



Unión Europea

FONDO EUROPEO DE DESARROLLO REGIONAL (FEDER)

Una manera de hacer Europa

ROH Ontology Classes, Object Properties and DataType Properties

1. Abstract	2
2. Ontologies used	2
3. Concepts modelled.	3
3.1. vivo:AcademicDegree	3
3.2. roh:Accreditation	4
3.3. roh:Activity	¡Error! Marcador no definido.
3.4. foaf:Agent	4
3.5. skos:Concept & skos:ConceptScheme	6
3.6. roh:CurriculumVitae	¡Error! Marcador no definido.
3.7. roh:Expense	7
3.8. gn:Feature	7
3.9. roh:Funding, roh:FundingAmount, roh:FundingProgram & roh:FundingSource	7
3.10. vcard:Kind	8
3.11. roh:Invention	8
3.12. roh:Metric	8
3.13. roh:Product	9
3.14. vivo:Project	¡Error! Marcador no definido.
3.15. vivo:Relationship	9
3.16. roh:ResearchResult	11
3.17. roh:Reservable	13
3.18. obo-bfo:BFO_0000023 (Role)	14
3.19. obo-ero:ERO_0000005 (Service)	15
3.20. roh:Status	15
3.21. obo-bfo:TemporalRegion	16
3.22. roh: ExperimentalProtocol	¡Error! Marcador no definido.

1. Abstract

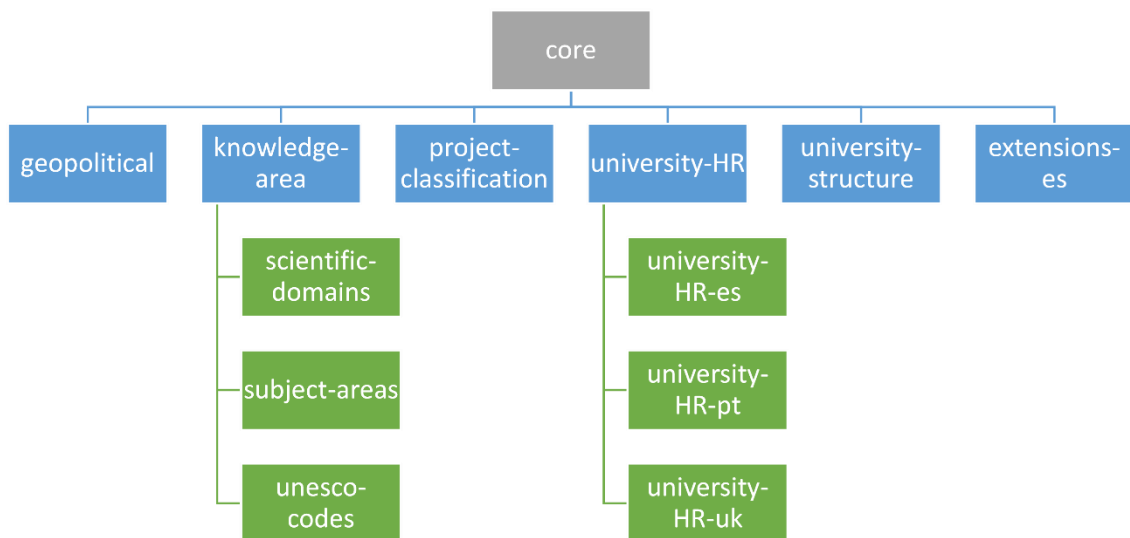
The aim of this document is to provide a bird's eye view on the entities modelled within ROH. The document includes an overview in tabular form for each of the core entities of the network of ontologies ROH, giving details on the object and data properties supported by each of them. This document is 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](#) which describes more verbosely the purpose of the core entities of ROH and their relationships with other entities in the ontology.

2. 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://bibilontology.com/
cito	CITO, the Citation Typing Ontology	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://xmlns.com/foaf/spec/
gn	GeoNames Ontology	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.eoliba.net/erod/erod/ontology/erod/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://www.obofoundry.org/ontology/ro.html
owl	OWL Web Ontology Language	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#	https://www.w3.org/TR/rdf-concepts/
rdfs	RDF Schema 1.1	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#	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#	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#	https://www.w3.org/TR/2008/WD-skos-reference-20080829/skos.html
terms	DCMI Metadata Terms	http://purl.org/dc/terms	https://www.dublincore.org/specifications/dublin-core/dcmi-terms/
vcad	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#	https://wiki.lyrasis.org/display/VIVO/The+core+ontology+and+its+annotations
oa	The Web Annotation Data Model		https://www.w3.org/ns/oa

3. Concepts modelled.

3.1. 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	BachelorsDegree							

	roh	DoctoralDegree						
	roh	MastersDegree						

3.2. 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							

3.3. 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	vcad: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	pbo-ero:ERO_0000005 (Service)	vivo	freetextKeyword	xsd:string	
			gn	locatedIn	gn:Feature				
			foaf	homePage	bibo:Document				
			pbo-ro	BFO_0000051 (hasPart)	foaf:Organization				
			vivo	dateTimeInterval	vivo:DateTimeInterval				
			vivo	hasSuccessorOrganization	foaf:Organization				
			vivo	hasPredecessorOrganization	foaf:Organization				
			roh	correspondingOrganizationOf					
			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	roh	issues	roh:Accreditation			
		vivo	Center						
		vivo	Company	roh	hasCompanyClassification	(skos:Concept and (skos:inScheme some roh:KnowledgeArea))	roh	isStartup	xsd:boolean
				roh	isSpinoffOf	foaf:Organization	roh	publicCompany	xsd:boolean
			roh	LargeEnterprise					
			roh	MediumEnterprise					
			roh	MicroEnterprise					
			roh	SmallEnterprise					
		vivo	Consortium						
		vivo	Department						
			AcademicDepartment						
		roh	EthicsCommittee	roh	produces	roh:EthicalReport			
		vivo	Foundation						
		roh	FundingOrganization	roh	promotes	roh:FundingProgram or roh:FundingSource			
		vivo	GovernmentAgency						
		vivo	Institute						
			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	

¹ Defined class attending the following restriction Organization and (issues some Accreditation) and (issues only Accreditation)

			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	lao: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:	coadvices	bibo:Document				
			roh	correspondingAuthorOf					
			roh	isGrantedWith	roh:Grant				
			roh	patentAssistantExaminer	bibo:Patent				
			roh	patentPrimaryExaminer	bibo:Patent				
			roh	supervisorOf	bibo:Thesis				
			roh	reviews	bibo:Document				
			roh	supervisorOf	bibo:Thesis				
			roh	teaches	skos:Concept and (skos:inScheme some some:AcademicSubject)				

3.4. 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							

3.5. 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	monetaryAmount	xsd:decimal	
						roh	title	xsd:string	
	roh	PatentExpense							
	roh	PersonExpense							
	roh	ProjectExpense							
	roh	ResearchObjectExpense							

3.6. 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.

3.7. 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	freeTextKeyword		
			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	monetaryAmount	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				

3.8. 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							

3.9. 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				

3.10. 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	

3.11. 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							

3.12. 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-lao: 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	FacultyAdministrative Position						
		vivo	FacultyPosition						
			roh:FacultyPositionE meritus						
		vivo	LibrarianPosition						
			roh:LibrarianPositionE meritus						
		vivo	NonAcademicPosition						
		vivo	NonFacultyAcademicP osition						
		vivo	PostdocPosition						
		vivo	PrimaryPosition						
		roh	ResearcherPosition						
	roh	ReservationRelationship	vivo	dateTimeInterval	vivo:DateTimeInterval				
			roh	hasKnowledgeArea	nd (skos:inScheme some roh:KnowledgeArea))				
			vivo	relates	roh:ReservableConsumer Role				
					roh:Reservable				
					roh:ReservableProviderR ole				
					foaf:Organization				
	roh	SupervisingRelationship	vivo	dateTimeInterval	vivo:DateTimeInterval				
			roh	produces	bibo:Thesis				
			vivo	relates	roh:SupervisorRole or roh:SuperviseeRole or foaf:Person				
		roh	BachelorsSupervising Relationship	roh	produces	roh:BachelorsThesis			
		roh	MastersSupervisingRe lationship	roh	produces	roh:MasterThesis			
		roh	PhDSupervisingRelati onship	roh	produces	roh:PhDThesis			

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

3.13. 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:KnowledgeArea)	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:ResearchObjectExpense				
		bibo	aauthorList	rdd:Seq				
		roh	hasLicense	vivo:License				
	roh	ResearchObject ²	correspondingOrganization	foaf:Organization	roh	language	xsd:string	
		roh	hasPartOfResearchResult	roh:ResearchResult				
		roh	producedBy	roh:Project				

3.14. 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	

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.

				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:IAQ_000013	roh	hasMetric	roh:PublicationMetric				
				vivo	dateIssued	Vivo:DateTimeValue				
			Vivo:ConferencePaper	vivo	dateIssued	vivo:DateTimeValue				
				bibo	presentdAt	bibo:Conference				
			roh:Works hop paper							
		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	Proforma Invoice						
		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	Research Proposal	vivo	relates	roh:Justification or roh:ProjectContract or roh:Project or vivo:ResearchProposal				
		roh	Technical Report							
		bibo	Thesis	roh	supervisedBy	foaf:Person	vivo	abbreviation	rdfs:Literal	
							vivo	placeOfPublication	rdfs:Literal	
		roh	Bachelors Thesis							
		roh	Masters Thesis							
		roh	PhD Thesis							
		bibo	Webpage							

3.15. 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	ReservableSoftware						
	vivo	Equipment						
	vivo	Facility	obo-ro	BFO_0000051 (hasPart)	roh:Facility			

3.16. 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	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						

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

3.17. obo-ero:ERO_0000005 (Service)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 (MaintenanceService)							
	obo-ero ERO_0001260 (DataMaintenanceService)							
	obo-ero ERO_0001259 (MaterialMaintenanceService)							
	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)							

3.18. 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							

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.

	roh	Terminated							
	roh	Unfunded							

3.19. obo-bfo:TemporalRegion⁵

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 TimeInterval	vivo	start	vivo:DateTimeValue				
		vivo	end	vivo:DateTimeValue				
	obo-bfo BFO_0000148 (ZeroDimensionTemporalRegion)							
	vivo DateTimeValue				vivo	dateTime	xsd:dateTime	

3.20. 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							

3.21. 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	

⁵ The actual URI associated to this concept is: http://purl.org/roh/mirror/obo/bfo#BFO_0000008

			roh	hasHRCClassification	(skos:Concept and (skos:inScheme some roh:HRCClassification))	vivo	abbreviation	rdfs:Literal	
			roh	hasKnowledgeArea	skos:Concept and (skos:inScheme some roh:KnowledgeArea)	roh	projectAcronym	xsd:string	
			roh	hasProjectCategorization	(skos:Concept and (skos:inScheme some roh:ProjectClassification))	roh	identifier	xsd:string	
			roh	isSupportedBy	roh:Funding	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:ExperimentalProtocol				
			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	vcad	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_0000050) 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							