CIDOC CRM as a Language for Cultural Heritage Level A1

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What is ontology?
Formal Ontology: Definitions

“A body of formally represented knowledge is based on a conceptualization: the objects, concepts, and other entities that are assumed to exist in some area of interest and the relationships that hold among them…”

A conceptualization is an abstract, simplified view of the world that we wish to represent for some purpose…

An ontology is an explicit specification of a conceptualization.”

Gruber, 1995

“An ontology is an explicit, partial account of a conceptualization.”

Guarino and Giaretta, 1995

1. KR is a Surrogate
2. KR is a set of Ontological Commitments
3. KR is a Fragmentary Theory of Intelligent Reasoning
4. KR is a medium for Efficient Computation
5. KR is a medium for Human Expression”

Davis et. al, 1993

“An ontology is an explicit, partial specification of a conceptualization that is expressible as a meta-level viewpoint on a set of possible domain theories for the purpose of modular design, redesign and reuse of knowledge-intensive system components.”

Schreiber, 1995
What is an ontology? (What is it not?)

- Mix of computer science and philosophy
- Bridge between computer science world and data producers/researchers
- Formalization of knowledge domain
- Bound to a reality
- Creates a *lingua franca*
- Machine Processable, HumanReadable

“A Universal Symbolism, very popular, very agreeable to the people...might be introduced if small figures were employed in the place of words, which would represent visible things by their lines, and the invisible, by the visible, which accompany them.”

— Leibniz, 1679
CIDOC CRM: Qu’est ce que c’est? More simply

Before

After

1. way of organizing your data to be compatible with others
2. way of making your data more interesting to search
3. way of making your data more sustainable and reusable
Ontology as Language

A way to gain control over our data
A way to make sure our data says what we mean
A way of expressing information accurately
A way to communicate with colleagues across time and space
A long term way of representing and storing our knowledge
A language which must be learnt to be used, like any language

Source: George × Dall-E
‘Paint the tower of babel in the style of Frida Kahlo’
Ontology Basics
A proposition is a picture (model) of reality. [A proposition shows its sense (i.e., how things stand if it is true), and says that things do so stand.]
Basic Recap: A Simple Language: Resource Description Framework (RDF)

**Classes**: like generic nouns, pointing out categories of things

**Properties**: like generic verbs, pointing out how things related

Start with simple sentences,  
S-V-O  
Make more complex  
S-V-O-V-S etc.
Ontology Lesson 1: Classes and Inheritance
Classes

A class in a formal ontology is a formal idea that provides a definition for a set of things in the world that all share some basic set of shared properties - according to the definition.

A class allows us to identify real world things that match its definition as belonging in common to the same kind or set of things.

Identifying an individual object as belonging to a class gives us a starting point for knowing and making claims about that thing.

In RDF language a Class is a tool by which one can classify objects as belonging to a type and is able to make queries about things of some type.
Classes and Inheritance

The World: tables, chairs, cats and dogs

The Mind: epistemology, questions, curiosities

*How many animals are there?*
*Show me puppies!*

*What birds are there?*
Exercise 1

In the provided spreadsheet

- In the **Lesson 1a tab** identify which examples are classes and which are instances
- In the **Lesson 1b tab**, try to create a one level hierarchy between the classes.

An example has been filled out to follow in both cases.

Exercise Spreadsheet

https://drive.google.com/drive/folders/1-rt99TCG9JhOlueOloKfUfljfa-Dhdk?usp=drive_link

Source:
Ontology Lesson 2: Properties
Properties

A property in a formal ontology is a formal idea that provides a definition for a kind of fact that can exist in the world between two things or between a thing and itself.

A property allows us to express characteristic kinds of facts that hold between actual real world things.

Properties are defined as potentially holding between two classes (two kinds of things) which means that not all properties can be used for talking about all things. In theory we can only make sensible sentences.

Properties allow us to express salient facts that hold between one or more (usually more) real world things.

In RDF language a Property is a tool by which we can classify relationships between things in the world that we talk about.

Source: Rewilding Europe
Properties and Inheritance

Platonic Realm of Forms: the 'Ontology'

The Mind: epistemology, questions, curiosities

The World: tables, chairs, cats and dogs

"How many animals with limbs?"   "How many animals with legs?"

"Which animals have wings?"
Properties: Domain and Range

The World: tables, chairs, cats and dogs

The Mind: epistemology, questions, curiosities

"The dog has this wing" X "The budgie has this wing"
"The budgie has this limb" "The Emu has that wing"
Exercise 2

In the provided spreadsheet

- In the Lesson 2a tab identify which examples are properties, which classes and which are instances
- In the Lesson 2b tab, try to indicate sensible / appropriate domain and range classes for the properties listed

An example has been filled out to follow in both cases.

Exercise Spreadsheet

https://drive.google.com/drive/folders/1-rt99TCG9JhOlue0IoKfUfljf_a-Dhdk?usp=drive_link

Source: https://gearjunkie.com/outdoor/hunt-fish/backyard-archery-targets
Ontology Lesson 3: Instances!
Instances

Instances for a formal ontology are tokens that represent real world things that can be declared as belonging to a class and, thereafter, about which we can make statements using properties.
Exercise 3

In the provided spreadsheet

- In the Lesson 3 tab identify which classes the instances belong to

An example has been filled out to follow in both cases.

Source: George x Dall-E
“paint a picture in the style of frida kahlo of three buckets labelled fish, cats, knives. The fish bucket overflows with fish. The cat bucket overflows with cats. The knives bucket overflows with knives.”

Exercise Spreadsheet

https://drive.google.com/drive/folders/1-rt99TCG9JhOlue0IoKfUfljf_a-Dhdk?usp=drive_link
CIDOC CRM Overview
CIDOC CRM Ontology and Modelling, Where to Begin?

Language of

90+- Classes / Nouns &
160 +- Properties / Verbs

The Standard: Link

Friendly Representation: Link
What is CIDOC CRM?

- “The overall scope of the CIDOC CRM can be summarised in simple terms as the curated knowledge of museums...”
- A lingua franca for cultural heritage specialists to express and exchange knowledge in a machine readable format
- A collaborative effort to support:
  - a generic model of recording of “what has happened” in human scale
  - generate huge, meaningful networks of knowledge by a simple abstraction: history as meetings of people, things and information
CIDOC CRM as a Language
Level A1
Learn it like a Language

Lesson 1: This is a ....
Lesson 2: What’s there to talk about?
Lesson 3: What’s it called?
Lesson 4: What kind of thing is that?
Lesson 5: What happened?

Lesson 6: Telling Time
Lesson 7: Describing the Physical
Lesson 8: Describing the Conceptual
Lesson 9: Talking about Endings and Beginnings
Lesson 10: Where is / was it?
CIDOC CRM Lesson 1: This is a …
Lesson 1: This is a …

The most basic thing that we can and must assert in our formal language to begin communicating about any object is what something is.

Natural language sentences of this type are of the form:

X is a Y.

X is the thing we are talking about.

Y is the kind of thing we say it is.

Rdfs:type is the verb that lets us say X is a Y.
Lesson 1: Examples

Natural Language

The person George is a E21 Person
Eiffel Tower is a E22 Human Made Object
The place New York is a E53 Place
The event World War II is a E5 Event
The play Hamlet is a E28 Conceptual Object
Exercise 1

In the provided spreadsheet

- In the **Lesson 1 tab** identify which classes the instances belong to

Use your intuition when looking at the CIDOC CRM classes. What does the class sound like to you. This is not always a good idea, but it’s a place to start...

An example has been filled out to follow in both cases.

---

Exercise Spreadsheet

[Exercise Spreadsheet](https://drive.google.com/drive/folders/1ukt_eLkCHTJRIEWLwEvI_a3nMcOjG16?usp=drive_link)

Source: [https://classmonitor.com/learn/activity/17d4535de7](https://classmonitor.com/learn/activity/17d4535de7)
## Lesson 1: Learning Outcomes / Review

<table>
<thead>
<tr>
<th>Natural Language Sentence Types</th>
<th>Class</th>
<th>Subclass of</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is a …</td>
<td>E1 CRM Entity</td>
<td>rdfs:Class</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Basic Formal Language Skill</th>
<th>Property</th>
<th>Domain</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicate an instance of a class</td>
<td>rdfs:type</td>
<td>rdfs:Resource</td>
<td>rdfs:Class</td>
</tr>
</tbody>
</table>
Interlude: Frida Kahlo!
Semantics works best with examples

Ontology and semantics allow us to create fact based networks of knowledge about real world things. “Stories”, but non-fictional ones.

Here is a textual version of Frida Kahlo’s story:

https://en.wikipedia.org/wiki/Frida_Kahlo

Here is a spreadsheet from which we will begin to learn how to tell the story of Frida using CIDOC CRM:

https://drive.google.com/drive/folders/1ukt_eLkC_HTJRIEWLwEvl_a3nMcOjG16?usp=drive_link

For the rest of this course we will be using the example of the life and work of Frida Kahlo to provide a frame for exploring how to ‘speak’ with CIDOC CRM.
Lesson 2: What's there to talk about?
Lesson 2: What’s there to talk about?

As large and confusing as our world is, the kinds of things that we talk about break down into a very small set of kinds of things. CIDOC CRM allows for describing five basic kinds of things. Learn these and you have the foundation of thinking in this language.

E2_Temporal_Entity  E53_Place  E18_Philosophical Thing  E28_Conceptual Object  E39_Actor
Lesson 2: Definitions

- **E2_Temporal_Entity**: Objects which are temporal in nature, something that takes place over time, and about which you want to make assertions regarding their duration, location, involved entities etc.
  - World War II
  - The Wedding of Charles and Camilla
  - The cleaning of the Parthenon Marbles
  - The Delivery of the News of the Victory at Marathon

- **E53_Place**: Objects which are geometric in nature about which one wants to assert spatial properties like absolute and relative location.
  - Mexico City
  - Mexico
  - North America
  - the floorspace of the classroom
  - the total surface of the painting

- **E18_Physical_Thing**: Objects which are material and substantial in nature and exist as unique singular individuals in the world. About these objects one may make direction assertions of dimension, composition, part whole relations, its function as bearer or holder of information.
  - Teotihuacan Site
  - The temple of Athina
  - The Nightwatch by Rembrandt

- **E28_Conceptual_Object**: Objects which are ideas and exist in the form of coherent, identifiable concepts that can be identified through time. About these objects one may make direct assertions of composition, part whole relations, their content representational functions.
  - The play Hamlet
  - The visual contents of the Nightwatch by Rembrandt
  - The Theory of Relativity

- **E39_Actor**: Objects which are agents in nature, having the capability to act as causes in events. Of which one wishes to make assertions of agency and membership.
  - Picasso
  - Rembrandt
  - Charles Dickens
  - Coca Cola
  - the Getty Museum
Exercise 2

In the provided spreadsheet

- In the Lesson 2 tab identify which classes the instances belong to

Use your understanding of the CIDOC CRM classes as it was taught in this lesson. Now you don’t have to work from intuition, you can work from knowledge.

There are many examples, do as many matches as you can. Try to get at least five of each.

An example has been filled out to follow in both cases.

Exercise Spreadsheet

https://drive.google.com/drive/folders/1ukt_eLkC_HTJRIEWLwEvl_a3nMcOjG16?usp=drive_link
Lesson 2: Learning Outcomes / Review

<table>
<thead>
<tr>
<th>Natural Language Sentence Types</th>
<th>Class</th>
<th>Subclass of</th>
</tr>
</thead>
<tbody>
<tr>
<td>X is a temporal happening</td>
<td>E2 Temporal Entity</td>
<td>E1 CRM Entity</td>
</tr>
<tr>
<td>X is a geographic place</td>
<td>E53 Place</td>
<td>E1 CRM Entity</td>
</tr>
<tr>
<td>X is a physical object</td>
<td>E18 Physical Thing</td>
<td>E70 Thing</td>
</tr>
<tr>
<td>X is an idea</td>
<td>E28 Conceptual Object</td>
<td>E71 Human-Made Thing</td>
</tr>
<tr>
<td>X is an agent</td>
<td>E39 Actor</td>
<td>E77 Persistent Item</td>
</tr>
</tbody>
</table>
Lesson 3: What’s it called?
A basic task in any language is to talk about the names that things have. This is also a basic feature of CIDOC CRM.

Natural language sentences of this type are of the form 

**X is called Y.**

X is the thing we want to give the name of.

Y is the name we want to relate to it.

crm:P1_is_identified_by allows us to make this statement.

---

Title: Adam naming the Animals  
Creator: G. Scotin and J. Cole after H. Gravelot and J.B. Chatelain  
Exercise 3

In the provided spreadsheet

In the Lesson 3 tab you will see a list of the E28 Conceptual Objects from the total list of Frida Kahlo entities. Identify which of these are also E41 Appellation. Identify as many as you can.

In the provided diagram document, you will see a list of instances of appellations and of things. Try to match the instances to their right class and connect the correct appellation to the correct object with the right property.

Try to find at least one appellation that correctly names an instance of:

- E2 Temporal Entity
- E18 Physical Thing
- E53 Place
- E39 Actor
- E28 Conceptual Object

Draw this in the provided diagram tool, tab ‘Lesson 3’.

Source: George x Dall-E
“draw a picture of a sweet girl in a pinafore dress standing in a field on a sunny day staring curiously and pointing at a cube that is floating in the air 10 metres from her”

Exercise Spreadsheet
https://drive.google.com/drive/folders/1ukt_eLkC_HTJRIEWlWEvl_a3nMcOjG16?usp=drive_link

Exercise Diagram
https://drive.google.com/drive/folders/1q2-9YAVfraqlkyRQrq8kgwBsMQ_sA397?usp=drive_link
Lesson 3: Learning Outcomes / Review

Natural Language Sentence Types

| X is called Y |

Basic Formal Language Skill

| Connect a documented entity to a name that it has. |

<table>
<thead>
<tr>
<th>Class</th>
<th>Subclass of</th>
</tr>
</thead>
<tbody>
<tr>
<td>E41 Appellation</td>
<td>rdfs:Class</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Property</th>
<th>Domain</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1_is_identified_by</td>
<td>E1 CRM Entity</td>
<td>E41 Appellation</td>
</tr>
</tbody>
</table>
Lesson 4: What kind of thing is that?
Lesson 4: What kind of thing is that?

A basic task in any language is to classify the things you are talking about, to indicate what kind of thing it is.

Natural language sentences of this type are of the form

X is classified as Y.

X is the thing we want to give the type to.

Y is the type we want to relate to it.

crm:P2_has_type allows us to make this statement.
Lesson 4: Examples

- E1_CRM_Entity
  - the Object
  - P2_has_type
  - E55_Type
    - Type

- E21_Person
  - the person George
  - P2_has_type
  - E55_Type
    - Teacher

- E22_Human-Made_Object
  - Eiffel Tower
  - P2_has_type
  - E55_Type
    - Monument

- E5_Event
  - the event World War II
  - P2_has_type
  - E55_Type
    - War

- E53_Place
  - the place New York
  - P2_has_type
  - E55_Type
    - City

- E28_Conceptual_Object
  - the play Hamlet
  - P2_has_type
  - E55_Type
    - Play
Exercise 4

In the provided spreadsheet

In the Lesson 4 tab you will see a list of the E28 Conceptual Objects from the total list of Frida Kahlo entities. Identify which of these are also E55 Type. Identify as many as you can.

In the provided diagram document, you will see a list of instances of types and of things. Try to match the instances to their right class and connect the correct type to the correct object using the correct property.

Try to find at least one type that correctly classifies an instance of:

- E2 Temporal Entity
- E18 Physical Thing
- E53 Place
- E39 Actor
- E28 Conceptual Object

Draw this in the provided diagram tool, tab ‘Lesson 4’.

Exercise Spreadsheet
https://docs.google.com/spreadsheets/d/1dIC-b-q0v0UFMTqBx9Jcc_3dgoN1tYWfvr0magjyQ/edit#gid=889881869

Exercise Diagram
https://drive.google.com/drive/folders/1dZG_t9aAcWJGbLjvljpZsbVUELQHyS_S?usp=drive_link
Lesson 4: Learning Outcomes / Review

Natural Language Sentence Types

X is classified as Y
X is of type Y
X is of the kind Y

Basic Formal Language Skill

Connect a documented entity to a type that categorizes it

<table>
<thead>
<tr>
<th>Class</th>
<th>Subclass of</th>
</tr>
</thead>
<tbody>
<tr>
<td>E55 Type</td>
<td>E28 Conceptual Object</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Property</th>
<th>Domain</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2_has_type</td>
<td>E1 CRM Entity</td>
<td>E55 Type</td>
</tr>
</tbody>
</table>
Lesson 5: What happened?
Lesson 5: What happened?

Talking about the past, there are typical sets of facts we want to be able to talk about that answer basic questions. When did that happen? Where did it happen? Who was involved? What was involved? All these questions relate to events in the past and this is how CIDOC CRM allows you to express them, as statements about events.

Natural language sentences of this type are of the form

X took place at time Y
X took place at place Q
X involved person P
X involved object Z

Using the event centred representation, CIDOC CRM gives several basic properties which allow you to express these ideas.
Lesson 5: Examples

Consider the following fictional example and its translation to CIDOC CRM formalization.

- The murder took place on the evening of June 24, 1928, at dusk.
- The murder took place in the parlour.
- The murder was carried out by Mr Plum. (Mr Plum was the murderer)
- The murder used the candlestick. (The candlestick was the murder weapon)
Exercise 5a

On the provided diagram tool, in the tab ‘Toolkit’, you will find a collection of instances, classes and properties which can be used to semantically represent the marriage of Frida Kahlo and Diego Rivera. On the tab ‘Example’ you will see how other activities have been modelled. In the tab ‘AnswerSpace’ you can make your semantic model.

Put together the instances, classes and properties in such a way that you describe the facts that:

Frida Kahlo and Diego Rivera were married in Coyoacan in 1929, exchanging their wedding rings.

Source: https://www.contexttravel.com/blog/articles/frida-kahlo-diego-rivera-life-story

Exercise Diagram
https://drive.google.com/drive/folders/1bmI9fbN9Yd06Zueuyc9MYa_BySgQCWV?usp=drive_link
Exercise 5b

On the provided diagram tool, tab ‘Toolkit’, you will find a collection of instances, classes and properties which can be used to semantically represent the event of Frida’s painting of the “Frieda and Diego Rivera - painting”. On the tab ‘Example’ you will see how other activities have been modelled. In the tab ‘AnswerSpace’ you can make your semantic model.

Put together the instances, classes and properties in such a way that you describe the facts that:

Frida Kahlo painted “Frieda and Diego Rivera” in San Francisco in 1931 using her paintbrush.

Exercise Diagram

https://drive.google.com/drive/folders/1u4lkGWmtPbFdt_OXeSCHAg0u6i34uwzk?usp=drive_link
### Natural Language Sentence Types

- X took place at time Y
- X took place at place Q
- X involved person P
- X involved object Z

### Basic Formal Language Skill

Choose an appropriate property to express your meaning.

Choose the correct domain class in order to be able to use your property.

<table>
<thead>
<tr>
<th>Property</th>
<th>Domain</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>P4_has_time-span</td>
<td>E2 Temporal Entity</td>
<td>E52 Time-Span</td>
</tr>
<tr>
<td>P7_took_place_at</td>
<td>E5 Event</td>
<td>E53 Place</td>
</tr>
<tr>
<td>P14_carried_out_by</td>
<td>E7 Activity</td>
<td>E39 Actor</td>
</tr>
<tr>
<td>P16_used_specific_object</td>
<td>E7 Activity</td>
<td>E70 Thing</td>
</tr>
</tbody>
</table>
Lesson 6: Telling Time
Lesson 6: Telling Time

Talking about time, there are typical sets of facts we want to be able to talk about that answer basic questions. When did that event start? When did it end? How long did it go on for?

Natural language sentences of this type are of the form

X happened at time Y

X happened within time Q

X was ongoing for Z time

We can express these sentences with a few CIDOC CRM predicates.
Lesson 6: Telling Time Examples

Consider the following example and its translation to CIDOC CRM formalization.

World War I began with the assassination of Duke Ferdinand 11:15 AM on June 28, 1914.

World War I ended with the Armistice signed on November 11, 1918.

World War I took place from 1914-1918.

World War I lasted four years.
Exercise 6

On the provided diagram tool, tab ‘Toolkit’, you will find a collection of instances, classes and properties which can be used to semantically represent the possible birth dates of Frida Kahlo. On the tab ‘Example’ you will see how other activities have been modelled. In the tab ‘AnswerSpace’ you can make your semantic model.

Put together the instances, classes and properties in such a way that you describe the facts that:

The Birth of Frida Kahlo occurred at some time within 1907-1910 but was definitely happening on July 6, 1907.

Title: My Birth
Creator: Frida Kahlo

Exercise Diagram
https://drive.google.com/drive/folders/1MQVWrMhp89v1BnHMHv2kD4bgvK6UKaSO?usp=drive_link
Lesson 6: Learning Outcomes / Review

Natural Language Sentence Types

X took definitely took place from time A to B
X took place between time A and B
X had a temporal duration of Y

Basic Formal Language Skill

Make a complex sentence (two hops)

Express time as intervals, not points

<table>
<thead>
<tr>
<th>Class</th>
<th>Subclass of</th>
</tr>
</thead>
<tbody>
<tr>
<td>E52 Time-Span</td>
<td>E1 CRM Entity</td>
</tr>
<tr>
<td>E61 Time-Primitive</td>
<td>E59 Primitive Value</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Property</th>
<th>Domain</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>P81_ongoing_through</td>
<td>E52 Timespan</td>
<td>E61 Time Primitive</td>
</tr>
<tr>
<td>P82_at_some_time_within</td>
<td>E52 Timespan</td>
<td>E61 Time Primitive</td>
</tr>
<tr>
<td>P191_had_duration</td>
<td>E52 Timespan</td>
<td>E54 Dimension</td>
</tr>
</tbody>
</table>
Lesson 7: Describing the Physical
Lesson 7: Describing the Physical

Much work carried out in cultural heritage contexts has to do with the description of physical objects cared for or observed by curators.

Natural language sentences about the materiality of physical objects that can be described by CRM include:

X is made of material Y
X has Q Dimension
X is part of Z
X bears the content P

We can express these sentences with a few CIDOC CRM predicates.
Lesson 7: Examples

Consider the following example and its translation to CIDOC CRM formalization.

- Panel of Federico da Montefeltro is materially composed of Oil and Wood
- Panel of Federico da Montefeltro has the dimension 47 cm × 33 cm
- Panel of Federico da Montefeltro is part of The Diptych of F and B
- Panel of Federico da Montefeltro bears the image of Federico da Montefeltro
Exercise 7a

On the provided diagram tool, tab ‘Toolkit’, you will find a collection of instances, classes and properties which can be used to semantically represent some key physical traits of the painting “Frieda and Diego Rivera”. On the tab ‘Example’ you will see how other physical things have been modelled. In the tab ‘AnswerSpace’ you can make your semantic model.

Put together the instances, classes and properties in such a way that you describe the facts that:

The painting “Frieda and Diego Rivera” is oil on canvas and measures “100.01 cm × 78.74 cm (39.37 in × 31.00 in)” and shows the image of “Frieda and Diego Rivera”.

Title:  Frida and Diego Rivera
Creator: Frida Kahlo
Source: https://bit.ly/47RxGqC

Exercise Diagram
https://drive.google.com/drive/folders/1c1bJPnbf5uDBxbNpTL6gdELNGwMj2mLq?usp=drive_link
Exercise 7b

On the provided diagram tool, tab ‘Toolkit’, you will find a collection of instances, classes and properties which can be used to semantically represent some key physical traits of the painting “Fantasmones Siniestros”. On the tab ‘Example’ you will see how other physical things have been modelled. In the tab ‘AnswerSpace’ you can make your semantic model.

Put together the instances, classes and properties in such a way that you describe the facts that:

The painting “Fantasmones Siniestros” is watercolour on paper, forms part of the Frida Kahlo Diary, and shows the image of “Fantasmones Siniestros”.

Exercise Diagram

https://drive.google.com/drive/folders/167reUDhWTJNrmjyaYn05LvvJtXgsOO6z?usp=drive_link
Lesson 7: Learning Outcomes / Review

Natural Language Sentence Types

X is made of material Y
X has Q Dimension
X is part of Z
X bears the content P

Basic Formal Language Skill

Express parthood appropriately

<table>
<thead>
<tr>
<th>Property</th>
<th>Domain</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>P43_ha_dimension</td>
<td>E70_Thing</td>
<td>E54 Dimension</td>
</tr>
<tr>
<td>P45_consists_of</td>
<td>E18_Physical_Thing</td>
<td>E57 Material</td>
</tr>
<tr>
<td>P46_is_composed_of</td>
<td>E18_Physical_Thing</td>
<td>E18_Physical_Thing</td>
</tr>
<tr>
<td>P128_carries</td>
<td>E18_Physical_Thing</td>
<td>E90 Symbolic Object</td>
</tr>
</tbody>
</table>
Lesson 8: Describing the Conceptual
Lesson 8: Describing the Conceptual

Much work carried out in cultural heritage contexts has to do with the description of the conceptual objects that are carried by physical works and which communicate meaning and information to their observers.

Natural language sentences about conceptual objects that can be described by CRM include:

**X refers to Y**

**X has content Q**

**X visually shows P**

**X is composed of S**

We can express these sentences with a few CIDOC CRM predicates.
Lesson 8: Examples

Consider the following example and its translation to CIDOC CRM formalization.

- The image on the reverse of the Panel of Federico da Montefeltro refers to the Four Cardinal Virtues
- The image visually shows Federico da Montelfreto
- The image has an inscription component
- The inscription on the image contains the passage “The famous one is drawn in glorious triumph”
Exercise 8

On the provided diagram tool, tab ‘Toolkit’, you will find a collection of instances, classes and properties which can be used to semantically represent the intellectual content of the painting “Frida and Diego Rivera”. On the tab ‘Example’ you will see how other conceptual things have been modelled. In the tab ‘AnswerSpace’ you can make your semantic model.

Put together the instances, classes and properties in such a way that you describe the facts that:

The image of the painting “Frida and Diego Rivera” is composed of an image of Frida Kahlo, an image of Diego Rivera and an image of a banner. These images show the real persons Frida Kahlo and Diego Rivera and refers to their wedding. The image of the banner contains the following text, “Aquí nos veis, a mí, Frida Kahlo, junto con mi amado esposo Diego Rivera. Pinté estos retratos en la bella ciudad de San Francisco, California, para nuestro amigo Mr. Albert Bender y fue en el mes de abril del año 1931”

Title: Frida and Diego Rivera
Creator: Frida Kahlo
Source: https://bit.ly/47RxGqC

Exercise Diagram
https://drive.google.com/drive/folders/13OJz1hJUth9d5XGwXPCgMuzfjlyFqu?usp=drive_link
Lesson 8: Learning Outcomes / Review

Natural Language Sentence Types

X refers to Y
X has content Q
X visually shows P
X is composed of S

Basic Formal Language Skill

Express reference and aboutness

Express structural parthood of conceptual objects

<table>
<thead>
<tr>
<th>Property</th>
<th>Domain</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>P67 refers to</td>
<td>E89 Propositional Object</td>
<td>E1 CRM Entity</td>
</tr>
<tr>
<td>P106 is composed of</td>
<td>E90 Symbolic Object</td>
<td>E90 Symbolic Object</td>
</tr>
<tr>
<td>P138 represents</td>
<td>E36 Visual Item</td>
<td>E1 CRM Entity</td>
</tr>
<tr>
<td>P190 has symbolic content</td>
<td>E90 Symbolic Object</td>
<td>E62 String</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Class</th>
<th>Subclass of</th>
</tr>
</thead>
<tbody>
<tr>
<td>E28 Conceptual Object</td>
<td>E71 Human-Made Thing</td>
</tr>
<tr>
<td>E89 Propositional Object</td>
<td>E28 Conceptual Object</td>
</tr>
<tr>
<td>E90 Symbolic Object</td>
<td>E28 Conceptual Object</td>
</tr>
<tr>
<td>E73 Information Object</td>
<td>E89 Propositional Object, E90 Symbolic Object</td>
</tr>
<tr>
<td>E36 Visual Image</td>
<td>E73 Information Object</td>
</tr>
</tbody>
</table>
Lesson 9: Talking about Endings and Beginnings
Lesson 9: Talking about Endings and Beginnings

The description of how and when something came to be or went out of existence is a basic part of describing the historicity of things in CH.

Natural language sentences about the coming to be and passing away of things that CRM covers include:

X came to be in event Y
X ceased to be in event Q

The sentences begin from temporal entity classes meaning that we can enrich what we want to say by also making sentences about who / what / when.
Lesson 9: Examples

Consider the following example and its translation to CIDOC CRM formalization.

- “Washington Crossing the Delaware” came to be through its painting
- Its painting occurred in 1850
- It was painted by Emanuel Leutze
- It was destroyed in an allied airstrike
- The airstrike took place sep 5, 1942
- The strike was carried out by the allies
Exercise 9

On the provided diagram tool, tab ‘Toolkit’, you will find a collection of instances, classes and properties which can be used to semantically represent the origin and end events of the painting “Fantasmones Siniestros”. On the tab ‘Example’ you will see how other beginnings and endings have been modelled. In the tab ‘AnswerSpace’ you can make your semantic model.

Put together the instances, classes and properties in such a way that you describe the facts that:

The painting “Fantasmones Siniestros” was painted by Frida Kahlo in the period 1945-1954 and was destroyed by Martin Mobarak in July, 2022.

Exercise Diagram
https://drive.google.com/drive/folders/1q-QuNwMDfcL21alwGnB57_Utks9RbhSM?usp=drive_link
Lesson 9: Learning Outcomes / Review

**Natural Language Sentence Types**

- X came to be in event Y
- X ceased to be in event Q

**Basic Formal Language Skill**

Use properties from superclasses in order to enrich what one can say

<table>
<thead>
<tr>
<th>Class</th>
<th>Subclass of</th>
</tr>
</thead>
<tbody>
<tr>
<td>E63 Beginning of Existence</td>
<td>E5 Event</td>
</tr>
<tr>
<td>E64 End of Existence</td>
<td>E5 Event</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Property</th>
<th>Domain</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>P92 brought out of existence</td>
<td>E63 Beginning of Existence</td>
<td>E77 Persistent Item</td>
</tr>
<tr>
<td>P93 took out of existence</td>
<td>E64 End of Existence</td>
<td>E77 Persistent Item</td>
</tr>
</tbody>
</table>
Lesson 10: Where is / was that?
Lesson 10: Where is/was that?

Locating events and things in space is a key discursive element of CH discourse.

Natural language sentences about location that CRM covers include:

X was the place of event Y

X is/was the location of object S

X is/was the location of actor P

X is part of place T

We can express these sentences with a few CIDOC CRM predicates.
Lesson 10: Where is/was that?

Consider the following example and its translation to CIDOC CRM formalization.

- The Monastery of St Paul De Mausole was the place of painting of Starry Night.
- The Monastery was once the location of the painting Starry Night.
- The Monastery was once the residence of Vincent Van Gogh
- The Monastery is in France.
Exercise 10

On the provided diagram tool, tab ‘Toolkit’, you will find a collection of instances, classes and properties which can be used to semantically represent art historical information about San Francisco. On the tab ‘Example’ you will see how other beginnings and endings have been modelled. In the tab ‘AnswerSpace’ you can make your semantic model.

Put together the instances, classes and properties in such a way that you describe the facts that:

San Francisco is part of the United States and was once time home to both Frida Kahlo and also her painting “Frieda and Diego Rivera”. It was in fact the site of her painting of that famous work.

Source: George x Dall-E
“paint a painting in the style of Frida Kahlo of Frida Kahlo and Diego Rivera strolling through San Francisco with the Golden Gate Bridge in the background”

Exercise Diagram
https://drive.google.com/drive/folders/14bFEXOdyu_Nc1BPAZAnzsarTotMloBL-?usp=drive_link
Lesson 10: Where is/was that?

Natural Language Sentence Types

X was the place of event Y
X is/was the location of object S
X is/was the location of actor P
X is part of place T

Basic Formal Language Skill

Inverse properties

Proper parthood places

<table>
<thead>
<tr>
<th>Property</th>
<th>Domain</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>P7i witnessed</td>
<td>E53 Place</td>
<td>E4 Period</td>
</tr>
<tr>
<td>P53i is former or current location of</td>
<td>E53 Place</td>
<td>E19 Physical Object</td>
</tr>
<tr>
<td>P74 has current or former residence</td>
<td>E53 Place</td>
<td>E39 Actor</td>
</tr>
<tr>
<td>P89 falls within</td>
<td>E53 Place</td>
<td>E53 Place</td>
</tr>
</tbody>
</table>

Class Subclass of

E53 Place E1 CRM Entity
End Of Level A1

Questions: George Bruseker (george@takin.solutions)

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