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{AU/ED. For XML tagging purposes, the terms and the definitions had to be separated. They will be rejoined in the page proofs.}

Adequatism.

The view that the entities in any given domain should be taken seriously on their own terms (as contrasted with **reductionism**). The goal of adequatism is to do justice to all the different kinds of entities that exist in reality; seealso **General principles of ontology design**.

All-some structure.

The structure that applies to the relations obtaining between **universals** whereby if a universal C bears some relation *R* to a universal D, then all relevant instances of C must bear the relevant instance-level relation to some instance of D at all relevant times.

Aristotelian definitional structure.

A definition that has the basic form “An A is a B that Cs” where “A” is the *definiendum*, the term that is being defined; “B that Cs” is the *definiens*, the expression that does the defining; and “C” is a statement of the *differentia*, that is to say, a statement of what it is that marks out those instances of B that are As (those features Bs must possess in order to be As).

Basic Formal Ontology (BFO).

A top-level (or upper-level) ontology consisting of **continuants** and **occurrents** developed to support integration especially of data obtained through scientific research. BFO is deliberately designed to be very small, in order to represent in consistent fashion those top-level categories common to domain ontologies developed by scientists in different fields. BFO assists domain ontologists by providing a common top-level structure to support the interoperability of the multiple domain ontologies created in its terms.

Category.

A formal (which is to say, domain-neutral) **universal**, such as *entity*, *continuant, occurrent*.

Class.

A maximal collection of particulars falling under a given general **term**; also called the extension of the term (or of the **universal** that the term denotes).

Continuant.

An entity that *continues* or *persists* through time, including (1) independent objects, (2) qualities and dispositions, and (3) the spatial regions these entities occupy at any given time. **Continuant** and **occurrent** are the two highest categories (universals) in BFO.

Continuant fiat boundary.

An **immaterial entity** that is of zero, one, or two dimensions and does not include a spatial region as part. Intuitively, *note(continuant fiat boundary)[*a *continuant fiat boundary* is a boundary of some material entity that exists exactly where that object meets its surroundings.

Controlled vocabulary.

A collection of preferred terms that are used to promote consistent description and retrieval of data.

Defined class.

A collection of **individuals** that are grouped together by virtue of their exhibiting some combination of characteristics that does not correspond to any **universal**.

Description logic (DL).

A fragment of **first-order logic** (FOL) used for purposes of formal knowledge representation and having more efficient decision properties than FOL. See also **Web Ontology Language (OWL)**.

Disposition.

A **realizable entity** (a power, potential, or tendency) that exists because of certain features of the physical makeup of the **independent continuant** that is its bearer.

Domain.

A delineated portion or sphere of reality corresponding to a scientific discipline (such as cell biology or electron microscopy), or to an area of knowledge or interest such as the Great War or stamp collecting.

Domain ontology.

See **Ontology, domain**.

Entity.

Anything that exists.

Epistemological idealism.

See **Idealism**.

Fallibilism.

The view that, although our current scientific theories are the best candidates we have for representing the truth about reality, it may nevertheless be the case any given stage that elements of our best current knowledge are at incorrect; see **General principles of ontology design**.

Fiat object part.

A **material entity** that is a proper part of some larger object, but is not demarcated from the remainder of this object by any physical discontinuities (thus, it is not itself an object). Examples include your upper torso, the Western hemisphere of the planet Earth.

First-order logic (FOL).

A formal language and system of reasoning utilizing predicates, constants and variables, quantifiers (all, some, none), and logical connectives (and, not, or, material implication); also known as first-order predicate logic; see also **Description logic (DL)**.

Foundational relations.

The fundamental relations in BFO, especially *is\_a* (meaning “is a subtype of”) and relations of part to whole.

Function.

A **realizable entity** whose realization is an end- or goal-directed activity of its bearer that exists in the bearer in virtue of its having a certain physical make-up as a result of either natural selection (in the case of biological entities) or intentional design (in the case of artifacts).

General principles of ontology design.

The principles to applied in every process of designing an ontology, including **realism**, **perspectivalism**, **adequatism**, **fallibilism**, the **open-world assumption**, and the **low-hanging fruit principle**.

Generically dependent continuant.

A **continuant** that is dependent on one or other **independent continuants** and can migrate from one bearer to another through a process of copying. We can think of generically dependent continuants as complex continuant patterns either of the sort created by authors or designers or (in the case of DNA sequences) brought into being through the processes of evolution.

Granularity.

The distinction between levels of reality exemplified in the biological domain for example in the levels of cells, organs, organisms and populations. See **Perspectivalism.**

History.

ABFO*process*that is the sum of the totality of processes taking place in the spatiotemporal region occupied by a material entity or site.

Idealism.

The thesis that our perceptions, thoughts, and statements are not about reality, but are rather about certain mental or created objects (variously called appearances, concepts, ideas, or models). For the idealist, there is nothing that exists (or, for the defender of **Epistemological idealism**, nothing that can be known) outside of the realm of sensations or ideas or concepts; see also **Realism**.

Immaterial entity.

An **independent continuant** that contains no **material entities** as parts. Immaterial entities divide into two major subgroups: (1) boundaries and sites, which bound, or are demarcated in relation to, material entities, and which can thus change location, shape, and size as their material hosts move or change shape or size; (2) spatial regions, which exist independently of material entities, and which thus do not change.

Independent continuant.

A **continuant** entity that is the bearer of qualities and a participant in processes. Independent continuants are such that their identity can be maintained over time through gain and loss of parts, as well as through changes in qualities.

Individual.

See **Particular.**

Inherence.

A one-sided dependence that obtains between **specifically** and **generically dependent continuants** on the one hand and **independent continuants** on the other. **Qualities**, **dispositions**, and **roles** inhere in independent continuants.

Instance.

See **Particular.**

Instantiation.

A relation between a **particular** and a **universal**; the particular is one of an open-ended set of particulars that are similar in the relevant respect; the particular is such that if it ceases to be an instance of this universal then it ceases to exist.

Inventory.

A representational artifact consisting of entries designed to keep track of the particulars contained, for example, in a warehouse of products.

is\_a.

The subtype relation used to form the backbone taxonomic hierarchy of an ontology.

Low-hanging fruit principle.

The principle that states that the designer of a domain ontology should start with those (often trivial) features of the subject matter that are the easiest and clearest to understand; also see **General principles of ontology design**.

Material entity.

An **independent continuant** that has some portion of matter as part, is spatially extended in three dimensions, and that continues to exist through some interval of time, however short. Three principal subtypes of material entity are **object**, **fiat object part**, and **object aggregate.**

Nominalism.

The position that there are no **universals**, in contrast to **ontological** **realism**; also see **Representationalism**.

Object.

A **material entity** that is (1) spatially extended in three dimensions; (2) causally unified; and (3) maximally self-connected. Examples include a single cell, a laptop, an organism, a planet, a spaceship.

Object aggregate.

A **material entity** that has as parts (exactly) two or more **objects** that are separate from each other in the sense that they share no parts in common. Examples include a heap of stones, a population of bacteria, a flock of geese.

Occurrent.

An entity that unfolds itself in time; the BFO category of *occurrents* comprises not only (1) the **processes** that unfold themselves in their successive temporal phases, but also (2) the boundaries or thresholds at the beginnings or ends of such temporal phases, as well as (3) the **temporal** and **spatiotemporal regions** in which these processes occur. **Occurrent** and **continuant** are the two highest categories (universals) in BFO.

One-dimensional continuant fiat boundary.

A **continuant fiat boundary** that is a continuous fiat line whose location is defined in relation to some **material entity**. Examples include the boundary of a real estate parcel, your waistline.

One-dimensional spatial region.

A **spatial region** with one dimension, also called a spatial line, defined relative to some reference frame; for example, lines of latitude and longitude.

One-dimensional temporal region.

A **temporal region** that is extended in time. It has further temporal regions as parts. One-dimensional temporal regions are the temporal regions in which processes occur or unfold.

Ontological realism.

The view according to which the general truths about reality that science discovers are grounded in universals, which are common features and characteristics of the entities in reality in virtue of which they are grouped into circles of similars; compare **Nominalism**, **Representationalism**.

Ontology.

A **representational artifact**, comprising a taxonomy as proper part, whose representations are intended to designate some combination of universals, defined classes, and certain relations between them; see also **Ontology, philosophical**.

Ontology, application.

An application ontology is an ontology created to accomplish some task of local significance. See **Ontology, reference**.

Ontology, domain.

A domain ontology is an ontology that describes and categorizes some **domain.**

Ontology, formal.

The study of the universals, relations, and structures common to all domains of reality; also used to refer to an upper-level ontology such as BFO.

Ontology, material.

The study of the universals, relations, and structures common to some specific domain of reality; sometimes used as a synonym of “**domain ontology**.”

Ontology, philosophical.

The theory of what exists—the study of the kinds of entities in reality and of the relationships that these entities bear to one another; also known as *metaphysics*. The goal of philosophical ontology is to provide a clear, coherent, and rigorously worked out account of the basic structures of reality.

Ontology, reference.

An ontology that is intended to provide a comprehensive representation of the entities in a given domain encapsulating the terminological content of established knowledge of the sort that is contained in a scientific textbook.

Ontology, top- (or upper-) level.

An ontology of highly general categories and relations that subsume the universals represented by specific domain ontologies.

Open-world assumption.

The assumption that we capture knowledge within an ontology or ontology-like resource in an ongoing process as we discover it, so that we can at no stage guarantee that we have discovered complete information—hence no conclusions should be drawn from the fact that a given assertion is not recorded in our system; see **General principles of ontology design**.

Participation.

The relation between a **material entity** and a **process** that obtains in virtue of the fact that the former participates in the latter.

Particular.

An individual (nonrepeatable) denizen of reality (an instance of a **universal**); all particulars stand in the relation of *instantiates* to some universal; each particular occupies a unique spatiotemporal location.

Particular-particular relation.

A relation between one particular and another; also called an instance-level relation; for example: Mary’s leg **part\_of** Mary; see **Relation**.

Perspectivalism.

The view according to which reality is too complex and variegated to be embraced within a single scientific theory, and that multiple distinct scientific theories may be equally accurate representations of one and the same reality, for instance because they partition this reality at different levels of **granularity**; see **General principles of ontology design**.

Principle of reuse.

A principle stating that ontologies should as far as possible reuse the ontological content that has already been created; see **General principles of ontology design**.

Process.

An **occurrent** entity that exists in time by occurring or happening, has temporal parts, and always depends on at least one **independent continuant** as participant.

Process boundary.

An **occurrent** entity that is the instantaneous temporal boundary of a **process**.

Quality.

A **specifically dependent continuant** that, if it inheres in an entity at all, is fully exhibited, manifested, or realized in that entity. In order for a quality to exist, one or more independent continuants must also exist. Examples include the mass of a kidney, the color of this portion of blood, and the shape of a hand.

Realism.

The view that thought, experience, and knowledge are (if partially and fallibly) about reality. A view of this sort should be the general attitude to be kept in mind throughout the process of designing an ontology; see **General principles of ontology design**.

Realizable entity.

A **specifically dependent continuant entity** that has at least one **independent continuant** as its bearer, and whose instances can be realized (manifested, actualized, executed) in associated processes of specific correlated types in which the bearer participates.

Reflexivity.

The property of a relation *R* whereby anything that bears *R* to something also bears that relation to itself. The relation “is as tall as” is reflexive, because when John is as tall as Jill, then he also stands in this same relation to himself.

Relation.

The manner in which two or more entities are associated or connected together. BFO recognizes three basic types of relation: connecting **universal** to **universal**, **universal** to **particular**, and **particular** to **particular**.

Relational quality.

A **quality** that inheres in two or more independent continuants. Examples include *a(relational quality)[*a marriage bond, a debt, an agreement.*]* From the BFO perspective there is both the relational quality **universal** *marriage bond* as well as specific instantiations of this universal obtaining between (and specifically depending upon) John and Mary, Bill and Sally, and so forth.

Representation.

An entity that makes reference to or is about another entity or entities.

Representational artifacts.

A **representation** that has been produced by someone and made available in a form that allows it to be accessed by others (such as a drawing, map, book, or computer database).

Representationalism.

The view that our perceptions, thoughts, beliefs, or models are directly about concepts (or ideas or images) in our minds and only indirectly about nonmental entities of various sorts in reality. On this view, what we actually know are not things in reality, but the ways in which we experience and conceptualize these things; see **Idealism**, **Realism**.

Representationalist interpretation of knowledge.

The view that the goal of knowledge representation is to represent concepts or ideas; see **Representationalism**, **Idealism**, **Realism**.

Role.

A **realizable entity** that (1) exists because the bearer is in some special physical, social, or institutional set of circumstances in which the bearer does not have to be, and (2) is not such that, if this realizable entity ceases to exist, then the physical make-up of the bearer is thereby changed. A role is thus always optional.

Semantic interoperability.

A property that obtains between two (or more) data or information systems when they are such that, because their terms are defined according to a common, logically well-defined ontology, each can carry out the tasks for which it was designed using data and information taken from the other as seamlessly as it can when using its own data and information.

Semantic Web.

Whereas the World Wide Web (WWW) is an interconnected system of web pages, the Semantic Web (SW) is an interconnected system made up of the content (data and information) from those pages. The SW emerged out of thinking in the field of artificial intelligence and was conceived as a system that enables machines to “understand” and respond to complex human queries based on their meaning—hence the use of the term “semantic.”

Site.

An **immaterial entity** in which objects such as molecules of air or organisms can be contained.

Spatial region.

A **continuant entity** that is a part of space. When an object moves from one place to another, it occupies a continuous series of different three-dimensional spatial regions at different times.

Spatiotemporal region.

An **occurrent**entity at or in which **occurrent** entities can be located. Just as the continuant representation of entities views space as a container within which objects and their qualities exist, so too the occurrent representation of processes views the combination of space and time together as such a container, within which processes unfold.

Specifically dependent continuant.

A **continuant** entity that depends on precisely one independent continuant for its existence. The former is dependent on the latter in the sense that, if the latter ceases to exist, then the former will as a matter of necessity cease to exist also. See **Independent continuant**, **Generically dependent continuant.**

Symmetry.

The property of a relation R whereby if a thing A bears R to something else B, then B also bears R to A. Example: if A is adjacent to B, then B is also adjacent to A.

Taxonomy.

A representational artifact taking the form of a graph with nodes representing kinds of things (universals) and edges representing subtype or subclass (*is\_a*) relations among these types of things. The most familiar kind of taxonomy is the classification of living things: domain, kingdom, phylum, class, order, family, genus, and species.

Temporal region.

An **occurrent** entity that is a part of time.

Term.

A noun or noun phrase, understood as a linguistic sign, that is utilized to represent some entity in the world.

Terminology.

A **representational artifact** containing a list of terms, complete with definitions, used in some domain and formulated in a natural language.

Three-dimensional spatial region.

A **spatial region** with three dimensions, also called a spatial volume; for example, the region occupied at any given time by the planet Earth.

Top-level ontology.

See **Ontology, top-level**.

Transitivity.

The property of a relation *R* whereby if a thing A bears *R* to another thing B, and B bears *R* to some third thing C, then A also bears *R* to C. A simple example is *being taller than*.

Two-dimensional continuant fiat boundary.

A **continuant fiat boundary** that is a self-connected fiat surface whose location is defined in relation to some material entity; for example, any surface of a continuant material object separating that object from the rest of its environment.

Two-dimensional spatial region.

A **spatial region** with two dimensions, also called a spatial surface; for example, the region occupied by the surface of the Earth.

Universal.

A mind-independent, repeatable feature of reality that exists only as instantiated in a respective **particular** (individual thing, instance) and is also dependent upon a particular for its existence. For example, the two universals *red* and *ball* are instantiated in a red ball lying on the floor. All particulars stand in the instantiation relation to some universal. Universals are the sorts of entities that are represented by general terms used in the formulation of scientific laws.

Use-mention distinction.

The distinction between *using* a noun phrase to make reference to something in reality, and *mentioning* the same noun phrase in order to engage in discourse about this noun phrase itself.

Web Ontology Language (OWL).

A family of languages used by the Semantic Web.

Zero-dimensional continuant fiat boundary.

A **continuant fiat boundary** that is a fiat point whose location is defined in relation to some material entity. Examples include the North Pole and the point of origin of a spatial coordinate system.

Zero-dimensional spatial region.

A **spatial region** with no dimensions, also called a spatial point; for example, the Earth’s center of gravity.

Zero-dimensional temporal region.

A **temporal region** that is without extent. Zero-dimensional temporal regions, also called temporal instants, are the temporal regions in which process boundaries are located.