BFO 2020 At T Temporalized Axioms

Located in at some time [asd-1]

$\forall p,q\,(\text{locatedInAtSomeTime}(p,q) \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{locatedIn}(p,q,t)))$

Concretizes at some time [gkc-1]

$\forall p,q\,(\text{concretizesAtSomeTime}(p,q)$
$\quad \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{concretizes}(p,q,t)))$

Location of at some time [spm-1]

$\forall p,q\,(\text{locationOfAtSomeTime}(p,q) \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{locationOf}(p,q,t)))$

Is carrier of at some time [qkm-1]

$\forall p,q\,(\text{isCarrierOfAtSomeTime}(p,q)$
$\quad \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{isCarrierOf}(p,q,t)))$

Member part of at some time [kax-1]

$\forall p,q\,(\text{memberPartOfAtSomeTime}(p,q)$
$\quad \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{memberPartOf}(p,q,t)))$

Has member part at some time [smy-1]

$\forall p,q\,(\text{hasMemberPartAtSomeTime}(p,q)$
$\quad \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{hasMemberPart}(p,q,t)))$

Has participant at some time [ebs-1]

$\forall p,q\,(\text{hasParticipantAtSomeTime}(p,q)$
$\quad \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{hasParticipant}(p,q,t)))$

Participates in at some time [oia-1]

$\forall p,q\,(\text{participatesInAtSomeTime}(p,q)$
$\quad \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{participatesIn}(p,q,t)))$

Rdf:type is interpreted as meaning an instance is a given type whenever it exists, and that the instance exists at some point. [fyy-1]

$\forall c,i\,(\text{rdfType}(c,i) \leftrightarrow (\forall t\,(\text{existsAt}(i,t) \rightarrow \text{instanceOf}(i,c,t))) \wedge \exists t\,\text{existsAt}(i,t))$

Is concretized by at some time [zgk-1]

$\forall p,q\,(\text{isConcretizedByAtSomeTime}(p,q)$
$\quad \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{isConcretizedBy}(p,q,t)))$

Material basis of at some time [exa-1]

$\forall p,q\,(\text{materialBasisOfAtSomeTime}(p,q)$
$\quad \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{materialBasisOf}(p,q,t)))$

Continuant part of at some time [lzq-1]

$\forall p,q\,(\text{continuantPartOfAtSomeTime}(p,q)$
$\quad \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{continuantPartOf}(p,q,t)))$

Has material basis at some time [fqc-1]

$\forall p,q\,(\text{hasMaterialBasisAtSomeTime}(p,q)$
$\quad \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{hasMaterialBasis}(p,q,t)))$

Has continuant part at some time [jvz-1]

$\forall p,q\,(\text{hasContinuantPartAtSomeTime}(p,q)$
$\quad \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{hasContinuantPart}(p,q,t)))$

Generically depends on at some time [vrq-1]

$\forall p,q\,(\text{genericallyDependsOnAtSomeTime}(p,q)$
$\quad \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{genericallyDependsOn}(p,q,t)))$

Occupies spatial region at some time [yci-1]

$\forall p,q\,(\text{occupiesSpatialRegionAtSomeTime}(p,q)$
$\quad \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{occupiesSpatialRegion}(p,q,t)))$

Spatially projects onto at some time [epa-1]

$\forall p,q\,(\text{spatiallyProjectsOntoAtSomeTime}(p,q)$
$\quad \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{spatiallyProjectsOnto}(p,q,t)))$

Proper continuant part of at some time [sql-1]

$$\forall p,q\,(\text{properContinuantPartOfAtSomeTime}(p,q) \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{properContinuantPartOf}(p,q,t)))$$

Has proper continuant part at some time [ule-1]

$$\forall p,q\,(\text{hasProperContinuantPartAtSomeTime}(p,q) \leftrightarrow \exists t\,(\text{existsAt}(p,t) \wedge \text{existsAt}(q,t) \wedge \text{hasProperContinuantPart}(p,q,t)))$$

Located in at all times [vdo-1]

$$\forall p,q\,(\text{locatedInAtAllTimes}(p,q) \leftrightarrow (\exists t\,(\text{locatedIn}(p,q,t) \wedge \text{existsAt}(p,t))) \wedge (\forall t\,(\text{existsAt}(p,t) \rightarrow \text{locatedIn}(p,q,t))))$$

Concretizes at all times [uge-1]

$$\forall p,q\,(\text{concretizesAtAllTimes}(p,q) \leftrightarrow (\exists t\,(\text{concretizes}(p,q,t) \wedge \text{existsAt}(p,t))) \wedge (\forall t\,(\text{existsAt}(p,t) \rightarrow \text{concretizes}(p,q,t))))$$

Location of at all times [imi-1]

$$\forall p,q\,(\text{locationOfAtAllTimes}(p,q) \leftrightarrow (\exists t\,(\text{locationOf}(p,q,t) \wedge \text{existsAt}(p,t))) \wedge (\forall t\,(\text{existsAt}(p,t) \rightarrow \text{locationOf}(p,q,t))))$$

Is carrier of at all times [fya-1]

$$\forall p,q\,(\text{isCarrierOfAtAllTimes}(p,q) \leftrightarrow (\exists t\,(\text{isCarrierOf}(p,q,t) \wedge \text{existsAt}(p,t))) \wedge (\forall t\,(\text{existsAt}(p,t) \rightarrow \text{isCarrierOf}(p,q,t))))$$

Member part of at all times [maf-1]

$$\forall p,q\,(\text{memberPartOfAtAllTimes}(p,q) \leftrightarrow (\exists t\,(\text{memberPartOf}(p,q,t) \wedge \text{existsAt}(p,t))) \wedge (\forall t\,(\text{existsAt}(p,t) \rightarrow \text{memberPartOf}(p,q,t))))$$

Has member part at all times [xwi-1]

$$\forall p,q\,(\text{hasMemberPartAtAllTimes}(p,q) \leftrightarrow (\exists t\,(\text{hasMemberPart}(p,q,t) \wedge \text{existsAt}(p,t))) \wedge (\forall t\,(\text{existsAt}(p,t) \rightarrow \text{hasMemberPart}(p,q,t))))$$

Has participant at all times [wyo-1]

$$\forall p,q\,(\text{hasParticipantAtAllTimes}(p,q) \leftrightarrow (\exists t\,(\text{hasParticipant}(p,q,t) \wedge \text{existsAt}(p,t))) \wedge (\forall t\,(\text{existsAt}(p,t) \rightarrow \text{hasParticipant}(p,q,t))))$$

Participates in at all times [ghl-1]

$$\forall p,q\,(\text{participatesInAtAllTimes}(p,q) \leftrightarrow (\exists t\,(\text{participatesIn}(p,q,t) \wedge \text{existsAt}(p,t))) \wedge (\forall t\,(\text{existsAt}(p,t) \rightarrow \text{participatesIn}(p,q,t))))$$

Is concretized by at all times [qhq-1]

$$\forall p,q\,(\text{isConcretizedByAtAllTimes}(p,q) \leftrightarrow (\exists t\,(\text{isConcretizedBy}(p,q,t) \wedge \text{existsAt}(p,t))) \wedge (\forall t\,(\text{existsAt}(p,t) \rightarrow \text{isConcretizedBy}(p,q,t))))$$

Material basis of at all times [scx-1]

$$\forall p,q\,(\text{materialBasisOfAtAllTimes}(p,q) \leftrightarrow (\exists t\,(\text{materialBasisOf}(p,q,t) \wedge \text{existsAt}(p,t))) \wedge (\forall t\,(\text{existsAt}(p,t) \rightarrow \text{materialBasisOf}(p,q,t))))$$

Continuant part of at all times [ztt-1]

$$\forall p,q\,(\text{continuantPartOfAtAllTimes}(p,q) \leftrightarrow (\exists t\,(\text{continuantPartOf}(p,q,t) \wedge \text{existsAt}(p,t))) \wedge (\forall t\,(\text{existsAt}(p,t) \rightarrow \text{continuantPartOf}(p,q,t))))$$

Has material basis at all times [qdl-1]

$$\forall p,q\,(\text{hasMaterialBasisAtAllTimes}(p,q) \leftrightarrow (\exists t\,(\text{hasMaterialBasis}(p,q,t) \wedge \text{existsAt}(p,t))) \wedge (\forall t\,(\text{existsAt}(p,t) \rightarrow \text{hasMaterialBasis}(p,q,t))))$$

Has continuant part at all times [uhy-1]

$\forall p,q\,(\text{hasContinuantPartAtAllTimes}(p,q)$
$\quad\leftrightarrow(\exists t\,(\text{hasContinuantPart}(p,q,t)\wedge\text{existsAt}(p,t)))$
$\quad\wedge(\forall t\,(\text{existsAt}(p,t)\rightarrow\text{hasContinuantPart}(p,q,t))))$

Generically depends on at all times [wie-1]

$\forall p,q\,(\text{genericallyDependsOnAtAllTimes}(p,q)$
$\quad\leftrightarrow(\exists t\,(\text{genericallyDependsOn}(p,q,t)\wedge\text{existsAt}(p,t)))$
$\quad\wedge(\forall t\,(\text{existsAt}(p,t)\rightarrow\text{genericallyDependsOn}(p,q,t))))$

Occupies spatial region at all times [tpr-1]

$\forall p,q\,(\text{occupiesSpatialRegionAtAllTimes}(p,q)$
$\quad\leftrightarrow(\exists t\,(\text{occupiesSpatialRegion}(p,q,t)\wedge\text{existsAt}(p,t)))$
$\quad\wedge(\forall t\,(\text{existsAt}(p,t)\rightarrow\text{occupiesSpatialRegion}(p,q,t))))$

Spatially projects onto at all times [ogh-1]

$\forall p,q\,(\text{spatiallyProjectsOntoAtAllTimes}(p,q)$
$\quad\leftrightarrow(\exists t\,(\text{spatiallyProjectsOnto}(p,q,t)\wedge\text{existsAt}(p,t)))$
$\quad\wedge(\forall t\,(\text{existsAt}(p,t)\rightarrow\text{spatiallyProjectsOnto}(p,q,t))))$

Proper continuant part of at all times [jiz-1]

$\forall p,q\,(\text{properContinuantPartOfAtAllTimes}(p,q)$
$\quad\leftrightarrow(\exists t\,(\text{properContinuantPartOf}(p,q,t)\wedge\text{existsAt}(p,t)))$
$\quad\wedge(\forall t\,(\text{existsAt}(p,t)\rightarrow\text{properContinuantPartOf}(p,q,t))))$

Has proper continuant part at all times [mxe-1]

$\forall p,q\,(\text{hasProperContinuantPartAtAllTimes}(p,q)$
$\quad\leftrightarrow(\exists t\,(\text{hasProperContinuantPart}(p,q,t)\wedge\text{existsAt}(p,t)))$
$\quad\wedge(\forall t\,(\text{existsAt}(p,t)\rightarrow\text{hasProperContinuantPart}(p,q,t))))$

Alan Ruttenberg, January 8, 2024. The most recent version of this file will always be in the GitHub repository https://github.com/bfo-ontology/bfo-2020