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# **The Organization Ontology**

**The VIVO Ontology Interest Group**

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The Organization Ontology (ORG) is an ontology for representing organizations of all kinds.

The Organization Ontology uses [Basic Formal Ontology \(BFO\)](#) as an upper level ontology, and conforms to [Open Biomedical Ontologies \(OBO\) Principles](#) for constructing interoperable ontologies.

The Organization Ontology is a one of several ontologies developed for the representation of scholarship by the [VIVO Project](#). The Organization Ontology is not limited to the representation of scholarship – it can be used to represent organizations in any setting.

In [VIVO 1](#), organizational representation was part of the VIVO ontology. In the new VIVO ontology, organizational representation has been removed in favor of this new Organizational Ontology. The Organizational Ontology is independent of VIVO and can be used in any setting where information about organizations needs to be represented.

An organization is a group of people with a purpose. It is not merely a group of people – that would be a collection of people, not an organization. The purpose may be explicit or implicit. Organizations may be legally constituted or informal. Organizations may be parts of other organizations.

See [Organizations](#) for subsumption and subtypes.

The Organization Ontology is designed to insure it can represent [Research Organization Registry](#) data. ROR is a curated, CC0 collection of facts regarding over 97,000 research organizations in the world. The Organization Ontology can represent these facts for use in graph-based systems such as VIVO.

Tools are provided with the Organization Ontology for retrieving ROR data and creating individuals with assertions as RDF triples using the Organization Ontology.



## ORGANIZATIONS

An organization is any collection of people with a purpose. Organizations may be formal/legal, as in the case of universities and corporations, or they may be informal, as, for example, clubs. Organizations may be parts of other organizations.

### 1.1 Subsumption

Organizations are *generically dependent continuants*<sup>1</sup> since they depend on the people and documents which define them. All the people and documents may be replaced with other people and documents, and the organization continues to exist.

### 1.2 Overview

*Figure 1* shows the classes and properties used to represent organizations in ORG. An overview of the classes and properties follows the figure.

At the center of the figure note that an organization has a name (rdfs:label).

An organization has a type. In the figure, the type of the organization is org:nonprofit. See below for a further discussion of types.

Now proceeding clockwise from type:

- An organization may be denoted by one or more identifiers. Identifiers are represented using the Identifier Ontology (IDO). Note that the identifier is an entity. It exists independently of the organization to denotes.
- Orgs may be related to other orgs. An org may be part of another organization.
- An org may be affiliated with another organization.
- An org may be denoted by a postal address. See *Addresses* for details. Addresses have properties that indicate how they are to be used.
- An org may have a predecessor organization. Organizations undergo change. The resulting organization may be a new organization of a different type, different people, different purpose.
- An organization may be a member of another organization.
- Organizations often have web sites. Web sites are information content entities that are about the organization. Note that the web site is an entity that exists with or without the organization it is about.

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<sup>1</sup> By OBO-complaint, we mean the ORG ontology has been developed in accordance with [Open Biomedical Ontologies \(OBO\) Principles](#).

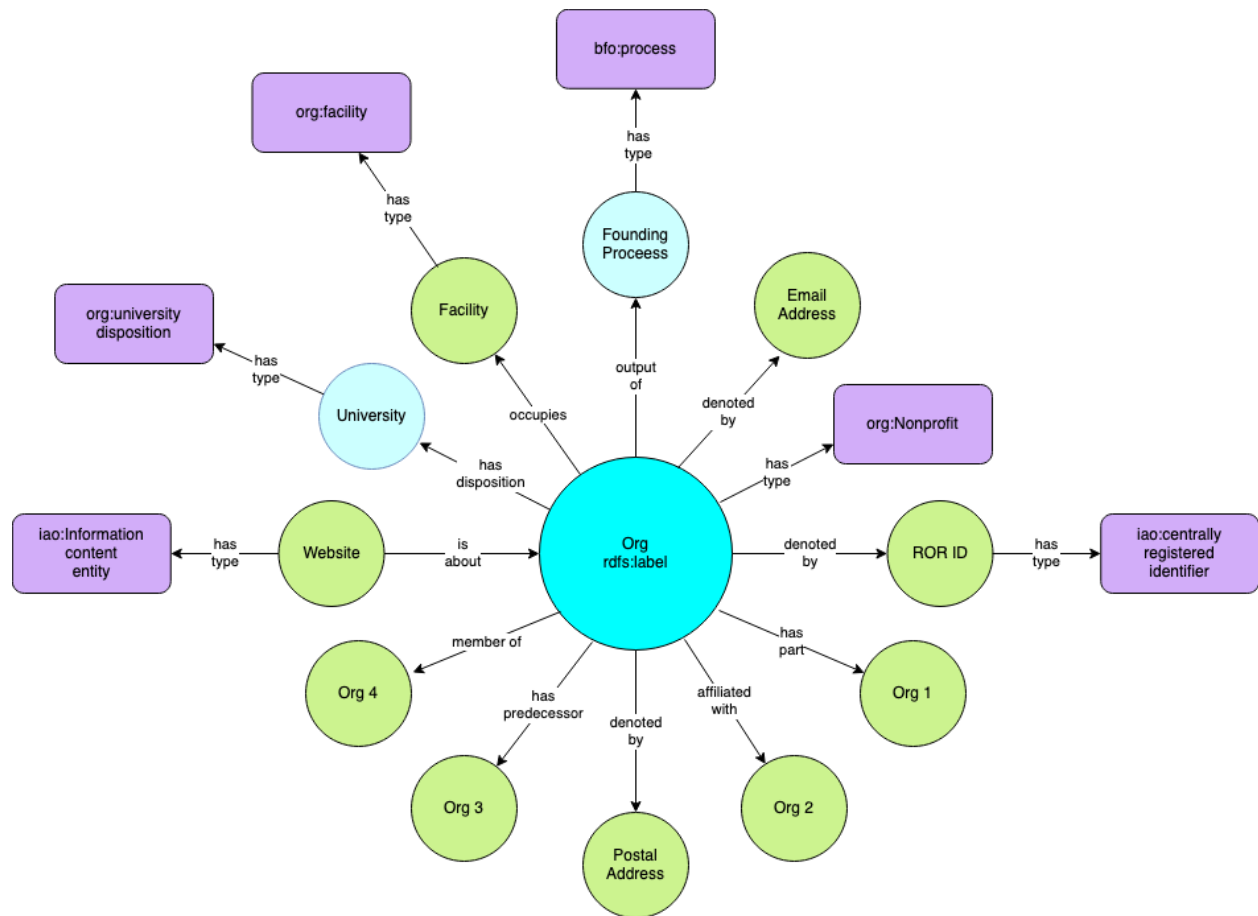


Fig. 1: Figure 1. Representation of organizations. The organization of interest is at the center of the figure. See notes below.



- Organizations have one or more dispositions. Dispositions identify the purpose of an organization. Dispositions of an organization may change over time. See below for a further discussion of dispositions. A disposition is dependent the entity which has the disposition. In BFO, a disposition is a specifically dependent continuant, dependent on the entity which has the specific disposition.
- An org may occupy zero or more facilities, such as an office building, or university campus. A facility is typically a man-made structure attached to the ground. As such, facilities have geographical locations – in cities, for example. See [Facilities](#) for more detail.
- Organizations come into being as the result of founding processes which have associated dates. See [Dates and Times](#) for a further discussion of the representation of dates and times related to organizations.
- Organizations may be denoted by one or more email addresses. See [Addresses](#) for details. As with postal addresses, email addresses may have properties describing their purpose.

## 1.3 Types

Organizations have one of the types in the table below. These are mutually exclusive. An organization can not be more than one type, just as an animal cannot be more than one species.

See [Table 1](#).

Table 1: Table 1 Types of Organizations

| Term ID - Label                              | Definition                                                                                                                                                     |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>ORG_0000002 - government organization</i> | An organization which is the body of persons that constitutes the governing authority of a political unit                                                      |
| <i>ORG_0000003 - company</i>                 | A legal entity of associated persons created for a specific purpose, typically commercial, in which excess revenue may be distributed to the company's owners. |
| <i>ORG_0000004 - non-profit organization</i> | A legal entity of associated persons created for a specific purpose, typically a mission, in which excess revenue is reinvested to serve the entity's mission  |
| <i>ORG_0000005 - informal organization</i>   | A group of people recognized as such by people outside the group. Without legal standing.                                                                      |
| <i>ORG_0000006 - organization part</i>       | An organization which exists as part of another organization. Implies a part_of relationship to another organization                                           |

*Figure 2. Subclasses of organization and subsumption hierarchy. The subclasses are mutually exclusive.* shows the subsumption hierarchy for organization and its subclasses.

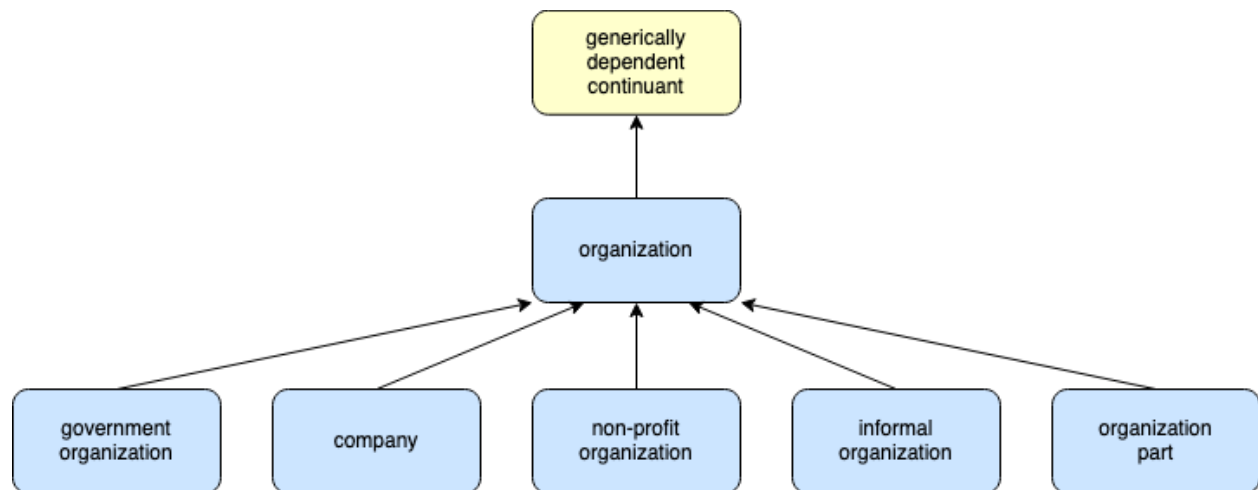


Fig. 2: Figure 2. Subclasses of organization and subsumption hierarchy. The subclasses are mutually exclusive.

### 1.4 Dispositions

Organizations have dispositions which indicate the purposes organizations have. An organization might have a disposition of *library* or *healthcare* or *military*. Dispositions are shown in [Table 2 Dispositions](#). An organization may have any number of dispositions.

See [Table 2](#).

Table 2: Table 2 Dispositions

| Term ID - Label                                                            | Definition                                                                                                                                                       |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>ORG_0000007 - university disposition</i>                                | A disposition to award academic degrees and conduct research in a variety of academic disciplines                                                                |
| <i>ORG_0000008 - association disposition</i>                               | A disposition to organize organizations or individuals along and industry or academic lines                                                                      |
| <i>ORG_0000009 - consortium disposition</i>                                | A disposition to organize organizations along industry or academic lines                                                                                         |
| <i>ORG_0000010 - service provider disposition</i>                          | A disposition to provide service with or without a fee                                                                                                           |
| <i>ORG_0000012 - extension provider disposition</i>                        | A disposition to provide extension services, typically in agriculture. Extension provides access to university research findings and advice to agriculturalists. |
| <i>ORG_0000013 - technology transfer disposition</i>                       | A disposition to create licenses for intellectual property for use by these beyond the creators                                                                  |
| <i>ORG_0000014 - philanthropy disposition</i>                              | A disposition to donate charitable causes, sometimes in the form of grants involving contracts regarding the use of the donated funds or effort.                 |
| <i>ORG_0000015 - funding disposition</i>                                   | A disposition to fund proposals, often is response to a call for proposals by the entity with the funding disposition                                            |
| <i>ORG_0000017 - hospital service provider disposition</i>                 | A disposition to provide hospital-based health care services to humans                                                                                           |
| <i>ORG_0000018 - archive disposition</i>                                   | A disposition to collect, store, and provide access to inanimate material entities, and/or information content entities                                          |
| <i>ORG_0000019 - museum disposition</i>                                    | A disposition to collect, store, and provide access to inanimate material entities in a facility                                                                 |
| <i>ORG_0000020 - gallery disposition</i>                                   | A disposition to display collected works from an archive                                                                                                         |
| <i>ORG_0000021 - publishing disposition</i>                                | A disposition to publish information content entities                                                                                                            |
| <i>ORG_0000022 - research disposition</i>                                  | A disposition to conduct research                                                                                                                                |
| <i>ORG_0000023 - education disposition</i>                                 | A disposition to teach, and provide experiential opportunities for students                                                                                      |
| <i>ORG_0000024 - training disposition</i>                                  | A disposition to train, and provide experiential opportunities for trainees                                                                                      |
| <i>ORG_0000025 - research administration disposition</i>                   | A disposition to provide resources and oversight for those conducting research                                                                                   |
| <i>ORG_0000026 - library disposition</i>                                   | A disposition to provide library services                                                                                                                        |
| <i>ORG_0000027 - commerce disposition</i>                                  | A disposition to sell things                                                                                                                                     |
| <i>ORG_0000028 - military disposition</i>                                  | A disposition to engage in warfare                                                                                                                               |
| <i>ORG_0000029 - religious disposition</i>                                 | A disposition to engage in matters of spirituality and faith                                                                                                     |
| <i>ORG_0000030 - governing disposition</i>                                 | A disposition to provide governance                                                                                                                              |
| <b>1.4. Dispositions</b><br><i>ORG_0000031 - manufacturing disposition</i> | A disposition to construct material entities                                                                                                                     |
| <i>ORG_0000032 - project team disposition</i>                              | A disposition to execute and finish a project.                                                                                                                   |
| <i>ORG_0000033 - sports disposition</i>                                    | A disposition to engage in sports activities                                                                                                                     |

### 1.5 Examples

#### Duke University

Duke is a nonprofit organization with a dispositions of university, education, and research

Duke has an organization part, Duke Health, which has a disposition of healthcare. Duke Health has an organizational part, Duke University Hospital, which has a disposition of hospital.

#### United States Navy

The United States Navy is an organization part of the US Department of Defense with disposition of military.

#### BASF

BASF is a company with a disposition of commerce.

### 1.6 Qualities

Qualities are realized entities that do not require a process, and can be added or subtracted from an entity without altering the entity. Use the *has quality* property to associate a quality with an entity.

For example, to assert organization x is student-led:

```
x has_quality y
y a student_led_organization_quality
```

See *Table 3*.

Table 3: Table 3 Qualities

| Term ID - Label                                        | Definition                                                                            |
|--------------------------------------------------------|---------------------------------------------------------------------------------------|
| <i>ORG_0000034 - information address quality</i>       | A quality of an address to be used for information inquiries                          |
| <i>ORG_0000035 - billing address quality</i>           | A quality of an address to be used to receive bills                                   |
| <i>ORG_0000036 - shipping address quality</i>          | A quality of an address to be used to receive shipped goods                           |
| <i>ORG_0000037 - preferred address quality</i>         | A quality of an address to be displayed in most settings                              |
| <i>ORG_0000038 - homepage quality</i>                  | A quality to be the primary website for an entity.                                    |
| <i>ORG_0000039 - wikipedia quality</i>                 | A quality to be the webpage within WikiPedia regarding the entity                     |
| <i>ORG_0000063 - student led organization quality</i>  | The quality of an organization that is led by a student                               |
| <i>ORG_0000064 - woman led organization quality</i>    | The quality of an organization that is led by a woman                                 |
| <i>ORG_0000065 - minority led organization quality</i> | The quality of an organization that is led by a designated minority                   |
| <i>ORG_0000066 - registered address quality</i>        | The quality of a location that is the legal/registered location for the organization  |
| <i>ORG_0000067 - primary address quality</i>           | The quality of a location that is the primary/preferred location for the organization |



## IDENTIFIERS

An identifier is a string or symbol, assigned to an organization by a *dubbing process*

The Organization Ontology uses [The Identifier Ontology](#) to represent identifiers for organizations.

The Identifier Ontology is a small set of terms in [Information Artifact Ontology \(IAO\)](#) to represent identifiers, and in particular, persistent identifiers, often called PIDs. Persistent identifiers are maintained by one or more maintainers interested in the persistence of the identifier and its assignment to an entity over time.

The table below lists identifiers available in the Organization Ontology<sup>1</sup>

See [Table 4](#).

Table 1: Table 4 Identifiers

| Term ID - Label                                                | Definition                                                                                                                       |
|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <i>IAO_0022003 - crossref funder identifier</i>                | An identifier assigned by CrossRef to an organization which has funded a project resulting in a published work                   |
| <i>IAO_0022006 - dbpedia identifier</i>                        | A URL used by DBpedia to identify an entity                                                                                      |
| <i>IAO_0022010 - global research organization identifier</i>   | An identifier assigned and managed by Digital Science for the purpose of denoting research organizations                         |
| <i>IAO_0022014 - international standard name identifier</i>    | An identifier for persons and organizations which may be assigned by matching algorithms based on records provided by publishers |
| <i>IAO_0022022 - research organization registry identifier</i> | An identifier assigned by ROR to research organizations in the world                                                             |
| <i>IAO_0022027 - wikidata q number</i>                         | QID (or Q number) is the unique identifier of a data item on Wikidata, comprising the letter “Q” followed by one or more digits. |
| <i>IAO_0022057 - ringgold identifier</i>                       | The Ringgold Identifier is a unique numerical identifier applied to organizations in the scholarly supply chain                  |

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<sup>1</sup> If a needed organization identifier is not in the table, please open a Github issue with the name and source of the identifier for inclusion in subsequent releases of the Organization Ontology.

### 2.1 Usage

To assert that an organization has an identifier, we assert the existence of the identifier of a particular type, its value/representation, and its association to the organization. We say:

```
x denoted_by y
y a research_organization_registry_identifier
y has_representation "ror-value"
```



## ADDRESSES

The Organization Ontology represents addresses (postal and email) as “things” that denote organizations.

### 3.1 Email Addresses

IAO\_0000429 is the term id for the class email address. It is an information artifact that denotes an organization and has a text string representation.

If y is the URI of an organization we can say y has email address `info@abc.com` by asserting:

```
y denoted_by x
x a email_address
x has_email_representation "info@abc.com"
```

Because the email address is a thing, we can assign qualities to it. Email addresses may have purposes (dispositions) to help users route email effectively. We might say:

```
x has_disposition z
z a information_address_disposition
```

to indicate that x is an email address that can be used by people to ask questions and get help.

### 3.2 Postal Addresses

Postal addresses are represented in a manner analogous to email addresses – postal addresses are information artifacts that denote an organization. Like email addresses they may have qualities (dispositions) that help people use the postal address effectively. Postal addresses are things. The term ID is IAO\_0000422.

Postal addresses are text strings in which the “parts” of a postal address are delimited by semicolons. Applications can parse these strings into parts needed by the application. Parts and parsing vary by jurisdiction but should conform to [Universal Postal Union](#) standards in implementations.

To say org y has a billing postal address, we can assert:

```
y denoted_by x
x a postal_address
x has_disposition z
z a billing_address_disposition
x has_postal_address_representation "line 1; line 2; city; region; country; postal-
↳code"
```

### 3.3 Terms used to represent Addresses

*Table 10 Terms used to represent addresses* lists term ids used in the representation of addresses

Table 1: Table 10 Terms used to represent addresses

| Term                                                   | Notes                                                     |
|--------------------------------------------------------|-----------------------------------------------------------|
| <i>IAO_0000235 - denoted by</i>                        | An organization is denoted by an address                  |
| <i>IAO_0000429 - email address</i>                     | An entity with properties and a value                     |
| <i>ORG_3000002 - has email representation</i>          | A datatype property to contain an email address string    |
| <i>RO_0000091 - has disposition</i>                    | Object property relating an entity to a disposition       |
| <i>ORG_0000031 - manufacturing disposition</i>         | A quality of an adress to obtain information              |
| <i>IAO_0000422 - postal address</i>                    | An entity with properties and a value for postal delivery |
| <i>ORG_0000032 - project team disposition</i>          | An address used to send bills to an entity                |
| <i>ORG_3000003 - has postal address representation</i> | An datatype property to contain a postal address string   |

## FACILITIES

A facility is a human-made structure, attached to the ground. Examples include

- buildings, including special purpose building such as hospitals and libraries
- campuses and other collections of building in contiguous space
- bridges, monuments, parks, parking lots, towers, dams, and all other human-made structures on the ground

Note that we exclude structures in space, non human made structures such as ant hills, and geological “structures” such as caves.

We also exclude spaces in facilities that that may have a specific purpose. We may say “the gene sequencing facility located in Building 42,” but the gene sequencing “facility” in this sentence is not a facility in the sense described here.

### 4.1 Facilities in the Organization Ontology

The Organization Ontology is focused on organizations. Organizations have relations to Facilities – they may occupy, own, lease, or otherwise be related. It is not the purpose of the Organization Ontology to provide extensive representation of facilities. The Organization Ontology has simple representations that appear to cover important use cases, particularly in the representation of organizations in scholarship.

### 4.2 Types of Facilities

- building
- campus

Perhaps we do not need more than these to start.

### 4.3 Properties of Facilities

- have names, abbreviations, nicknames, and acronyms.
- have locations. Facilities may be “located in” a city, or may have a geolocation with a latitude/longitude representation.
- have identifiers. These are represented using the Identifier Ontology (IDO).
- A facility may be part of a campus.
- A room may be located in a building.

## 4.4 Relation of Organizations and Facilities

- occupies. The organization has zero or more of its people residing in or working at or regularly visiting the facility. Occupies can be used when the ownership of a facility is not of interest, ambiguous, or unknown.

No other relations are anticipated for the Organization Ontology.

## LOCATIONS

The Organization Ontology represents locations as places on the earth. The following entities have locations:

- continents
- countries. Including disputed countries<sup>1</sup>.
- regions of countries. These may have many different names based on the local jurisdiction, such as territory, state, region, province, or even “kingdom” in the case of the United Kingdom.
- populated places, which may be cities<sup>2</sup>. These need not be legally recognized, merely recognized by people outside the populated place.
- *facilities*

### 5.1 Properties of Locations

- located in. The Louvre is located in Paris. Paris is located in France. Metropolitan France is located in Europe.
- has geographic representation – a text string of latitude and longitude of (hopefully) the centroid of the location. For example, Paris has geographical representation “48.864716,2.349014” Note there are no compass designations (E, W, N, S) in the representation. A negative latitude is south of the equator, a positive latitude is north of the equator. A negative longitude is east of the prime meridian, a positive longitude is west of the prime meridian.

### 5.2 Relations of Locations to Organizations and Facilities

Organizations occupy locations. They are not “located in” locations for two reasons:

1. Organizations are not material. Only material things have locations. An Organization such as a chess club may meet in a variety of locations, but they are not located in a location. An organization such as Amazon has a presence in many locations.
2. “located in” means all of something located wholly within something else.

Organizations occupy locations. This means they have some legal right to the location (own, lease, title, other) or they have one or more persons affiliated with the organization who is at the location (all or some of the time). While occupation may involve disputes, most do not.

We can then say

---

<sup>1</sup> definition of “countries” is a matter of dispute and controversy. Any list of countries is subject to dispute.

<sup>2</sup> A city often means a governed place, or the government of the place, “The City of New York” For our purposes we do not distinguish between city, town, village or other possibly formal, legal designations.

The University of Florida 'occupies' The University of Florida Gainesville campus  
 The University of Florida Gainesville campus 'is located in' Gainesville  
 The University of Florida Gainesville campus 'has geolocation representation' "29.  
 ↪6436325,-82.3571242"

Note that 'located in' is transitive. Gainesville is located in Florida. Florida is located in the United States. We can infer that the University of Florida campus is located in the United States.

*Organizations* do not have locations. Facilities, and buildings have locations. Campuses have locations.

Table 14 *Terms used to represent locations* lists terms used in the representation of locations

Table 1: Table 14 Terms used to represent locations

| Term                                                | Notes                                                       |
|-----------------------------------------------------|-------------------------------------------------------------|
| <i>ORG_0000040 - architectural structure</i>        | A man-made construction attached to the ground, a bauwerk   |
| <i>ORG_0000041 - campus</i>                         | The grounds of a business, university, or other             |
| <i>ORG_0000042 - facility</i>                       | An architectural structure with a function                  |
| <i>ORG_0000043 - building</i>                       | A permanent walled and roofed construction                  |
| <i>ORG_0000044 - room</i>                           | A space delineated by partitions in a building              |
| <i>ORG_0000047 - continent</i>                      | One of the seven major land masses of the earth             |
| <i>ORG_0000048 - country</i>                        | The territory occupied by a sovereign state                 |
| <i>ORG_0000049 - region</i>                         | Any subdivision of the territory of a country               |
| <i>ORG_0000050 - populated place</i>                | Any named place on the earth occupied by people             |
| <i>ORG_2000002 - has occurent part</i>              | The relation indicating an organization occupies a location |
| <i>RO_0001015 - location of</i>                     | Location of                                                 |
| <i>RO_0001025 - located in</i>                      | Located in                                                  |
| <i>ORG_0000045 - geographic region</i>              | A geographical location on the earth                        |
| <i>ORG_0000046 - geographic point</i>               | A point on the earth                                        |
| <i>ORG_3000004 - has geolocation representation</i> | A geolocation representation as lat,long                    |

## DATES AND TIMES

The Organization Ontology uses the W3C Time Ontology<sup>1</sup> for representation of dates and times. The key entity is `time:Instant`, which may have a precision to indicate whether we know the instant to a particular day, month, year, or with more precision such as hour, minute, second, and so on. The Time Ontology has sophisticated semantics for many kinds of calendars. The examples for the Organization Ontology assume Gregorian calendar. Most time instants related to organizations are at the day or year precision. Assertions such as “This org was founded in that year” are common.

### 6.1 BFO Date Semantics

BFO has “occurents” – entities which occur in time. The most important BFO entity for organizations is `BFO_000015` – process. A process is an occurrent which has proper temporal parts and involves an entity as participant or output.

In the ORG ontology, most processes of interest – the creation of organizations, the dissolution of organizations, are processes in which rights and privileges are obtained. All organizations have rights and privileges, either formally recognized in founding documents, or informally by word of mouth and personal agreements. These are not currently represented in the Organization Ontology, but are readily added.

Processes often have process boundaries (`BFO_000035`) as demarcations in a process, points in time at which something occurred. Process boundaries can have an associated time instant to indicate when the process boundary occurred.

*Figure 3. General time pattern. An organization is the output of a founding process.* shows the general pattern. An organization is the output of a founding process. The founding process has a process boundary which is the moment in the process at which the organization comes into existence (the founding). The founding has an associated time instant. The instant has a datetime value and a time precision.

*Implementation note:* The colors in the figure represent dependency of entities. The dark blue organization is the entity of interest. The light blue founding process and founding process boundary are dependent on the object of interest. In typical data systems, if the organization was removed from the system, its founding process and founding process boundary would also be removed. The datetime instant would not be removed, it may be associated with other occurents in the data system.

This representation achieves several goals:

1. Uses BFO to represent time semantics, clarifying the nature of dates and what they represent using a consistent upper level ontology.
2. Uses W3C Time Ontology to represent time values gaining richness of expression in the representation of date and time values.

---

<sup>1</sup> <https://www.w3.org/TR/owl-time/>

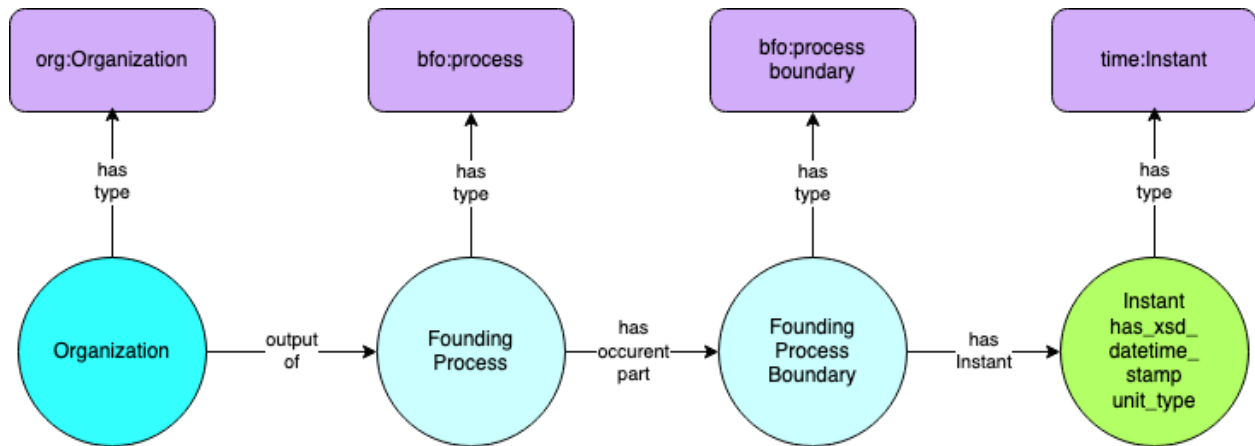


Fig. 1: Figure 3. General time pattern. An organization is the output of a founding process.

3. Provides the framework necessary to add additional detail regarding processes related to organizations, including additional processes, rights and privileges resulting from processes, additional milestones in processes, locations and participants of processes, documents and other participants and outputs of processes.

## 6.2 Example

To assert that an organization x was founded in the year 1853, we would say:

```

x a organization
x output_of y
y a founding_process
y has_occurent_part z
z a founding_process_boundary
z has_instant t
t a instant
t unit_type unit_year
t has_xsd_datetme_stamp "1853-01-01T00:00:00Z"^^xsd:dateTimeStamp

```

*Implementation note 1:* Some data systems may be pre-populated with instants of year precision for years of interest. In such a case the above example would end with `z has_instant t`, where `t` is the pre-existing instant representing 1853 with year precision.

*Implementation note 2:* Some data system may require that time representations be formatted in a particular way, for example W3C datetime standard, with a time zone, even if the time precision is year only. Elements of the time representation other than the year would be ignored by the data system. In such cases, the time representation might be appear as “1853-01-01T00:00:01+00:00” for example.



## 6.3 Terms used to represent dates and times

Table 13 Terms used to represent dates and times lists terms used to represent dates and times

Table 1: Table 13 Terms used to represent dates and times

| Term                                                   | Notes                                                  |
|--------------------------------------------------------|--------------------------------------------------------|
| <i>RO_0002353 - output of</i>                          | output of                                              |
| <i>RO_0002234 - has output</i>                         | has output                                             |
| <i>BFO_0000015 - process</i>                           | process                                                |
| <i>ORG_0000040 - architectural structure</i>           | founding process                                       |
| <i>ORG_2000003 - has time instant</i>                  | has occurent part                                      |
| <i>RO_0002012 - occurent part of</i>                   | occurent part of                                       |
| <i>BFO_0000035 - process boundary</i>                  | process boundary                                       |
| <i>ORG_0000041 - campus</i>                            | founding process boundary                              |
| <i>ORG_0000042 - facility</i>                          | dissolution process                                    |
| <i>ORG_0000043 - building</i>                          | dissolution process boundary                           |
| <i>ORG_2000003 - has time instant</i>                  | has instant. Process boundaries have instants.         |
| <i>Instant - time instant</i>                          | Instant                                                |
| <i>inXSDDateTimeStamp - in XSD Date-Time-Stamp</i>     | An xsd:datetimestamp string associated with an Instant |
| <i>unitType - temporal unit type</i>                   | has datetime precision                                 |
| <i>unitYear - year (unit of temporal duration)</i>     | year precision                                         |
| <i>unitMonth - month (unit of temporal duration)</i>   | month precision                                        |
| <i>unitDay - day (unit of temporal duration)</i>       | day precision                                          |
| <i>unitHour - hour (unit of temporal duration)</i>     | hour precision                                         |
| <i>unitMinute - minute (unit of temporal duration)</i> | minute precision                                       |
| <i>unitSecond - second (unit of temporal duration)</i> | second precision                                       |



## ASSOCIATIONS

### 7.1 Associations of Organizations with other Organizations

Organizations can be associated with each other in a variety of manners. Here we describe how to represent various associations between organizations.

#### 7.1.1 Affiliation

An organization can be affiliated with another organization. In the Organization Ontology, affiliation is a broad term and may mean an association that is not further specified. The only restriction on affiliation is that it is *symmetric*. If organization  $x$  is affiliated with organization  $y$ , then organization  $y$  is affiliated with organization  $x$ .

We say simply

```
x a organization
y a organization
y affiliated_with x
```

for which we can infer<sup>1</sup>:

```
x affiliated_with y
```

#### 7.1.2 Structure

Representing organizational structure is a common need. The Organization Ontology has two properties, `has_organizational_part` and `organizational_part_of`, to specify the relationship between an organizational part and its parent organization (which may also be an organizational part).

For example, if  $x$  represents Baylor University, and  $y$  represents its College of Medicine we would assert:

```
x has_organizational_part y
```

from which we could infer  $y$  *organizational\_part\_of*  $x$ <sup>2</sup>.

---

<sup>1</sup> Some inferencers are able to create/materialize symmetric assertions. Some query engines will satisfy query requirements as if the assertion had been materialized.

<sup>2</sup> Some inferencers are able to create/materialize inverse assertions. Some query engines will satisfy query requirements as if the assertion had been materialized.

### 7.1.3 Spin-offs

Representing organizations that spin-off from other organizations is done using *has spin-off organization*” and *\*spin-off organization off* properties.

For example, to represent that y spun-off of x, we would assert:

```
y spin-off_organization_of x
```

from which we could infer *x has\_spin-off\_organization y*<sup>Page 23, 2</sup>.

In some cases, we want to know more about the nature of the spin-off process, including dates of various milestones, people who participated, documents involved, and more. *spin-off process* is an entity in which other entities may participate, and as an occurrent, may have one or more *spin-off process boundaries* as occurrent parts. See [Dates and Times](#) for representation of time-based entities.

### 7.1.4 History

In some cases, we may wish to assert that organization y is the successor of organization x, meaning that x has ceased to exist, y now exists, and that the result of the dissolution of x was the formation of y. The inverse of *successor\_of* is *has\_successor*. We can say either *y successor\_of x* or *x has\_successor y*<sup>Page 23, 2</sup>.

We say:

```
x a organization
y a organization
y successor_of x
```

In some cases, we want to know more about the nature of the succession process, including dates of various milestones, people who participated, documents involved, and more. *succession process* is an entity in which other entities may participate, and as an occurrent, may have one or more *succession process boundaries* as occurrent parts. See [Dates and Times](#) for representation of time-based entities.

### 7.1.5 Membership

Organizations may be members of other organizations. If x is a member of y, we can simple say

```
x member_of y
```

and we can equivalently say *y has\_member x*<sup>Page 23, 2</sup>.

In some cases, we may need to know more about the membership, which is an asymmetric relationship of two organizations – one organization is the member and the other organization has granted membership to the member organization.

This is shown in [Figure 4](#). Since Membership is an occurrent, it can have time-related assertions.

To say that v was a member of z through a membership x, we would assert:

```
v bearer_of w
w a organizational_member_role
w realized_in x
x a organizational_membership
x realizes y
y a organizational_membership_grantor_role
y inheres_in z
```

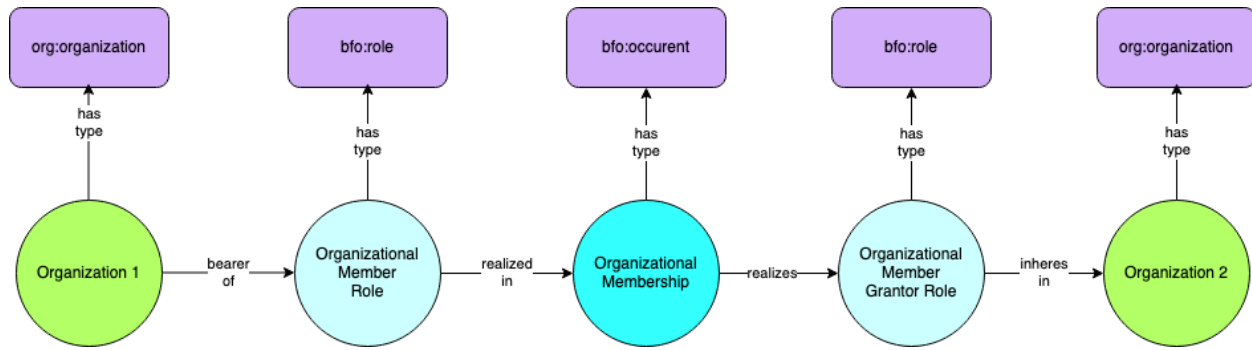


Fig. 1: Figure 4. General membership pattern. Organization 1 has a member role in a membership. Organization 2 has a grantor role in the membership.

Since each of these properties has an inverse, we could equivalently have asserted:

```
z bearer_of y
y a organizational_membership_grantor_role
y realized_in z
x a organizational_membership
x realizes w
w a organizational_member_role
w inheres_in x
```

Note that this detail is typically only needed in cases where we wanted to say more about the roles, or membership entity.

## 7.1.6 Future work – Associations of Organizations to Occurents

Organizations have associations to occurent such as projects, performances, and events. Future ontological work in one or more of these domains should create the properties and classes needed to represent how organizations are associated with them.

## 7.2 Associations of Organizations and People

In a similar manner to the associations between organizations and organizations, we can associate organizations and people. And in a similar manner, we can simply say the organization has an association with a person, or we can use an intermediate entity and roles to describe how the organization and person are related, providing detail regarding dates, documents, processes, and participants in the association between an organization and a person.

### 7.2.1 Has Employee / Employer Of

To assert a person is an employee of an organization, we can simply say

```
x has_employee y
```

or, equivalently, we can say:

```
y has_employee x
```

The entity *position* is a relationship between a person and an organization. A person may one of several roles with respect to the position. An organization may have one of several roles with respect to the position. See [Figure 5](#).

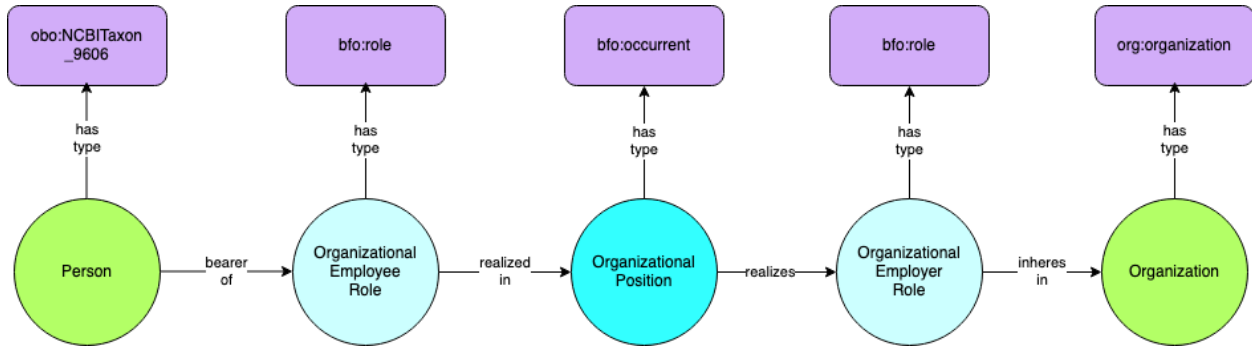


Fig. 2: Figure 5. General employee pattern. Organization 1 has a member role in a membership. Organization 2 has a grantor role in the membership.

To say that *v* was an employee of *z* through a position *x*, we would assert:

```
v bearer_of w
w a organizational_employee_role
w realized_in x
x a organizational_position
x realizes y
y a organizational_employer_role
y inheres_in z
```

Since each of these properties has an inverse, we could equivalently have asserted:

```
z bearer_of y
y a organizational_employer_role
y realized_in z
x a organizational_position
x realizes w
w a organizational_employee_role
w inheres_in x
```

Note that this detail is typically only needed in cases where we wanted to say more about the roles, or membership entity.

### 7.2.2 Additional Roles and Associations between Organizations and People

Additional roles and properties are available to assert other associations between organizations and people.

**has\_member/ member\_of** can be used to assert a person is a member of an organization. **person\_member\_role** and **person\_member\_grantor\_role** can be used as in [Figure 5](#) to assert that a person has a member role in an organization granted by the organization. A membership denotes the association.

#### Persons are not Organizations

Separate object properties are used to represent associations between organizations and other organizations, and associations between persons and organizations. Separate roles and entities are used to represent person roles in memberships and organizational roles in memberships. Separate entities are used to describe a membership of an organization in another organization, and a membership of a person in an organization.

**has\_associate / associate\_of** can be used to assert a person is an associate of an organization. **organizational\_associate\_role** and **organizational\_associate\_grantor\_role** can be used as in [Figure 5](#) to assert that a person has an associate role in an organization granted by the organization. The position denotes the association.

**head\_of / has\_head** can be used to assert a person is the head of an organization. **organizational\_head\_role** and **organizational\_head\_grantor\_role** can be used as in [Figure 5](#) to assert that a person has a head role in an organization granted by the organization. The position denotes the relationship.

**has\_volunteer / volunteer\_of** can be used to assert a person is a volunteer of an organization. **organizational\_volunteer\_role** and **organizational\_volunteer\_grantor\_role** can be used as in [Figure 5](#) to assert that a person has a volunteer role in an organization granted by the organization. The position denotes the relationship.

**has\_appointee / appointee\_of** can be used to assert a person is an appointee of an organization. **organizational\_appointee\_role** and **organizational\_appointee\_grantor\_role** can be used as in [Figure 5](#) to assert that a person has an appointee role in an organization granted by the organization. The position denotes the association.





## ANNOTATION PROPERTIES

Annotation properties provide text for readers of ontologies to explain the use of terms. [Information Artifact Ontology \(IAO\)](#) defines annotation properties used throughout the VIVO ontologies for defining terms. [Table 5 Classes](#) lists the IAO properties used to annotate terms in the ontologies. [Table 6 Annotation Properties](#) lists the terms in the controlled vocabulary for curation status. To assert that a term's metadata is complete, the assertion is:

```
<term> IAO:0000114 IAO_0000120
```

Alternative terms (IAO\_0000118) are not common in the VIVO ontologies. All other annotations are expected for all terms.

See [Table 6](#).

Table 1: Table 6 Annotation Properties

| Term ID - Label                                          | Definition                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>IAO_0000111</i><br>- <i>editor preferred label</i>    | The concise, meaningful, and human-friendly name for a class or property preferred by the ontology developers. (US-English)                                                                                                                                                   |
| <i>IAO_0000112</i><br>- <i>example of usage</i>          | A phrase describing how a term should be used and/or a citation to a work which uses it. May also include other kinds of examples that facilitate immediate understanding, such as widely know prototypes or instances of a class, or cases where a relation is said to hold. |
| <i>IAO_0000114</i><br>- <i>has curation status</i>       | A specification of the state of the metadata for a term                                                                                                                                                                                                                       |
| <i>IAO_0000115</i><br>- <i>definition</i>                | The official definition, explaining the meaning of a class or property. Shall be Aristotelian, formalized and normalized. Can be augmented with colloquial definitions.                                                                                                       |
| <i>IAO_0000116</i><br>- <i>editor note</i>               | An administrative note intended for its editor. It may not be included in the publication version of the ontology, so it should contain nothing necessary for end users to understand the ontology.                                                                           |
| <i>IAO_0000117</i><br>- <i>term editor</i>               | Name of editor entering the term in the file. The term editor is a point of contact for information regarding the term. The term editor may be, but is not always, the author of the definition, which may have been worked upon by several people                            |
| <i>IAO_0000118</i><br>- <i>alternative term</i>          | An alternative name for a class or property which means the same thing as the preferred name (semantically equivalent)                                                                                                                                                        |
| <i>IAO_0000119</i><br>- <i>definition source</i>         | Formal citation, e.g. identifier in external database to indicate / attribute source(s) for the definition. Free text indicate / attribute source(s) for the definition. EXAMPLE: Author Name, URI, MeSH Term C04, PUBMED ID, Wiki uri on 31.01.2007                          |
| <i>IAO_0000232</i><br>- <i>curator note</i>              | An administrative note of use for a curator but of no use for a user                                                                                                                                                                                                          |
| <i>IAO_0000233</i><br>- <i>term tracker item</i>         | An IRI or similar locator for a request or discussion of an ontology term.                                                                                                                                                                                                    |
| <i>IAO_0000412</i><br>- <i>imported from</i>             | For external terms/classes, the ontology from which the term was imported                                                                                                                                                                                                     |
| <i>ORG_1000001</i><br>- <i>vivo 1 ontology reference</i> | The term in the original VIVO ontology that is most like the annotated term.                                                                                                                                                                                                  |
| <i>created</i> - <i>No label</i>                         | None                                                                                                                                                                                                                                                                          |
| <i>creator</i> - <i>No label</i>                         | None                                                                                                                                                                                                                                                                          |
| <i>description</i> - <i>No label</i>                     | None                                                                                                                                                                                                                                                                          |
| <i>title</i> - <i>No label</i>                           | None                                                                                                                                                                                                                                                                          |
| <i>license</i> - <i>No label</i>                         | None                                                                                                                                                                                                                                                                          |
| <i>inverseOf</i> - <i>No label</i>                       | None                                                                                                                                                                                                                                                                          |

Table 2: Table 11 Common Annotation Properties

| Property    | Label               | Notes                                               |
|-------------|---------------------|-----------------------------------------------------|
| IAO_0000112 | example of usage    | A phrase describing how a term should be used       |
| IAO_0000114 | has curation status | A term from a controlled vocabulary                 |
| IAO_0000115 | definition          | Explains the meaning of a term or property          |
| IAO_0000116 | editor note         | An administrative note intended for the term editor |
| IAO_0000117 | term editor         | Name of the editor                                  |
| IAO_0000118 | alternative term    | Alternative name for the term                       |
| IAO_0000119 | definition source   | Definition citation, may be a link to definition    |

Table 3: Table 12 Curation Status

| Property    | Label                   | Notes                                           |
|-------------|-------------------------|-------------------------------------------------|
| IAO_0000120 | metadata complete       | Term has all metadata, but may not be final     |
| IAO_0000121 | organizational term     | Tags used to aid ontology development           |
| IAO_0000122 | ready for release       | No further edits needed for term                |
| IAO_0000123 | metadata incomplete     | Term is under development                       |
| IAO_0000124 | uncurated               | Name and class ID, little else                  |
| IAO_0000125 | pending final vetting   | Complete, awaiting final review                 |
| IAO_0000423 | to be replaced with ext | The term is a placeholder and belongs elsewhere |

## 8.1 Non IAO Annotation Properties

The VIVO ontologies use other annotation properties to describe terms and the ontologies.

`rdfs:label` is required for all terms and for the ontology itself. All labels must be unique. This greatly simplifies the use of the ontologies – one can search for the label and unambiguously find the corresponding term.

### 8.1.1 Ontology annotations

Several annotation are used to describe the ontology and are not used further.

`terms:license` is required for all ontologies. The license should be CC0 or CC-BY, no other restrictions are acceptable for use in the VIVO ontologies.

`owl:versionIRI` a URL identifying the ontology version

`owl:versionInfo` a text string identifying the ontology version

`dc:created` a date string specifying the date the ontology was originally created

`dc:creator` a text string with the name and URL of the creator of the ontology

`dc:description` a text description of the ontology, its domain, and purpose

`dc:title` the name of the ontology to be used in citations

`rdfs:comment` additional text describing the context of the ontology

### 8.1.2 Term annotations

The following annotations are used to describe terms that are imported to the ORG ontology. Most of these are substitutes for the standardized annotation properties describe above in *Table 5 Classes*.

`skos:altLabel skos:definition skos:example skos:prefLabel skos:scopeNote`

#### IAO\_0000111 - editor preferred label

**Label**

editor preferred label

**Definition**

The concise, meaningful, and human-friendly name for a class or property preferred by the ontology developers. (US-English)

**Definition source**

GROUP:OBI:<<http://purl.obolibrary.org/obo/obi>>

**Term editor**

PERSON:Daniel Schober

#### IAO\_0000112 - example of usage

**Label**

example of usage

**Definition**

A phrase describing how a term should be used and/or a citation to a work which uses it. May also include other kinds of examples that facilitate immediate understanding, such as widely know prototypes or instances of a class, or cases where a relation is said to hold.

**Definition source**GROUP:OBI:<<http://purl.obolibrary.org/obo/obi>>**Term editor**

PERSON:Daniel Schober

**IAO\_0000114 - has curation status****Label**

has curation status

**Definition**

A specification of the state of the metadata for a term

**Definition source**

OBI\_0000281

**Term editor**

PERSON:Alan Ruttenberg

PERSON:Bill Bug

PERSON:Melanie Courtot

**IAO\_0000115 - definition****Label**

definition

**Definition**

The official definition, explaining the meaning of a class or property. Shall be Aristotelian, formalized and normalized. Can be augmented with colloquial definitions.

### Definition source

GROUP:OBI:<<http://purl.obolibrary.org/obo/obi>>

### Editor's note

2012-04-05: Barry Smith

The official OBI definition, explaining the meaning of a class or property: 'Shall be Aristotelian, formalized and normalized. Can be augmented with colloquial definitions' is terrible.

Can you fix to something like:

A statement of necessary and sufficient conditions explaining the meaning of an expression referring to a class or property.

Alan Ruttenberg

Your proposed definition is a reasonable candidate, except that it is very common that necessary and sufficient conditions are not given. Mostly they are necessary, occasionally they are necessary and sufficient or just sufficient. Often they use terms that are not themselves defined and so they effectively can't be evaluated by those criteria.

On the specifics of the proposed definition:

We don't have definitions of 'meaning' or 'expression' or 'property'. For 'reference' in the intended sense I think we use the term 'denotation'. For 'expression', I think we you mean symbol, or identifier. For 'meaning' it differs for class and property. For class we want documentation that let's the intended reader determine whether an entity is instance of the class, or not. For property we want documentation that let's the intended reader determine, given a pair of potential relata, whether the assertion that the relation holds is true. The 'intended reader' part suggests that we also specify who, we expect, would be able to understand the definition, and also generalizes over human and computer reader to include textual and logical definition.

Personally, I am more comfortable weakening definition to documentation, with instructions as to what is desirable.

We also have the outstanding issue of how to aim different definitions to different audiences. A clinical audience reading chebi wants a different sort of definition documentation/definition from a chemistry trained audience, and similarly there is a need for a definition that is adequate for an ontologist to work with.

### Term editor

PERSON:Daniel Schober

**IAO\_0000116 - editor note****Label**

editor note

**Definition**

An administrative note intended for its editor. It may not be included in the publication version of the ontology, so it should contain nothing necessary for end users to understand the ontology.

**Definition source**GROUP:OBI:<<http://purl.obfoundry.org/obo/obi>>**Term editor**

PERSON:Daniel Schober

**IAO\_0000117 - term editor****Label**

term editor

**Definition**

Name of editor entering the term in the file. The term editor is a point of contact for information regarding the term. The term editor may be, but is not always, the author of the definition, which may have been worked upon by several people

**Definition source**GROUP:OBI:<<http://purl.obolibrary.org/obo/obi>>**Editor's note**

20110707, MC: label update to term editor and definition modified accordingly. See <https://github.com/information-artifact-ontology/IAO/issues/115>.

**Term editor**

PERSON:Daniel Schober

### IAO\_0000118 - alternative term

**Label**

alternative term

**Definition**

An alternative name for a class or property which means the same thing as the preferred name (semantically equivalent)

**Definition source**

GROUP:OBI:<<http://purl.obolibrary.org/obo/obi>>

**Term editor**

PERSON:Daniel Schober

### IAO\_0000119 - definition source

**Label**

definition source

**Definition**

Formal citation, e.g. identifier in external database to indicate / attribute source(s) for the definition. Free text indicate / attribute source(s) for the definition. EXAMPLE: Author Name, URI, MeSH Term C04, PUBMED ID, Wiki uri on 31.01.2007

**Definition source**



Discussion on obo-discuss mailing-list, see <http://bit.ly/hgm99w>  
 GROUP:OBI:<<http://purl.obolibrary.org/obo/obi>>

**Term editor**

PERSON:Daniel Schober

**IAO\_0000232 - curator note**

**Label**

curator note

**Definition**

An administrative note of use for a curator but of no use for a user

**Term editor**

PERSON:Alan Ruttenberg

**IAO\_0000233 - term tracker item**

**Label**

term tracker item

**Definition**

An IRI or similar locator for a request or discussion of an ontology term.

**Definition source**

Person: Jie Zheng, Chris Stoeckert, Alan Ruttenberg

**Example**

the URI for an OBI Terms ticket at sourceforge, such as <https://sourceforge.net/p/obi/obi-terms/772/>

**Term editor**

Person: Jie Zheng, Chris Stoeckert, Alan Ruttenberg

### IAO\_0000412 - imported from

**Label**

imported from

**Definition**

For external terms/classes, the ontology from which the term was imported

**Definition source**

GROUP:OBI:<<http://purl.obolibrary.org/obo/obi>>

**Term editor**

PERSON:Melanie Courtot

PERSON:Alan Ruttenberg

### ORG\_1000001 - vivo 1 ontology reference

**Label**

vivo 1 ontology reference

**Alternate name**

in vivo 1

**Definition**

The term in the original VIVO ontology that is most like the annotated term.

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The organization class in the original VIVO ontology is most like the organization class in the VIVO Organization Ontology. They have different superclasses, so they are not the same.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**created - No label**

**creator - No label**

**description - No label**

**title - No label**

license - No label

inverseOf - No label

## CLASSES

**Classes** are collections of **individuals**. A university, a nonprofit, building, and a role in a project are all individuals. Classes of individuals are defined by specifying members (extension) or more frequently in scholarship, by specifying conditions (intension).

In ontologies, and using *OWL*, individuals instances of classes. Classes are arranged in subsumption hierarchies, indicating that individuals in one class are members of some higher class. For example, a cat is a mammal. Your cat is an instance of the class cat. All cats are mammals. We say cat is a subclass of mammal. We can infer that all individuals that are cats are mammals. Your cat is a cat, so we can infer your cat is a mammal.

## 9.1 All Classes

See *Table 5*.

Table 1: Table 5 Classes

| Term ID - Label                             | Definition                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>BFO_0000001 - entity</i>                 | The fundamental thing that has existence. All things that exist are entities.                                                                                                                                                                                                                                           |
| <i>BFO_0000002 - continuant</i>             | An entity which has existence in time                                                                                                                                                                                                                                                                                   |
| <i>BFO_0000003 - occurrent</i>              | An entity which occurs in time                                                                                                                                                                                                                                                                                          |
| <i>BFO_0000004 - independent continuant</i> | B is an independent continuant = Def. b is a continuant which is such that there is no c and no t such that b s-depends_on c at t. (axiom label in BFO2 Reference: [017-002])                                                                                                                                           |
| <i>BFO_0000008 - temporal region</i>        | An occurrent which is some part of time                                                                                                                                                                                                                                                                                 |
| <i>BFO_0000015 - process</i>                | P is a process = Def. p is an occurrent that has temporal proper parts and for some time t, p s-depends_on some material entity at t. (axiom label in BFO2 Reference: [083-003]) [has axiom label:<br><a href="http://purl.obolibrary.org/obo/bfo/axiom/083-003">http://purl.obolibrary.org/obo/bfo/axiom/083-003</a> ] |
| <i>BFO_0000016 - disposition</i>            | A realizable entity that presents in a continuant                                                                                                                                                                                                                                                                       |
| <i>BFO_0000017 - realizable entity</i>      | To say that b is a realizable entity is to say that b is a specifically dependent continuant that inheres in some independent continuant which is not a spatial region and is of a type instances of which are realized in processes of a correlated type. (axiom label in BFO2 Reference: [058-002])                   |

continues on next page

Table 1 – continued from previous page

| Term ID - Label                                        | Definition                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>BFO_0000019 - quality</i>                           | A quality is a specifically dependent continuant that, in contrast to roles and dispositions, does not require any further process in order to be realized.                                                                                                                                                                                                                                                         |
| <i>BFO_0000020 - specifically dependent continuant</i> | B is a specifically dependent continuant = Def. b is a continuant & there is some independent continuant c which is not a spatial region and which is such that b s-depends_on c at every time t during the course of b's existence. (axiom label in BFO2 Reference: [050-003]) [has axiom label: <a href="http://purl.obolibrary.org/obo/bfo/axiom/050-003">http://purl.obolibrary.org/obo/bfo/axiom/050-003</a> ] |
| <i>BFO_0000023 - role</i>                              | B is a role means: b is a realizable entity & b exists because there is some single bearer that is in some special physical, social, or institutional set of circumstances in which this bearer does not have to be & b is not such that, if it ceases to exist, then the physical make-up of the bearer is thereby changed.                                                                                        |
| <i>BFO_0000029 - site</i>                              | B is a site means: b is a three-dimensional immaterial entity that is (partially or wholly) bounded by a material entity or it is a three-dimensional immaterial part thereof. (axiom label in BFO2 Reference: [034-002])                                                                                                                                                                                           |
| <i>BFO_0000031 - generically dependent continuant</i>  | B is a generically dependent continuant = Def. b is a continuant that g-depends_on one or more other entities. (axiom label in BFO2 Reference: [074-001]) [has axiom label: <a href="http://purl.obolibrary.org/obo/bfo/axiom/074-001">http://purl.obolibrary.org/obo/bfo/axiom/074-001</a> ]                                                                                                                       |
| <i>BFO_0000035 - process boundary</i>                  | P is a process boundary = Def. p is a temporal part of a process & p has no proper temporal parts. (axiom label in BFO2 Reference: [084-001]) [has axiom label: <a href="http://purl.obolibrary.org/obo/bfo/axiom/084-001">http://purl.obolibrary.org/obo/bfo/axiom/084-001</a> ]                                                                                                                                   |
| <i>BFO_0000038 - one-dimensional temporal region</i>   | A one-dimensional temporal region is a temporal region that is extended. (axiom label in BFO2 Reference: [103-001])                                                                                                                                                                                                                                                                                                 |
| <i>BFO_0000040 - material entity</i>                   | A material entity is an independent continuant that has some portion of matter as proper or improper continuant part. (axiom label in BFO2 Reference: [019-002])                                                                                                                                                                                                                                                    |
| <i>BFO_0000141 - immaterial entity</i>                 | An immaterial entity is the boundary or interior of a material entity                                                                                                                                                                                                                                                                                                                                               |
| <i>BFO_0000148 - zero-dimensional temporal region</i>  | A temporal region of no duration.                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>IAO_0000030 - information content entity</i>        | A generically dependent continuant that is about some thing.                                                                                                                                                                                                                                                                                                                                                        |
| <i>IAO_0000422 - postal address</i>                    | A textual entity that is used as directive to deliver something to a person, or organization                                                                                                                                                                                                                                                                                                                        |
| <i>IAO_0000429 - email address</i>                     | A designation used to deliver email to a recipient. Typically has an associated email representation                                                                                                                                                                                                                                                                                                                |

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Table 1 – continued from previous page

| Term ID - Label                                                | Definition                                                                                                                                                                                             |
|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>IAO_0000578 - centrally registered identifier</i>           | An information content entity that consists of a CRID symbol and additional information about the CRID registry to which it belongs.                                                                   |
| <i>IAO_0020000 - identifier</i>                                | An identifier is an information content entity that is the outcome of a dubbing process and is used to refer to one instance of entity shared by a group of people to refer to that individual entity. |
| <i>IAO_0022003 - crossref funder identifier</i>                | An identifier assigned by CrossRef to an organization which has funded a project resulting in a published work                                                                                         |
| <i>IAO_0022006 - dbpedia identifier</i>                        | A URL used by DBpedia to identify an entity                                                                                                                                                            |
| <i>IAO_0022010 - global research organization identifier</i>   | An identifier assigned and managed by Digital Science for the purpose of denoting research organizations                                                                                               |
| <i>IAO_0022014 - international standard name identifier</i>    | An identifier for persons and organizations which may be assigned by matching algorithms based on records provided by publishers                                                                       |
| <i>IAO_0022022 - research organization registry identifier</i> | An identifier assigned by ROR to research organizations in the world                                                                                                                                   |
| <i>IAO_0022027 - wikidata q number</i>                         | QID (or Q number) is the unique identifier of a data item on Wikidata, comprising the letter “Q” followed by one or more digits.                                                                       |
| <i>IAO_0022057 - ringgold identifier</i>                       | The Ringgold Identifier is a unique numerical identifier applied to organizations in the scholarly supply chain                                                                                        |
| <i>NCBITaxon_9606 - Homo sapiens</i>                           | The species of bipedal primates to which modern humans belong                                                                                                                                          |
| <i>ORG_0000001 - organization</i>                              | A group of people recognized as such by people outside the group.                                                                                                                                      |
| <i>ORG_0000002 - government organization</i>                   | An organization which is the body of persons that constitutes the governing authority of a political unit                                                                                              |
| <i>ORG_0000003 - company</i>                                   | A legal entity of associated persons created for a specific purpose, typically commercial, in which excess revenue may be distributed to the company’s owners.                                         |
| <i>ORG_0000004 - nonprofit organization</i>                    | A legal entity of associated persons created for a specific purpose, typically a mission, in which excess revenue is reinvested to serve the entity’s mission                                          |
| <i>ORG_0000005 - informal organization</i>                     | A group of people recognized as such by people outside the group. Without legal standing.                                                                                                              |
| <i>ORG_0000006 - organization part</i>                         | An organization which exists as part of another organization. Implies a part_of relationship to another organization                                                                                   |
| <i>ORG_0000007 - university disposition</i>                    | A disposition to award academic degrees and conduct research in a variety of academic disciplines                                                                                                      |

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Table 1 – continued from previous page

| Term ID - Label                                               | Definition                                                                                                                                                                                |
|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>ORG_0000008 - association disposition</i>                  | A disposition to organize organizations or individuals along and industry or academic lines                                                                                               |
| <i>ORG_0000009 - consortium disposition</i>                   | A disposition to organize organizations along industry or academic lines                                                                                                                  |
| <i>ORG_0000010 - service provider disposition</i>             | A disposition to provide service with or without a fee                                                                                                                                    |
| <i>ORG_0000011 - laboratory service provider disposition</i>  | A disposition to provide laboratory services. In the US, organization parts in universities that have a disposition to provide laboratory services to others are called core laboratories |
| <i>ORG_0000012 - extension provider disposition</i>           | A disposition to provide extension services, typically in agriculture. Extension provides access to university research findings and advice to agriculturalists.                          |
| <i>ORG_0000013 - technology transfer disposition</i>          | A disposition to create licenses for intellectual property for use by these beyond the creators                                                                                           |
| <i>ORG_0000014 - philanthropy disposition</i>                 | A disposition to donate charitable causes, sometimes in the form of grants involving contracts regarding the use of the donated funds or effort.                                          |
| <i>ORG_0000015 - funding disposition</i>                      | A disposition to fund proposals, often is response to a call for proposals by the entity with the funding disposition                                                                     |
| <i>ORG_0000016 - health care service provider disposition</i> | A disposition to provider health care to humans                                                                                                                                           |
| <i>ORG_0000017 - hospital service provider disposition</i>    | A disposition to provide hospital-based health care services to humans                                                                                                                    |
| <i>ORG_0000018 - archive disposition</i>                      | A disposition to collect, store, and provide access to inanimate material entities, and/or information content entitites                                                                  |
| <i>ORG_0000019 - museum disposition</i>                       | A disposition to collect, store, and provide access to inanimate material entities in a facility                                                                                          |
| <i>ORG_0000020 - gallery disposition</i>                      | A disposition to display collected works from an archive                                                                                                                                  |
| <i>ORG_0000021 - publishing disposition</i>                   | A disposition to publish information content entities                                                                                                                                     |
| <i>ORG_0000022 - research disposition</i>                     | A disposition to conduct research                                                                                                                                                         |
| <i>ORG_0000023 - education disposition</i>                    | A disposition to teach, and provide experiential opprtunities for students                                                                                                                |
| <i>ORG_0000024 - training disposition</i>                     | A disposition to train, and provide experiential opportunities for trainees                                                                                                               |
| <i>ORG_0000025 - research administration disposition</i>      | A disposition to provide resources and oversight for those conducting research                                                                                                            |
| <i>ORG_0000026 - library disposition</i>                      | A disposition to provide library services                                                                                                                                                 |
| <i>ORG_0000027 - commerce disposition</i>                     | A disposition to sell things                                                                                                                                                              |
| <i>ORG_0000028 - military disposition</i>                     | A disposition to engage in warfare                                                                                                                                                        |
| <i>ORG_0000029 - religious disposition</i>                    | A disposition to engage in matters of spirtuality and faith                                                                                                                               |
| <i>ORG_0000030 - governing disposition</i>                    | A disposition to provide governance                                                                                                                                                       |

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Table 1 – continued from previous page

| Term ID - Label                                   | Definition                                                                                                                                                                                 |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>ORG_0000031 - manufacturing disposition</i>    | A dispositon to construct material entities                                                                                                                                                |
| <i>ORG_0000032 - project team disposition</i>     | A disposition to execute and finish a project.                                                                                                                                             |
| <i>ORG_0000033 - sports disposition</i>           | A disposition to engage in sports activites, typically competitive.                                                                                                                        |
| <i>ORG_0000034 - information address quality</i>  | A quality of an address to be used for information inquiries                                                                                                                               |
| <i>ORG_0000035 - billing address quality</i>      | A quality of an address to be used to receive bills                                                                                                                                        |
| <i>ORG_0000036 - shipping address quality</i>     | A quality of an address to be used to receive shipped goods                                                                                                                                |
| <i>ORG_0000037 - preferred address quality</i>    | A quality of an address to be displayed in most settings                                                                                                                                   |
| <i>ORG_0000038 - homepage quality</i>             | A quality to be the primary website for an entity.                                                                                                                                         |
| <i>ORG_0000039 - wikipedia quality</i>            | A quality to be the webpage within WikiPedia regarding the entity                                                                                                                          |
| <i>ORG_0000040 - architectural structure</i>      | A material entity that is a human made strcuture with firm connection between its foundation and the ground.                                                                               |
| <i>ORG_0000041 - campus</i>                       | The geographic location consisting of the grounds or property of a school, college, university, business, church, or hospital, often understood to include buildings and other structures. |
| <i>ORG_0000042 - facility</i>                     | An architectural structure that bears some function.                                                                                                                                       |
| <i>ORG_0000043 - building</i>                     | A permanent walled and roofed construction                                                                                                                                                 |
| <i>ORG_0000044 - room</i>                         | A space contained by a partitioned part of the inside of a building. Often has an identifier.                                                                                              |
| <i>ORG_0000045 - geographic region</i>            | A place on the earth. Not necessarily contiguous                                                                                                                                           |
| <i>ORG_0000046 - geographic point</i>             | A point located on the earth                                                                                                                                                               |
| <i>ORG_0000047 - continent</i>                    | One of the main landmasses of the globe, usually reckoned as seven in number (Europe, Asia, Africa, North America, South America, Australia, and Antarctica).                              |
| <i>ORG_0000048 - country</i>                      | The territory governed by a sovereign state.                                                                                                                                               |
| <i>ORG_0000049 - region</i>                       | A subdivision of the territory of a country                                                                                                                                                |
| <i>ORG_0000050 - populated place</i>              | A named place on the earth occupied by people                                                                                                                                              |
| <i>ORG_0000051 - founding process</i>             | The process by which the organization was founded                                                                                                                                          |
| <i>ORG_0000052 - founding process boundary</i>    | The process boundary which defines the moment of creation of an orgnization. Before the moment the organization does not exist. After the moment, the organization exists.                 |
| <i>ORG_0000053 - dissolution process</i>          | The process by which an organization no longer exists.                                                                                                                                     |
| <i>ORG_0000054 - dissolution process boundary</i> | The process boundary which marks the moment at which the organization no longer exists                                                                                                     |
| <i>ORG_0000055 - succession process</i>           | The process by which one organization gores out of existence and is succeeded by a new organization                                                                                        |
| <i>ORG_0000056 - succession process boundary</i>  | The process boundary within a succession process. Complex succession processes may have many boundaries.                                                                                   |

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Table 1 – continued from previous page

| Term ID - Label                                            | Definition                                                                                                                                                                                                                         |
|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>ORG_0000057 - web site</i>                              | The information content entity consisting of a group of World Wide Web pages usually containing hyperlinks to each other and made available online by an individual, company, educational institution, government, or organization |
| <i>ORG_0000058 - spin-off process</i>                      | The process by which one organization spins off of another                                                                                                                                                                         |
| <i>ORG_0000059 - spin-off process boundary</i>             | The boundary of a spin-off process                                                                                                                                                                                                 |
| <i>ORG_0000060 - organizational membership</i>             | The asymmetric relationship involving two organizations in which one is a member of the other                                                                                                                                      |
| <i>ORG_0000061 - organizational member role</i>            | The role of an organization in being a member of another                                                                                                                                                                           |
| <i>ORG_0000062 - organizational member grantor role</i>    | The role of an organization in granting a member role to another                                                                                                                                                                   |
| <i>ORG_0000063 - student led organization quality</i>      | The quality of an organization that is led by a student                                                                                                                                                                            |
| <i>ORG_0000064 - woman led organization quality</i>        | The quality of an organization that is led by a woman                                                                                                                                                                              |
| <i>ORG_0000065 - minority led organization quality</i>     | The quality of an organization that is led by a designated minority                                                                                                                                                                |
| <i>ORG_0000066 - registered address quality</i>            | The quality of a location that is the legal/registered location for the organization                                                                                                                                               |
| <i>ORG_0000067 - primary address quality</i>               | The quality of a location that is the primary/preferred location for the organization                                                                                                                                              |
| <i>ORG_0000068 - organizational position</i>               | The asymmetric relationship between an organization and a person in which a person has a role in the position, as does the organization.                                                                                           |
| <i>ORG_0000069 - organizational employee role</i>          | The role of a person to be an employee of an organization                                                                                                                                                                          |
| <i>ORG_0000070 - organizational employer role</i>          | The role of an organization to employ a person                                                                                                                                                                                     |
| <i>ORG_0000071 - organizational associate role</i>         | The role of a person to be an associate of an organization                                                                                                                                                                         |
| <i>ORG_0000072 - organizational associate grantor role</i> | The role of an organization to grant associate status to a person                                                                                                                                                                  |
| <i>ORG_0000073 - organizational head role</i>              | The role of a person to be the head of an organization                                                                                                                                                                             |
| <i>ORG_0000074 - organizational head grantor role</i>      | The role of an organization to grant head status to a person                                                                                                                                                                       |
| <i>ORG_0000075 - organizational appointee role</i>         | The role of a person to be an appointee of an organization                                                                                                                                                                         |
| <i>ORG_0000076 - organizational appointee grantor role</i> | The role of an organization to grant appointee status to a person                                                                                                                                                                  |
| <i>ORG_0000077 - organizational volunteer role</i>         | The role of a person to be a volunteer of an organization                                                                                                                                                                          |
| <i>ORG_0000078 - organizational volunteer grantor role</i> | The role of an organization to grant volunteer status to a person                                                                                                                                                                  |
| <i>ORG_0000079 - airline disposition</i>                   | The disposition of an organization that operates airplanes carrying freight or passengers                                                                                                                                          |

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Table 1 – continued from previous page

| Term ID - Label                                 | Definition                                                                                                                  |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <i>ORG_0000080 - media disposition</i>          | The disposition of an organization that creates, transmits, and/or licenses live or recorded material for viewing by others |
| <i>ORG_0000081 - performing disposition</i>     | The disposition of an organization to perform live or recorded music, theatre, or dance                                     |
| <i>ORG_0000082 - labor union disposition</i>    | The disposition of an organization to organize workers for the purpose of negotiations with employers of the workers        |
| <i>ORG_0000083 - person membership</i>          | The asymmetric relationship representing a person's membership in an organization                                           |
| <i>ORG_0000084 - person member role</i>         | The role of a person to be a member of an organization                                                                      |
| <i>ORG_0000085 - person member grantor role</i> | The role of an organization to grant membership to a person                                                                 |
| <i>Concept - concept (skos)</i>                 | An idea or notion, a unit of thought                                                                                        |
| <i>Instant - time instant</i>                   | A zero-dimensional part of time. Precision may specify a range. Represented by xsd datetime string                          |
| <i>TemporalUnit - temporal unit</i>             | A specification of a time duration. Used to specify precision of time instants                                              |

### 9.1.1 BFO\_0000001 - entity

**Label**

entity

**Definition**

The fundamental thing that has existence. All things that exist are entities.

**Imported From**

<http://purl.obolibrary.org/obo/bfo/2020/bfo.owl>

### 9.1.2 BFO\_0000002 - continuant

**Label**

continuant

**Definition**

An entity which has existence in time

**Imported From**

<http://purl.obolibrary.org/obo/bfo/2020/bfo.owl>

### 9.1.3 BFO\_0000003 - occurrent

**Label**

occurrent

**Definition**

An entity which occurs in time

**Imported From**

<http://purl.obolibrary.org/obo/bfo/2020/bfo.owl>

### 9.1.4 BFO\_0000004 - independent continuant

**Label**

independent continuant

**Definition**

B is an independent continuant = Def. b is a continuant which is such that there is no c and no t such that b s-depends\_on c at t. (axiom label in BFO2 Reference: [017-002])

**Example**

a molecule  
a heart  
an organism  
a chair  
a leg  
the interior of your mouth  
an orchestra.  
an atom  
the bottom right portion of a human torso  
a spatial region

**Imported From**

<http://purl.obolibrary.org/obo/bfo/2019-08-26/bfo.owl>

### 9.1.5 BFO\_0000008 - temporal region

**Label**

temporal region

**Definition**

An occurrent which is some part of time

**Imported From**

<http://purl.obolibrary.org/obo/bfo/2020/bfo.owl>

### 9.1.6 BFO\_0000015 - process

**Label**

process

**Definition**

P is a process = Def. p is an occurrent that has temporal proper parts and for some time t, p s-depends\_on some material entity at t. (axiom label in BFO2 Reference: [083-003]) [has axiom label: <http://purl.obolibrary.org/obo/bfo/axiom/083-003>]

**Imported From**

<http://purl.obolibrary.org/obo/bfo/2020/bfo.owl>

### 9.1.7 BFO\_0000016 - disposition

**Label**

disposition

**Definition**

A realizable entity that presents in a continuant

**Imported From**

<http://purl.obolibrary.org/obo/bfo/2020/bfo.owl>

### 9.1.8 BFO\_0000017 - realizable entity

**Label**

realizable entity

**Definition**

To say that *b* is a realizable entity is to say that *b* is a specifically dependent continuant that inheres in some independent continuant which is not a spatial region and is of a type instances of which are realized in processes of a correlated type. (axiom label in BFO2 Reference: [058-002])

**Imported From**

<http://purl.obolibrary.org/obo/bfo/2020/bfo.owl>

### 9.1.9 BFO\_0000019 - quality

**Label**

quality

**Definition**

A quality is a specifically dependent continuant that, in contrast to roles and dispositions, does not require any further process in order to be realized.

**Example**

the shape of your nostril

the color of a tomato

the mass of this piece of gold.

the ambient temperature of this portion of air

the shape of your nose

the length of the circumference of your waist

**Imported From**

<http://purl.obolibrary.org/obo/bfo/2019-08-26/bfo.owl>

### 9.1.10 BFO\_0000020 - specifically dependent continuant

**Label**

specifically dependent continuant

**Definition**

B is a specifically dependent continuant = Def. b is a continuant & there is some independent continuant c which is not a spatial region and which is such that b s-depends\_on c at every time t during the course of b's existence. (axiom label in BFO2 Reference: [050-003]) [has axiom label: <http://purl.obolibrary.org/obo/bfo/axiom/050-003>]

**Imported From**

<http://purl.obolibrary.org/obo/bfo/2020/bfo.owl>

### 9.1.11 BFO\_0000023 - role

**Label**

role

**Definition**

B is a role means: b is a realizable entity & b exists because there is some single bearer that is in some special physical, social, or institutional set of circumstances in which this bearer does not have to be & b is not such that, if it ceases to exist, then the physical make-up of the bearer is thereby changed.

**Example**

John's role of husband to Mary is dependent on Mary's role of wife to John, and both are dependent on the object aggregate comprising John and Mary as member parts joined together through the relational quality of being married.

the role of a stone in marking a property boundary



the role of a building in serving as a military target

the role of subject in a clinical trial

the priest role

the role of a boundary to demarcate two neighboring administrative territories

the student role

**Editor's note**

BFO 2 Reference: One major family of examples of non-rigid universals involves roles, and ontologies developed for corresponding administrative purposes may consist entirely of representatives of entities of this sort. Thus 'professor', defined as follows,  $b \text{ instance\_of professor at } t = \text{Def. there is some } c, c \text{ instance\_of professor role \& } c \text{ inheres\_in } b \text{ at } t.$  denotes a non-rigid universal and so also do 'nurse', 'student', 'colonel', 'taxpayer', and so forth. (These terms are all, in the jargon of philosophy, phase sortals.) By using role terms in definitions, we can create a BFO conformant treatment of such entities drawing on the fact that, while an instance of professor may be simultaneously an instance of trade union member, no instance of the type professor role is also (at any time) an instance of the type trade union member role (any more than any instance of the type color is at any time an instance of the type length). If an ontology of employment positions should be defined in terms of roles following the above pattern, this enables the ontology to do justice to the fact that individuals instantiate the corresponding universals – professor, sergeant, nurse – only during certain phases in their lives.

**Imported From**

<http://purl.obolibrary.org/obo/bfo/2019-08-26/bfo.owl>

**9.1.12 BFO\_0000029 - site****Label**

site

**Definition**

B is a site means:  $b$  is a three-dimensional immaterial entity that is (partially or wholly) bounded by a material entity or it is a three-dimensional immaterial part thereof. (axiom label in BFO2 Reference: [034-002])

**Example**

the interior of the trunk of your car

the interior of your refrigerator

a hole in the interior of a portion of cheese

the lumen of your gut  
a rabbit hole  
the Piazza San Marco  
your left nostril (a fiat part – the opening – of your left nasal cavity)  
the interior of your office  
the interior of a kangaroo pouch  
Manhattan Canyon)  
the interior of your bedroom  
an air traffic control region defined in the airspace above an airport  
the Grand Canyon  
the cockpit of an aircraft  
the hold of a ship

### Imported From

<http://purl.obolibrary.org/obo/bfo/2019-08-26/bfo.owl>

### 9.1.13 BFO\_0000031 - generically dependent continuant

#### Label

generically dependent continuant

#### Definition

B is a generically dependent continuant = Def. b is a continuant that g-depends\_on one or more other entities.  
(axiom label in BFO2 Reference: [074-001]) [has axiom label: <http://purl.obolibrary.org/obo/bfo/axiom/074-001>]

#### Imported From

<http://purl.obolibrary.org/obo/bfo/2020/bfo.owl>

### 9.1.14 BFO\_0000035 - process boundary

**Label**

process boundary

**Definition**

P is a process boundary =Def. p is a temporal part of a process & p has no proper temporal parts. (axiom label in BFO2 Reference: [084-001]) [has axiom label: <http://purl.obolibrary.org/obo/bfo/axiom/084-001>]

**Imported From**

<http://purl.obolibrary.org/obo/bfo/2020/bfo.owl>

### 9.1.15 BFO\_0000038 - one-dimensional temporal region

**Label**

one-dimensional temporal region

**Definition**

A one-dimensional temporal region is a temporal region that is extended. (axiom label in BFO2 Reference: [103-001])

**Imported From**

<http://purl.obolibrary.org/obo/bfo/2020/bfo.owl>

### 9.1.16 BFO\_0000040 - material entity

**Label**

material entity

**Definition**

A material entity is an independent continuant that has some portion of matter as proper or improper continuant part. (axiom label in BFO2 Reference: [019-002])

**Example**

an energy wave

an aggregate of human beings.

a photon

a tornado

a flame

a human being

a hurricane

the undetached arm of a human being

an epidemic

a sea wave

a puff of smoke

a forest fire

**Editor's note**

BFO 2 Reference: 'Matter' is intended to encompass both mass and energy (we will address the ontological treatment of portions of energy in a later version of BFO). A portion of matter is anything that includes elementary particles among its proper or improper parts: quarks and leptons, including electrons, as the smallest particles thus far discovered; baryons (including protons and neutrons) at a higher level of granularity; atoms and molecules at still higher levels, forming the cells, organs, organisms and other material entities studied by biologists, the portions of rock studied by geologists, the fossils studied by paleontologists, and so on. Material entities are three-dimensional entities (entities extended in three spatial dimensions), as contrasted with the processes in which they participate, which are four-dimensional entities (entities extended also along the dimension of time). According to the FMA, material entities may have immaterial entities as parts – including the entities identified below as sites; for example the interior (or 'lumen') of your small intestine is a part of your body. BFO 2.0 embodies a decision to follow the FMA here.

BFO 2 Reference: Material entities (continuant) can preserve their identity even while gaining and losing material parts. Continuant are contrasted with occurrents, which unfold themselves in successive temporal parts or phases [60]

BFO 2 Reference: Object, Fiat Object Part and Object Aggregate are not intended to be exhaustive of Material Entity. Users are invited to propose new subcategories of Material Entity.

#### Imported From

<http://purl.obolibrary.org/obo/bfo/2019-08-26/bfo.owl>

### 9.1.17 BFO\_0000141 - immaterial entity

#### Label

immaterial entity

#### Definition

An immaterial entity is the boundary or interior of a material entity

#### Editor's note

BFO 2 Reference: Immaterial entities are divided into two subgroups: boundaries and sites, which bound, or are demarcated in relation, to material entities, and which can thus change location, shape and size and as their material hosts move or change shape or size (for example: your nasal passage; the hold of a ship; the boundary of Wales (which moves with the rotation of the Earth) [38, 7, 10

#### Imported From

<http://purl.obolibrary.org/obo/bfo/2019-08-26/bfo.owl>

### 9.1.18 BFO\_0000148 - zero-dimensional temporal region

#### Label

zero-dimensional temporal region

#### Definition

A temporal region of no duration.

**Imported From**

<http://purl.obolibrary.org/obo/bfo/2020/bfo.owl>

### 9.1.19 IAO\_0000030 - information content entity

**Label**

information content entity

**Definition**

A generically dependent continuant that is about some thing.

**Definition source**

OBI\_0000142

**Example**

Examples of information content entites include journal articles, data, graphical layouts, and graphs.

**Editor's note**

2014-03-10: The use of “thing” is intended to be general enough to include universals and configurations (see <https://groups.google.com/d/msg/information-ontology/GBxvYZCk1oc/-L6B5fSBBTQJ>).

information\_content\_entity 'is\_encoded\_in' some digital\_entity in obi before split (040907). information\_content\_entity 'is\_encoded\_in' some physical\_document in obi before split (040907).

Previous. An information content entity is a non-realizable information entity that 'is encoded in' some digital or physical entity.

**Imported From**

<http://purl.obolibrary.org/obo/iao/2020-12-09/iao.owl>

**Term editor**

PERSON: Chris Stoeckert

### 9.1.20 IAO\_0000422 - postal address

**Label**

postal address

**Definition**

A textual entity that is used as directive to deliver something to a person, or organization

**Editor's note**

2010-05-24 Alan Ruttenberg. Use label for the string representation. See issue <https://github.com/information-artifact-ontology/IAO/issues/59>

**Imported From**

<http://purl.obolibrary.org/obo/iao/2017-03-24/iao.owl>

### 9.1.21 IAO\_0000429 - email address

**Label**

email address

**Definition**

A designation used to deliver email to a recipient. Typically has an associated email representation

**Editor's note**

Alan Ruttenberg 1/3/2012 - Provisional id, see issue at <https://github.com/information-artifact-ontology/IAO/issues/130&thanks=130&ts=1325636583>

**Imported From**

<http://purl.obolibrary.org/obo/iao/2017-03-24/iao.owl>

**Term editor**

Person:Chris Stoeckart

Person:Alan Ruttenberg

### 9.1.22 IAO\_0000578 - centrally registered identifier

**Label**

centrally registered identifier

**Alternate name**

CRID

**Definition**

An information content entity that consists of a CRID symbol and additional information about the CRID registry to which it belongs.

**Definition source**

Original proposal from Bjoern, discussions at IAO calls

**Example**

The sentence “The article has Pubmed ID 12345.” contains a CRID that has two parts: one part is the CRID symbol, which is ‘12345’; the other part denotes the CRID registry, which is Pubmed.

**Editor’s note**

Alan, IAO call 20101124: potentially the CRID denotes the instance it was associated with during creation.

Note, IAO call 20101124: URIs are not always CRID, as not centrally registered. We acknowledge that CRID is a subset of a larger identifier class, but this subset fulfills our current needs. OBI PURLs are CRID as they are registered with OCLC. UPCs (Universal Product Codes from AC Nielsen) are not CRID as they are not centrally registered.



2014-05-05: In defining this term we take no position on what the CRID denotes. In particular do not assume it denotes a *record* in the CRID registry (since the registry might not have ‘records’).

**Imported From**

<http://purl.obolibrary.org/obo/iao/ido/release/2021-02-19/ido.owl>

**Term editor**

PERSON: Melanie Courtot

PERSON: Alan Ruttenberg

PERSON: Bjoern Peters

PERSON: Bill Hogan

### 9.1.23 IAO\_0020000 - identifier

**Label**

identifier

**Definition**

An identifier is an information content entity that is the outcome of a dubbing process and is used to refer to one instance of entity shared by a group of people to refer to that individual entity.

**Imported From**

<http://purl.obolibrary.org/obo/iao/ido/release/2021-02-19/ido.owl>

### 9.1.24 IAO\_0022003 - crossref funder identifier

**Label**

crossref funder identifier

**Definition**

An identifier assigned by CrossRef to an organization which has funded a project resulting in a published work

**Example**

The CrossRef ID for the University of Florida is 100007698. When authors cite the university as a funder of their work, CrossRef uses this number to identify the university

**Imported From**

<http://purl.obolibrary.org/obo/iao/ido/release/2021-02-19/ido.owl>

**Term editor**

PERSON: Michael Conlon

### 9.1.25 IAO\_0022006 - dbpedia identifier

**Label**

dbpedia identifier

**Definition**

A URL used by DBpedia to identify an entity

**Definition source**

<https://dbpedia.org>

**Example**

The DBpedia URL for the football player Cristiano Ronaldo is [http://dbpedia.org/resource/Cristiano\\_Ronaldo](http://dbpedia.org/resource/Cristiano_Ronaldo)

**Editor's note**

clarify

**Imported From**

<http://purl.obolibrary.org/obo/iao/ido/release/2021-02-19/ido.owl>

**Term editor**

PERSON: Michael Conlon

### 9.1.26 IAO\_0022010 - global research organization identifier

**Label**

global research organization identifier

**Definition**

An identifier assigned and managed by Digital Science for the purpose of denoting research organizations

**Definition source**

<https://grid.ac>

**Example**

The ISBN-13 for Native Son, by Richard Wright, Harper Perennial, Reissued 2005 is 978-0-06-083756-3

**Imported From**

<http://purl.obolibrary.org/obo/iao/ido/release/2021-02-19/ido.owl>

**Term editor**

PERSON: Michael Conlon

### 9.1.27 IAO\_0022014 - international standard name identifier

**Label**

international standard name identifier

**Definition**

An identifier for persons and organizations which may be assigned by matching algorithms based on records provided by publishers

**Definition source**

<https://isni.org/page/what-is-isni/>

**Editor's note**

spell out

**Imported From**

<http://purl.obolibrary.org/obo/iao/ido/release/2021-02-19/ido.owl>

**Term editor**

PERSON: Michael Conlon

### 9.1.28 IAO\_0022022 - research organization registry identifier

**Label**

research organization registry identifier

**Definition**

An identifier assigned by ROR to research organizations in the world

**Definition source**

<http://ror.org>

**Imported From**

<http://purl.obolibrary.org/obo/iao/ido/release/2021-02-19/ido.owl>

**Term editor**

PERSON: Michael Conlon

### 9.1.29 IAO\_0022027 - wikidata q number

**Label**

wikidata q number

**Definition**

QID (or Q number) is the unique identifier of a data item on Wikidata, comprising the letter “Q” followed by one or more digits.

**Definition source**

<https://www.wikidata.org/wiki/Q43649390>

**Imported From**

<http://purl.obolibrary.org/obo/iao/ido/release/2021-02-19/ido.owl>

**Term editor**

PERSON: Michael Conlon

### 9.1.30 IAO\_0022057 - ringgold identifier

**Label**

ringgold identifier

**Definition**

The Ringgold Identifier is a unique numerical identifier applied to organizations in the scholarly supply chain

**Definition source**

<https://www.ringgold.com/ringgold-identifier/>

**Imported From**

<http://purl.obolibrary.org/obo/iao/ido/release/2021-02-19/ido.owl>

**Term editor**

PERSON: Michael Conlon

### 9.1.31 NCBITaxon\_9606 - Homo sapiens

**Label**

Homo sapiens

**Alternate name**

human being

human

**Definition**

The species of bipedal primates to which modern humans belong

**Imported From**

<http://purl.obolibrary.org/obo/obi/2021-04-06/obi.owl>

**9.1.32 ORG\_0000001 - organization****Label**

organization

**Definition**

A group of people recognized as such by people outside the group.

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

A political party, a homeowners association, a football team, a publisher, a government agency, an organized religion

**Similar term in VIVO 1 Ontology**

<http://xmlns.com/foaf/0.1/Organization>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.33 ORG\_0000002 - government organization

**Label**

government organization

**Alternate name**

government

**Definition**

An organization which is the body of persons that constitutes the governing authority of a political unit

**Definition source**

<https://www.merriam-webster.com/dictionary/government>

**Example**

The State of Florida is recognized as a government organization by the United States. The government of the United States is recognized by other governments. Note there is no “part of” relationship here. Each is a government organization.

**Similar term in VIVO 1 Ontology**

<http://vivoweb.org/ontology/core#GovernmentAgency>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>



### 9.1.34 ORG\_0000003 - company

**Label**

company

**Definition**

A legal entity of associated persons created for a specific purpose, typically commercial, in which excess revenue may be distributed to the company's owners.

**Definition source**

See <https://www.merriam-webster.com/dictionary/company>

**Example**

BASF, The University of Phoenix, Facebook, Elsevier, Apple, Google, Amazon

**Similar term in VIVO 1 Ontology**

<http://vivoweb.org/ontology/core#Company>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.35 ORG\_0000004 - nonprofit organization

**Label**

nonprofit organization

**Alternate name**

not for profit

**Definition**

A legal entity of associated persons created for a specific purpose, typically a mission, in which excess revenue is reinvested to serve the entity's mission

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Doctors Without Borders, Duke University, The American Medical Association

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.36 ORG\_0000005 - informal organization

**Label**

informal organization

**Definition**

A group of people recognized as such by people outside the group. Without legal standing.

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

A student club, a university committee, the VIVO Ontology Interest Group

**Editor's note**

There are many names associated with informal organizations, such as club, group, party, team, cell, task force,

work group, interest group, meeting, roundtable, . So far dispositions and qualities that would distinguish the entities with various names have not been formulated.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.37 ORG\_0000006 - organization part

**Label**

organization part

**Definition**

An organization which exists as part of another organization. Implies a part\_of relationship to another organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The US Navy is an organizational part of the US Department of Defense. The History Department is an organizational part of its college

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.38 ORG\_0000007 - university disposition

**Label**

university disposition

**Definition**

A disposition to award academic degrees and conduct research in a variety of academic disciplines

**Definition source**

<https://en.wikipedia.org/wiki/University>

**Example**

The University of Bologna is an organization that has a university disposition

**Editor's note**

Some dispositions may well be functions – the organization does not exist without it.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.39 ORG\_0000008 - association disposition

**Label**

association disposition

**Alternate name**

professional society

**Definition**

A disposition to organize organizations or individuals along and industry or academic lines

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The American Medical Association; The AFL-CIO; The Institution of Railway Signal Engineers

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.40 ORG\_0000009 - consortium disposition

**Label**

consortium disposition

**Definition**

A disposition to organize organizations along industry or academic lines

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The Association of Research Libraries; The NIH Common Fund Metabolomics Consortium

**Editor's note**

The word “association” in english may mean many different things. Often consortiums have the word “association” in their title.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.41 ORG\_0000010 - service provider disposition

**Label**

service provider disposition

**Definition**

A disposition to provide service with or without a fee

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

A hospital has a service provider disposition to provide medical services to patients

**Editor's note**

We can expect to have many types of service provider dispositions

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.42 ORG\_0000011 - laboratory service provider disposition

**Label**

laboratory service provider disposition

**Definition**

A disposition to provide laboratory services. In the US, organization parts in universities that have a disposition to provide laboratory services to others are called core laboratories

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The Interdisciplinary Center for Biotechnology Research is a part of the university with a disposition to offer laboratory services to others

**Editor's note**

The word “core laboratory” may indicate that an organization has a disposition of laboratory services

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.43 ORG\_0000012 - extension provider disposition

**Label**

extension provider disposition

**Alternate name**

agricultural extension

**Definition**

A disposition to provide extension services, typically in agriculture. Extension provides access to university research findings and advice to agriculturalists.

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Texas A&M Agrilife Extension is a part of the university with a disposition for providing agricultural extension services

**Editor's note**

Extension is most commonly used to describe agricultural extension services.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.44 ORG\_000013 - technology transfer disposition

**Label**

technology transfer disposition

**Alternate name**

technology licensing

tech transfer

**Definition**

A disposition to create licenses for intellectual property for use by these beyond the creators



**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The Duke Office of Licensing and Ventures has a technology transfer disposition

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.45 ORG\_0000014 - philanthropy disposition

**Label**

philanthropy disposition

**Alternate name**

philanthropic

**Definition**

A disposition to donate charitable causes, sometimes in the form of grants involving contracts regarding the use of the donated funds or effort.

**Definition source**

<https://www.dictionary.com/browse/philanthropy>

**Example**

The Wellcome Trust, The Bill and Melinda Gates Foundation, The Sierra Club have dispositions of philanthropy

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.46 ORG\_0000015 - funding disposition

**Label**

funding disposition

**Alternate name**

grantor

**Definition**

A disposition to fund proposals, often is response to a call for proposals by the entity with the funding disposition

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The National Institutes of Health (NIH) and The National Science Foundation (NSF) have funder dispositions

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.47 ORG\_0000016 - health care service provider disposition

**Label**

health care service provider disposition

**Alternate name**

health care provider

**Definition**

A disposition to provider health care to humans

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

A nurse has a disposition to provide health care services

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.48 ORG\_0000017 - hospital service provider disposition

**Label**

hospital service provider disposition

**Alternate name**

hospital

**Definition**

A disposition to provide hospital-based health care services to humans

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Mt. Sinai Hospital in New York has a disposition to provide hospital services

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.49 ORG\_0000018 - archive disposition

**Label**

archive disposition

**Alternate name**

archives

**Definition**

A disposition to collect, store, and provide access to inanimate material entities, and/or information content entities

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The British Museum has a disposition to archive, particularly works of the United Kingdom

**Editor's note**

We might expect to have refinements of this disposition as special cases

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.50 ORG\_0000019 - museum disposition

**Label**

museum disposition

**Definition**

A disposition to collect, store, and provide access to inanimate material entities in a facility

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The National Portrait Gallery is an art museum

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.51 ORG\_0000020 - gallery disposition

**Label**

gallery disposition

**Definition**

A disposition to display collected works from an archive

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The Color Factory in New York City is an art gallery

**Editor's note**

The distinction between an art gallery and an art museum has to do with the temporary nature of displays in galleries, as well as the common practice in galleries to sell art on display

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.52 ORG\_0000021 - publishing disposition

**Label**

publishing disposition

**Definition**

A disposition to publish information content entities

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Random House, Taylor and Francis, The American Psychological Association, The University of California Berkeley has a disposition to publish

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.53 ORG\_0000022 - research disposition

**Label**

research disposition

**Definition**

A disposition to conduct research

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The Max Plank Institute, Northwestern University, CERN (the European Organization for Nuclear Research) have have a disposition to conduct research

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.54 ORG\_0000023 - education disposition

**Label**

education disposition

**Alternate name**

teaching

**Definition**

A disposition to teach, and provide experiential opprtunities for students

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

A pre-school education program, a post-graduate education program, adult education programs all have education dispositions

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.55 ORG\_000024 - training disposition

**Label**

training disposition

**Alternate name**

trainer

**Definition**

A disposition to train, and provide experiential opportunities for trainees

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

A military training program, a flight school training program, a CPR training program all have dispositions to train

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>



### 9.1.56 ORG\_0000025 - research administration disposition

**Label**

research administration disposition

**Definition**

A disposition to provide resources and oversight for those conducting research

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The Office of Research at a university typically does not conduct research, it has a disposition to administer research

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.57 ORG\_0000026 - library disposition

**Label**

library disposition

**Definition**

A disposition to provide library services

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The Library of Congress, the local public library, a university library all have dispositions of library

**Editor's note**

Perhaps a function

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.58 ORG\_000027 - commerce disposition

**Label**

commerce disposition

**Alternate name**

business

**Definition**

A disposition to sell things

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Google, Tesla, General Electric, BASF, AstraZeneca all have a disposition to sell things

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.59 ORG\_0000028 - military disposition

**Label**

military disposition

**Alternate name**

armed forces

**Definition**

A disposition to engage in warfare

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The US Space Force, the Chinese Navy, and the Bolivian Army are example of organizations with military disposition

**Editor's note**

Perhaps a function

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.60 ORG\_0000029 - religious disposition

**Label**

religious disposition

**Alternate name**

church

**Definition**

A disposition to engage in matters of spirituality and faith

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The Catholic Church, a local synagogue, a mosque, a buddhist monestary have a religious disposition

**Editor's note**

Perhaps a function.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.61 ORG\_0000030 - governing disposition

**Label**

governing disposition

**Definition**

A disposition to provide governance

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

A Board of Trustees, A Board of Directors, the Senate of the United States all have governing dispositions

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.62 ORG\_0000031 - manufacturing disposition

**Label**

manufacturing disposition

**Alternate name**

manufacturer

**Definition**

A dispositon to construct material entities

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Volkswagon, Apple, Pfizer, Airbus, BASF, Nestle, and General Electric all have manufacturing dispositions

**Similar term in VIVO 1 Ontology**

[http://purl.obolibrary.org/obo/ERO\\_0000034](http://purl.obolibrary.org/obo/ERO_0000034)

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**See also**

[http://purl.obolibrary.org/obo/OBI\\_0000835](http://purl.obolibrary.org/obo/OBI_0000835)

### 9.1.63 ORG\_0000032 - project team disposition

**Label**

project team disposition

**Alternate name**

team

**Definition**

A disposition to execute and finish a project.

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

A book writing team, a grant writing team, a time-limited work group, and a conference organizing committee all have a project team disposition

**Editor's note**

Organization may be formal or informal.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**9.1.64 ORG\_0000033 - sports disposition****Label**

sports disposition

**Definition**

A disposition to engage in sports activities, typically competitive.

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The University of Alabama mens football team, Manchester United, the Mumbai Indians Cricket Team are all organizations with a disposition of sports

**Editor's note**

Perhaps a function

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.65 ORG\_0000034 - information address quality

**Label**

information address quality

**Definition**

A quality of an address to be used for information inquiries

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Email addresses that begin help@ info@ contact@ often have information address address disposition

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.66 ORG\_0000035 - billing address quality

**Label**

billing address quality

**Definition**

A quality of an address to be used to receive bills

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>



**Example**

Bills may be sent to Attn: Name at

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.67 ORG\_0000036 - shipping address quality

**Label**

shipping address quality

**Alternate name**

delivery address

**Definition**

A quality of an address to be used to receive shipped goods

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The loading dock address for central receiving of an organization

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.68 ORG\_0000037 - preferred address quality

**Label**

preferred address quality

**Definition**

A quality of an address to be displayed in most settings

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The address the organization displays most prominently in promotional materials

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.69 ORG\_0000038 - homepage quality

**Label**

homepage quality

**Definition**

A quality to be the primary website for an entity.

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The home page of Harvard is <https://harvard.edu>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.70 ORG\_0000039 - wikipedia quality

**Label**

wikipedia quality

**Definition**

A quality to be the webpage within WikiPedia regarding the entity

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The Wikipedia page of Harvard is [https://en.wikipedia.org/wiki/Harvard\\_University](https://en.wikipedia.org/wiki/Harvard_University)

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.71 ORG\_0000040 - architectural structure

**Label**

architectural structure

**Alternate name**

bauwerk

**Definition**

A material entity that is a human made structure with firm connection between its foundation and the ground.

**Definition source**

[http://purl.obolibrary.org/obo/OMRSE\\_00000061](http://purl.obolibrary.org/obo/OMRSE_00000061)

**Example**

Yankee Stadium, Stonehenge, The Shard, The Large Hadron Collider. The Great Wall of China

**Editor's note**

Perhaps identical to the term in OMRSE

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**See also**

[http://purl.obolibrary.org/obo/OMRSE\\_00000061](http://purl.obolibrary.org/obo/OMRSE_00000061)

### 9.1.72 ORG\_0000041 - campus

**Label**

campus

**Definition**

The geographic location consisting of the grounds or property of a school, college, university, business, church, or hospital, often understood to include buildings and other structures.

**Definition source**

<https://en.wiktionary.org/wiki/campus>

**Example**

The campus of Oxford University, the campus of Microsoft in Redmond, Washington, the NIH campus in Bethesda, Maryland.

**Similar term in VIVO 1 Ontology**

<http://vivoweb.org/ontology/core#Campus>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.73 ORG\_0000042 - facility

**Label**

facility

**Definition**

An architectural structure that bears some function.

**Definition source**

[http://purl.obolibrary.org/obo/OMRSE\\_00000062](http://purl.obolibrary.org/obo/OMRSE_00000062)

**Example**

Walt Disney World, Kennedy Space Center, Golden Gate Bridge

**Editor's note**

Perhaps identical to the term in OMRSE

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**See also**

[http://purl.obolibrary.org/obo/OMRSE\\_00000062](http://purl.obolibrary.org/obo/OMRSE_00000062)

### 9.1.74 ORG\_0000043 - building

**Label**

building

**Definition**

A permanent walled and roofed construction

**Definition source**

<https://en.wikipedia.org/wiki/Building>

**Example**

The Pentagon, The Leaning Tower of Pisa, The Gherkin, The Coliseum

**Editor's note**

Similar to the term in ENVRO, but based on 'architectural structure' in OMRSE

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**See also**

[http://purl.obolibrary.org/obo/ENVO\\_00000073](http://purl.obolibrary.org/obo/ENVO_00000073)

## 9.1.75 ORG\_0000044 - room

**Label**

room

**Definition**

A space contained by a partitioned part of the inside of a building. Often has an identifier.

**Definition source**

<https://www.merriam-webster.com/dictionary/room>

**Example**

The Oval Office is a room in the White House. A classroom, a locker room, a bedroom, a kitchen are all rooms.

**Editor's note**

A room is not a structure. It is a space inside a structure.

**Similar term in VIVO 1 Ontology**

<http://vivoweb.org/ontology/core#Room>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.76 ORG\_0000045 - geographic region

**Label**

geographic region

**Definition**

A place on the earth. Not necessarily contiguous

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The Indian Ocean, Africa, Metropolitan France, West 57th Street

**Editor's note**

1. Geographical locations are often confused with the entities that are located in those places. For example, France is a country with several discontinuous geographical locations. Metropolitan France is a geographical location in Europe.
2. Unlike the GAZ term, this term is not a reference to a place on the earth, rather it is a place on the earth.

**Similar term in VIVO 1 Ontology**

<http://vivoweb.org/ontology/core#GeographicRegion>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>



**See also**

[http://purl.obolibrary.org/obo/GAZ\\_00000448](http://purl.obolibrary.org/obo/GAZ_00000448)

**9.1.77 ORG\_0000046 - geographic point****Label**

geographic point

**Alternate name**

latlong

**Definition**

A point located on the earth

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The point with latitude 27.9881199 and longitude 86.9161989

**Editor's note**

1. Since a point is smaller than a building, we say the point is located in a building. The building is the location of the point.
2. Typically use ORG\_0000004 to provide a lat/long value for the point.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.78 ORG\_0000047 - continent

**Label**

continent

**Definition**

One of the main landmasses of the globe, usually reckoned as seven in number (Europe, Asia, Africa, North America, South America, Australia, and Antarctica).

**Definition source**

<https://www.dictionary.com/browse/continent>

**Example**

Asia, Europe, Antarctica, North America, South America, Africa, and Oceania are the continents

**Editor's note**

Should define 7 named individuals and then this class is explicitly defined

**Similar term in VIVO 1 Ontology**

<http://vivoweb.org/ontology/core#Continent>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.79 ORG\_0000048 - country

**Label**

country

**Definition**

The territory governed by a sovereign state.

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Canada, Ecuador, Slovakia, Namibia, Pakistan, New Zealand are all countries

**Editor's note**

This term is about the territory, not the geopolitical entity of the same name.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

## 9.1.80 ORG\_0000049 - region

**Label**

region

**Definition**

A subdivision of the territory of a country

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

US states, counties, Canadian Provinces, US Zip codes, US SMSAs, US time zone territories are all examples of regions.

**Editor's note**

This term is about the territory, not its governance. It could be subclassed to define various types of regions – census tracts, zip codes, and others.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.81 ORG\_0000050 - populated place

**Label**

populated place

**Definition**

A named place on the earth occupied by people

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Tokyo Japan, Eustis Florida, Podgorica Montenegro, and Stevenage United Kingdom are all populated places.

**Editor's note**

There is wide variation in the applicaton of this term.

**Similar term in VIVO 1 Ontology**

<http://vivoweb.org/ontology/core#PopulatedPlace>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.82 ORG\_0000051 - founding process

**Label**

founding process

**Definition**

The process by which the organization was founded

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The United States government was founded by the constitutional convention process of 1787 resulting in a ratified constitution in 1790

**Editor's note**

The founding process might be a subproperty of a generic creation process if such a process ever appears at a higher level in the ontologies

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.83 ORG\_0000052 - founding process boundary

**Label**

founding process boundary

**Alternate name**

founding

**Definition**

The process boundary which defines the moment of creation of an organization. Before the moment the organization does not exist. After the moment, the organization exists.

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The University of Bologna was founded in 1088. Facebook was founded in 2004.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.84 ORG\_0000053 - dissolution process

**Label**

dissolution process

**Definition**

The process by which an organization no longer exists.

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The German Democratic Republic (aka East Germany) ended in 1990.

**Editor's note**

There are many dissolution processes (merger, acquisition, discontinuation). These can be added at a later date if needed.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.85 ORG\_0000054 - dissolution process boundary

**Label**

dissolution process boundary

**Alternate name**

dissolution

**Definition**

The process boundary which marks the moment at which the organization no longer exists

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Duraspace ceased to exist on July 1, 2019

**Editor's note**

The dissolution process may have many steps and boundaries, such as ceasing operations, transfer of funds, dissolution of board. These can be added at a later date if needed.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.86 ORG\_0000055 - succession process

**Label**

succession process

**Definition**

The process by which one organization goes out of existence and is succeeded by a new organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The Central People's Government of the People's Republic of China was proclaimed by Mao Zedong on October 1, 1949 at 3PM replacing the government of the Republic of China.

**Editor's note**

The succession process typically has founding and dissolution processes as occurrent parts

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>



### 9.1.87 ORG\_0000056 - succession process boundary

**Label**

succession process boundary

**Definition**

The process boundary within a succession process. Complex succession processes may have many boundaries.

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

East Timor became a formally independent country on 20 May 2002

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.88 ORG\_0000057 - web site

**Label**

web site

**Definition**

The information content entity consisting of a group of World Wide Web pages usually containing hyperlinks to each other and made available online by an individual, company, educational institution, government, or organization

**Definition source**

<https://www.merriam-webster.com/dictionary/website>

**Example**

Facebook and Google have prominent web sites.

**Similar term in VIVO 1 Ontology**

<http://www.w3.org/2006/vcard/ns#URL>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.89 ORG\_0000058 - spin-off process

**Label**

spin-off process

**Definition**

The process by which one organization spins off of another

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Google is the output of a spin-off process in which Stanford University was a participant

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.90 ORG\_0000059 - spin-off process boundary

**Label**

spin-off process boundary

**Definition**

The boundary of a spin-off process

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Spin-off process boundaries include moments such as incorporation, board formation, funding acquisition, and patent licensing

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.91 ORG\_0000060 - organizational membership

**Label**

organizational membership

**Definition**

The asymmetric relationship involving two organizations in which one is a member of the other

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Texas A&M University is an organizational member of the Association of Public and Land Grant Universities

**Editor's note**

Organizational Membership is a Membership, which is a Relationship, which is an Occurrent. The subsumption is out of scope for the Organizationa Ontology. The existence of a membership implies the existence of a membership creation process and a membership creation process boundary. These are currently out of scope for the Organization Ontology

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.92 ORG\_0000061 - organizational member role

**Label**

organizational member role

**Alternate name**

member

**Definition**

The role of an organization in being a member of another

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The University of aToronto has organizational membership role which is realized in a membership granted by the American Association of Universities

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**9.1.93 ORG\_0000062 - organizational member grantor role****Label**

organizational member grantor role

**Definition**

The role of an organization in granting a member role to another

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Most membership organizations grant their memberships to their members

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**9.1.94 ORG\_0000063 - student led organization quality****Label**

student led organization quality

**Definition**

The quality of an organization that is led by a student

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The student chess club, the student data science club, the student newspaper may all be student-led organizations

**Editor's note**

Student-led organizations may be formal or informal

**Similar term in VIVO 1 Ontology**

<http://vivoweb.org/ontology/core#StudentOrganization>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.95 ORG\_0000064 - woman led organization quality

**Label**

woman led organization quality

**Definition**

The quality of an organization that is led by a woman

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

As of 2021, The Office of the Vice President of the United States, and the Federal Government of Germany are women-led organizations

**Editor's note**

In some jurisdictions, such as the US, counting women-led organizations is important

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.96 ORG\_0000065 - minority led organization quality

**Label**

minority led organization quality

**Definition**

The quality of an organization that is led by a designated minority

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

From 2008-2016, the Office of the President of the United States was a minority-led organization

**Editor's note**

In some jurisdictions, such as the US, counting minority-led organizations is important

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.97 ORG\_0000066 - registered address quality

**Label**

registered address quality

**Definition**

The quality of a location that is the legal/registered location for the organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The legal registered location for Google is Mountain View, California

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.98 ORG\_0000067 - primary address quality

**Label**

primary address quality

**Definition**

The quality of a location that is the primary/preferred location for the organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>



**Example**

The primary site for Microsoft is Redmond, Washington

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

## 9.1.99 ORG\_0000068 - organizational position

**Label**

organizational position

**Alternate name**

post

**Definition**

The asymmetric relationship between an organization and a person in which a person has a role in the position, as does the organization.

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

A university may have a position of chancellor, which is then filled by a person

**Editor's note**

The organization and the person in the position relationship each have roles with respect to the position relationship

**Similar term in VIVO 1 Ontology**

<http://vivoweb.org/ontology/core#Position>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.100 ORG\_0000069 - organizational employee role

**Label**

organizational employee role

**Definition**

The role of a person to be an employee of an organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Walt Disney was an employee of the United States Post Office

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.101 ORG\_0000070 - organizational employer role

**Label**

organizational employer role

**Definition**

The role of an organization to employ a person

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

McDonalds once employed Jeff Bezos

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.102 ORG\_0000071 - organizational associate role

**Label**

organizational associate role

**Definition**

The role of a person to be an associate of an organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Bill Gates is an associate of Microsoft, even though he is no longer employed there

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.103 ORG\_0000072 - organizational associate grantor role

**Label**

organizational associate grantor role

**Definition**

The role of an organization to grant associate status to a person

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

A university may grant various forms of associate status to people who are not formally associated with the university

**Editor's note**

This is a role of an organization, not a person within the organization

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.104 ORG\_0000073 - organizational head role

**Label**

organizational head role

**Definition**

The role of a person to be the head of an organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Joey Wat is the head of Yum China

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.105 ORG\_0000074 - organizational head grantor role

**Label**

organizational head grantor role

**Definition**

The role of an organization to grant head status to a person

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The board of trustees of a company often grants the head of role

**Editor's note**

This is a role of an organization, not a person within the organization

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.106 ORG\_0000075 - organizational appointee role

**Label**

organizational appointee role

**Definition**

The role of a person to be an appointee of an organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Jorge Mario Bergoglio was appointed to the position Pope by the papal conclave of the College of Cardinals of the Catholic Church in 2013

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.107 ORG\_0000076 - organizational appointee grantor role

**Label**

organizational appointee grantor role

**Definition**

The role of an organization to grant appointee status to a person

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The members of a chess club may elect one of their members to serve as secretary

**Editor's note**

This is a role of an organization, not a person within the organization

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.108 ORG\_0000077 - organizational volunteer role

**Label**

organizational volunteer role

**Definition**

The role of a person to be a volunteer of an organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Lillian Carter, the mother of US president Jimmy Carter, served as a peace corps volunteer in India

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.109 ORG\_0000078 - organizational volunteer grantor role

**Label**

organizational volunteer grantor role

**Definition**

The role of an organization to grant volunteer status to a person

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

A hospital has a volunteer grantor role with respect to those persons who volunteer at the hospital

**Editor's note**

This is a role of an organization, not a person within the organization

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.110 ORG\_0000079 - airline disposition

**Label**

airline disposition

**Definition**

The disposition of an organization that operates airplanes carrying freight or passengers



**Definition source**

<https://www.ahdictionary.com/word/search.html?q=airline>

**Example**

Delta, Lufthanza, and Aeroflot all have airline disposition

**Editor's note**

Added for completeness with schema.org

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.111 ORG\_0000080 - media disposition

**Label**

media disposition

**Definition**

The disposition of an organization that creates, transmits, and/or licenses live or recorded material for viewing by others

**Definition source**

<https://www.macmillandictionary.com/dictionary/british/media-organization>

**Example**

NBC, BBC, CNN, EFE News Agency and the Japan Times all have media dispositions

**Editor's note**

Added for completeness with schema.org

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.112 ORG\_0000081 - performing disposition

**Label**

performing disposition

**Definition**

The disposition of an organization to perform live or recorded music, theatre, or dance

**Definition source**

[https://en.wikipedia.org/wiki/Performing\\_arts](https://en.wikipedia.org/wiki/Performing_arts)

**Example**

The Bolshoi Ballet, the Royal Shakespeare Company, the local community theater, the Metropolitan Opera are all organizations with performing disposition

**Editor's note**

Added for completeness with schema.org

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.113 ORG\_0000082 - labor union disposition

**Label**

labor union disposition

**Alternate name**

workers union

trade union

**Definition**

The disposition of an organization to organize workers for the purpose of negotiations with employers of the workers

**Definition source**

<https://duckduckgo.com/?t=ffab&q=labor+union&ia=web>

**Example**

All-China Federation of Trade Unions (ACFTU), the Congress of South African Trade Unions (COSATU) and the General Confederation of Labor (CGT) in France are all organizations with disposition of labor union.

**Editor's note**

Added for completeness with schema.org

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.114 ORG\_0000083 - person membership

**Label**

person membership

**Definition**

The asymmetric relationship representing a person's membership in an organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 9.1.115 ORG\_0000084 - person member role

**Label**

person member role

**Definition**

The role of a person to be a member of an organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

George Harrison had a person member role with respect to The Beatles

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**9.1.116 ORG\_0000085 - person member grantor role****Label**

person member grantor role

**Definition**

The role of an organization to grant membership to a person

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Professional societies have a grantor role with respect to their members

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**9.1.117 Concept - concept (skos)****Label**

concept (skos)

**Definition**

An idea or notion, a unit of thought

### Editor's note

Minor hijack here. We added the subClassOf assertion to tie in to the BFO subsumption hierarchy rather than adding a new term for 'concept' Concept as a generic dependent continuant seems right – the concept is dependent on the collective of humans. Thought is in human brains. We also edited the label adding (skos) to insure unique labels as required by the OBO Principles. MC.

## 9.1.118 Instant - time instant

### Label

time instant

### Definition

A zero-dimensional part of time. Precision may specify a range. Represented by xsd datetime string

### Imported From

<http://www.w3.org/2006/time#2016>

## 9.1.119 TemporalUnit - temporal unit

### Label

temporal unit

### Definition

A specification of a time duration. Used to specify precision of time instants

### Imported From

<http://www.w3.org/2006/time#2016>

## OBJECT PROPERTIES

Object properties relate one entity to another (not one class to another) [Harmse2018]. For example, an organization may be “part of” another organization. “part of” is an object property that describes the relations between the two individual organizations.

Basic Formal Ontology (BFO) uses the [Relation Ontology \(RO\)](#) to define object properties.

Each object property can have a domain and a range. When we say property  $p$  has domain  $D$ , we mean that all triples of the form  $x P y$ ,  $x$  is a  $D$ . When we say property  $p$  has range  $R$ , we mean that in all triples of the form  $x P y$ ,  $y$  is an  $R$ .

For example, if we define an object property “author\_of”, we might define the domain to be “Person” and the range to be “Information Content Entity”. If we write  $x$  author\_of  $y$ , we know  $x$  is a Person and  $y$  is an Information Content Entity.<sup>1</sup>

### 10.1 Common Object Properties

Some object properties are quite common in the representation of scholarship. Many representations involve the use of identifiers. People, publications, organizations and other entities may be “denoted\_by” an identifier. We assert, for example,:

```
x a Person
y a ORCID
x denoted_by y
```

“denoted\_by” has an *inverse property* “denotes.” If  $x$  is denoted\_by  $y$ , then  $y$  denotes  $x$ . We could write the above as:

```
x a Person
y a ORCID
y denotes x
```

See [Table 14 Terms used to represent locations](#). The pattern *entity1 bearer\_of role; role realized\_in process; process has\_output entity2* is quite common and describes the role *entity1* had through a process in the creation of *entity2*. Each of these properties has an inverse, so we could assert equivalently, *entity2 output\_of process; process realizes role; role inheres in entity1*.

---

<sup>1</sup> Are these the correct domain and range for such a property? Discuss.

Table 1: Table 15 Common Object Properties

| Property    | Label       | Notes                                         |
|-------------|-------------|-----------------------------------------------|
| BFO_0000050 | part of     | An entity is part of another entity           |
| BFO_0000051 | has part    | Inverse of part of                            |
| IAO_0000219 | denotes     | The relation between an identifier and entity |
| IAO_0000235 | denoted by  | Inverse of denotes                            |
| RO_0000053  | bearer of   | relation between a dependent and its bearer   |
| RO_0000052  | inheres in  | The inverse of bearer of                      |
| BFO_0000055 | realizes    | A process realizes a role                     |
| BFO_0000054 | realized in | A role is realized in a process               |
| RO_0002234  | has output  | An occurrent has a continuant as an output    |
| RO_0002353  | output of   | A continuant is the output of an occurrent    |
| RO_0000086  | has quality | An entity has another entity as a quality     |
| RO_0000080  | quality of  | An entity is a quality of another entity      |

## 10.2 All Object Properties

See Table 7.

Table 2: Table 7 Object Properties

| Term ID - Label                  | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>BFO_0000050 - part of</i>     | A core relation that holds between a part and its whole                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>BFO_0000051 - has part</i>    | A core relation that holds between a whole and its part                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>BFO_0000054 - realized in</i> | A relation between a realizable entity and a process, where there is some material entity that is bearer of the realizable entity and participates in the process, and the realizable entity comes to be realized in the course of the process                                                                                                                                                                                                             |
| <i>BFO_0000055 - realizes</i>    | A relation between a process and a realizable entity, where there is some material entity that is bearer of the realizable entity and participates in the process, and the realizable entity comes to be realized in the course of the process                                                                                                                                                                                                             |
| <i>IAO_0000136 - is about</i>    | A (currently) primitive relation that relates an information artifact to an entity.                                                                                                                                                                                                                                                                                                                                                                        |
| <i>IAO_0000219 - denotes</i>     | A primitive, instance-level, relation obtaining between an information content entity and some portion of reality. Denotation is what happens when someone creates an information content entity E in order to specifically refer to something. The only relation between E and the thing is that E can be used to 'pick out' the thing. This relation connects those two together. Freedictionary.com sense 3: To signify directly; refer to specifically |

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Table 2 – continued from previous page

| Term ID - Label                                   | Definition                                                                                                                                                                |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>IAO_0000235 - denoted by</i>                   | Inverse of the relation ‘denotes’                                                                                                                                         |
| <i>ORG_2000001 - occupies</i>                     | The property that associates an organization occupies a geographical location is it has one of more people at the location, or has legal rights to the location           |
| <i>ORG_2000002 - has occurent part</i>            | The property that associates an occurent which has an occurent part wholly contained within it                                                                            |
| <i>ORG_2000003 - has time instant</i>             | The property that associates a process boundary with the time instant at which the process boundary occurs                                                                |
| <i>ORG_2000004 - has organizational interest</i>  | The property that associates an organization with a concept that the organization manifests in its work                                                                   |
| <i>ORG_2000005 - has website</i>                  | The property that associates an organization with its website                                                                                                             |
| <i>ORG_2000006 - website of</i>                   | The property that associates a website with its organization                                                                                                              |
| <i>ORG_2000007 - has successor organization</i>   | The property that associates an organization with the organization that succeeds it. The preceeding organization ceases to exist, the successor is brought into existence |
| <i>ORG_2000008 - successor organization of</i>    | The property that associates an on organization with the organization that preceeded it                                                                                   |
| <i>ORG_2000009 - has organizational part</i>      | The property that associates an organization with one of its organizational parts                                                                                         |
| <i>ORG_2000010 - organizational part of</i>       | The property that associates an organization part with the organization of which it is a part                                                                             |
| <i>ORG_2000011 - affiliated with</i>              | The property that associates an organization with another organization that is not an organizational part associatiion                                                    |
| <i>ORG_2000012 - has spin-off organization</i>    | The property that associates an organization with a part that is now independent                                                                                          |
| <i>ORG_2000013 - spin-off organization of</i>     | The property that associates an organization with an organization of which it was formerly a part                                                                         |
| <i>ORG_2000014 - has organizational member</i>    | The property that associates an organization with one of its members                                                                                                      |
| <i>ORG_2000015 - organizational member of</i>     | The property that associates a member organizaiton with the organization of which it is a member                                                                          |
| <i>ORG_2000016 - has organizational employee</i>  | The property that associates an organization with an employee of the organization                                                                                         |
| <i>ORG_2000017 - organizational employee of</i>   | The property that associates a person with the organization of which that person is an employee                                                                           |
| <i>ORG_2000018 - has organizational associate</i> | The property that associates an organization with a person who is associated with the organization                                                                        |
| <i>ORG_2000019 - organizational associate of</i>  | The property that associates a person with an organization with which they are associated                                                                                 |
| <i>ORG_2000020 - has organizational head</i>      | The property that associates an organization with the person who is the head of the organization                                                                          |
| <i>ORG_2000021 - organizational head of</i>       | The property that associates a person with an organization which they are head of                                                                                         |

continues on next page

Table 2 – continued from previous page

| Term ID - Label                                   | Definition                                                                                                                                                                                     |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>ORG_2000022 - has organizational volunteer</i> | The property that associates an organization with a person who volunteers for the organization                                                                                                 |
| <i>ORG_2000023 - organizational volunteer of</i>  | The property that associates a person with an organization for which they volunteer                                                                                                            |
| <i>ORG_2000024 - has organizational appointee</i> | The property that associates an organization with a person who is appointed by the organization to some post or position within the organization                                               |
| <i>ORG_2000025 - organizational appointee of</i>  | The property that associates a person with the organization which has appointed the person to some post or position within the organization                                                    |
| <i>ORG_2000026 - has person member</i>            | The property that associates an organization with a person who is a member of the organization                                                                                                 |
| <i>ORG_2000027 - person member of</i>             | The property that associates a person with an organization of which the person is a member                                                                                                     |
| <i>RO_0000052 - inheres in</i>                    | A relation between a specifically dependent continuant (the dependent) and an independent continuant (the bearer), in which the dependent specifically depends on the bearer for its existence |
| <i>RO_0000053 - bearer of</i>                     | A relation between an independent continuant (the bearer) and a specifically dependent continuant (the dependent), in which the dependent specifically depends on the bearer for its existence |
| <i>RO_0000056 - participates in</i>               | A relation between a continuant and a process, in which the continuant is somehow involved in the process                                                                                      |
| <i>RO_0000057 - has participant</i>               | A relation between a process and a continuant, in which the continuant is somehow involved in the process                                                                                      |
| <i>RO_0000080 - quality of</i>                    | A relation between a quality and an independent continuant (the bearer), in which the quality specifically depends on the bearer for its existence                                             |
| <i>RO_0000081 - role of</i>                       | A relation between a role and an independent continuant (the bearer), in which the role specifically depends on the bearer for its existence                                                   |
| <i>RO_0000086 - has quality</i>                   | A relation between an independent continuant (the bearer) and a quality, in which the quality specifically depends on the bearer for its existence                                             |
| <i>RO_0000087 - has role</i>                      | A relation between an independent continuant (the bearer) and a role, in which the role specifically depends on the bearer for its existence                                                   |
| <i>RO_0000091 - has disposition</i>               | A relation between an independent continuant (the bearer) and a disposition, in which the disposition specifically depends on the bearer for its existence                                     |
| <i>RO_0000092 - disposition of</i>                | Inverse of has disposition                                                                                                                                                                     |

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Table 2 – continued from previous page

| Term ID - Label                                   | Definition                                                                                                                       |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <i>RO_0001015 - location of</i>                   | A relation between two independent continuants, the location and the target, in which the target is entirely within the location |
| <i>RO_0001025 - located in</i>                    | A relation between two independent continuants, the target and the location, in which the target is entirely within the location |
| <i>RO_0002012 - occurrent part of</i>             | A part of relation that applies only between occurents.                                                                          |
| <i>RO_0002131 - overlaps</i>                      | X overlaps y if and only if there exists some z such that x has part z and z part of y                                           |
| <i>RO_0002234 - has output</i>                    | P has output c iff c is a participant in p, c is present at the end of p, and c is not present at the beginning of p.            |
| <i>RO_0002323 - mereotopologically related to</i> | A mereological relationship or a topological relationship                                                                        |
| <i>RO_0002353 - output of</i>                     | Inverse of has output                                                                                                            |
| <i>unitType - temporal unit type</i>              | An indicator of the temporal precision of a time instant                                                                         |

### 10.2.1 BFO\_0000050 - part of

#### Label

part of

#### Definition

A core relation that holds between a part and its whole

#### Example

my brain is part of my body (continuant parthood, two material entities)

this day is part of this year (occurrent parthood)

my stomach cavity is part of my stomach (continuant parthood, immaterial entity is part of material entity)

#### Editor's note

Parthood requires the part and the whole to have compatible classes: only an occurrent can be part of an occurrent; only a process can be part of a process; only a continuant can be part of a continuant; only an independent continuant can be part of an independent continuant; only an immaterial entity can be part of an immaterial entity; only a specifically dependent continuant can be part of a specifically dependent continuant; only a generically dependent continuant can be part of a generically dependent continuant. (This list is not exhaustive.)

A continuant cannot be part of an occurrent: use ‘participates in’. An occurrent cannot be part of a continuant: use ‘has participant’. A material entity cannot be part of an immaterial entity: use ‘has location’. A specifically dependent continuant cannot be part of an independent continuant: use ‘inheres in’. An independent continuant cannot be part of a specifically dependent continuant: use ‘bearer of’.

Occurrents are not subject to change and so parthood between occurrents holds for all the times that the part exists. Many continuants are subject to change, so parthood between continuants will only hold at certain times, but this is difficult to specify in OWL. See <https://code.google.com/p/obo-relations/wiki/ROAndTime>

Everything is part of itself. Any part of any part of a thing is itself part of that thing. Two distinct things cannot be part of each other.

### Imported From

<http://purl.obolibrary.org/obo/ro/releases/2020-12-18/ro.owl>

### See also

<http://ontologydesignpatterns.org/wiki/Submissions:PartOf>

[http://www.obofoundry.org/ro/#OBO\\_REL:part\\_of](http://www.obofoundry.org/ro/#OBO_REL:part_of)

[http://ontologydesignpatterns.org/wiki/Community:Parts\\_and\\_Collections](http://ontologydesignpatterns.org/wiki/Community:Parts_and_Collections)

## 10.2.2 BFO\_0000051 - has part

### Label

has part

### Definition

A core relation that holds between a whole and its part

### Example

my body has part my brain (continuant parthood, two material entities)

my stomach has part my stomach cavity (continuant parthood, material entity has part immaterial entity)

this year has part this day (occurrent parthood)

### Editor’s note

Parthood requires the part and the whole to have compatible classes: only an occurrent have an occurrent as part; only a process can have a process as part; only a continuant can have a continuant as part; only an independent continuant can have an independent continuant as part; only a specifically dependent continuant can have a specifically dependent continuant as part; only a generically dependent continuant can have a generically dependent continuant as part. (This list is not exhaustive.)

A continuant cannot have an occurrent as part: use 'participates in'. An occurrent cannot have a continuant as part: use 'has participant'. An immaterial entity cannot have a material entity as part: use 'location of'. An independent continuant cannot have a specifically dependent continuant as part: use 'bearer of'. A specifically dependent continuant cannot have an independent continuant as part: use 'inheres in'.

Everything has itself as a part. Any part of any part of a thing is itself part of that thing. Two distinct things cannot have each other as a part.

Occurrents are not subject to change and so parthood between occurrents holds for all the times that the part exists. Many continuants are subject to change, so parthood between continuants will only hold at certain times, but this is difficult to specify in OWL. See <https://code.google.com/p/obo-relations/wiki/ROAndTime>

### Imported From

<http://purl.obolibrary.org/obo/ro/releases/2020-12-18/ro.owl>

## 10.2.3 BFO\_0000054 - realized in

### Label

realized in

### Alternate name

is realized by

realized\_in

### Definition

A relation between a realizable entity and a process, where there is some material entity that is bearer of the realizable entity and participates in the process, and the realizable entity comes to be realized in the course of the process

### Example

this investigator role is realized in this investigation

this fragility is realized in this shattering

this disease is realized in this disease course

### Imported From

<http://purl.obolibrary.org/obo/ro/releases/2021-03-08/ro.owl>

## 10.2.4 BFO\_0000055 - realizes

### Label

realizes

### Definition

A relation between a process and a realizable entity, where there is some material entity that is bearer of the realizable entity and participates in the process, and the realizable entity comes to be realized in the course of the process

### Example

this investigation realizes this investigator role

this shattering realizes this fragility

this disease course realizes this disease

### Imported From

<http://purl.obolibrary.org/obo/ro/releases/2021-03-08/ro.owl>

## 10.2.5 IAO\_0000136 - is about

### Label

is about

### Definition

A (currently) primitive relation that relates an information artifact to an entity.

**Definition source**

Smith, Ceusters, Ruttenberg, 2000 years of philosophy

**Example**

This document is about information artifacts and their representations

**Editor's note**

7/6/2009 Alan Ruttenberg. Following discussion with Jonathan Rees, and introduction of “mentions” relation. Weaken the is\_about relationship to be primitive.

We will try to build it back up by elaborating the various subproperties that are more precisely defined.

Some currently missing phenomena that should be considered “about” are predications - “The only person who knows the answer is sitting beside me” , Allegory, Satire, and other literary forms that can be topical without explicitly mentioning the topic.

**Imported From**

<http://purl.obolibrary.org/obo/iao/2020-12-09/iao.owl>

**Term editor**

person:Alan Ruttenberg

## 10.2.6 IAO\_0000219 - denotes

**Label**

denotes

**Definition**

A primitive, instance-level, relation obtaining between an information content entity and some portion of reality. Denotation is what happens when someone creates an information content entity E in order to specifically refer to something. The only relation between E and the thing is that E can be used to ‘pick out’ the thing. This relation connects those two together. Freedictionary.com sense 3: To signify directly; refer to specifically

**Definition source**

Conversations with Barry Smith, Werner Ceusters, Bjoern Peters, Michel Dumontier, Melanie Courtot, James Malone, Bill Hogan

**Example**

A person's name denotes the person. A variable name in a computer program denotes some piece of memory. Lexically equivalent strings can denote different things, for instance "Alan" can denote different people. In each case of use, there is a case of the denotation relation obtaining, between "Alan" and the person that is being named.

**Editor's note**

2009-11-10 Alan Ruttenberg. Old definition said the following to emphasize the generic nature of this relation. We no longer have 'specifically denotes', which would have been primitive, so make this relation primitive.  $g$  denotes  $r$  =def  $r$  is a portion of reality there is some  $c$  that is a concretization of  $g$  every  $c$  that is a concretization of  $g$  specifically denotes  $r$

**Imported From**

<http://purl.obolibrary.org/obo/iao/2020-12-09/iao.owl>

**Term editor**

person:Alan Ruttenberg

### 10.2.7 IAO\_0000235 - denoted by

**Label**

denoted by

**Definition**

Inverse of the relation 'denotes'

**Imported From**

<http://purl.obolibrary.org/obo/iao/2020-12-09/iao.owl>



**Term editor**

Person: Jie Zheng, Chris Stoeckert, Mike Conlon

### 10.2.8 ORG\_2000001 - occupies

**Label**

occupies

**Definition**

The property that associates an organization occupies a geographical location is it has one of more people at the location, or has legal rights to the location

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The Navaho Nation occupies the Navaho Nation reservation. Microsoft occupies a campus in Redmond Washington. The University of Pittsburg occupies the

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 10.2.9 ORG\_2000002 - has occurent part

**Label**

has occurent part

**Definition**

The property that associates an occurent which has an occurent part wholly contained within it

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The project to put a man on the man achieved success on July 20, 1969

**Editor's note**

The inverse of RO\_2012 and should be defined in RO. Defined here for convenience since it is missing from RO.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

### 10.2.10 ORG\_2000003 - has time instant

**Label**

has time instant

**Definition**

The property that associates a process boundary with the time instant at which the process boundary occurs

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

Duraspace was dissolved (a process boundary) in 2019 (a time instant with an XSDdate timestamp and a year precision)

**Editor's note**

This provides a bidge between BFO ontologies and the W3C time ontology

**Similar term in VIVO 1 Ontology**

<http://vivoweb.org/ontology/core#dateTimeValue>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**10.2.11 ORG\_2000004 - has organizational interest****Label**

has organizational interest

**Alternate name**

interested in

**Definition**

The property that associates an organization with a concept that the organization manifests in its work

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

LYRASIS has organizational interest open source software. The New York Yankees Baseball Club has organizational interest baseball. The Gettysburg Foundation has organizational interest The Battle of Gettysburg.

**Editor's note**

Additional subproperties could provide insight regarding the nature of the interest such as research interest, commercial interest, and so on

### Similar term in VIVO 1 Ontology

<http://vivoweb.org/ontology/core#hasResearchArea>

### Term editor

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

## 10.2.12 ORG\_2000005 - has website

### Label

has website

### Definition

The property that associates an organization with its website

### Definition source

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### Example

LYRASIS has website <https://lyrasis.org>. Moscow State University has website <https://msu.ru>

### Term editor

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.13 ORG\_2000006 - website of

**Label**

website of

**Definition**

The property that associates a website with its organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

The website <https://vivoweb.org> website of The VIVO Project

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.14 ORG\_2000007 - has successor organization

**Label**

has successor organization

**Definition**

The property that associates an organization with the organization that succeeds it. The preceeding organization ceases to exist, the successor is brought into existence

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

The United Colonies has successor organization The United States of America

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.15 ORG\_2000008 - successor organization of

**Label**

successor organization of

**Definition**

The property that associates an on organization with the organization that preceeded it

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

The United Nations is the successor of the The League of Nations.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.16 ORG\_2000009 - has organizational part

**Label**

has organizational part

**Alternate name**

parent of

**Definition**

The property that associates an organization with one of its organizational parts

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

The University of Florida has organizational part College of Medicine; The College of Medicine has organizational part Department of Anesthesiology

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.17 ORG\_2000010 - organizational part of

**Label**

organizational part of

**Alternate name**

child of

**Definition**

The property that associates an organization part with the organization of which it is a part

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

The College of Medicine at UF organizational part of UF; Department of Anesthesiology at UF organizational part of College of Medicine at UF

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.18 ORG\_2000011 - affiliated with

**Label**

affiliated with

**Alternate name**

linked to

**Definition**

The property that associates an organization with another organization that is not an organizational part association

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

The Theatre Library Association is an affiliate of the American Library Association



**Editor's note**

Affiliate relationships exist in many different types of configurations across all sorts of industries. This term has very broad semantics.

**Similar term in VIVO 1 Ontology**

<http://vivoweb.org/ontology/core#affiliatedOrganization>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**10.2.19 ORG\_2000012 - has spin-off organization****Label**

has spin-off organization

**Alternate name**

has spinout

**Definition**

The property that associates an organization with a part that is now independent

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

Google is a spin-off company of Stanford University; AGTC is a spin-off company of the University of Florida

**Editor's note**

To say that a is a spin-off of b implies there is a spin-off process and that a is the output of that spin-off process

### Term editor

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

## 10.2.20 ORG\_2000013 - spin-off organization of

### Label

spin-off organization of

### Alternate name

spinout of

### Definition

The property that associates an organization with an organization of which it was formerly a part

### Definition source

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### Example

Open Clinical is a spin-off of Oxford University. ToposNomos Ltd. is a spin-off company of the University of Magdeburg

### Term editor

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.21 ORG\_2000014 - has organizational member

**Label**

has organizational member

**Definition**

The property that associates an organization with one of its members

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

The EU has member Republic of Ireland

**Editor's note**

To say that an organization is a member of another implies there is a membership and that the two organizations each have roles that

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.22 ORG\_2000015 - organizational member of

**Label**

organizational member of

**Definition**

The property that associates a member organization with the organization of which it is a member

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

The University of North Carolina is a member of the Southeast University Research Association

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.23 ORG\_2000016 - has organizational employee

**Label**

has organizational employee

**Definition**

The property that associates an organization with an employee of the organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

For the season ending in 2021, the Los Angeles Lakers have employee LeBron James.

**Similar term in VIVO 1 Ontology**

[http://purl.obolibrary.org/obo/ERO\\_0000787](http://purl.obolibrary.org/obo/ERO_0000787)

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.24 ORG\_2000017 - organizational employee of

**Label**

organizational employee of

**Definition**

The property that associates a person with the organization of which that person is an employee

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

The president of a university is typically an employee of the university

**Similar term in VIVO 1 Ontology**

[http://purl.obolibrary.org/obo/ERO\\_0000787](http://purl.obolibrary.org/obo/ERO_0000787)

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.25 ORG\_2000018 - has organizational associate

**Label**

has organizational associate

**Definition**

The property that associates an organization with a person who is associated with the organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

One might say that an organization has associates who are their former employees

**Editor's note**

Associate is intentionally loose. A person can be associated with an organization in many ways. Subsequent additional properties may be needed to clarify.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.26 ORG\_2000019 - organizational associate of

**Label**

organizational associate of

**Definition**

The property that associates a person with an organization with which they are associated

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

One might say that people who have reviewed articles for a journal are associateds of that journal

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.27 ORG\_2000020 - has organizational head

**Label**

has organizational head

**Definition**

The property that associates an organization with the person who is the head of the organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

As of this writing, Google has head Sundar Pichai

**Similar term in VIVO 1 Ontology**

<http://vivoweb.org/ontology/core#LeaderRole>

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.28 ORG\_2000021 - organizational head of

**Label**

organizational head of

**Definition**

The property that associates a person with an organization which they are the head of

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

As of this writing, Elon Musk is head of Tesla

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.29 ORG\_2000022 - has organizational volunteer

**Label**

has organizational volunteer

**Definition**

The property that associates an organization with a person who volunteers for the organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

Volunteer fire departments have firefighters who are volunteers of the fire department

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>



### 10.2.30 ORG\_2000023 - organizational volunteer of

**Label**

organizational volunteer of

**Definition**

The property that associates a person with an organization for which they volunteer

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

Many Americans have served as volunteers of the Peace Corps

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.31 ORG\_2000024 - has organizational appointee

**Label**

has organizational appointee

**Definition**

The property that associates an organization with a person who is appointed by the organization to some post or position within the organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

As of this writing, the government of the UK has appointed Amanda Milling Minister without Portfolio (unpaid)

**Editor's note**

Appointee typically includes a title, may or may not include a salary.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.32 ORG\_2000025 - organizational appointee of

**Label**

organizational appointee of

**Definition**

The property that associates a person with the organization which has appointed the person to some post or position within the organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

The board of trustees of a university may appoint the university president

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.33 ORG\_2000026 - has person member

**Label**

has person member

**Definition**

The property that associates an organization with a person who is a member of the organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

As of 2021, The Conservative Party of the UK has person member Boris Johnson

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.34 ORG\_2000027 - person member of

**Label**

person member of

**Definition**

The property that associates a person with an organization of which the person is a member

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

**Example**

Florence Nightingale was a person member of the American Statistical Association

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8448>

### 10.2.35 RO\_0000052 - inheres in

**Label**

inheres in

**Alternate name**

inheres\_in

**Definition**

A relation between a specifically dependent continuant (the dependent) and an independent continuant (the bearer), in which the dependent specifically depends on the bearer for its existence

**Example**

this red color inheres in this apple

this fragility inheres in this vase

**Editor's note**

A dependent inheres in its bearer at all times for which the dependent exists.

**Imported From**

<http://purl.obolibrary.org/obo/ro/releases/2021-03-08/ro.owl>

### 10.2.36 RO\_0000053 - bearer of

**Label**

bearer of

**Definition**

A relation between an independent continuant (the bearer) and a specifically dependent continuant (the dependent), in which the dependent specifically depends on the bearer for its existence

**Example**

this apple is bearer of this red color

this vase is bearer of this fragility

**Editor's note**

A bearer can have many dependents, and its dependents can exist for different periods of time, but none of its dependents can exist when the bearer does not exist.

**Imported From**

<http://purl.obolibrary.org/obo/ro/releases/2020-12-18/ro.owl>

### 10.2.37 RO\_0000056 - participates in

**Label**

participates in

**Definition**

A relation between a continuant and a process, in which the continuant is somehow involved in the process

**Example**

this input material (or this output material) participates in this process

this blood clot participates in this blood coagulation  
this investigator participates in this investigation

### Imported From

<http://purl.obolibrary.org/obo/ro/releases/2020-12-18/ro.owl>

## 10.2.38 RO\_0000057 - has participant

### Label

has participant

### Definition

A relation between a process and a continuant, in which the continuant is somehow involved in the process

### Example

this investigation has participant this investigator  
this blood coagulation has participant this blood clot  
this process has participant this input material (or this output material)

### Editor's note

Has\_participant is a primitive instance-level relation between a process, a continuant, and a time at which the continuant participates in some way in the process. The relation obtains, for example, when this particular process of oxygen exchange across this particular alveolar membrane has\_participant this particular sample of hemoglobin at this particular time.

### Imported From

<http://purl.obolibrary.org/obo/ro/releases/2020-12-18/ro.owl>

### 10.2.39 RO\_0000080 - quality of

**Label**

quality of

**Alternate name**

quality\_of

is quality of

**Definition**

A relation between a quality and an independent continuant (the bearer), in which the quality specifically depends on the bearer for its existence

**Example**

this red color is a quality of this apple

**Editor's note**

A quality inheres in its bearer at all times for which the quality exists.

**Imported From**

<http://purl.obolibrary.org/obo/ro/releases/2021-03-08/ro.owl>

### 10.2.40 RO\_0000081 - role of

**Label**

role of

**Alternate name**

role\_of

is role of

**Definition**

A relation between a role and an independent continuant (the bearer), in which the role specifically depends on the bearer for its existence

**Example**

This investigator role is a role of this person

**Editor's note**

A role inheres in its bearer at all times for which the role exists, however the role need not be realized at all the times that the role exists.

**Imported From**

<http://purl.obolibrary.org/obo/ro/releases/2021-03-08/ro.owl>

### 10.2.41 RO\_0000086 - has quality

**Label**

has quality

**Alternate name**

has\_quality

**Definition**

A relation between an independent continuant (the bearer) and a quality, in which the quality specifically depends on the bearer for its existence

**Example**

this apple has quality this red color



**Editor's note**

A bearer can have many qualities, and its qualities can exist for different periods of time, but none of its qualities can exist when the bearer does not exist.

**Imported From**

<http://purl.obolibrary.org/obo/ro/releases/2021-03-08/ro.owl>

## 10.2.42 RO\_0000087 - has role

**Label**

has role

**Alternate name**

has\_role

**Definition**

A relation between an independent continuant (the bearer) and a role, in which the role specifically depends on the bearer for its existence

**Example**

This person has role this investigator role (more colloquially: this person has this role of investigator)

**Editor's note**

A bearer can have many roles, and its roles can exist for different periods of time, but none of its roles can exist when the bearer does not exist. A role need not be realized at all the times that the role exists.

**Imported From**

<http://purl.obolibrary.org/obo/ro/releases/2021-03-08/ro.owl>

### 10.2.43 RO\_0000091 - has disposition

**Label**

has disposition

**Definition**

A relation between an independent continuant (the bearer) and a disposition, in which the disposition specifically depends on the bearer for its existence

**Imported From**

<http://purl.obolibrary.org/obo/ro/releases/2020-12-18/ro.owl>

### 10.2.44 RO\_0000092 - disposition of

**Label**

disposition of

**Definition**

Inverse of has disposition

**Imported From**

<http://purl.obolibrary.org/obo/ro/releases/2021-03-08/ro.owl>

### 10.2.45 RO\_0001015 - location of

**Label**

location of

**Definition**

A relation between two independent continuants, the location and the target, in which the target is entirely within the location

**Example**

this cage is the location of this rat  
my head is the location of my brain

**Editor's note**

Most location relations will only hold at certain times, but this is difficult to specify in OWL. See <https://code.google.com/p/obo-relations/wiki/ROAndTime>

**Imported From**

<http://purl.obolibrary.org/obo/ro/releases/2021-03-08/ro.owl>

**10.2.46 RO\_0001025 - located in****Label**

located in

**Definition**

A relation between two independent continuants, the target and the location, in which the target is entirely within the location

**Example**

this rat is located in this cage  
my brain is located in my head

**Editor's note**

Location as a relation between instances: The primitive instance-level relation *c* located\_in *r* at *t* reflects the fact that each continuant is at any given time associated with exactly one spatial region, namely its exact location. Following

we can use this relation to define a further instance-level location relation - not between a continuant and the region which it exactly occupies, but rather between one continuant and another. *c* is located in *c1*, in this sense, whenever the spatial region occupied by *c* is *part\_of* the spatial region occupied by *c1*. Note that this relation comprehends both the relation of exact location between one continuant and another which obtains when *r* and *r1* are identical (for example, when a portion of fluid exactly fills a cavity), as well as those sorts of inexact location relations which obtain, for example, between brain and head or between ovum and uterus

Most location relations will only hold at certain times, but this is difficult to specify in OWL. See <https://code.google.com/p/obo-relations/wiki/ROAndTime>

### Imported From

<http://purl.obolibrary.org/obo/ro/releases/2021-03-08/ro.owl>

## 10.2.47 RO\_0002012 - occurent part of

### Label

occurent part of

### Definition

A part of relation that applies only between occurents.

### Imported From

<http://purl.obolibrary.org/obo/ro/releases/2020-12-18/ro.owl>

<http://purl.obolibrary.org/obo/ro/releases/2021-03-08/ro.owl>

## 10.2.48 RO\_0002131 - overlaps

### Label

overlaps

### Definition

X overlaps y if and only if there exists some z such that x has part z and z part of y

**Imported From**

<http://purl.obolibrary.org/obo/ro/releases/2020-12-18/ro.owl>

**10.2.49 RO\_0002234 - has output****Label**

has output

**Definition**

P has output c iff c is a participant in p, c is present at the end of p, and c is not present at the beginning of p.

**Imported From**

<http://purl.obolibrary.org/obo/ro/releases/2021-03-08/ro.owl>

**Term editor**

Chris Mungall

**10.2.50 RO\_0002323 - mereotopologically related to****Label**

mereotopologically related to

**Definition**

A mereological relationship or a topological relationship

**Imported From**

<http://purl.obolibrary.org/obo/ro/releases/2020-12-18/ro.owl>

**Term editor**

Chris Mungall

### 10.2.51 RO\_0002353 - output of

**Label**

output of

**Definition**

Inverse of has output

**Imported From**

<http://purl.obolibrary.org/obo/ro/releases/2021-03-08/ro.owl>

**Term editor**

Chris Mungall

### 10.2.52 unitType - temporal unit type

**Label**

temporal unit type

**Definition**

An indicator of the temporal precision of a time instant

**Imported From**

<http://www.w3.org/2006/time#2016>

## DATATYPE PROPERTIES

See *Table 8*.

Table 1: Table 8 Datatype Properties

| Term ID - Label                                        | Definition                                                                                                                                                                 |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>OBI_0002815 - has representation</i>                | Define ‘has representation’ is a data property that attaches between an information content entity and a value that contains linguistically or computationally coded text. |
| <i>ORG_3000001 - number of employees</i>               | Specifies the number of people (headcount) who receive paychecks from the organization for work performed                                                                  |
| <i>ORG_3000002 - has email representation</i>          | Specifies the email address string for an email address                                                                                                                    |
| <i>ORG_3000003 - has postal address representation</i> | Specifies the postal address string for a postal address                                                                                                                   |
| <i>ORG_3000004 - has geolocation representation</i>    | Specifies the geolocation string for a geolocation                                                                                                                         |
| <i>ORG_3000005 - has URL representation</i>            | Specifies the value of a URL that represents the address of a web site on the world wide web                                                                               |
| <i>ORG_3000006 - has official organization name</i>    | Specifies the value of a name of the organization which appears in the current documents authorizing its existence                                                         |
| <i>ORG_3000007 - has organization name</i>             | Specifies the value of a name of an organization                                                                                                                           |
| <i>inXSDDateTimeStamp - in XSD Date-Time-Stamp</i>     | A datatype property to contain the representation of a time instant as an xsd datatimestamp                                                                                |

### 11.1 OBI\_0002815 - has representation

#### Label

has representation

**Definition**

Define 'has representation' is a data property that attaches between an information content entity and a value that contains linguistically or computationally coded text.

**Example**

I feel sick to my stomach every Tuesday

12th arrondissement of Paris

20g

**Editor's note**

Further processing may enable the value to be represented in a component data structure such as an OBI value specification.

**Imported From**

<http://purl.obolibrary.org/obo/obi/2020-08-24/obi.owl>

**Term editor**

Damion Dooley

Mark Miller

## 11.2 ORG\_3000001 - number of employees

**Label**

number of employees

**Alternate name**

# of employees

**Definition**

Specifies the number of people (headcount) who receive paychecks from the organization for work performed



**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Amazon.com number\_of\_employees 1300000

**Editor's note**

Informal organizations do not have employees. Create a class restriction as a domain.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

## 11.3 ORG\_3000002 - has email representation

**Label**

has email representation

**Alternate name**

has email value

**Definition**

Specifies the email address string for an email address

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

[info@metabolomics.info](mailto:info@metabolomics.info)

**Editor's note**

Regex pattern restriction for RFC ??? Email addresses

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

## 11.4 ORG\_3000003 - has postal address representation

**Label**

has postal address representation

**Alternate name**

has address value

**Definition**

Specifies the postal address string for a postal address

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

1210 NW 14th Ave; ;Gainesville; Fl; USA; 32601

**Editor's note**

Regex pattern restriction for UPC email addresses

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

## 11.5 ORG\_3000004 - has geolocation representation

**Label**

has geolocation representation

**Alternate name**

has geolocation

**Definition**

Specifies the geolocation string for a geolocation

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

29.6651224,-82.3396949

**Editor's note**

Regex pattern restriction to +/-lat;+/-long

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

## 11.6 ORG\_3000005 - has URL representation

**Label**

has URL representation

**Alternate name**

has uniform resource locator

**Definition**

Specifies the value of a URL that represents the address of a web site on the world wide web

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The URL of the United Nations home page is <http://un.org>

**Editor's note**

Replace with terms from IDO?

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

## 11.7 ORG\_3000006 - has official organization name

**Label**

has official organization name

**Definition**

Specifies the value of a name of the organization which appears in the current documents authorizing its existence

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

The official name of the united states is The United States of America.

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

## 11.8 ORG\_3000007 - has organization name

**Label**

has organization name

**Definition**

Specifies the value of a name of an organization

**Definition source**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

**Example**

Names of The United States of America include: USA, US, United States, America.

**Editor's note**

Abbreviations and acronyms are also names of organizations

**Term editor**

Michael Conlon <https://orcid.org/0000-0002-1304-8447>

## 11.9 inXSDDateTimeStamp - in XSD Date-Time-Stamp

**Label**

in XSD Date-Time-Stamp

**Definition**

A datatype property to contain the representation of a time instant as an xsd datetimestamp

**Imported From**

<http://www.w3.org/2006/time#2016>

## NAMED INDIVIDUALS

**Named individuals** are entities which are instances of classes. A university, a continent, a building, a date, and a role in a project are all named individuals.

### 12.1 All Named Individuals

See *Table 9*.

Table 1: Table 9 Named Individuals

| Term ID - Label                                        | Definition |
|--------------------------------------------------------|------------|
| <i>unitDay - day (unit of temporal duration)</i>       | None       |
| <i>unitHour - hour (unit of temporal duration)</i>     | None       |
| <i>unitMinute - minute (unit of temporal duration)</i> | None       |
| <i>unitMonth - month (unit of temporal duration)</i>   | None       |
| <i>unitSecond - second (unit of temporal duration)</i> | None       |
| <i>unitWeek - week (unit of temporal duration)</i>     | None       |
| <i>unitYear - year (unit of temporal duration)</i>     | None       |

#### 12.1.1 unitDay - day (unit of temporal duration)

|                                 |
|---------------------------------|
| <b>Label</b>                    |
| day (unit of temporal duration) |

### 12.1.2 unitHour - hour (unit of temporal duration)

**Label**

hour (unit of temporal duration)

### 12.1.3 unitMinute - minute (unit of temporal duration)

**Label**

minute (unit of temporal duration)

### 12.1.4 unitMonth - month (unit of temporal duration)

**Label**

month (unit of temporal duration)

### 12.1.5 unitSecond - second (unit of temporal duration)

**Label**

second (unit of temporal duration)

### 12.1.6 unitWeek - week (unit of temporal duration)

**Label**

week (unit of temporal duration)



### 12.1.7 unitYear - year (unit of temporal duration)

|                                  |
|----------------------------------|
| <b>Label</b>                     |
| year (unit of temporal duration) |



## OUT OF SCOPE TERMS

In designing and building ontologies, one seeks to find a coherent domain for the ontology – a set of terms that are useful in representing the entities of the domain, include and reuse terms from other ontologies as appropriate, while not including terms that belong elsewhere. These choices are somewhat arbitrary, as long as we have a clear view of the domain we are attempting to represent, and we are willing to “give away” terms that we included, but can be reused.

For the Organization Ontology, we adhered as best we could to several guiding principles regarding terms, domains, inclusion and exclusion.

And, of course, we may have a change of heart regarding any term or set of terms.

### 13.1 Out of Scope but Defined Here

#### Locations

It is important for organizations and their facilities to be located on the surface of the earth. We found the existing OBI ontologies [ENVO](#) and [GAZ](#) to have inconsistencies and/or complexities that prohibited their reuse. We created a simple set of terms within the Organization Ontology to define a nested set of locations from continents down to rooms that can have geographical representations (latitude and longitude) attached to them.

We would be happy to use terms from another ontology that defines location terms we could use.

#### Facilities

The Organization Ontology has a need to make assertions regarding occupancy of structures

### 13.2 Out of Scope and Included Here

An organization ontology should reuse terms it needs from other ontologies.

#### Upper Level Ontology and Annotation Properties

[Basic Formal Ontology \(BFO\)](#) is used for an upper level ontology. We use the [Information Artifact Ontology \(IAO\)](#) annotation properties to annotate terms. We use Dublin Core and OWL annotation properties to annotate the ontology.

### Identifiers

The [Identifier Ontology](#)<sup>1</sup> defines identifiers and semantics for using identifiers to identify organizations, people, and scholarly works.

### Information Artifacts

The [Information Artifact Ontology \(IAO\)](#) defines information artifacts needed here.

### Time

The [W3C Time Ontology \(Time\)](#) is used to define time:Instant and associated properties for using time:Instant. We have asserted a superclass for time:Instant to align it with BFO.

### Concept

The [Simple Knowledge Organization System \(SKOS\)](#) issued to define skos:Concept. We have asserted a superclass for skos:Concept to align it with BFO.

## 13.3 Out of Scope and Not Included Here

### Reports to / has report

reports to / has report are properties in the [W3C Organization Ontology](#) for asserting that individual people report to other individual people in an organization.

We believe these are out of scope for an organization ontology, and are best left to an administrative ontology.

### Additional detail regarding locations

We have tried to include enough, but not too much. This is not a locations ontology.<sup>2</sup>

### Additional detail regarding structures

We have tried to include enough, but not too much. This is not a structures ontology.<sup>3</sup>

---

<sup>1</sup> The Identifier Ontology is underdevelopment as a planned expansion of [Information Artifact Ontology \(IAO\)](#)

<sup>2</sup> We follow in the footsteps of [VIVO 1](#), including terms that have shown their value over a decade of use.

<sup>3</sup> Same as the comment on locations.

**Properties related to Academic Events**

We have not included properties related to organizations must host, sponsor or otherwise participate in. See [The Academic Event Ontology](#) for terms associating organizations and academic events.



## TRANSLATING FROM VIVO TO THE ORGANIZATION ONTOLOGY

For those familiar with representing organizations using the VIVO Ontology, we provide a guide for translating assertions in the VIVO Ontology to assertions in the Organization Ontology<sup>1</sup>.

### 14.1 Translating Types

The VIVO Ontology organization types are presented in [Table 16](#) with instructions for translating each. The Organization Ontology separates the concept of what the organization “is” (company, organization part, etc) from what the organization “does” (hospital, library, etc). In many cases, the VIVO Ontology combined these and information about one or the other (“is”, “does”) is missing.

For example, consider `vivo:Museum`. This assertion of type is actually an assertion of purpose. The type of organization (organization part, nonprofit) is missing. We can assert the museum is an organization, and has a disposition of museum. We may be able to bring additional information to bear and assert a specific type<sup>2</sup>.

[Table 16](#) provides a guide for translating Organizational types to assertions in the Organization Ontology.

---

<sup>1</sup> We intend to provide SPARQL CONSTRUCT queries for automatic translation of VIVO Ontology organization assertions to Organization Ontology assertions in the future. Consider this guide as advice to the adventurous, or to collaborators who would like to draft, test, and contribute such queries.

<sup>2</sup> Note that additional information is needed. The Metropolitan Museum of Art in New York City is a nonprofit organization. The Florida Museum of Natural History in Gainesville, Florida, is an organizational part of the University of Florida. In the VIVO Ontology, both would be asserted to be type `vivo:Museum`. In the Organization Ontology, the first would be asserted to be nonprofit, the second organization part. Both would be asserted to have disposition museum.

Table 1: Table 16 Translating VIVO types to Organizational Ontology assertions

| VIVO Type                  | Organization Ontology Assertions                                                                                                                                    |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Association                | Unknown type. Assert Organization only.<br>Type is often nonprofit.<br>Disposition is association.                                                                  |
| Center                     | Unknown type. Assert organization only.<br>Type is often an organization part.<br>Unknown dispositions. Often research.                                             |
| College                    | Unknown type. Assert organization only.<br>At a US university, an organizational part.<br>At a US university, dispositions of education, service, research          |
| Company                    | Type is Company<br>Disposition is often commerce                                                                                                                    |
| Consortium                 | Unknown type. Assert Organization only.<br>Type is often nonprofit<br>Disposition is often association                                                              |
| CoreLaboratory             | Type is organization part<br>Dispositions are laboratory and service provider                                                                                       |
| Department                 | Type is organizational part<br>Unknown dispositions                                                                                                                 |
| Division                   | Type is organizational part<br>Unknown dispositions                                                                                                                 |
| ExtensionUnit              | Type is organizational part<br>Disposition is agricultural extension                                                                                                |
| ERO_00000565               | Type is organizational part<br>Disposition is technology transfer                                                                                                   |
| Foundation                 | Type may be nonprofit<br>Type may be organizational part<br>May be affiliated with another organization<br>Disposition is philanthropy<br>Disposition may be funder |
| FundingOrganization        | Unknown type. Assert organization only.<br>Disposition is funder                                                                                                    |
| GovernmentAgency           | Type is government organization or organizational part<br>Disposition is unknown                                                                                    |
| Hospital                   | Unknown type. Assert organization only.<br>Disposition is hospital.                                                                                                 |
| Institute                  | Unknown type. Assert organization only.<br>Disposition is unknown. Often research.                                                                                  |
| Laboratory                 | Unknown type. Assert organization only.<br>Disposition is laboratory.                                                                                               |
| Library                    | Unknown type. Assert organization only.<br>Disposition is library.                                                                                                  |
| Museum                     | Unknown type. Assert organization only.<br>Disposition is library.                                                                                                  |
| Program                    | Type is organizational part.<br>Disposition is unknown.                                                                                                             |
| Publisher                  | Type is unknown. Assert organization only.<br>Often type is company. But all others possible.<br>Disposition is publisher.                                          |
| ResearchOrganization       | Unknown type. Assert organization only.<br>Disposition is research.                                                                                                 |
| School                     | Type is unknown. Assert organization only.                                                                                                                          |
| 188                        | At US university, an organizational part.<br>Disposition is often education.                                                                                        |
| ServiceProvidingLaboratory | Type is unknown. Assert organization only.<br>Dispositions are laboratory and service provider.                                                                     |
| StudentOrganization        | Type is organizational part                                                                                                                                         |



---

<sup>3</sup> To be determined.

<sup>4</sup> Team may mean “sports team” or “project team” or other. A sports team may be formal, such as Manchester United Football Club, or informal as in “my weekly bowling team.” A project team may be considered part of an organization, or informally organized to move work forward.



## TRANSLATING FROM ROR TO THE ORGANIZATION ONTOLOGY

Research Organization Registry (ROR) provides data on over 95,000 research organizations in the world. ROR data is available CC0, curated, and via an open API.

### 15.1 Translating Types

The ROR Organization types are listed in [Table 17](#) ROR types are high-level and can be multi-valued, much as Organization Ontology dispositions are multi-valued.

Organizations without research disposition are out of scope for ROR. All organizations in ROR can be asserted to have research disposition.

[Table 17](#) provides a guide for translating ROR organizational types to assertions in the VIVO Organization Ontology.

Table 1: Table 17 Translating ROR types to VIVO Organizational assertions

| ROR Type   | VIVO Organization Ontology Assertions                                           |
|------------|---------------------------------------------------------------------------------|
| Education  | Unknown type. Assert Organization only.<br>Disposition is education, research   |
| Healthcare | Unknown type. Assert organization only.<br>Disposition is healthcare, research. |
| Company    | Type is company.<br>Disposition is research.                                    |
| Archive    | Type is unknown. Assert Organization only.<br>Disposition is archive, research. |
| Nonprofit  | Type is nonprofit<br>Disposition is research.                                   |
| Government | Type is government organization<br>Disposition is research.                     |
| Facility   | Type is unknown. Organization only.<br>Disposition is research.                 |
| Other      | Type is unknown.<br>Disposition is research.                                    |



## TRANSLATING FROM SCHEMA.ORG TO THE ORGANIZATION ONTOLOGY

[schema.org](http://schema.org) is an important folksonomy and JSON model for representing common entities on the web. The organization model of [schema.org](http://schema.org) has organization types and properties which can be represented using the Organization Ontology.

Full interoperability with [schema.org](http://schema.org) is not currently a goal of the Organization Ontology work<sup>1</sup>

### 16.1 Translating Types

The [schema.org](http://schema.org) organization types are listed in [Table 18](#) [schema.org](http://schema.org) types are high-level and can be multi-valued, much as Organization Ontology dispositions are multi-valued.

[Table 18](#) provides a guide for translating [schema.org](http://schema.org) organizational types to assertions in the VIVO Organization Ontology.

---

<sup>1</sup> Full interoperability between [schema.org](http://schema.org) and the Organization Ontology could be future goal. It appears that all the ontological structure is in place to add additional properties and entities from [schema.org](http://schema.org) to the Organization Ontology.

Table 1: Table 18 Translating schema.org types to VIVO Organizational assertions

| schema.org Type         | Organization Ontology Assertions                                                                       |
|-------------------------|--------------------------------------------------------------------------------------------------------|
| Airline                 | Unknown type. Typically company.<br>Disposition is airline.                                            |
| Consortium              | Unknown type. Assert Organization only.<br>Type is often nonprofit<br>Disposition is often association |
| Corporation             | Type is company.<br>Disposition is often commerce.                                                     |
| EducationalOrganization | Type is unknown. Assert Organization only.<br>Disposition is education.                                |
| FundingScheme           | Type is unknown. Assert organization only. <sup>2</sup><br>Disposition is funding.                     |
| GovernmentOrganization  | Type is government organization<br>Disposition is unknown.                                             |
| LibrarySystem           | Type is unknown. Organization only.<br>Disposition is library.                                         |
| LocalBusiness           | Type is company.<br>Disposition is often commerce.                                                     |
| MedicalOrganization     | Unknown type. Assert Organization only.<br>Disposition is healthcare provider                          |
| NGO                     | Type is nonprofit<br>Disposition is unknown.                                                           |
| NewsMediaOrganization   | Type is unknown. Assert Organization only.<br>Disposition is media.                                    |
| PerformingGroup         | Type is unknown. Assert Organization only.<br>Disposition is performing                                |
| Project                 | Type is unknown. Perhaps informal. <sup>3</sup><br>Disposition is project.                             |
| SportsOrganization      | Type is unknown. Assert organization only.<br>Disposition is sports.                                   |
| WorkersUnion            | Type is unknown. Often nonprofit.<br>Disposition is labor union.                                       |

<sup>2</sup> Unclear if a funding scheme is an organization. It might be an informal organization of those participating in the “scheme” or it may be an organizational part of an organization with funding disposition.

<sup>3</sup> In Basic Formal Ontology (BFO) ontologies, the word “project” is used to describe a particular type of process, that is, an occurrent. A project is not an organization. A project may “have” an organization, an organization may conduct a project. In english, when people refer to a “project,” they may be referring to an organization that was created for the purpose of executing a defined piece of work. Such an organization may be formal or informal, it may be an organizational part, or an organization of its own.

## DATES DATA

The Organization Ontology includes a template (`templates\dates.tsv`) and data (`templates\dates.ttl`) built from the template for the dates from 1800-2050 in year precision, one individual per year. Most organizations have been established, or changed in this time period, and year precision is often “good enough” for specifying these events.

The data have been created with standard URLs of the form

```
http://vivoweb.org/data/date/xxxx
```

A sample date is given below:

```
### http://vivoweb.org/data/year/2021
<http://vivoweb.org/data/year/2021>
  rdf:type owl:NamedIndividual ,
    <http://www.w3.org/2006/time#Instant> ;
  <http://www.w3.org/2006/time#unitType> <http://www.w3.org/2006/time#unitYear> .
↪;
  <http://www.w3.org/2006/time#inXSDDateTimeStamp> "2021-01-01T00:00:00Z"^^
↪xsd:dateTimeStamp .
```

Including the file `data/dates.ttl` in your graph should provide you with all the dates in year precision from 1800-2050. You can then use these dates in assertions about years. For example, to assert organization `x` was established in 1853 (see *Dates and Time*) you can say:

```
x output_of y
y a founding_process
y has_occurent_part z
z a founding_process_boundary
z has_instant <http://vivoweb.org/data/year/1853>
```





## FOR ONTOLOGY AUTHORS

The Organization Ontology has been developed using [Basic Formal Ontology \(BFO\)](#) as an upper level ontology, and in an attempt to follow the Open Biomedical Ontologies (OBO) Principles. Many ontologies have been developed using this approach. Many of these ontologies can be found on [Ontobee](#)

### 18.1 Domain

In designing the Organization Ontology, we first conceive of the domain of organizations, that is we develop a use case for the ontology. This *domain definition* guides us throughout design and implementation, indicating terms that should be included and those that should be defined elsewhere. From time to time, terms must be defined to express important assertions regarding organizations, but have not been defined elsewhere in a form that can be used here. Such terms have a curation status indicating that we would prefer if these terms are defined elsewhere.

### 18.2 Reusing terms

We are generally cautious to reuse terms from other ontologies. To reuse terms, we require the ontology in which they are defined to:

1. Use BFO as an upper level ontology. We have made just a few exceptions and in each case we have provided a superclass for the term in BFO to create a consistent and complete subsumption hierarchy.
2. Conform to OBO principles. Again, we have made just a few exceptions.
3. An appropriate license for the ontology whose terms we will reuse. When a license for an ontology is not clear, we cannot use its terms.
4. Active maintenance. Ontologies can be slow to add terms and to fix things that need fixing. If an ontology is not actively maintained, we cannot use its terms.
5. Use of MIREOT, a plug-in for Protege. When terms from other ontologies are needed, we use Protege to edit *org-header.ttl* and add the terms using the MIREOT plug-in. This provides a consistent means for adding terms.
6. We trim out annotation properties of included terms that are not of interest.

### 18.3 Use of templates

All terms defined in the Organization Ontology are created using templates. There are templates for classes, annotation properties, datatype properties, object properties, and named individuals. In each case, the columns correspond to annotations, class expressions and other declarations used to create each term.

### 18.4 Consistent build

The ontology file `org.ttl` is built using a simple script, `build.sh`. The script performs four operations:

1. Makes data useful for ontology users.
2. Makes ontological assertions from the templates
3. Merges org-header and the template assertions into `org.ttl`
4. Validates `org.ttl`

### 18.5 Validation

The ontology is validated on each build using *robot validate*

### 18.6 Documentation

We document the ontology as it is written. See *For Documentation Authors* <documentation-authors>\_ Documenting as we write the ontology helps with consistency, accuracy, and completeness.

## FOR DOCUMENTATION AUTHORS

We are learning about Sphinx and ReadTheDocs, and considering their use for creating documentation for the VIVO Ontology and related ontologies.

Documentation is produced using a hybrid of manual text production, manual figure production, and automated table of contents, table, term page, and index production.

### 19.1 Manual Text Production

The top page is `index.rst` which contains a preface, a table of contents, listy of tables, list of figures, and reference to the index, which is automatically generated by Sphinx.

Text is stored in pages with `.rst` file tpes. Pages are written using a text editor such as BBEdit, vim, or Sublime.

Documentation in a `docs` folder of the ontology GitHub repository, keeping ontology and documentation together.

### 19.2 Manual Figure Production

We use *draw.io* <<http://draw.io>>, also known as diagrams.net. This free to use, open source software is available for use through a browser or as a downloaded app.

### 19.3 Automated Text Production

One need is to provide search and index capability at the term level. A user should be able to find the documentation for *date* or *person* or *disposition* without difficulty.

A simple python script `ontology-docs.py` is included with the Organization Ontology. Given *any* ontology, the script can:

1. Create pages for each term using python scripts – scripts would use annotation property values to automatically write pages of documentation from the ontology.
2. Create tables of terms using queries of the ontology.
3. Update lists of properties and classes as subsidiary tables of contents.

## 19.4 Automated GitHub pages

The documentation is automatically built and deployed on GitHub Pages using GitHub Actions. The scripts to do this were written by Michael Altfield and documented here: [Continuous Documentation: Hosting Read the Docs on GitHub Pages \(1/2\)](#)

## 19.5 Resulting Documentation Features

1. No need for formatting examples – use “View Page Source” on any page to see how it was written
2. No need to write about the tools. Each tool has outstanding documentation.
3. See [Sphinx](#) to get started with the documentation.
4. Use [RestructuredText](#) to write the documentation. RestructuredText is a mark-up language originally developed to document python.
5. Use GitHub for collaboration, issue tracking, version control, and release management for the documentation. GitHub renders RestructuredText pages (pages with .rst file types) automatically for those who wish to check or read pages directly from GitHub.
6. Use Makefiles included with [ReadTheDocs](#) for rendering the documentation via HTML, PDF, or ePub.
7. Automated generation of HTML, PDF, and ePub documentation formats, and hosting of the documentation in the Organization Ontology GitHub repository, using GitHub actions.

## NOTES AND SOURCES

For early work on the Organization Ontology and thoughts behind what might be needed and how things might be addressed, we relied on “Early Thoughts on Representing Organizations in VIVO” by the VIVO Ontology Interest Group [VOIG2021]. While not everything there has been implemented here, and not everything here is implemented as described there, the general outline of representing organizations using [Basic Formal Ontology \(BFO\)](#) according to [Open Biomedical Ontologies \(OBO\) Principles](#) was first described there. A good reference for BFO is [Arp2015].

We use [Wikipedia], [Wiktionary], and [Wikidata] often. Term definitions, references, fact-checking, and identifiers may come from these sources.

We use Ontobee [Ong2017] for looking up terms in OBO Foundry ontologies.

We use Protege [Musen2015] for modeling `org-header.ttl` and the MIREOT plug-in for Protege [Hannah2012] for adding terms from other ontologies to `org-header.ttl`. We use robot [Jackson2019] for processing templates of properties, merging them and `org-header.ttl` together to produce `org.ttl` and then to run reports against `org.ttl` for validation.

We have tried to represent organizations in a manner that is inclusive of ideas regarding organizations that have been represented elsewhere. The VIVO Ontology [vivo2013] provides organizational representation, but is not BFO or OBO conformant. We hope we have represented here what is represented in the VIVO Ontology. The W3C Organization Ontology [Reynolds2014] has been a second source for terms and concepts that might be included in a BFO/OBO conformant ontology.

We have used the [GRID], [ROR21], and [schema.org] data models as sources of concepts and properties that may need to be represented in the Organization Ontology. See *Translating from VIVO to the Organization Ontology*, *Translating from ROR to the Organization Ontology*, and *Translating from schema.org to the Organization Ontology* for details of how types and other properties are mapped from these sources to the Organization Ontology.

### 20.1 Regarding the W3C Organization Ontology

The W3C Organization Ontology (W3CO) provides a set of useful terms for representing organizations. Many terms there are represented in this work. Our work uses BFO as an upper level ontology – everything in the Organization Ontology fits in the BFO subsumption hierarchy. cross-walking the W3C Organization Ontology and the VIVO Organization Ontology (VORG) is straightforward. Below are comments related to mapping.

- Purpose in W3CO is open-ended text. In VORG, purpose is represented by dispositions
- Classification in W3CO are interests in VORG.
- Identifiers in VORG are handled using IDO
- Linked to in W3CO is replaced by semantic object properties indicating the relationship between organizations
- Formal Organization in W3CO is any organization that is not an Informal Organization in VORG.
- OrganizationUnit in W3CO is Organization Part in VORG.

- Membership in VORG is modeled using standard BFO roles and occurrent part representation
- Posts in W3CO are modeled as positions in VORG in a manner analogous to memberships (same conceptual model, different roles and entities)
- Reports to in W3CO is deconstructed. Personnel relationships are distinct from org relationships in VORG. Person to person relationships are out of scope for VORG.
- Locations in VORG are modeled as BFO sites. See *Locations* <locations>
- Addresses in VORG are modeled as IAO entities. See *Addresses* <addresses>
- *based at* is a property of a person and is out of scope for VORG.
- OrganizationCollaboration is a project and is modeled using standard BFO constructs. Organizations have *participant in projects*
- Change event is a BFO process boundary

## 20.2 References

## GLOSSARY

**Basic Formal Ontology (BFO)** Basic Formal Ontology. An upper level ontology used to represent things that exist.

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**Domain** A part of the world consisting of related entities.

**Dubbing Process** A process by which an identifier is assigned to an entity.

**Entity** A thing, as defined in an ontology.

**Generically dependent continuant** In BFO, an entity whose existence depends generically on the existence of other entities. Examples include information artifacts (which depend on representations, and “memory”) and organizations which depend on the people and purpose which define the organization.

**IAO** Information Artifacts Ontology. A BFO-based, OBO-compliant ontology for representing information artifacts

**Information artifacts** Things that contain or represent information. Examples include documents, software, databases, data elements, and photographs.

**OBO** Open Biomedical Ontologies. A collection of ontologies, and a set of principles for developing ontologies that fit together.

**OWL** Web Ontology Language. A W3C standard for representing ontologies.

**Ontology** A precise exposition declaring entities, their properties and relationships.

**RO** [Relation Ontology \(RO\)](#) is used with Basic Formal Ontology (BFO) to represent relations between entities. Object properties are often sub-properties of properties in RO.

**ROR** [Research Organization Registry](#). An open (CC0), curated, collection of facts about the research organizations of the world.

**Term** The fundamental entry in an ontology. A term may be a class, an annotation property, an object property, or a datatype property.

**VIVO** Software, ontologies, and community for representing scholarship.

**VIVO 1** The [VIVO Ontology](#) as implemented in VIVO beginning with VIVO version 1.6.





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