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**ROH Ontology Classes, Object Properties and DataType Properties**

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## **Abstract**

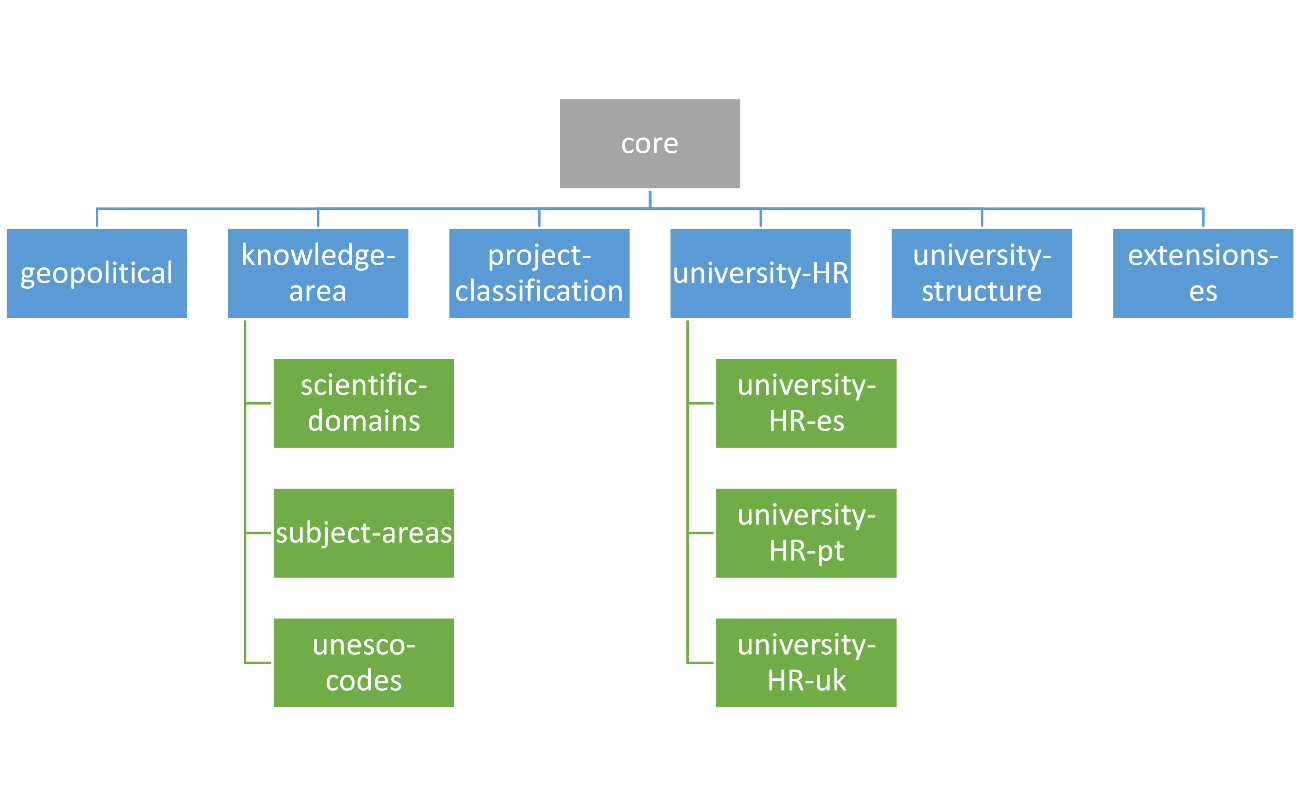
The aim of this document is to provide a bird’s eye view on the entities modelled within ROH. The document includes an overview in tabular form for each of the core entities of the network of ontologies ROH, giving details on the object and data properties supported by each of them. This document is meant to be useful when instances of ROH want to be created, since it clearly explains what entity types a given entity type relates with through an object property and what data properties are supported by a given entity type, including details about its associated object types.

This document should be read as a complement to the [ROH Tutorial document](https://github.com/HerculesCRUE/ROH/blob/gh-pages/0%20-%20OntologyTutorial.pdf) which describes more verbosely the purpose of the core entities of ROH and their relationships with other entities in the ontology.

## **Ontologies used**

The following table lists all ontologies created, which combine entities defined specifically in our core ontology under prefix roh with those reused from other well-known and extensively adopted ontologies. Notice that ROH network of ontologies is divided into 2 main parts as depicted in the following figure:

* The generic ontology, **core module**, contains the most important entities and properties to model information in the academic domain. It contains the central part of the network of ontologies. It covers the academic domain, being agnostic to the country or the research organization whose information wants to be modelled with.
* A set of **vertical modules** which include, on one hand, specializations of some academic concepts for a given country domain. For instance, the figure Associate Professor in the Spanish academic domain would be encountered in the vertical module university-HR-es and is assigned the URI http://purl.org/roh/university-hr/es#ProfesorTitularDeUniversidad. On the other hand, these vertical modules, include controlled vocabularies, according to SKOS ontology, for different important areas in the academic domain, namely, geographical locations (geopolitical) , knowledge areas (including concepts for scientific-domains, subject-areas or unesco-codes), classification of project types (project-classification), resource positions in universities (university-HR for Spain, UK or Portugal), controlled vocabulary with all universities in Spain (university-structure) or some extensions for the Spanish university system (extensions-es).



The following table illustrates the name spaces of the ontologies used within ROH:

|  |  |  |  |
| --- | --- | --- | --- |
| **Prefix** | **Ontology name** | **Ontology namespace** | **Ontology website** |
| bibo | Bibliographic Ontology | [http://purl.org/roh/mirror/bibo#](http://purl.org/roh/mirror/bibo) | <http://bibliontology.com/> |
| cito | CiTO, the Citation Typing Ontology | [http://purl.org/spar/cito#](http://purl.org/spar/cito) | <https://sparontologies.github.io/cito/current/cito.html> |
| foaf | FOAF: Friend of a Friend Ontology | [http://purl.org/roh/mirror/foaf#](http://purl.org/roh/mirror/foaf) | <http://xmlns.com/foaf/spec/> |
| gn | GeoNames Ontology | [http://purl.org/roh/mirror/geonames#](http://purl.org/roh/mirror/geonames) | <http://www.geonames.org/ontology/documentation.html> |
| obo-bfo | OBO Foundry, Basic Formal Ontology | http://purl.org/roh/mirror/obo/bfo# | <http://www.obofoundry.org/ontology/bfo.html> |
| obo-ero | OBO Foundry, eagle-i Research Resource Ontology (ERO) | http://purl.org/roh/mirror/obo/ero# | <https://open.catalyst.harvard.edu/wiki/display/eaglei/Ontology> |
| obo-iao | OBO Foundry, Information Artifact Ontology | http://purl.org/roh/mirror/obo/iao# | <https://github.com/information-artifact-ontology/IAO/> |
| obo-ro | OBO Foundry, Relations Ontology | [http://purl.org/roh/mirror/obo/ro#](http://purl.org/roh/mirror/obo/ro) | <http://www.obofoundry.org/ontology/ro.html> |
| owl | OWL Web Ontology Language | [http://www.w3.org/2002/07/owl#](http://www.w3.org/2002/07/owl) | <https://www.w3.org/TR/owl-features/> |
| rdf | The RDF Concepts Vocabulary (RDF) | [http://www.w3.org/1999/02/22-rdf-syntax-ns#](http://www.w3.org/1999/02/22-rdf-syntax-ns) | <https://www.w3.org/TR/rdf-concepts/> |
| rdfs | RDF Schema 1.1 | [http://www.w3.org/2000/01/rdf-schema#](http://www.w3.org/2000/01/rdf-schema) | https://www.w3.org/TR/rdf-schema/ |
| roh | Red de Ontologías Hércules / Hercules Network of Ontologies | [http://purl.org/roh#](http://purl.org/roh) | https://github.com/HerculesCRUE/ROH/tree/main/sigmaaie/modules/core/doc |
| roh-es | Extensions of ROH for Spanish academic system | [http://purl.org/roh/es#](http://purl.org/roh) | https://github.com/HerculesCRUE/ROH/tree/main/sigmaaie/modules/extensions-es/doc |
| skos | SKOS Simple Knowledge Organization System | [http://www.w3.org/2004/02/skos/core#](http://www.w3.org/2004/02/skos/core) | <https://www.w3.org/TR/2008/WD-skos-reference-20080829/skos.html> |
| terms | DCMI Metadata Terms | [http://purl.org/dc/terms](http://purl.org/umu/uneskos) | https://www.dublincore.org/specifications/dublin-core/dcmi-terms/ |
| vcard | vCard Ontology - for describing People and Organizations | http://purl.org/roh/mirror/vcard# | <https://www.w3.org/TR/vcard-rdf/> |
| vivo | VIVO core ontology | [http://purl.org/roh/mirror/vivo#](http://purl.org/roh/mirror/vivo) | <https://wiki.lyrasis.org/display/VIVO/The+core+ontology+and+its+annotations> |
| oa | The Web Annotation Data Model |  | <https://www.w3.org/ns/oa> |

## **Concepts modelled.**

### vivo:AcademicDegree

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **vivo** | **AcademicDegree** | |  |  |  | vivo | abbreviation | rdfs:Literal |  |
|  |  | |  |  |  | roh | title | xsd:string |  |
|  | **roh** | **BacherlorsDegree** |  |  |  |  |  |  |  |
|  | **roh** | **DoctoralDegree** |  |  |  |  |  |  |  |
|  | **roh** | **MastersDegree** |  |  |  |  |  |  |  |

### roh:Accreditation

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **roh** | **Accreditation** | | | roh | hasKnowledgeArea | skos:Concept | roh | title | xsd:string |  |
|  |  | | | vivo | dateIssued | vivo:DateTimeValue | vivo | description | xsd:string |  |
|  |  | | | vivo | hasGoverningAuthority | foaf:Organization |  |  |  |  |
|  |  | | | roh | **accreditationOf** | foaf:Agent |  |  |  |  |
|  |  | | | roh | **issuedBy** | roh:AccreditationIssuer |  |  |  |  |
|  | roh | AcademicAccreditation | |  |  |  |  |  |  |  |
|  | vivo | Certificate | |  |  |  |  |  |  |  |
|  |  | roh | Award |  |  |  |  |  |  |  |
|  |  | roh | CourseCertificate |  |  |  |  |  |  |  |
|  |  | roh | LanguageCertificate |  |  |  | roh | **languageOfTheCertificate** | xsd:string |  |
|  |  |  |  |  |  |  | roh | **listeningSkill** | xsd:string | {"A1" , "A2" , "B1" , "B2" , "C1" , "C2"} |
|  |  |  |  |  |  |  | roh | **readingSkill** | xsd:string | {"A1" , "A2" , "B1" , "B2" , "C1" , "C2"} |
|  |  |  |  |  |  |  | roh | **speakingSkill** | xsd:string | {"A1" , "A2" , "B1" , "B2" , "C1" , "C2"} |
|  |  |  |  |  |  |  | roh | **spokenInteractionSkill** | xsd:string | {"A1" , "A2" , "B1" , "B2" , "C1" , "C2"} |
|  |  |  |  |  |  |  | roh | **writingSkill** | xsd:string | {"A1" , "A2" , "B1" , "B2" , "C1" , "C2"} |
|  | roh | DegreeHomologation | | vivo | relates | vivo:AwardedDegree |  |  |  |  |
|  | vivo | License | |  |  |  |  |  |  |  |
|  | roh | ResearchAccreditation | |  |  |  |  |  |  |  |
|  |  | roh-es | Sexennial | vivo | dateTimeInterval | vivo:DateTimeInterval |  |  |  |  |
|  | roh | SealOfQuality | |  |  |  |  |  |  |  |

### foaf:Agent

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | | | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **foaf** | **Agent** | | | | | vivo | relatedBy | vivo:Relationship | vivo | freeTextKeyword | xsd:string |  |
|  |  | | | | | roh | **hasAccreditation** | roh:Accreditation |  |  |  |  |
|  |  | | | | | roh | **associatedWith** | foaf:Agent |  |  |  |  |
|  |  | | | | | roh | hasMetric | roh:AuthorMetric |  |  |  |  |
|  |  | | | | | roh | **hasReservable** | roh:Reservable |  |  |  |  |
|  |  | | | | | roh | **hasRole** | obo-bfo:BFO\_0000023 (Role) |  |  |  |  |
|  |  | | | | | foaf | **mBox** | owl:Thing |  |  |  |  |
|  |  | | | | | roh | hasContactInfo | vcard:Kind |  |  |  |  |
|  | **foaf** | **Group** | | | |  |  |  |  |  |  |  |
|  | **foaf** | **Organization** | | | | roh | hasContactInfo | vcard:Organization | foaf | name | xsd:string |  |
|  |  |  | | | | roh | hasKnowledgeArea | (skos:Concept and (skos:inScheme some roh:KnowledgeArea)) | vivo | abbreviation | rdfs:Literal |  |
|  |  |  | | | | roh | hasReservable | roh:Reservable | vivo | description | xsd:string |  |
|  |  |  | | | | roh | participates | roh:Activity | vivo | identifier | xsd:string |  |
|  |  |  | | | | roh | **provides** | obo-ero:ERO\_0000005 (Service) | vivo | freetextKeyword | xsd:string |  |
|  |  |  | | | | gn | locatedIn | gn:Feature |  |  |  |  |
|  |  |  | | | | foaf | homePage | bibo:Document |  |  |  |  |
|  |  |  | | | | obo-ro | BFO\_0000051 (hasPart) | foaf:Organization |  |  |  |  |
|  |  |  | | | | vivo | dateTimeInterval | vivo:DateTimeInterval |  |  |  |  |
|  |  |  | | | | vivo | **hasSuccessorOrganization** | foaf:Organization |  |  |  |  |
|  |  |  | | | | vivo | **hasPredecessorOrganization** | foaf:Organization |  |  |  |  |
|  |  |  | | | | roh | **correspondinfOrganizationOf** |  |  |  |  |  |
|  |  |  | | | | roh | **foundationDate** | vivo:DateTimeValue |  |  |  |  |
|  |  |  | | | | roh | grantedBy | roh:FundingAmount |  |  |  |  |
|  |  |  | | | | roh | hasSpinOff | vivo:Company |  |  |  |  |
|  |  |  | | | | roh | **ownerOrganizationOf** | roh:PatentApplication or bibo:Patent |  |  |  |  |
|  |  |  | | | | vivo | **affiliatedOrganization** | foaf:Organization |  |  |  |  |
|  |  | roh | AccreditationIssuer[[1]](#footnote-1) | | | roh | **issues** | roh:Accreditation |  |  |  |  |
|  |  | vivo | Center | | |  |  |  |  |  |  |  |
|  |  | vivo | Company | | | roh | hasCompanyClassification | (skos:Concept and (skos:inScheme some roh:KnowledgeArea)) | roh | isStartup | xsd:boolean |  |
|  |  |  |  | | | roh | isSpinfoffOf | foaf:Organization | roh | publicCompany | xsd:boolean |  |
|  |  |  | roh | LargeEnterprise | |  |  |  |  |  |  |  |
|  |  |  | roh | MediumEnterprise | |  |  |  |  |  |  |  |
|  |  |  | roh | MicroEnterprise | |  |  |  |  |  |  |  |
|  |  |  | roh | SmallEnterprise | |  |  |  |  |  |  |  |
|  |  | vivo | Consortium | | |  |  |  |  |  |  |  |
|  |  | vivo | Department | | |  |  |  |  |  |  |  |
|  |  |  | vivo | | AcademicDepartment |  |  |  |  |  |  |  |
|  |  | roh | EthicsCommittee | | | roh | **produces** | roh:EthicalReport |  |  |  |  |
|  |  | vivo | Foundation | | |  |  |  |  |  |  |  |
|  |  | roh | FundingOrganization | | | roh | **promotes** | roh:FundingProgram or roh:FundingSource |  |  |  |  |
|  |  | vivo | GovernmentAgency | | |  |  |  |  |  |  |  |
|  |  | vivo | Institute | | |  |  |  |  |  |  |  |
|  |  |  | roh | | ResearchInstitute |  |  |  |  |  |  |  |
|  |  | roh | ManagementUnit | | |  |  |  |  |  |  |  |
|  |  | roh | ResearchGroup | | |  |  |  | roh | excellenceLabel | xsd:boolean |  |
|  |  | roh | UniversityDivision | | |  |  |  |  |  |  |  |
|  |  | vivo | University | | | roh | **awards** | vivo:AwardedDegree |  |  |  |  |
|  |  | roh | Company | | | roh | **hasCompanyCategorization** | roh:CompanyClassification | roh | isStartup | xsd:boolean |  |
|  |  |  |  | | |  |  |  | roh | publicCompany | xsd:boolean |  |
|  | **foaf** | **Person** | | | | roh | birthdate | vivo:DateTimeValue | roh | researchLine | xsd:string |  |
|  |  |  | | | | roh | hasContactInfo | vcard:Individual | roh | **taxID** | xsd:string |  |
|  |  |  | | | | roh | hasContract | roh:PersonContract | roh | **firstName** | xsd:string |  |
|  |  |  | | | | roh | **hasCV** | roh:CurriculumVitae | foaf | **gender** | xsd:string |  |
|  |  |  | | | | roh | hasKnowledgeArea | (skos:Concept and (skos:inScheme some roh:KnowledgeArea)) | foaf | name | xsd:string |  |
|  |  |  | | | | roh | **hasPosition** | vivo:Position | foaf | nick | xsd:string |  |
|  |  |  | | | | roh | **hasRole** | Bfo:BFO\_0000023 | foaf | **surname** | xsd:string |  |
|  |  |  | | | | roh | participates | roh:Activity | vivo | identifier | xsd:string |  |
|  |  |  | | | | vivo | relates | vivo:AwardedDegree | vivo | description | xsd:string |  |
|  |  |  | | | | roh | spends | roh:PersonExpense | roh | ORCID | xsd:string |  |
|  |  |  | | | | foaf | homePage | bibo:Document | vivo | **eRACommonsId** |  |  |
|  |  |  | | | | foaf | **img** | foaf:Image | foaf | **firstName** | xsd:string |  |
|  |  |  | | | | foaf | **mbox** | Iao:IAO\_000030 | vivo | **researcherId** |  |  |
|  |  |  | | | | vivo | **elegibleFor** | roh:Accreditation | roh | title | xsd:string |  |
|  |  |  | | | | roh | **hasMetric** | roh:AuthorMetric | vivo | **scopusId** | xsd:string |  |
|  |  |  | | | | roh | **companyFounder** | vivo:Company |  |  |  |  |
|  |  |  | | | | roh | advises | bibo:Document |  |  |  |  |
|  |  |  | | | | roh: | coadvises | bibo:Document |  |  |  |  |
|  |  |  | | | | roh | **correspondingAuthorOf** |  |  |  |  |  |
|  |  |  | | | | roh | **isGrantedWith** | roh:Grant |  |  |  |  |
|  |  |  | | | | roh | **patentAssistantExaminar** | bibo:Patent |  |  |  |  |
|  |  |  | | | | roh | **patentPrimaryExaminar** | bibo:Patent |  |  |  |  |
|  |  |  | | | | roh | **supervisorOf** | bibo:Thesis |  |  |  |  |
|  |  |  | | | | roh | **reviews** | bibo:Document |  |  |  |  |
|  |  |  | | | | roh | **supervisorOf** | bibo:Thesis |  |  |  |  |
|  |  |  | | | | roh | **teaches** | skos:Concept and (skos:inScheme some some:AcademicSubject) |  |  |  |  |

### skos:Concept & skos:ConceptScheme

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **skos** | **Concept** | | | | roh | **codeOf** | **skos:Concept** |  |  |  |  |
|  |  | | | | roh | **hasCode** | **skos:Concept** |  |  |  |  |
|  |  | | | | roh | **hasKnowledgeArea** |  |  |  |  |  |
|  | **oa** | **Motivation** | | |  |  |  |  |  |  |  |
| **skos** | **ConceptScheme** | | | |  |  |  |  |  |  |  |
|  | roh | | AcademicSubject | |  |  |  |  |  |  |  |
|  |  | | roh | BachelorsDegreeSubject |  |  |  |  |  |  |  |
|  |  | | roh | MastersDegreeSubject |  |  |  |  |  |  |  |
|  | roh | | AdministrativeEntity | |  |  |  |  |  |  |  |
|  | roh | | CompanyClassification | |  |  |  |  |  |  |  |
|  | roh | | Country | |  |  |  |  |  |  |  |
|  | roh | | ExpenseClassification | |  |  |  |  |  |  |  |
|  | roh | | FundingProgramClassification | |  |  |  |  |  |  |  |
|  | roh | | HRClassification | |  |  |  |  |  |  |  |
|  | roh | | KnowledgeArea | |  |  |  |  |  |  |  |
|  | roh | | ProjectClassification | |  |  |  |  |  |  |  |
|  | roh | | PropertyClassification | |  |  |  |  |  |  |  |
|  | roh | | ResearchProblem | |  |  |  |  |  |  |  |

### roh:Expense

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **roh** | **Expense** | | vivo | dateIssued | vivo:DateTimeValue | roh | currency | xsd:string |  |
|  |  | | roh | hasExpenseClassification | (skos:Concept and (skos:inScheme some roh:ExpenseClassification)) | vivo | description | xsd:string |  |
|  |  | | roh | **spentBy** |  | roh | expenseModality | xsd:string |  |
|  |  | |  |  |  | roh | monetaryAmoung | xsd:decimal |  |
|  |  | |  |  |  | roh | title | xsd:string |  |
|  | roh | PatentExpense |  |  |  |  |  |  |  |
|  | roh | PersonExpense |  |  |  |  |  |  |  |
|  | roh | ProjectExpense |  |  |  |  |  |  |  |
|  | roh | ResearchObjectExpense |  |  |  |  |  |  |  |

### gn:Feature

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **gn** | **Feature** | tu | **featureClass** |  | gn | geonamesID | rdfs:Literal |  |
|  |  | gn | featureCode | gn:Code | gn | countryCode | rdfs:Literal |  |
|  |  | gn | parentAMD1 | gn:featureCode | gn | name | xsd:string |  |
|  |  | gn | parentAMD2 | gn:featureCode | gn | population | xsd:integer |  |
|  |  | gn | parentAMD3 | gn:featureCode |  |  |  |  |
|  |  | gn | parentAMD4 | gn:featureCode |  |  |  |  |

The properties (datatype and object) of this table have not been imported in ROH.

### roh:Funding, roh:FundingAmount, roh:FundingProgram & roh:FundingSource

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **roh** | **Funding** | | obo-ro | BFO\_0000051 (has part) | roh:FundingAmount | vivo | identifier | xsd:string |  |
|  |  | | vivo | dateTimeInterval | vivo:DateTimeInterval | vivo | description |  |  |
|  |  | | roh | **fundedBy** | roh:FundingProgram or vivo:FundingOrganization | vivo | freeTexttKeyword |  |  |
|  |  | | roh | hasContract | vivo:Contract | roh | **publicFunding** | xsd:boolean |  |
|  |  | | roh | hasKnowledgeArea | (skos:Concept and (skos:inScheme some roh:KnowledgeArea)) |  |  |  |  |
|  |  | | roh | **supports** |  |  |  |  |  |
|  | roh | Grant |  |  |  |  |  |  |  |
|  | roh | Loan |  |  |  |  |  |  |  |
|  | roh | Outsourcing |  |  |  |  |  |  |  |
|  | roh | RefundableAdvance |  |  |  |  |  |  |  |
| **roh** | **FundingAmount** | | obo-ro | BFO\_0000050 (part of) | roh:Funding | roh | currency | xsd:string |  |
|  |  | | vivo | dateTimeInterval | vivo:DateTimeInterval | roh | monetaryAmoung | xsd:decimal |  |
|  |  | | roh | **grants** | foaf:Organization |  |  |  |  |
| **roh** | **FundingProgram** | | obo-ro | BFO\_0000051 (has part) | roh:FundingProgram | vivo | description | xsd:string |  |
|  |  | | vivo | dateTimeInterval | vivo:DateTimeInterval | vivo | identifier | xsd:string |  |
|  |  | | roh | hasFundingProgramClassification | (skos:Concept and (skos:inScheme some roh:FundingProgramClassification)) | roh | title | xsd:string |  |
|  |  | | gn | locatedIn | gn:Feature |  |  |  |  |
|  |  | | roh | **promotedBy** | vivo:FundingOrganization |  |  |  |  |
|  |  | | roh | **funds** | roh:Funding |  |  |  |  |
|  |  | | vivo | relatedBy | roh:Dossier |  |  |  |  |
| **roh** | **FundingSource** | | roh | funds | roh:FundingProgram |  |  |  |  |
|  |  | | roh | **promotedBy** | vivo:FundingOrganization |  |  |  |  |

### vcard:Kind

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **vcard** | **Kind** | | roh | **contactInfoOf** |  |  |  |  |  |
|  | vcard | Group |  |  |  |  |  |  |  |
|  | vcard | Individual |  |  |  |  |  |  |  |
|  | vcard | Location |  |  |  |  |  |  |  |
|  | vcard | Organization |  |  |  |  |  |  |  |

### roh:Invention

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **roh** | **Invention** | | roh | fundedBy | roh:FundingProgram | roh | title | xsd:string |  |
|  |  | | roh | hasKnowledgeArea | (skos:Concept and (skos:inScheme some roh:KnowledgeArea)) | vivo | abbreviation | rdfs:Literal |  |
|  |  | | roh | hasPropertyClassification | (skos:Concept and (skos:inScheme some roh:PropertyClassification)) | vivo | description | xsd:string |  |
|  |  | | roh | isSupportedBy | roh:Funding | vivo | freeTextKeyword | xsd:string |  |
|  |  | | roh | patentStatus | roh:Submitted or roh:Accepted or roh:Rejected | vivo | identifier | rdfs:Literal |  |
|  |  | | roh | spends | roh:PatentExpense |  |  |  |  |
|  |  | | obo-ro | BFO\_0000051 (hasPart) | roh:PatentApplication |  |  |  |  |
|  |  | | vivo | relatedBy | roh:Dossier |  |  |  |  |
|  |  | | vivo | relates | obo-bfo:BFO\_0000023 (Role) |  |  |  |  |
|  |  | | roh | **hasPatent** | bibo:Patent |  |  |  |  |
|  |  | | gn | locatedIn | gn:Feature |  |  |  |  |
|  |  | | roh | produces | roh:ResearchObject |  |  |  |  |
|  | **roh** | **PatentApplication** | roh | ownerOrganization | foaf:Organization |  |  |  |  |
|  |  |  | roh | **patentStatus** | roh:Submitted or roh:Accepted or roh:Rejected |  |  |  |  |

### roh:Metric

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **roh** | **Metric** | | | | vivo | dateIssued | vivo:DateTimeValue | roh | metricName | xsd:string |  |
|  | roh | AuthorMetric | | | roh | **metricOf** | foaf:Agent | roh | citationCount | xsd:integer |  |
|  |  |  | | |  |  |  | roh | h-index | xsd:integer |  |
|  |  |  | | |  |  |  | roh | I10-index | xsd:integer |  |
|  | roh | DegreeMetric | | |  |  |  |  |  |  |  |
|  |  | roh | ThesisMetric | |  |  |  | roh | **cumLaude** | xsd:boolean |  |
|  |  |  |  | |  |  |  | roh | **mark** | xsd:string |  |
|  |  |  | roh | PhDThesisMetric |  |  |  | roh | cumLaude | xsd:boolean |  |
|  |  |  |  | |  |  |  | roh | mark | xsd:string |  |
|  | roh | PublicationMetric | | |  |  |  | roh | citationCount | xsd:integer |  |
|  | roh | JournalMetric | | |  |  |  | roh | **impactFactor** | xsd:float |  |
|  |  |  | | |  |  |  | roh | **impactFactorName** | xsd:string |  |
|  |  |  | | |  |  |  | roh | **quartile** | xsd:string | {"Q1" , "Q2" , "Q3" , "Q4"} |
|  |  |  | | |  |  |  | roh | **ranking** | xsd:string |  |

### roh:Product

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **roh** | **Product** | |  |  |  | roh | **hasTRL** | xsd:integer |  |
|  | **roh** | **Prototype** |  |  |  |  |  |  |  |

### vivo:Relationship

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | | | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **vivo** | **Relationship** | | | | |  |  |  |  |  |  |  |
|  | **vivo** | **AdvisingRelationship** | | | | vivo | dateTimeInterval | vivo:DateTimeInterval |  |  |  |  |
|  |  |  | | | | vivo | **degreeCandidacy** | vivo:AcademicDegree |  |  |  |  |
|  |  |  | | | | roh | hasKnowledgeArea | (skos:Concept and (skos:inScheme some roh:KnowledgeArea)) |  |  |  |  |
|  |  |  | | | | vivo | relates | vivo:AdviseeRole |  |  |  |  |
|  |  |  | | | | vivo:AdvisorRole |  |  |  |  |
|  |  |  | | | | foaf:Person |  |  |  |  |
|  |  | vivo | FacultyMentoringRelationship | | |  |  |  |  |  |  |  |
|  |  | vivo | GraduateAdvisingRelationship | | |  |  |  |  |  |  |  |
|  |  | vivo | PostdocOrFellowAdvisingRelationship | | |  |  |  |  |  |  |  |
|  |  | vivo | UndergraduateAdvisingRelationship | | |  |  |  |  |  |  |  |
|  | **roh** | **AuditingRelationship** | | | | vivo | dateTimeInterval | vivo:DateTimeInterval |  |  |  |  |
|  |  |  | | | | vivo | relates | roh:AuditeeRole, |  |  |  |  |
|  |  |  | | | | vivo:AuditorRole, |  |  |  |  |
|  |  |  | | | | foaf:Agent |  |  |  |  |
|  | **vivo** | **AwardedDegree** | | | | roh | **awardedBy** | vivo:University |  |  |  |  |
|  |  |  | | | | vivo | dateTimeValue | vivo:DateTimeValue |  |  |  |  |
|  |  |  | | | | vivo | relates | foaf:Person or roh:AcademicDegree |  |  |  |  |
|  |  |  | | | | roh | requires | Bibo:Document or bfo:BFO\_000023 (Role) |  |  |  |  |
|  | **vivo** | **Contract** | | | | **vivo** | **assignedBy** | **foaf:Organization** | bibo | abstract | xsd:string |  |
|  |  |  | | | | roh | attachment | owl:Thing |  |  |  |  |
|  |  |  | | | | roh | **contractSigningDate** | vivo:DateTimeValue |  |  |  |  |
|  |  |  | | | | vivo | dateTimeInterval | vivo:DateTimeInterval |  |  |  |  |
|  |  |  | | | | roh | hasKnowledgeArea | (skos:Concept and (skos:inScheme some roh:KnowledgeArea)) |  |  |  |  |
|  |  |  | | | | vivo | relates | roh:Funding or bibo:Patent or foaf:Agent or obo-bfo:BFO\_0000023 (Role) |  |  |  |  |
|  |  |  | | | | roh | contractOf | Owl:Thing |  |  |  |  |
|  |  |  | | | | vivo | supportedInformationResource | obo-iao: IAO\_0000030 (InformationContentEntity) |  |  |  |  |
|  |  | roh | | PatentContract | |  |  |  |  |  |  |  |
|  |  | roh | | PersonContract | |  |  |  |  |  |  |  |
|  |  | roh | | ProjectContract | |  |  |  |  |  |  |  |
|  |  | roh | | ServiceContract | |  |  |  |  |  |  |  |
|  | **vivo** | **Position** | | | | vivo | dateTimeInterval | vivo:DateTimeInterval | vivo | rank | xsd:int |  |
|  |  |  | | | | roh | **positionOf** | foaf:Person | vivo | **hrJobTitle** |  |  |
|  |  |  | | | | vivo | relates | foaf:Organization |  |  |  |  |
|  |  |  | | | | foaf:Person |  |  |  |  |
|  |  | vivo | | FacultyAdministrativePosition | |  |  |  |  |  |  |  |
|  |  | vivo | | FacultyPosition | |  |  |  |  |  |  |  |
|  |  |  | | roh:FacultyPositionEmeritus | |  |  |  |  |  |  |  |
|  |  | vivo | | LibrarianPosition | |  |  |  |  |  |  |  |
|  |  |  | | roh:LibrarianPositionEmeritus | |  |  |  |  |  |  |  |
|  |  | vivo | | NonAcademicPosition | |  |  |  |  |  |  |  |
|  |  | vivo | | NonFacultyAcademicPosition | |  |  |  |  |  |  |  |
|  |  |  | | vivo | PostdocPosition |  |  |  |  |  |  |  |
|  |  | vivo | | PrimaryPosition | |  |  |  |  |  |  |  |
|  |  | roh | | ResearcherPosition | |  |  |  |  |  |  |  |
|  | **roh** | **ReservationRelationship** | | | | **vivo** | **dateTimeInterval** | **vivo:DateTimeInterval** |  |  |  |  |
|  |  |  | | | | **roh** | hasKnowledgeArea | (skos:Concept and (skos:inScheme some roh:KnowledgeArea)) |  |  |  |  |
|  |  |  | | | | **vivo** | **relates** | **roh:ReservableConsumerRole** |  |  |  |  |
|  | **roh:Reservable** |  |  |  |  |
|  | **roh:ReservableProvoderRole** |  |  |  |  |
|  | **foaf:Organization** |  |  |  |  |
|  | **roh** | **SupervisingRelationship** | | | | vivo | dateTimeInterval | vivo:DateTimeInterval |  |  |  |  |
|  |  |  | | | | roh | produces | bibo:Thesis |  |  |  |  |
|  |  |  | | | | vivo | relates | roh:SupervisorRole or roh:SuperviseeRole or foaf:Person |  |  |  |  |
|  |  | roh | | BachelorsSupervisingRelationship | | roh | produces | roh:BachelorsThesis |  |  |  |  |
|  |  | roh | | MastersSupervisingRelationship | | roh | produces | roh:MasterThesis |  |  |  |  |
|  |  | roh | | PhDSupervisingRelationship | | roh | produces | roh:PhDThesis |  |  |  |  |

Notice that in vertical modules you can find human resource positions associated to different countries.

### roh:ResearchResult

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **roh** | **ResearchResult** | | roh | hasKnowledgeArea | skos:Concept and (skos:inScheme some roh:Knowledge Area) | roh | identifier | xsd:string |  |
|  |  | | roh | researchResultHasPart | roh:ExperimentalProtocol or roh:Repository or bibo:Document or ero:ERO\_0000071 or vivo:Project | roh | title | xsd:string |  |
|  |  | | roh | seqOfAuthors | rdf:Seq | vivo | abbreviation | rdfs:Literal |  |
|  |  | | roh | hasSucessor | roh:ResearchResult | vivo | description | rdfs:Literal |  |
|  |  | | roh | correspondingAuthor | foaf:Person | vivo | freeTextKeyword | xsd:string |  |
|  |  | | vivo | dateTimeInterval | vivo:DateTimeInterval | roh | **needsEthicalValidation** | xsd:boolean |  |
|  |  | | roh | spends | roh:RsearchObjectExpense |  |  |  |  |
|  |  | | bibo | aauthorList | rdd:Seq |  |  |  |  |
|  |  | | roh | hasLicense | vivo:License |  |  |  |  |
|  | roh | **ResearchObject[[2]](#footnote-2)** | roh | correspondingOrganization | foaf:Organization | roh | language | xsd:string |  |
|  |  |  | roh | hasPartOfResearchResult | roh:ResearchResult |  |  |  |  |
|  |  |  | roh | **producedBy** | roh:Project |  |  |  |  |
|  |  |  | vivo | **relates** |  |  |  |  |  |

### IAO\_0000030 (Information Content Entity)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | | | | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **obo-iao** | **IAO\_0000030 (Information Content Entity)** | | | | | | roh | correspondingOrganization | foaf:Organization | roh | language | xsd:string |  |
|  | **roh** | **Repository** | | | | | roh | correspondingAuthor | foaf:Person | roh | title | xsd:string |  |
|  |  |  | | | | | roh | hasKnowledgeArea | (skos:Concept and (skos:inScheme some roh:KnowledgeArea)) | vivo | description | xsd:string |  |
|  |  |  | | | | | roh | hasReadme | roh:README | bibo | abstract | xsd:string |  |
|  |  |  | | | | | roh | partOfResearchResult | roh:ResearchResult |  |  |  |  |
|  |  |  | | | | | cito | cites | roh:ExperimentalProtocol or ero: ERO\_0000071 or roh:Repository or bibo:Document | vivo | freeTextKeyword | xsd:string |  |
|  |  |  | | | | | roh | repositoryHasPart | ExperimentalProtocol or bibo:Document or ero: ERO\_0000071 |  |  |  |  |
|  |  |  | | | | | roh | hasPredecessor | roh:Repository |  |  |  |  |
|  |  |  | | | | | roh | seqOfAuthors | rdf:Seq |  |  |  |  |
|  |  |  | | | | | roh | hasLicense | vivo:License |  |  |  |  |
|  |  |  | | | | | roh | repositoryStatus | roh:Closed or roh:Open |  |  |  |  |
|  |  |  | | | | | vivo | dateTimeValue | vivo:DateTimeValue |  |  |  |  |
|  |  |  | | | | | foaf | homePage | bibo:Webpage |  |  |  |  |
|  |  | roh | BitBucketRepository | | | | roh | hasPredecessor | roh: BitBucketRepository |  |  |  |  |
|  |  | roh | GitHubRepository | | | | roh | hasPredecessor | roh:GitHubRepository |  |  |  |  |
|  |  | roh | ZenodoRepository | | | | roh | hasPredecessor | roh: ZenodoRepository | bibo | doi | xsd:integer |  |
|  |  |  |  | | | |  |  |  | vivo | identifier | xsd:integer |  |
|  | **bibo** | **Collection** | | | | |  |  |  | bibo | oclcnum | rdfs:Literal |  |
|  |  | roh | Dossier | | | | vivo | dateTimeInterval | vivo:DateTimeInterval | vivo | description | rdfs:Literal |  |
|  |  |  |  | | | | vivo | relates | roh:FundingProgram or roh:ProjectContract or bibo:Report or vivo:Project | vivo | identifier | xsd:string |  |
|  |  |  |  | | | |  |  |  | roh | title | xsd:string |  |
|  |  | bibo | Periodical | | | | vivo | publisher | foaf:Organization | bibo | eissn | rdfs:Literal |  |
|  |  |  |  | | | |  |  |  | bibo | issn | rdfs:Literal |  |
|  |  |  | bibo | Journal | | | roh | hasMetric | roh:JournalMetric | vivo | abbreviation | rdfs:Literal |  |
|  |  |  | bibo | Magazine | | |  |  |  |  |  |  |  |
|  | **bibo** | **Document** | | | | | bibo | **authorList** | rdf:Seq | bibo | abstract | xsd:string |  |
|  |  |  | | | | | roh | correspondingAuthor | foaf:Person | bibo | doi | xsd:string |  |
|  |  |  | | | | | roh | correspondingOrganization | foaf:Organization | bibo | volumen | rdfs:Literal |  |
|  |  |  | | | | | roh | partOfRepository | roh:Repository | roh | title | xsd:string |  |
|  |  |  | | | | | roh | partOfResearchResult | roh:ResearchResult | bibo | volumen |  |  |
|  |  |  | | | | | vivo | dateIssued | vivo:DateTimeValue | vivo | freeTextKeyword | xsd:string |  |
|  |  |  | | | | | bibo | **editorList** | rdf:Seq | bibo | **pageStart** | rdfs:Literal |  |
|  |  |  | | | | | vivo | hasPublicationVenue | bibo:Collection or bibo:Book | bibo | **pageEnd** | rdfs:Literal |  |
|  |  |  | | | | | vivo | **publisher** | foaf:Agent |  |  |  |  |
|  |  |  | | | | | cito | **cites** | roh:ExperimentalProtocol or ero: ERO\_0000071 or roh:Repository or bibo:Document |  |  |  |  |
|  |  |  | | | | | roh | documentStatus | roh:Accepted or roh:Rejected |  |  |  |  |
|  |  | roh | README | | | | roh | readmeOf | roh:Repository or ero: ERO\_0000071 |  |  |  |  |
|  |  | roh | ExperimentalProtocolResult | | | |  |  |  |  |  |  |  |
|  |  | vivo | Abstract | | | |  |  |  |  |  |  |  |
|  |  | bibo | Article | | | |  |  |  | bibo | **issue** |  |  |
|  |  |  | bibo | AcademicArticle | | | **vivo** | **hasPublicationVenue** | **bibo:Journal** | bibo | eanucc13 | rdfs:Literal |  |
|  |  |  |  |  | | | **roh** | **hasMetric** | **roh:PublicationMetric** |  |  |  |  |
|  |  |  |  |  | | | **roh** | **correspondingAuthor** | **Foaf:Person** |  |  |  |  |
|  |  |  |  | iao:IAO\_0000013 | | | roh | hasMetric | roh:PublicationMetric |  |  |  |  |
|  |  |  |  |  | | | vivo | dateIssued | Vivo:DateTimeValue |  |  |  |  |
|  |  |  |  | Vivo:ConferencePaper | | | vivo | dateIssued | vivo:DateTimeValue |  |  |  |  |
|  |  |  |  |  | | | bibo | presentdAt | bibo:Conference |  |  |  |  |
|  |  |  |  |  | | roh:WorkshopPaper |  |  |  |  |  |  |  |
|  |  |  | roh | BlogPost | | |  |  |  |  |  |  |  |
|  |  |  | vivo | EditorialArticle | | |  |  |  |  |  |  |  |
|  |  | bibo | AudioVisualDocument | | | |  |  |  |  |  |  |  |
|  |  |  | roh | RadioProgram | | |  |  |  |  |  |  |  |
|  |  |  | roh | TvProgram | | |  |  |  |  |  |  |  |
|  |  | bibo | Book | | | | vivo | publisher | foaf:Organization | bibo | edition | rdfs:Literal |  |
|  |  |  |  | | | |  |  |  | bibo | isbn | rdfs:Literal |  |
|  |  |  |  | | | |  |  |  | bibo | iccn | rdfs:Literal |  |
|  |  |  |  | | | |  |  |  | vivo | placeOfPublication | rdfs:Literal |  |
|  |  |  | bibo | Proceedings | | |  |  |  |  |  |  |  |
|  |  | roh | CaseStudy | | | |  |  |  |  |  |  |  |
|  |  | roh | Catalog | | | |  |  |  |  |  |  |  |
|  |  | bibo | CollectedDocument | | | | ro | BFO\_0000051 | bibo:Document |  |  |  |  |
|  |  |  | roh | Database | | |  |  |  |  |  |  |  |
|  |  |  | bibo | EditedBook | | |  |  |  |  |  |  |  |
|  |  |  | bibo | Issue | | | obo-ro | BFO\_0000051 (hasPart) | bibo:Article | bibo | issue | rdfs:Literal |  |
|  |  | vivo | ConferencePoster | | | |  |  |  |  |  |  |  |
|  |  | roh | CurriculumVitae | | | | roh | **CVOf** | foaf:Person | roh | summary | xsd:string |  |
|  |  | vivo | Dataset | | | | cito | isCitedAsDataSourceBy | bibo:Document |  |  |  |  |
|  |  | bibo | DocumentPart | | | | vivo | publisher | foaf:Organization | vivo | placeOfPublication | rdfs:Literal |  |
|  |  |  | bibo | BookSection | | |  |  |  | bibo | edition | rdfs:Literal |  |
|  |  |  |  | bibo: Chapter | | |  |  |  |  |  |  |  |
|  |  | roh | EditedPublication | | | |  |  |  |  |  |  |  |
|  |  | foaf | Image | | | |  |  |  |  |  |  |  |
|  |  | roh | Invoice | | | |  |  |  |  |  |  |  |
|  |  |  | roh | | ProformaInvoice | |  |  |  |  |  |  |  |
|  |  | bibo | Manual | | | |  |  |  |  |  |  |  |
|  |  | bibo | Patent | | | | **vivo** | **assignee** | **foaf:Organization** | **vivo** | **identifier** | xsd:string |  |
|  |  |  |  | | | | vivo | dateIssued | vivo:DateTimeValue | roh | modality | xsd:string |  |
|  |  |  |  | | | | roh | expirationDate | vivo:DateTimeValue |  |  |  |  |
|  |  |  |  | | | | roh | hasKnowledgeArea | (skos:Concept and (skos:inScheme some roh:KnowledgeArea)) |  |  |  |  |
|  |  |  |  | | | | gn | locatedIn | gn:Feature |  |  |  |  |
|  |  |  |  | | | | roh | ownerOrganization | foaf:Organization |  |  |  |  |
|  |  |  |  | | | | **roh** | **patentCountry** | (skos:Concept and (skos:inScheme some roh:Country)) |  |  |  |  |
|  |  |  |  | | | | **roh** | **patentInventor** | foaf:Person |  |  |  |  |
|  |  | bibo | Report | | | | bibo | distributor | foaf:Organization |  |  |  |  |
|  |  |  |  | | | | vivo | publisher | foaf:Organization |  |  |  |  |
|  |  |  | roh | EthicalReport | | |  |  |  |  |  |  |  |
|  |  |  |  | roh: EthicalAudit | | |  |  |  |  |  |  |  |
|  |  |  |  | roh: EthicalValidation | | |  |  |  |  |  |  |  |
|  |  |  | roh | EvaluationSummary | | | roh | evaluationStatus | roh:Final or roh:Provisional |  |  |  |  |
|  |  |  | roh | Justification | | | vivo | relates | vivo:Project |  |  |  |  |
|  |  |  | vivo | ResearchProposal | | | vivo | relates | roh:Justification or roh:ProjectContract or roh:Project or vivo:ResearchProposal |  |  |  |  |
|  |  |  | roh | TechnicalReport | | |  |  |  |  |  |  |  |
|  |  | bibo | Thesis | | | | **roh** | **supervisedBy** | foaf:Person | vivo | abbreviation | rdfs:Literal |  |
|  |  |  |  | | | |  |  |  | vivo | placeOfPublication | rdfs:Literal |  |
|  |  |  | roh | BachelorsThesis | | |  |  |  |  |  |  |  |
|  |  |  | roh | MastersThesis | | |  |  |  |  |  |  |  |
|  |  |  | roh | PhDThesis | | |  |  |  |  |  |  |  |
|  |  | bibo | Webpage | | | |  |  |  |  |  |  |  |

### roh:Reservable

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | **Prefix** | | **Object property (bold indicates explicit Domain, otherwise a Restriction)** | **Range Class** | | **Prefix** | **Datatype Property (bold indicates explicit domain; otherwise a restriction)** | | **Range Datatype (if typed)** | | **Range values** |
| **roh** | **Reservable** | | **vivo** | | **dateTimeInterval** | **vivo:DateTimeInterval** | | **vivo** | **description** | | **xsd:string** | |  |
|  |  | | **roh** | | **reservableOf** | **foaf:Agent** | | **vivo** | **freetextKeyword** | | **xsd:string** | |  |
|  |  | |  | |  |  | | **roh** | **title** | | **xsd:string** | |  |
|  | roh | ReserbableSoftware |  |  | |  |  | |  |  | |  | |
|  | vivo | Equipment |  |  | |  |  | |  |  | |  | |
|  | vivo | Facility | pbo-ro | BFO\_0000051 (hasPart) | | roh:Facility |  | |  |  | |  | |

### obo-bfo:BFO\_0000023 (Role)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** | |
| **obo-bfo** | **BFO\_0000023 (Role)[[3]](#footnote-3)** | | vivo | dateTimeInterval | vivo:DateTimeInterval | roh | **dedication** | xsd:string | {"PARTIAL" , "TOTAL"} | |
|  |  | | roh | RO\_0000052 (inheresIn) | foaf:Agent | vivo | dedicationPercentage | xsd:float |  | |
|  |  | |  |  |  | vivo | description | xsd:string |  | |
|  |  | | roh | hasKnowledgeArea | (skos:Concept and (skos:inScheme some roh:KnowledgeArea)) | roh | referencedLaw | xsd:string |  | |
|  |  | | vivo | relatedBy | roh:PatentApplication or vivo:Project or vivo:Relationship |  |  |  |  | |
|  |  | | obo-bfo | realizedIn | roh:Activity |  |  |  |  | |
|  |  | | roh | **roleOf** | foaf:Agent |  |  |  |  | |
|  | vivo | AdministratorRole |  |  |  |  |  |  | |  |
|  | vivo | AdviseeRole |  |  |  |  |  |  | |  |
|  | vivo | AdvisorRole |  |  |  |  |  |  | |  |
|  | vivo | AttendeeRole |  |  |  |  |  |  | |  |
|  | vivo | AuditeeRole |  |  |  |  |  |  | |  |
|  | vivo | AuditorRole |  |  |  |  |  |  | |  |
|  | vivo | EditorRole |  |  |  |  |  |  | |  |
|  | obo-ero | ERO\_0000225 (EducatorRole) |  |  |  |  |  |  | |  |
|  | obo-ero | ERO\_0000787 (EmployeeRole) |  |  |  |  |  |  | |  |
|  | roh | ExternalMemberRole |  |  |  |  |  |  | |  |
|  | obo-ero | ERO\_0000224 (FundingRole) |  |  |  |  |  |  | |  |
|  | vivo | LeaderRole |  |  |  |  |  |  | |  |
|  | vivo | MemberRole |  |  |  |  |  |  | |  |
|  | vivo | OrganizerRole |  |  |  |  |  |  | |  |
|  | vivo | PresenterRole |  |  |  |  |  |  | |  |
|  | vivo | ResearcherRole |  |  |  |  |  |  | |  |
|  | roh | ReservableConsumerRole |  |  |  |  |  |  | |  |
|  | roh | ReservableProviderRole |  |  |  |  |  |  | |  |
|  | vivo | ReviewerRole |  |  |  |  |  |  | |  |
|  | obo-ero | ERO\_0000783 (StudentRole) |  |  |  |  |  |  | |  |
|  | roh | SuperviseeRole |  |  |  |  |  |  | |  |
|  | roh | SupervisorRole |  |  |  |  |  |  | |  |
|  | vivo | TeacherRole |  |  |  |  |  |  | |  |
|  | roh | TechnicalSupport |  |  |  |  |  |  | |  |
|  | roh | ThirdPartyContractorRole |  |  |  |  |  |  | |  |

### obo-ero:ERO\_0000005 (Service)[[4]](#footnote-4)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **obo-ero** | **ERO\_0000005 (Service)** | | | roh | isProvidedBy | foaf:Organization | vivo | | description | xsd:string |  |
|  |  | | | roh | produces | bibo:Report | vivo | | identifier | xsd:string |  |
|  |  | | |  |  |  | roh | | title | xsd:string |  |
|  | obo-ero | ERO\_0000391 (AccessService) | |  |  |  |  |  | |  |  |
|  | obo-ero | ERO\_0001261 (AnalysisService) | |  |  |  |  |  | |  |  |
|  |  | obo-ero | ERO\_0001262 (DataAnalysisService ) |  |  |  |  |  | |  |  |
|  |  | obo-ero | ERO\_0000395 (MaterialMaintenanceService) |  |  |  |  |  | |  |  |
|  | obo-ero | ERO\_0001258 (MaitenanceService) | |  |  |  |  |  | |  |  |
|  |  | obo-ero | ERO\_0001260 (DataMaintenanceService) |  |  |  |  |  | |  |  |
|  |  | obo-ero | ERO\_0001259 (MaterialManteinanceServcie) |  |  |  |  |  | |  |  |
|  | obo-ero | ERO\_0000394 (MaterialProcessingService) | |  |  |  |  |  | |  |  |
|  |  | obo-ero | ERO\_0001263 (MaterialModificationService) |  |  |  |  |  | |  |  |
|  |  | obo-ero | ERO\_0000396 (MaterialProductionService) |  |  |  |  |  | |  |  |
|  | obo-ero | ERO\_0000392 (StorageService) | |  |  |  |  |  | |  |  |
|  |  | obo-ero | ERO\_0001257 (DataStorageService) |  |  |  |  |  | |  |  |
|  |  | obo-ero | ERO\_0001256 (MaterialStorageService) |  |  |  |  |  | |  |  |
|  | obo-ero | ERO\_0001255 (SupportService) | |  |  |  |  |  | |  |  |
|  | obo-ero | ERO\_0000393 (TrainingService) | |  |  |  |  |  | |  |  |
|  | obo-ero | ERO\_0001254 (TransportService) | |  |  |  |  |  | |  |  |

### roh:Status

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **roh** | **Status** | | vivo | dateTimeInterval | vivo:DateTimeInterval |  | |  |  |  |
|  | roh | Accepted |  |  |  |  |  | |  |  |
|  | roh | Cancelled |  |  |  |  |  | |  |  |
|  | roh | Closed |  |  |  |  |  | |  |  |
|  | roh | Final |  |  |  |  |  | |  |  |
|  | roh | Funded |  |  |  |  |  | |  |  |
|  | roh | Open |  |  |  |  |  | |  |  |
|  | roh | ProposalSubmitted |  |  |  |  |  | |  |  |
|  | roh | Provisional |  |  |  |  |  | |  |  |
|  | roh | Rejected |  |  |  |  |  | |  |  |
|  | roh | Signed |  |  |  |  |  | |  |  |
|  | roh | Submitted |  |  |  |  |  | |  |  |
|  | roh | Terminated |  |  |  |  |  | |  |  |
|  | roh | Unfunded |  |  |  |  |  | |  |  |

### obo-bfo:TemporalRegion[[5]](#footnote-5)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **obo-bfo** | **BFO\_0000008 (TemporalRegion)** | | |  |  |  |  |  |  |  |
|  | obo-bfo | BFO\_0000038 (OneDimensionalTemporalRegion) | |  |  |  |  |  |  |  |
|  |  | vivo | DateTimeInterval | vivo | start | vivo:DateTimeValue |  |  |  |  |
|  |  |  |  | vivo | end | vivo:DateTimeValue |  |  |  |  |
|  | obo-bfo | BFO\_0000148 (ZeroDimensionTemporalRegion) | |  |  |  |  |  |  |  |
|  |  | vivo | DateTimeValue |  |  |  | vivo | dateTime | xsd:dateTime |  |

### obo-ero:Software

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **ero** | ERO\_0000071 | | roh | correspondingAuthor | foaf:Person | roh | | language | xsd:string |  |
|  |  | | roh | hasKnowledgeArea | (skos:Concept and (skos:inScheme some roh:KnowledgeArea)) | vivo | | description | xsd:string |  |
|  |  | | roh | hasReadme | roh:README | bibo | | abstract | xsd:string |  |
|  |  | | cito | cites | Owl:Thing | vivo | | freeTextKeyword | xsd:string |  |
|  |  | | roh | partOfResearchResult | roh:ResearchResult | roh | | title | xsd:string |  |
|  |  | | roh | partOfRepository | roh:Repository |  | |  |  |  |
|  |  | | roh | hasPredecessor | ero:ERO\_0000071 | roh | | programmingLanguage | xsd:string |  |
|  |  | | roh | seqOfAuthors | rdf:Seq |  | |  |  |  |
|  |  | | roh | hasLicense | vivo:License |  | |  |  |  |
|  |  | | roh | softwareStatus | roh:Final or roh:Provisional |  | |  |  |  |
|  |  | | vivo | dateTimeValue | vivo:DateTimeValue |  | |  |  |  |
|  |  | | foaf | homePage | vivo:Webpage |  | |  |  |  |
|  | roh | ReservableSoftware |  |  |  |  |  | |  |  |

### bfo:BFO\_0000015

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Prefix** | **Class** | | | | **Prefix** | **Object property** (bold indicates explicit Domain, otherwise a Restriction) | **Range Class** | **Prefix** | **Datatype Property** (bold indicates explicit domain; otherwise a restriction) | **Range Datatype** (if typed) | **Range values** |
| **bfo** | **BFO\_0000015** | | | |  |  |  |  |  |  |  |
|  | **vivo** | **Project** | | | roh | **foreseenJustificationDate** | vivo:DateTimeValue | roh | **modality** | xsd:string |  |
|  |  |  | | | roh | **fundedBy** | roh:FundingProgram | roh | **needsEthicalValidation** | xsd:boolean |  |
|  |  |  | | | roh | hasContract | roh:ProjectContract | roh | title | xsd:string |  |
|  |  |  | | | roh | **hasHRClassification** | (skos:Concept and (skos:inScheme some roh:HRClassification)) | vivo | abbreviation | rdfs:Literal |  |
|  |  |  | | | roh | hasKnowledgeArea | skos:Concept and (skos:inScheme some roh:Knowledge Area) | roh | projectAcronym | xsd:string |  |
|  |  |  | | | roh | **hasProjectCategorization** | (skos:Concept and (skos:inScheme some roh:ProjectClassification) | roh | identifier | xsd:string |  |
|  |  |  | | | roh | **isSupportedBy** | roh:Funging | vivo | description | rdfs:Literal |  |
|  |  |  | | | roh | **participates** | roh:Activity | vivo | freeTextKeyword | xsd:string |  |
|  |  |  | | | roh | **produces** | Roh:ResearchObject | roh | **isCompetitive** | xsd:boolean |  |
|  |  |  | | | roh | **projectStatus** | roh:Status (roh:Closed or roh:Open or roh:ProposalSubmitted or roh:Rejected) | roh | projectID | rdf:Literal |  |
|  |  |  | | | roh | spends | roh:ProjectExpense | roh: | **projectObjective** | xsd:string |  |
|  |  |  | | | gn | locatedIn | gn:Feature |  |  |  |  |
|  |  |  | | | obo-ro | BFO\_0000051 (hasPart) | vivo:Project |  |  |  |  |
|  |  |  | | | vivo | dateTimeInterval | vivo:DateTimeInterval |  |  |  |  |
|  |  |  | | | vivo | relates | obo-bfo:BFO\_0000023 (Role) |  |  |  |  |
|  |  |  | | | vivo | relatedBy | roh:Dossier or roh:Justification or roh:EthicalReport |  |  |  |  |
|  |  |  | | | roh | **coordinatedBy** | foaf:Agent |  |  |  |  |
|  | **roh** | ExperimentalProtocol | | | roh | correspondingAuthor | foaf:Person | roh | language | xsd:string |  |
|  |  |  | | | roh | hasKnowledgeArea | (skos:Concept and (skos:inScheme some roh:KnowledgeArea)) | vivo | description | xsd:string |  |
|  |  |  | | | roh | produces | roh:ExperimentalProtocolResult | bibo | abstract | xsd:string |  |
|  |  |  | | | cito | cites | roh:ExperimentalProtocol or ero:ERO\_0000071 or roh:Repository or bibo:Document | vivo | freeTextKeyword | xsd:string |  |
|  |  |  | | | roh | partOfResearchResult | roh:ResearchResult | roh | title | xsd:string |  |
|  |  |  | | | rog | partOfRepository | roh: Repository |  |  |  |  |
|  |  |  | | | roh | hasPredecessor | roh:ExperimentalProticol |  |  |  |  |
|  |  |  | | | roh | seqOfAuthors | rdf:Seq |  |  |  |  |
|  |  |  | | | roh | hasLicense | vivo:License |  |  |  |  |
|  |  |  | | | vivo | dateTimeInterval | vivo:DateTimeInterval |  |  |  |  |
|  |  |  | | | foaf | homePage | vivo:Webpage |  |  |  |  |
|  | **roh** | **Activity** | | | vivo | hasKnowledgeArea | (skos:Concept and (skos:inScheme some roh:KnowledgeArea)) | roh | title | xsd:string |  |
|  |  |  | | | roh | **participatedBy** | foaf:Agent or vivo:Project | vcard | locality | xsd:string |  |
|  |  |  | | | gn | locatedIn | gn:Feature | vivo | contactInformation | rdfs:Literal |  |
|  |  |  | | | bibo | presents | bibo:Document | vivo | description | xsd:string |  |
|  |  |  | | | vivo | relates | roh:Expense or obo-bfo:BFO\_0000023 (Role) | vivo | identifier | xsd:string |  |
|  |  |  | | | vivo | dateTimeInterval | vivo:DateTimeInterval | vivo | freeTextKeyword | xsd:string |  |
|  |  | vivo | Competition | |  |  |  |  |  |  |  |
|  |  | roh | Contest | |  |  |  |  |  |  |  |
|  |  | roh | DisseminationEvent | |  |  |  |  |  |  |  |
|  |  | roh | ThesisTable | |  |  |  |  |  |  |  |
|  |  | bibo | Conference | |  |  |  | vivo | abbreviation | rdfs:Literal |  |
|  |  | vivo | Course | | obo-ro | (BFO\_000050) )partOf | vivo:AcademicDegree | vivo | **courseCredits** | xsd:int |  |
|  |  |  | | |  |  |  | roh | **courseHours** | xsd:string |  |
|  |  | vivo | Exhibit | |  |  |  |  |  |  |  |
|  |  | bibo | Hearing | |  |  |  |  |  |  |  |
|  |  | vivo | Internship | |  |  |  |  |  |  |  |
|  |  | vivo | Interview | |  |  |  |  |  |  |  |
|  |  | vivo | Meeting | |  |  |  |  |  |  |  |
|  |  | bibo | Performance | |  |  |  |  |  |  |  |
|  |  | vivo | Presentation | |  |  |  |  |  |  |  |
|  |  |  | vivo | InvitedTalk |  |  |  |  |  |  |  |
|  |  |  | roh | PanelTalk |  |  |  |  |  |  |  |
|  |  | roh | ThesisViva | |  |  |  |  |  |  |  |
|  |  | bibo | Workshop | |  |  |  |  |  |  |  |

1. Defined class attending the following restriction Organization and (issues some Accreditation) and (issues only Accreditation) [↑](#footnote-ref-1)
2. Notice that roh:ResearchObject is a defined class, which follows these restrictions: Research or

   ('part of research result' some 'Research Result') or ('produced by' only vivo:Project) This is, an instance in ROH belongs to class roh:ResearchObject if it meets these restrictions. [↑](#footnote-ref-2)
3. Notice that the actual name of this class is opaque, i.e. BFO\_0000023, its associated URI is http://purl.org/roh/obo/bfo#BFO\_0000023 [↑](#footnote-ref-3)
4. Associated to IRI http://purl.org/roh/mirror/obo/ero#ERO\_0000005. These classes from obo-ero use opaque IDs, for their instantiation the alphanumeric IDs declared under parenthesis should be used. [↑](#footnote-ref-4)
5. The actual URI associated to this concept is: http://purl.org/roh/mirror/obo/bfo#BFO\_0000008 [↑](#footnote-ref-5)