



everest

Managing, Preserving and Disseminating  
Research Objects in Earth Science with the  
ROHub ScienceGateway

**Raul Palma**, Jose M. Gomez Perez, Andres Garcia, Cezary Mazurek



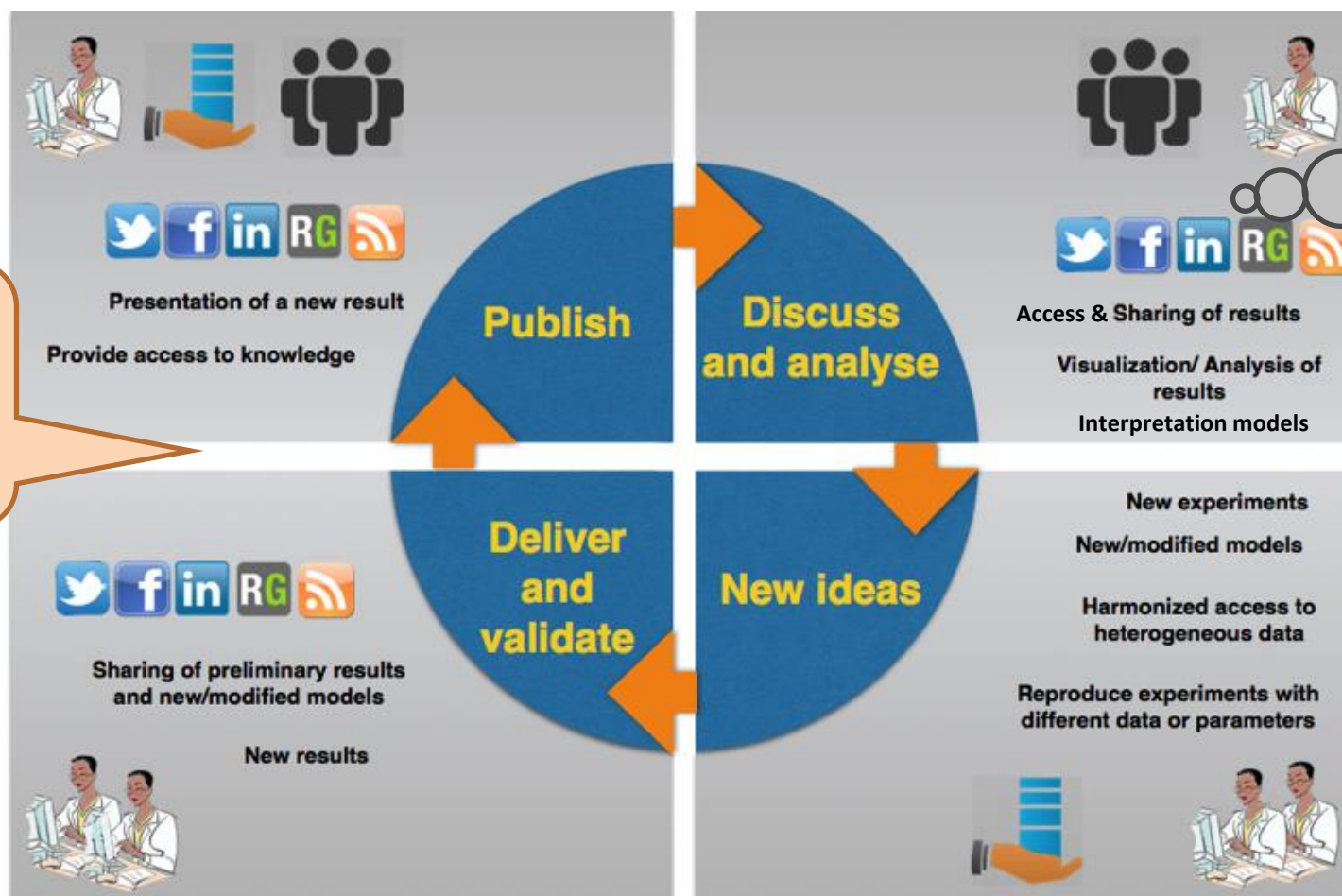
This project is co-funded by the European Union

# The Research and Information Lifecycle in Earth Science



A continuous, iterative and dynamic process followed by scientists for conducting, validating and disseminating scientific knowledge

(peer) Review:  
“Are these novel findings? Was the method sound?”



Reader:  
“I trust the method and data are sound.”



Colleagues:  
“Let’s collaborate!”

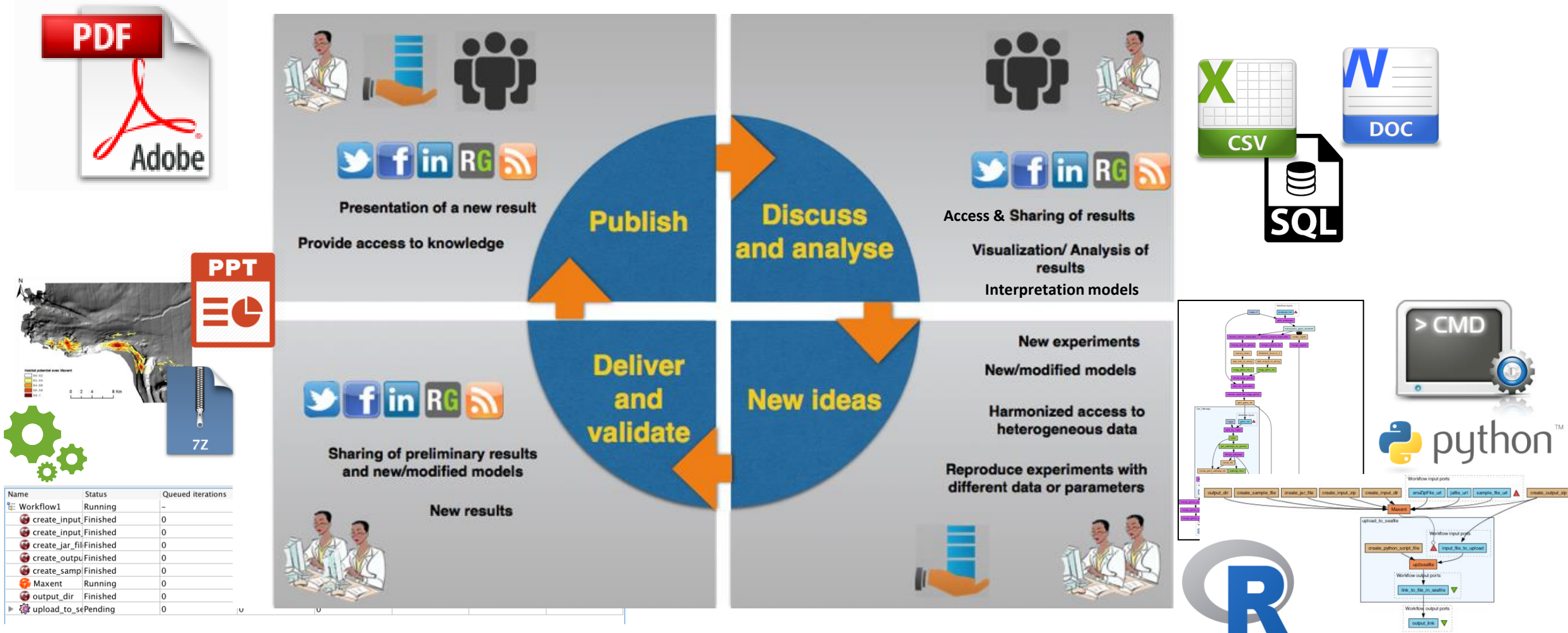


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# The Research and Information Lifecycle in Earth Science



Data and process intensive: increasingly consuming and generating a variety of digital resources -> need to i) capture the lifecycle and ii) provide single-entry point to resources involved





# Research in data and process intensive disciplines

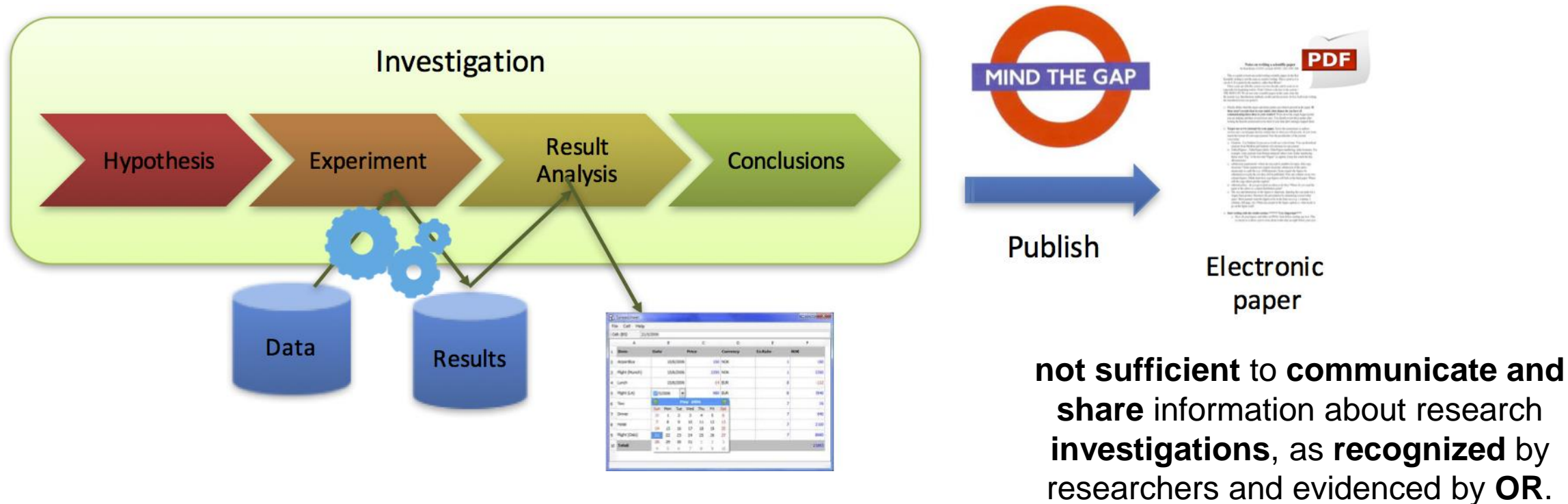


- How to provide a single-entry point to all the related resources ?
- How to capture the lifecycle of scientific investigations ?
- How to validate and disseminate scientific knowledge ?
- How to preserve the scientific knowledge for their reuse?





# Electronic paper is not enough!



**Open Research** movement: Openly share the data of your experiments





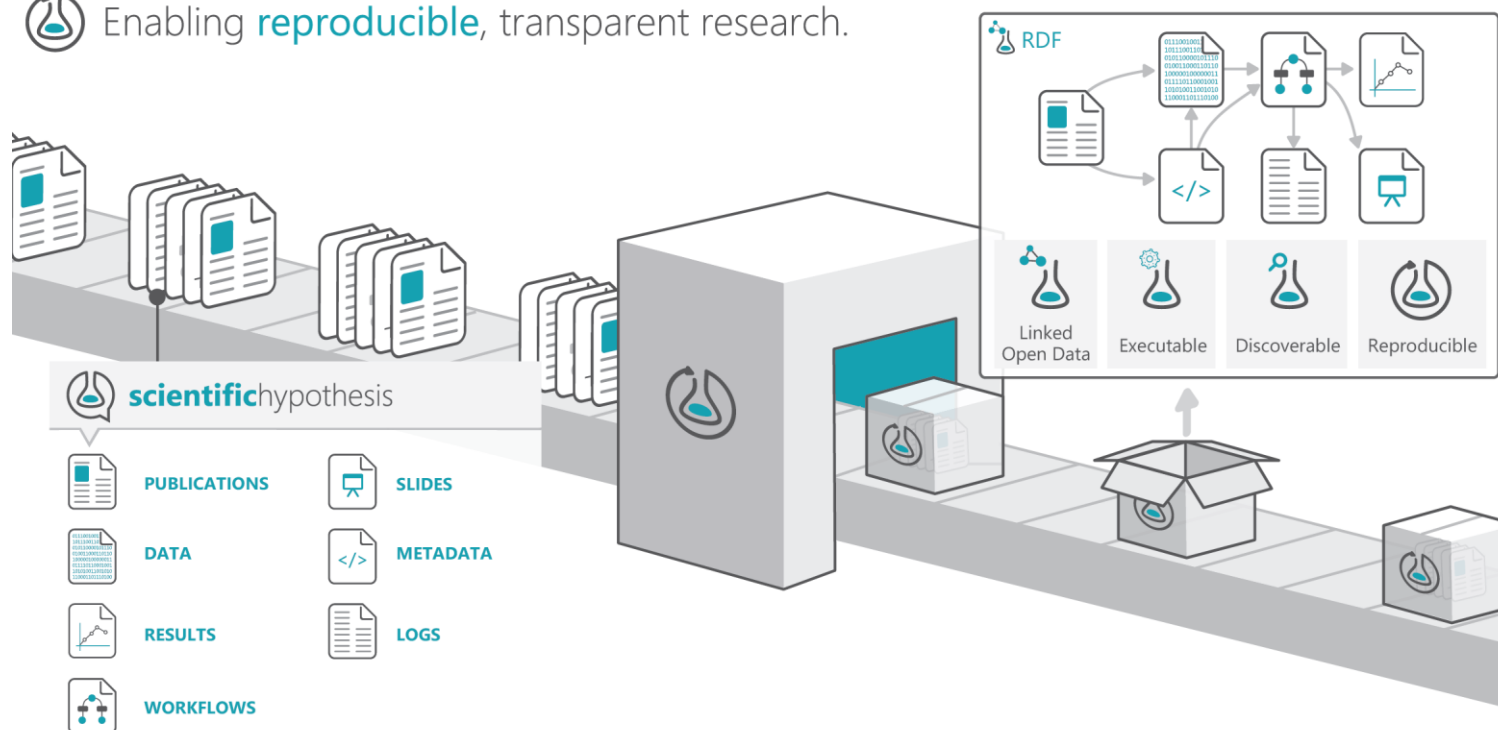
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# Research objects



**Research objects goal:** Account, describe and share *everything* about your research, including how those things are related

 Enabling **reproducible**, transparent research.



**Unique identifier**, e.g. DOI

**Hypotheses**

**Data** used and results produced

**Methods** employed to produce and analyse data  
**Scientific workflows** implementing such methods

**Provenance** of their executions

**Versioning** information

**People** involved in the investigation

**Annotations** about these resources

<http://www.researchobject.org>



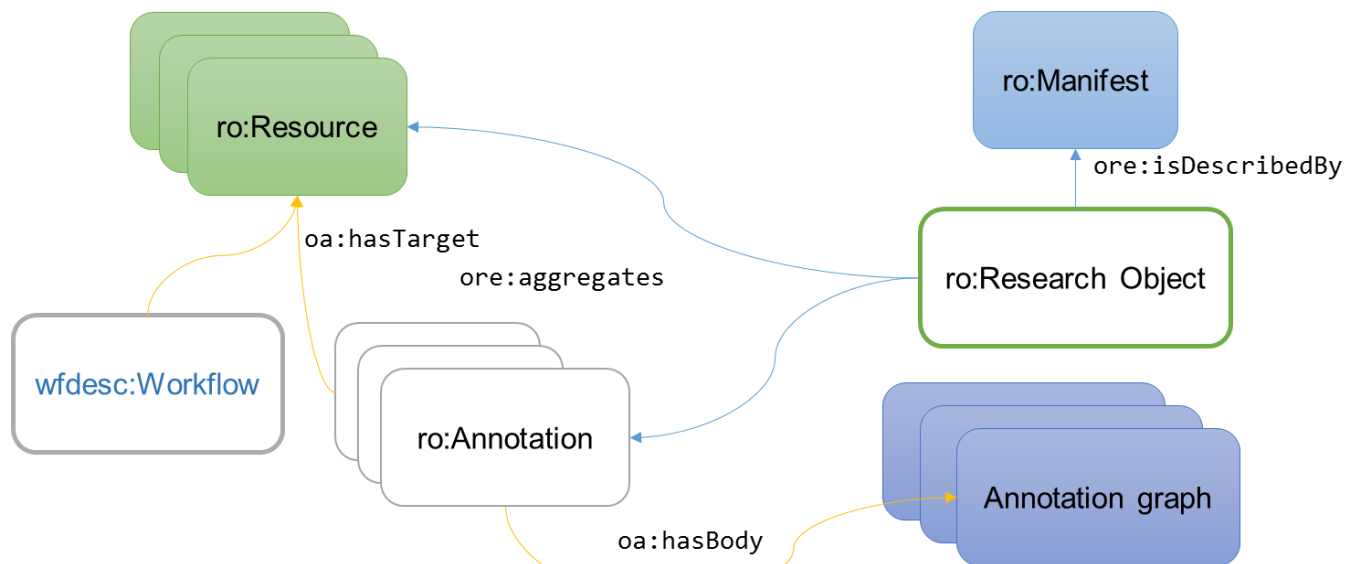


# Why research objects

- i. To **organize and describe** the resources, materials, and methods of an investigation
- ii. To **share** your research materials with other scientists at **discrete milestones of your investigation**. Uniquely identified by an URI, pref. as a DOI  
*(RO as a social object)*
- iii. To enable **reproducibility** and **reuse** of scientific methods
- iv. To be **recognized** and **cited** *(even constituent parts)*
- v. To **preserve** results and **prevent decay**  
*(curation of workflow definition)*
- vi. To provide **evidence** to findings claimed in **scholarly articles**



# Representing research objects: The RO Model



**ro** (aggregation and annotation)

**wfdesc** (workflow description)

**wfprov** (workflow provenance)

**roevo** (evolution model)

**minim** (minimum information model)

**RO primer:** <http://wf4ever.github.com/ro-primer>

**RO specification:** <http://wf4ever.github.com/ro>

## ■ RO = ORE + AO + vocabularies

### ■ Object Re-use and Exchange (OAI-ORE)

- Describes aggregations of resources
- data, metadata, papers, etc.

### ■ Annotation Ontology (AO)

- Associates RDF metadata descriptions with resources

### ■ Generic and domain-specific vocabularies

- Used in annotation bodies to provide information about resources
- Involve types, dependencies, descriptions





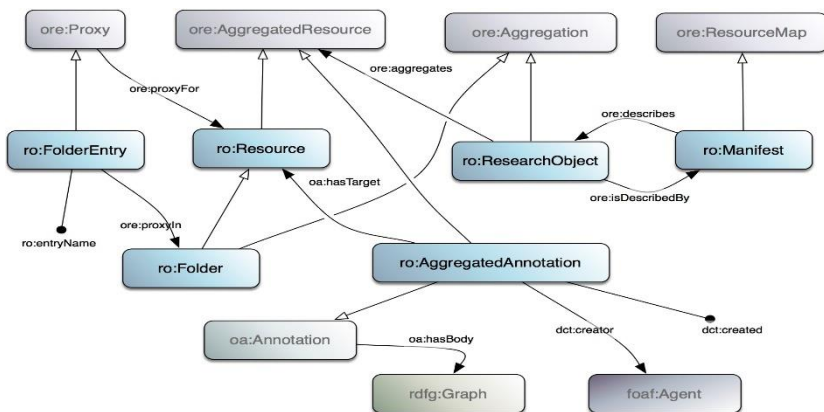


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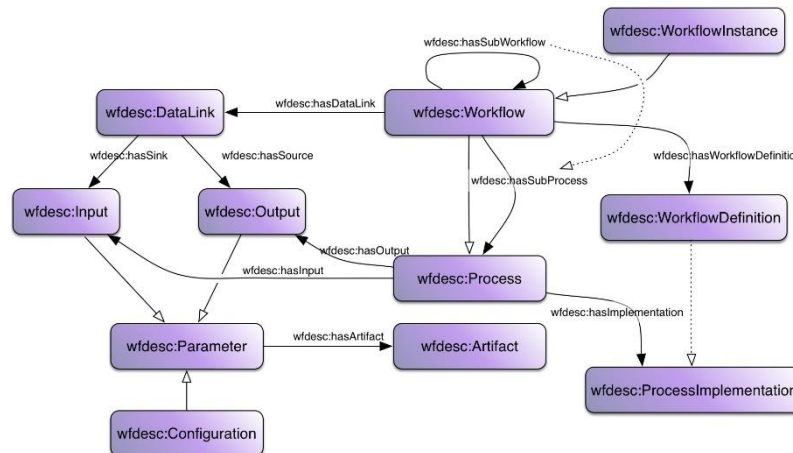


# The RO ontology stack

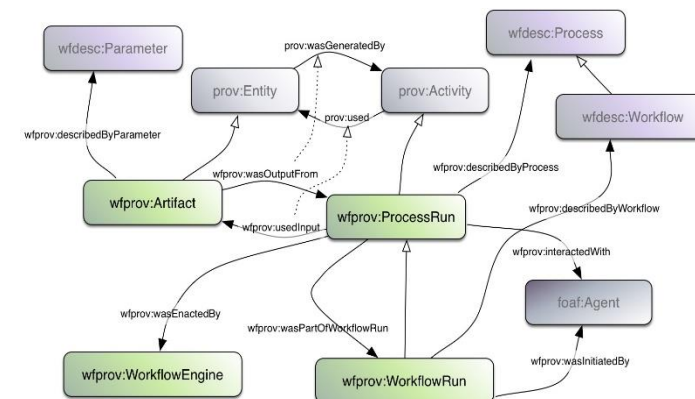
## Research object (ro)



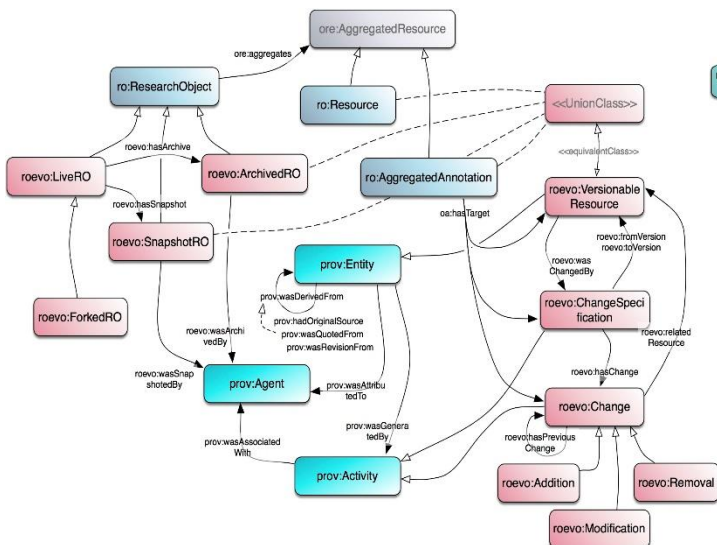
## Workflow description (wfdesc)



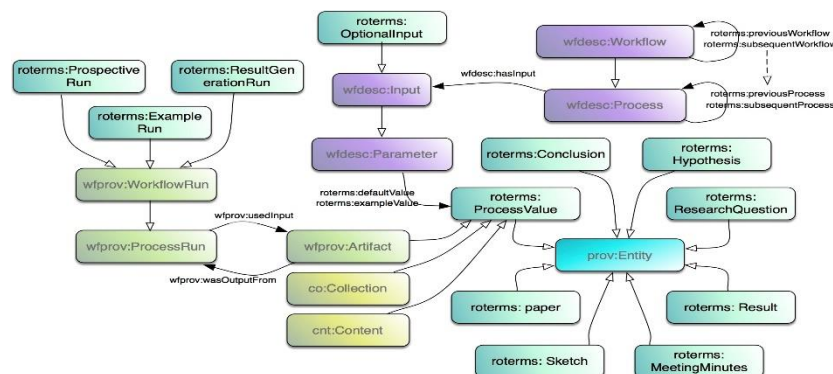
## Workflow provenance (wfprov)



## RO evolution (roevo)



## RO terms (roterms)



## RO for Earth Science (roes)



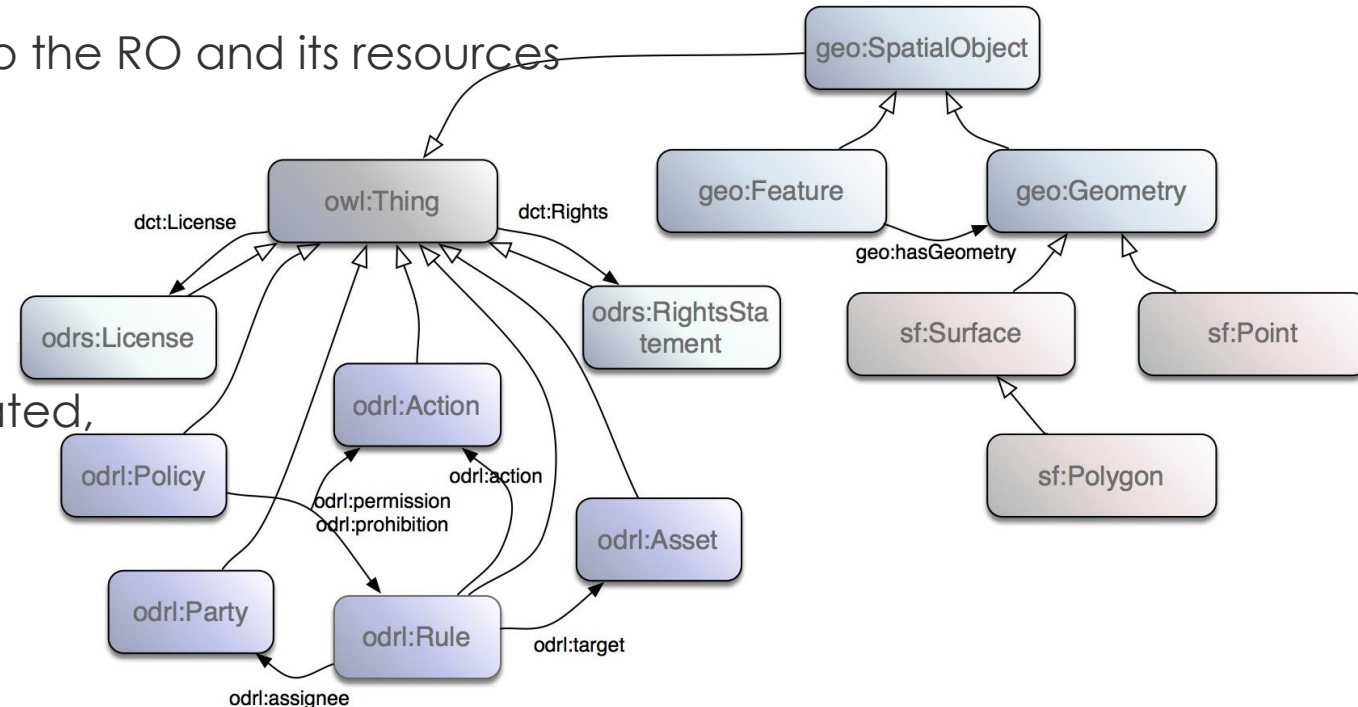
Emphasis on **Geo, access rights and IP** policies

<https://github.com/wf4ever/ro/tree/earth-science>



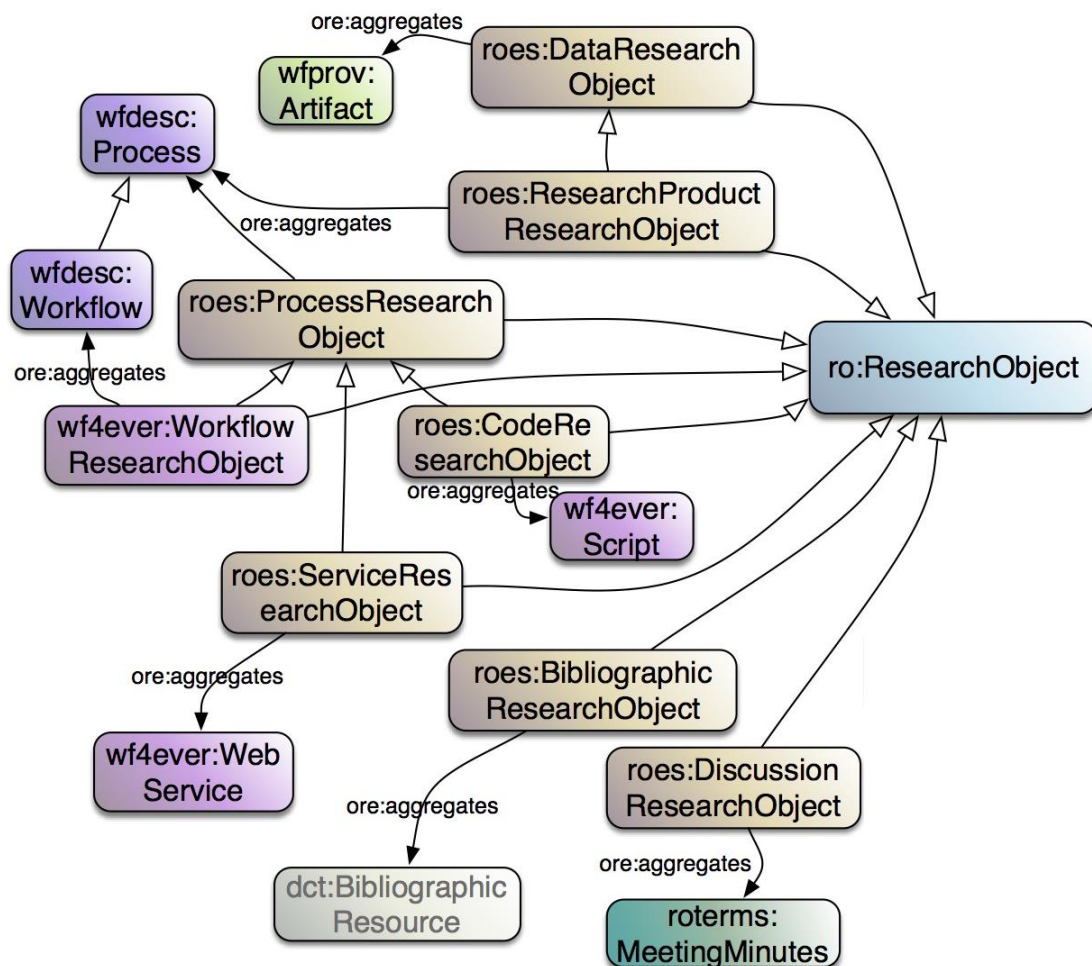
# Earth Science extensions (1/3)

- RO model should cover metadata regarding
  - Geospatial information
    - Coordinates of the region relevant for the RO and the observation it represents
  - Time-period coverage
    - Indication of the time span covered in the observation
  - Data access policies
    - Detailed information for controlling access to the RO and its resources
  - Intellectual property rights
    - Detailed information about for licensing and attribution
  - General metadata relevant to ES
    - E.g. the main scientific discipline of the RO, the size and format of the resource aggregated, the RO submission date, its digital object identifier (DOI), the main target community, etc.





# Earth Science extensions (2/3)



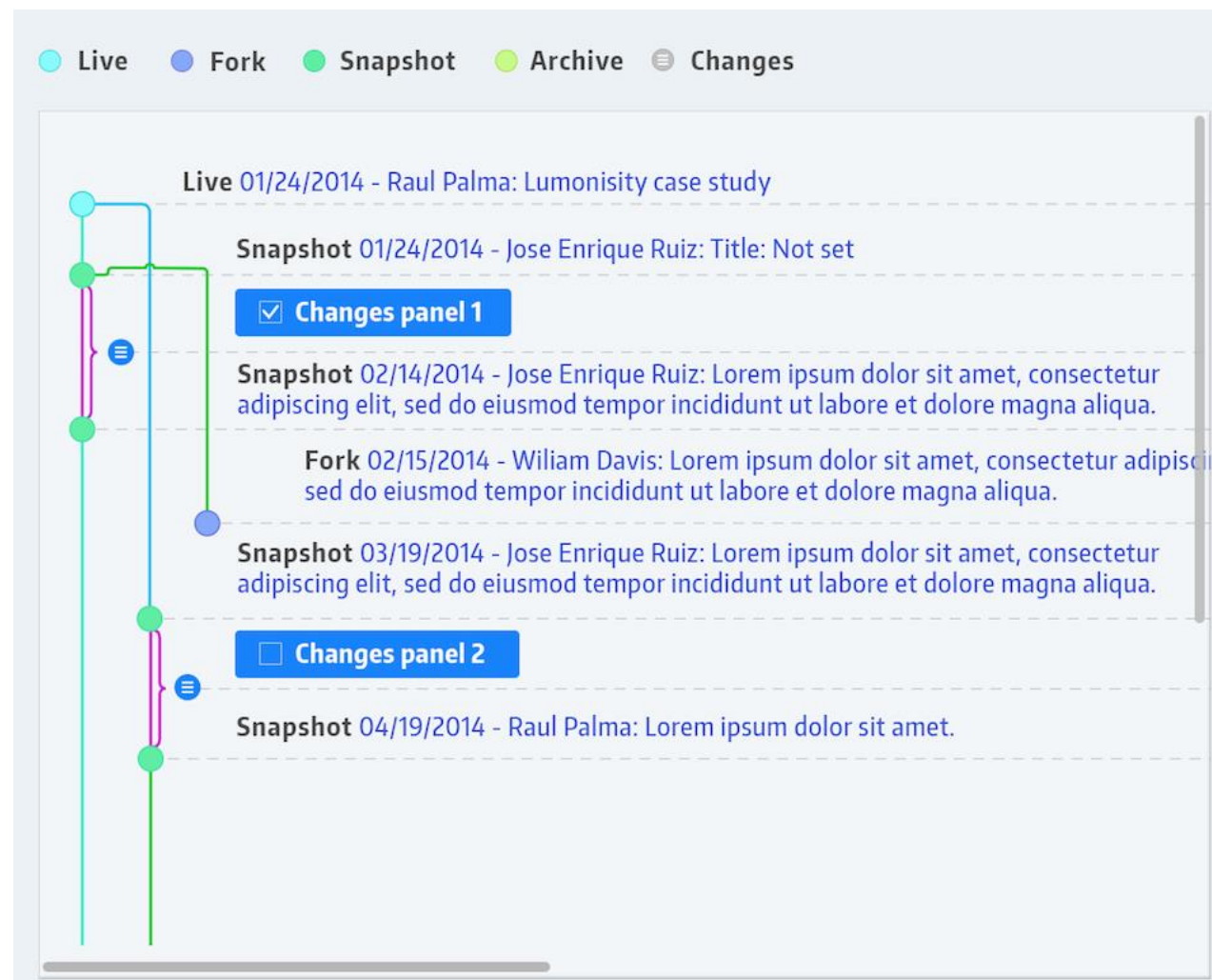
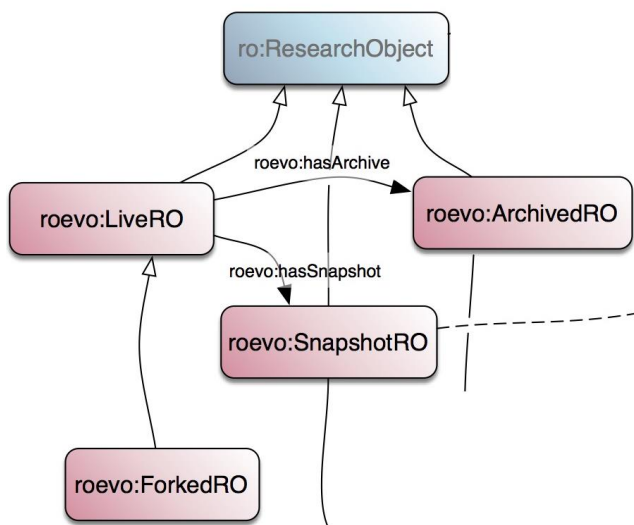
- We also defined different types of research objects according to the purpose and hence the kind of the resources it would aggregate:

- Workflow-centric
- Data-centric
- Research Product centric
- Process-centric
- Code-centric
- Service-centric
- Bibliography-centric
- Discussion-centric



# Earth Science extensions (3/3)

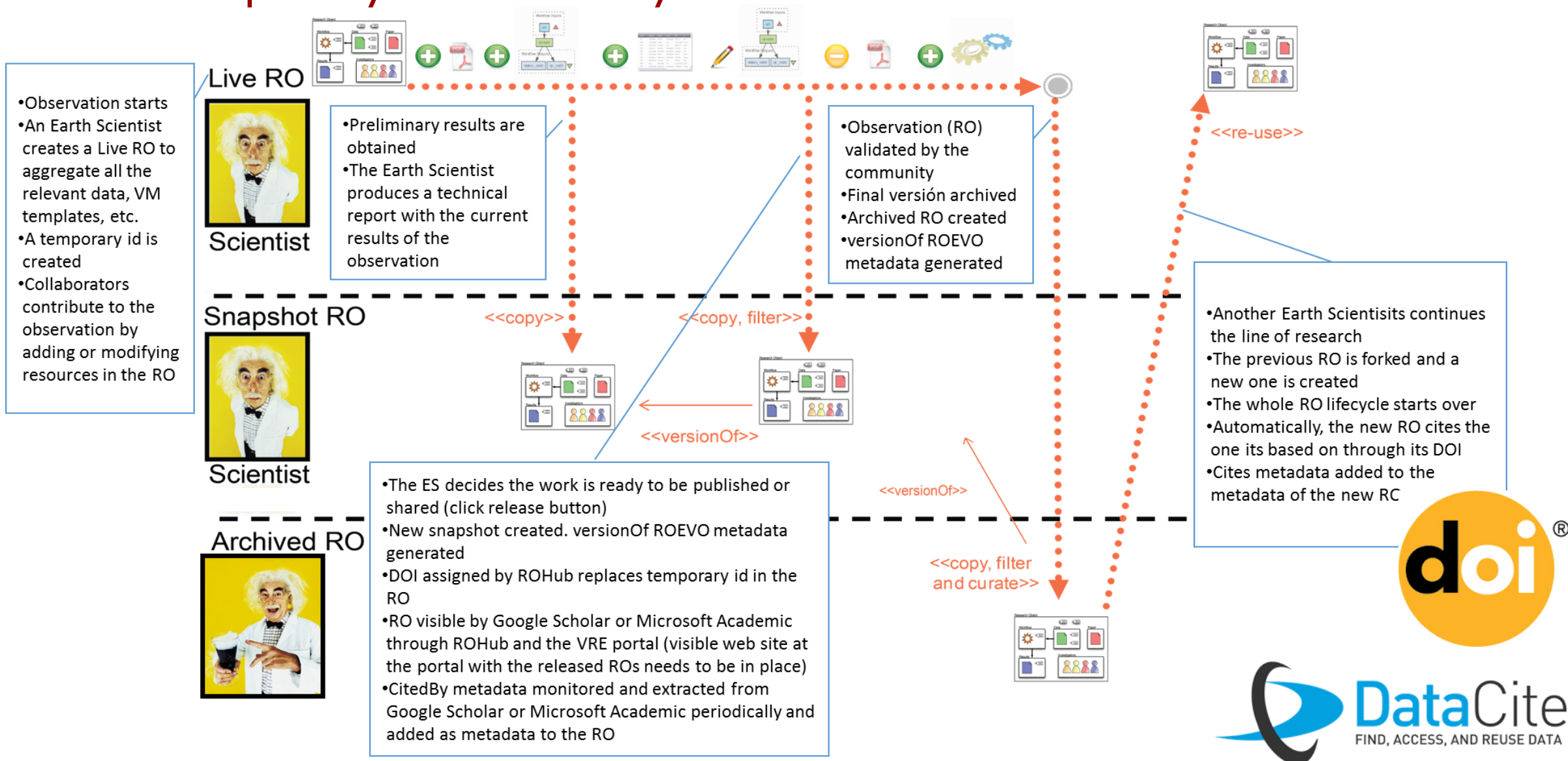
- Also, we made extension to the evolution model:
  - in addition to support snapshot and releases, it was requested support for forking to facilitate creation of new research objects from existing ones, e.g., to extend and build on previous work, or to try alternate lines of work







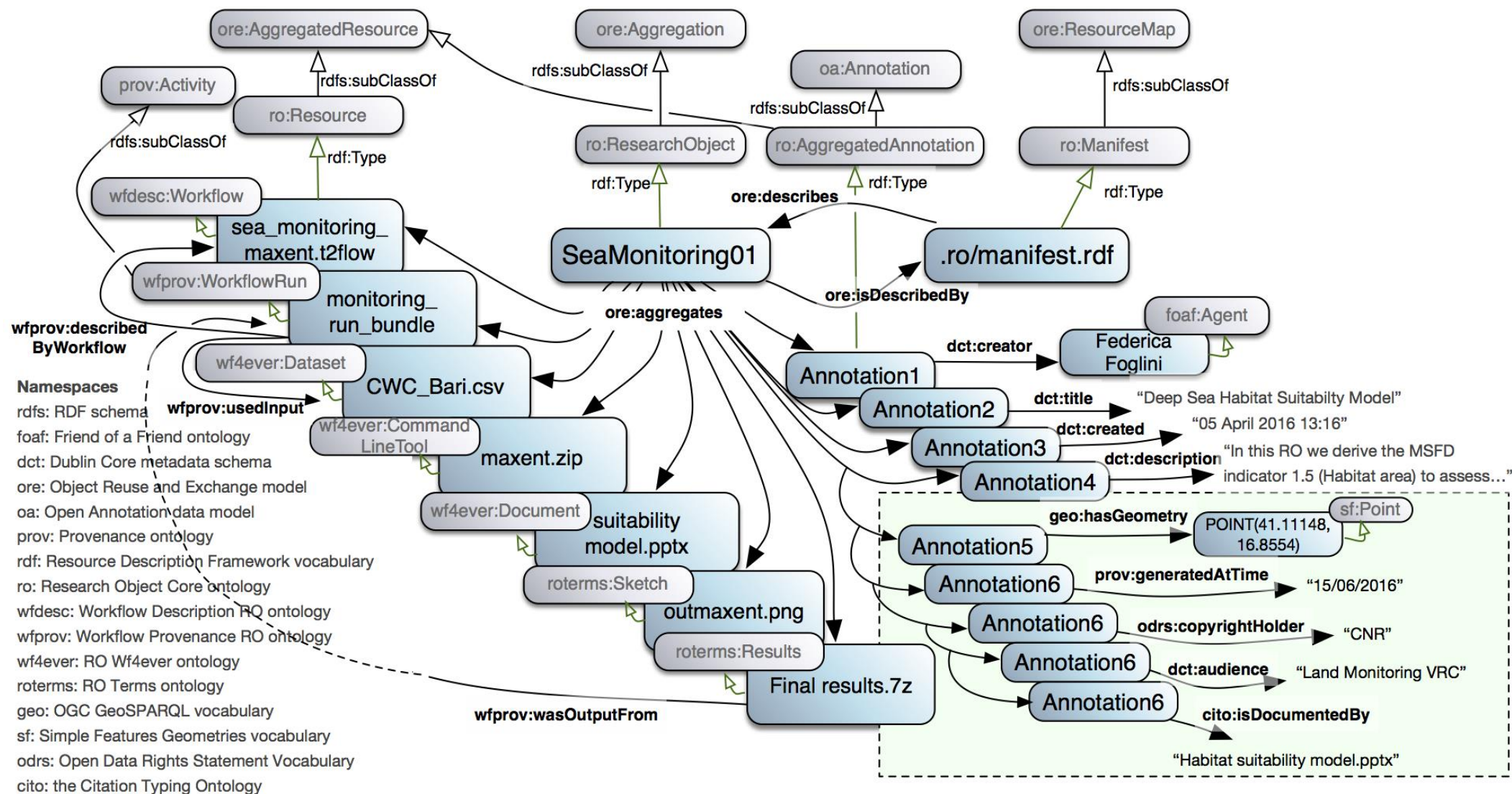
# Exemplary RO lifecycle







# Exemplary research object (sea monitoring use case)





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And what is the existing RO supporting  
technology ?





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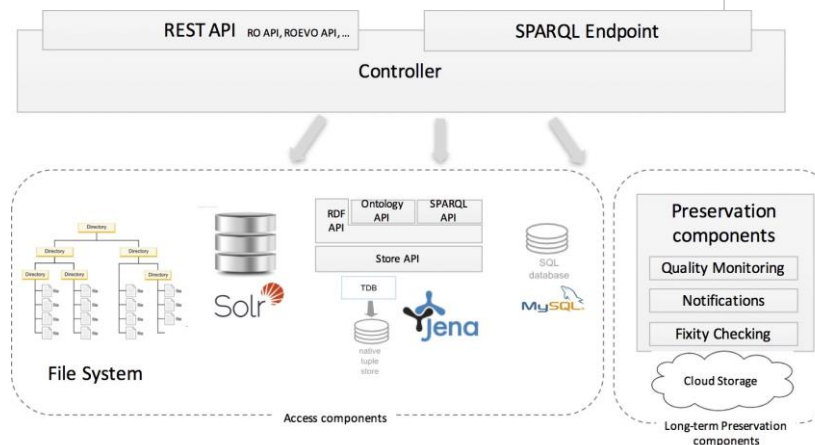


# Research object management platform

- ROHUB comprises both
  - a **backend service** (RODL), implementing and exposing the set of APIs
  - a reference **web client application** (ROHUB portal), exposing the research object functionalities to the end-users.
- Combination of digital libraries, long term-preservation and semantic technologies
- First released in 2012



Palma R., Corcho O., Gómez-Pérez J.M., Mazurek, C., "ROHub – A Digital Library for Sharing and Preserving Research Objects". Poster Proceedings of iPres 2014.



The screenshot shows the ROHUB portal interface. At the top, there's a navigation bar with links: HOME, ABOUT, ACTIVITY, EXPLORE, DISCOVER, MYROS, PEOPLE, SUPPORT, SHARE, FONT SIZE, EN, PL, Raul, and Logout. Below the navigation bar is a search bar with the text "Look for the keywords or find person" and a button "Need help? Learn how to browse Research Objects ...". The main content area displays details for a research object titled "Deep Sea Habitat Suitability Model". The object is in the "Physics: Universe sciences" research area, has a size of 1000kB, and is in a "LIVE" status. It was created on "Tue Apr 05 2016". The life cycle shows 2 snapshots and 0 LIVE (forked) versions, with a link to "See the life cycle". The uploader is "http://ffoglini.livejournal.com/" and the credits are "NOT AVAILABLE". The title is "Deep Sea Habitat Suitability Model". The description states: "In this RO we derive the MSFD indicator 1.5 (Habitat area) to assess the biological diversity descriptor. To do this in deep sea environment, the scientist (user) needs to implement a habitat suitability model." The completeness is 80%, with a link to "Check the quality". The share link is "http://sandbox.rohub.org/rodl/ROs/SeaMonitoring01/". The sketch shows a map of the Mediterranean Sea with a heatmap overlay indicating habitat potential. The map includes a scale bar from 0 to 8 Km and a legend for "Habitat potential areas: Maximum" with values from 0.0 to 1.0. The page also shows a "Check the content" button and a "Show annotations" button.



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# High-level features (1/2)

- **Holistic research object management** platform, enabling
  - scientists throughout the research **lifecycle** to **create** and **manage high-quality ROs** that can be **interpreted** and **reproduced** in the future
  - to **reference, share** and **preserve scientific** findings, **campaigns**, and **observations** related resources, including **internal** ones, links to **external** ones as well as other ROs (**nested ROs**)
  - to **collaborate** with colleagues and to **discover new knowledge** through different advanced exploratory search interfaces that exploit **RO metadata** (both explicitly provided and **automatically extracted** from its content)

# High-level features (1/2)

- **Holistic research object management** platform, enabling
  - To **manage** the **RO evolution** including the ability to generate **snapshots**, **releases** and **forks**
  - to **publish** the associated work and assign it a **DOI** for getting **citations**
  - to **monitor and follow** the status of a particular work and to get **notifications** about its progress
  - to **find researchers** relevant in a particular domain, e.g., for possible collaborations or reviews
- To **support** different **user roles**
  - Scientists, students and enthusiasts
  - Industry
  - Investors
  - Publishers



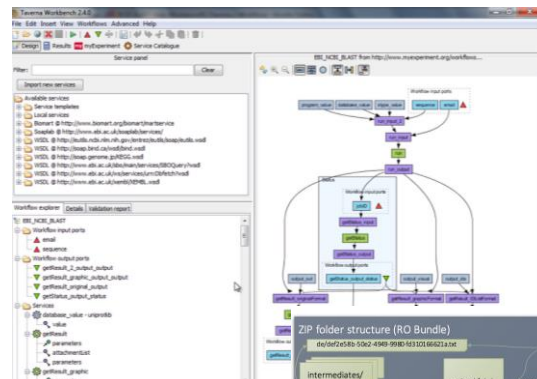


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# Interoperability with external systems via RO bundles

Workbench



The Taverna Suite of Tools

Workflow Repository

User Interfaces

Web Portals / Gateways  
Client User Interfaces

Third Party Tools

Player

Virtual Machine

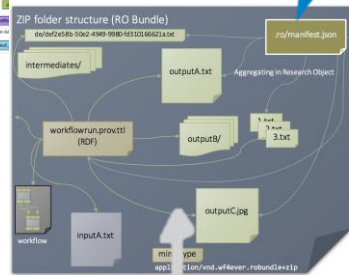
Command Line

Prog APIs

OSGi Alliance

Secure Service Access  
OAuth1 & 2, username/password, certificates.

Server



Upload a resource

Resource type  
☒ A local file  
☐ A web resource

Resource type  
Workflow  
Workflow Process  
Dataset  
Document  
Image

File to upload  
 test-bundle.bundle.zip  
☐ Is this an RO bundle?



HOME ABOUT ACTIVITY EXPLORE DISCOVER MYROS PEOPLE SUPPORT SHARE FONT SIZE EN PL Sign In

Look for the keywords or find person

Need help? Learn how to browse Research Objects ...

SEAMONITORING-CNR-TESTING-SEA\_MONITORING\_MAXENT\_V6.BUNDLE

Overview Content Quality Activity Life cycle Relations Citations Reference

home

Resource information

inputs  
3 items

intermediates  
7 items

SEAMONITORING-CNR-TESTING-SEA\_MONITORING\_MAXENT\_V6.BUNDLE

Overview Content Quality Activity Life cycle Relations Citations Reference

home > outputs >

Resource information

output\_link.txt  
117 Bytes

Name: output\_link.txt

https://box.everest.psncl.pl/seafhttp/files/303de0b7-44b3-4275-87dd-3c7dc2cf4824/maxent-output7129193146824760280.zip



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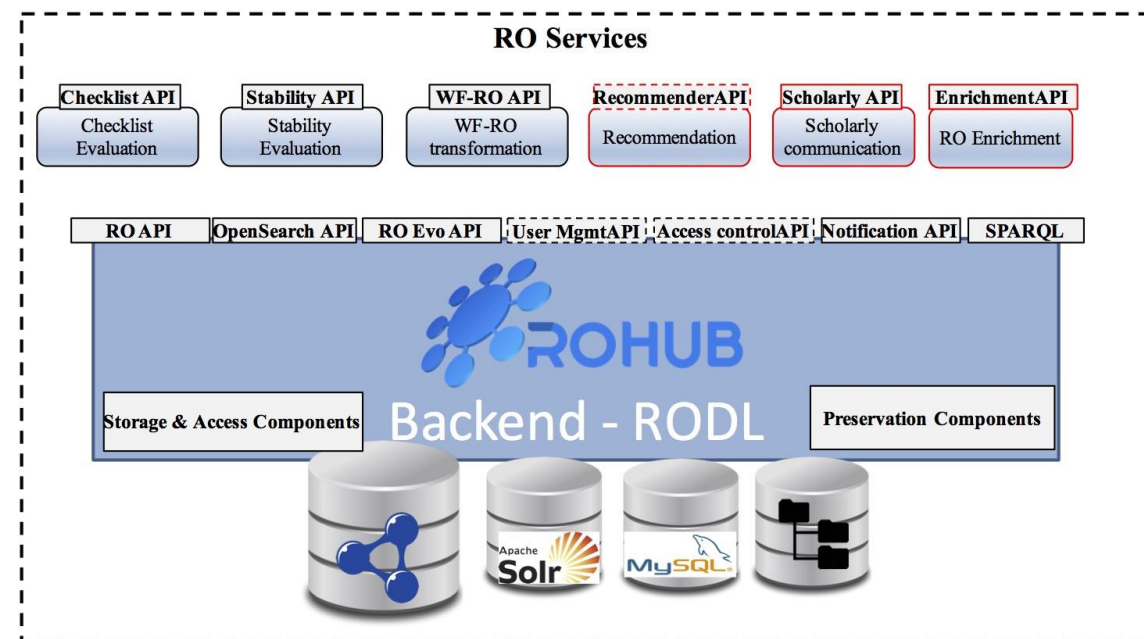
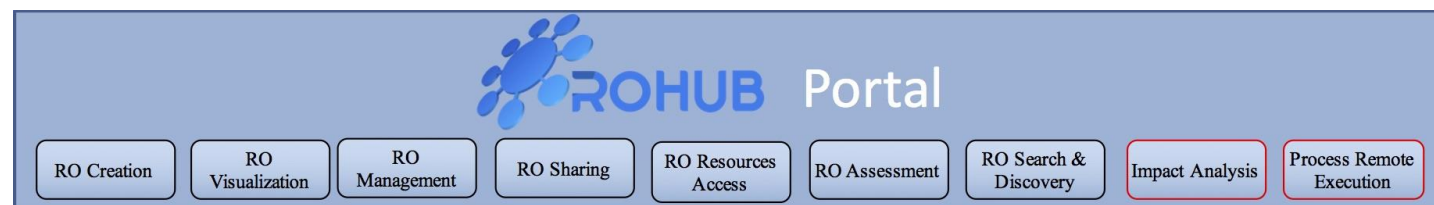
# Behind the scenes

A full suite of RO APIs provided by ROHUB and other RO services

The RO API suite includes several **specifications for managing different aspects of ROs**. The two main APIs are:

- **RO API** enables the **storage and retrieval** of ROs and their aggregated resources, as well as **annotating** them.
- **RO evolution API** enables to **record the transformation** of ROs based on their **lifecycle**, and to access the **history** of their evolution

Other APIs include: checklist, stability, recommendation, workflow runner, WF-RO, user mgmt, notification, access control, search (OpenSearch)



Palma R., Hołubowicz P., Page K., Soiland-Reyes S., Klyne G., Mazurek C. A Suite of APIs for the Management of Research Objects, Proceedings of the Developers Workshop, ISWC. October 2014.

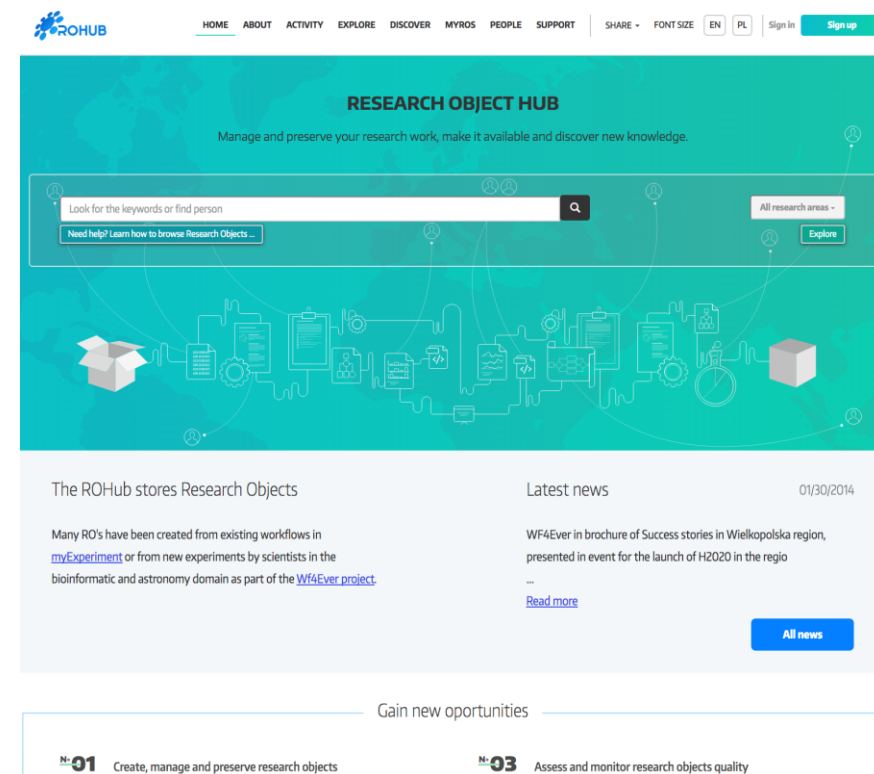
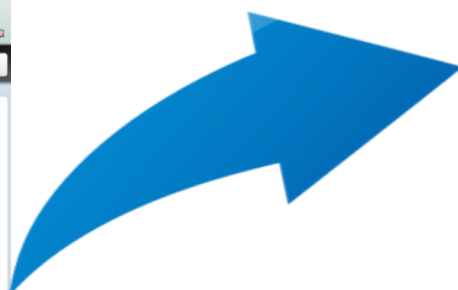
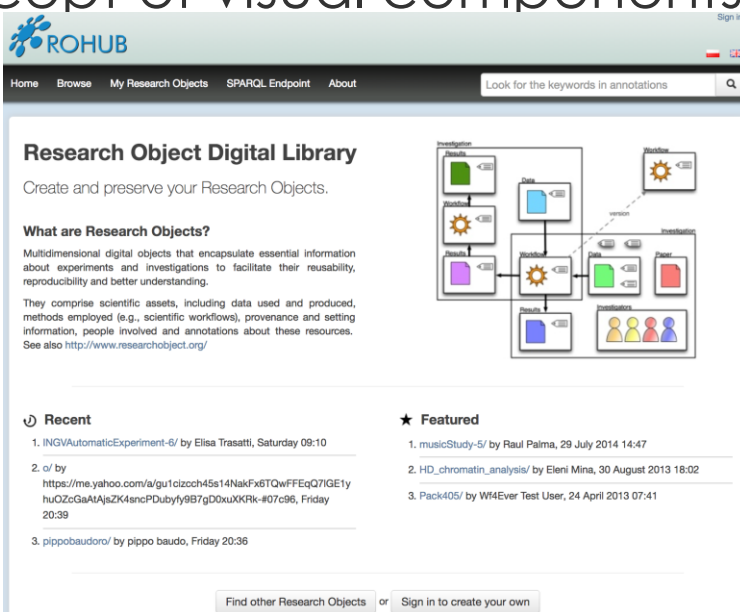


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# The RO user interface – ROHUB portal

- Fully fledged interface for the management of research objects, exposing the services functionalities to the end-users
- A new portal currently under development following the concept of visual components





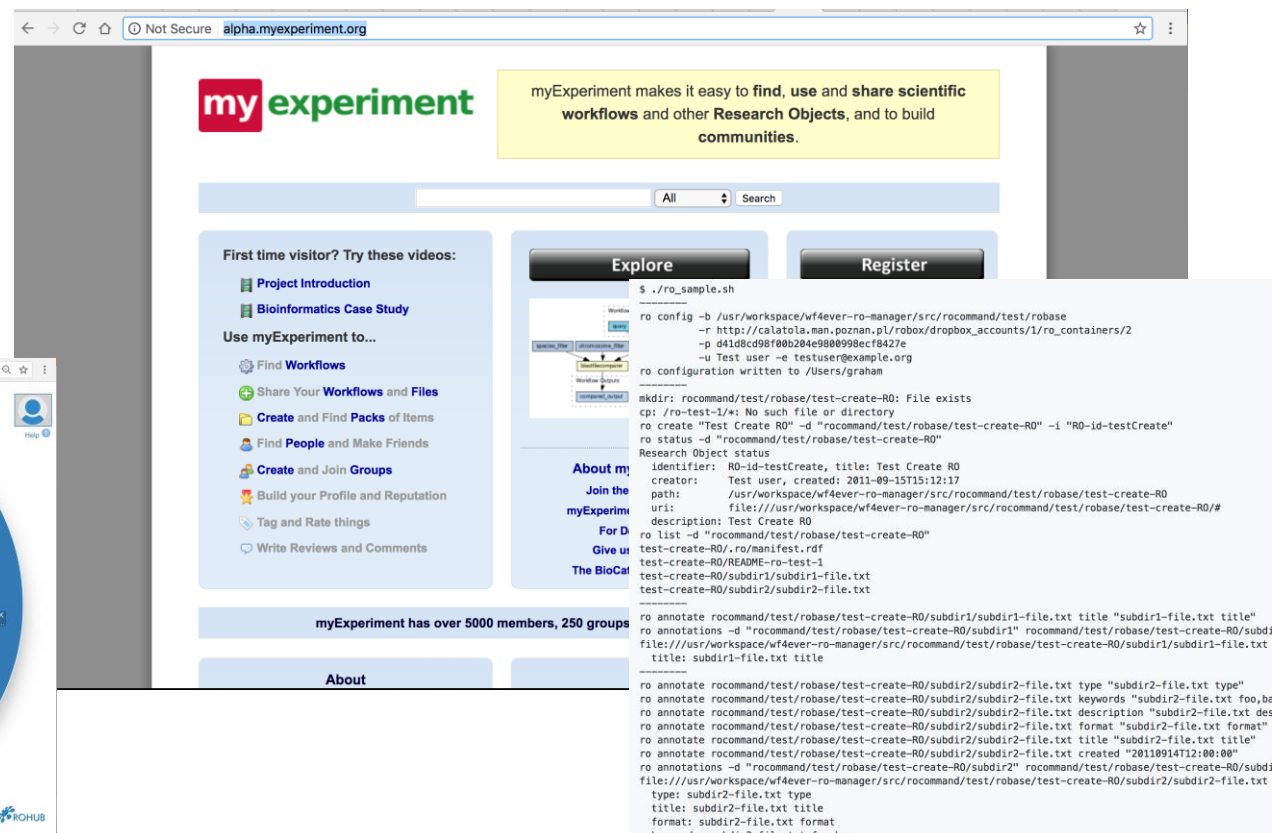
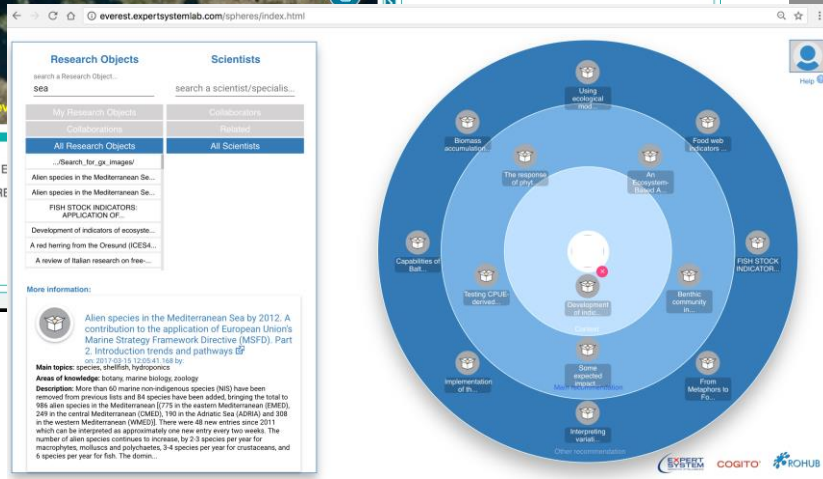
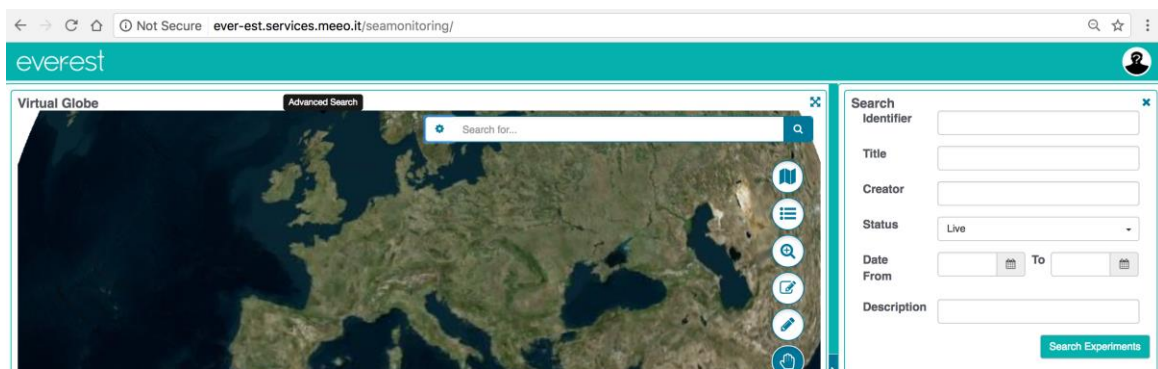


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# But there are other user interfaces...

RODL can have other client applications, e.g., VRC portals, collaboration spheres, command-line (ro-manager), myExperiment (alpha),...





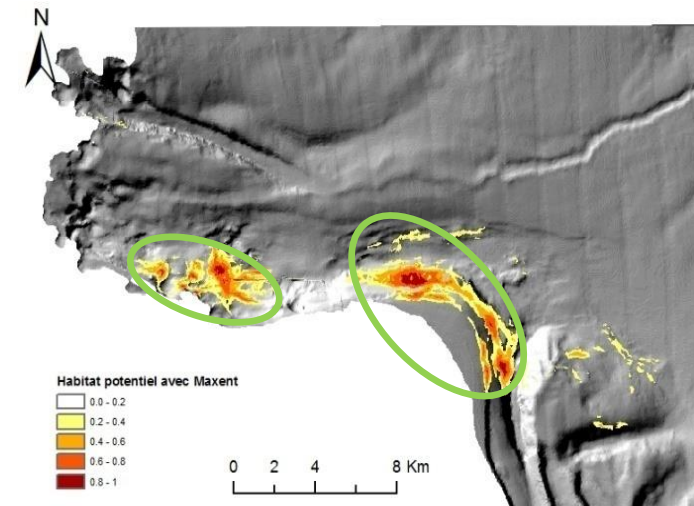
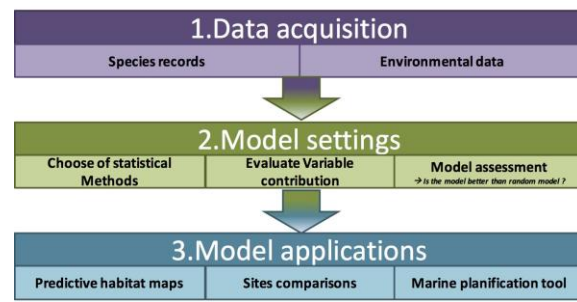
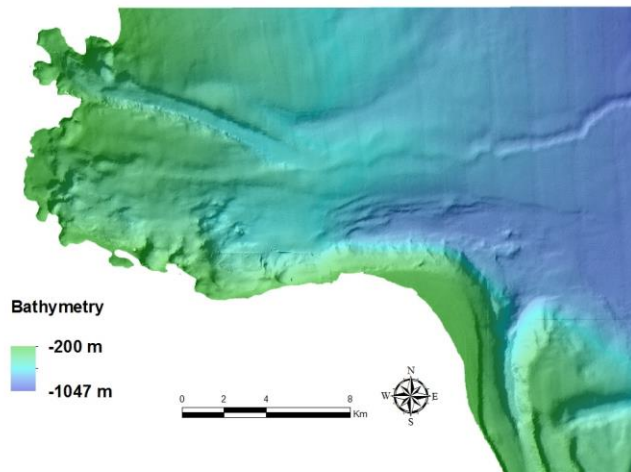
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# Exemplary use case



- Study: predictive habitat mapping of cold-water coral (CWC) in the Bari canyon
  - Relate **species occurrence data (CWC distribution)** with **environmental predictor variables (EGVs = Eco-geographic variables)**
  - Explain the contribution of each environmental variable to the species distribution
  - Produce **continuous maps** of potential species or habitat
  - **Automatize** this process by formalize it in a scientific **workflow**







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# Exemplary use case



## ■ Requirements:

- To **search** high resolution bathymetric data, and other data, e.g., CWC occurrences data
- To run a **high quality** model to obtain a reliable map of habitat suitability for CWC.
- To **share** the results with colleagues from different institutions at the Marine Strategy Framework Directive **(at different points in time)**
- To **reuse** the model in different locations, and to **re-run the model** after 1 year using new data (same location)
- To **preserve** the results and to **publish** methodologies and final maps
- To **collaborate** (colleagues should be notified), follow and **keep track of the study lifecycle**

## ■ Limitations:

- **No reference site** where a scientist can **find** publications on this topic, workflows executing the models, links to the data to be used and results (to mention a few).
- **No specific repositories** that are used to **preserve** and **reuse** all this information
- **No information** about the **quality** of the models and the methodologies described in the paper.
- Big **lack** of **communication** and synchronization during the study lifecycle



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# Use case: overcoming existing limitations...

- ROHUB enables scientists to **encapsulate** the data, provenance of workflows executions, results, documentation and other resources related to the particular study through a **single information unit**

## Create an RO from ZIP

Where is the ZIP archive? ☒ A file on my disk ☐ A web resource

### Create RO

RO Identifier

Title

Description

RO Type

Research area

Template

Cancel OK

## Upload a resource

Resource type ☒ A local file ☐ A web resource

Resource type

File to upload  No file chosen

OK Cancel

## SEAMONITORING01

Overview **Content** Quality Activity Life cycle Relations Citations Reference

### Actions

home > documents

Name	Created	Details	Creator	Action
152278-f.doc	1	04/14/2016	<a href="http://ffogliini.livejournal.com/">http://ffogliini.livejournal.com/</a>	...
GeoHAB2016.docx	1	04/14/2016	<a href="http://ffogliini.livejournal.com/">http://ffogliini.livejournal.com/</a>	...
Habitat suitability models for BARI canyon_2.pptx	2	04/05/2016	<a href="http://ffogliini.livejournal.com/">http://ffogliini.livejournal.com/</a>	...
How_to_use.docx	2	04/05/2016	<a href="http://ffogliini.livejournal.com/">http://ffogliini.livejournal.com/</a>	...
The-cold-water-coral-Lophelia-pertusa-Scleracti...	1	04/05/2016	<a href="http://ffogliini.livejournal.com/">http://ffogliini.livejournal.com/</a>	...

### "152278-f.doc" details

Description:	Not set
Type:	Not set
Size:	36352 KB
Created on:	04/14/2016
Uploader:	<a href="http://ffogliini.livejournal.com/">http://ffogliini.livejournal.com/</a>
URI:	<a href="http://sandbox.rohub.org/rodi/ROs/SeaMonitoring01/152278-f.doc">http://sandbox.rohub.org/rodi/ROs/SeaMonitoring01/152278-f.doc</a>
Sketch:	No image available

Hide details ^

Number of annotations: 1 [Show the annotations](#)

Add annotations ^



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# Use case: overcoming existing limitations...

- The scientist (& collaborators), then, can **search** for other research objects aggregating relevant resources that can be **re-used**, like potential input data, the processes, or other related resources, to reference them from the new research object

**Filters**

**Research area**

Type a research area name

- ☐ Natural Sciences
- ☐ Engineering and Technology
- ☐ Medical and Health Sciences
- ☐ Agricultural Sciences
- ☐ Social Sciences
- ☐ Humanities

**Creator**

- ☐ Marcin (3)
- ☐ Marcin Berendt (3)
- ☐ Marcin Krystek (5)
- ☐ Maria Susana Avila Garcia (1)
- ☐ Michele Lazzarini (5)
- ☐ Miguel Ceriani (1)
- ☐ Oscar Corcho (8)

**Creation date**

**Type**

- ☐ Data Research Object
- ☐ Research Product Research Object
- ☐ Process Research Object
- ☐ Code Research Object
- ☐ Workflow Research Object
- ☐ Service Research Object
- ☐ Bibliographic Research Object
- ☐ Discussion Research Object

**State**

**Quality**

**Content**

**Metrics**

**Research Objects List**

Results: 2564  
Results on page: 9 18 36

Sorted by: Creation date: Descending

**test-aggregate-2-test-aggregated/ Research Area**

NO TITLE FOUND OR ERROR DURING PROCESSING

Status: LIVE  
Creation date: Fri Jun 16 2017

Uploader: [Sergio Ferraresi](#)  
Credits: [Unknown](#)

completeness 75%

13 resources 4 annotations 0 comments 12 citations

**TestFromDiscovery-1/ Research Area**

Test From Discovery

Status: LIVE  
Creation date: Fri Jun 16 2017

Uploader: [Sergio Ferraresi](#)  
Credits: [Unknown](#)

completeness 75%

6 resources 3 annotations 0 comments 12 citations

**TestFromDiscovery/ Research Area**

Test From Discovery

Status: LIVE  
Creation date: Fri Jun 16 2017

Uploader: [Sergio Ferraresi](#)  
Credits: [Unknown](#)

completeness 75%

4 resources 2 annotations 0 comments 12 citations

**Trendintheevolutionofinvasvehellyfish- from2009to2015/ Research Area**

NO TITLE FOUND OR ERROR DURING PROCESSING

Status: LIVE  
Creation date: Fri Jun 16 2017

Uploader: [Francesco De Leo](#)  
Credits: [Unknown](#)

completeness 75%

18 resources 4 annotations 0 comments 12 citations

**Research Objects**

search a Research Object...  
volcano

**Scientists**

search a scientist/specialist...

**My Research Objects**

**Collaborations**

**All Research Objects**

**Volcano Source Modelling (VSM) - Appl...**

**Volcano Source Modelling (VSM) - Appl...**

**Related**

**All Scientists**

**Piotr Haliukiewicz**

**Oscar Corcho**

**Marcin Krystek**

**Kristina Hettne**

**Kristina Hettne**

**Khalid Behajame**

**Jose Manuel Gomez-Periz**

**Jose Manuel Gomez-Periz**

**More information:**

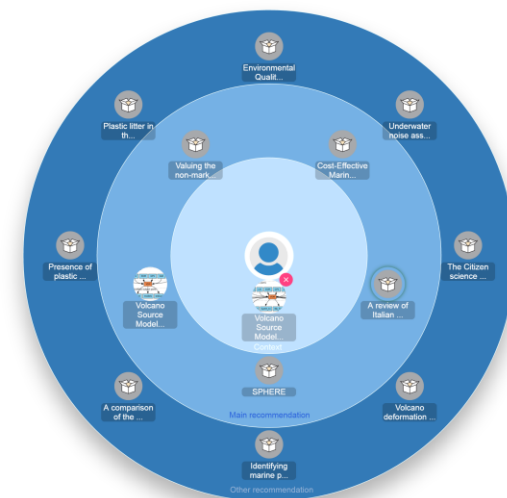
**A review of Italian research on free-living marine nematodes and the future perspectives on their use as Ecological Indicators (EcoInd)**

on: 2017-03-15 14:17:07.07 by:

**Main topics:** nematode, habitat, breakdown

**Area of knowledge:** zoology, biology, marine biology

**Description:** The use of free-living marine nematodes as ecological indicators (EcoInds) of human impacts has increased greatly in Italy since 1990. This paper is a summary of the Italian research experience in the study of nematode assemblages of shallow water habitats, and provides a breakdown of the most important insights that have been obtained so far. Although nematodes are among the best candidates for the Ecological Quality (EcoQ) assessment in the benthic domain, many guidelines need to be developed and limits overcome. Italian research has certainly contributed to the achievement of this purpose with highly focused local investigations on the eff...





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# Use case: overcoming existing limitations...

- As the research work progresses, the scientist can **verify and get assistance** to build a **high-quality research object**, e.g., that has all the required resources and metadata

OverviewContentQualityActivityLife cycleRelationsCitationsReference

Research Area:Physics: Universe sciencesSize: 1000kBDownloadEvolution

Title:Deep Sea Habitat Suitability Model

Description:In this RO we derive the MSFD indicator 1.5 (Habitat area) to assess the biological diversity descriptor. To do this in deep sea environment, the scientist (user) needs to implement a habitat suitability model.

Link:<http://sandbox.rohub.org/rod/ROs/SeaMonitoring01/>

Status:LIVE

Creator:<http://ffoglini.livejournal.com/>

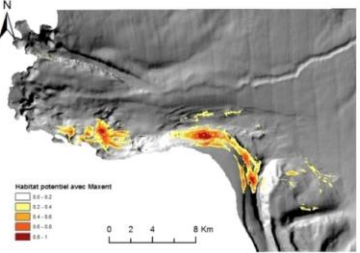
Creation date:2016-04-05 01:16:51

Credits:N/A(<http://ffoglini.livejournal.com/>)

Research Object Type:N/A

Keywords:sea monitoring; habitat suitability

Ancillary Documentation:[http://sandbox.rohub.org/rod/ROs/SeaMonitoring01/Habitat%20Suitability%20Models%20for%20BARI%20canyon\\_2.pptx](http://sandbox.rohub.org/rod/ROs/SeaMonitoring01/Habitat%20Suitability%20Models%20for%20BARI%20canyon_2.pptx)

Sketch:

Quality:80%[Check the quality](#)

## SEAMONITORING01

OverviewContentQualityActivityLife cycleRelationsCitationsReference

Completeness:94[See quality history with RO Monitoring Tool](#)

Quality checked list

Chose the list:[Earth Science workflow-centric RO key requirements](#)Recommended list: **Research Object basic requirements**

☒ Research Object has title

☒ Research Object has description

☒ Research Object has creator

☒ Research Object has copyright holder

☒ Research Object has keywords

☒ Research Object has sketch

☒ Research Object has subject

☒ Research Object has ancillary documentation

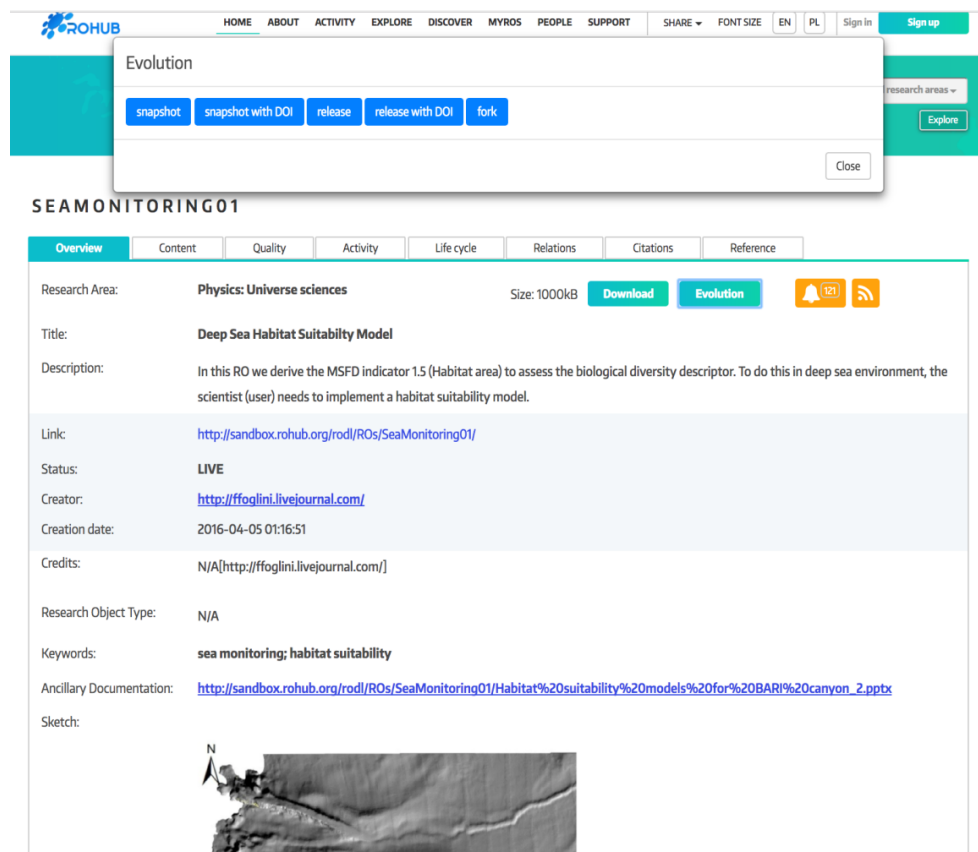
☒ Workflow resource is present

☒ All workflow definitions referenced by workflow resources are accessible. The wf definition is the resource understood by a workflow engine (e.g, t2flow, ga, kar).

☒ Workflow run is indicated

# Use case: overcoming existing limitations...

- The scientists can i) **release and share** the RO throughout the research lifecycle, so that those releases can then be **review**, **reused** or **re-executed by others**; ii) **visualise** the RO evolution



The screenshot shows the ROHUB Evolution modal window with buttons for 'snapshot', 'snapshot with DOI', 'release', 'release with DOI', and 'fork'. Below it is the SEAMONITORING01 research object page. The page includes a navigation bar with tabs: Overview, Content, Quality, Activity, Life cycle, Relations, Citations, and Reference. The main content area displays the research object details:

Research Area: **Physics: Universe sciences** Size: 1000kB [Download] [Evolution] [121] [RSS]

Title: **Deep Sea Habitat Suitability Model**

Description: In this RO we derive the MSFD indicator 1.5 (Habitat area) to assess the biological diversity descriptor. To do this in deep sea environment, the scientist (user) needs to implement a habitat suitability model.

Link: <http://sandbox.rohub.org/rod/ROs/SeaMonitoring01/>

Status: **LIVE**

Creator: <http://ffoglini.livejournal.com/>


Creation date: 2016-04-05 01:16:51

Credits: N/A[<http://ffoglini.livejournal.com/>]

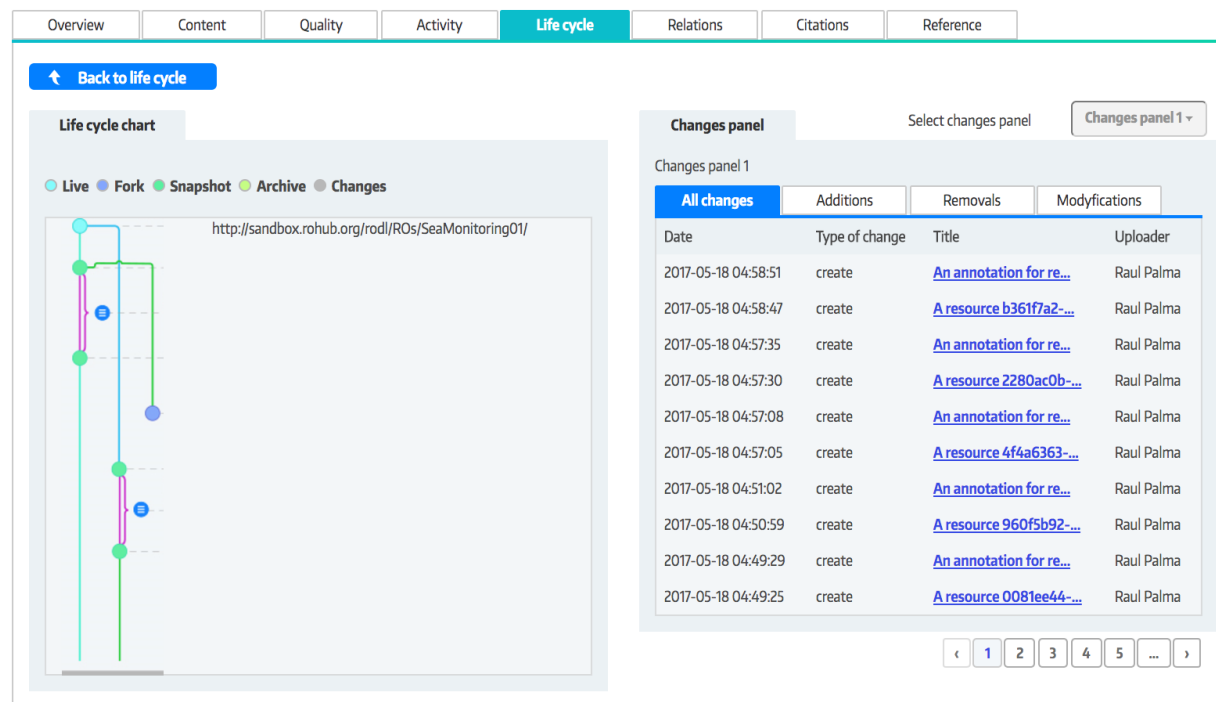
Research Object Type: N/A

Keywords: **sea monitoring; habitat suitability**

Ancillary Documentation: [http://sandbox.rohub.org/rod/ROs/SeaMonitoring01/Habitat%20suitability%20models%20for%20BARI%20canyon\\_2.pptx](http://sandbox.rohub.org/rod/ROs/SeaMonitoring01/Habitat%20suitability%20models%20for%20BARI%20canyon_2.pptx)

Sketch: 

## SEAMONITORING01



The screenshot shows the SEAMONITORING01 Life cycle chart and Changes panel. The Life cycle chart displays a timeline of changes, with a legend indicating Live (blue), Fork (purple), Snapshot (green), Archive (yellow), and Changes (grey). The URL <http://sandbox.rohub.org/rod/ROs/SeaMonitoring01/> is shown. The Changes panel displays a table of changes:

Changes panel 1			
All changes	Additions	Removals	Modifications
Date	Type of change	Title	Uploader
2017-05-18 04:58:51	create	<a href="#">An annotation for re...</a>	Raul Palma
2017-05-18 04:58:47	create	<a href="#">A resource b361f7a2-...</a>	Raul Palma
2017-05-18 04:57:35	create	<a href="#">An annotation for re...</a>	Raul Palma
2017-05-18 04:57:30	create	<a href="#">A resource 2280ac0b-...</a>	Raul Palma
2017-05-18 04:57:08	create	<a href="#">An annotation for re...</a>	Raul Palma
2017-05-18 04:57:05	create	<a href="#">A resource 4f4a6363-...</a>	Raul Palma
2017-05-18 04:51:02	create	<a href="#">An annotation for re...</a>	Raul Palma
2017-05-18 04:50:59	create	<a href="#">A resource 960f5b92-...</a>	Raul Palma
2017-05-18 04:49:29	create	<a href="#">An annotation for re...</a>	Raul Palma
2017-05-18 04:49:25	create	<a href="#">A resource 0081ee44-...</a>	Raul Palma



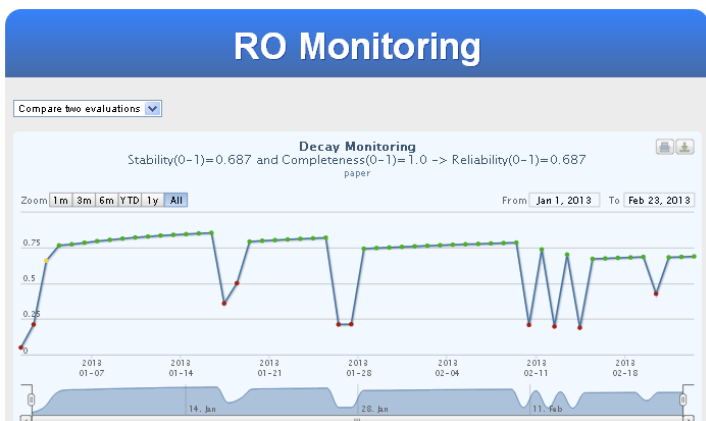


This project is co-funded by the European Union



# Use case: overcoming existing limitations...

- Scientists can **preserve** ROs, so that they can be effectively reused, including the monitoring and notification of changes in the RO quality through time.
- Colleagues can also **subscribe to changes** (quality and content) in the RO **to follow and keep track** of the work progress



SEAMONITORING01

Overview Content Quality Activity Life cycle Relations Citations Reference

Download Evolution

Filters

Publication date

From Month Day Year

To Month Day Year

Ok

Clear filters

Filters applied

Results: 121

Results on page: 9 18 36

Sorted by: Date

Date	Object type	Title
2017-05-18 04:58:51	annotation	<a href="#">An annotation for resource Workflow_WPS created by Raul Palma</a>
2017-05-18 04:58:47	resource	<a href="#">A resource b3617a2-7f68-424c-8b86-8601 been added to the Resear...</a>
2017-05-18 04:57:35	annotation	<a href="#">An annotation for resource Habitat Suitabili has been created b...</a>
2017-05-18 04:57:30	resource	<a href="#">A resource 2280ac0b-d979-47f0-b461-408 been added to the Resear...</a>
2017-05-18 04:57:08	annotation	<a href="#">An annotation for resource Workflow_slope been created by Raul ...</a>
2017-05-18 04:57:05	resource	<a href="#">A resource 4f4a6363-8e44-42f9-8d27-999' been added to the Resear...</a>
2017-05-18 04:51:02	annotation	<a href="#">An annotation for resource Habitat Suitabili has been created b...</a>
2017-05-18 04:50:59	resource	<a href="#">A resource 960f5b92-ec07-478b-a885-981t been added to the Resear...</a>
2017-05-18 04:49:29	annotation	<a href="#">An annotation for resource Workflow_WPS created by Raul Palma</a>

biological diversity descriptor. To do this in deep sea environment, the

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Title

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http://sandbox.rohub.org/rod/atomnotifications/ro-http%3A%2F%2Fsandbox.rohub.org%2Frod%2FROs%2FSeaMonitoring-cn-testing%2F

Link

http://sandbox.rohub.org/rod/atomnotifications/7

ro-http%3A%2F%2Fsandbox.rohub.org%2Frod%2FROs%2FSeaMonitoring-cn-testing%2F

Latest posts

A resource samplesfile.xml has been added to the Research Object SeaMonitoring-cn-testing by Raul Palma

A resource jarfile.xml has been added to the Research Object SeaMonitoring-cn-testing by Raul Palma

A resource envDirectory.xml has been added to the Research Object SeaMonitoring-cn-testing by Raul Palma

An annotation for resource sea\_monitoring\_maxent\_v6.02flow has been created by Raul Palma

A resource sea\_monitoring\_maxent\_v6.02flow has been added to the Research Object SeaMonitoring-cn-testing by Raul Palma



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# Use case: overcoming existing limitations...

- Scientists can **collaborate** with other colleagues, setting different **access modes** and **permissions** to the RO

Overview	Content	Quality	Activity	Life cycle	Relations	Citations	Reference	Access Control
----------	---------	---------	----------	------------	-----------	-----------	-----------	----------------

Access Mode : public ▾

Editors :

Readers :



Grand Privilege

☒

☐



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# Use case: overcoming existing limitations...

- Finally, the results can be **published with DOI** for proper citation and attribution

The screenshot shows the ROHUB website interface. At the top, there's a navigation bar with links like HOME, ABOUT, ACTIVITY, EXPLORE, DISCOVER, MYROS, PEOPLE, SUPPORT, and a SHARE dropdown. A 'Sign up' button is on the right. Below the navigation bar, there's a modal window titled 'Evolution' with buttons for 'snapshot', 'snapshot with DOI', 'release', 'release with DOI', and 'fork'. The main content area displays details for a research object named 'SEAMONITORING01'. It includes tabs for Overview, Content, Quality, Activity, Life cycle, Relations, Citations, and Reference. The 'Overview' tab is active, showing the Research Area as 'Physics: Universe sciences', the Title as 'Deep Sea Habitat Suitability Model', and a description. It also lists the Link, Status (LIVE), Creator, Creation date, Credits, Research Object Type, Keywords, Ancillary Documentation, and a Sketch of a deep-sea environment.



<http://doi.org/10.4225/01/4F3DB08617645>

resolver service      prefix (assigning body)      suffix (resource)





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