27-29 May 2024

International conference on Marine Data and Information Systems

D4Science: Advancing Ocean Science Through Collaborative Data Analysis

Massimiliano Assante, PhD – CNR, Italy

D4SCIENCE

National Research Council of Italy

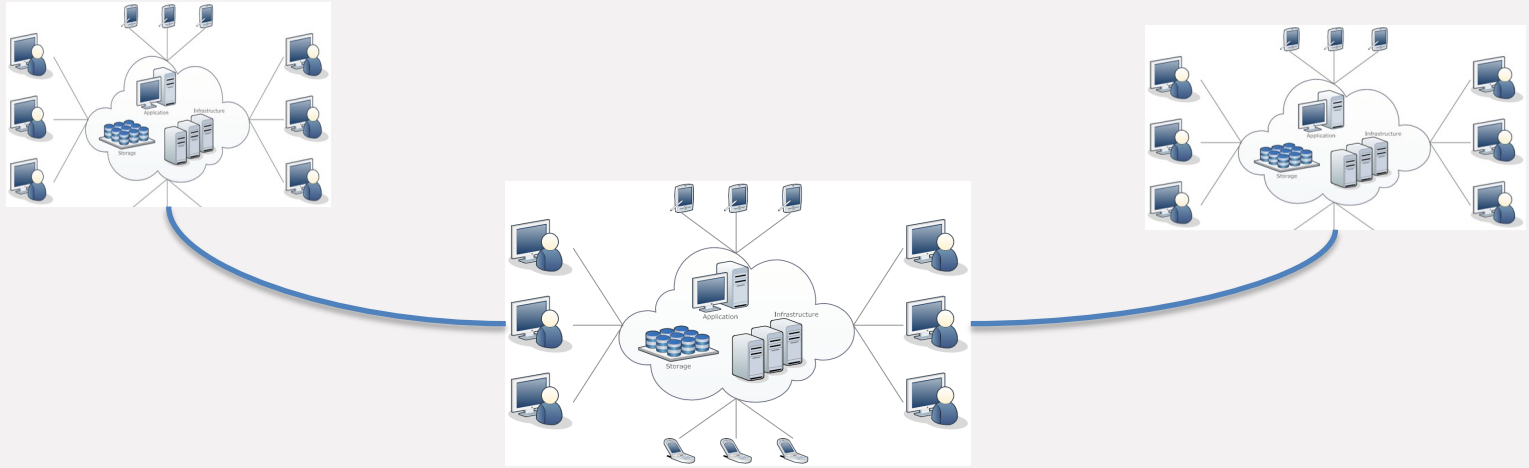
D4Science: Advancing Ocean Science Through Collaborative Data Analysis

M. Assante, L. Candela, L. Frosini, F. Mangiacrapa, E. Molinaro, P. Pagano

CNR - Istituto Scienza e Tecnologia dell'Informazione "A. Faedo", Pisa, Italy

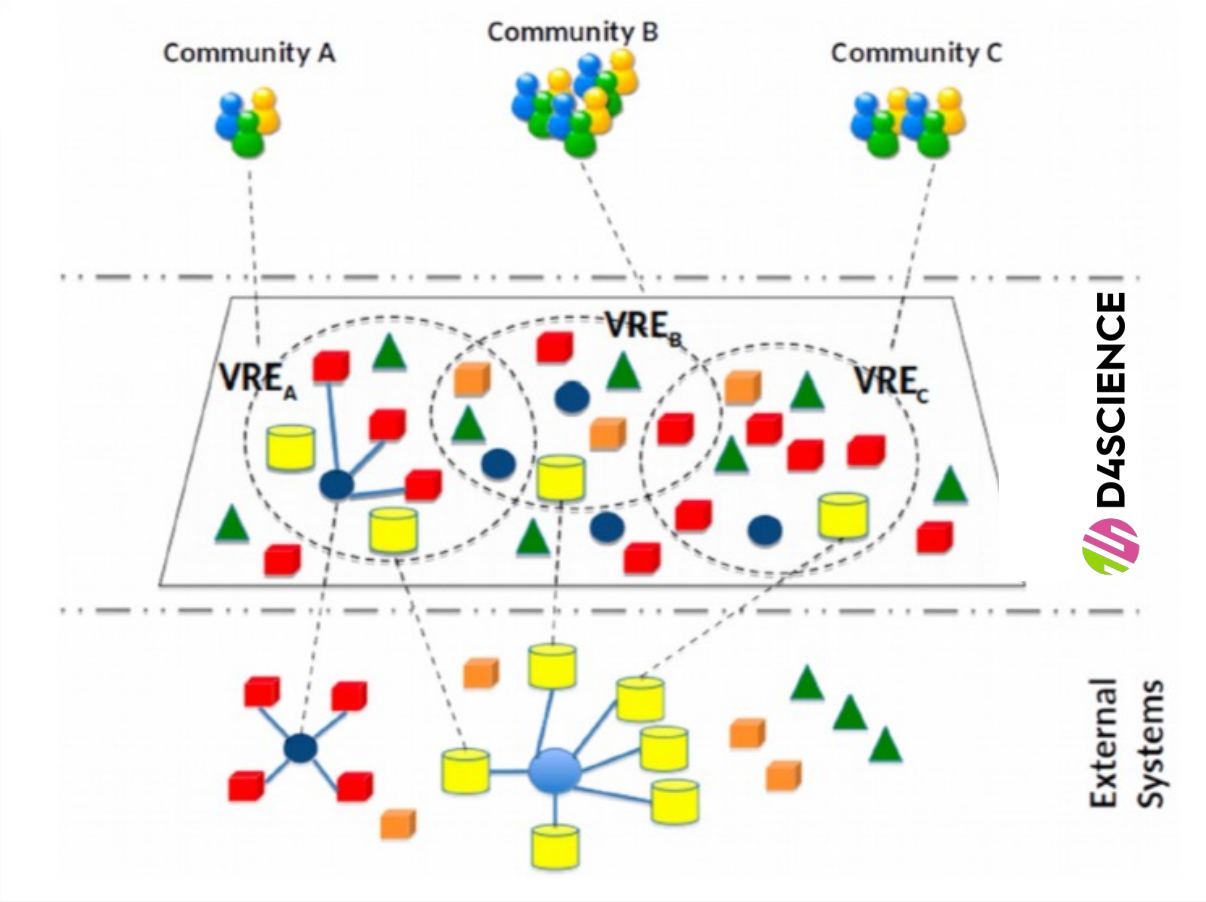
What is D4Science

- A digital **infrastructure** for **collaborative scientific research**, combining over 500 software components into a coherent and centrally managed system of **hardware**, **software**, and **data resources**



D4SCIENCE promotes Open Science practices through the operation of a Data Infrastructure service

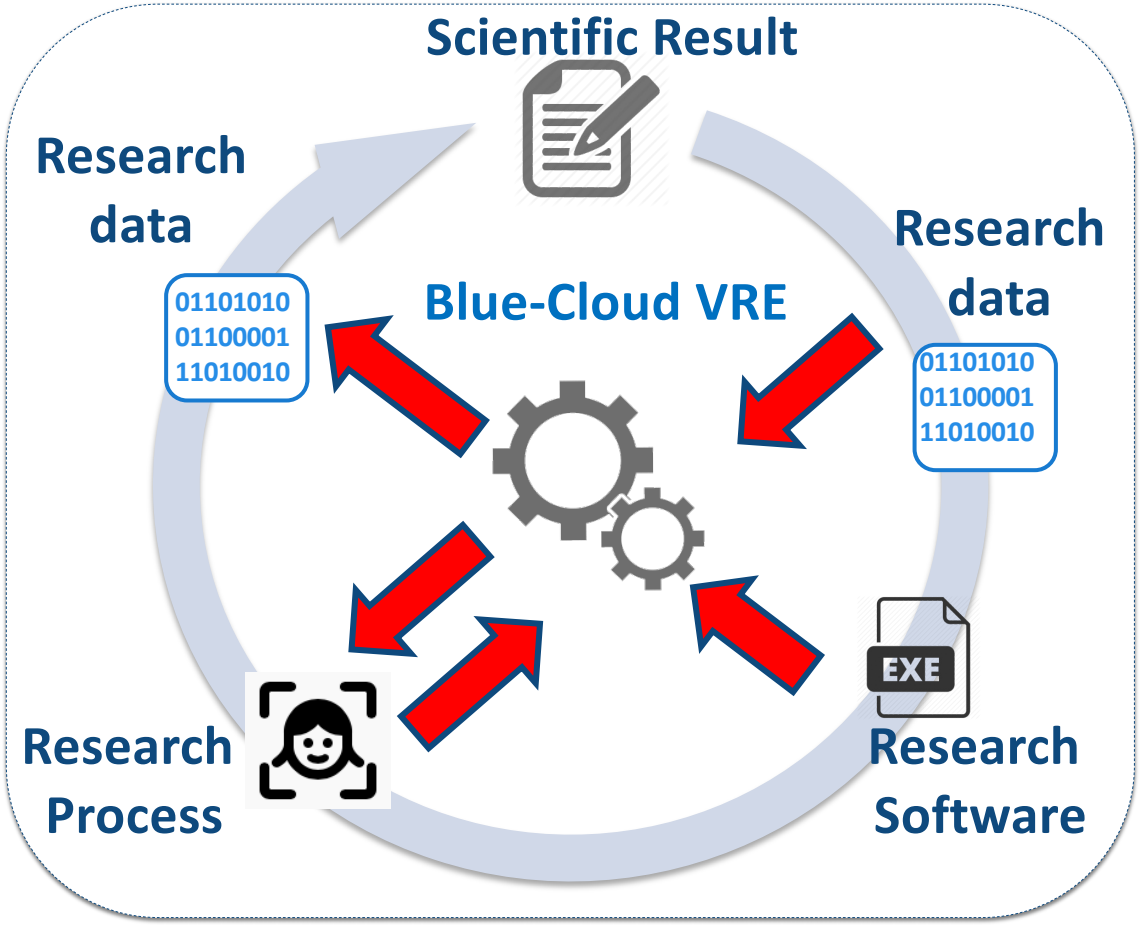
- leverage **external systems** (e.g. data, storage, cloud-based infrastructures)
- by exposing them as a **common unified space of resources**
- to serve **diverse community of researchers**
- via the **provision of tailored services and sharing tools**
- made accessible through a flexible, web-based and on-demand environments called **Virtual Research Environments (VRE)**



M. Assante et al. (2023**) Virtual research environments co-creation: The D4Science experience.** Concurrency Computat Pract Exper. 2023; 35(18):e6925. doi:10.1002/cpe.6925

M. Assante, et al. (2019) **Enacting open science by D4Science**. Future Generation Computer Systems (Vol. 101) doi: 10.1016/j.future.2019.05.063

D4SCIENCE



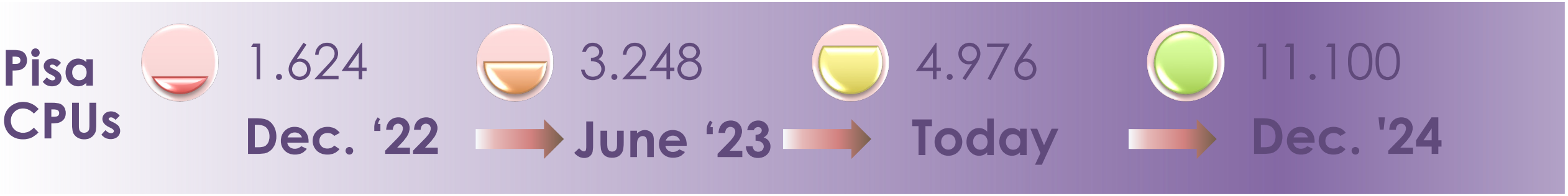
Enable

- Repeat, Reproduce, Reuse, Evaluate
- Active collaboration
- Effective sharing
- Provenance and attribution

Adopt

- As-a-service approach
- Standards
- Economy-of-scale to reduce operational costs

Resources Evolution



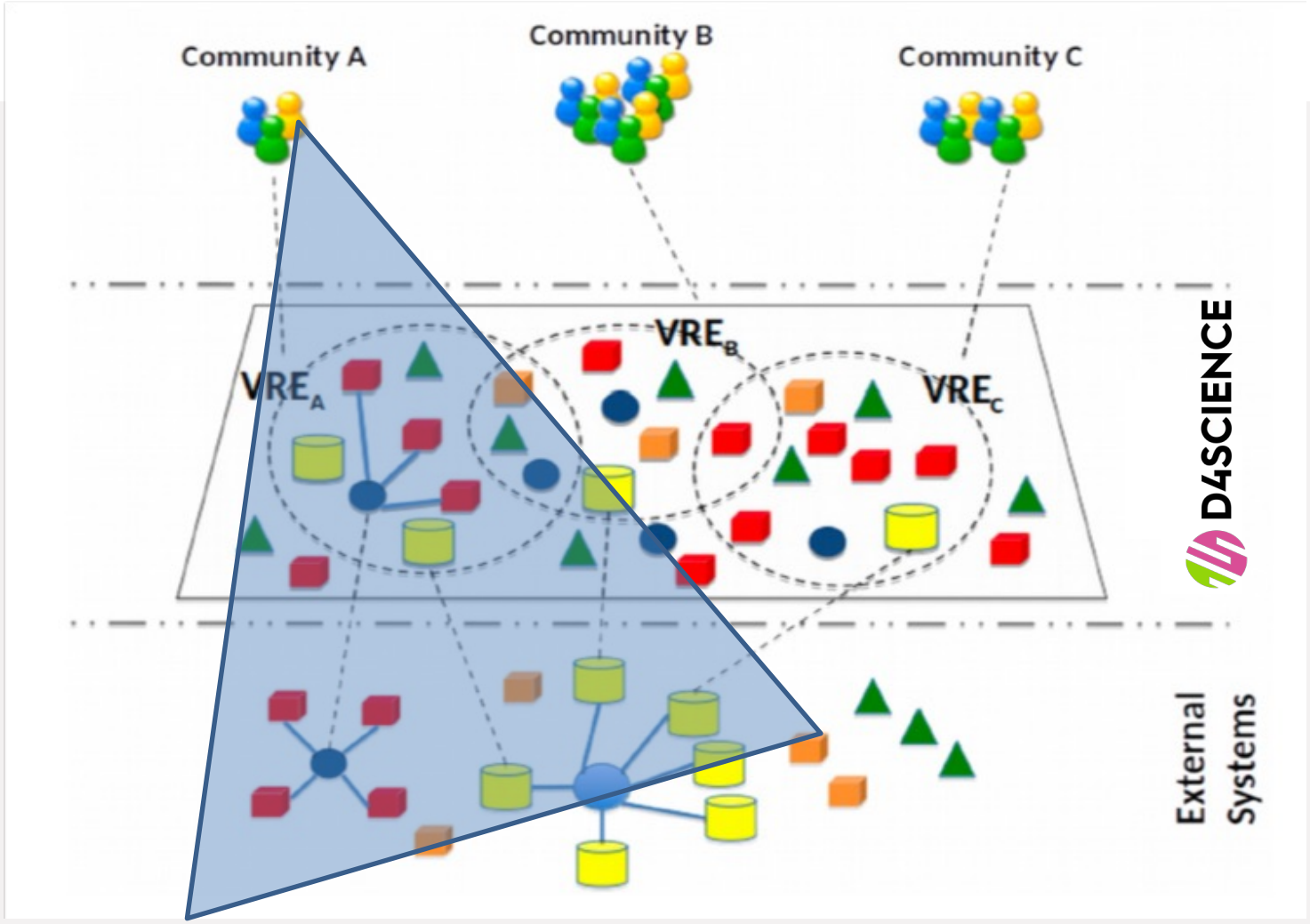
D4Science is a federated digital infrastructure promoting Open Science

- 4 sites (1 Pisa, 3 @ GARR)
- 3590 CPUs core
- 13 TB RAM
- 600 TB Storage

D4Science is owned and managed by CNR

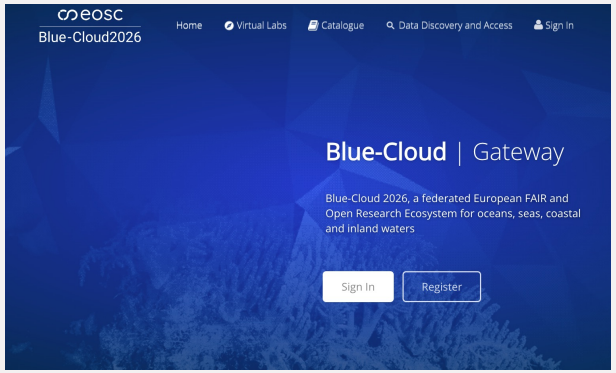
It supports ESFRI RIs, national and European projects, national and international initiatives

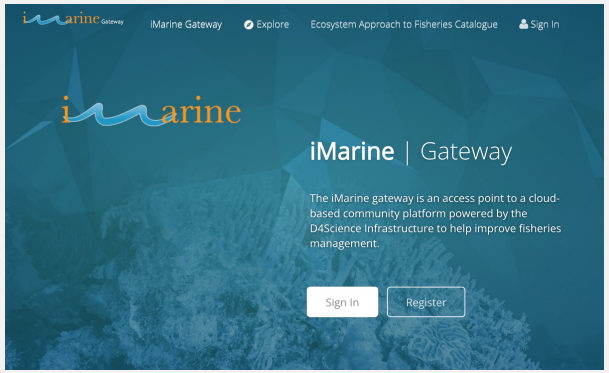
Community VREs on D4Science

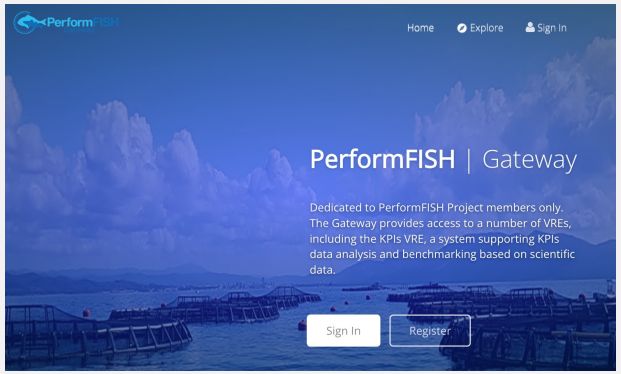


D4Science in Marine and Ocean Science

- Actively supports diverse marine and ocean science projects and initatives.
- Contributions to European Open Science Cloud (EOSC) through projects such as **Blue-Cloud and EOSC Blue-Cloud2026**.
- Supported H2020 **BlueBRIDGE** and **iMarine** EU FP7 Project.



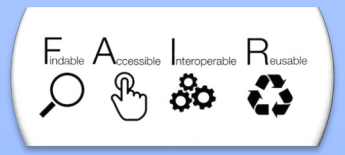




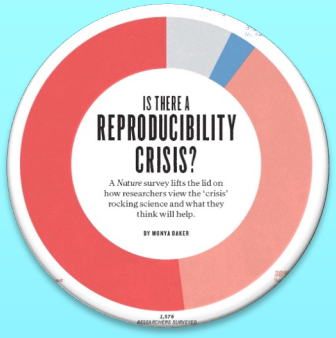
One common place

Collaboration

Sharing



Reuse

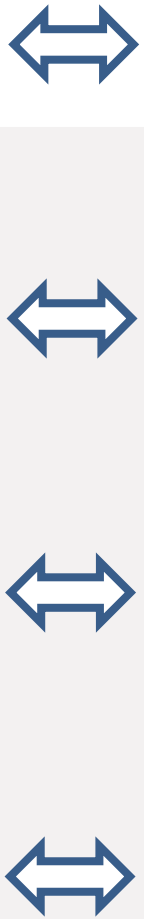


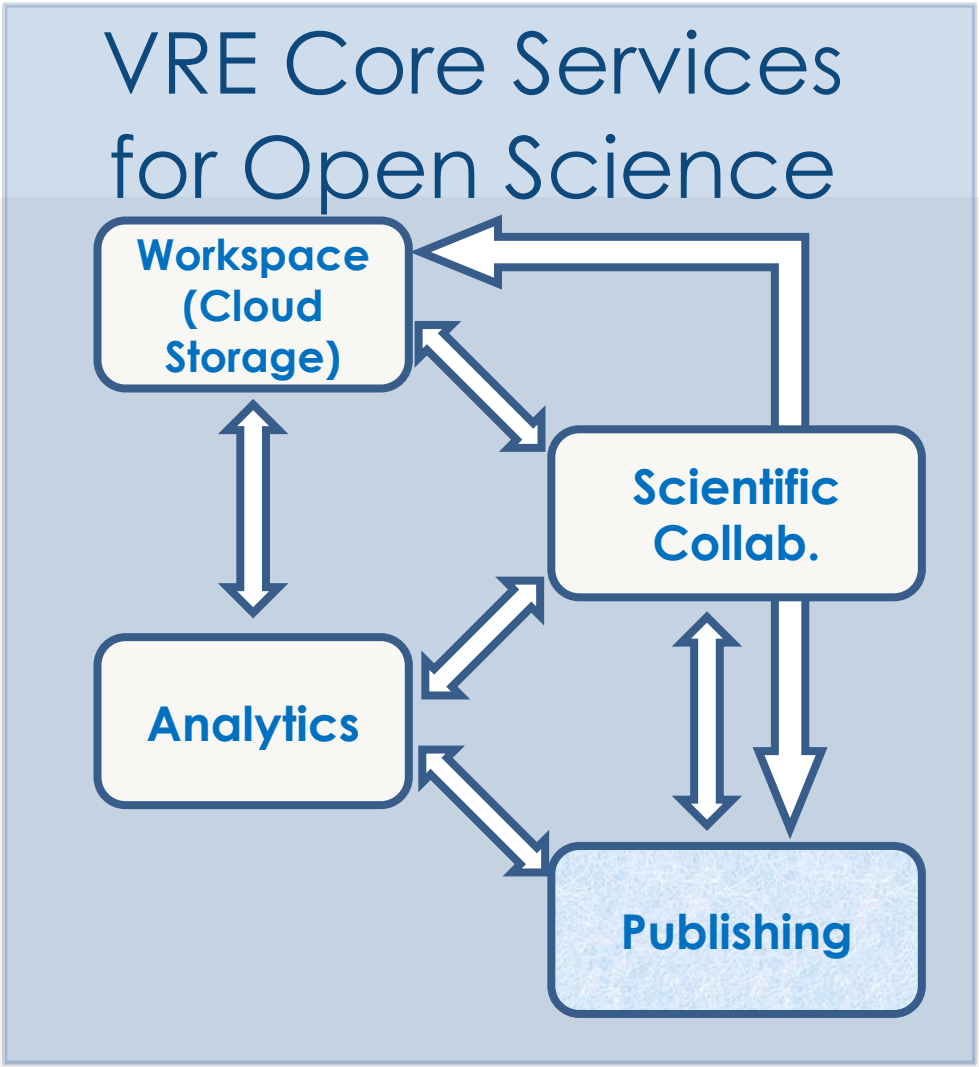
Reproducibility

Collaborative Data Analysis

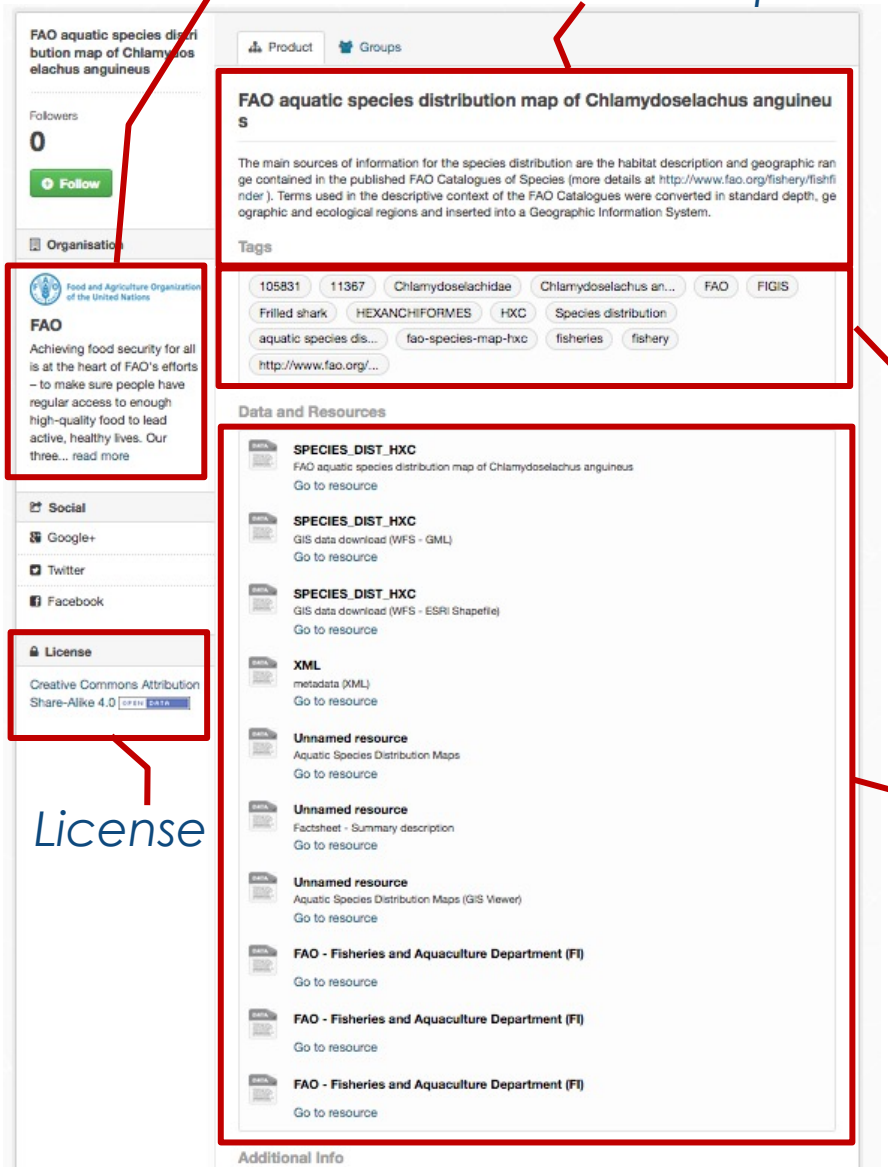
VRE tools

- Highly Configurable Jupyter Notebook env.
- Rstudio Version 4+ env.
- (R) Shiny Apps
- Analytics Engine
- Custom Service/Apps





Publishing: an item example



Organization

Title & Description

Tags

License

Resources (item payloads)

PURL QR-Code

Metadata

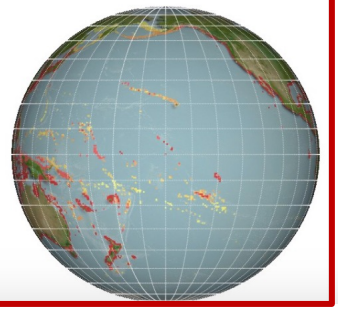
Item URL

http://data.d4science.org/ctlg/d4science.research-infrastructures.eu/sarda-sarda3

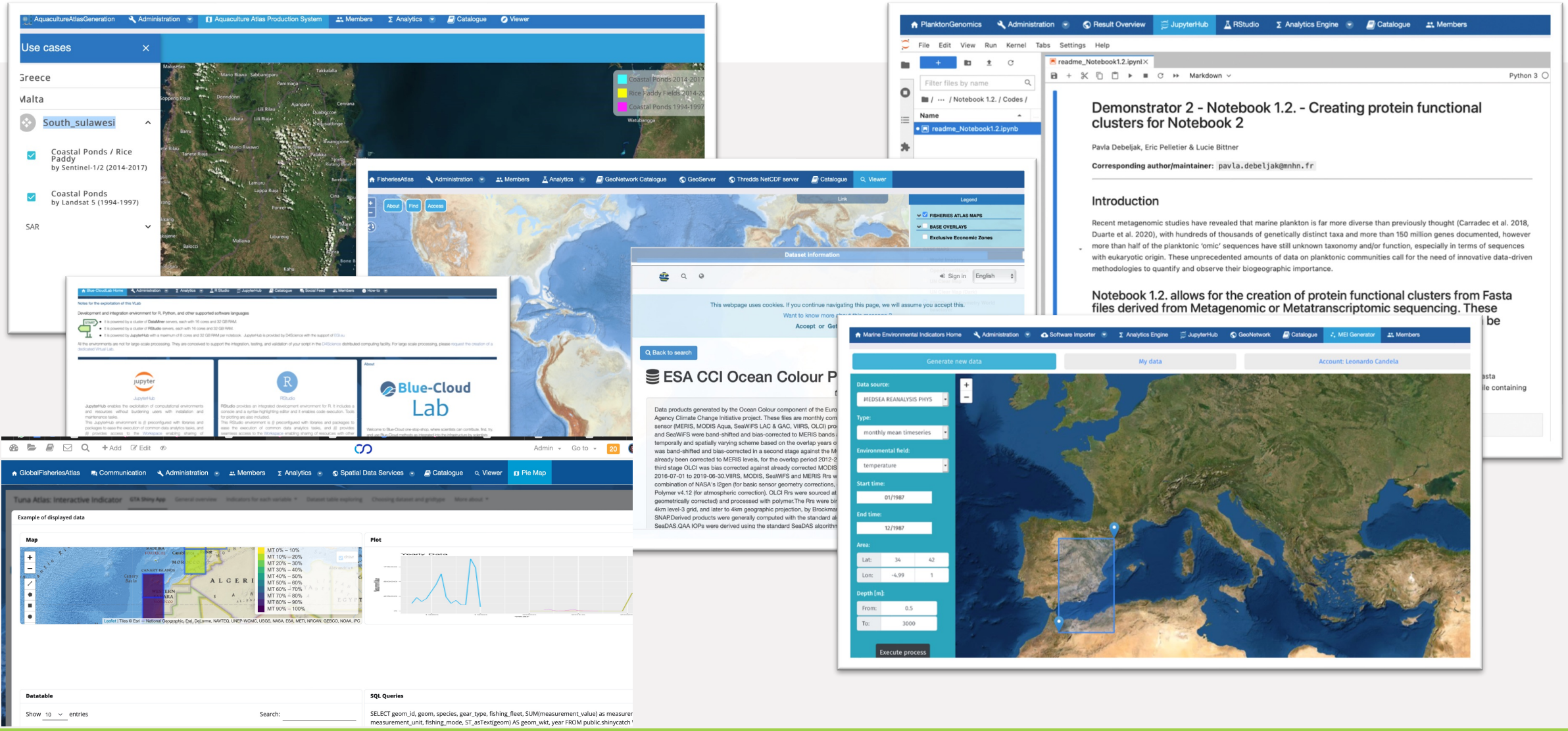
Geonetwork Links

Field	Value
GN_Metadata_Show	http://geonetwork.d4science.org/geonetwork/srv/en/metadata.show?uuid=b9bd0ef9-76f9-4fb9-8f98-1c36557bc5f8
GN_Metadata_Source	http://geonetwork.d4science.org/geonetwork/srv/en/xml.metadata.get?uuid=b9bd0ef9-76f9-4fb9-8f98-1c36557bc5f8
GN_URL	http://geonetwork.d4science.org/geonetwork

Additional Info

Field	Value
access_constraints	[]
bbox-east-long	180.0
bbox-north-lat	90.0
bbox-south-lat	-90.0
bbox-west-long	-180.0
contact-email	info@i-marine.eu
coupled-resource	
dataset-reference-date	type: creation value: 2013-04-12T01:13:51.731+02:00
frequency-of-update	asNeeded
graphic-preview-file	

VLabs at-a-glance



27-29 May 2024

International conference on Marine Data and Information Systems

Thanks for your attention

SeaDataNet AISBL · Havforskningsinstituttet · Ifremer · MARIS · MEDIN · National Oceanography Centre · INGV · iMagine · IODE · eosc Blue-Cloud2026