Building on **iMarine** for fostering Innovation, Decision making, Governance and Education

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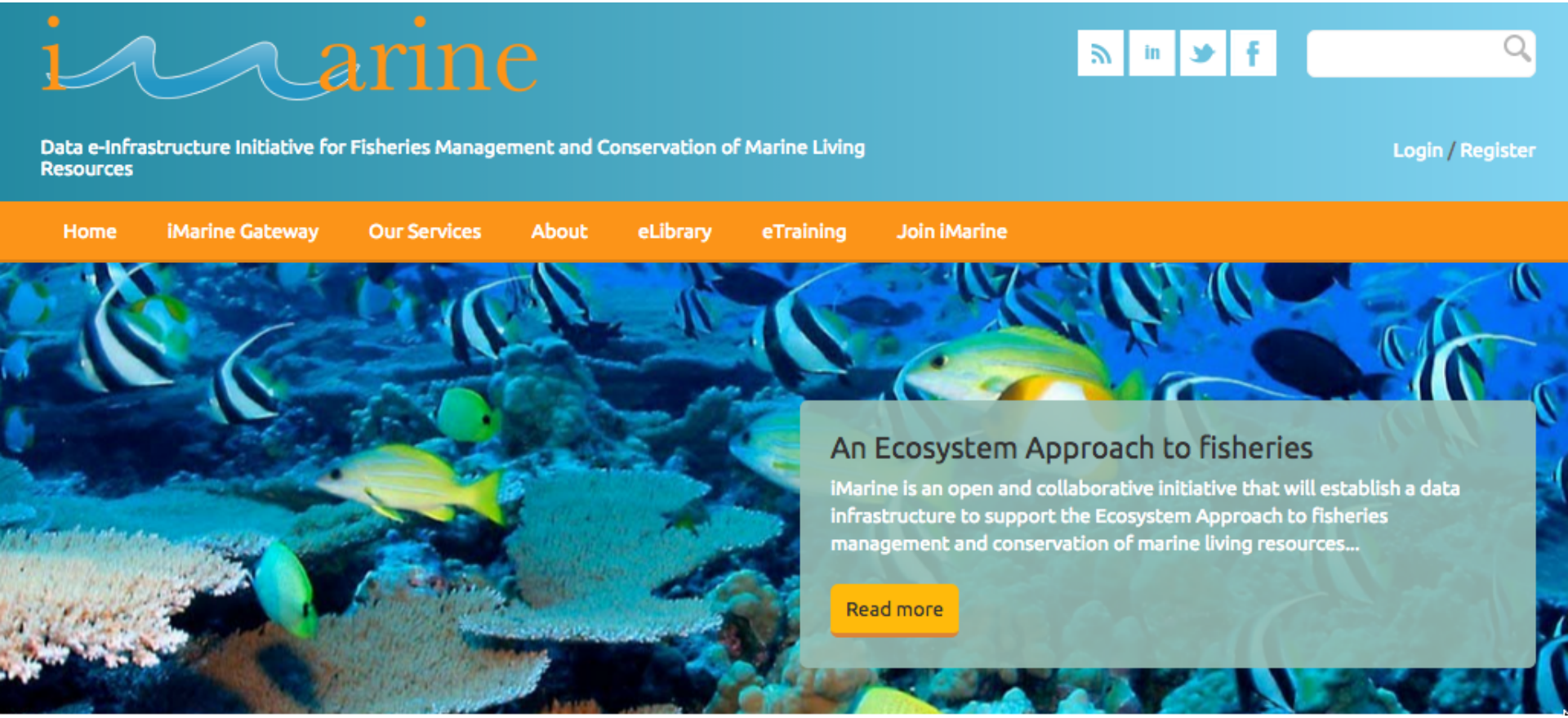
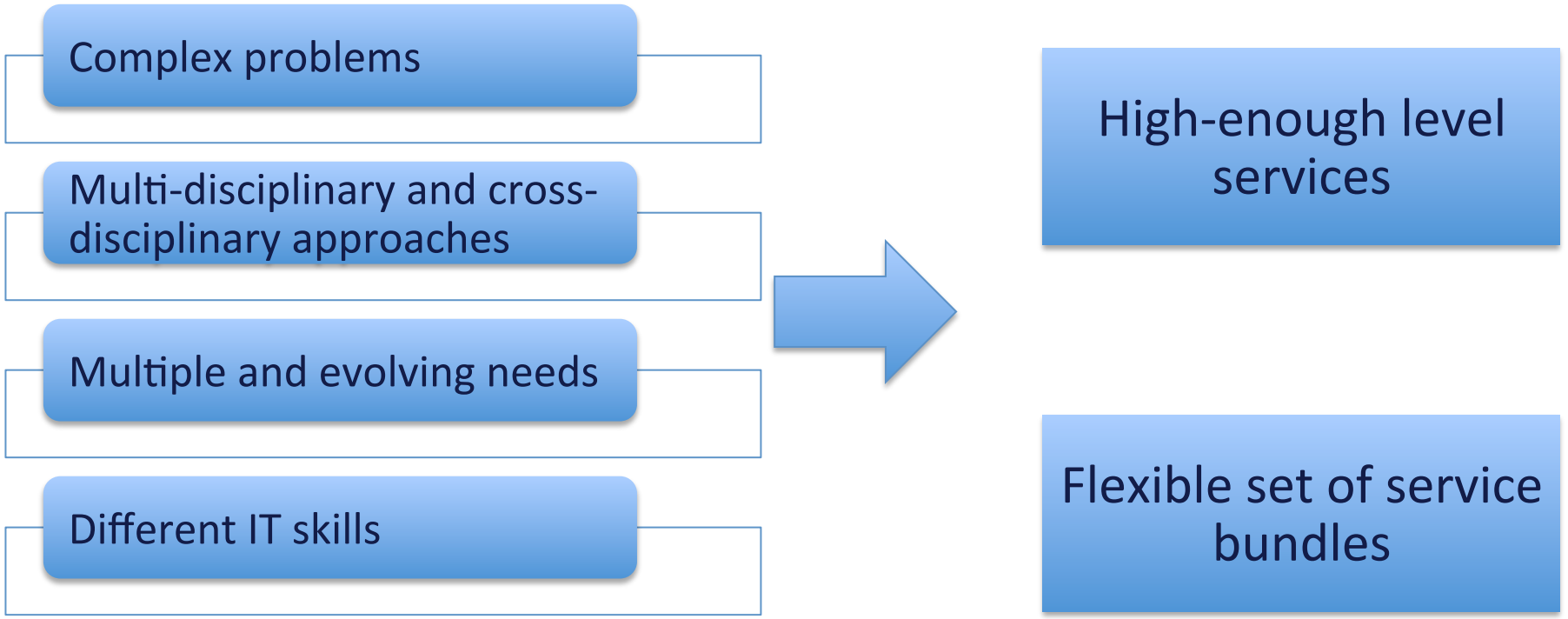
ISTI-CNR

iMarine

EU FP7 e-Infrastructure (2013-2014)

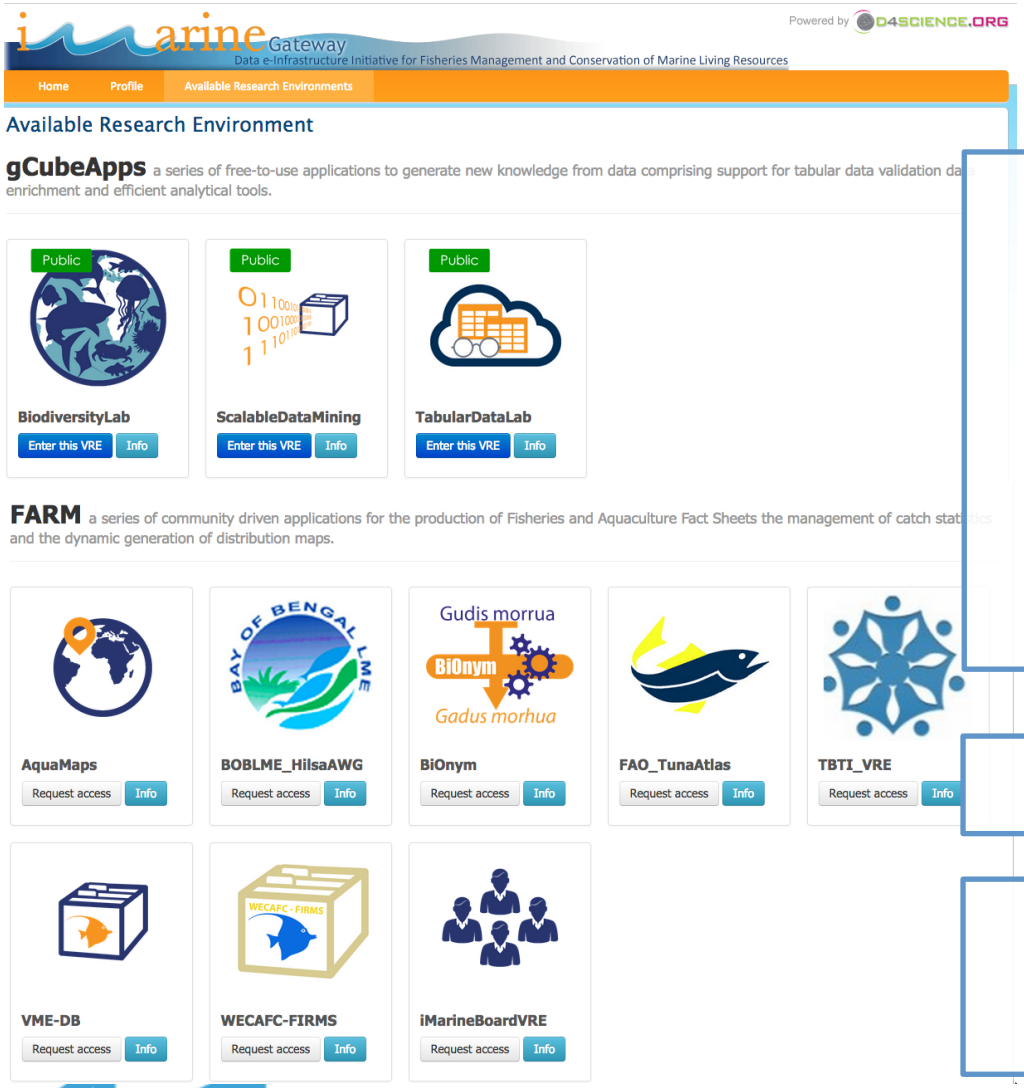


Context & Requirements



Virtual Research Environments

i-marine.d4science.org



Virtual Research Environment

- **web-based working environment**
- providing access to services and resources tailored to serve the needs of a community of practice **in accomplishing a specific goal**
- **open and flexible** with respect to service offering and lifetime
- providing fine-grained **controlled sharing** of both intermediate and final research results

Public VREs

- Open to any interested users

Private VREs

- Restricted to the members of a collaborating team performing specific experiments and tasks

Data curation & integration:

FAO Tuna Atlas VRE

FAO_TunaAtlas

Data collected by RFBs maintained in FAO managed DBs

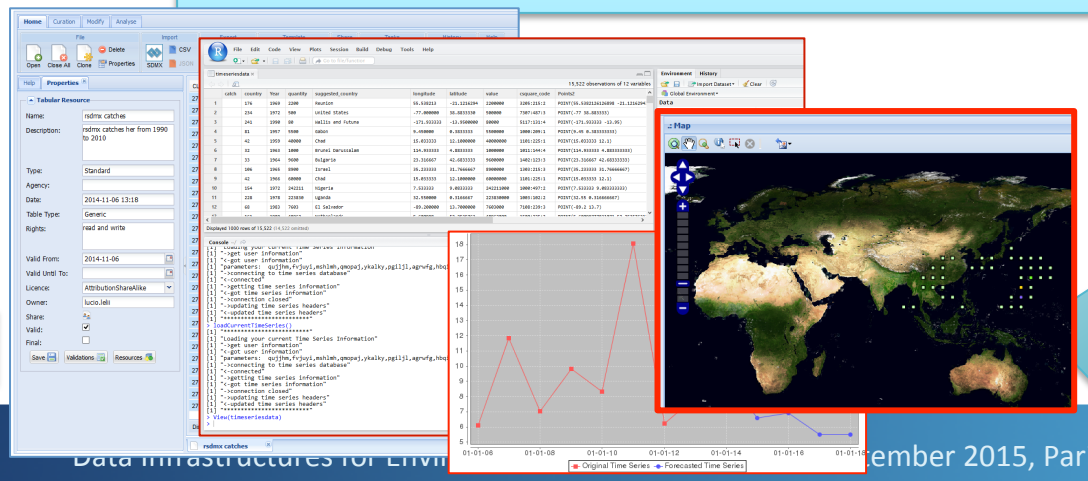
- **The Atlas of Billfish Catches**
- **The Global Tuna Catches by Stocks**

Curation

Normalise data, delete columns and aggregate catch data, delete duplicated records, aggregate valid duplicates, aggregate time dimensions, apply reference data codes, discovery error in codes, fix errors in codes, simple preprocessing, ….

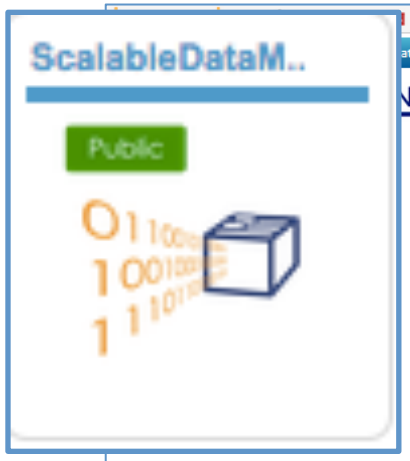
RFMOs

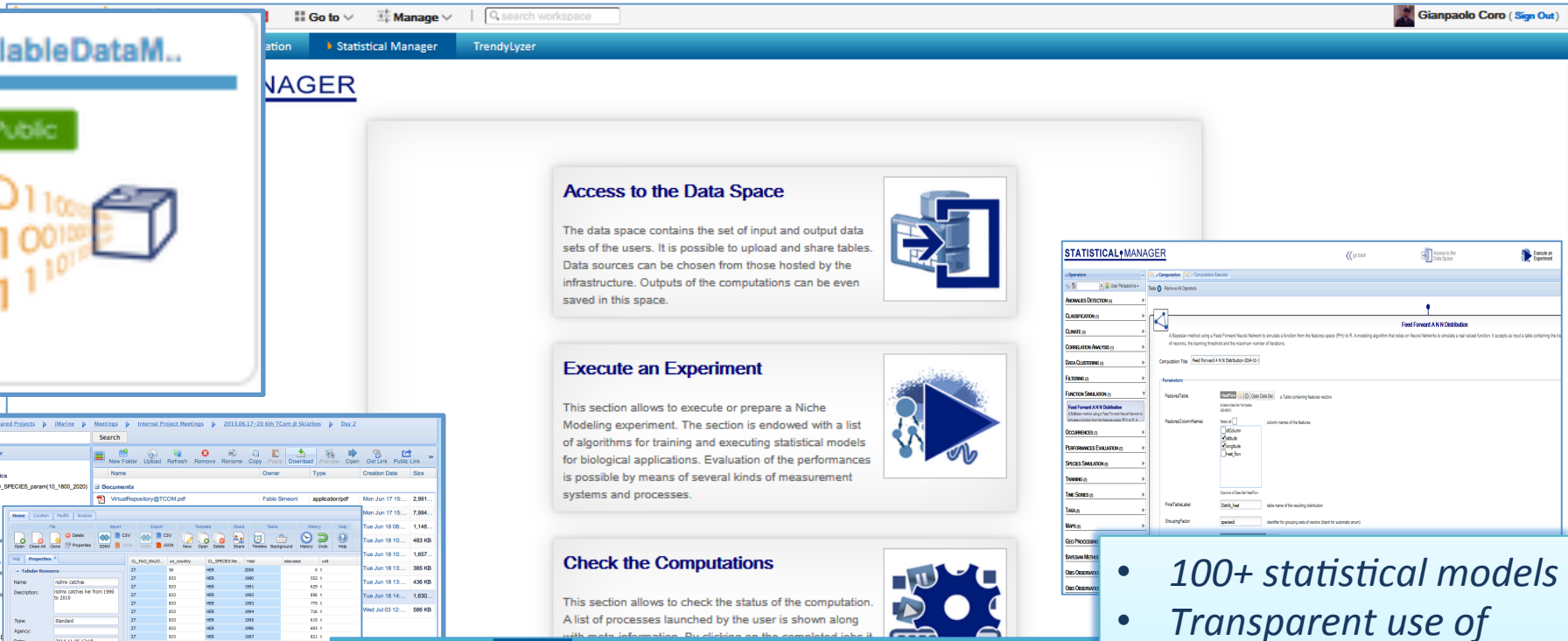
CSV

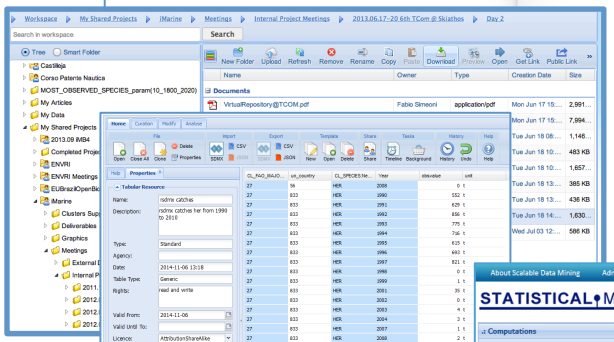


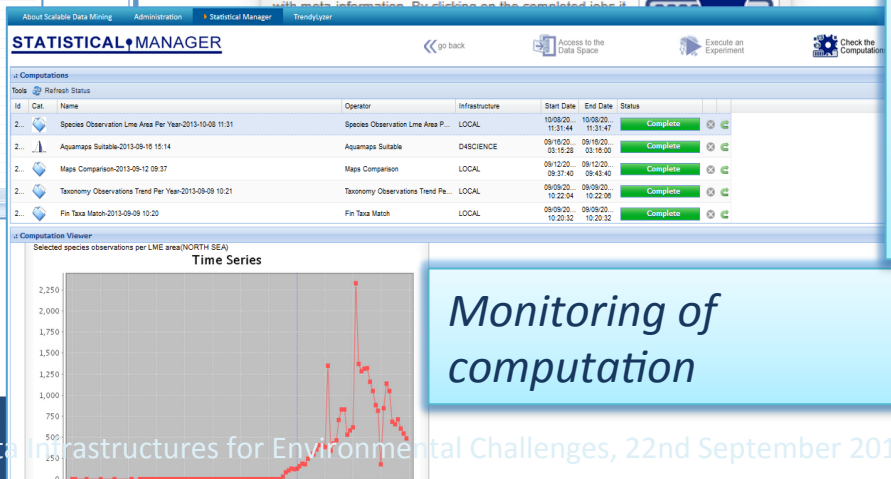
Tuna Atlas

Analysis: *Scalable Data Mining VRE*









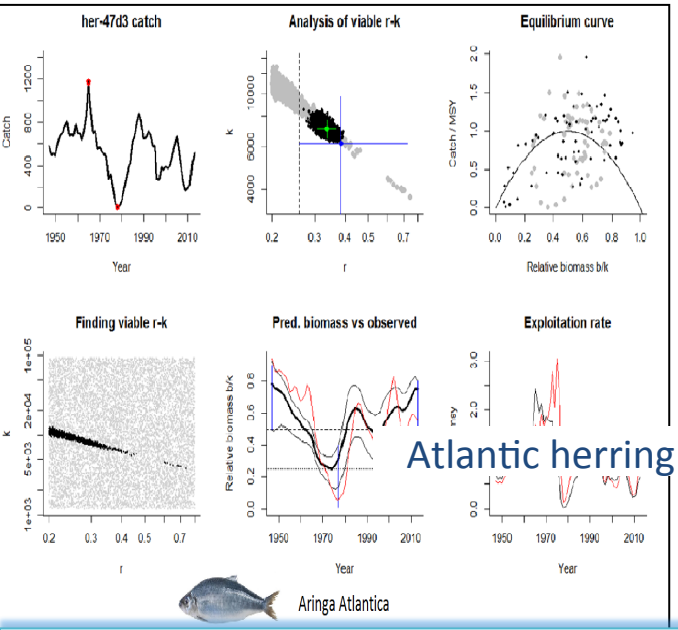
- *100+ statistical models*
- *Transparent use of cloud computing*
- *Automatically generated interfaces*
- *Integration with R*

Data access & dataset preparation

Monitoring of computation

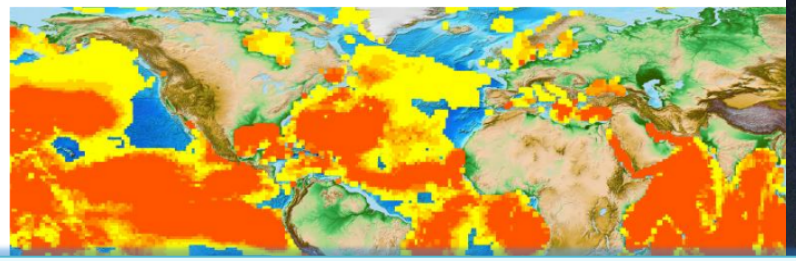
Statistical Manager: efficiency and efficacy

Stock assessment



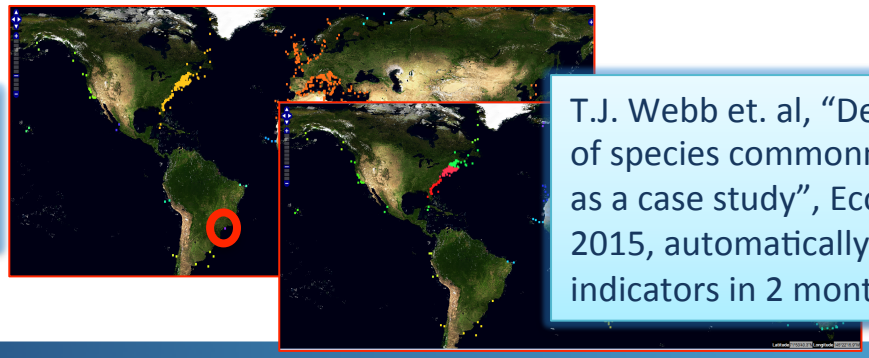
State-of-the-art models to estimate Maximum Sustainable Yield computational: reduced time by 95% in average

Ecology



G. Coro et al. “Improving data quality to build a robust distribution model for Architeuthis dux.”, Ecological Modelling ”, 2015 – “time to paper”= 2 months

Clustering analysis

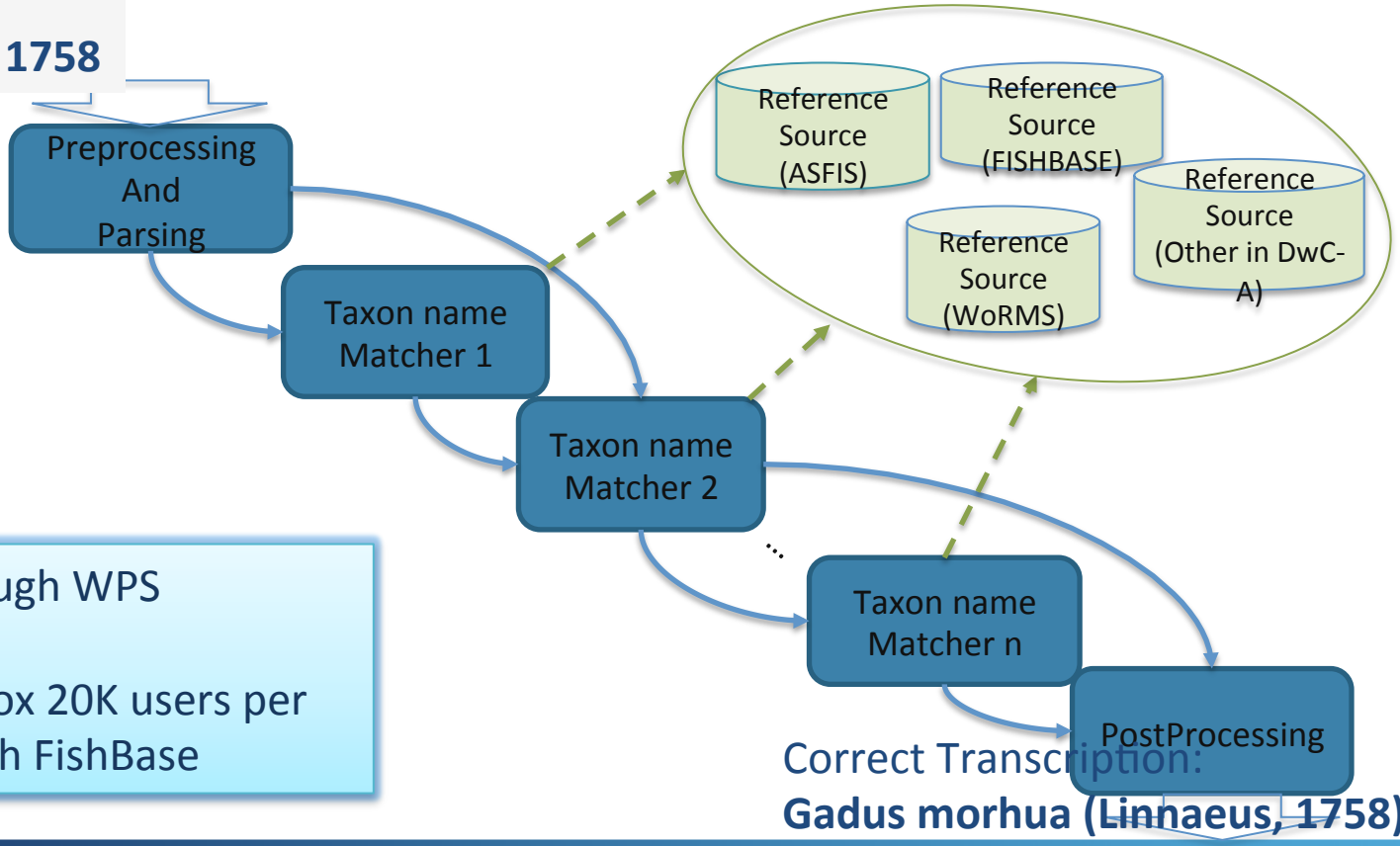


T.J. Webb et. al, “Detecting categories of species commonness: North Sea fish as a case study”, Ecological Modelling, 2015, automatically produced validated indicators in 2 months

Usage by third-party services providers: BiOnym

A flexible workflow approach to taxon name matching

Raw Input String
Gadus morua Lineus 1758

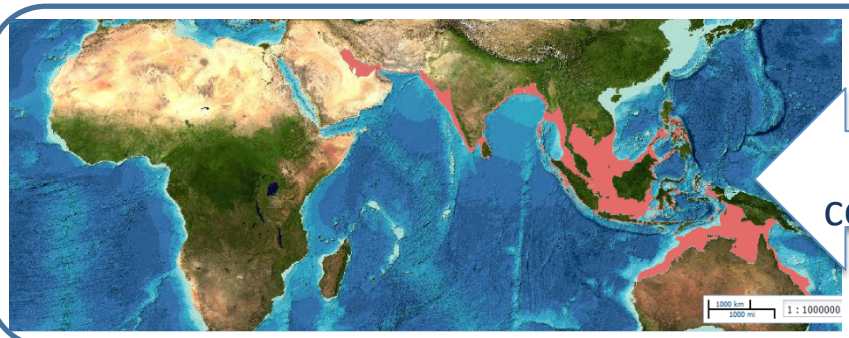


Available through WPS

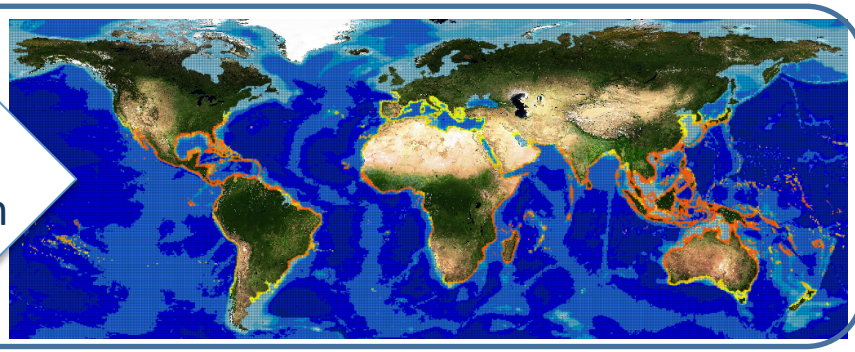
Currently approx 20K users per months through FishBase

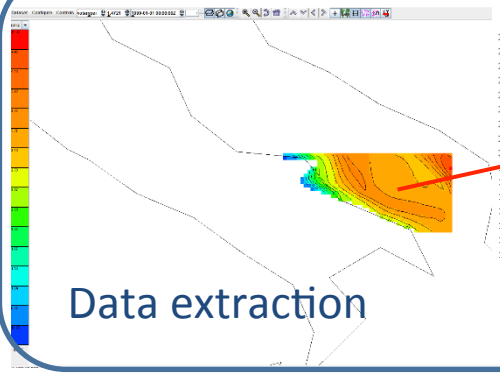
Correct Transcription:
Gadus morhua (Linnaeus, 1758)

Geospatial data processing

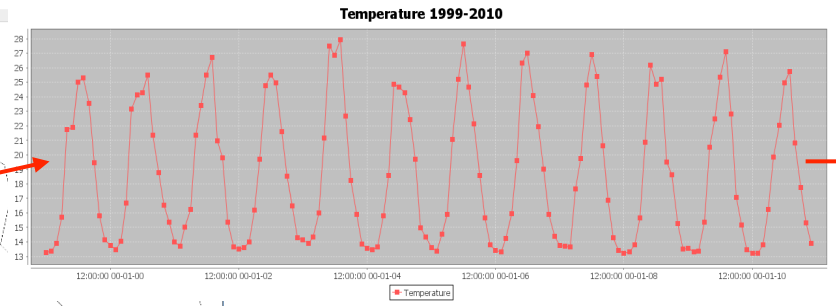


Maps comparison

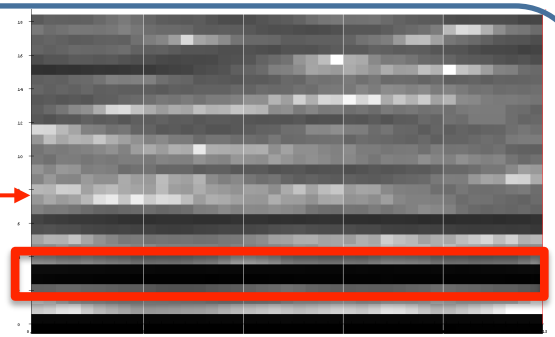




Data extraction



Signal processing

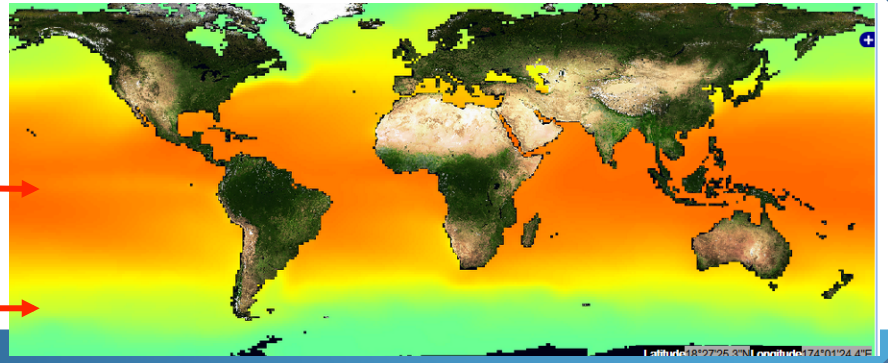


Periodicity detection

FAD_MAJO...	un_country	CL_SPECES:Ne...	Year	obsvalue	unit
27	56	HER	2008	0	t
27	833	HER	1990	552	t
27	833	HER	1991	629	t
27	833	HER	1992	856	t
27	833	HER	1993	775	t
27	833	HER	1994	716	t
27	833	HER	1995	615	t
27	833	HER	1996	693	t
27	833	HER	1997	821	t
27	833	HER	1998	0	t
27	833	HER	1999	1	t
27	833	HER	2001	35	t
27	833	HER	2002	0	t
27	833	HER	2003	4	t
27	833	HER	2004	3	t
27	833	HER	2007	1	t
27	833	HER	2008	2	t
27	833	HER	2009	1	t
27	833	HER	2010	0	t
27	56	HER	1996	2	t
27	246	HER	1990	67748	t
27	246	HER	1991	53216	t
27	246	HER	1992	74051	t
27	246	HER	1993	79234	t

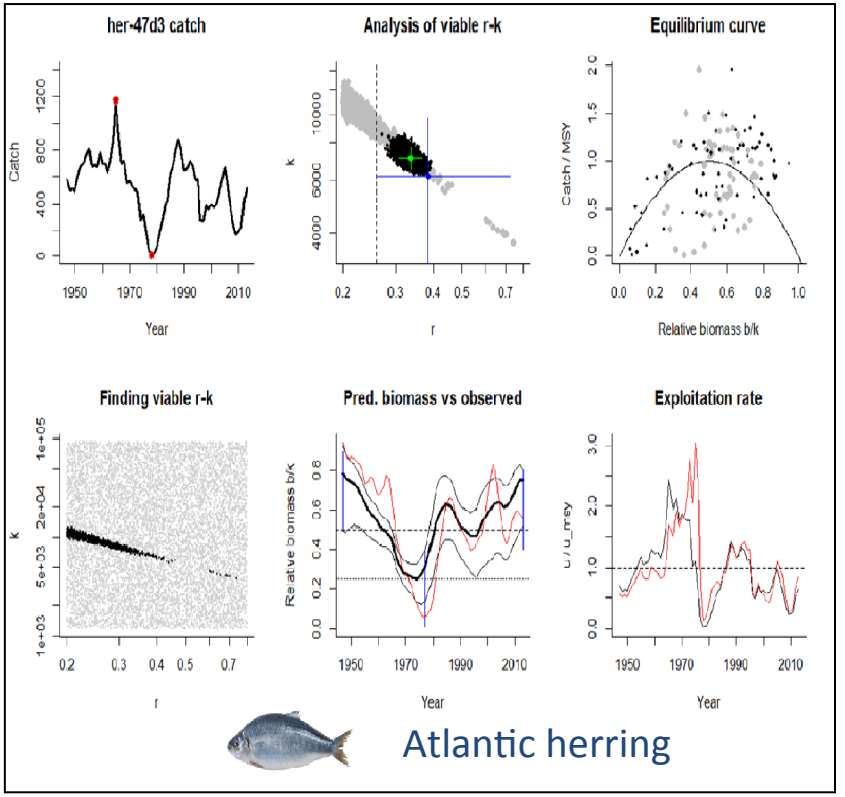
Maps generation

NetCDF file



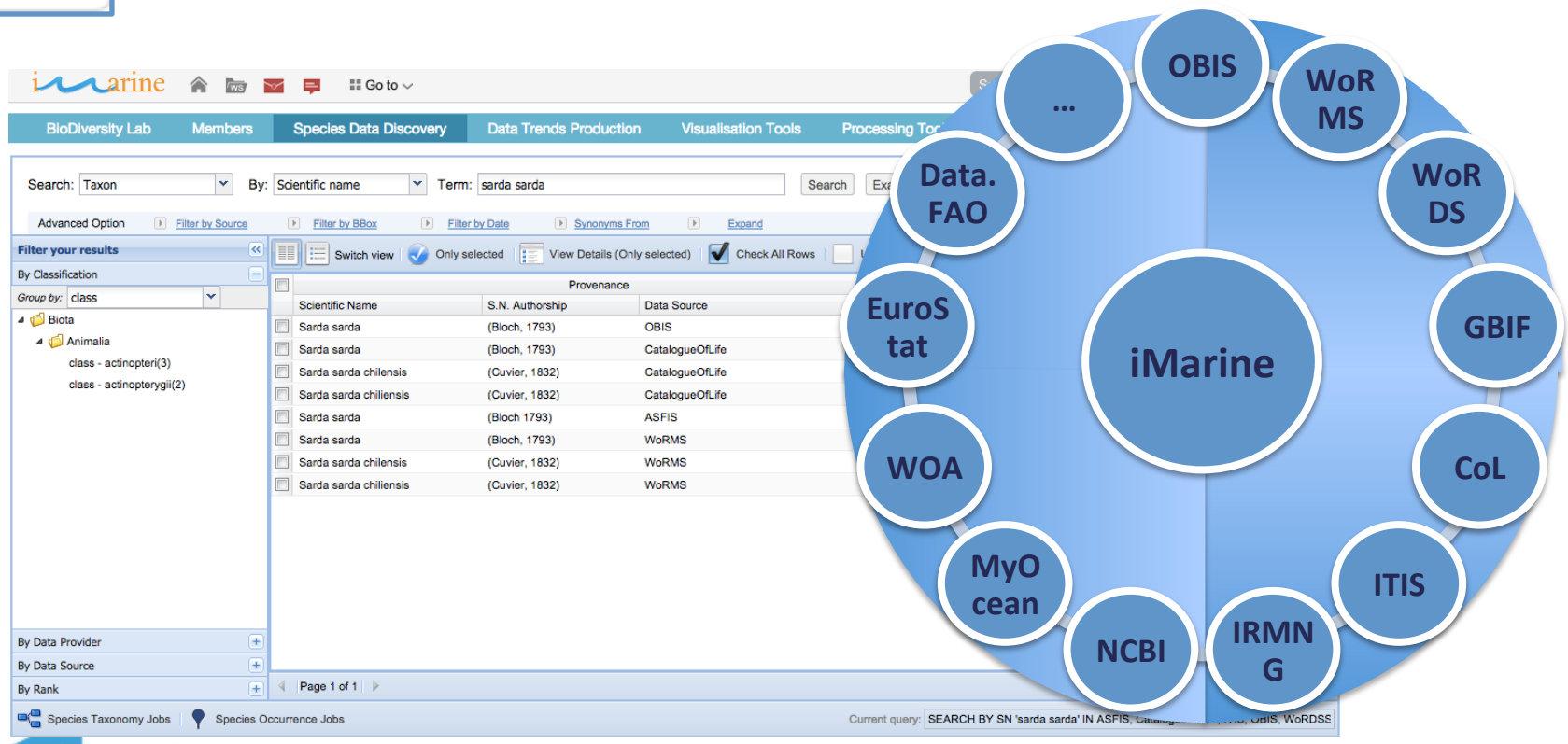
Stock assessment

- **Length-Weight Relations**: estimates Length-Weight relation parameters for marine species, using Bayesian methods. Developed by R. Froese, T. Thorson and R. B. Reyes
- **SGVM interpolation**: interpolation of vessels trajectories. Developed by the Study Group on VMS, involving ICES
- **FAO MSY**: stock assessment for FAO catch data. Developed by the Resource Use and Conservation Division of the FAO Fisheries and Aquaculture Department (ref. Y. Ye)
- **ICCAT VPA**: stock assessment method for International Commission for the Conservation of Atlantic Tunas (ICCAT) data. Developed by Ifremer and IRD (ref. S. Bonhommeau, J. Bard)
- **CMSY**:estimates Maximum Sustainable Yield from catch statistics. Prime choice for ICES as main stock assessment tool. Developed by R. Froese, G. Coro, N. Demirel, K. Kleisner and H. Winker



i-Marine reduced time-to-market: State-of-the-art models to estimate Maximum Sustainable Yield computational time reduced of 95% in average

Uniform access to data: *BioDiversityLab*



Report production: *VME-DB*

VME-DB

The **International Guidelines for the Management of Deep-Sea Fisheries on the High Seas**. **VME database** to assist in informed decision making and the development of further **measures to increase sustainability** and reduce impacts.

Time

Corner Seamounts Selected year: 2012 Print | PDF | XML | Source | Citation

Description | Map | Management | Regional overview | Meeting reports | Media

Measures specific to this VME area

Area closed to bottom fishing until 31 Dec 2014, with exploratory fishing option. Vessels fishing this ares shall have a scientific observer onboard. (Art 16.1-3)

Period in force: 2007 – 2014

Source of information
NAFO Conservation and Enforcement Measures 2012 (NAFO FC Doc 12/1 Serial No. N6001) Fisheries Commission 2012

General measures

Fishing areas
The comprehensive map of existing bottom fishing areas (as delineated by the coordinates shown in Table 1 and illustrated in Figure 4) shall be revised regularly to incorporate any new relevant information. Contracting Parties may, in the future, consider the possibility of refining the comprehensive map on the basis of haul by haul information, if available. (Art.17)

Exploratory fishing protocol
Exploratory fishing covers all bottom fishing activities (a) outside of the existing bottom fishing area and (b) to fisheries within the existing bottom fishing area that show significant change. (Art 15.8). Exploratory fisheries must be conducted according to an exploratory fisheries protocol (Art 18; Annex 1E.I-IV) and are subject to review FC and SC. Exploritory fisheries will be allowed only if there are adequate mitigation measures to prevent SAI to VMEs (Art 19).

Encounter protocols
In existing bottom fishing areas, encounters with VME indicator species above a threshold value are reported to the Executive Secretary and trigger a 2 nmile move on rule. In new fishing areas, such encounters also result in temporary closures of 2 nmile radius and require a more detailed report

Management Body/Authority
Northwest Atlantic Fisheries Organization (NAFO)
The Northwest Atlantic Fisheries Organization's (NAFO) overall objective is to contribute through consultation and cooperation to the optimum utilization, rational management and conservation of the fishery resources of its area of competence, and to ensure the long term conservation and sustainable use of the fishery resources and, in so doing, to safeguard the marine ecosystems in which these resources are found.

Web site
http://www.nafo.int/

Regional Fishery Body fact sheet
http://www.fao.org/fishery/rfb/NAFO/en

VME record

Description (Habitat & Biology)

Specific measures

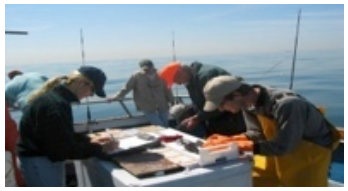
Historical information on fishing areas and closed areas

Meetings & other Sources of Information

General Measures

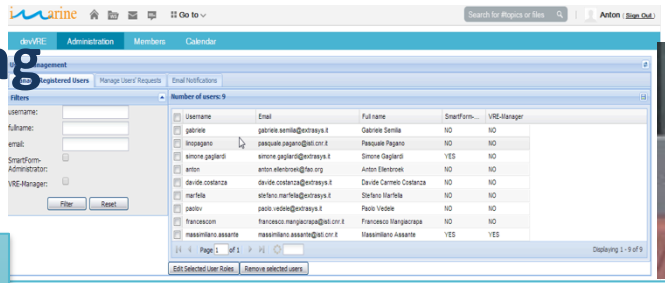
RFMO

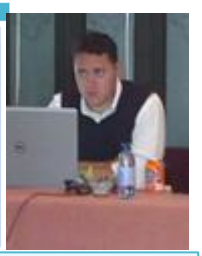
Data collection: SmartForm VRE



On Board Bycatch recording

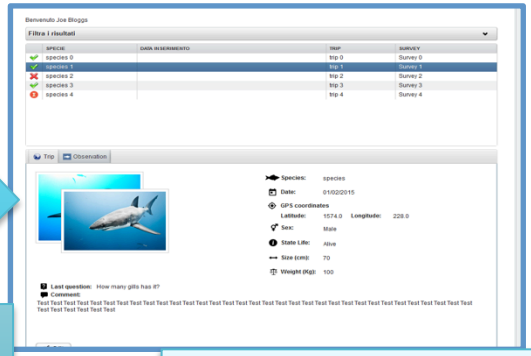
- Dutch Elasmobranch society
- SEAFO RFB, …..



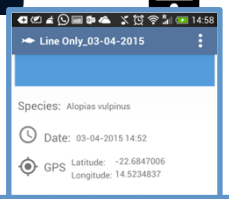


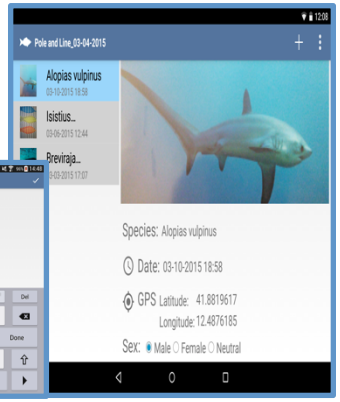
Define forms, controlled vocabularies, ….

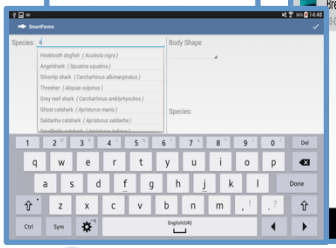
Select a Fishery survey

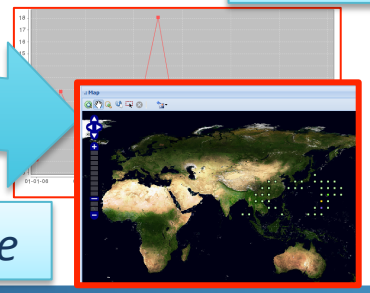


Validate& Enrich









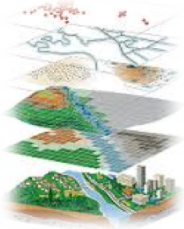
Analyse

Deposit

iMarine e-infrastructure

Databases

Cloud storage



Geospatial data

Storage

Data management

Metadata generation and management

Harmonisation

Sharing

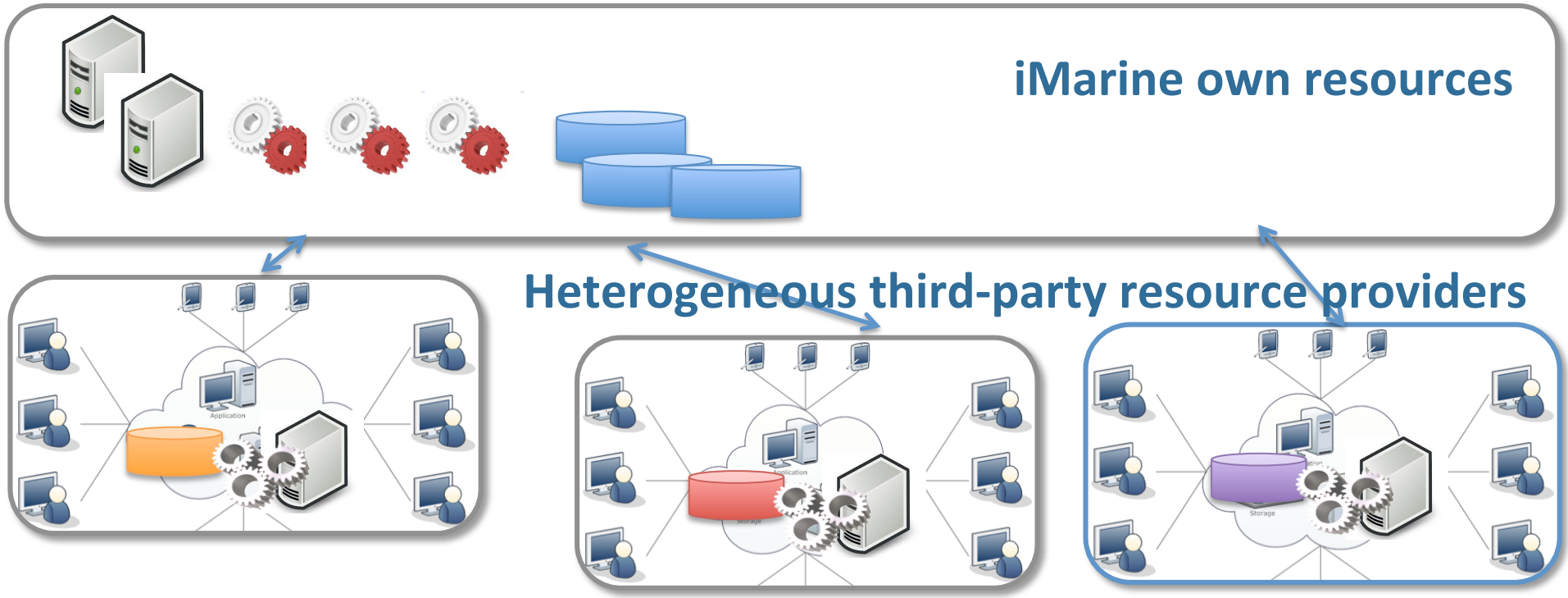
Cloud computing

Elastic resources assignment

Multi-platform: R, Java, Fortran

Processing

iMarine from inside



Data Infrastructures: beyond research

- Solid ground for **informed advice to competent authorities**
- **Cost effective training** & **knowledge bridging** between research and innovation
- Enlarged spectrum of **growth opportunities**

Building Research environments fostering Innovation, Decision making, Governance and Education

for Blue growth

H2020 EU EINFRA
Sept 2015 –Febr 2018

Six interrelated detailed objectives

Blue Assessment	Collaborative production of scientific knowledge required for **assessing the status of fish stocks** and **producing a global record of stocks and fisheries**
Blue Economy	Production of scientific knowledge for **analysing socio-economic performance in aquaculture**
Blue Environment	Production of scientific knowledge **for fisheries & habitat degradation monitoring**
Blue Skill	**Education and knowl. bridging** between research &innovation in the area of protection and mgmt of marine resources
Blue Commons	**Service commons** across VREs to facilitate the exploitation of existing infrastructure resources
Blue Uptake	**Uptake of the BlueBRIDGE tools and services**, with specifc focus on SMEs, other scientific domains & policy making contexts

References

- www.i-marine.d4science.org
- www.i-marine.ee
- www.bluebridge-vres.eu
- www.d4science.org
- www.gcube-system.org