

CIDOC CRM

A High Level Overview of the Model

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The CIDOC Conceptual Reference Model



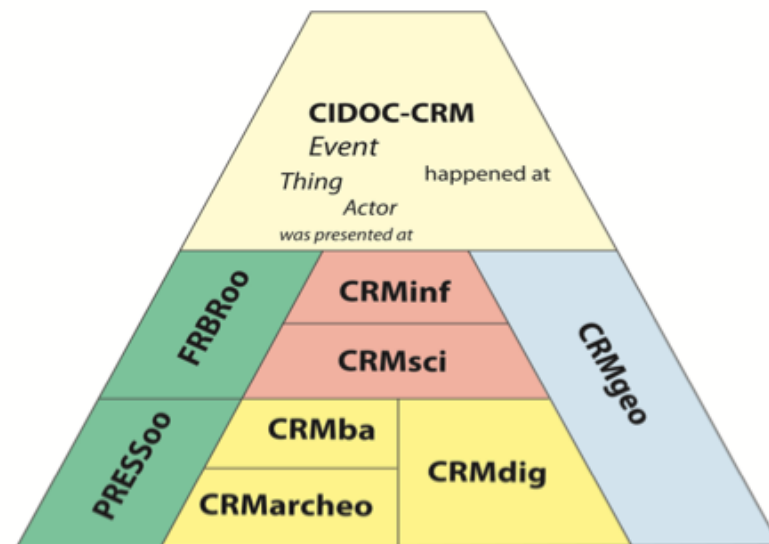
- *Developed by the **CRM Special Interest Group of the International Committee for Documentation (CIDOC)** of the International Council of Museums (ICOM), following an initiative of ICS-FORTH, Heraklion, Crete.*
- *a **core ontology** describing the underlying semantics of over a hundred database schemata 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*

CIDOC CRM: Description

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/



CIDOC-CRM family of Models



CIDOC CRM as Interlingua for CH Data Integration

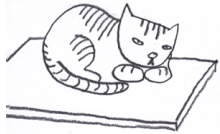
- We assume that we all speak about the same world
- We assume that data structures are means by which to make statements about this same world
- We propose an intermediary language that allows a re-expression of propositions in source data structures to an interlingua
- The interlingua is successful just when it allows a semantically consistent re-interpretation of data in such a way that it is usable and comparable in a KB

Learning CRM like learning a language but...

- CRM is a simplified language that proposes classes (nouns) and relations (verbs) that are logically defined
- CRM is an artificial language; does not aspire to poetry, only allowing the representation of a pertinent set of facts
- Learning CRM is much easier than learning a natural language as its basic units are highly limited and follow a common logic
- Like learning a regular language we start with easier examples and move to harder expressions

The Lingua Franca Goal

VARIOUS MODES OF REPRESENTATION



“The cat is on the mat”

ID	Thing on Mat
1	CAT

$\exists x \exists y \text{ Cat}(x) \ \& \ \text{Mat}(y) \ \& \ \text{On}(x,y)$

“猫在垫子上”

WORLD



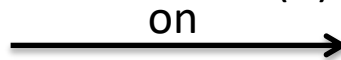
ONTOLOGIC LINGUA FRANCA

CLASS (S)

OBJECT

physical thing that occupies a unique space time place.

RELATION (V)



Indicates a spatial relation between some obj and plc whereby obj is in physical contact to and above the place

CLASS (O)

PLACE

Geometrically declared mathematical extent

Formal Ontology Form: What's it made of?

Scope: a definition of the intended field of discourse/reality that the formal ontology should cover.

e.g. Car Manufacturing, Cultural Heritage, Fashion

Classes: universals meant to represent some set of entities in the world of discourse, that have a distinct, identifiable behaviour and identity.

Relations/Properties: the relations that exist between classes in the ontology. These formally define the possible relations between classes and their meaning.

Anatomy of a Class

The Label: arbitrary but identifying

Subclass/Superclass: Place in ISA

The Scope Note: gives the meaning, the intension. First thing to check!

The Examples: helps to verify... do others think/do it like you do

The Properties: more verification of appropriateness.

How does it relate to other concepts? Is this how my concept behaves?

E5 Event

Subclass of: [E4 Period](#)
Superclass of: [E7 Activity](#)
[E63 Beginning of Existence](#)
[E64 End of Existence](#)

Scope Note: This class comprises changes of states in cultural, social or physical systems, regardless of scale, brought about by a series or group of coherent physical, cultural, technological or legal phenomena. Such changes of state will affect instances of E77 Persistent Item or its subclasses.

The distinction between an E5 Event and an E4 Period is partly a question of the scale of observation. Viewed at a coarse level of detail, an E5 Event is an 'instantaneous' change of state. At a fine level, the E5 Event can be analysed into its component phenomena within a space and time frame, and as such can be seen as an E4 Period. The reverse is not necessarily the case: not all instances of E4 Period give rise to a noteworthy change of state.

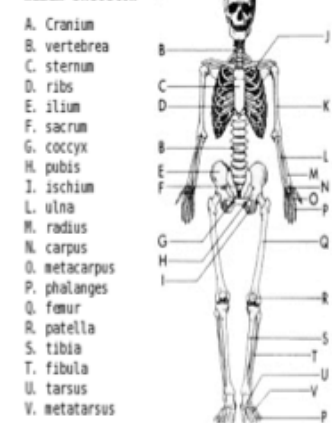
Examples:

- * the birth of Cleopatra (E67)
- * the destruction of Lisbon by earthquake in 1755 (E6)
- * World War II (E7)
- * the Battle of Stalingrad (E7)
- * the Yalta Conference (E7)
- * my birthday celebration 28-6-1995 (E7)
- * the falling of a tile from my roof last Sunday
- * the CIDOC Conference 2003 (E7)

Properties

- [P1 is identified by \(identifies\): E41 Appellation](#)
- [P137 exemplifies \(is exemplified by\): E55 Type](#)
([P137.1 in the nomenclator role: E55 Type](#))
- [P2 has type \(is type of\): E55 Type](#)
- [P11 had participant \(participated in\): E39 Actor](#)
- [P12 occurred in the presence of \(was present at\): E77 Persistent Item](#)
- [P8 took place on or within \(witnessed\): E19 Physical Object](#)
([short cut of: E46 Section Definition](#))
- [P7 took place at \(witnessed\): E53 Place](#)
- [P4 has time span \(is time span of\): E52 Time-Span](#)
- [P120 occurs before \(occurs after\): E2 Temporal Entity](#)
- [P119 meets in time with \(is met in time by\): E2 Temporal Entity](#)
- [P118 overlaps in time with \(is overlapped in time by\): E2 Temporal Entity](#)
- [P117 occurs during \(includes\): E2 Temporal Entity](#)
- [P116 starts \(is started by\): E2 Temporal Entity](#)
- [P115 finishes \(is finished by\): E2 Temporal Entity](#)
- [P114 is equal in time to: E2 Temporal Entity](#)
- [P10 falls within \(contains\): E4 Period](#)
- [P9 consists of \(forms part of\): E4 Period](#)
- [P132 overlaps with: E4 Period](#)
- [P133 is separated from: E4 Period](#)
- [P3 has note: E62 String](#)
([P3.1 has type: E55 Type](#))

human skeleton



Anatomy of a Property

The Label: arbitrary but identifying

The Domain: The set of classes from which the property can originate

The Range: the set of classes to which the property can join the domain class

Superproperty/subproperty: Place in IsA Hierarchy

The Scope Note: gives the meaning, the intension. First thing to check!

The Examples: helps to verify...
do others think/do it like you do

P1 is identified by (identifies)

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.

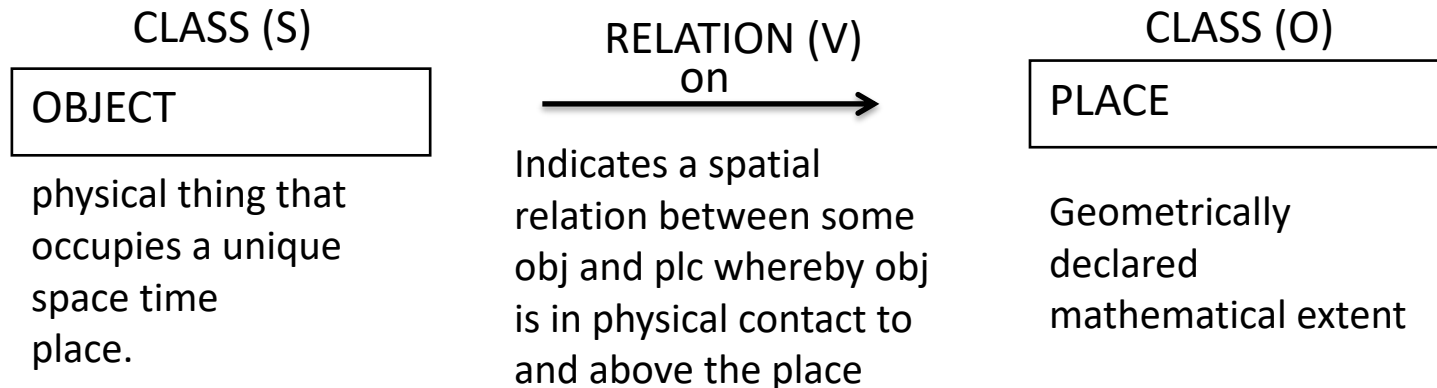
This property is intended for identifiers in general use, which form part of the world the model intends to describe, and not merely for internal database identifiers which are specific to a technical system, unless these latter also have a more general use outside the technical context. This property 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](#))

Ontology Language, What to Learn

ONTOLOGIC LINGUA FRANCA



1. **What is an instance of a class?** -> Read and understand the scope note, the definition.

Hint: 'instance of class' is fancy mathematical expression for what can this noun be used to talk about in this language

2. **What relations/properties can I use to connect this class to other classes?** -> read and understand the declared relations/properties of a class (their domain and range)

Hint: this is a rather formal way of saying there is a syntax for proper sentences in this language. You can see the syntax by reading the standard declaration.

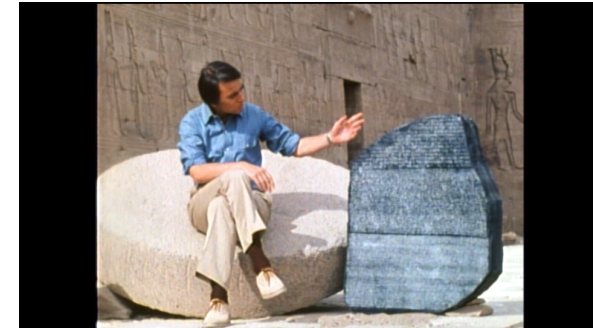
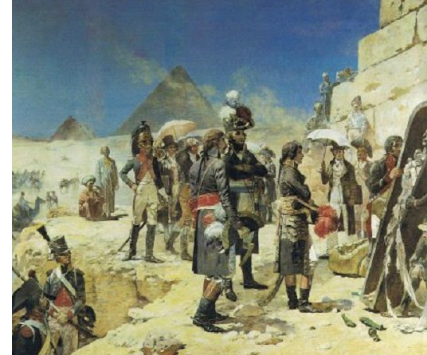
Otherwise: **How to I make useful, sensible statements about my subject in this language?**

CRM's Lingua Franca Goal

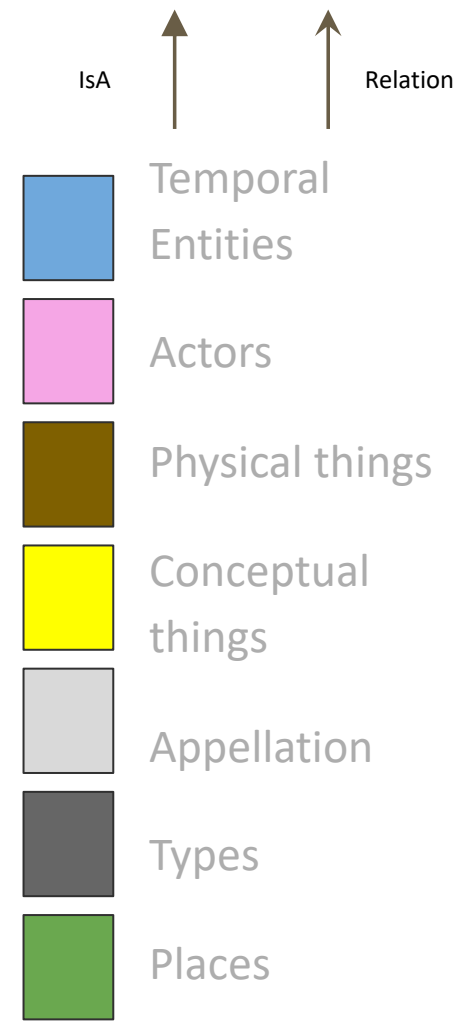
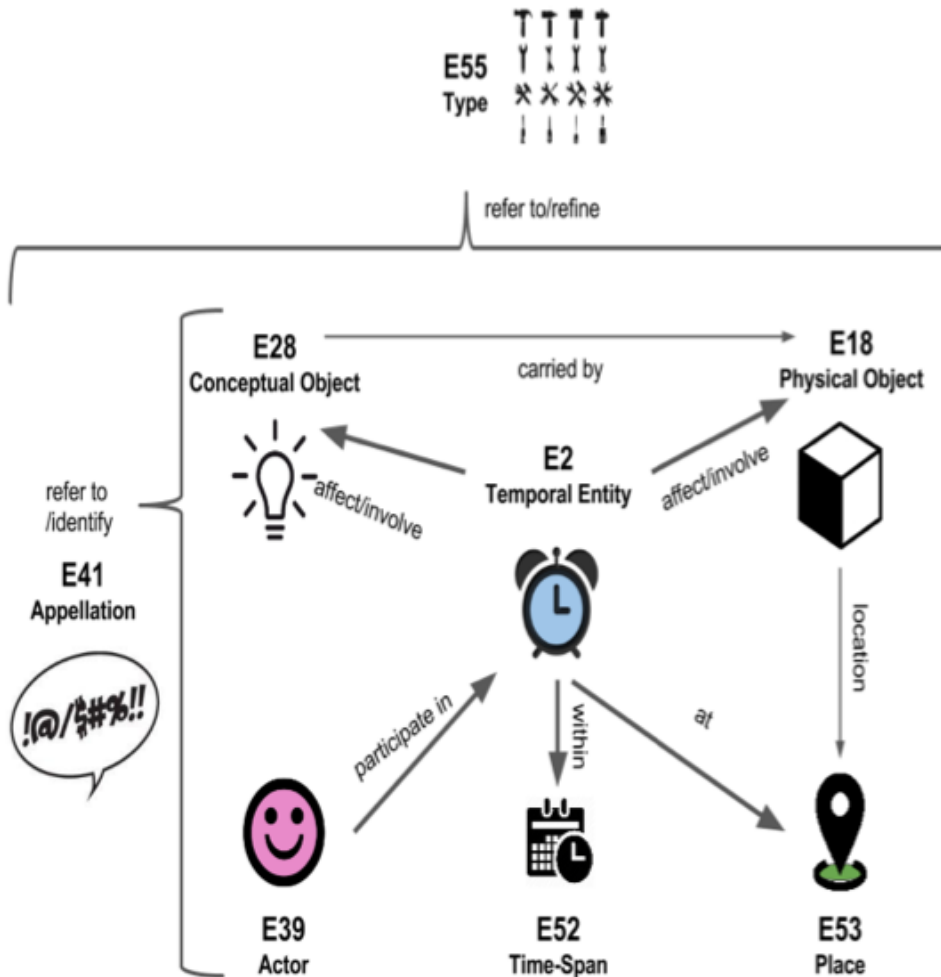
REPRESENTATIONAL STRATEGY

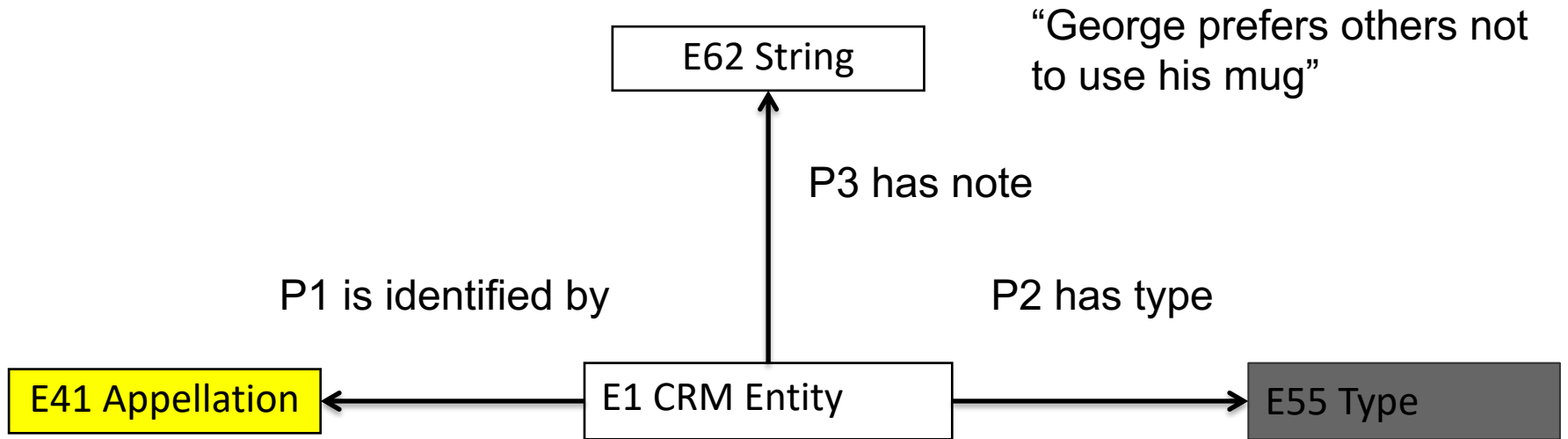
- ***General model of “what has happened” on human scale***
- ***generates huge, meaningful networks of knowledge by a simple abstraction: history as meetings of people, things and information***

WORLD



CIDOC CRM: General Modelling Pattern





“George’s Mug”



Mug

The basic CRM sentences

Can ask:
Where was it?

E53 Place

The top CRM class for
locations

E52 Time Span

E54 Dimension

E1 CRM Entity

Can ask:
Is it still on-going?

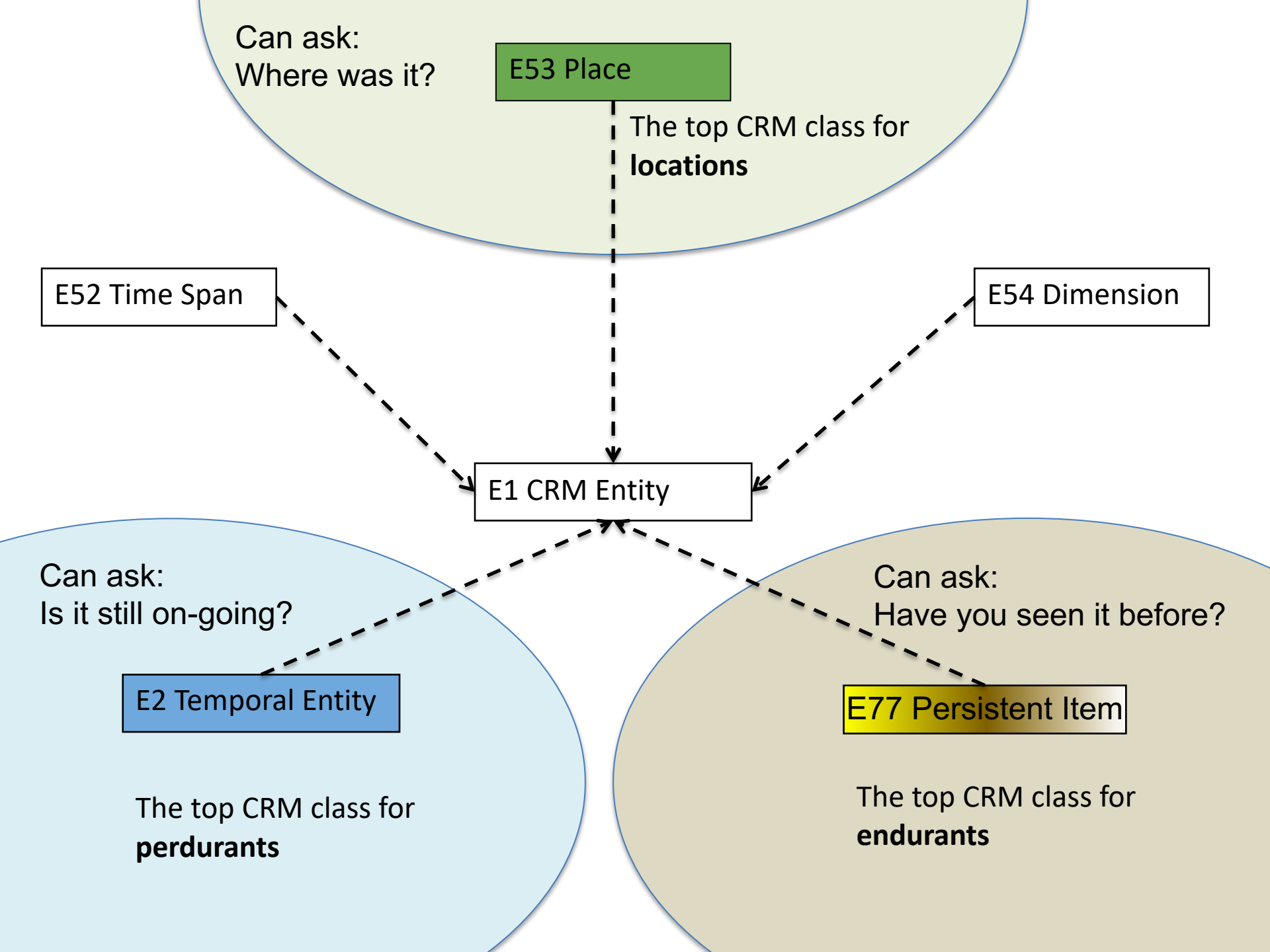
E2 Temporal Entity

The top CRM class for
perdurants

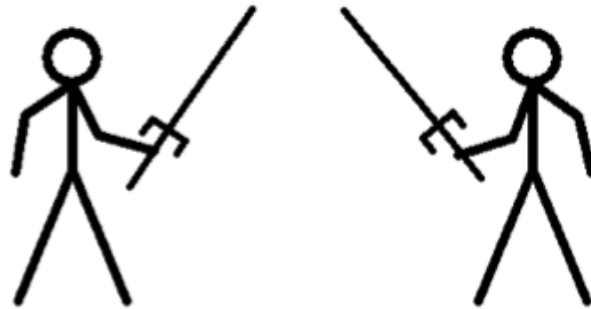
Can ask:
Have you seen it before?

E77 Persistent Item

The top CRM class for
endurants



Top Level Entities Illustrated



E2 Temporal Entity

The battle of
the stick people

E77 Persistent Item

Two People
Swords
Triangle
Sun

E53 Place

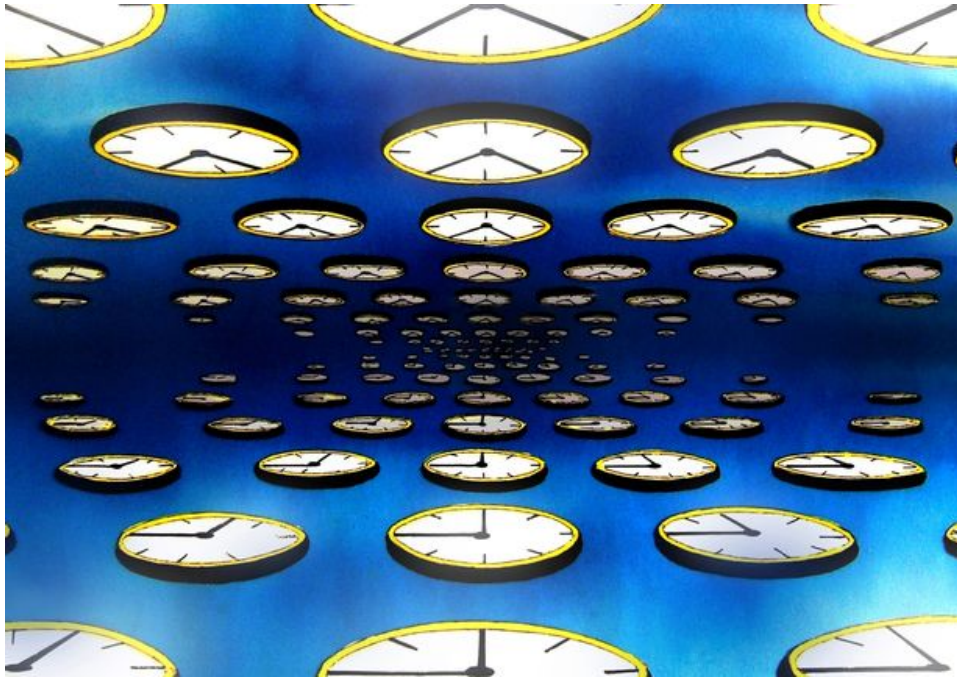
The extent of
the battlefield
of the stick
people

Examples of Top Level Entities

E2 Temporal Entity	E77 Persistent Item	E53 Place
A handshake	hands	The square
A battle	guns	A field
A walk	trees	length of the path
The Jurassic	dinosaurs	Jurassic South America
WW II	bunkers	France
A kiss	lips	Paris

n.b.: in an actual system all instances must be particulars not generics

Exercise 1

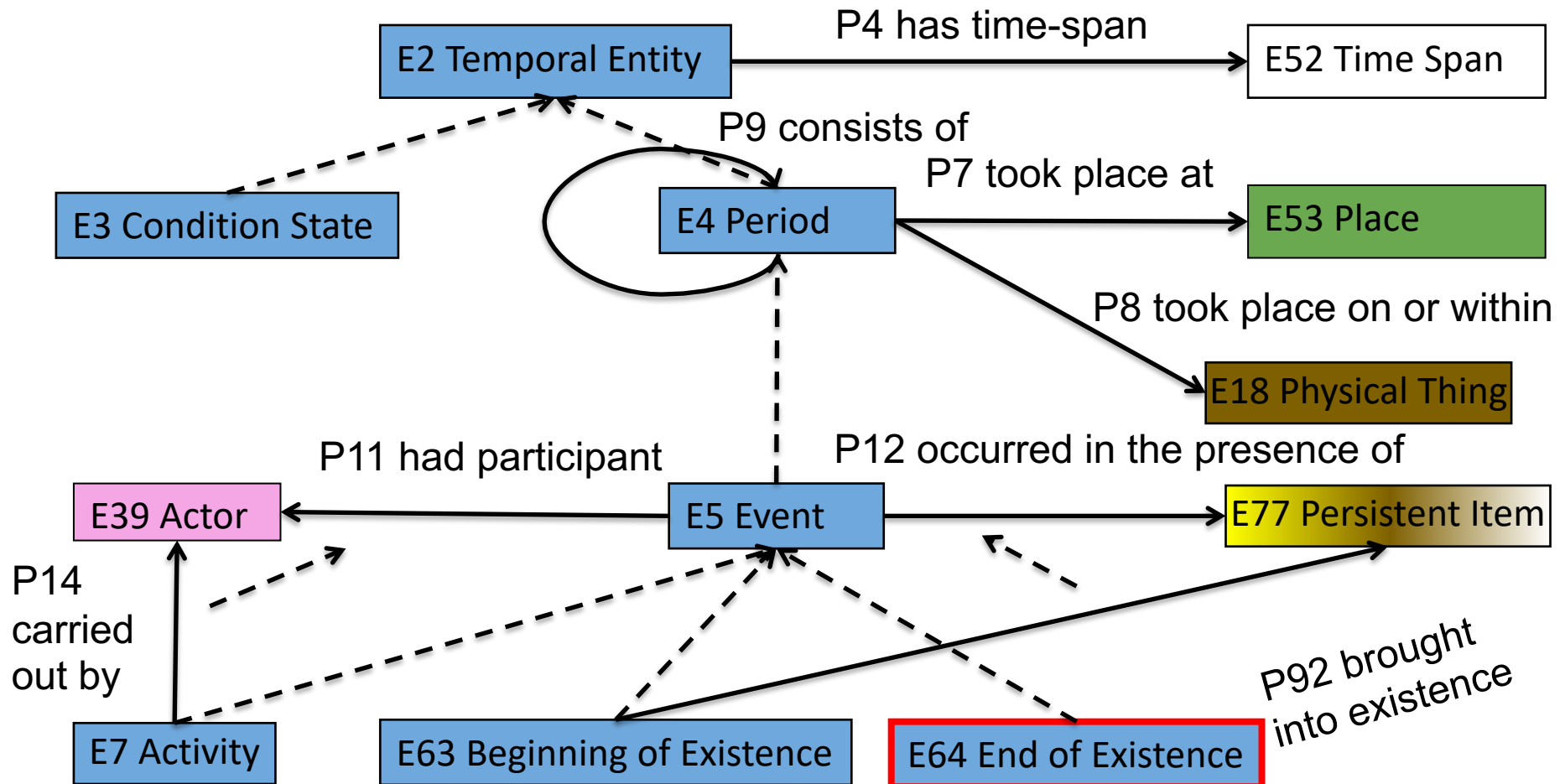


Enabling representation of and reasoning over temporal phenomena

TEMPORAL ENTITIES (PERDURANTS)

Top Level Temporal Classes

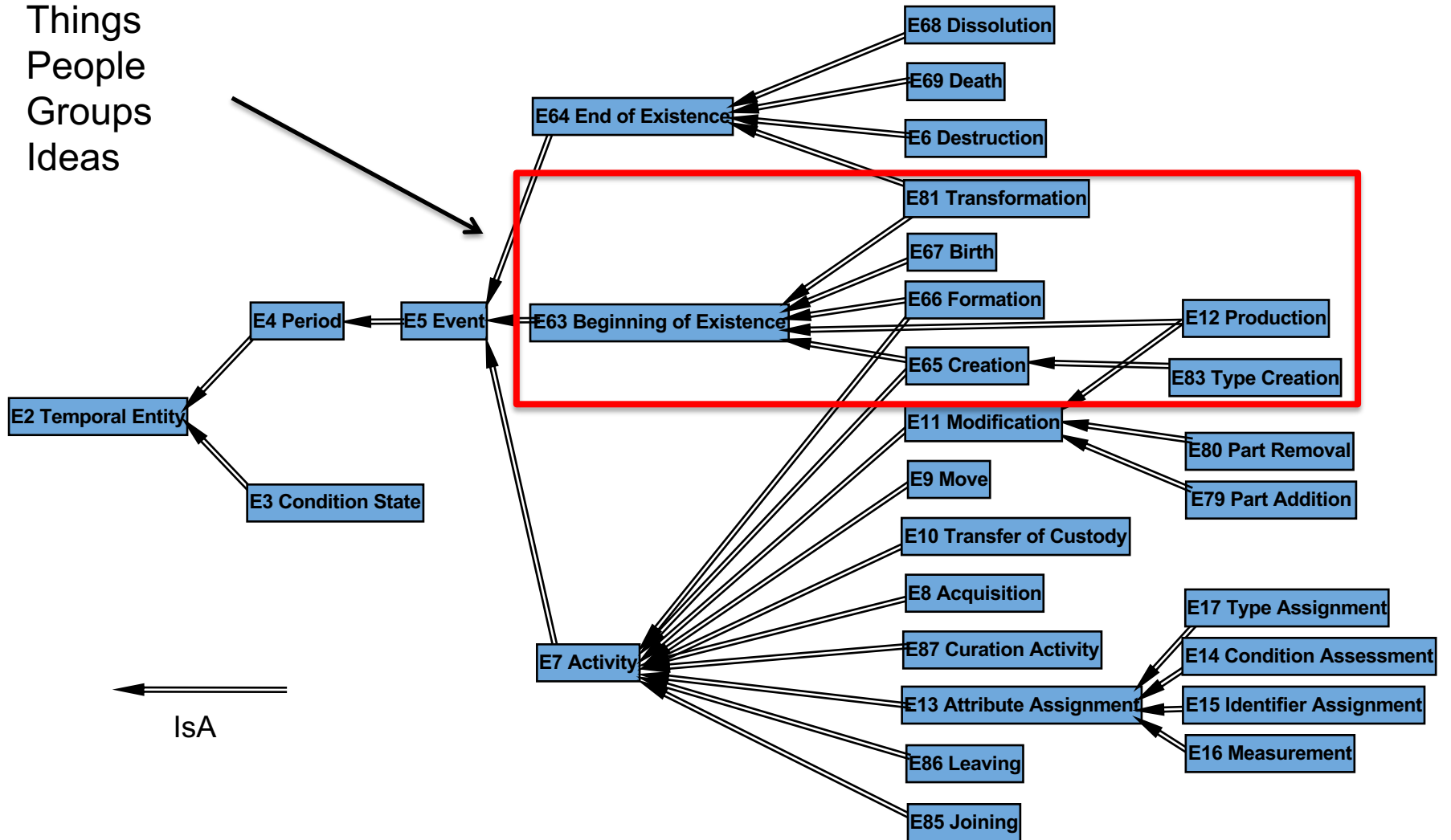
Expressivity



Coming to exist

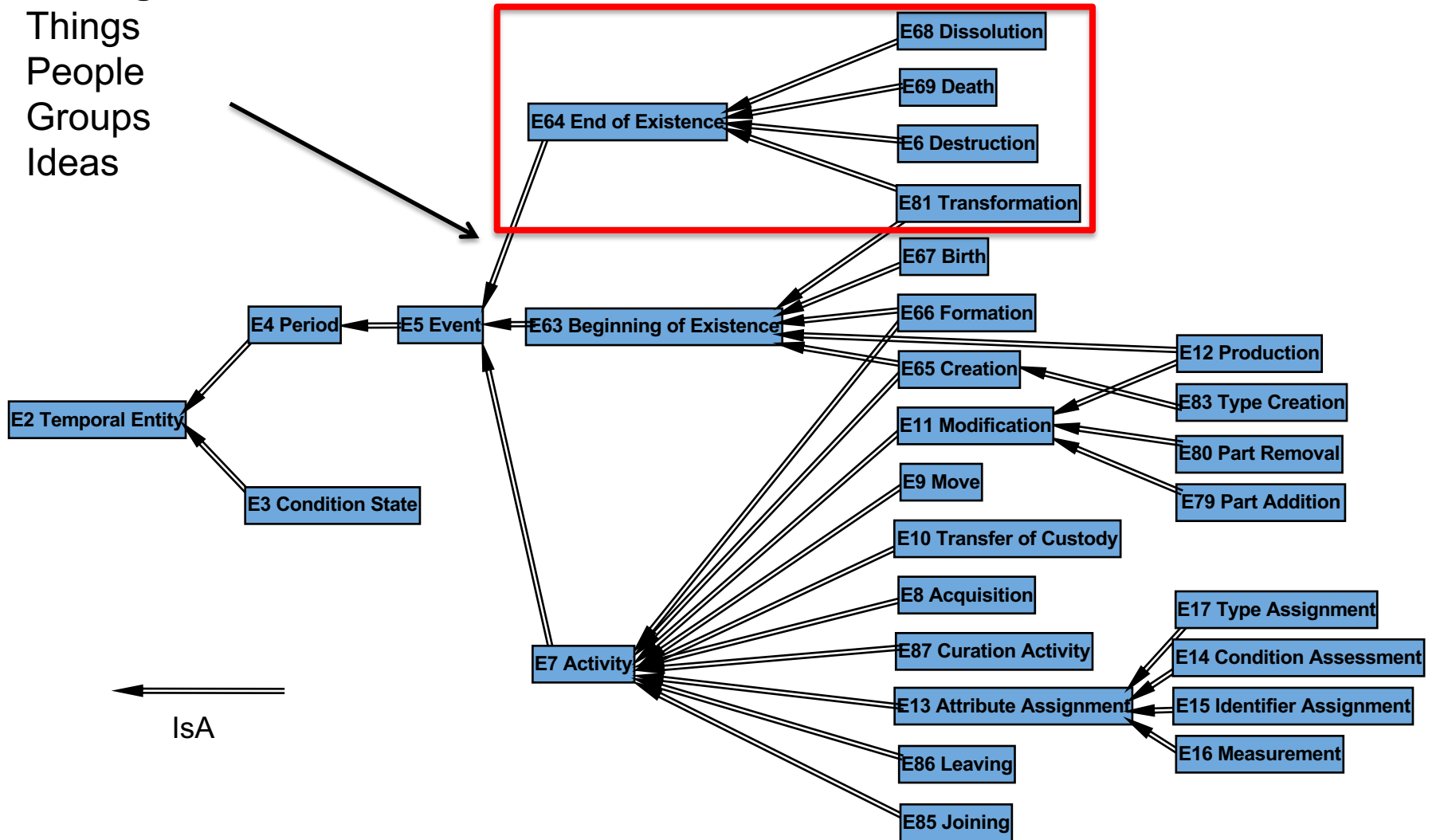
Coming to be of:

Things
People
Groups
Ideas



Ceasing to exist

Ending of:
Things
People
Groups
Ideas



Forms of Activity

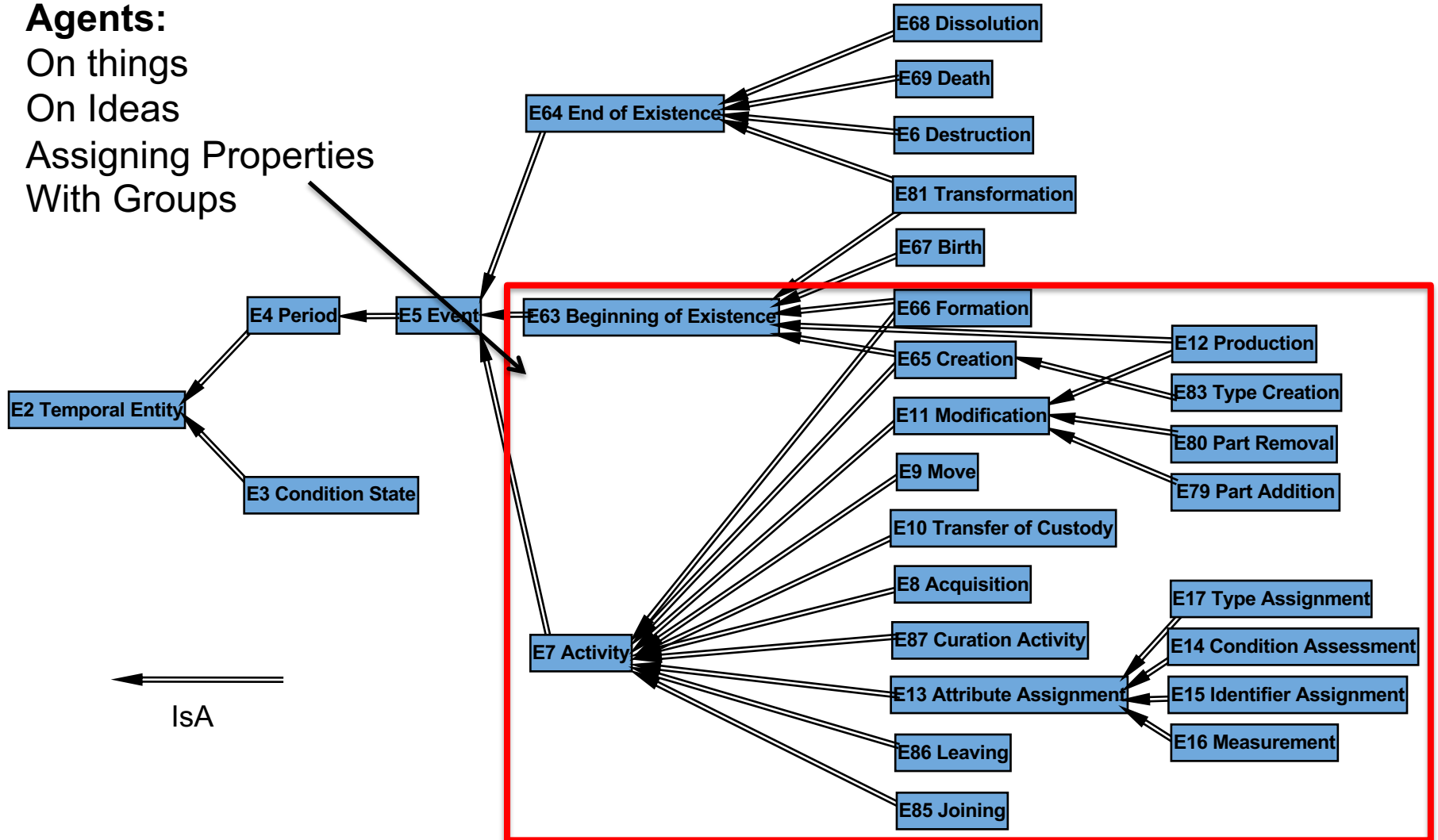
Causal Activities of Agents:

On things

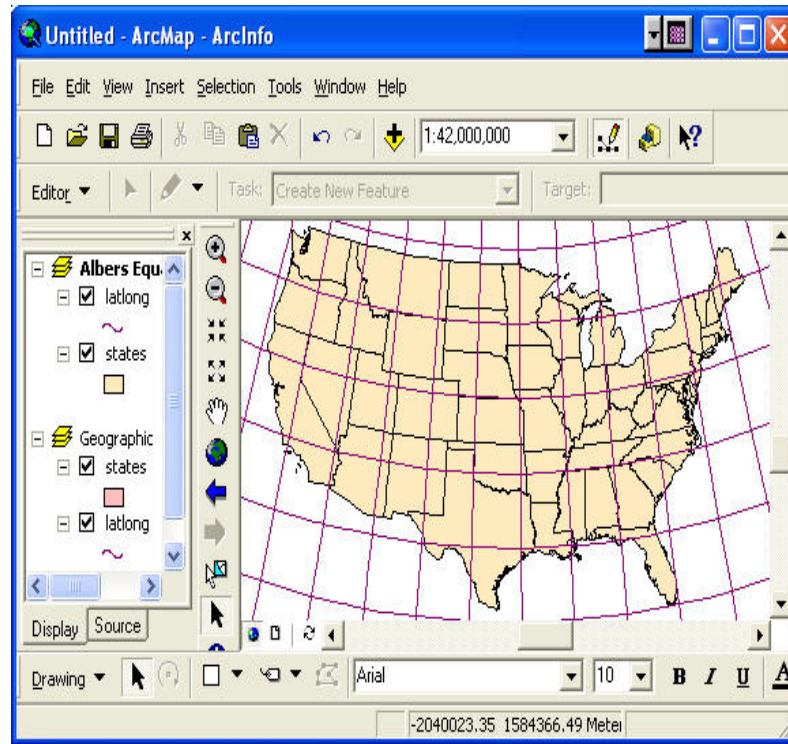
On Ideas

Assigning Properties

With Groups



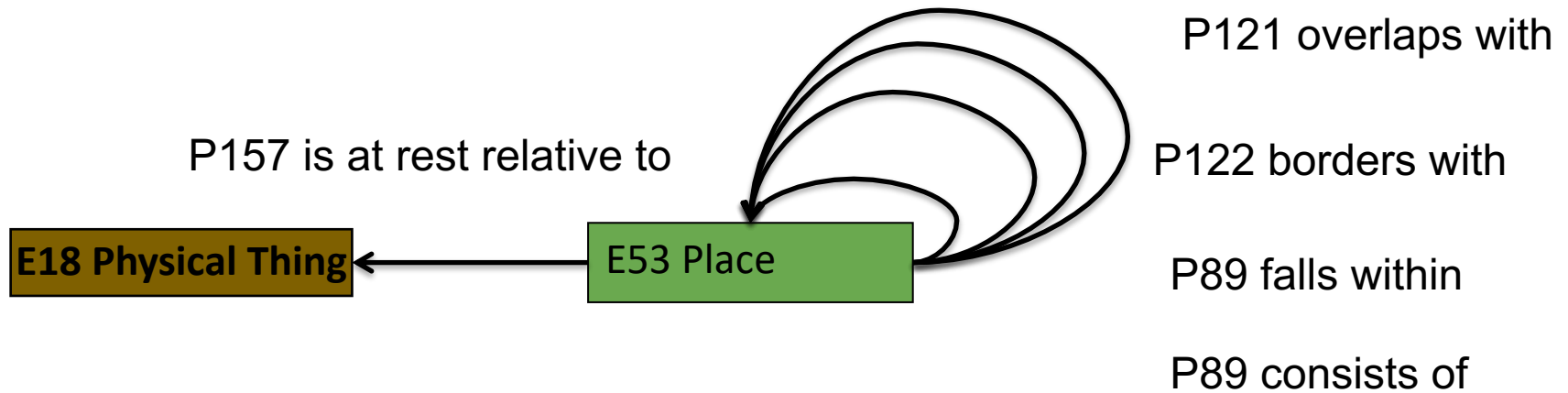
Exercise 2



Enabling Representation and Reasoning over Spatial Phenomena

PLACES

High Level Distinctions/Connections amongst Places

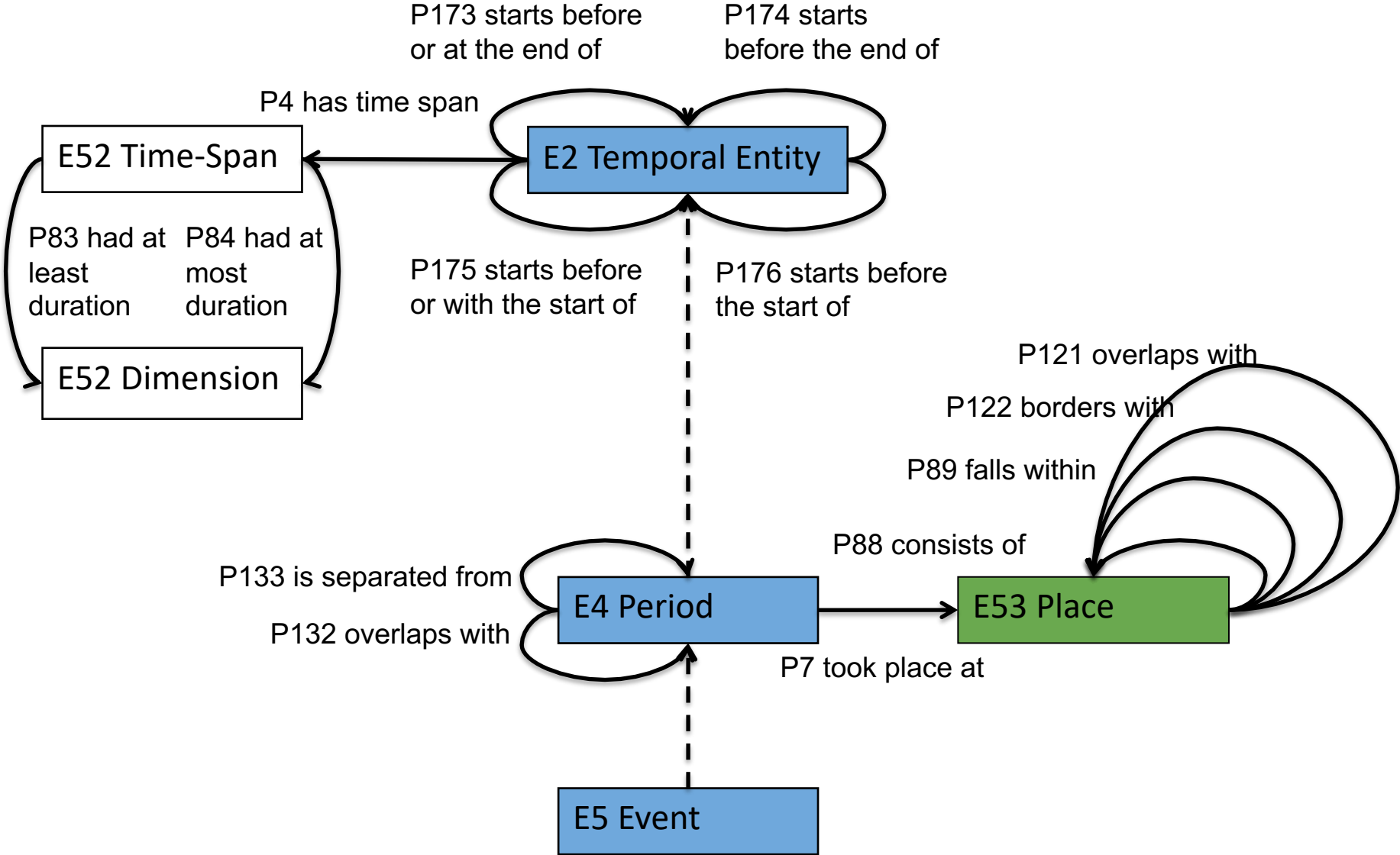


E53 Place

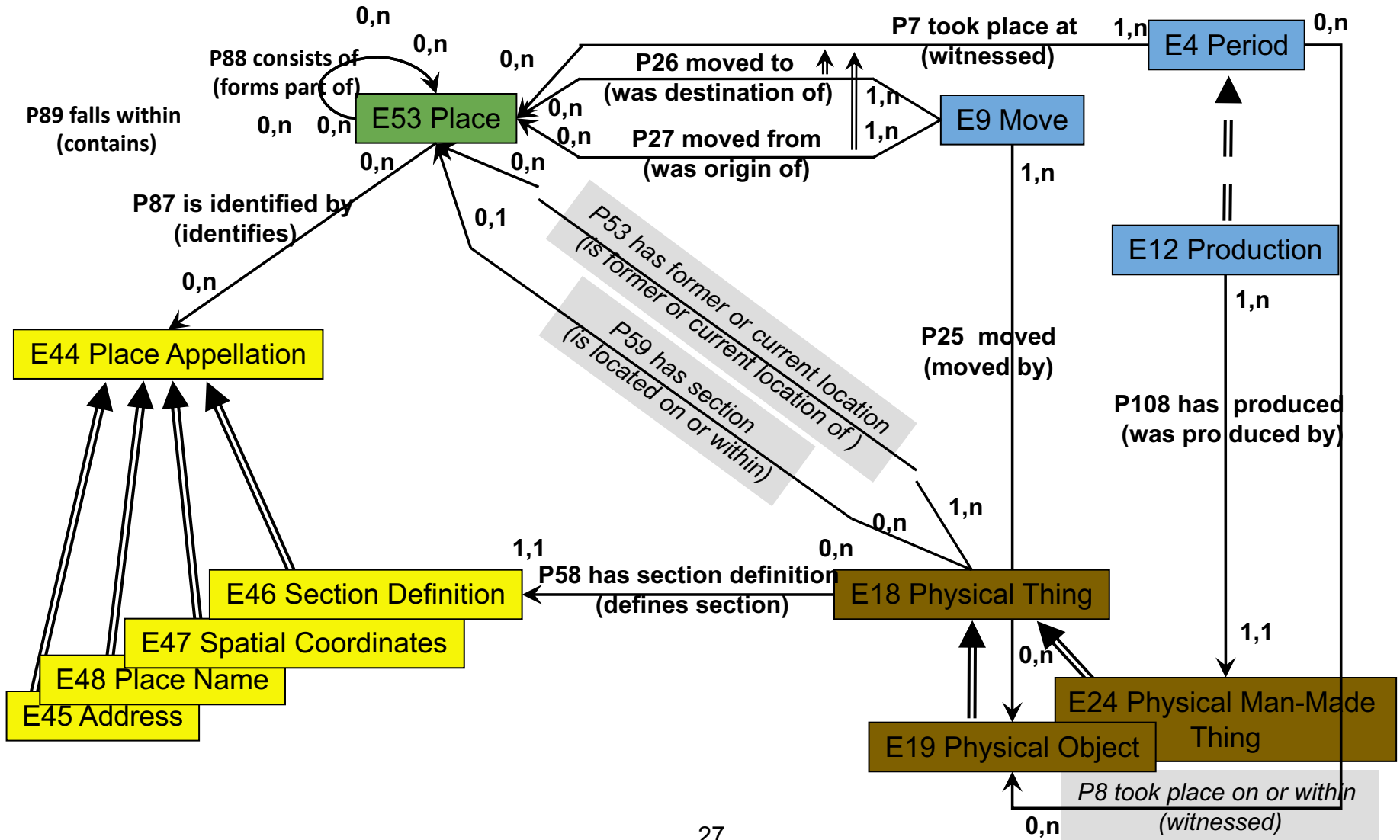
This class comprises extents in space, in particular on the surface of the earth, in the pure sense of physics: independent from temporal phenomena and matter.

The instances of E53 Place are usually determined by reference to the position of “immobile” objects such as buildings, cities, mountains, rivers, or dedicated geodetic marks.

Spatio-Temporal Relationships



Reasoning using E53 Place



Exercise 4

Can ask:
Who did it?

E39 Actor

The top CRM class for
agency

E77 Persistent Item

Can ask:
What did it mean?

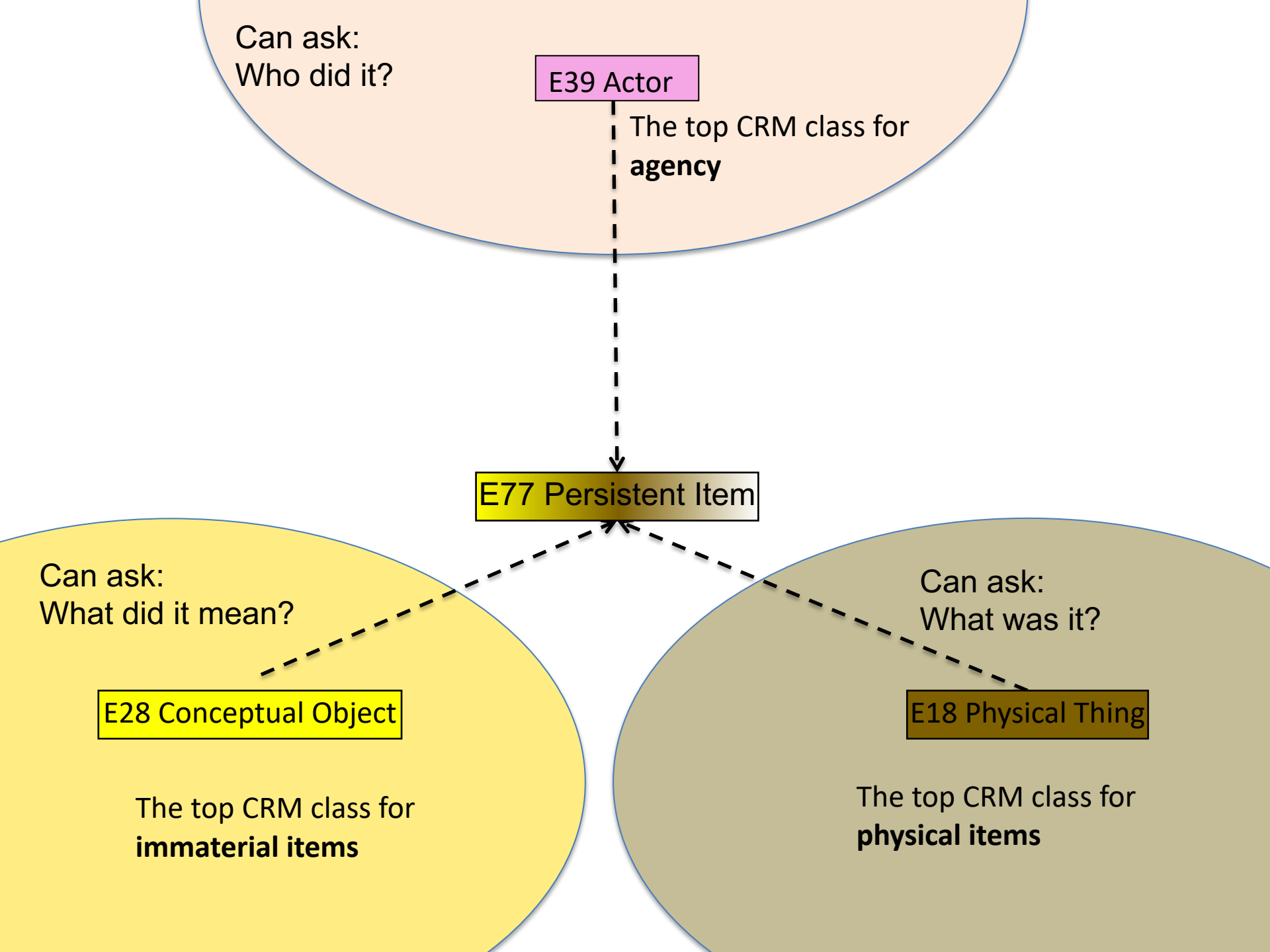
E28 Conceptual Object

The top CRM class for
immaterial items

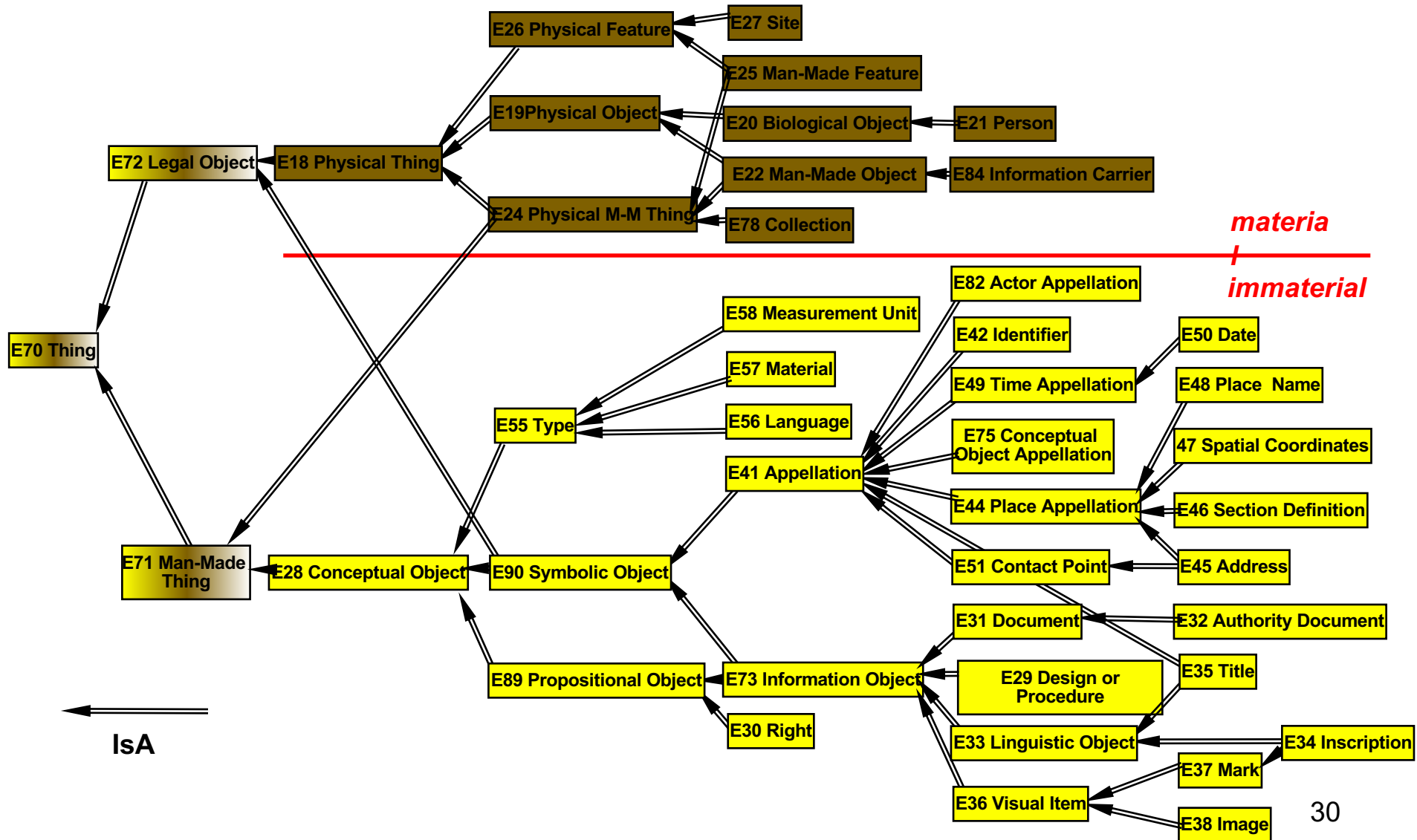
Can ask:
What was it?

E18 Physical Thing

The top CRM class for
physical items

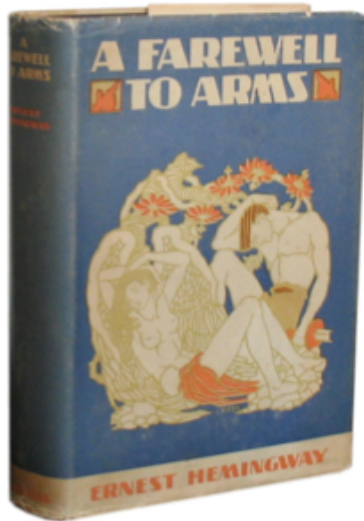


Endurant Classes: Reasoning over Things



Top Level Endurants Illustrated

E18 Physical Thing



E39 Actor



E28 Conceptual Object

“In the late summer of that year we lived in a house in a village that looked across the river and the plain to the mountains. In the bed of the river there were pebbles and boulders, dry and white in the sun, and the water was clear and swiftly moving and blue in the channels. Troops went by the house and down the road and the dust they raised powdered the leaves of the trees.”

Examples of Top Level Endurants

E18 Physical Thing

This Book

Mona Lisa Painting

This CD

This Acetate Film

This Parchment

E28 Conceptual Object

A Farewell to Arms

The Image of Mona
Lisa

Beethoven's Fifth

Citizen Kane

American
Constitution

E39 Actor

Hemingway

Da Vinci

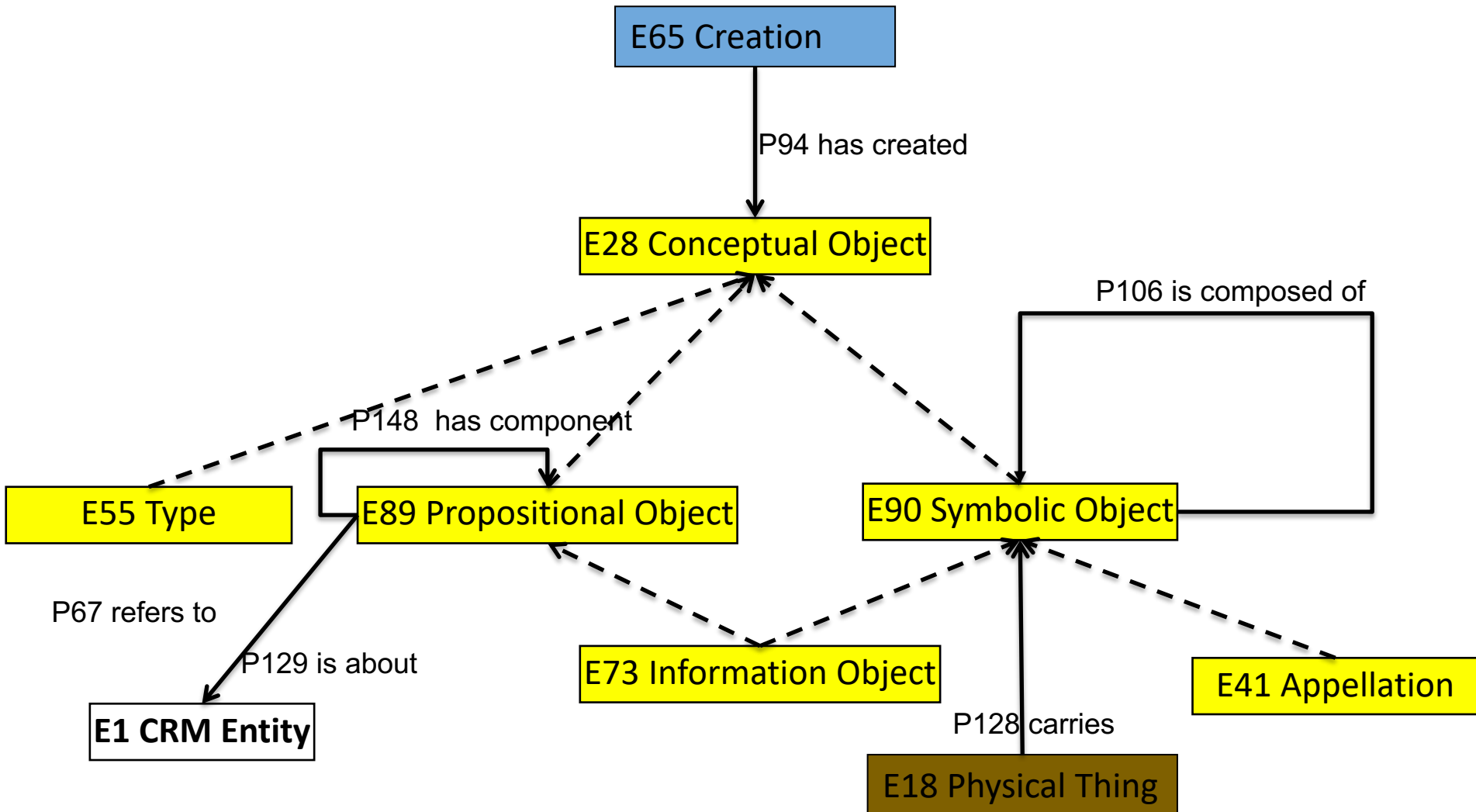
Beethoven

Orson Welles

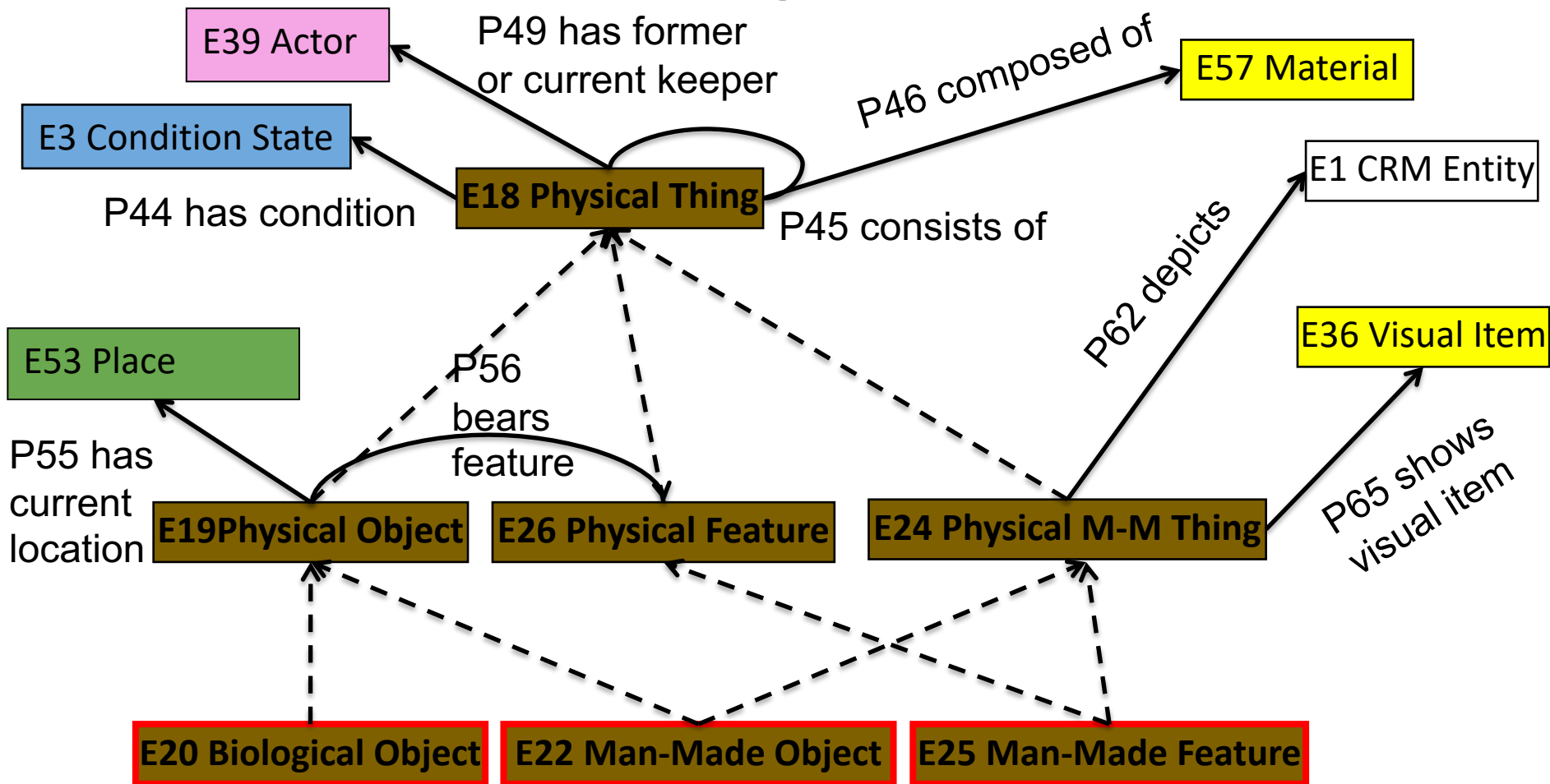
Founding Fathers

Exercise 5

High Level Relations between Conceptual Objects

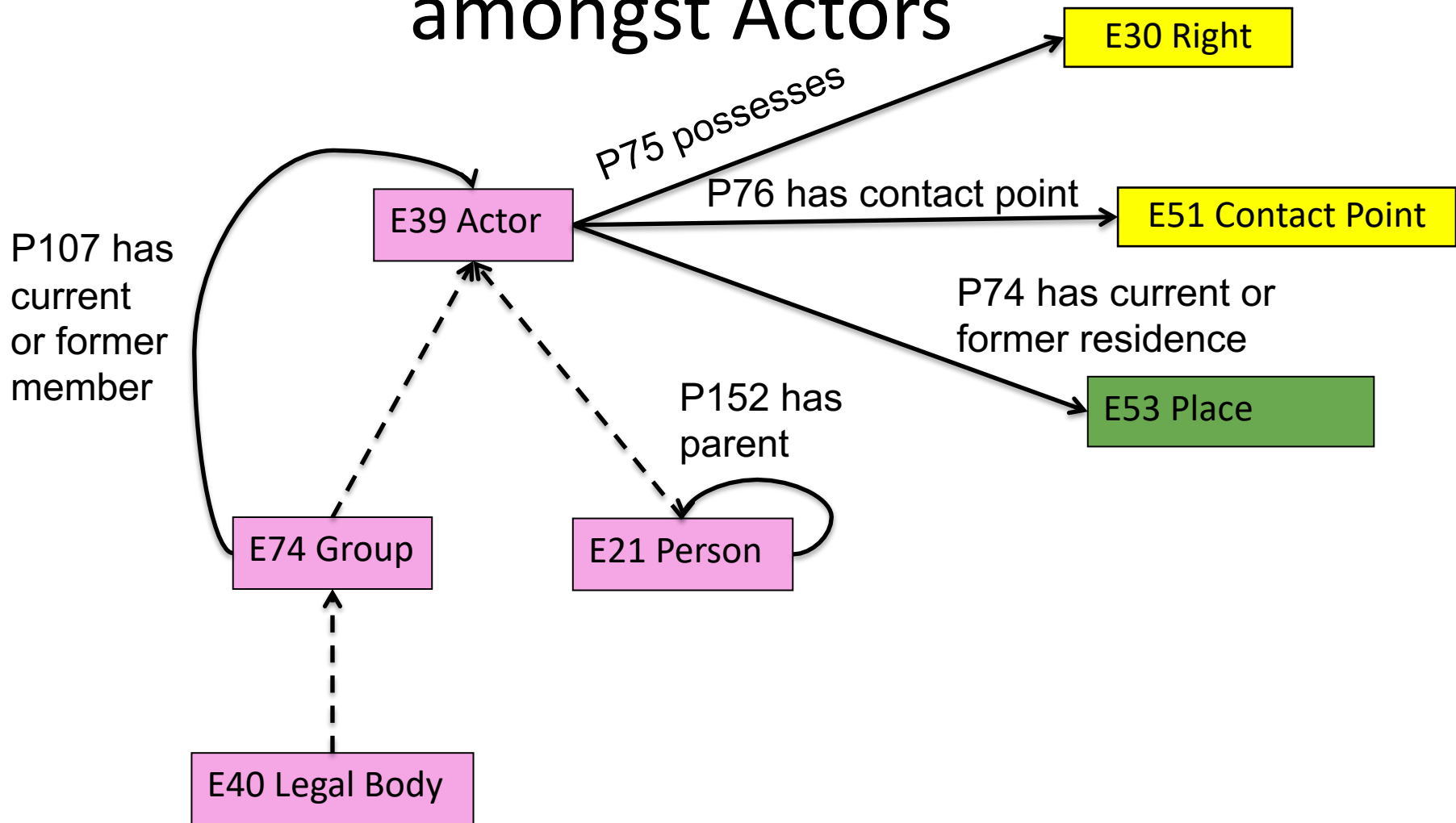


Multi IsA Enables Elaboration of Following Classes



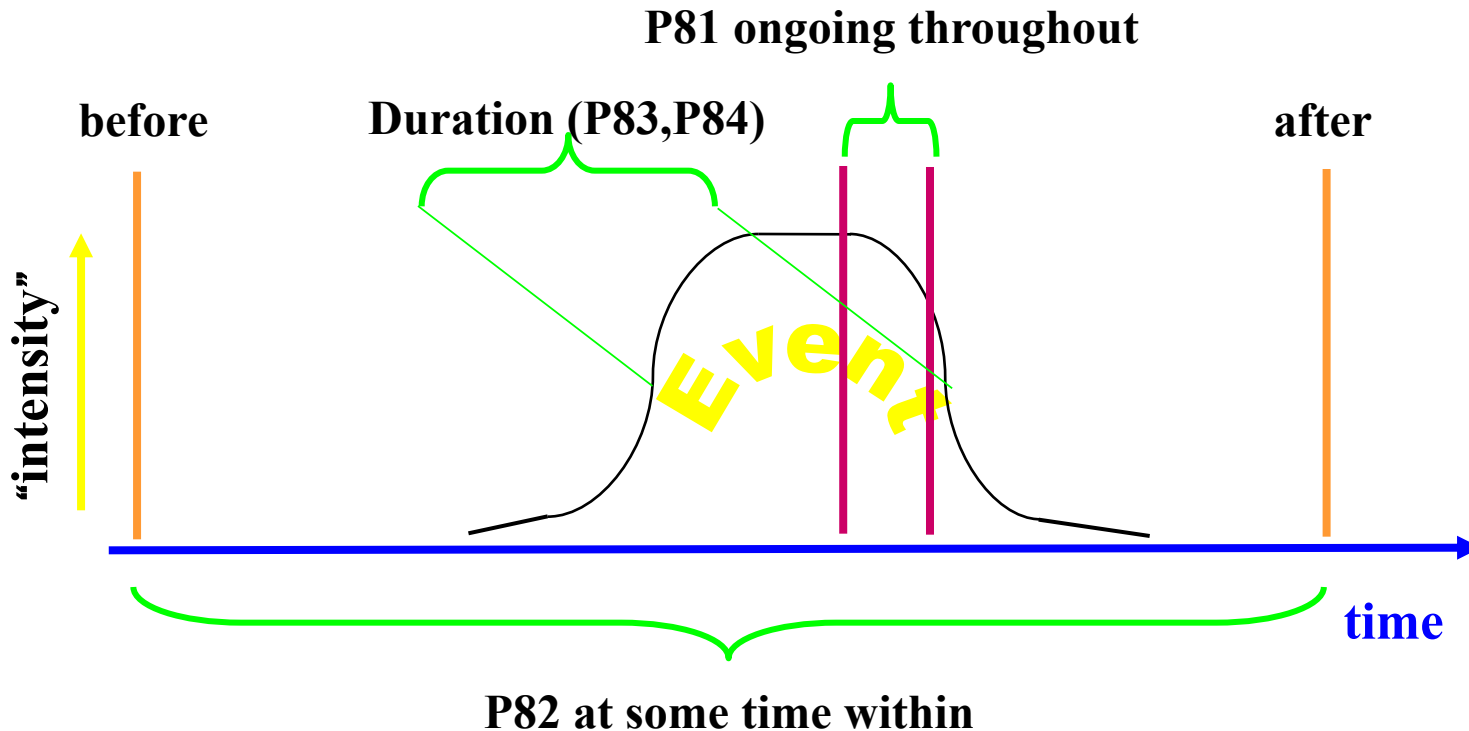
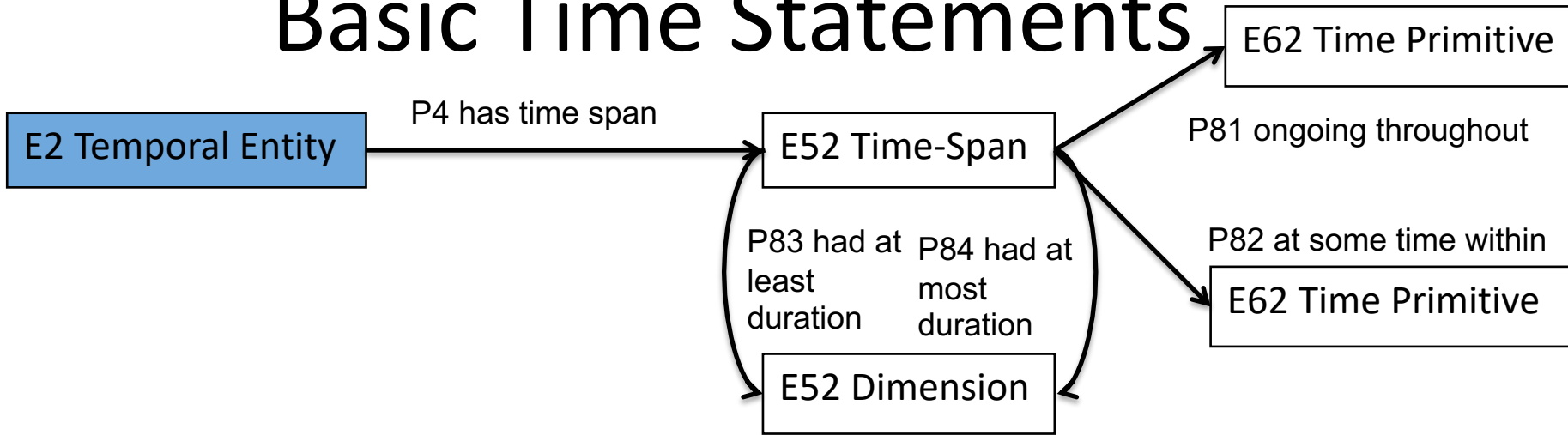
Exercise 6

High Level Distinctions/Connections amongst Actors

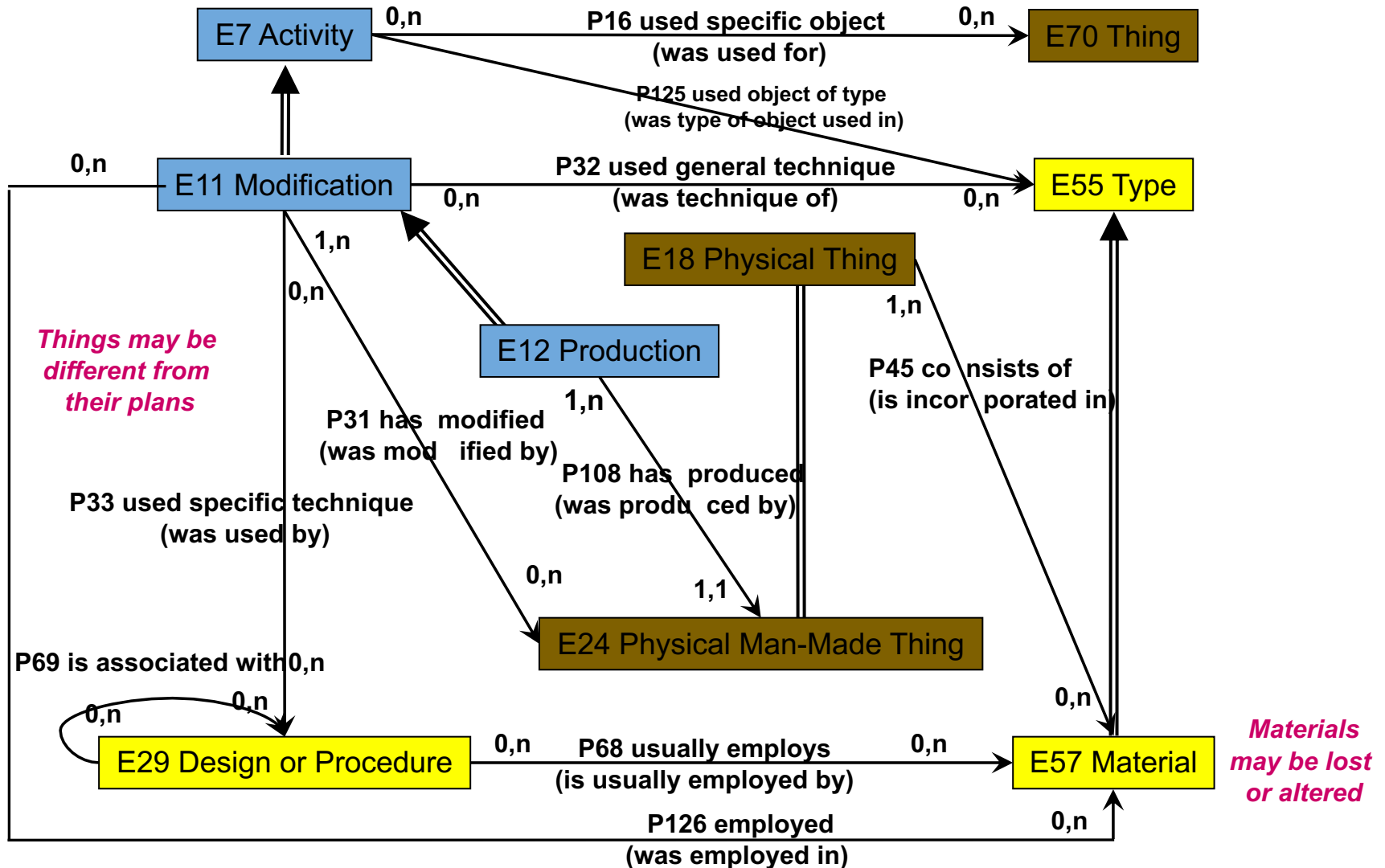


Exercise 7

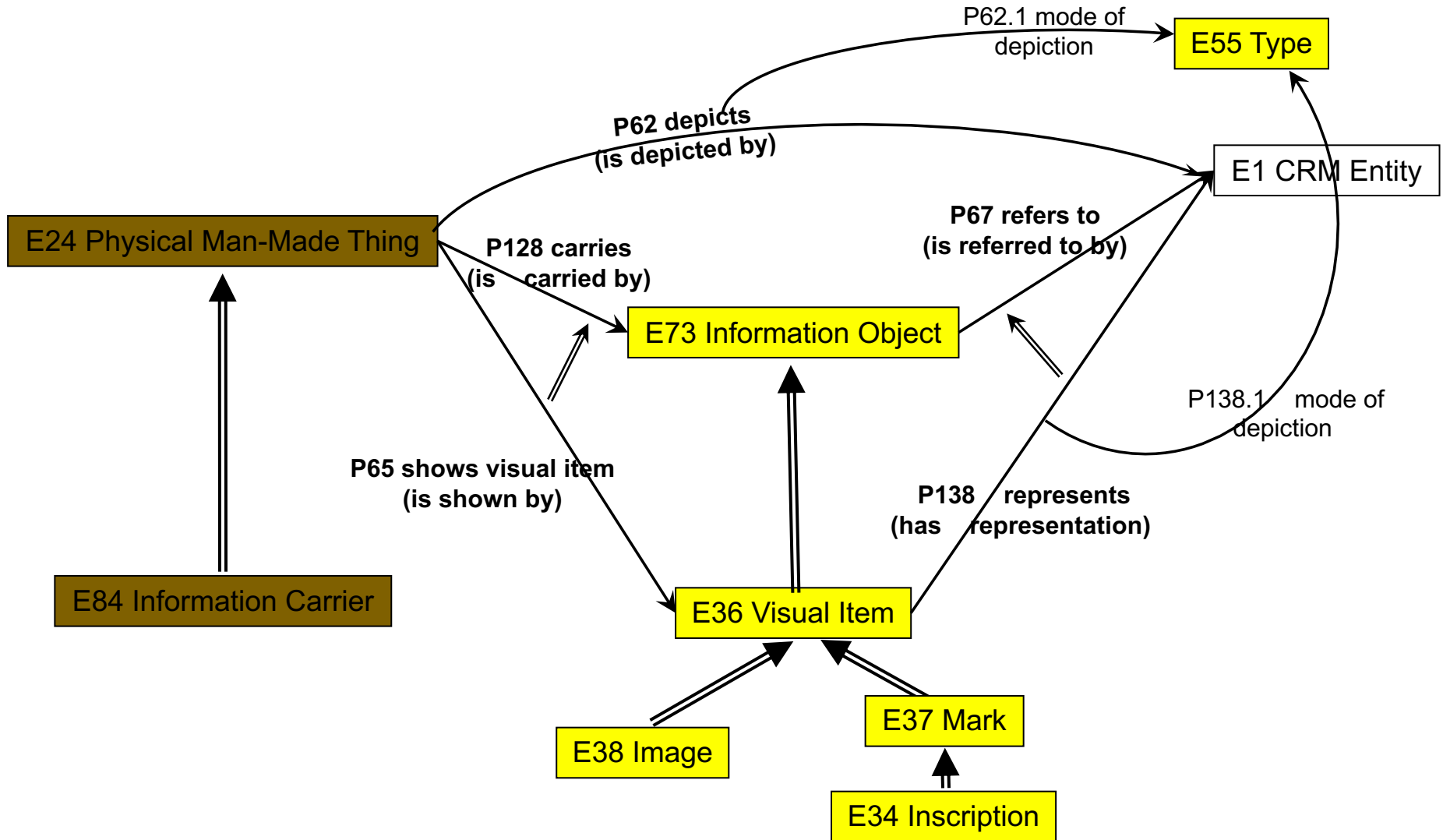
Basic Time Statements



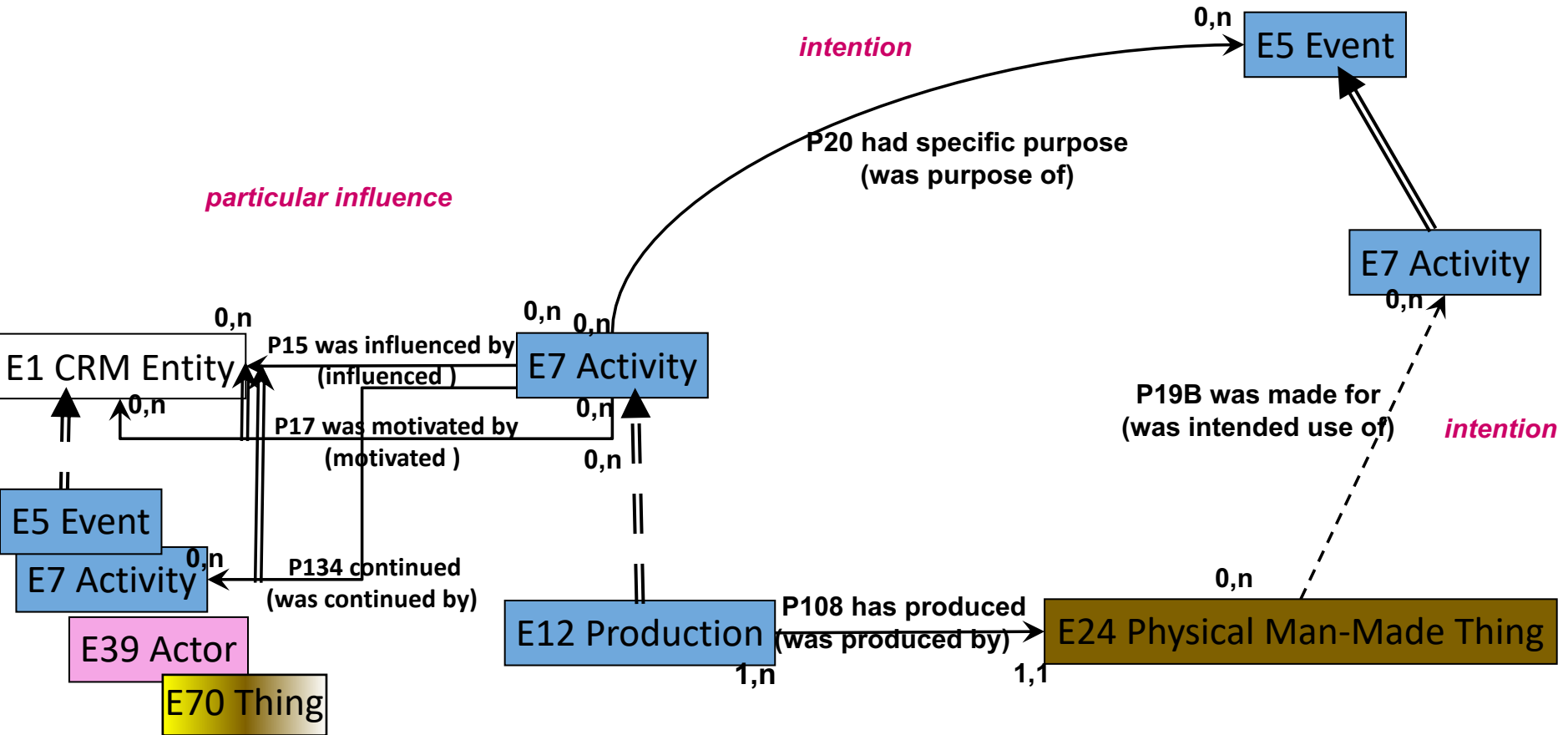
Things Coming to be in Time



Conceptual, Physical Relations and Reasoning



Factual: Influence and Intention



Thank you

Questions?

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