



“BIG Data in Blue Growth and Innovation. The implementation of BlueMed initiative”

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Blue Growth



European Blue Growth: € 500 billion/year; 5 million jobs.
Six broad areas: living resources, non-living resources, transport, shipbuilding, tourism and offshore renewable energy (EC data).

Blue Growth and Big Data

The growth of global maritime traffic and of activities exploiting the sea resources as well as sea monitoring and protection activities are asking for advanced automated monitoring systems and maritime sensors networks. They would produce large volume of relevant data that, if efficiently stored and analysed, might compose new avenues to science-driven marine protection strategies, maritime operations and policy making.

Institutional/industrial initiatives and infrastructures on Internet of Things (IoT), cloud computing and Big Data and data analytics are required for sharing, advanced processing and analysis of key data of interest for maritime security (including migration phenomena), maritime navigation and transportation safety and security, sustainable fisheries and aquaculture, abiotic sea resources exploitation, etc.

They can also provide new knowledge creation and this in turn can contribute to increase the Blue Growth in terms of safety, sustainability, excellence and competitiveness.

The Mediterranean Sea & BLUEMED initiative

The Mediterranean Sea has unique bio-geo-physical characteristics and socio-economic features. The **Mediterranean sea prominently contributes to the EU economy with 30% of global sea-borne trade, 450 ports/terminals, the 2nd World's largest market for cruise ships, half of the EU's fishing fleet, 400 UNESCO sites and 260 protected areas.**

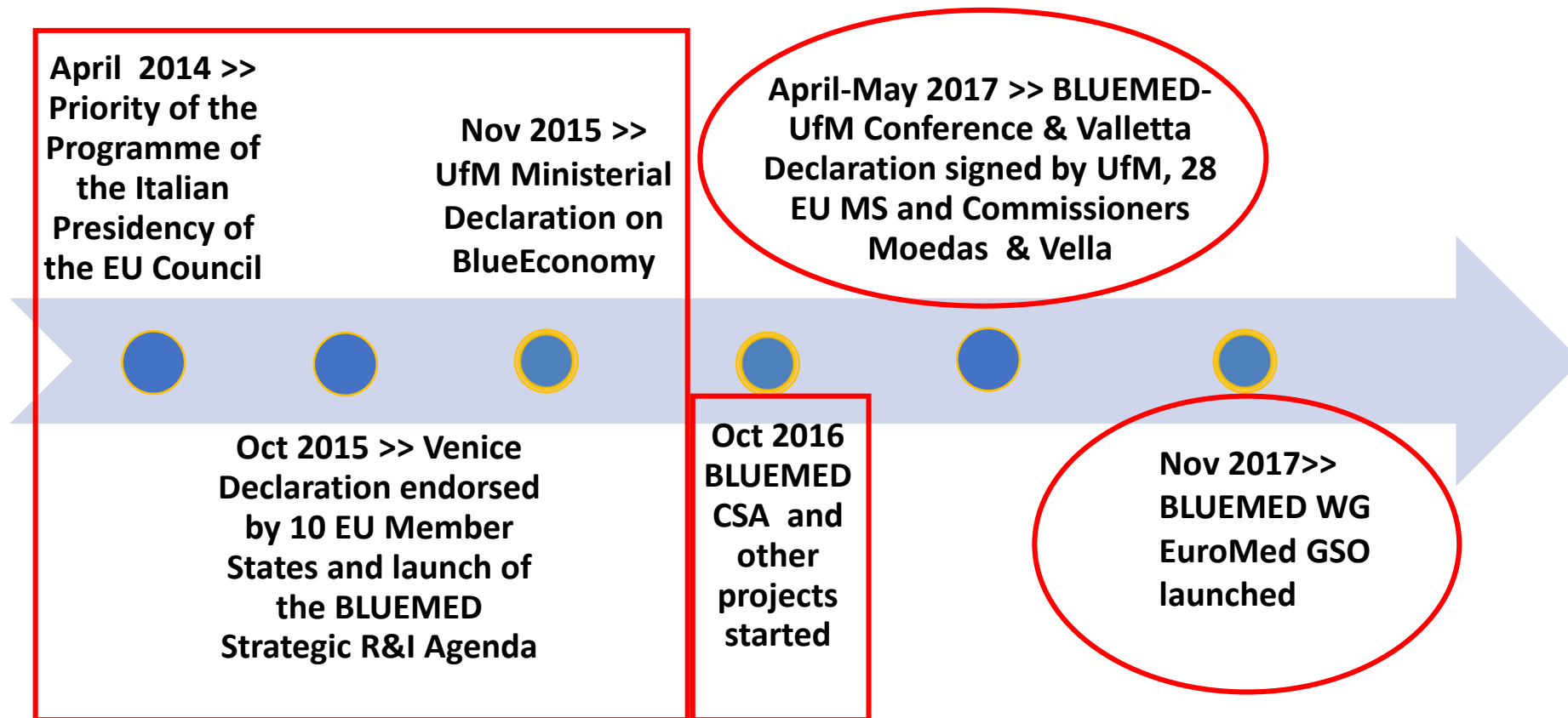
However, it is facing relevant environmental challenges (due to climate change, maritime traffic and pollution, overfishing, etc.) and **does not efficiently exploit local biodiversity, deep sea resources, tourism, renewable energy, etc.**

Such needs/opportunities cannot be addressed/implemented by any EU MS individually but require a common/shared Vision and R&I Agenda (SRIA). The adoption of advanced monitoring systems and big data can enabling the actions.

The **BLUEMED Initiative** was initiated to foster integration of knowledge and efforts of Countries of the MED to jointly create new 'blue' jobs and sustainable growth in the area.

The BLUEMED initiative: the process

It was a priority of the Programme of the IT Presidency of the Council of the European Union; IT implemented it in close cooperation with CY, HU, FR, GR, MT SI, ES, PT and BE, and the EU commission (DG RTD, DG MARE).



BLUEMED Strategic R&I Agenda (SRIA)

Key enabling knowledge for the Mediterranean

- Mediterranean Sea ecosystems: services, resources, vulnerability and resilience to natural and anthropogenic pressures
- Mediterranean Sea dynamics: development of services in the Mediterranean

Key sectorial enablers in the Mediterranean

- Innovative business based on marine bio-resources in the Mediterranean
- Ecosystem-based management in the Mediterranean

Enabling technology and capacity creation for the Mediterranean

- Smart, greener maritime transport in the Mediterranean
- Multi-purpose off-shore platforms in the Mediterranean
- Marine and costal cultural heritage in the Mediterranean: discovering, protecting and valuing

http://www.blued-med-initiative.eu/wp-content/uploads/2018/12/BLUEMED-SRIA_Update_2018.pdf

BLUEMED SRIA & Big data

Challenge A. Smart, greener and safer maritime transport and facilities, Action A3.1 **Towards autonomous ships and digital shipping (i.e. from sensors and IoT, to big data analytics);**

Challenge B. Observing systems and operational oceanography capacities. ACTION B1.3 **Implement ICT, Big Data Analysis and Cloud Services Platforms to take advantage of multi-sectoral data management and sharing opportunities for the Mediterranean.**

ACTION B3.1 **Integrate the Information Communication Technologies - ICT (Big Data, IOT-connected objects, Deep Learning, etc.) in the development of observing systems to deliver high-tech products and services for traditional and emerging sectors such as fisheries, aquaculture, MRE, etc.**

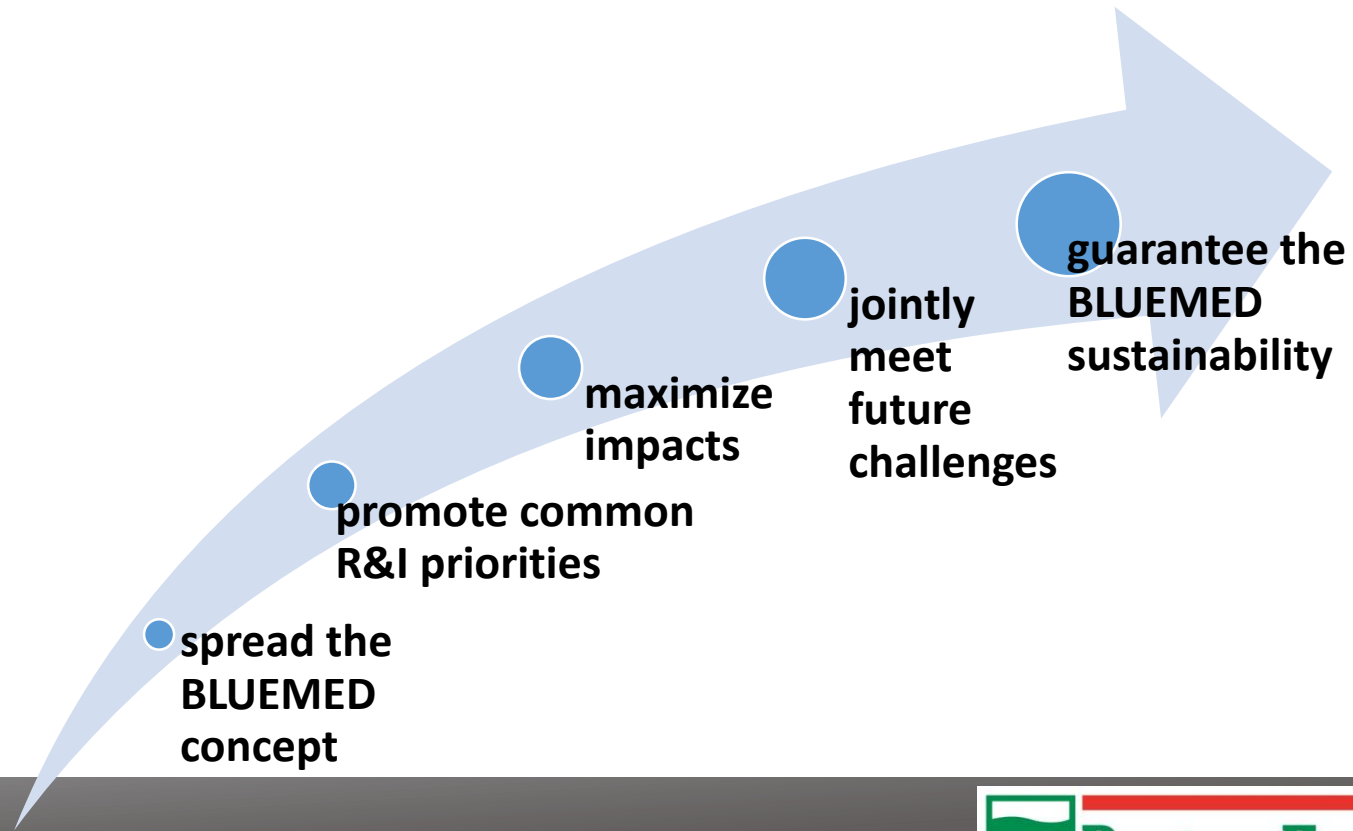
Challenge C. Sustainable tourism and cultural heritage. Action C2.5 Promote **digitalization of tourism practices and innovative products (e.g. smart moorings, serious games, augmented reality, scripting on smartphone, underwater trails...)to develop citizen science services and participative tourism.**

BLUEMED VISION. Mediterranean sea have the right physical and economic/social environment where launching an innovative policy and practice on data sharing and reuse (also for new purposes) across different communities. Some EU-funded projects are exploring ways to construct interoperable approaches to support open-data policies in the area but we need to guide potential users through the large sets of data, to the access to raw data and to products of variable degree of elaboration and complexity. **Bluemed aims at defining guides for the potential users of all marine-related data/products in support to economic growth of the region.**

BLUEMED initiative: governance & implementation

The **BLUEMED Working Group, EuroMed GSOs**, chaired by EC DG R&I and UfM, joined by 8 EU MS and 7 non EU Countries of the area: **strategic planning**

The **BLUEMED CSA**, coordinated by IT and joined by R&I partners from CY, HR, FR, GR, MT, ES, and PT: **implementation of BLUEMED priorities and strategies in the whole MED.**



BLUEMED initiative: impacts

BlueLabs/BlueTechnology 2016 calls (DG MARE)
6 topics under BG call in H2020 SC2 WP16/17 (DG RTD)

BG-07-2017: Blue green innovation for clean coasts/seas (IA,12M, 2017) **CLAIM** and **GoJelly**

BG-12-2016: Towards an integrated Med Sea Observing System (IA, 8M, 2016) **ODYSSEA**

BG-13-2016: Support to the BLUEMED Initiative: Coordination of marine and maritime research and innovation activities in the Mediterranean (CSA, 3M, 2016) **BLUEMED**

SFS-20-2017: Towards a science-based regionalisation of the Common Fisheries Policy (RIA,6M, 2017)

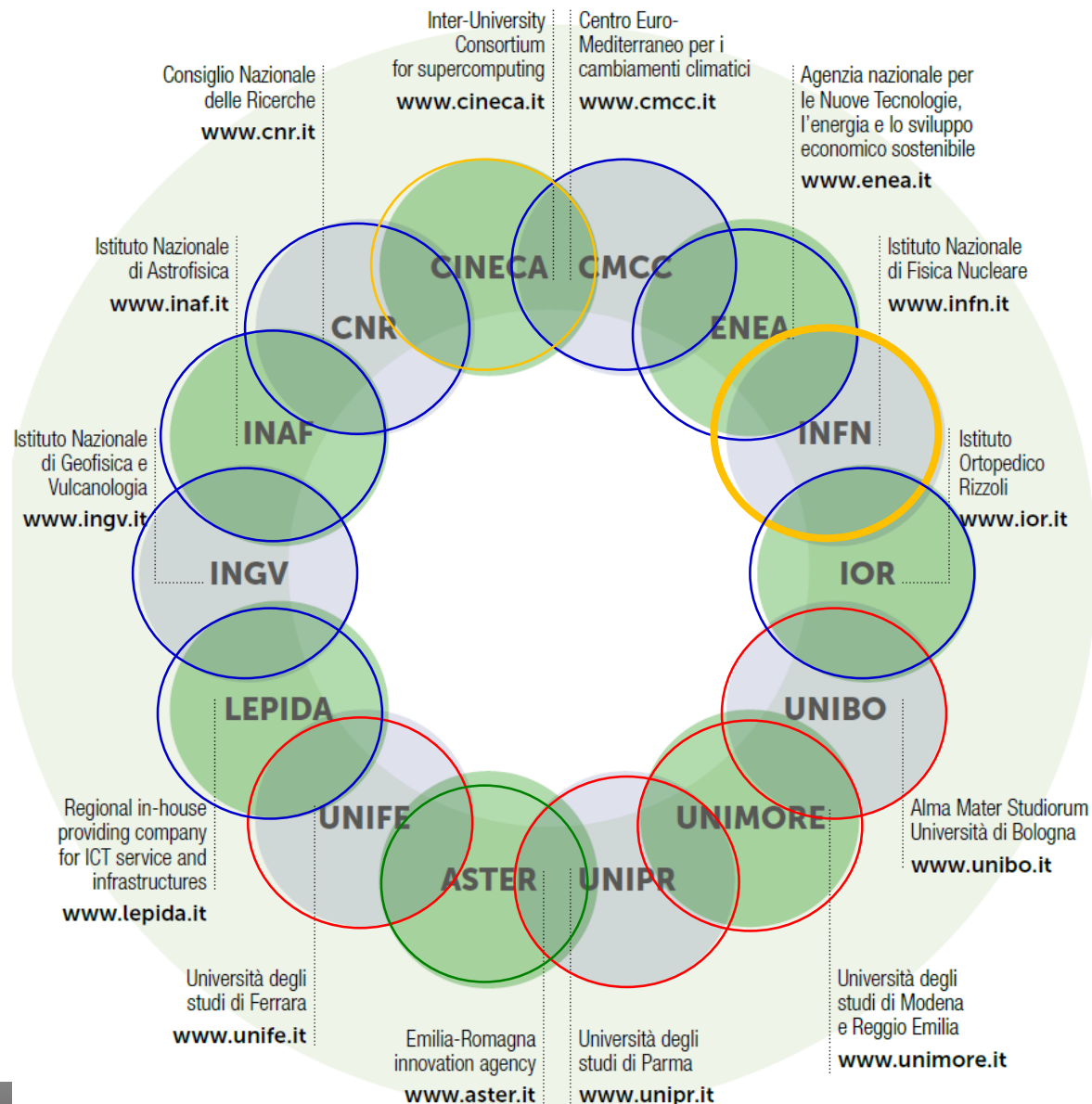
SFS-21-2016/2017: Advancing basic biological knowledge and improving management tools for commercially important fish and other seafood species (RIA,5M) **FAR FISH (2016)**

SFS-23-2016: Improving the technical performance of the Mediterranean aquaculture (RIA, 6M, 2016) **MedAID** and **PerformFISH**

H2020 R&I projects addressed to promote big data in blue growth domain are: Sea Data Cloud, Emodnet, Copernicus CMEMS, Blue Bridge.

New topics on blue cloud services, observation and forecasting are open in the H2020 SC2 2019 WP.

ER Big Data community: public actors



CONNECTIVITY

LEPIDA, GARR

INFRASTRUCTURES

HW

CINECA, INFN, LEPIDA,

SW

CINECA, INFN, UNIMORE,
UNIBO, UNIFE, INAF, CNR,
ENEA

END USERS

UNIMORE, CINECA, INFN,
UNIBO, UNIFE, INAF, CNR, IOR,
UNIPR, LEPIDA, ENEA, CMCC,
INGV

ER Big Data community: potential

THE HARDWARE COMPUTING INFRASTRUCTURE

An High Performance Computing facility (HPC) hosting a Tier0 and Tier1 and operating within PRACE (Partnership for Advanced Computing in Europe) at **CINECA, in Bologna**, with the following capabilities:

CPU: ~16 PETAFLIPS/
350.000 COMPUTING CORES
STORAGE: ~20 PB OF NET
DISK SPACE

(*) available by end of 2016 with the installation of the MARCONI Supercomputer.

A High Throughput Computing facility (HTC) which hosts the WLCG Tier1 at the **CNAF-INFN in Bologna**, with the following capabilities:

CPU: ~193 KHS06 / ~15600
COMPUTING CORES
STORAGE: ~17 PB OF NET
DISK SPACE
LIBRARY: ~22PB OF TAPE
SPACE.

GARR-X/LEPIDA

Fast and effective nation-wide network connection, mainly provided by GARR and Lepida

INAF, CNR, ENEA, UNIBO, UNIMORE, UNIPR and UNIFE have many HW and SW resources for big data analysis, modeling and engineering, partially co-funded by ER Region under the EU 2007-2013 ERDF program.

All together, they are representing the 70% of the High Performing Computing (HPC) and the High Throughput Computing (HTC) capabilities of the Country.

ER Big Data community: activities



1791

RESEARCHERS
INVOLVED



230

FOREIGN
RESEARCHERS
HOSTED



94

INTERNATIONAL
EVENTS



60

HIGHER EDUCATION
INITIATIVES
INCLUDING

PhD courses

Laurea magistrale

Master

Summer schools

FIGURES
(2014-2017)

ER Big Data community: expertises

BIG DATA IN ICT AND DIGITAL CONTENT

BIG DATA IN LIFE SCIENCE

BIG DATA IN HUMAN BRAIN AND NEUROSCIENCE COMPUTING

BIG DATA IN MATERIALS

BIG DATA IN TRANSPORT

BIG DATA IN AGRI-FOOD AND BIOINDUSTRY

BIG DATA IN MECHANICS AND INDUSTRIAL PROCESSING

BIG DATA IN ENVIRONMENT AND ENERGY

BIG DATA IN CLIMATE CHANGE

BIG DATA IN SMART CITIES, SAFETY & SECURITY

BIG DATA IN SOCIAL SCIENCES AND HUMANITIES

BIG DATA IN ECONOMICS AND FINANCE

BIG DATA IN PHYSICS, ASTROPHYSICS AND SPACE SCIENCE

They are involved in **over than 15 relevant EU infrastructures of the wide big data domain** (among others, MAX, EUROFUSION, ELIXIR, EUDAT, RDA, INDIGO-DATA CLOUD, EXANETS, BBMRI, EATRIS, EPOS, SKA, CTA, KM3NET, ETC), **about 30 H2020 projects (RIA and IA), about 50 FP7 projects and several prominent national R&I projects**

Thank You!

The “Big Data Association”



The ER Big Data ecosystem evolved in an association with a National and EU road map in June 2018. Among its major objectives, there are:

- ❑ Facilitate sharing and joint exploitation of existing regional and national results, knowledge, capacities and frameworks;
- ❑ Boost cooperation between local public and private actors and sectors for maximizing the leverage effects of public and private investments;
- ❑ Plan and implement joint R&I and policy actions at national, European and international level;
- ❑ Promote researcher careers, training and mobility, and in general the development of skills in the big data domain.

In cooperation with CPMR Intermediterranean Commission (IMC) and the Balkans & Black Sea Commission (BBSC), the **Big Data Association can contribute to the implementation of big data** in their areas of interest **by enabling** :

- **the exploration of new data-driven opportunities** (fostering data rescue/re-use, sustaining existing observing systems and designing future augmented ones);
- **the exploitation of new multi-disciplinary data through Big Data analytics**, and
- **the consolidation of Open Data policies in the areas.**