IEEE MLO subgroup

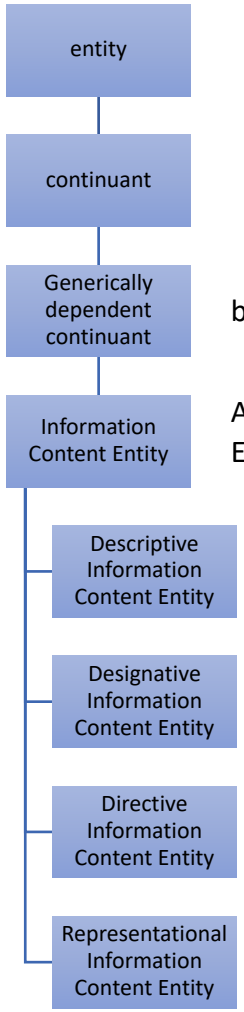
CCO Information model

Ron Rudnicki

Summer 2023

The CCO Information Entity Ontology

4 aboutness relations



b is a generically dependent continuant = Def. b is a continuant that g-depends_on one or more other entities.

A Generically Dependent Continuant that generically depends on some Information Bearing Entity and stands in relation of aboutness to some Entity.

An Information Content Entity that consists of a set of propositions that describe some Entity.

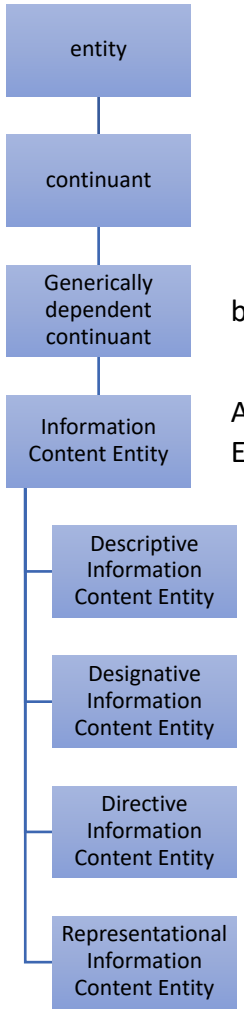
An Information Content Entity that consists of a set of symbols that denote some Entity.

An Information Content Entity that consists of a set of propositions or images (as in the case of a blueprint) that prescribe some Entity.

An Information Content Entity that represents some Entity.

The CCO Information Entity Ontology (revised)

4 aboutness relations



b is a generically dependent continuant = Def. b is a continuant that g-depends_on one or more other entities.

A Generically Dependent Continuant that generically depends on some Information Bearing Entity and stands in relation of aboutness to some Entity.

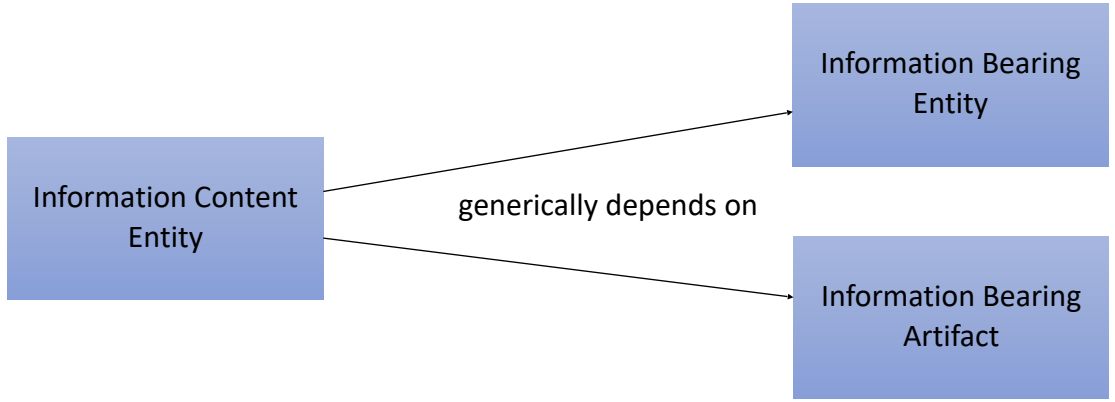
An Information Content Entity that ~~consists of a set of propositions that describe~~ stands in a descriptive relation to some Entity.

An Information Content Entity that ~~consists of a set of symbols that denote~~ stands in a denotative relation to some Entity.

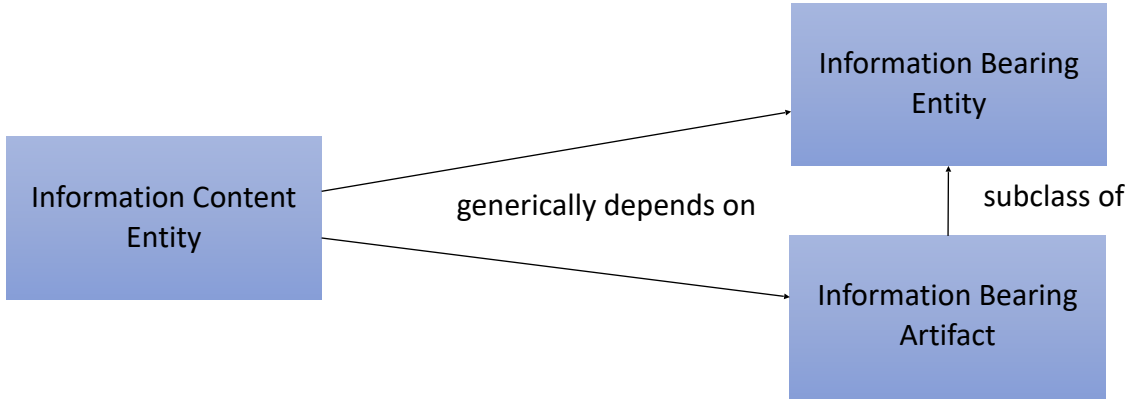
An Information Content Entity ~~that consists of a set of propositions or images (as in the case of a blueprint) that prescribe~~ stands in a prescriptive relation to some Entity.

An Information Content Entity that ~~represents~~ stands in a representative relation to some Entity.

Generic Dependence of Information Content Entities in CCO

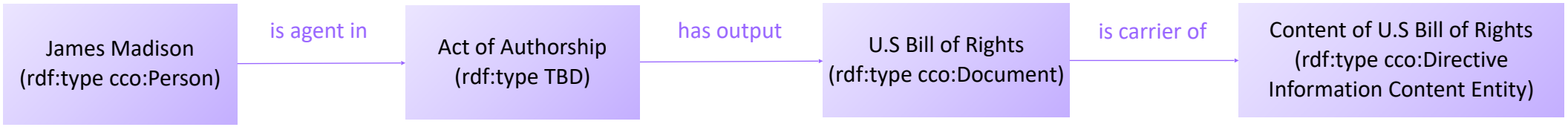


Needs revision but TBD, possibly…



Use Case: James Madison wrote the U.S. Bill of Rights

The assertion attributes authorship of the U.S. Bill of Rights to James Madison. This attribution doesn't refer to his penning of a manuscript but rather to the content of the first 10 amendments to the U.S. Constitution. In other words, the attribution is not a reference to an information bearing artifact but to an information content entity. How is this expressed in the CCO?



Proposed Revision (1)

The CCO model of content creation places too much emphasis on the manuscript instead
the model should show a direct relation between the act of creation and the information content

Proposed Revision (2)

Introducing subclasses of Information Content Entity such as Constitution and Constitutional Amendment would differentiate content entities. This would bring the CCO model into proximity of the IAO model.

(Most of) The IAO Information Content Entity Taxonomy

Conflation in the IAO Information Model

The IAO Information Model conflates the information content entity with the information bearing entity. Consider some examples:

A measurement datum is an information content entity that is a recording of the output of a measurement such as produced by a device. (comment rjr: a device recording is a material object)

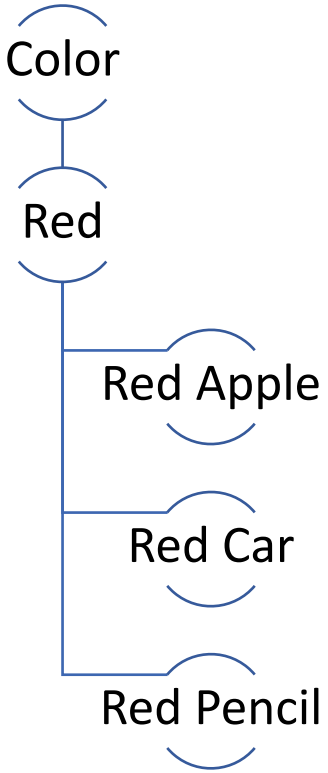
A scalar measurement datum is a measurement datum that is composed of two parts, numerals and a unit label. (comment rjr: numerals and unit labels are concretizations, they have a font size for example)

(Definition of 'Document') - A collection of information content entities intended to be understood together as a whole (comment rjr: no apparent conflation)
(Example of Usage of 'Document') - A journal article, patent application, laboratory notebook, or a book (comment rjr: notebooks, books are material objects)

(Definition of 'Footnote') - A part of a document that is about a specific other part of the document. Usually footnotes are spatially segregated from the rest of the document. (comment rjr: spatial segmentation is difficult to comprehend applying to non-material entities)
(Example of Usage of 'Footnote') - The referent in the text is usually indicated by a special typographic character such as * or a superscripted number, which is also used to indicate the footnote that refers to that text. (comment rjr: typographic characters, superscripted numbers are concretizations)

Conflation in the IAO Information Model

This conflation is analogous to adding subclasses to specifically dependent content (SDC) entities that are configurations of the SDC and the entity that bears it.



This conflation in the IAO model could be remedied by making the subclasses of Information Content Entity defined classes. For example, the current definition of 'Measurement Datum' could be changed from

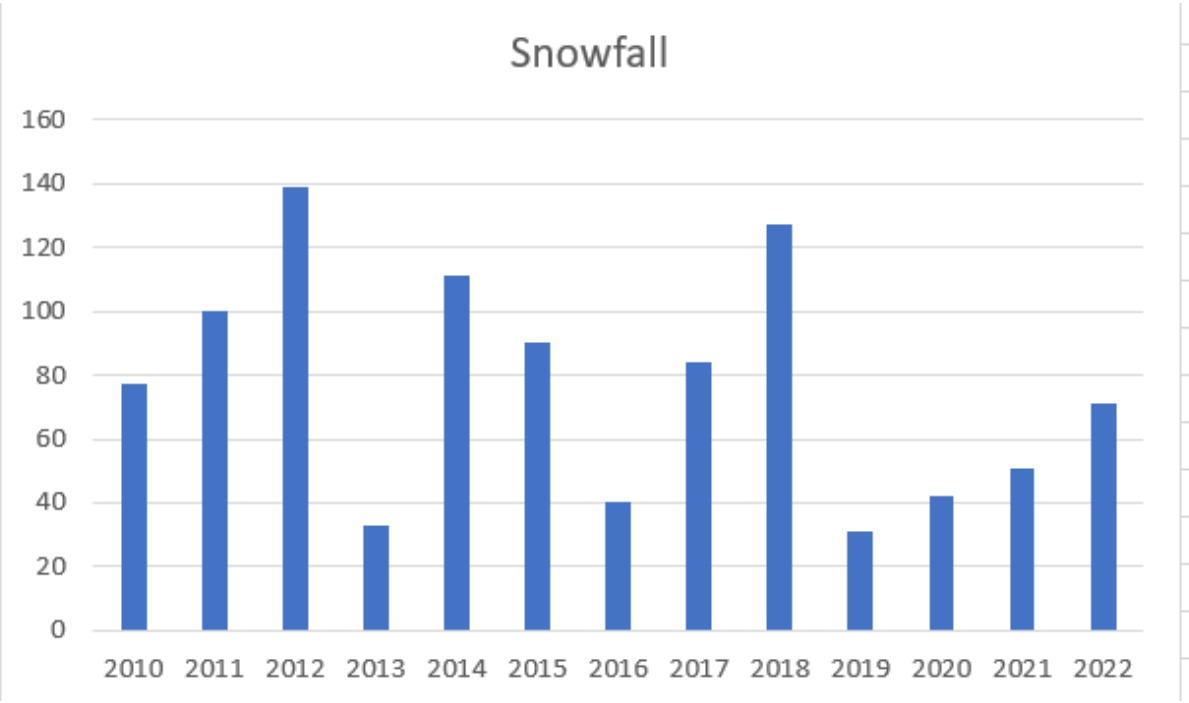
'an information content entity that is a recording of the output of a measurement such as produced by a device.'

to 'an information content entity that is concretized in the recording of the output of a measurement such as produced by a device'

Semantic Equivalence Between Information Content Entities

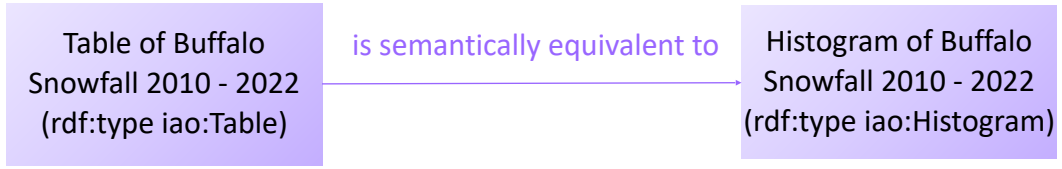
It is desirable to be able to assert that two concretizations share the same information as we might with this table and chart

Year	Snowfall
2010	77
2011	100
2012	139
2013	33
2014	111
2015	90
2016	40
2017	84
2018	127
2019	31
2020	42
2021	51
2022	71



Semantic Equivalence Between Information Content Entities

If defined classes of configurations of information and their concretizations are the only entities we have at our disposal to model information content then we will need to introduce an object property such as ‘is semantically equivalent to’



Even so, this makes assertions about the information itself, such as its classification level, level of trust, latency and staleness more complicated as they would have to be attributed to each defined instance rather than to the information they share.

Proposed Revision (3)

- Agree upon the universals (i.e., non-defined classes) of information content
  - Proposal: Designative, Descriptive, Directive, and Representational
- Adopt the IAO information classes making them defined classes but not part of the taxonomies of the universals (e.g., a table might be used to describe (snowfall levels) or direct (task list).
- Re-label the CCO information bearing artifact classes (for example relabel Document to Document Copy)

Use Cases for Information Bearing Artifacts

- Legal documents
  - passports, driver licenses, birth certificates, deeds, wills, contracts
- Network architectures
  - databases, application services
- Counts
  - number of books in a library, best seller lists, trending topics