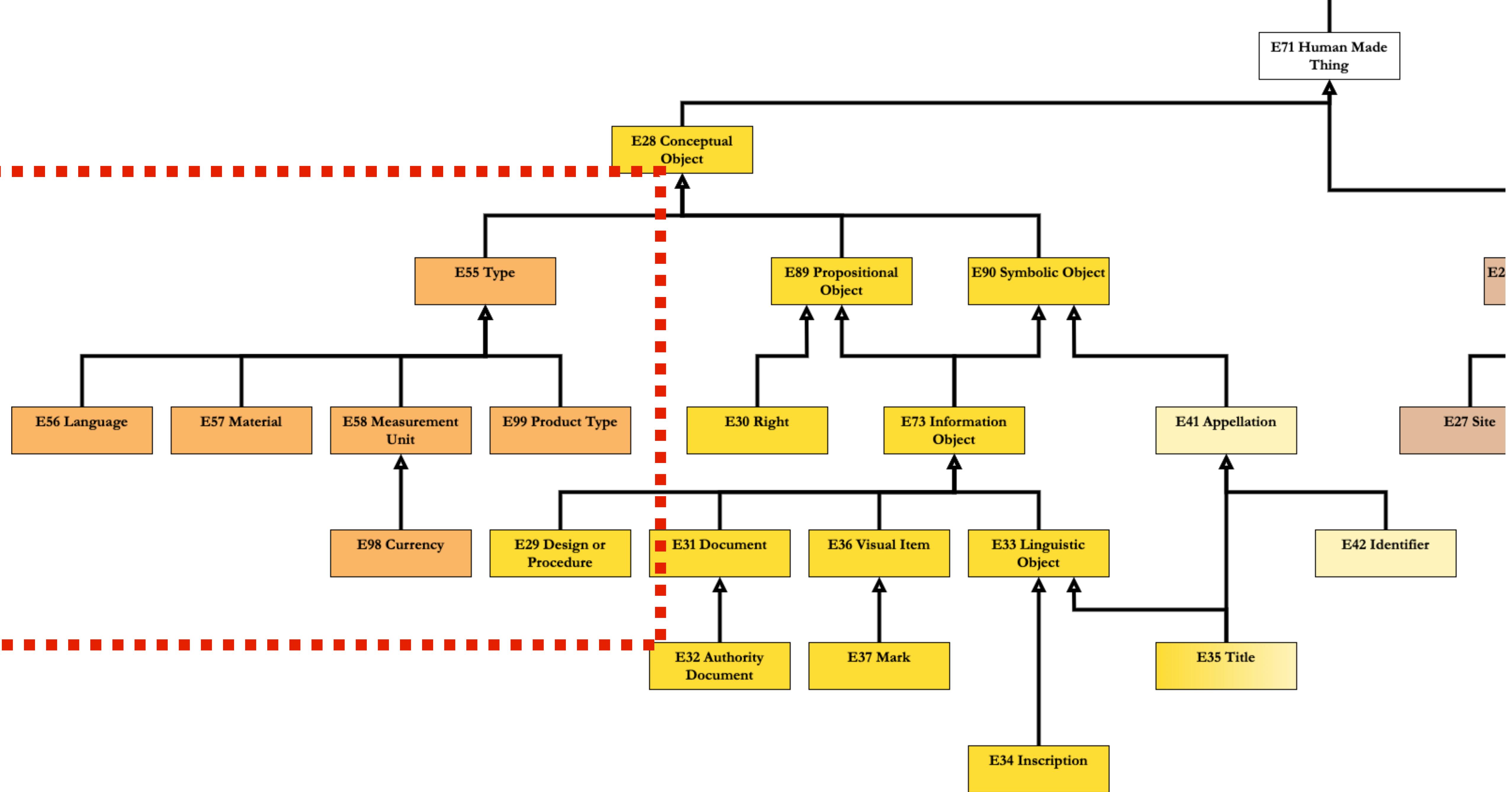
E24 Physical Human
Made Thing

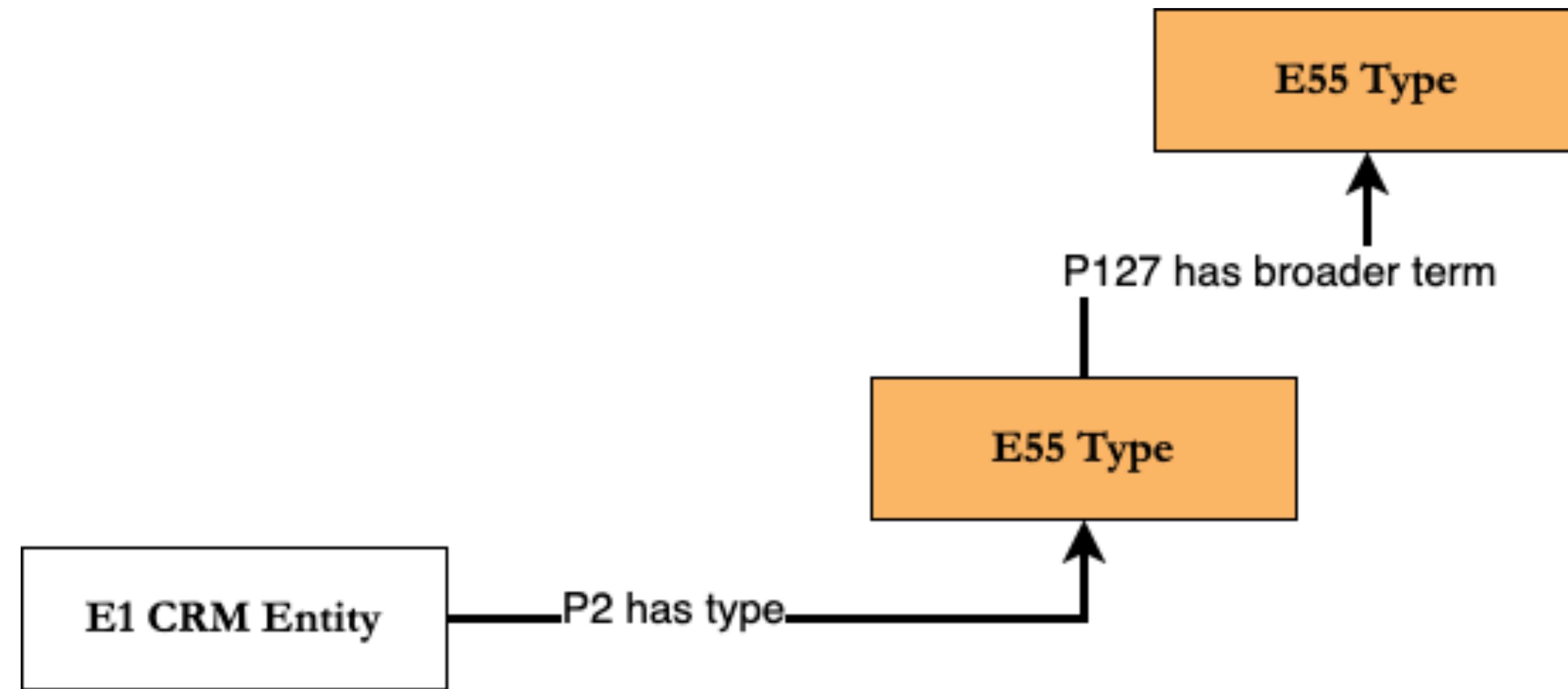
P128 carries

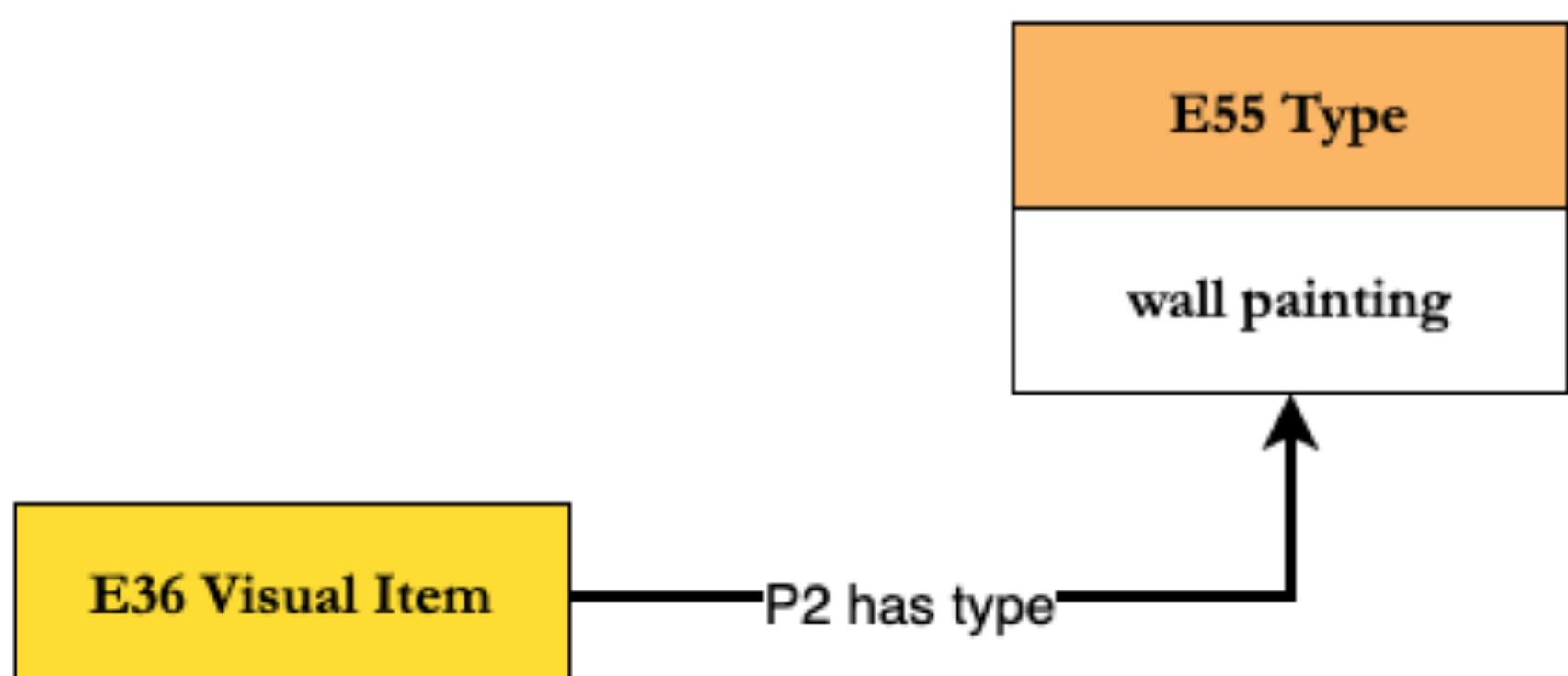
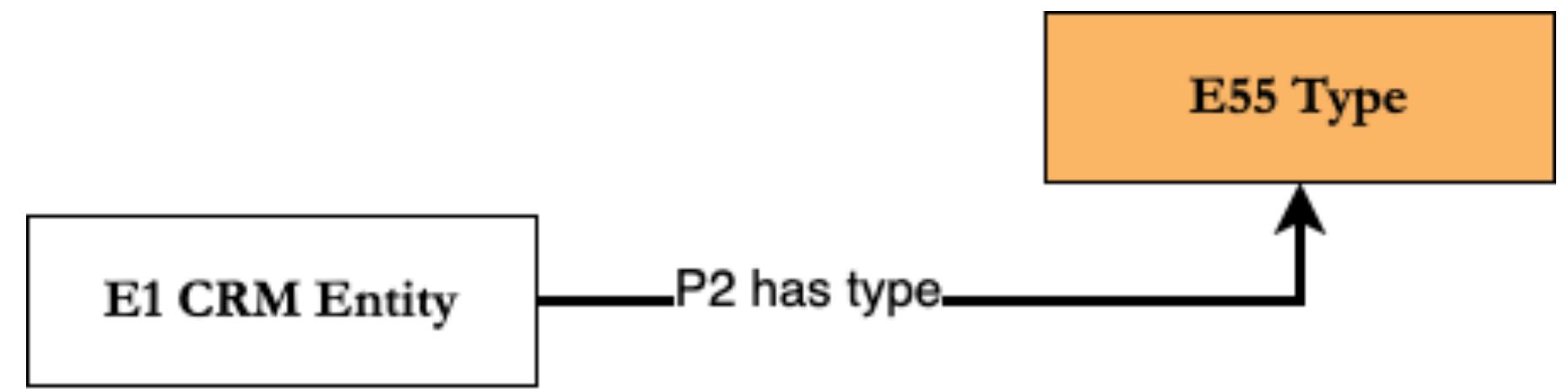
P128 carries

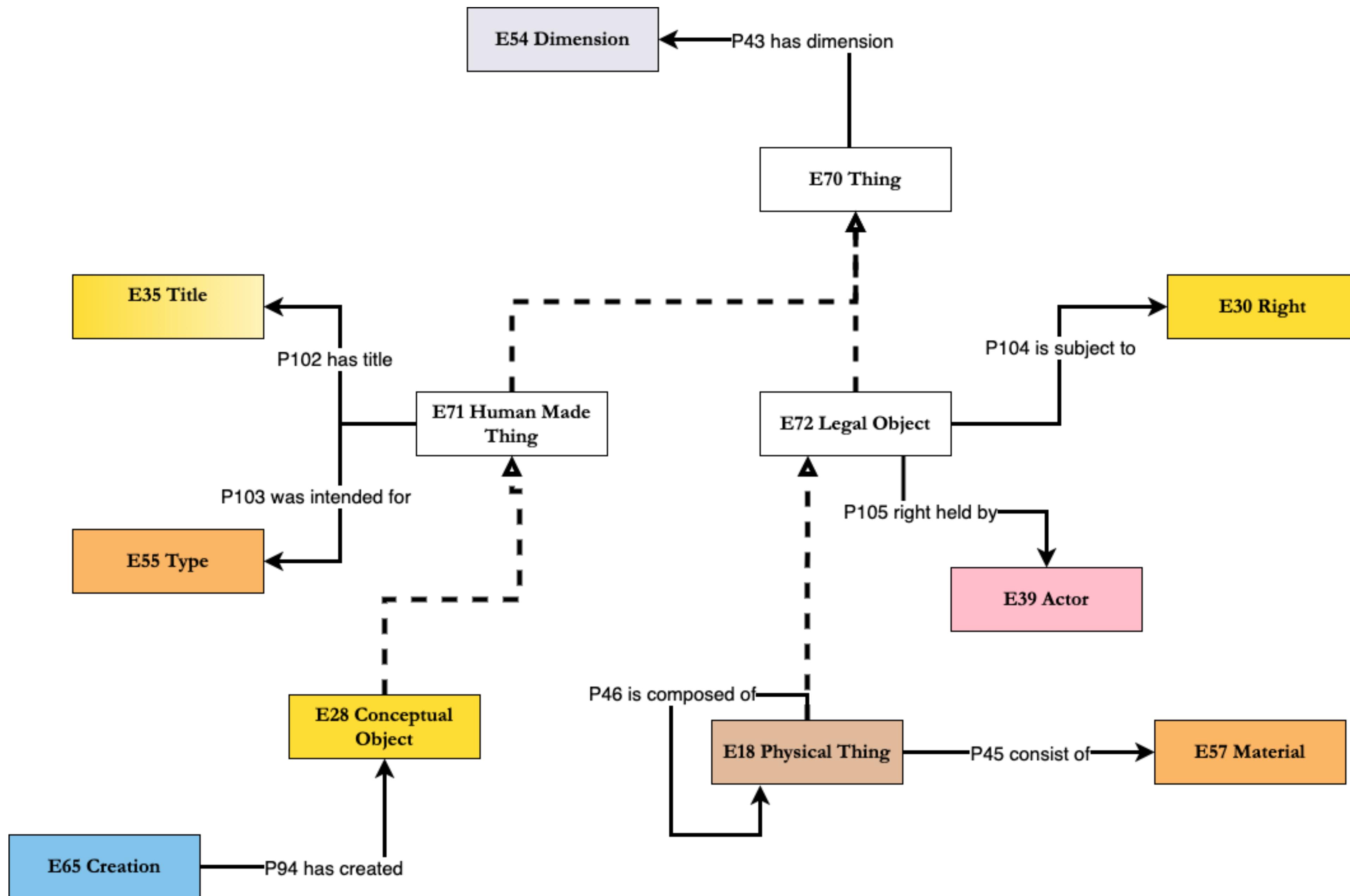
E36 Visual Item











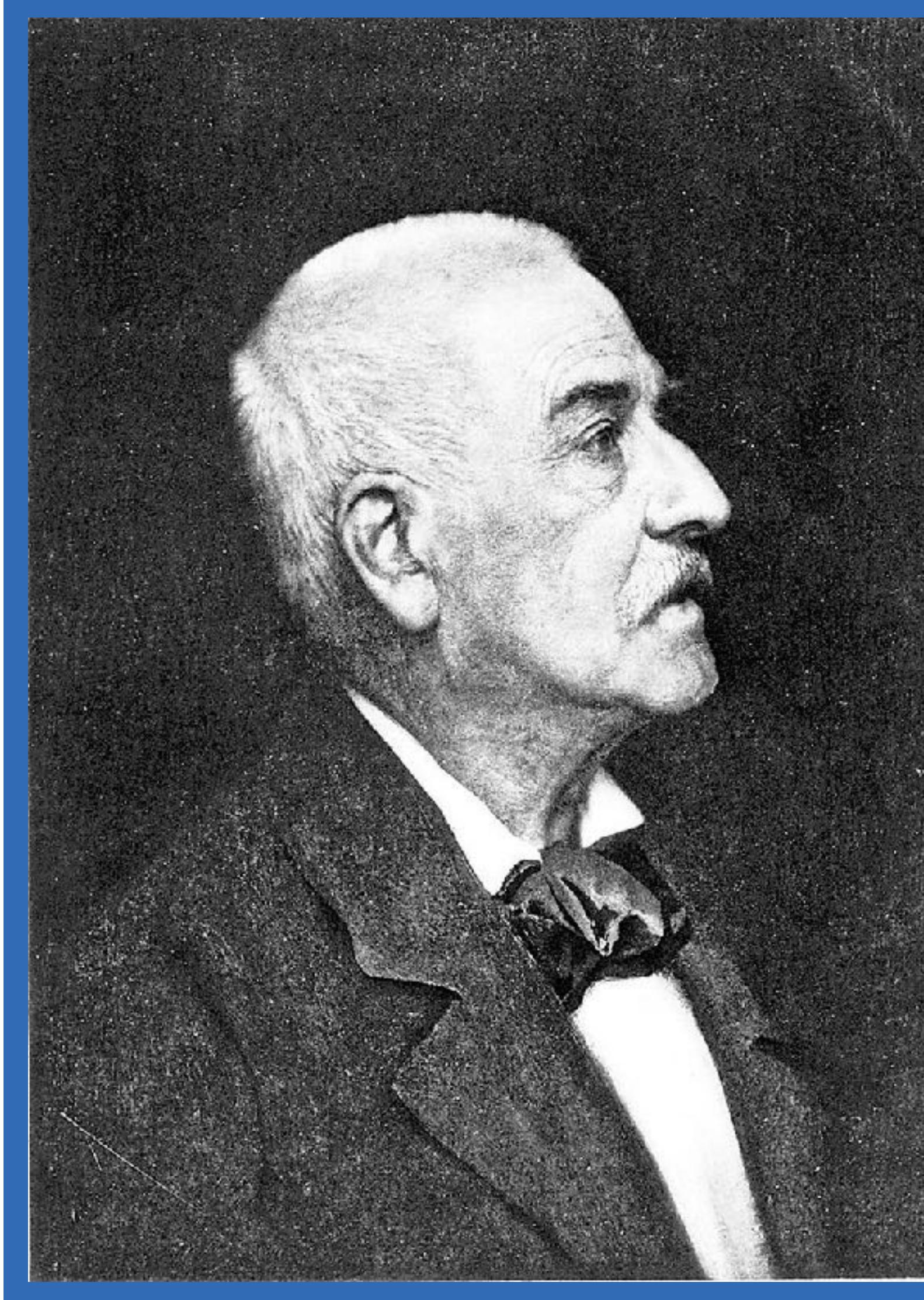


Foto Go
Sehr geehrte Herrn Leiter
Volksschule Lübeck ganz
die Freiheit Rücksichtslos
geg. die Kultur und Kultur
durch die Kraft und für Kultur
der Freiheit wissenschaftlich definieren
der Geschäftsvorsteher gewidmet
bedeutung der Galerie galathala

Potnia Lady Writers

Women social condition in the second half of the XIX Century, narrated through the pen of Lady writers and male correspondents.

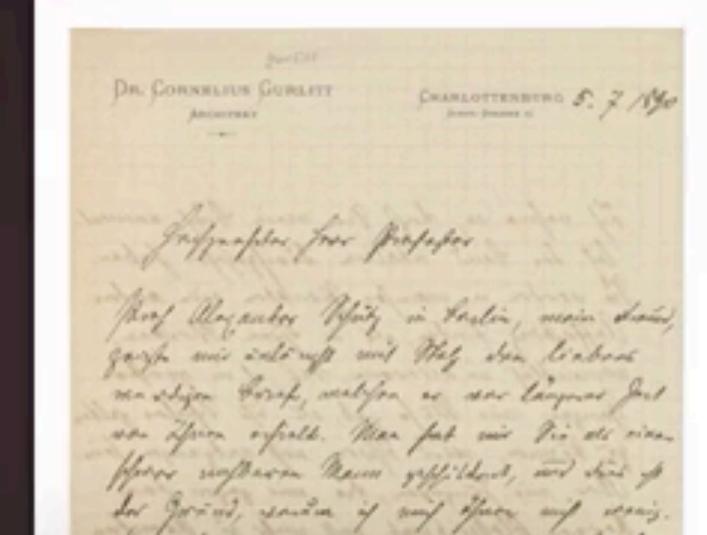


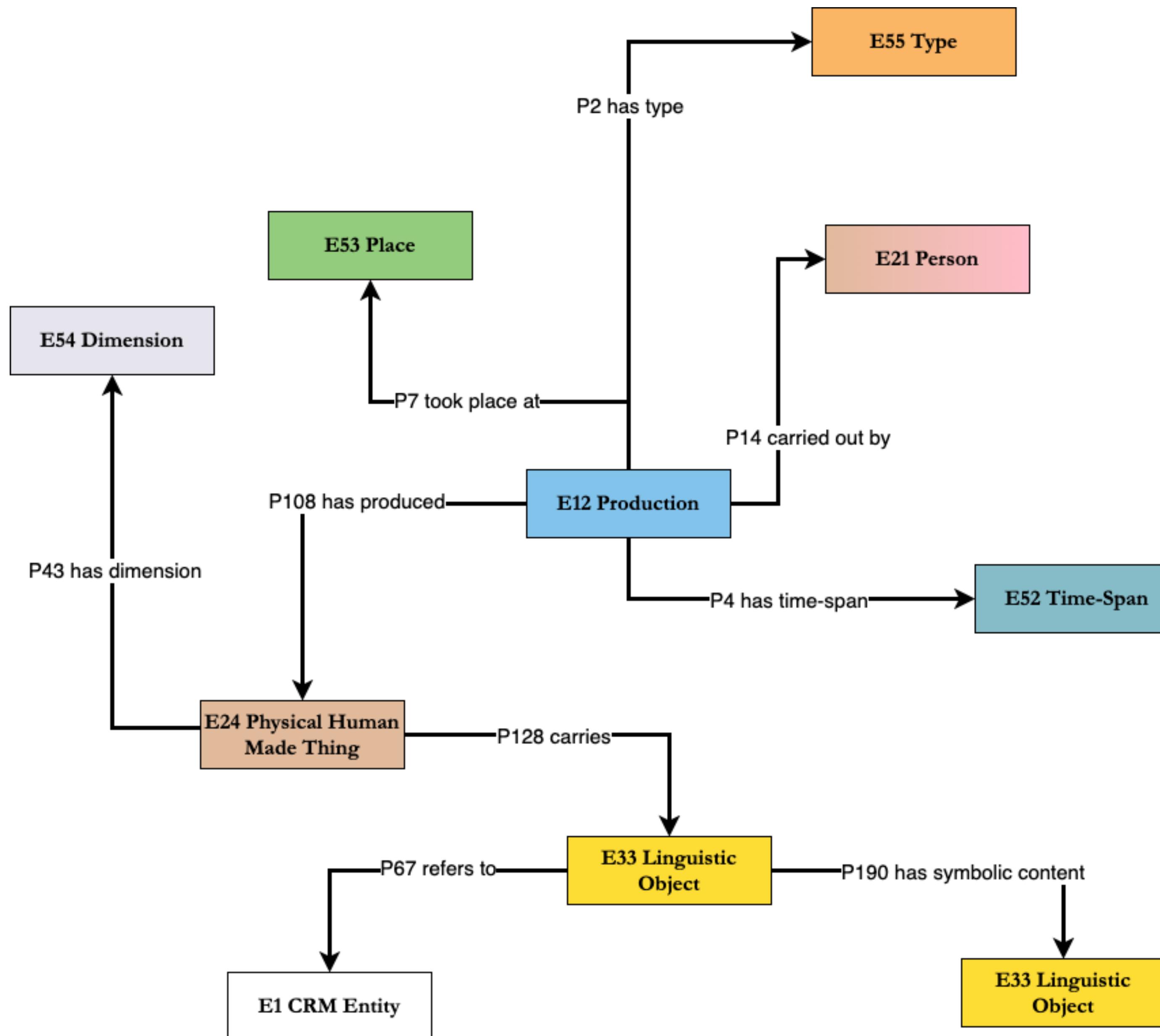
Click [here](#) to begin the platform test

Collections



Highlights

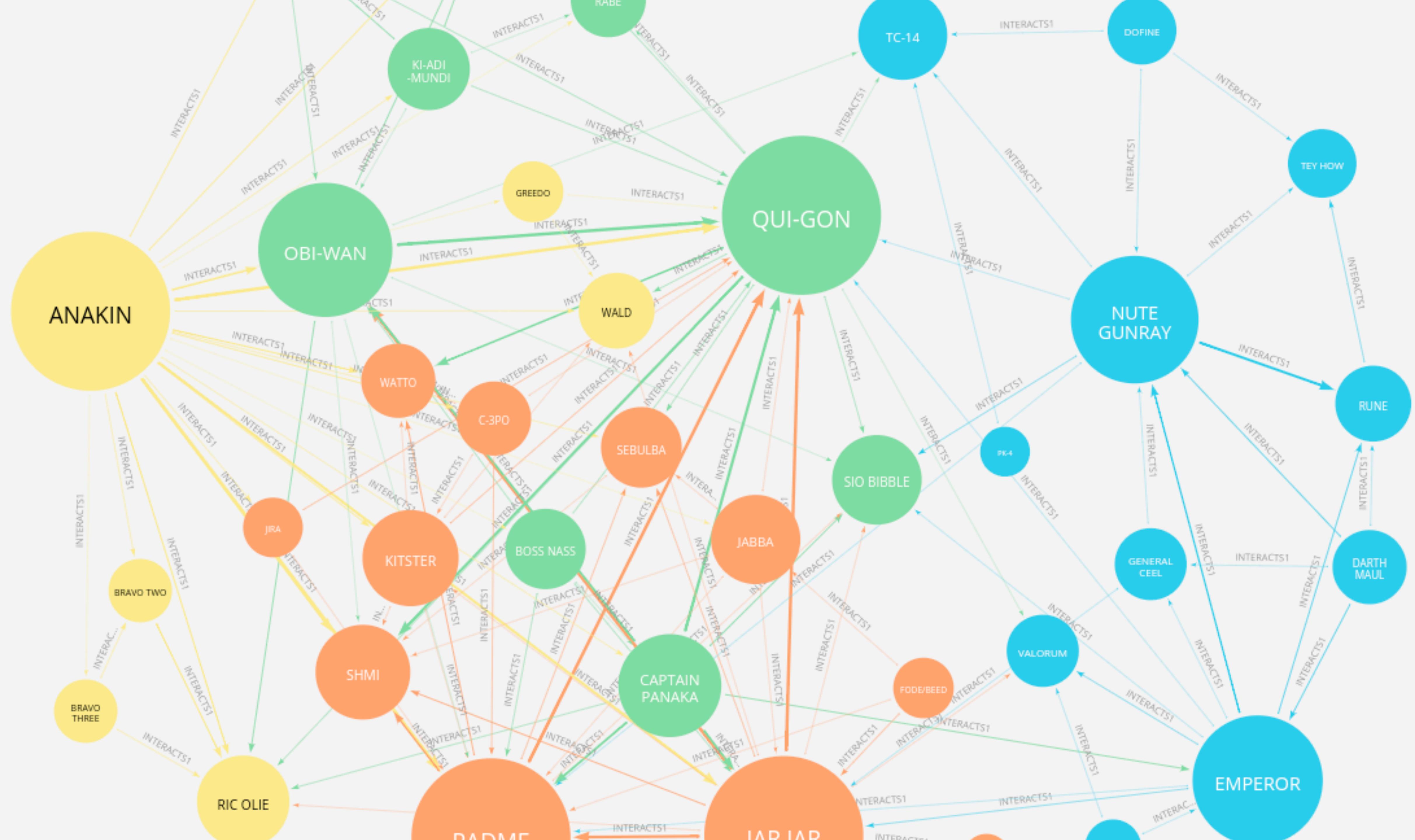




Where to find patterns

Model some data

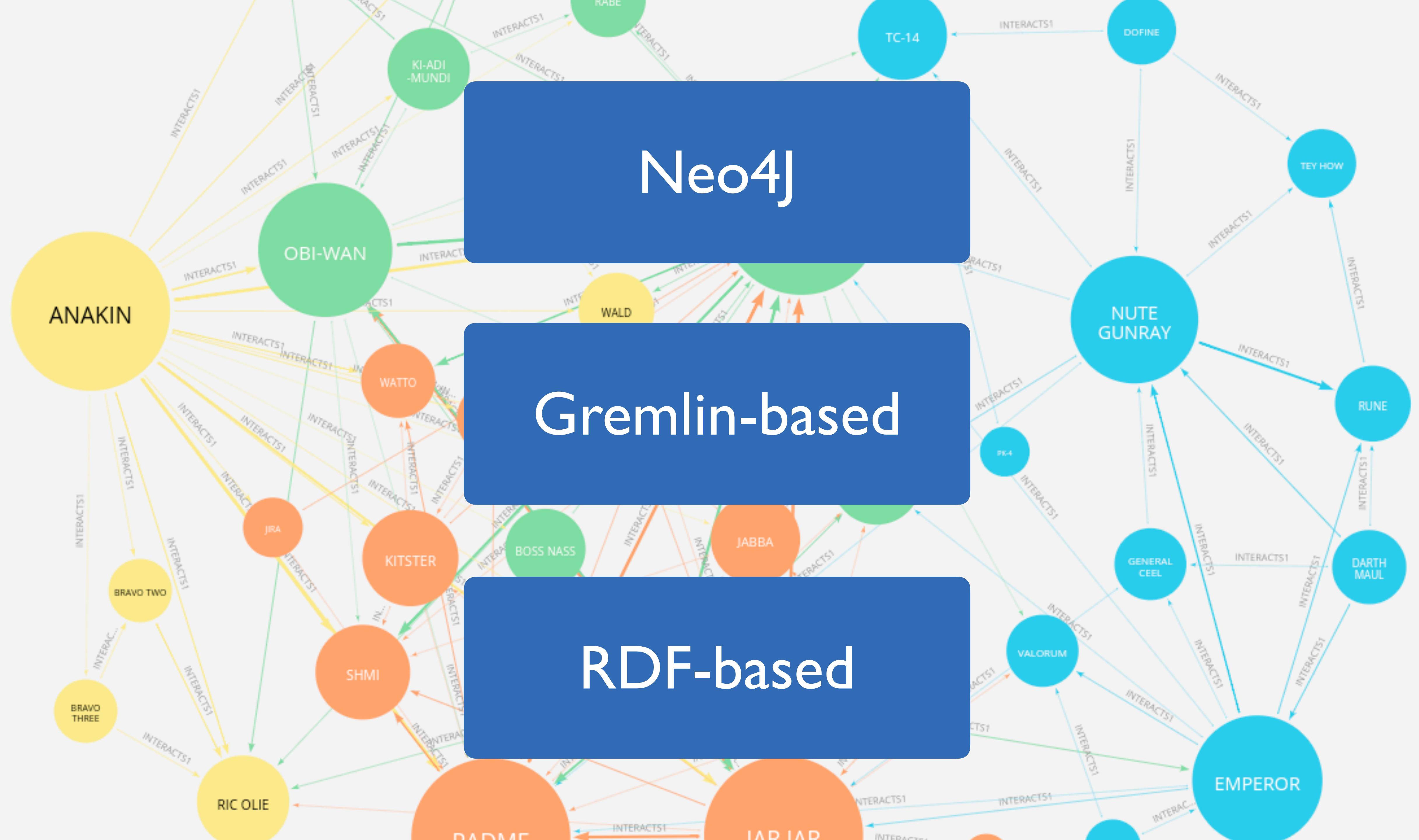
SPARQL



Neo4J

Gremlin-based

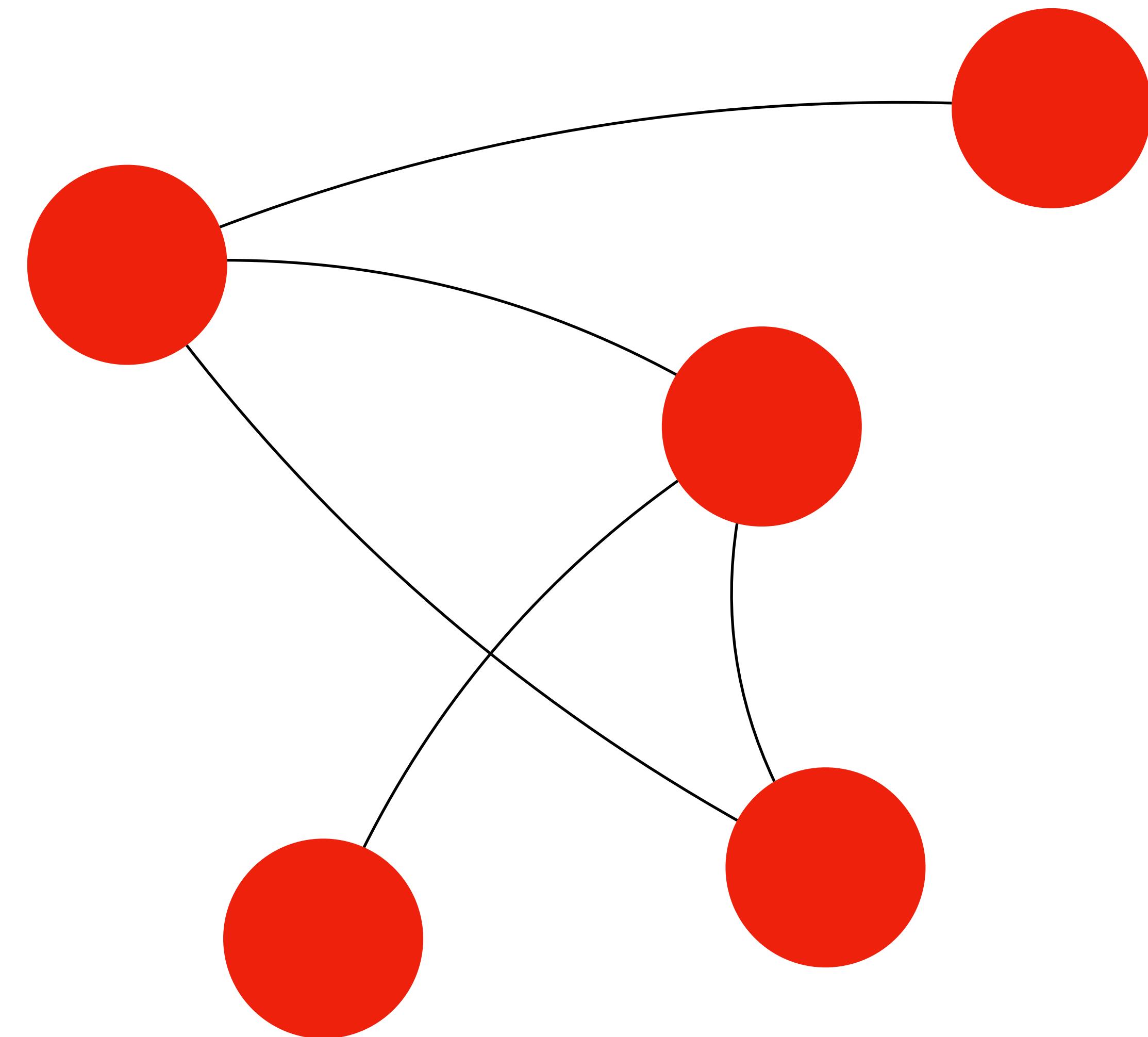
RDF-based



Neo4j

Gremlin-based

RDF-based



Neo4J

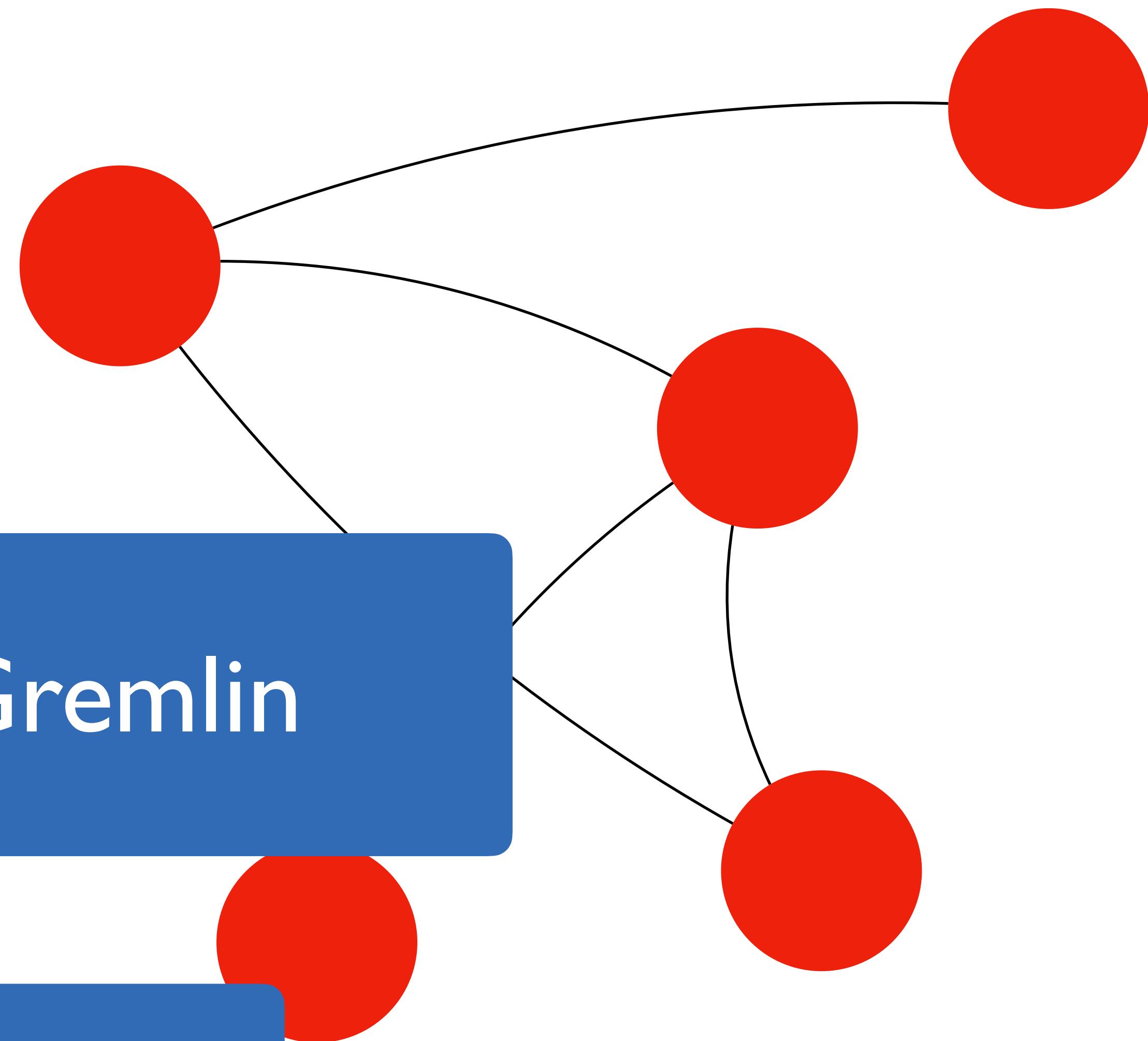
Cypher

Gremlin-based

Gremlin

RDF-based

SPARQL



Neo4J

Cypher

(p:Person {name: "Jennifer"})-[rel:LIKES]->(g:Technology {type: "Graphs"})

Gremlin-based

Gremlin

gremlin>
g.V().has('person','name',within('vadas','marko')).values('age').mean()

RDF-based

SPARQL



```
PREFIX schema: <http://schema.org/>
PREFIX gn: <http://www.geonames.org/ontology#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
```

```
SELECT DISTINCT ?district ?name
WHERE {
    ?district gn:featureCode gn:A.ADM2 ;
              a schema:AdministrativeArea ;
              schema:name ?name .
}
```



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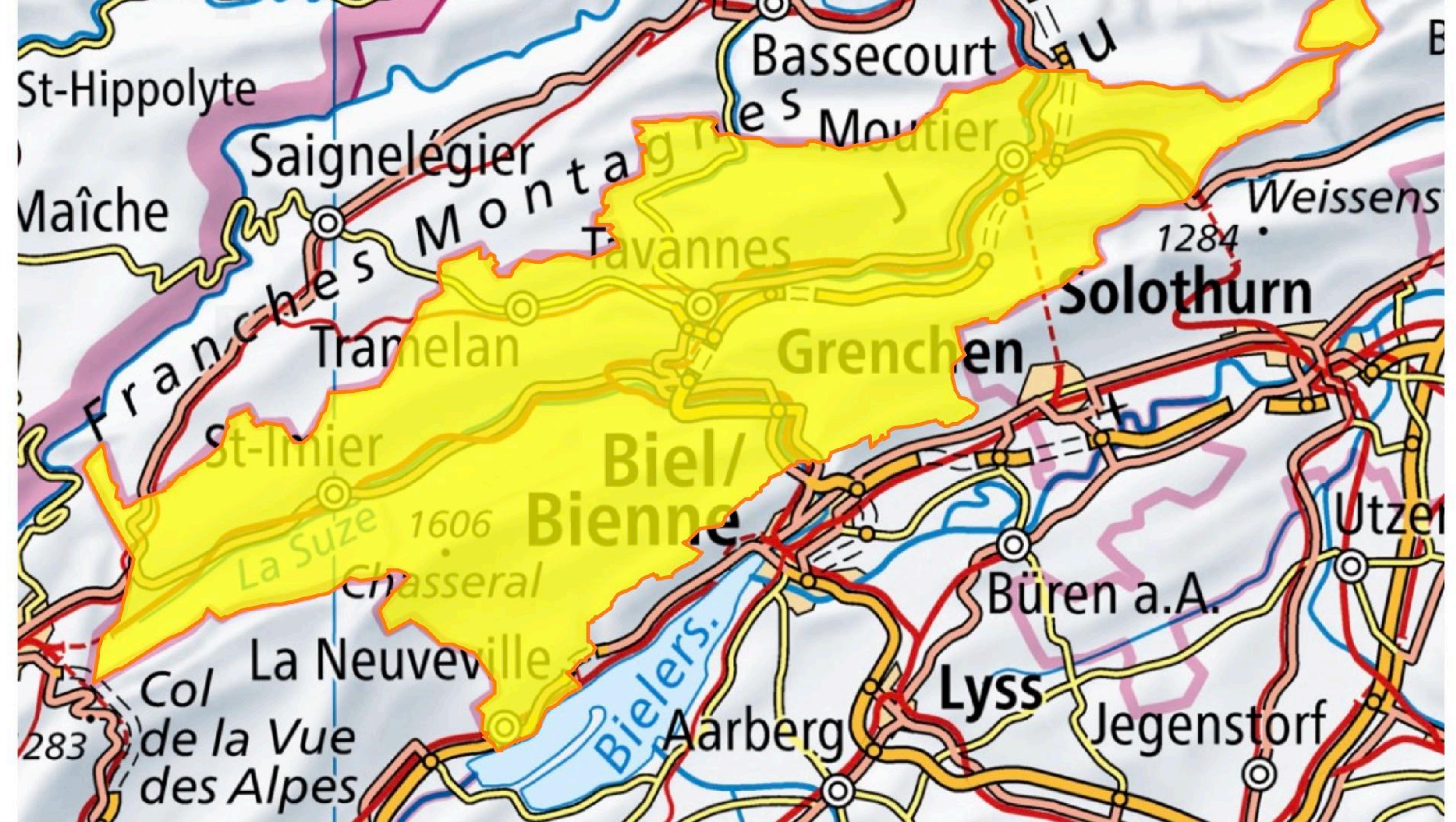
SELECT DISTINCT ?district ?name

WHERE {

?district gn:featureCode gn:A.ADM2 ;
a schema:AdministrativeArea ;
schema:name ?name .

}

district		name
1	https://ld.geo.admin.ch/boundaries/district/241	Jura bernois
2	https://ld.geo.admin.ch/boundaries/district/1842	Bernina
3	https://ld.geo.admin.ch/boundaries/district/1005	See
4	https://ld.geo.admin.ch/boundaries/district/2221	Aigle
5	https://ld.geo.admin.ch/boundaries/district/1403	Schaffhausen
6	https://ld.geo.admin.ch/boundaries/district/1904	Brugg
7	https://ld.geo.admin.ch/boundaries/district/1910	Zofingen
8	https://ld.geo.admin.ch/boundaries/district/112	Zürich
9	https://ld.geo.admin.ch/boundaries/district/1101	Gäu
10	https://ld.geo.admin.ch/boundaries/district/1107	Lebern
11	https://ld.geo.admin.ch/boundaries/district/246	Bern-Mittelland
12	https://ld.geo.admin.ch/boundaries/district/242	Biel/Bienne
13	https://ld.geo.admin.ch/boundaries/district/1821	Albula
14	https://ld.geo.admin.ch/boundaries/district/1822	Bernina
15	https://ld.geo.admin.ch/boundaries/district/312	Luzern-Land
16	https://ld.geo.admin.ch/boundaries/district/102	Andelfingen



SUBJECT

Confession of a Woman Raised from
the Dead

madeBy

PREDICATE

Giotto

OBJECT

SUBJECT

Confession of a Woman Raised from
the Dead

PREDICATE

hasDescription

PREDICATE

madeBy

Giotto

OBJECT

OBJECT

Nel borgo di Monte Marano, presso Benevento era morta una donna particolarmente devota di san Francesco. La sera vennero i chierici per le esequie e già apprestavano a celebrare la veglia con la recita dei salmi quando improvvisamente, alla vista di tutti, la donna si alzò sul letto e chiamò sacerdoti presenti, che era il suo padrino, e gli disse: \"Padre, voglio confessarmi. Ascolta il mio peccato. Quando sono morta, io dovevo essere gettata in un pozzo di fuoco, perché non avevo confessato il peccato che sto per dirti. Ma per tua misericordia ho pregato san Francesco, che durante la vita ho sempre servito con devozione. Mi è stato concesso di ritornare ora nel corpo, per confessare quel peccato e meritarmi la vita eterna. Dopo che lo avrò confessato, ecco, mi affretterò a riceverla l'assoluzione, si stese in pace sul suo letto e s'addormentò felicemente nel Signore\".

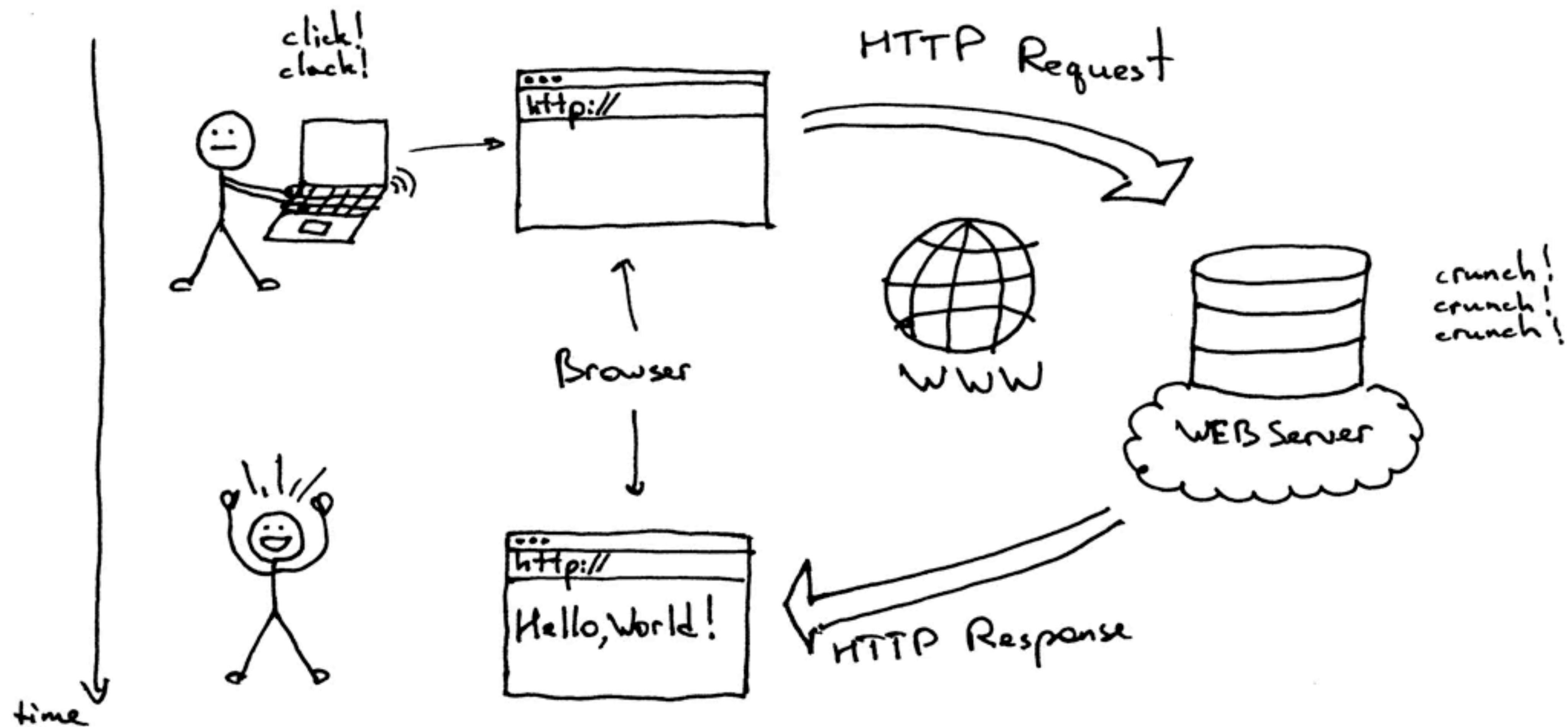
[http://lod.unige.ch/buonfresco/physical/
fd4c5ec2-27c4-4f2b-ae92-8e3e71864867](http://lod.unige.ch/buonfresco/physical/fd4c5ec2-27c4-4f2b-ae92-8e3e71864867)

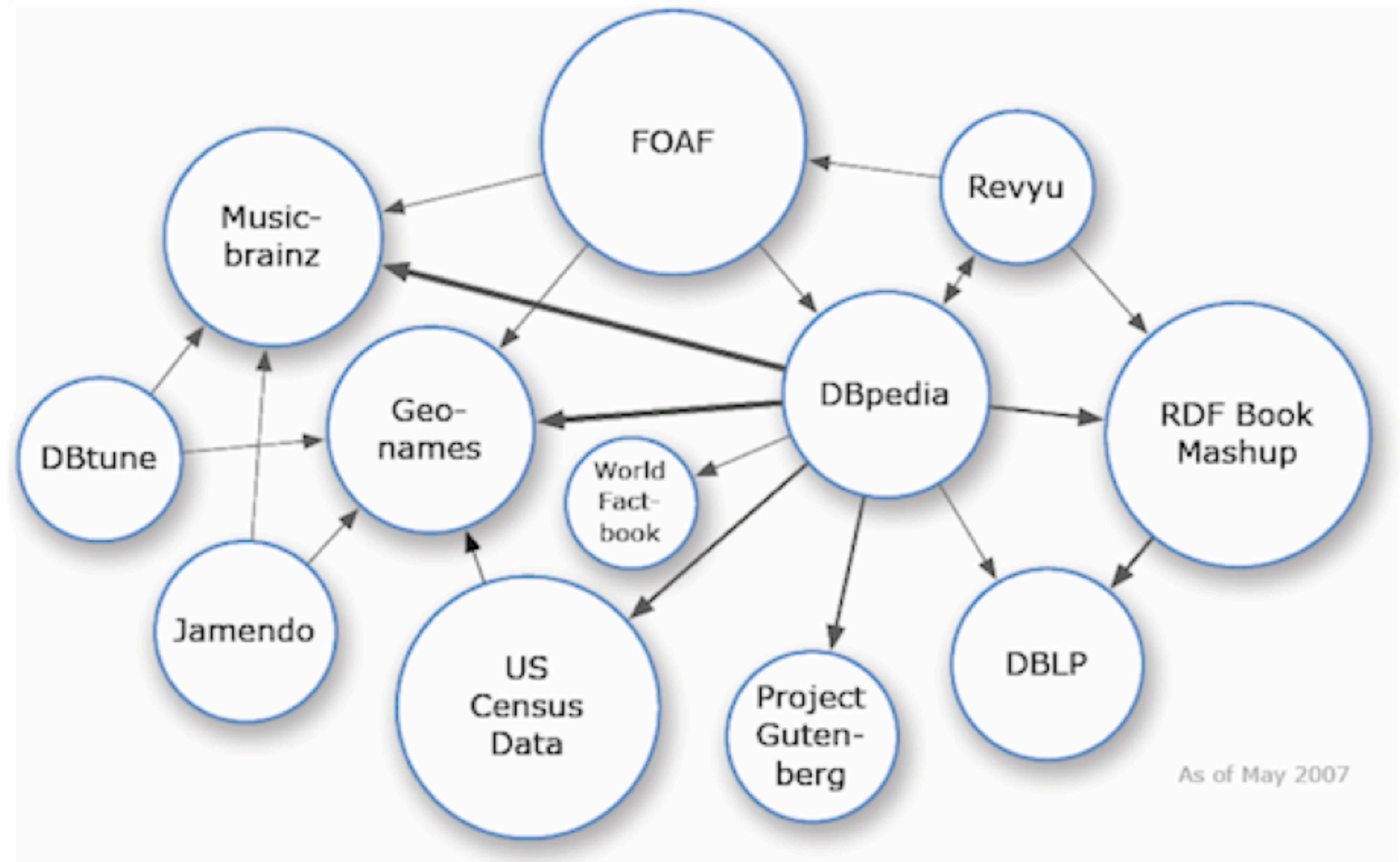
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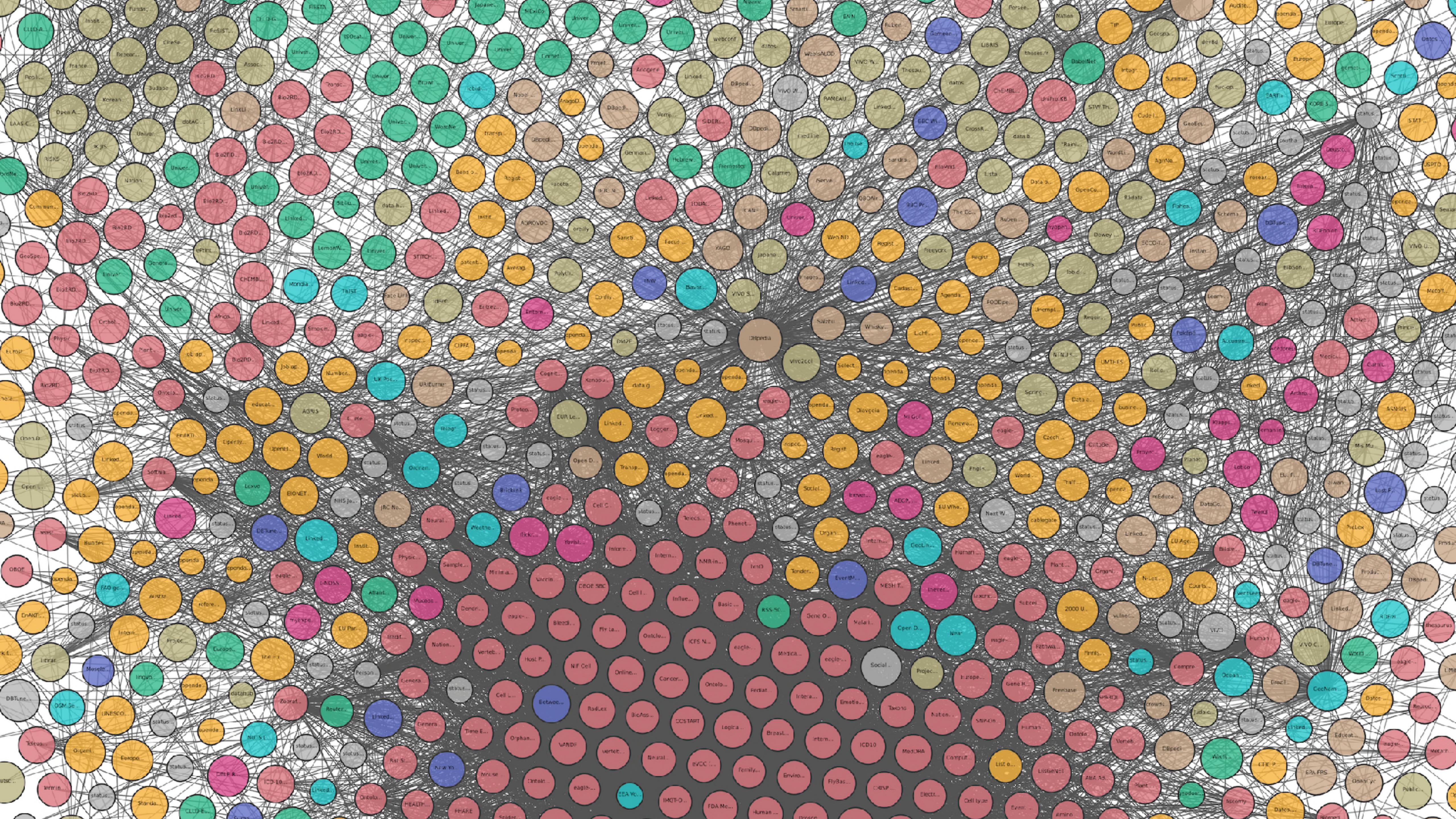
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<http://lod.unige.ch/buonfresco/Q7814>

[http://lod.unige.ch/
buonfresco/text/e5e01af8-aa6d-385a-
ac98-529812bb50c9](http://lod.unige.ch/buonfresco/text/e5e01af8-aa6d-385a-ac98-529812bb50c9)







Ontologies

FOAF

Dublin Core

SKOS



```
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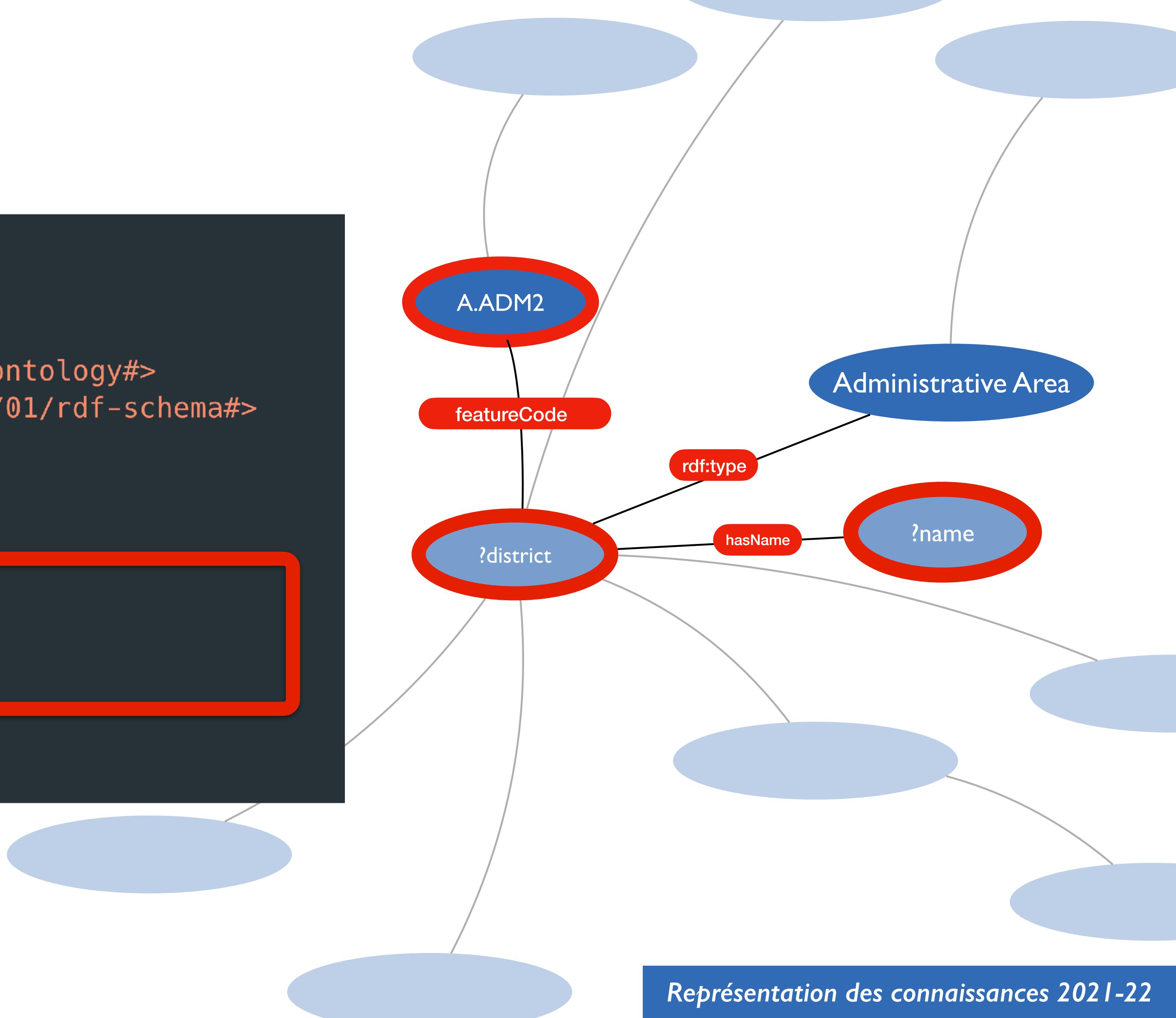
```
}
```



```
PREFIX schema: <http://schema.org/>
PREFIX gn: <http://www.geonames.org/ontology#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
```

```
SELECT DISTINCT ?district ?name
WHERE {
```

```
?district gn:featureCode gn:A.ADM2 ;
a schema:AdministrativeArea ;
schema:name ?name .
}
```



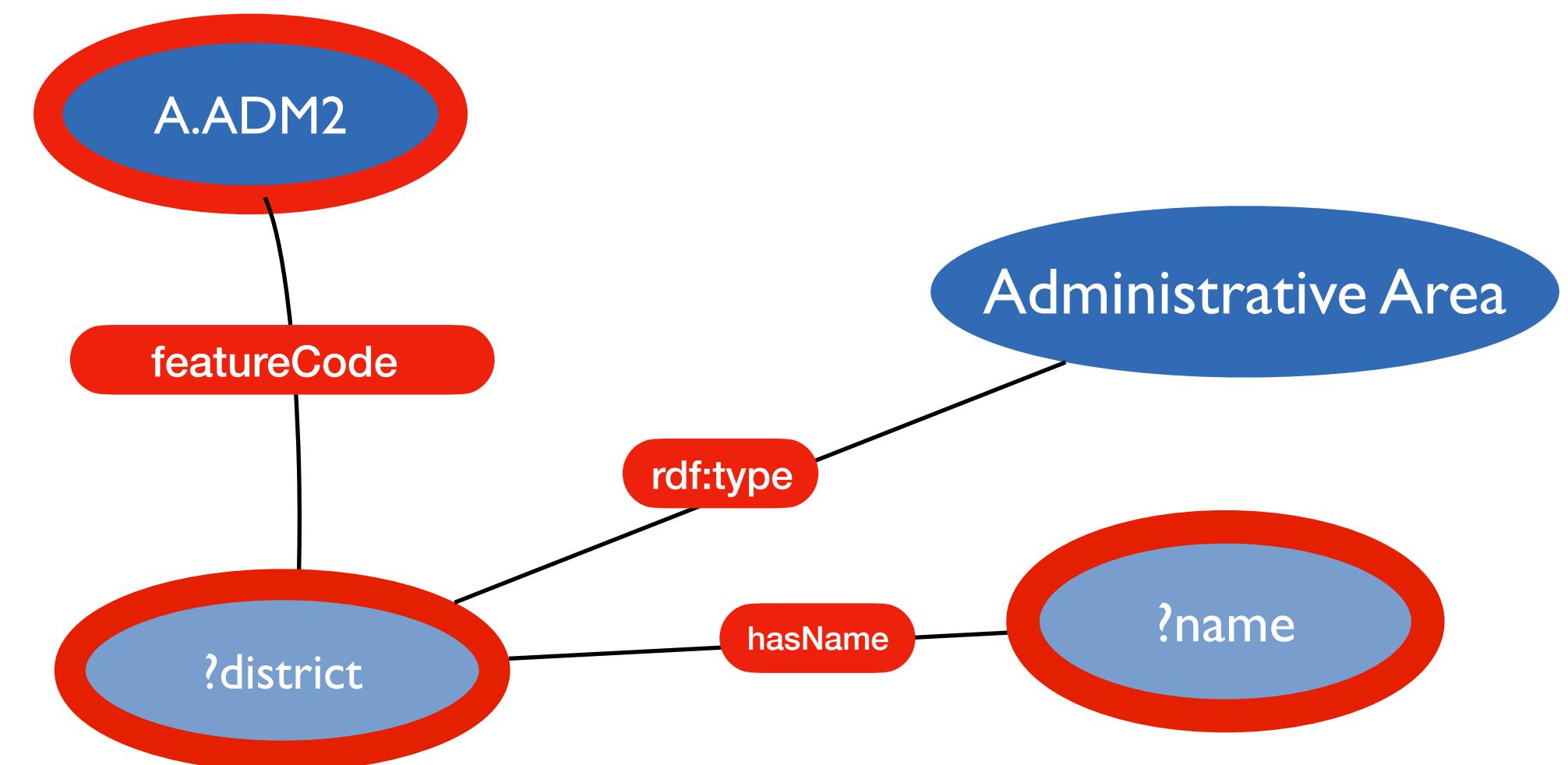


```
PREFIX schema: <http://schema.org/>
PREFIX gn: <http://www.geonames.org/ontology#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
```

```
SELECT DISTINCT ?district ?name
WHERE {
```

```
?district gn:featureCode gn:A.ADM2 ;
a schema:AdministrativeArea ;
schema:name ?name .
```

```
}
```





```
SELECT * WHERE {
```

```
?a ?b ?c
```

```
}
```

```
LIMIT 100
```



```
SELECT * WHERE {
```

```
?a ?b ?c
```

```
}
```

```
LIMIT 100
```



```
SELECT * WHERE {
```

```
?a ?b ?c
```

```
}
```

```
LIMIT 100
```



```
SELECT * WHERE {  
    ?a wdt:P31 wd:Q41298;  
}  
LIMIT 100
```

**Give me everything about the resources which
are instances of the class magazine. Limit the
result to 100.**



```
SELECT * WHERE {  
  
?a wdt:P31 wd:Q41298;  
      wdt:P17 wd:Q142.  
  
}  
LIMIT 100
```

**Give me everything about the resources which
are instances of the class magazine and are
made in France. Limit the result to 100.**



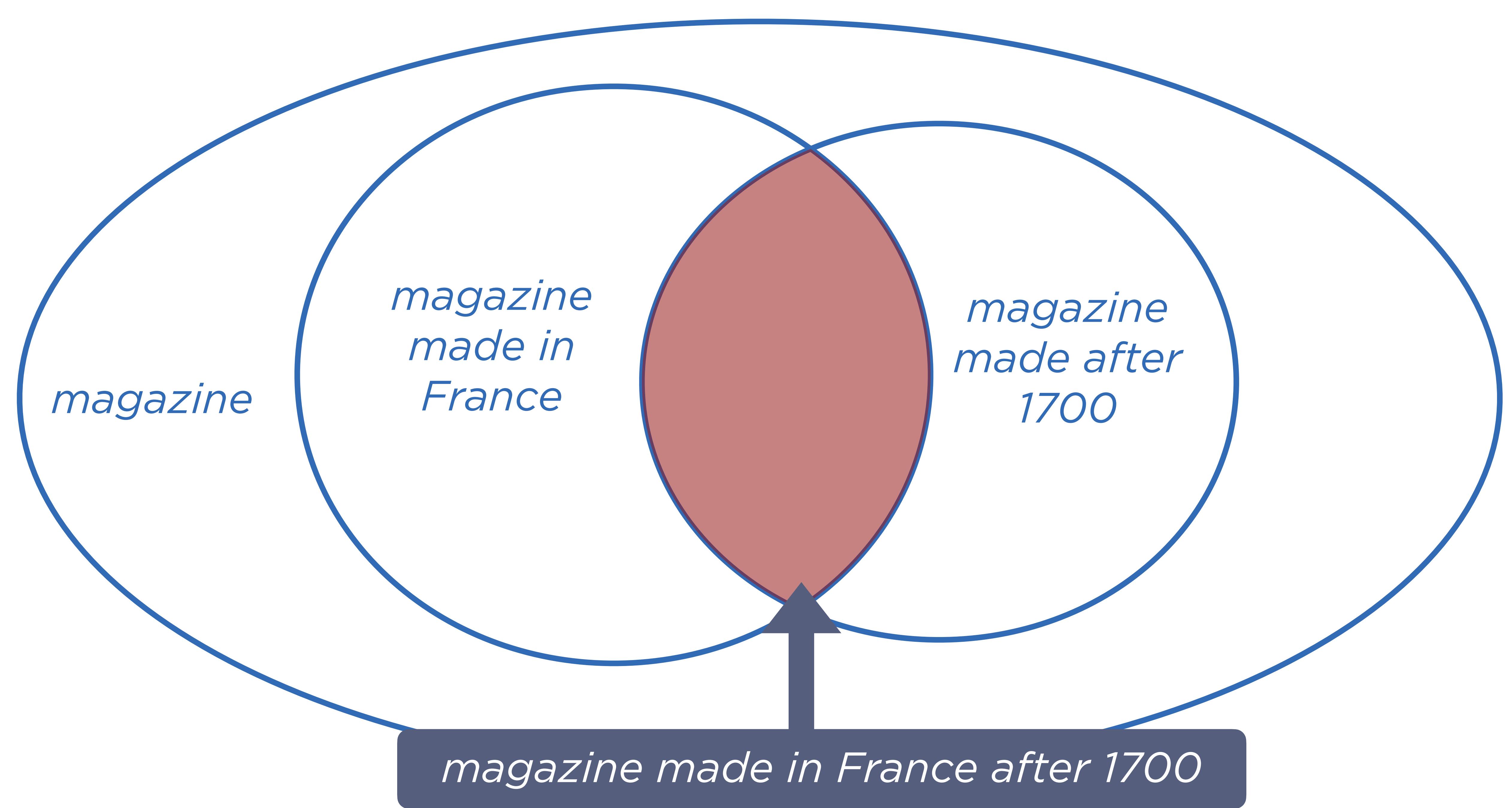
```
SELECT * WHERE {  
?a wdt:P31 wd:Q41298;  
    wdt:P571 ?time ;  
    wdt:P17 wd:Q142.  
  
    FILTER(?time > "1700-01-01T00:00:00"^^xsd:dateTime)  
}  
LIMIT 100
```

Give me everything about the resources which are instances of the class magazine and are made in France after 1700. Limit the result to 100.

magazine

*magazine
made in
France*

*magazine
made after
1700*





```
SELECT * WHERE {  
  
    ?a wdt:P31 wd:Q1002697 ;  
        wdt:P571 ?time.  
  
    FILTER( ?time > "1700"^^xsd:dateTime && ?time < "1800"^^xsd:dateTime)  
  
}
```

Give me everything about the resources which are instances of the class periodical made in-between 1700 and 1800. Limit the result to 200.



```
SELECT ?label WHERE {  
    wd:Q83155 rdfs:label ?label .  
}
```

Give me the name of a resource



```
SELECT ?label WHERE {  
    wd:Q83155 rdfs:label ?label .  
    FILTER (lang(?label) = 'en')  
}
```

Give me the name of a resource in en



```
SELECT ?label_it ?label_en WHERE {  
  
    wd:Q83155 rdfs:label ?label_en, ?label_it ;  
  
        FILTER (lang(?label_en) = 'en')  
        FILTER (lang(?label_it) = 'it')  
  
}
```

Give me the name of a resource in english and italian

```
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
SELECT DISTINCT ?fullName ?givenName ?familyName ?dbpedia ?birth ?death
?bio ?gender ?placeOfBirth ?placeOfDeath ?activity ?viaf
WHERE {

    OPTIONAL {
        <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://vocab.org
/bio/0.1/birth> ?birth .
    }
    OPTIONAL {
        <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://vocab.org
/bio/0.1/death> ?death .
    }
    OPTIONAL {
        <http://data.bnf.fr/ark:/12148/cb12393105j#about>
<http://rdvocab.info/ElementsGr2/biographicalInformation> ?bio .
    }
    OPTIONAL {
        <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://xmlns.com
/foaf/0.1/gender> ?gender .
    }
    OPTIONAL {
        <http://data.bnf.fr/ark:/12148/cb12393105j#about>
<http://rdvocab.info/ElementsGr2/placeOfBirth> ?placeOfBirth .
    }
    OPTIONAL {
        <http://data.bnf.fr/ark:/12148/cb12393105j#about>
<http://rdvocab.info/ElementsGr2/placeOfDeath> ?placeOfDeath .
    }
    OPTIONAL {
        <http://data.bnf.fr/ark:/12148/cb12393105j#about>
<http://rdvocab.info/ElementsGr2/fieldOfActivityOfThePerson> ?activity .
        FILTER ( datatype(?activity) != '' )
    }
    OPTIONAL {
        <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://xmlns.com
/foaf/0.1/familyName> ?familyName .
    }
    OPTIONAL {
        <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://xmlns.com
/foaf/0.1/givenName> ?givenName .
    }
    OPTIONAL {
        <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://xmlns.com
/foaf/0.1/name> ?fullName .
    }
    OPTIONAL {
        <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://www.w3.org
/2002/07/owl#sameAs> ?dbpedia .
        FILTER ( contains(str(?dbpedia),'dbpedia'))
    }
    OPTIONAL {
        <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://www.w3.org
/2002/07/owl#sameAs> ?viaf .
        FILTER ( contains(str(?viaf),'viaf'))
    }

}
```

```
SELECT DISTINCT ?fullName ?givenName ?familyName ?dbpedia ?birth ?death  
?bio ?gender ?placeOfBirth ?placeOfDeath ?activity ?viaf  
WHERE {  
  
OPTIONAL {  
    <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://vocab.org  
/bio/0.1/birth> ?birth .  
  
OPTIONAL {  
    <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://vocab.org  
/bio/0.1/death> ?death .  
}  
OPTIONAL {  
    <http://data.bnf.fr/ark:/12148/cb12393105j#about>  
<http://rdvocab.info/ElementsGr2/biographicalInformation> ?bio .  
}  
OPTIONAL {  
    <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://xmlns.com  
/foaf/0.1/gender> ?gender .  
}  
OPTIONAL {  
    <http://data.bnf.fr/ark:/12148/cb12393105j#about>  
<http://rdvocab.info/ElementsGr2/placeOfBirth> ?placeOfBirth .  
}  
OPTIONAL {  
    <http://data.bnf.fr/ark:/12148/cb12393105j#about>  
<http://rdvocab.info/ElementsGr2/placeOfDeath> ?placeOfDeath .  
}  
OPTIONAL {  
    <http://data.bnf.fr/ark:/12148/cb12393105j#about>  
<http://rdvocab.info/ElementsGr2/fieldOfActivityOfThePerson> ?activity .
```

give me the birth date
only if it is available
if not move along

```
OPTIONAL {  
    <http://data.bnf.fr/ark:/12148/cb12393105j#about>  
<http://rdvocab.info/ElementsGr2/fieldOfActivityOfThePerson> ?activity .  
    FILTER ( datatype(?activity) != '' )  
}  
  
OPTIONAL {  
    <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://xmlns.com  
/foaf/0.1/familyName> ?familyName .  
}  
OPTIONAL {  
    <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://xmlns.com  
/foaf/0.1/givenName> ?givenName .  
}  
OPTIONAL {  
    <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://xmlns.com  
/foaf/0.1/name> ?fullName .  
}  
OPTIONAL {  
    <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://www.w3.org  
/2002/07/owl#sameAs> ?dbpedia .  
    FILTER ( contains(str(?dbpedia), 'dbpedia'))  
}  
OPTIONAL {  
    <http://data.bnf.fr/ark:/12148/cb12393105j#about> <http://www.w3.org  
/2002/07/owl#sameAs> ?viaf .  
    FILTER ( contains(str(?viaf), 'viaf'))  
}  
}
```

Give me a string that
contains the value
‘viaf’

SKOS

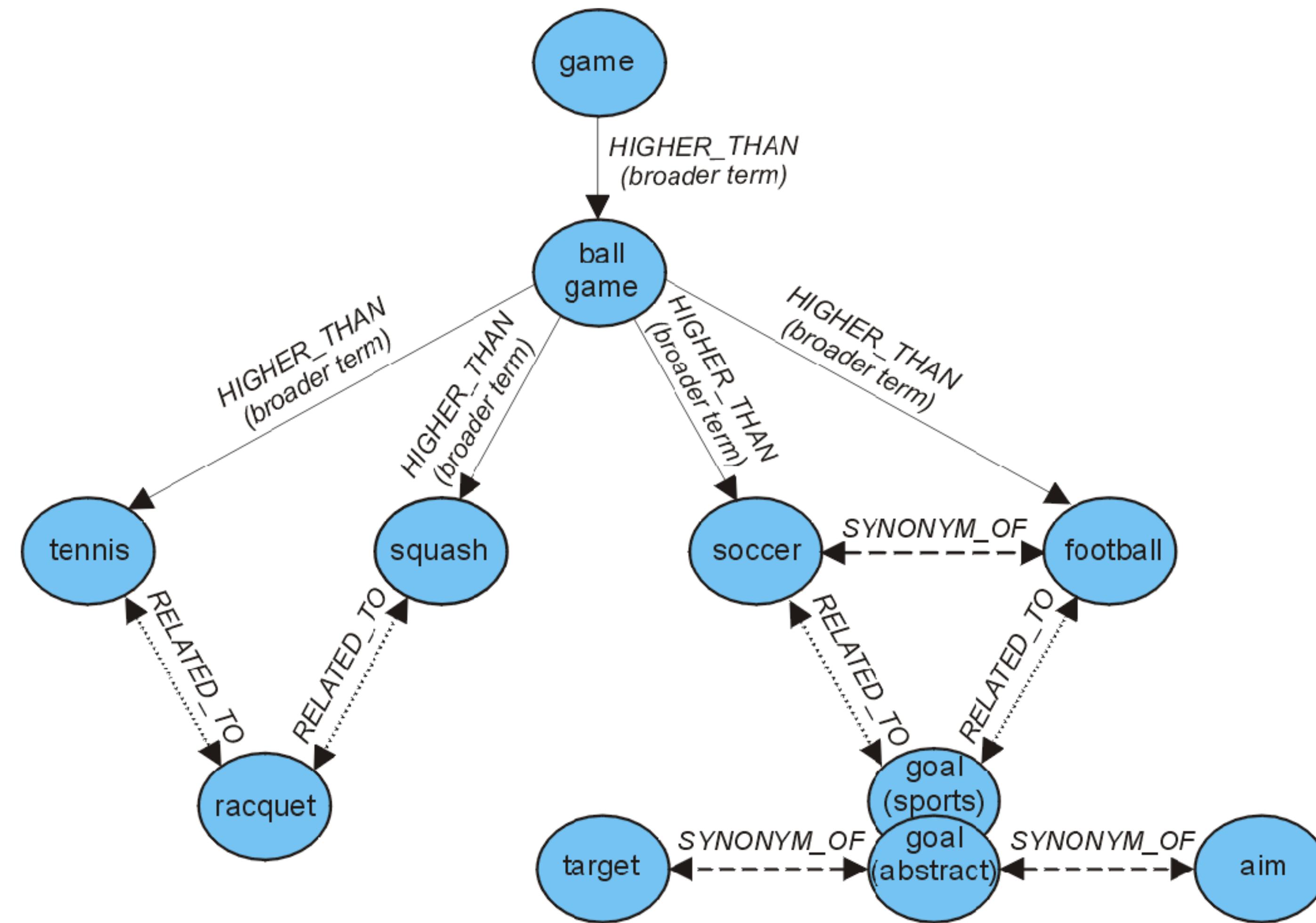
SKOS—Simple Knowledge Organization System
is an ontology that can be used for thesauri, classification
schemes, subject heading lists, taxonomies, folksonomies
etc. (KOS).

The fundamental element of the SKOS vocabulary is the
concept. Concepts are the units of thought which underlie
many KOS

The first characterizations of concepts are the expressions that are used to refer to them in natural language: their labels. SKOS provides three properties to attach labels to conceptual resources: `skos:prefLabel`, `skos:altLabel` and `skos:hiddenLabel`.

In KOSs semantic relations play a crucial role for defining concepts:

- **skos:broader** and **skos:narrower** enable the representation of hierarchical links, such as the relationship between one genre and its more specific species, or, depending on interpretations, the relationship between one whole and its parts;
- **skos:related** enables the representation of associative (non-hierarchical) links



**why semantics?
why not just graph**