The Organization Ontology

The VIVO Ontology Interest Group

Jun 04, 2021

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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.

CHAPTER

ONE

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*[1] 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:non-profit. 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.

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

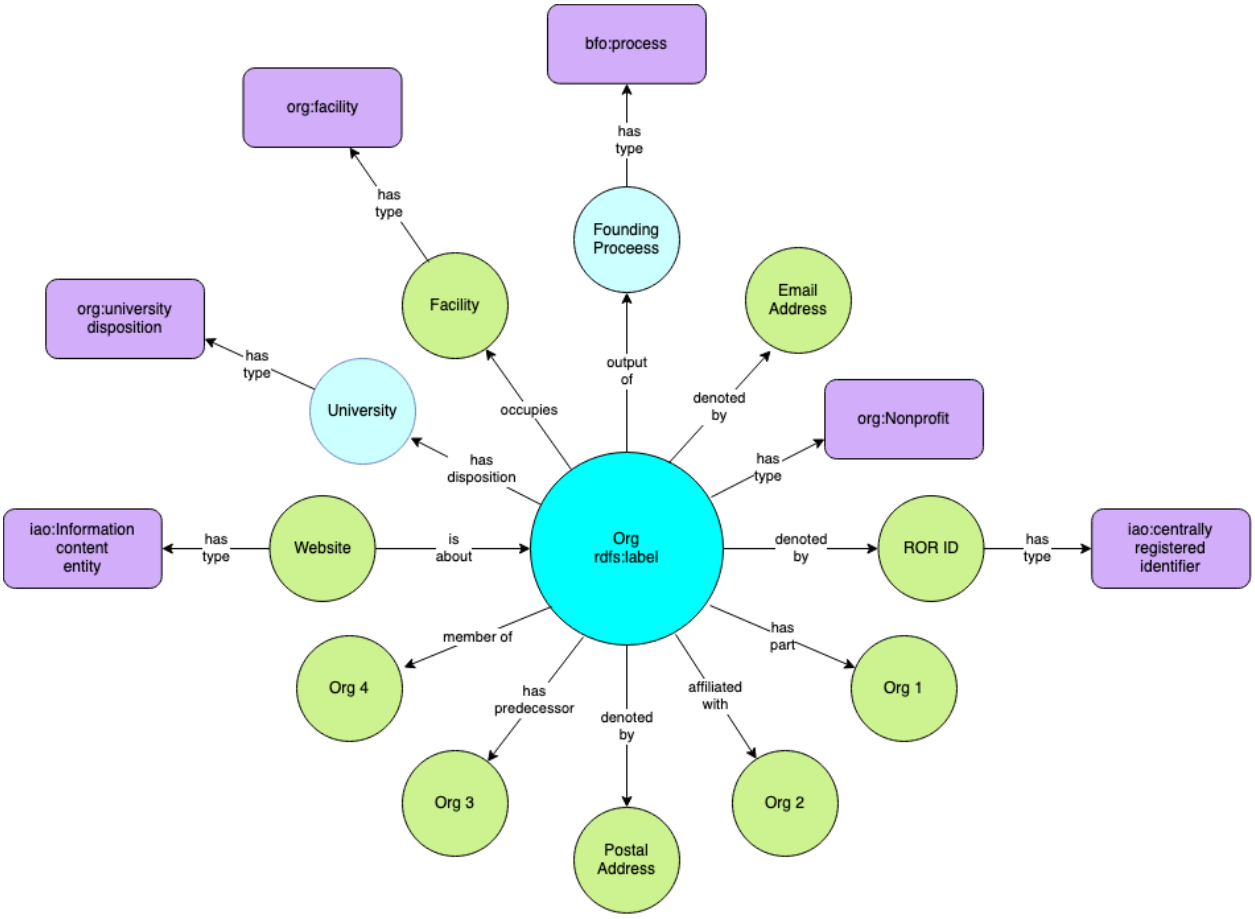

Fig. 1: Figure 1. Representation of organizations. The organization of interest is at the center of the figure. See notes below.

- 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
ORG_0000002	government organization	An organization which is the body of persons tha
ORG_0000003	company	A legal entity of associated persons created for
ORG_0000004	non-profit organization	A legal entity of associated persons created for
ORG_0000005	informal organization	A group of people recognized as such by people o
ORG_0000006	organization part	An organization which exists as part of another

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

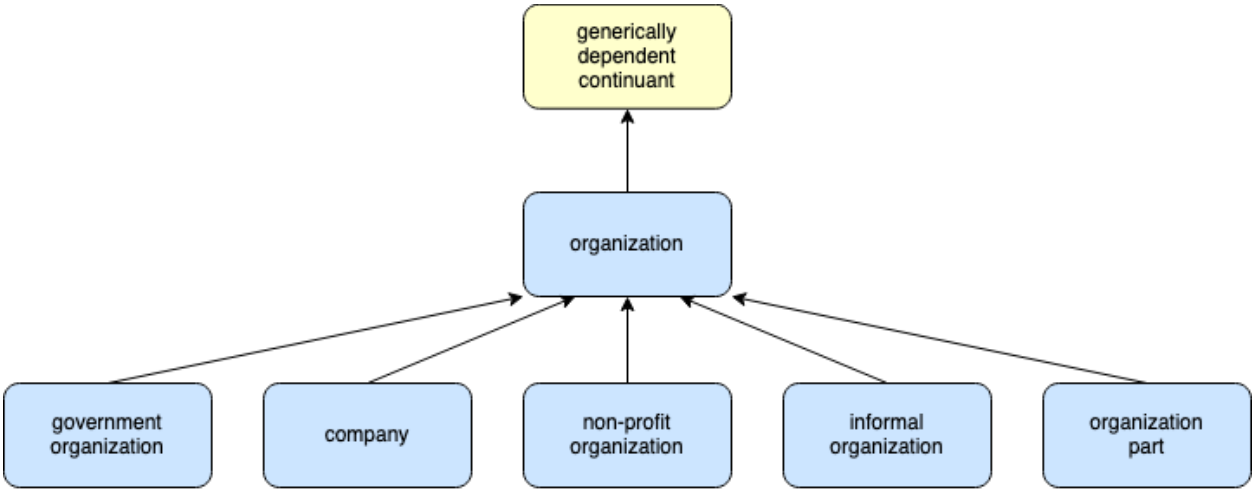

Fig. 2: Figure 2. Subclasses of organization and subsumption hierarchy. The subclasses are mutually exclusive.

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
ORG_0000007	university disposition	A disposition to award academic degrees and cond
ORG_0000008	association disposition	A disposition to organize organizations or indiv
ORG_0000009	consortium disposition	A disposition to organize organizations along in
ORG_0000010	service provider disposi	A disposition to provide service with or without
ORG_0000012	extension provider dispo	A disposition to provide extension services, typ
ORG_0000013	technology transfer disp	A disposition to create licenses for intellectua
ORG_0000014	philanthropy disposition	A disposition to donate charitable causes, somet
ORG_0000015	funding disposition	A disposition to fund proposals, often is respon
ORG_0000017	hospital service provide	A disposition to provide hospital-based health c
ORG_0000018	archive disposition	A disposition to collect, store, and provide acc
ORG_0000019	museum disposition	A disposition to collect, store, and provide acc
ORG_0000020	gallery disposition	A disposition to display collected works from an
ORG_0000021	publishing disposition	A disposition to publish information content ent
ORG_0000022	research disposition	A disposition to conduct research
ORG_0000023	education disposition	A disposition to teach, and provide experiential
ORG_0000024	training disposition	A disposition to train, and provide experiential
ORG_0000025	research administration	A disposition to provide resources and oversight
ORG_0000026	library disposition	A disposition to provide library services
ORG_0000027	commerce disposition	A disposition to sell things
ORG_0000028	military disposition	A disposition to engage in warfare
ORG_0000029	religious disposition	A disposition to engage in matters of spirtualit
ORG_0000030	governing disposition	A disposition to provide governance
ORG_0000031	manufacturing dispositio	A dispositon to construct material entities
ORG_0000032	project team disposition	A disposition to execute and finish a project.
ORG_0000033	sports disposition	A disposition to engage in sports activites, typ
ORG_0000079	airline disposition	The disposition of an organization that operates
ORG_0000080	media disposition	The disposition of an organization that creates,
ORG_0000081	performing disposition	The disposition of an organization to perform li
ORG_0000082	labor union disposition	The disposition of an organization to organize w

1.5 Examples

Duke University

Duke is a non-profit 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
ORG_0000034	information address qual	A quality of an information content entity denot
ORG_0000035	billing address quality	A quality of an address to be used to receive bi
ORG_0000036	shipping address quality	A quality of an address to be used to receive sh
ORG_0000037	preferred address qualit	A quality of an address to be displayed in most
ORG_0000038	homepage quality	A quality to be the primary website for an entit
ORG_0000039	wikipedia quality	A quality to be the webpage within WikiPedia reg
ORG_0000063	student led organization	The quality of an organization that is led by a
ORG_0000064	woman led organization q	The quality of an organization that is led by a
ORG_0000065	minority led organizatio	The quality of an organiztion that is led by a d
ORG_0000066	registered location qual	The quality of a location that is the legal/regi
ORG_0000067	primary location quality	The quality of a location that is the primary/pr

CHAPTER

TWO

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[1]

See *Table 4*.

Table 1: Table 4 Identifiers

Term ID	Label	Definition
IAO_0022003	crossref funder identifi	An identifier assigned by CrossRef to an organiz
IAO_0022006	dbpedia identifier	A URL used by DBpedia to identify an entity
IAO_0022010	global research organiza	An identifier assigned and managed by Digital Sc
IAO_0022014	international standard n	An identifier for persons and organizations whic
IAO_0022022	research organization re	An identifier assigned by ROR to research organi
IAO_0022027	wikidata q number	QID (or Q number) is the unique identifier of a
IAO_0022057	ringgold identifier	The Ringgold Identifier is a unique numerical id

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_orgnization_registry_identifier
y has_representation "ror-value"
```

[1] 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.

CHAPTER

THREE

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

CHAPTER

FOUR

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.

CHAPTER

FIVE

LOCATIONS

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

- continents
- countries. Including disputed countries[1].
- 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[2]. 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

[1] definition of "countries" is a matter of dispute and controversy. Any list of countries is subject to dispute.

[2] 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
ORG_0000040 - architectural structure	A man-made construction attached to the ground, a bauwerk
ORG_0000041 - campus	The grounds of a business, university, or other
ORG_0000042 - facility	An architectural structure with a function
ORG_0000043 - building	A permanent walled and roofed construction
ORG_0000044 - room	A space delineated by partitions in a building
ORG_0000047 - continent	One of the seven major land masses of the earth
ORG_0000048 - country	The territory occupied by a sovereign state
ORG_0000049 - region	Any subdivision of the territory of a country
ORG_0000050 - populated place	Any named place on the earth occupied by people
ORG_2000002 - has occurent part	The relation indicating an organization occupies a location
RO_0001015 - location of	Location of
RO_0001025 - located in	Located in
ORG_0000045 - geographic region	A geographical location on the earth
ORG_0000046 - geographic point	A point on the earth
ORG_3000004 - has geolocation representation	A geolocation representation as lat,long

CHAPTER

SIX

DATES AND TIMES

The Organization Ontology uses the W3C Time Ontology[1] 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 occurrents 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.

[1] https://www.w3.org/TR/owl-time/

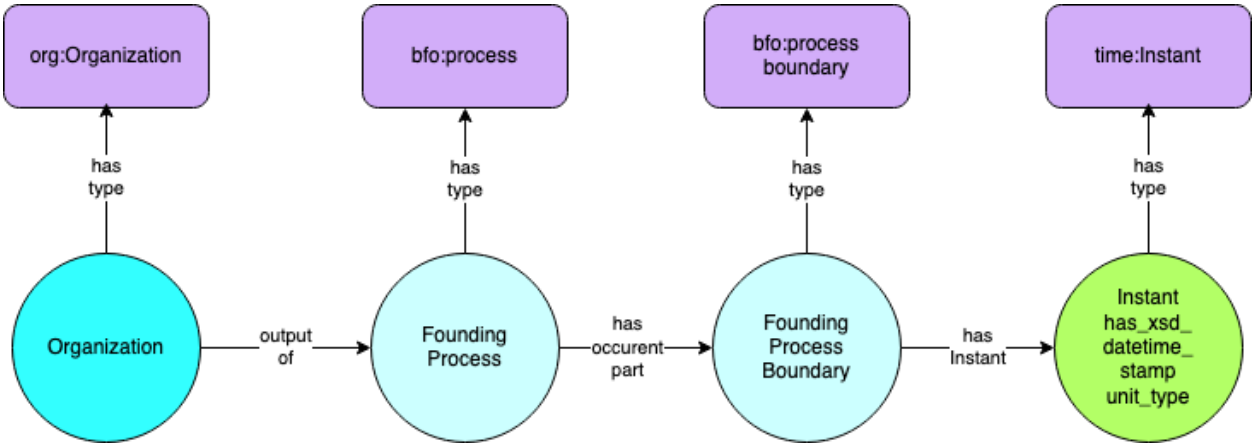

Fig. 1: Figure 3. General time pattern. An organization is the output of a founding process.

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

CHAPTER

SEVEN

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 and 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 x is affiliated with organization y.

We say simply

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

for which we can infer[1]:

```
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*[2].

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

[2] 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*[Page 21, 2].

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 occurent 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*[Page 21, 2].

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 occurent 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*[Page 21, 2].

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 occurent, 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
```

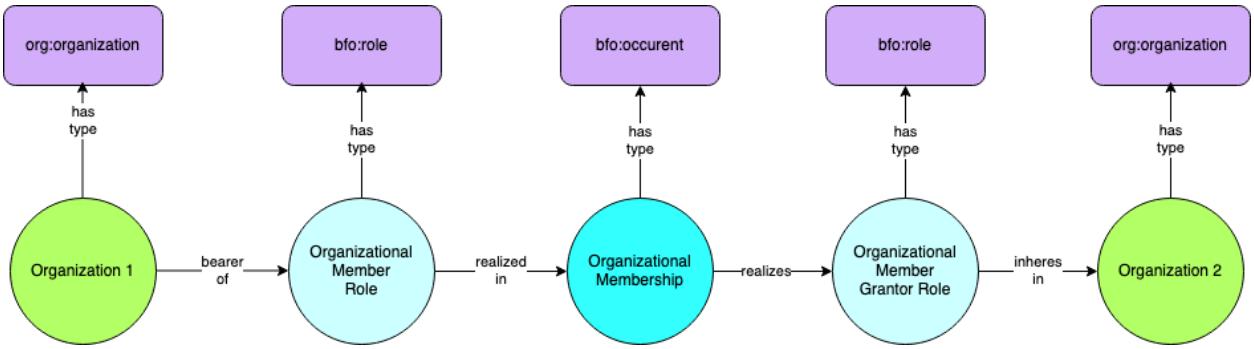

Fig. 1: Figure 4. General membership pattern. Organization 1 has a member role in a membership. Organization 2 has a grantor role in the membership.

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*.

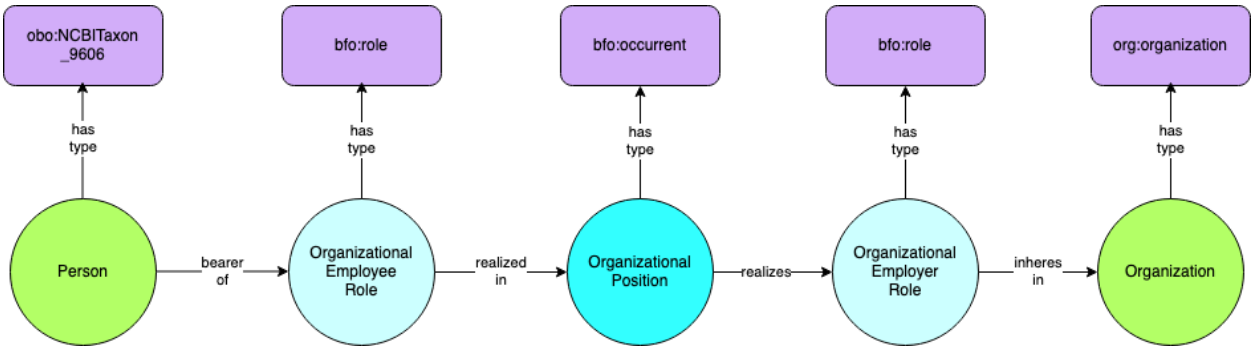

Fig. 2: Figure 5. General employee pattern. Organization 1 has a member role in a membership. Organization 2 has a grantor role in the membership.

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.

CHAPTER

EIGHT

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.

8.1 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

8.2 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

8.3 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:Bill Bug

PERSON:Melanie Courtot

PERSON:Alan Ruttenberg

8.4 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

8.5 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

8.6 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

8.7 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

8.8 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

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

Discussion on obo-discuss mailing-list, see http://bit.ly/hgm99w

Term editor

PERSON:Daniel Schober

8.9 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

8.10 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

8.11 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:Alan Ruttenberg

PERSON:Melanie Courtot

8.12 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

8.13 created - No label

8.14 creator - No label

8.15 description - No label

8.16 title - No label

8.17 license - No label

8.18 inverseOf - No label

See *Table 6*.

Table 1: Table 6 Annotation Properties

Term ID	Label	Definition
IAO_0000111	editor preferred label	The concise, meaningful, and human-friendly name
IAO_0000112	example of usage	A phrase describing how a term should be used an
IAO_0000114	has curation status	A specification of the state of the metadata for
IAO_0000115	definition	The official definition, explaining the meaning
IAO_0000116	editor note	An administrative note intended for its editor.
IAO_0000117	term editor	Name of editor entering the term in the file. Th
IAO_0000118	alternative term	An alternative name for a class or property whic
IAO_0000119	definition source	Formal citation, e.g. identifier in external dat
IAO_0000232	curator note	An administrative note of use for a curator but
IAO_0000233	term tracker item	An IRI or similar locator for a request or discu
IAO_0000412	imported from	For external terms/classes, the ontology from wh
ORG_1000001	vivo 1 ontology referenc	The term in the original VIVO ontology that is m
created	None	None
creator	None	None
description	None	None
title	None	None
license	None	None
inverseOf	None	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

8.19 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.

8.19.1 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

8.19.2 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`

CHAPTER

NINE

CLASSES

Classes are collections of **individuals**. A university, a non-profit, a government agency, 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 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

9.2 BFO_0000002 - continuant

Label

continuant

Definition

An entity which has existence in time

Imported From

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

9.3 BFO_0000003 - occurrent

Label

occurrent

Definition

An entity which occurs in time

Imported From

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

9.4 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 heart

the interior of your mouth

an atom

an orchestra.

a spatial region

a leg

a chair

the bottom right portion of a human torso

an organism

a molecule

Imported From

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

9.5 BFO_0000008 - temporal region

Label

temporal region

Definition

An occurent which is some part of time

Imported From

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

9.6 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

9.7 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

9.8 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

9.9 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 mass of this piece of gold.

the shape of your nose

the shape of your nostril

the ambient temperature of this portion of air

the color of a tomato

the length of the circumference of your waist

Imported From

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

9.10 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

9.11 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

the priest role

the role of a building in serving as a military target

the student role

the role of a boundary to demarcate two neighboring administrative territories

the role of a stone in marking a property boundary

the role of subject in a clinical trial

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.

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 instance_of professor at t =Def. there is some c, c instance_of professor role & c inheres_in b 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

9.12 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 cockpit of an aircraft

your left nostril (a fiat part – the opening – of your left nasal cavity)

an air traffic control region defined in the airspace above an airport

the interior of your bedroom

the interior of the trunk of your car

a hole in the interior of a portion of cheese

the interior of your refrigerator

the Piazza San Marco

Manhattan Canyon)

a rabbit hole

the interior of a kangaroo pouch

the lumen of your gut

the interior of your office

the Grand Canyon

the hold of a ship

Imported From

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

9.13 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

9.14 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

9.15 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

9.16 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

a hurricane

a human being

a puff of smoke

a forest fire

the undetached arm of a human being

a flame

a photon

a tornado

a sea wave

an epidemic

an aggregate of human beings.

an energy wave

Editor's note

BFO 2 Reference: Material entities (continuants) can preserve their identity even while gaining and losing material parts. Continuants 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.

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.

Imported From

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

9.17 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

9.18 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

9.19 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

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.

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).

Imported From

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

Term editor

PERSON: Chris Stoeckert

9.20 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

9.21 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

9.22 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: Alan Ruttenberg

PERSON: Bill Hogan

PERSON: Bjoern Peters

PERSON: Melanie Courtot

9.23 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

9.24 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

9.25 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

Editor's note

clarify

Imported From

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

Term editor

PERSON: Michael Conlon

9.26 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

9.27 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

9.28 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

9.29 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

9.30 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

9.31 NCBITaxon_9606 - Homo sapiens

Label

Homo sapiens

Alternate name

human

human being

Definition

The species of bipedal primates to which moden humans belong

Imported From

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

9.32 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

9.33 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

9.34 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

9.35 ORG_0000004 - non-profit organization

Label

non-profit 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

9.36 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

9.37 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

9.38 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

9.39 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

9.40 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 diffierent things. Often consortiums have the word "association" in their title.

Term editor

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

9.41 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

9.42 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 Rsearch 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

9.43 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 exteension services

Editor's note

Extension is most commonly used to describe agircultural extension services.

Term editor

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

9.44 ORG_0000013 - 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

9.45 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

9.46 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

9.47 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 servces

Term editor

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

9.48 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

9.49 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 entitites

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

9.50 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

9.51 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 and 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

9.52 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 Pyschological Association, The University of California Berkeley has a disposition to publish

Term editor

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

9.53 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

9.54 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

9.55 ORG_0000024 - 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

9.56 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

9.57 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 allhave dispositions of library

Editor's note

Perhaps a function

Term editor

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

9.58 ORG_0000027 - 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

9.59 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 miltary disposition

Editor's note

Perhaps a function

Term editor

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

9.60 ORG_0000029 - religious disposition

Label

religious disposition

Alternate name

church

Definition

A disposition to engage in matters of spirtuality and faith

Definition source

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

Example

The Catholic Church, a local synagogue, a mosque, a buudhist monestary have a relgisious disposition

Editor's note

Perhaps a function.

Term editor

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

9.61 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

9.62 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

Term editor

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

See also

http://purl.obolibrary.org/obo/OBI_0000835

9.63 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

9.64 ORG_0000033 - sports disposition

Label

sports disposition

Definition

A disposition to engage in sports activites, 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

9.65 ORG_0000034 - information address quality

Label

information address quality

Definition

A quality of an information content entity denoted by an address which has the purpose of responding to 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

9.66 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

9.67 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

9.68 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

9.69 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

9.70 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

Term editor

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

9.71 ORG_0000040 - architectural structure

Label

architectural structure

Alternate name

bauwerk

Definition

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

Definition source

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

9.72 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

9.73 ORG_0000042 - facility

Label

facility

Definition

An architectural structure that bears some function.

Definition source

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

9.74 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

9.75 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

9.76 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 discontiguous geographical loctions. 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

9.77 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

9.78 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

9.79 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

9.80 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, Candian 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 verious types of regions – census tracts, zip codes, and others.

Term editor

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

9.81 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

9.82 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 by 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

9.83 ORG_0000052 - founding process boundary

Label

founding process boundary

Alternate name

founding

Definition

The process boundary which defines the moment of creation of an orgnization. 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

9.84 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

9.85 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

9.86 ORG_0000055 - succession process

Label

succession process

Definition

The process by which one organization gores 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 occurent parts

Term editor

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

9.87 ORG_0000056 - succession process boundary

Label

succession process boundary

Definition

A process boundary within a succession process. Complex succesion 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

9.88 ORG_0000057 - web site

Label

web site

Definition

An 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

9.89 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

9.90 ORG_0000059 - spin-off process boundary

Label

spin-off process boundary

Definition

A boundary in 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 ac quisition, and patent licensing

Term editor

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

9.91 ORG_0000060 - organizational membership

Label

organizational membership

Definition

An 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

9.92 ORG_0000061 - organizational member role

Label

organizational member role

Alternate name

member

Definition

A 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

9.93 ORG_0000062 - organizational member grantor role

Label

organizational member grantor role

Definition

A 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 theoir memberships to their members

Term editor

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

9.94 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

9.95 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

9.96 ORG_0000065 - minority led organization quality

Label

minority led organization quality

Definition

The quality of an organiztion 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

9.97 ORG_0000066 - registered location quality

Label

registered location 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

9.98 ORG_0000067 - primary location quality

Label

primary location 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

9.99 ORG_0000068 - organizational position

Label

organizational position

Alternate name

post

Definition

An asymmetric relationship between an organization and a person. Each has a role in the position or post

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

9.100 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

9.101 ORG_0000070 - organizational employor role

Label

organizational employor 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

9.102 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

9.103 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

9.104 ORG_0000073 - organizatonal head role

Label

organizatonal 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

9.105 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

9.106 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

Term editor

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

9.107 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

9.108 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

9.109 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

9.110 ORG_0000079 - airline disposition

Label

airline disposition

Definition

The disposition of an organization that operates airplanes carrying frieght 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

9.111 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

9.112 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

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

9.113 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

9.114 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

9.115 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 has a person member role with respect to The Beatles

Term editor

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

9.116 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 socieities have a grantor role with respect to their members

Term editor

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

9.117 Concept - (skos) concept

Label

(skos) concept

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 addding (skos) to insure unique labels as required by the OBO Principles. MC.

9.118 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

9.119 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

9.120 All Classes

See *Table 5*.

Table 1: Table 5 Classes

Term ID	Label	Definition
BFO_0000001	entity	The fundamental thing that has existence. All th
BFO_0000002	continuant	An entity which has existence in time
BFO_0000003	occurrent	An entity which occurs in time
BFO_0000004	independent continuant	B is an independent continuant = Def. b is a con
BFO_0000008	temporal region	An occurent which is some part of time
BFO_0000015	process	P is a process = Def. p is an occurrent that has
BFO_0000016	disposition	A realizable entity that presents in a continuan
BFO_0000017	realizable entity	To say that b is a realizable entity is to say t
BFO_0000019	quality	A quality is a specifically dependent continuant
BFO_0000020	specifically dependent c	B is a specifically dependent continuant = Def.
BFO_0000023	role	B is a role means: b is a realizable entity & b
BFO_0000029	site	B is a site means: b is a three-dimensional imma
BFO_0000031	generically dependent co	B is a generically dependent continuant = Def. b
BFO_0000035	process boundary	P is a process boundary =Def. p is a temporal pa
BFO_0000038	one-dimensional temporal	A one-dimensional temporal region is a temporal
BFO_0000040	material entity	A material entity is an independent continuant t
BFO_0000141	immaterial entity	An immaterial entity is the boundary or interior
BFO_0000148	zero-dimensional tempora	A temporal region of no duration.
IAO_0000030	information content enti	A generically dependent continuant that is about
IAO_0000422	postal address	A textual entity that is used as directive to de
IAO_0000429	email address	A designation used to deliver email to a recipie
IAO_0000578	centrally registered ide	An information content entity that consists of a
IAO_0020000	identifier	An identifier is an information content entity t
IAO_0022003	crossref funder identifi	An identifier assigned by CrossRef to an organiz
IAO_0022006	dbpedia identifier	A URL used by DBpedia to identify an entity
IAO_0022010	global research organiza	An identifier assigned and managed by Digital Sc
IAO_0022014	international standard n	An identifier for persons and organizations whic
IAO_0022022	research organization re	An identifier assigned by ROR to research organi
IAO_0022027	wikidata q number	QID (or Q number) is the unique identifier of a
IAO_0022057	ringgold identifier	The Ringgold Identifier is a unique numerical id
NCBITaxon_9606	Homo sapiens	The species of bipedal primates to which moden h
ORG_0000001	organization	A group of people recognized as such by people o
ORG_0000002	government organization	An organization which is the body of persons tha
ORG_0000003	company	A legal entity of associated persons created for
ORG_0000004	non-profit organization	A legal entity of associated persons created for
ORG_0000005	informal organization	A group of people recognized as such by people o
ORG_0000006	organization part	An organization which exists as part of another
ORG_0000007	university disposition	A disposition to award academic degrees and cond
ORG_0000008	association disposition	A disposition to organize organizations or indiv
ORG_0000009	consortium disposition	A disposition to organize organizations along in
ORG_0000010	service provider disposi	A disposition to provide service with or without
ORG_0000011	laboratory service provi	A disposition to provide laboratory services. I
ORG_0000012	extension provider dispo	A disposition to provide extension services, typ
ORG_0000013	technology transfer disp	A disposition to create licenses for intellectua

continues on next page

Table 1 – continued from previous page

Term ID	Label	Definition
ORG_0000014	philanthropy disposition	A disposition to donate charitable causes, somet
ORG_0000015	funding disposition	A disposition to fund proposals, often is respon
ORG_0000016	health care service prov	A disposition to provider health care to humans
ORG_0000017	hospital service provide	A disposition to provide hospital-based health c
ORG_0000018	archive disposition	A disposition to collect, store, and provide acc
ORG_0000019	museum disposition	A disposition to collect, store, and provide acc
ORG_0000020	gallery disposition	A disposition to display collected works from an
ORG_0000021	publishing disposition	A disposition to publish information content ent
ORG_0000022	research disposition	A disposition to conduct research
ORG_0000023	education disposition	A disposition to teach, and provide experiential
ORG_0000024	training disposition	A disposition to train, and provide experiential
ORG_0000025	research administration	A disposition to provide resources and oversight
ORG_0000026	library disposition	A disposition to provide library services
ORG_0000027	commerce disposition	A disposition to sell things
ORG_0000028	military disposition	A disposition to engage in warfare
ORG_0000029	religious disposition	A disposition to engage in matters of spirtualit
ORG_0000030	governing disposition	A disposition to provide governance
ORG_0000031	manufacturing dispositio	A dispositon to construct material entities
ORG_0000032	project team disposition	A disposition to execute and finish a project.
ORG_0000033	sports disposition	A disposition to engage in sports activites, typ
ORG_0000034	information address qual	A quality of an information content entity denot
ORG_0000035	billing address quality	A quality of an address to be used to receive bi
ORG_0000036	shipping address quality	A quality of an address to be used to receive sh
ORG_0000037	preferred address qualit	A quality of an address to be displayed in most
ORG_0000038	homepage quality	A quality to be the primary website for an entit
ORG_0000039	wikipedia quality	A quality to be the webpage within WikiPedia reg
ORG_0000040	architectural structure	A material entity that is a human made strcuture
ORG_0000041	campus	The geographic location consisting of the groun
ORG_0000042	facility	An architectural structure that bears some funct
ORG_0000043	building	A permanent walled and roofed construction
ORG_0000044	room	A space contained by a partitioned part of the i
ORG_0000045	geographic region	A place on the earth. Not necessarily contiguou
ORG_0000046	geographic point	A point located on the earth
ORG_0000047	continent	One of the main landmasses of the globe, usually
ORG_0000048	country	The territory governed by a sovereign state.
ORG_0000049	region	A subdivision of the territory of a country
ORG_0000050	populated place	A named place on the earth occupied by people
ORG_0000051	founding process	The process by which the organization was founde
ORG_0000052	founding process boundar	The process boundary which defines the moment of
ORG_0000053	dissolution process	The process by which an organization no longer e
ORG_0000054	dissolution process boun	The process boundary which marks the moment at w
ORG_0000055	succession process	The process by which one organization gores out
ORG_0000056	succession process bound	A process boundary within a succession process.
ORG_0000057	web site	An information content entity consisting of a gr
ORG_0000058	spin-off process	The process by which one organization spins off
ORG_0000059	spin-off process boundar	A boundary in a spin-off process
ORG_0000060	organizational membershi	An asymmetric relationship involving two organiz
ORG_0000061	organizational member ro	A role of an organization in being a member of a
ORG_0000062	organizational member gr	A role of an organization in granting a member r

continues on next page

Table 1 – continued from previous page

Term ID	Label	Definition
ORG_0000063	student led organization	The quality of an organization that is led by a
ORG_0000064	woman led organization q	The quality of an organization that is led by a
ORG_0000065	minority led organizatio	The quality of an organiztion that is led by a d
ORG_0000066	registered location qual	The quality of a location that is the legal/regi
ORG_0000067	primary location quality	The quality of a location that is the primary/pr
ORG_0000068	organizational position	An asymmetric relationship between an organizati
ORG_0000069	organizational employee	The role of a person to be an employee of an org
ORG_0000070	organizational employor	The role of an organization to employ a person
ORG_0000071	organizational associate	The role of a person to be an associate of an or
ORG_0000072	organizational associate	The role of an organization to grant associate s
ORG_0000073	organizatonal head role	The role of a person to be the head of an organi
ORG_0000074	organizational head gran	The role of an organization to grant head status
ORG_0000075	organizational appointee	The role of a person to be an appointee of an or
ORG_0000076	organizational appointee	The role of an organization to grant appointee s
ORG_0000077	organizational volunteer	The role of a person to be a volunteer of an org
ORG_0000078	organizational volunteer	The role of an organization to grant volunteer s
ORG_0000079	airline disposition	The disposition of an organization that operates
ORG_0000080	media disposition	The disposition of an organization that creates,
ORG_0000081	performing disposition	The disposition of an organization to perform li
ORG_0000082	labor union disposition	The disposition of an organization to organize w
ORG_0000083	person membership	The asymmetric relationship representing a perso
ORG_0000084	person member role	The role of a person to be a member of an organi
ORG_0000085	person member grantor ro	The role of an organization to grant membership
Concept	(skos) concept	An idea or notion, a unit of thought
Instant	Time instant	A zero-dimensional part of time. Precision may
TemporalUnit	Temporal unit	A specification of a time duration. Used to spe

CHAPTER

TEN

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.[1]

10.1 BFO_0000050 - part of

Label

part of

Definition

A core relation that holds between a part and its whole

Example

this day is part of this year (occurrent parthood)

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

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

[1] Are these the correct domain and range for such a property? Discuss.

Editor's note

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.

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

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'.

Imported From

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

See also

http://www.obofoundry.org/ro/#OBO_REL:part_of

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

http://ontologydesignpatterns.org/wiki/Community:Parts_and_Collections

10.2 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)

this year has part this day (occurrent parthood)

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

Editor's note

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

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'.

Imported From

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

10.3 BFO_0000054 - realized in

Label

realized in

Alternate name

realized_in

is realized by

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 fragility is realized in this shattering

this investigator role is realized in this investigation

this disease is realized in this disease course

Imported From

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

10.4 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 shattering realizes this fragility

this investigation realizes this investigator role

this disease course realizes this disease

Imported From

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

10.5 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

10.6 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

10.7 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

10.8 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

10.9 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

10.10 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 XSDdatetimestamp 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

10.11 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

10.12 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

10.13 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

10.14 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

10.15 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

10.16 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

10.17 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 Anethesiology at UF organizational part of College of Medicine at UF

Term editor

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

10.18 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 associatiion

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

10.19 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

10.20 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

10.21 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 on organizaton 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

10.22 ORG_2000015 - organizational member of

Label

organizational member of

Definition

The property that associates a member organizaiton 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

10.23 ORG_2000016 - has organizational employee

Label

has organizational employee

Definition

The property that assocates 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

Term editor

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

10.24 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

Term editor

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

10.25 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

10.26 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

10.27 ORG_2000020 - has organizational head

Label

has organizational head

Definition

The property that associates an organziation 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

10.28 ORG_2000021 - organizational head of

Label

organizational head of

Definition

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

10.29 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

10.30 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

10.31 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

10.32 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

10.33 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

10.34 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

10.35 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 fragility inheres in this vase

this red color inheres in this apple

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

10.36 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

10.37 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 investigator participates in this investigation

this blood clot participates in this blood coagulation

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

Imported From

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

10.38 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 process has participant this input material (or this output material)

this investigation has participant this investigator

this blood coagulation has participant this blood clot

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

10.39 RO_0000080 - quality of

Label

quality of

Alternate name

is quality of

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

10.40 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

10.41 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

10.42 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

10.43 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

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

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

Imported From

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

10.44 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/2021-03-08/ro.owl

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

10.45 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

10.46 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

10.47 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

10.48 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

10.49 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

10.50 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*.

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

10.51 All Object Properties

See *Table 7*.

Table 2: Table 7 Object Properties

Term ID	Label	Definition
BFO_0000050	part of	A core relation that holds between a part and it
BFO_0000051	has part	A core relation that holds between a whole and i
BFO_0000054	realized in	A relation between a realizable entity and a pro
BFO_0000055	realizes	A relation between a process and a realizable en
IAO_0000136	is about	A (currently) primitive relation that relates an
IAO_0000219	denotes	A primitive, instance-level, relation obtaining
IAO_0000235	denoted by	Inverse of the relation 'denotes'
ORG_2000001	occupies	The property that associates an organization occ
ORG_2000002	has occurent part	The property that associates an occurent which h
ORG_2000003	has time instant	The property that associates a process boundary
ORG_2000004	has organizational inter	The property that associates an organization wit
ORG_2000005	has website	The property that associates an organization wit
ORG_2000006	website of	The property that associates a website with its
ORG_2000007	has successor organizati	The property that associates an organization wit
ORG_2000008	successor organization o	The property that associates an on organization
ORG_2000009	has organizational part	The property that associates an organization wit
ORG_2000010	organizational part of	The property that associates an organization par
ORG_2000011	affiliated with	The property that associates an organization wit
ORG_2000012	has spin-off organizatio	The property that associates an organization wit
ORG_2000013	spin-off organization of	The property that associates an organization wit
ORG_2000014	has organizational membe	The property that associates an organization wit
ORG_2000015	organizational member of	The property that associates a member organizait
ORG_2000016	has organizational emplo	The property that assocates an organization with
ORG_2000017	organizational employee	The property that associates a person with the o
ORG_2000018	has organizational assoc	The property that associates an organization wit
ORG_2000019	organizational associate	The property that associates a person with an or
ORG_2000020	has organizational head	The property that associates an organziation wit

continues on next page

Table 2 – continued from previous page

Term ID	Label	Definition
ORG_2000021	organizational head of	The property that associates a person with an or
ORG_2000022	has organizational volun	The property that associates an organization wit
ORG_2000023	organizational volunteer	The property that associates a person with an or
ORG_2000024	has organizational appoi	The property that associates an organization wit
ORG_2000025	organizational appointee	The property that associates a person with the o
ORG_2000026	has person member	The property that associates an organization wit
ORG_2000027	person member of	The property that associates a person with an or
RO_0000052	inheres in	A relation between a specifically dependent cont
RO_0000053	bearer of	A relation between an independent continuant (th
RO_0000056	participates in	A relation between a continuant and a process, i
RO_0000057	has participant	A relation between a process and a continuant, i
RO_0000080	quality of	A relation between a quality and an independent
RO_0000086	has quality	A relation between an independent continuant (th
RO_0000091	has disposition	A relation between an independent continuant (th
RO_0001015	location of	A relation between two independent continuants,
RO_0001025	located in	A relation between two independent continuants,
RO_0002012	occurent part of	A part of relation that applies only between occ
RO_0002131	overlaps	X overlaps y if and only if there exists some z
RO_0002234	has output	P has output c iff c is a participant in p, c is
RO_0002323	mereotopologically relat	A mereological relationship or a topological rel
RO_0002353	output of	Inverse of has output
unitType	temporal unit type	An indicator of the temporal precision of a time

CHAPTER

ELEVEN

DATATYPE PROPERTIES

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

12th arrondissement of Paris

20g

I feel sick to my stomach every Tuesday

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

Mark Miller

Damion Dooley

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

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 incude: 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

11.10 All Datatype Properties

See *Table 8*.

Table 1: Table 8 Datatype Properties

Term ID	Label	Definition
OBI_0002815	has representation	Define 'has representation' is a data property t
ORG_3000001	number of employees	Specifies the number of people (headcount) who r
ORG_3000002	has email representation	Specifies the email address string for an email
ORG_3000003	has postal address repre	Specifies the postal address string for a postal
ORG_3000004	has geolocation represen	Specifies the geolocation string for a geolocati
ORG_3000005	has URL representation	Specifies the value of a URL that represents the
ORG_3000006	has official organizatio	Specifies the value of a name of the organizatio
ORG_3000007	has organization name	Specifies the value of a name of an organization
inXSDDateTimeStamp	in XSD Date-Time-Stamp	A datatype property to contain the representatio

CHAPTER

TWELVE

NAMED INDIVIDUALS

Named individuals are entities which are instances of classes. A university, a non-profit, a government agency, a date, and a role in a project are all named individuals.

12.1 unitDay - Day (unit of temporal duration)

Label

Day (unit of temporal duration)

12.2 unitHour - Hour (unit of temporal duration)

Label

Hour (unit of temporal duration)

12.3 unitMinute - Minute (unit of temporal duration)

Label

Minute (unit of temporal duration)

12.4 unitMonth - Month (unit of temporal duration)

Label

Month (unit of temporal duration)

12.5 unitSecond - Second (unit of temporal duration)

Label

Second (unit of temporal duration)

12.6 unitWeek - Week (unit of temporal duration)

Label

Week (unit of temporal duration)

12.7 unitYear - Year (unit of temporal duration)

Label

Year (unit of temporal duration)

12.8 All Named Individuals

See *Table 9*.

Table 1: Table 9 Named Individuals

Term ID	Label	Definition
unitDay	Day (unit of temporal du	None
unitHour	Hour (unit of temporal d	None
unitMinute	Minute (unit of temporal	None
unitMonth	Month (unit of temporal	None
unitSecond	Second (unit of temporal	None
unitWeek	Week (unit of temporal d	None
unitYear	Year (unit of temporal d	None

CHAPTER

THIRTEEN

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 cler 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 annotate the ontology.

Identifiers

The Identifier Ontology[1] 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.[2]

Additional detail regarding structures

We have tried to include enough, but not too much. This is not a structures ontology.[3].

[1] The Identifier Ontology is underdevelopment as a planned expansion of Information Artifact Ontology (IAO)
[2] We follow in the footsteps of *VIVO 1*, including terms that have shown their value over a decade of use.
[3] 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.

CHAPTER

FOURTEEN

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[1].

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, non-profit) 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 a specific type[2].

Table 16 provides a guide for translating Organizational types to assertions in the Organization Ontology.

[1] We in tend to provide SPARQL CONSTRUCT queries for automatica 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.

[2] Note that additional information is needed. The Metropolitan Museum of Art in New York City is a non-profit 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 non-profit, 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. Type is often non-profit. Disposition is association.
Center	Unknown type. Assert organization only. Type is often an organization part. Unknown dispositions. Often research.
College	Unknown type. Assert organization only. At a US university, an organizational part. At a US university, dispositions of education, service, research
Company	Type is Company Disposition is often commerce
Consortium	Unknown type. Assert Organization only. Type is often non-profit Disposition is often association
CoreLaboratory	Type is organization part Dispositions are laboratory and service provider
Department	Type is organizational part Unknown dispositions
Division	Type is organizational part Unknown dispositions
ExtensionUnit	Type is organizational part Disposition is agricultural extension
ERO_00000565	Type is organizational part Disposition is technology transfer
Foundation	Type may be non-profit Type may be organizational part May be affiliated with another organization Disposition is philanthropy Disposition may be funder
FundingOrganization	Unknown type. Assert organization only. Disposition is funder
GovernmentAgency	Type is government organization or organizational part Disposition is unknown
Hospital	Unknown type. Assert organization only. Disposition is hospital.
Institute	Unknown type. Assert organization only. Disposition is unknown. Often research.
Laboratory	Unknown type. Assert organization only. Disposition is laboratory.
Library	Unknown type. Assert organization only. Disposition is library.
Museum	Unknown type. Assert organization only. Disposition is library.
Program	Type is organizational part. Disposition is unknown.
Publisher	Type is unknown. Assert organization only. Often type is company. But all others possible. Disposition is publisher.
ResearchOrganization	Unknown type. Assert organization only. Disposition is research.
School	Type is unknown. Assert organization only. At US university, an organizational part. Disposition is often education.
ServiceProvidingLaboratory	Type is unknown. Assert organization only. Dispositions are laboratory and service provider.
StudentOrgani-	Type is organizational part

[3] To be determined.

[4] 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.

CHAPTER

FIFTEEN

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. Disposition is education, research
Healthcare	Unknown type. Assert organization only. Disposition is healthcare, research.
Company	Type is company. Disposition is research.
Archive	Type is unknown. Assert Organization only. Disposition is archive, research.
Nonprofit	Type is nonprofit Disposition is research.
Government	Type is government organization Disposition is research.
Facility	Type is unknown. Organization only. Disposition is research.
Other	Type is unknown. Disposition is research.

CHAPTER

SIXTEEN

TRANSLATING FROM SCHEMA.ORG TO THE ORGANIZATION ONTOLOGY

schema.org is an important folksonomy and JSON model for representing common entities on the web. The organization model of schema.org has organization types and properties which can be represented using the Organization Ontology.

Full interoperability with schema.org is not currently a goal of the Organization Ontology work[1]

16.1 Translating Types

The schema.org organization types are listed in *Table 18* 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 organizational types to assertions in the VIVO Organization Ontology.

[1] Full interoperability between 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 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. Disposition is airline.
Consortium	Unknown type. Assert Organization only. Type is often non-profit Disposition is often association
Corporation	Type is company. Disposition is often commerce.
EducationalOrganization	Type is unknown. Assert Organization only. Disposition is education.
FundingScheme	Type is unknown. Assert organization only.[2] Disposition is funding.
GovernmentOrganization	Type is government organization Disposition is unknown.
LibrarySystem	Type is unknown. Organization only. Disposition is library.
LocalBusiness	Type is company. Disposition is often commerce.
MedicalOrganization	Unknown type. Assert Organization only. Disposition is healthcare provider
NGO	Type is non-profit Disposition is unknown.
NewsMediaOrganization	Type is unknown. Assert Organization only. Disposition is media.
PerformingGroup	Type is unknown. Assert Organization only. Disposition is performing
Project	Type is unknown. Perhaps informal.[3] Disposition is project.
SportsOrganization	Type is unknown. Assert organization only. Disposition is sports.
WorkersUnion	Type is unknown. Often non-profit. Disposition is labor union.

[2] 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.

[3] In Basic Formal Ontology (BFO) ontologies, the word "project" is used to describe a particular type of process, that is, an occurent. 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.

CHAPTER

SEVENTEEN

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>
```

CHAPTER

EIGHTEEN

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.

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.

18.1 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 occurent 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

18.2 References

CHAPTER

NINETEEN

FOR ONTOLOGY AUTHORS

Here will have information for those writing ontologies.

CHAPTER

TWENTY

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.

20.1 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.

20.2 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.

20.3 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.

20.4 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, versional control, and release management for the documentation. Put documentation in a `docs` folder of the ontology repository. GitHub renders RestructuredText pages (pages with .rst file types) automatically for those who wish to check oor 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.

CHAPTER

TWENTYONE

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 organizatins 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.

CHAPTER

TWENTYTWO

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CHAPTER

TWENTYTHREE

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