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# The European Marine Biological Resource Centre

A marine biological ESFRI Research Infrastructure



**Workshop: Deep Ocean Cabled Observatories:**  
from the geosphere to the cosmos

**NIKHEF, Amsterdam, 24<sup>th</sup> and 25<sup>th</sup> of May 2012**





# Marine biodiversity, an under-tapped resource for exploring molecules and bio-processes

Life evolved in the sea; only  
From  $\approx 450$  ma onwards the land  
became colonized

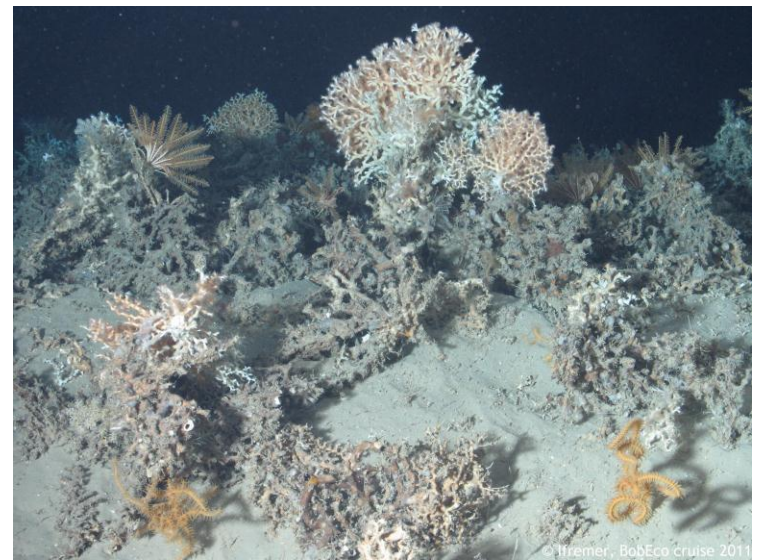
More diversity of marine life forms  
and processes, more genetic and  
biochemical diversity.

Unlike terrestrial food production (mostly domesticated), marine resources are still  
exploited directly, despite much evidence of unsustainable use and damage to other  
bio-resources

The **ocean floor** below 1,000 m is the most  
extensive habitat on Earth  $\approx 300$  million km<sup>2</sup>

its biodiversity remains practically unprospected  
due to technological challenges and costs.

In samples from the ocean bottom,  
often  $>50\%$  are species new to science





# Marine biodiversity, an under-tapped resource for exploring molecules and bio-processes

## Of the 34 fundamental animal lineages

17 have terrestrial representatives

32 have marine representatives

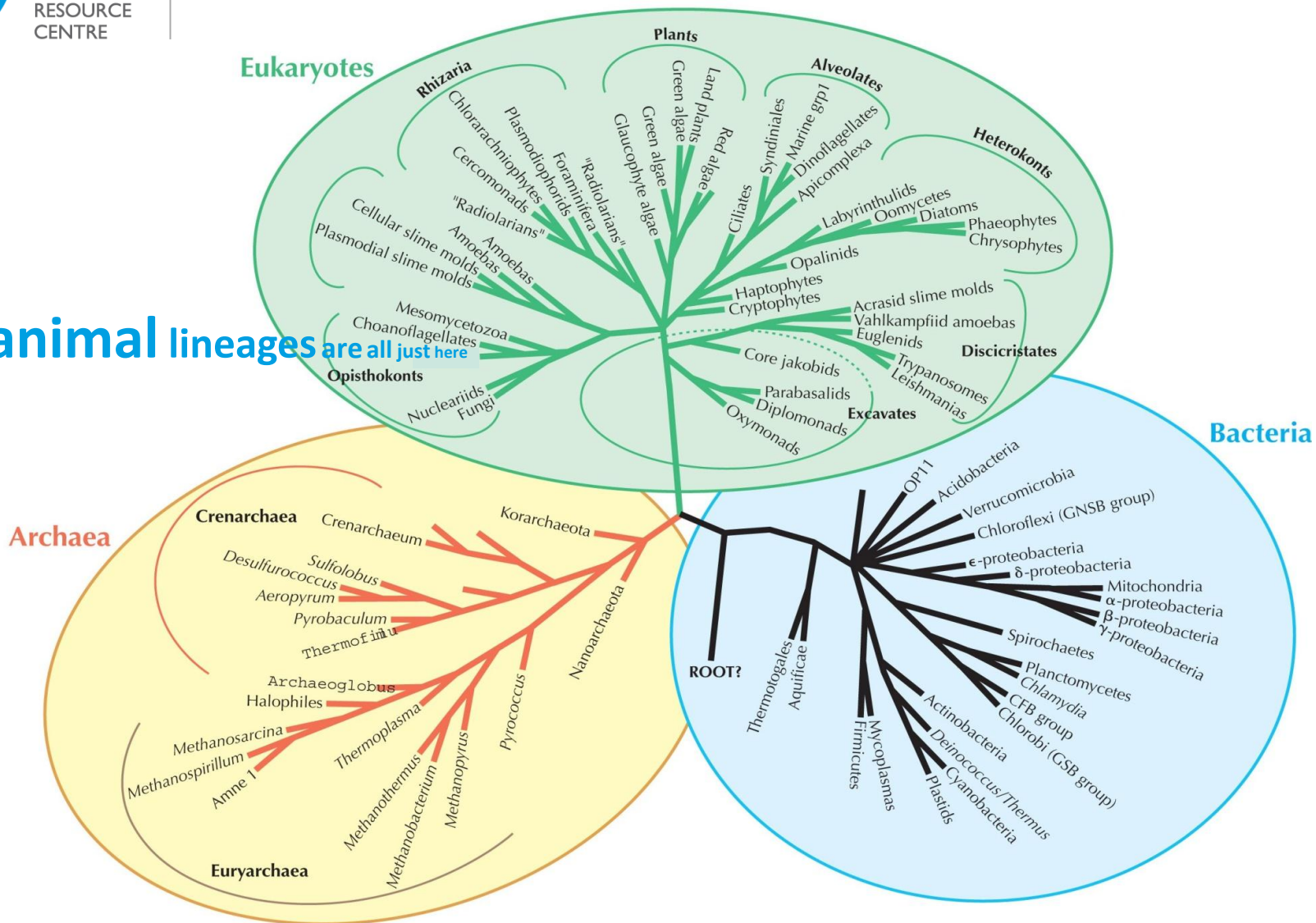
13 are exclusively marine





# And all those 34 fundamental ....

animal lineages are all just here



In: *Evolution* by N. Barton (adapted from the tree of life of Baldauf)





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# Marine biodiversity, an under-tapped resource for exploring molecules and bio-processes

Number of described marine species

Arrieta et al. PNAS 107: 18318-24.



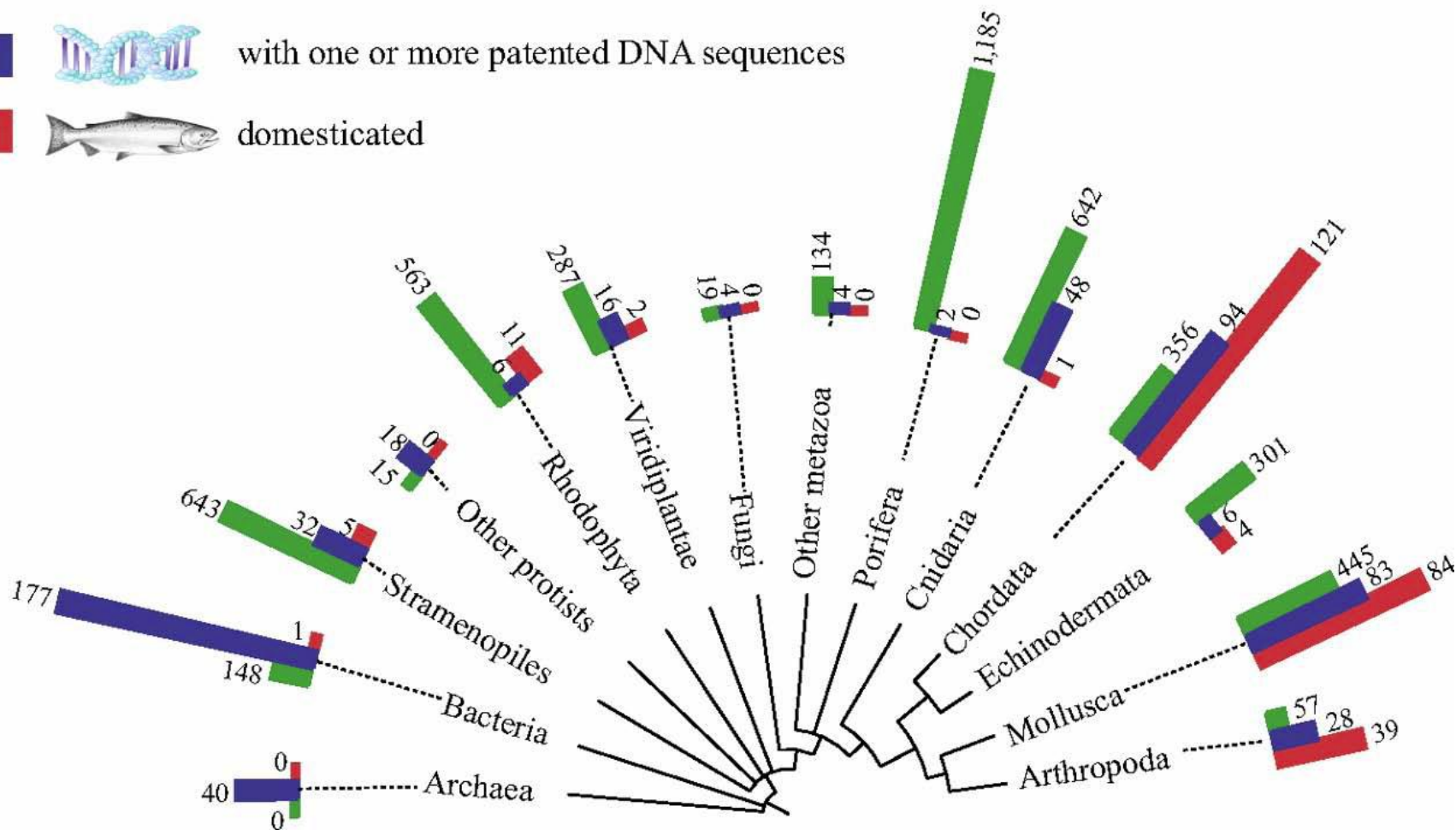
with one or more described natural products



with one or more patented DNA sequences



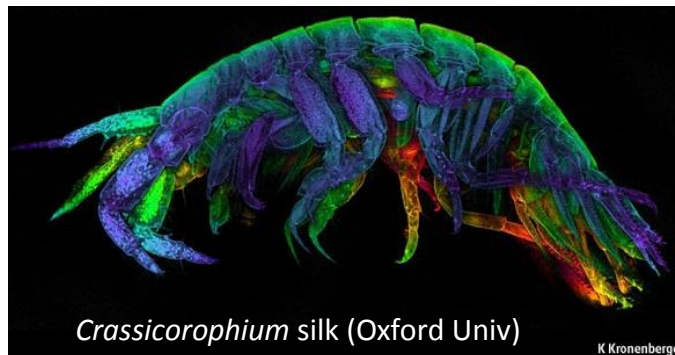
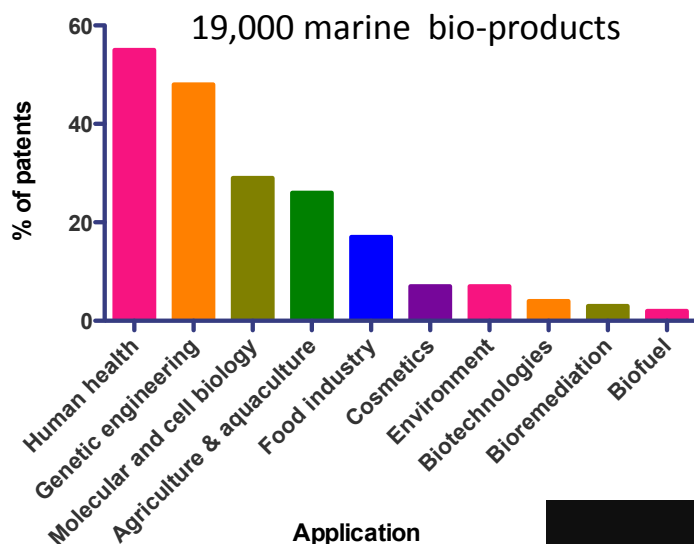
domesticated



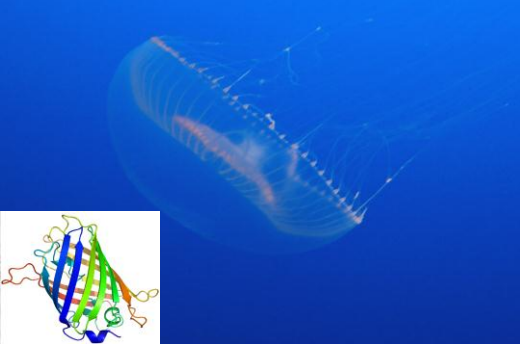


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# Marine biodiversity, an under-tapped resource for exploring molecules and bio-processes



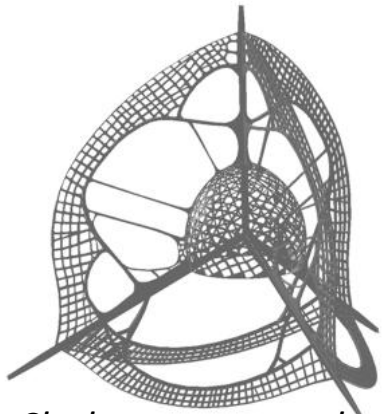
**Green Fluorescent Protein**  
2008 Nobel Prize in Chemistry





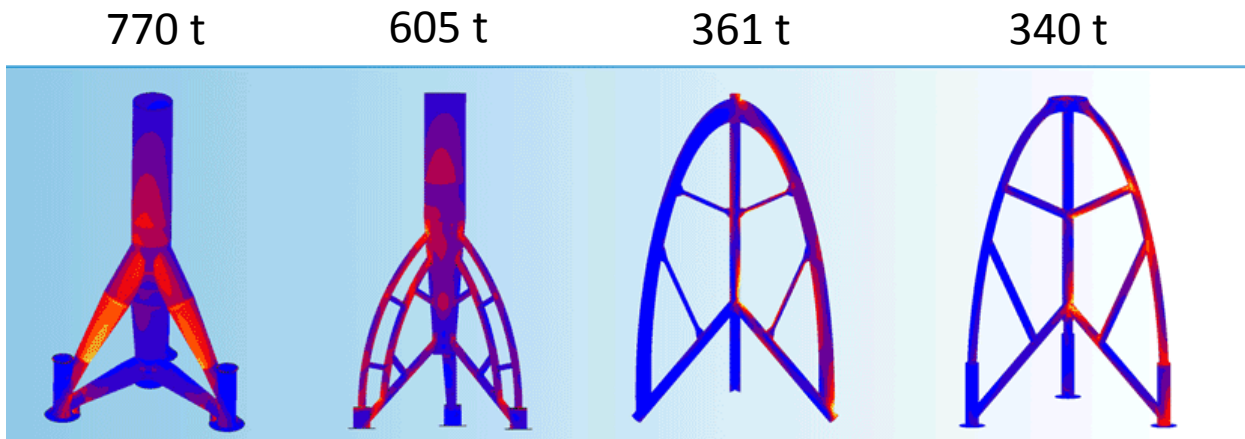
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# Marine biodiversity, an under-tapped resource for evolutionary light-weight structure engineering



*Clathrocorys teuscheri*  
Actinopoda (Radiolaria)

from biological precursors  
towards lighter offshore foundations  
and better distribution of stress





# Marine biological research stations



**SZN, Italy**



**CCMAR, Portugal**



**HMRC, Greece**



**SLCMS, Sweden**



**SAMS, UK**



**MBA, UK**



**SOI, UK**



**SARS, Norway**



**AWI, Germany**



**SBR, France**



**OOV, France**



**OOB, France**



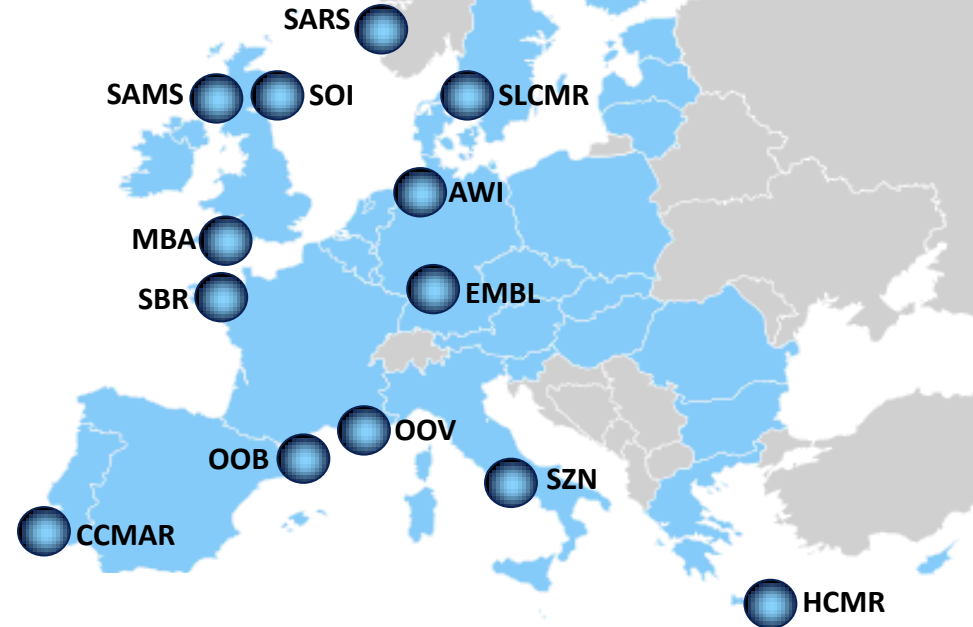


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# A distributed marine biological ESFRI Research Infrastructure

**Preparatory Phase**  
(Feb 2011 – Jan 2014)

● **12 Marine institutes and EMBL  
in 9 Countries**

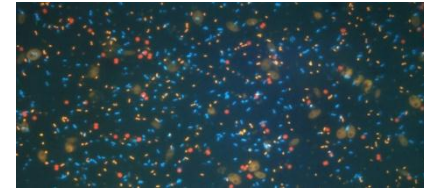


Aspiring partners in Belgium, Denmark, Finland, Ireland, Israel, Lithuania, the Netherlands, Poland, Russia, Spain, Turkey, ...



## EMBRC will provide:

- Access to marine ecosystems including (historical) time-series data;
- Access to marine model species and their genomics resources, for biomedicine, ecotoxicology, biodiversity, gene discovery, etc.;
- Logistics for ex situ experiments, including modern equipment for biology;
- Logistics for hosting and catering;
- Training and education;
- Knowledge transfer to SME's and Industry;
- Consultancy.



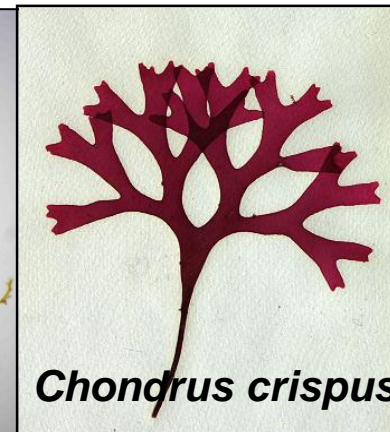
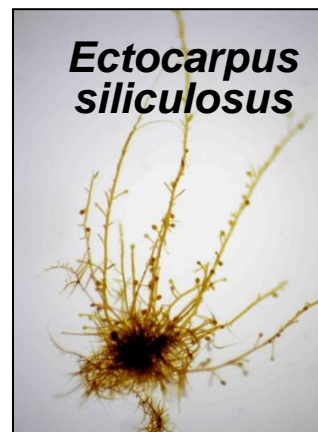




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# EMBRC Mission

**Access to marine biological resources requires culturing or raising of a variety of micro- and macro-organisms.**

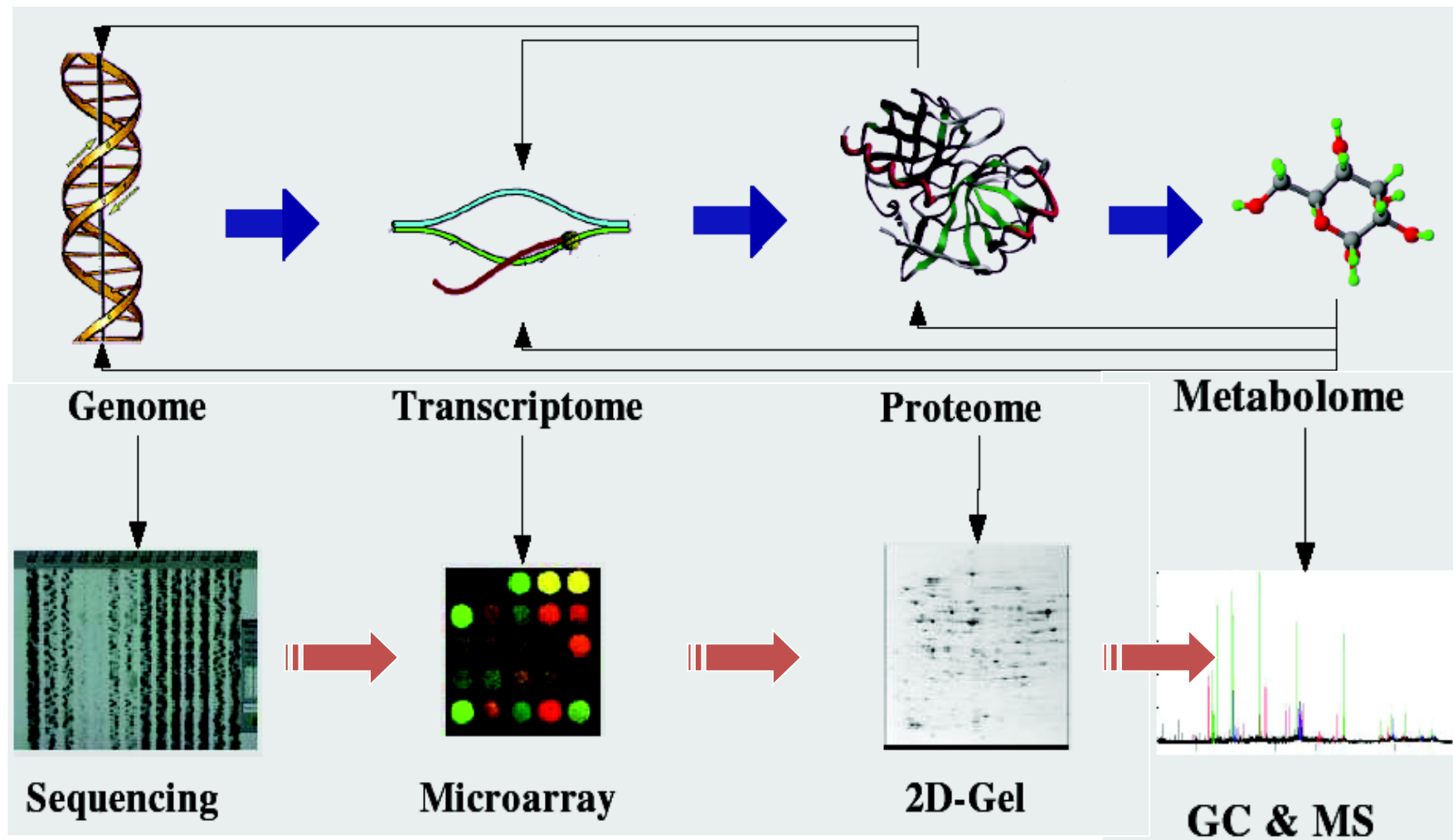






# The Genomics Revolution

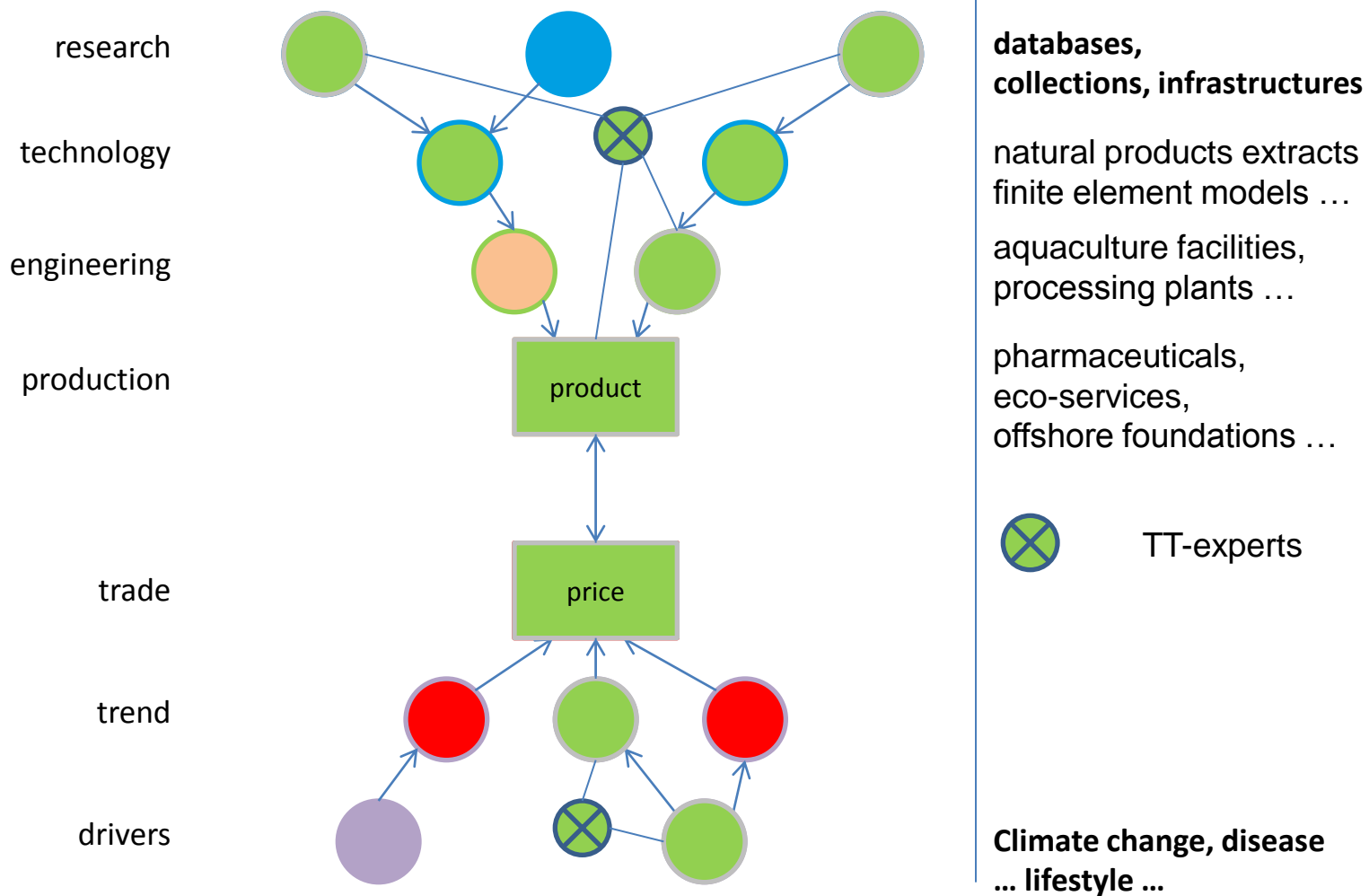
Marine biologists now have access to all components of marine life, from genes to metabolites





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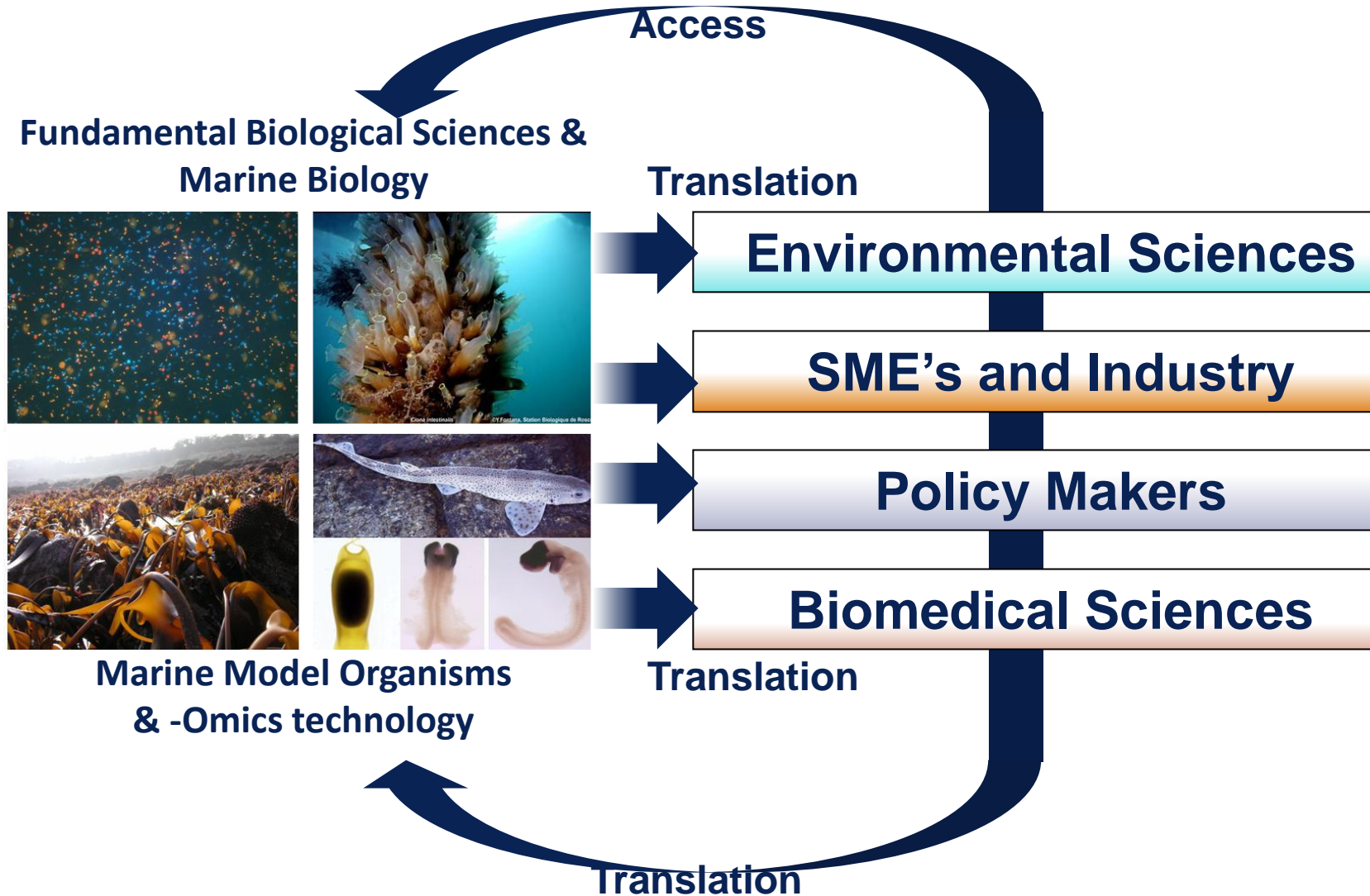
# The challenge of knowledge- and technology transfer





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# EMBRC Strategy





# Timeline and Funding

**Preparatory phase:** 3 years  
Feb 2011- Jan 2014

€ 3.900.000 from EC

**Construction phase:** years 4-8  
2014-2018

Funding from Member States (MS)  
Structural funds

**Operation phase:** year 5-25

Funding from MS, EU, users



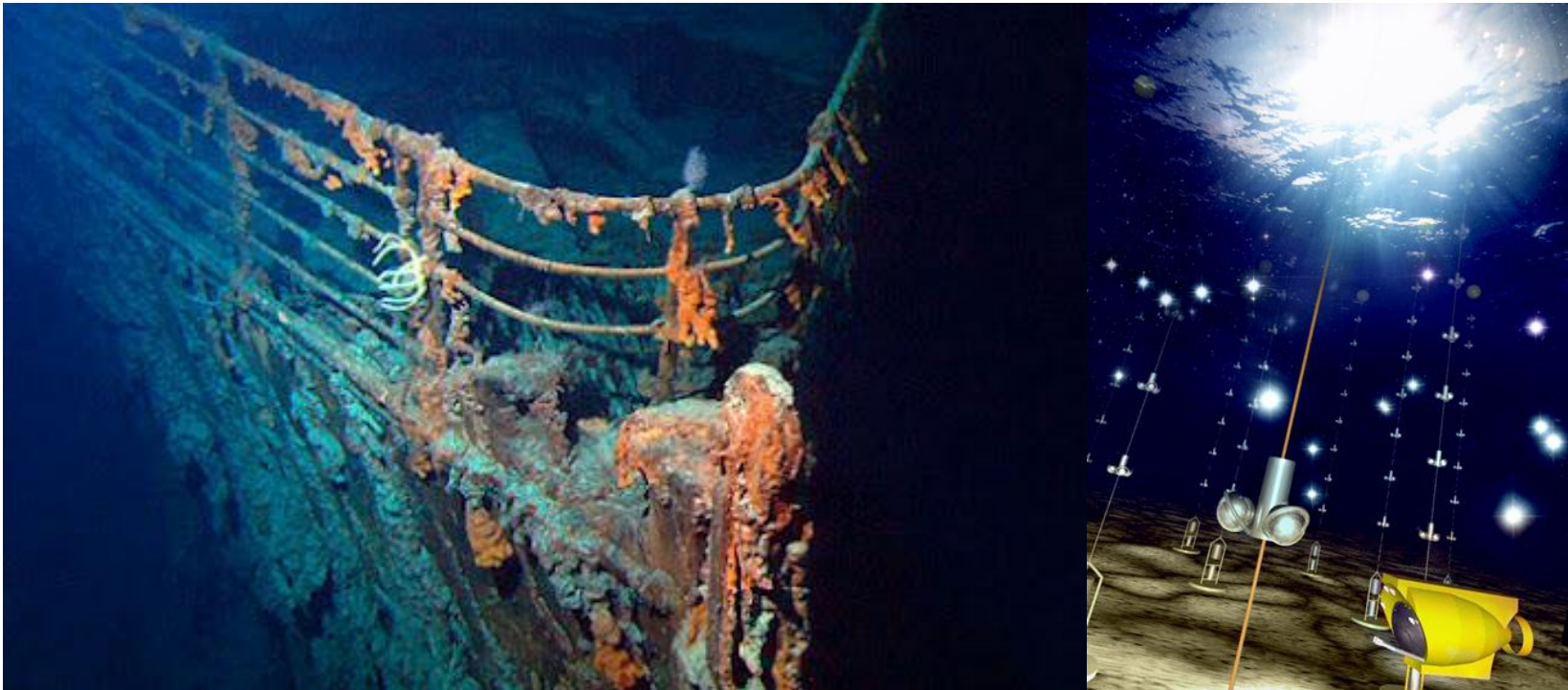


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## EMBRC and ASPERA



As soon as you put something on the ocean floor, biology takes possession



The **ocean floor** below 1,000 m is the most extensive habitat on Earth, its biodiversity remains practically unprospected due to technological challenges and costs. In samples from the ocean bottom, often >50% are species new to science



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# Thanks



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# EMBRC and the Nagoya Protocol on Access and Benefit-sharing



ABS : Sharing the benefits arising from the utilization of genetic resources in a fair and equitable way :

- appropriate access to genetic resources
- appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies
- appropriate funding

⇒ EMBRC at the forefront of its implementation for access to and utilization of marine genetic resources

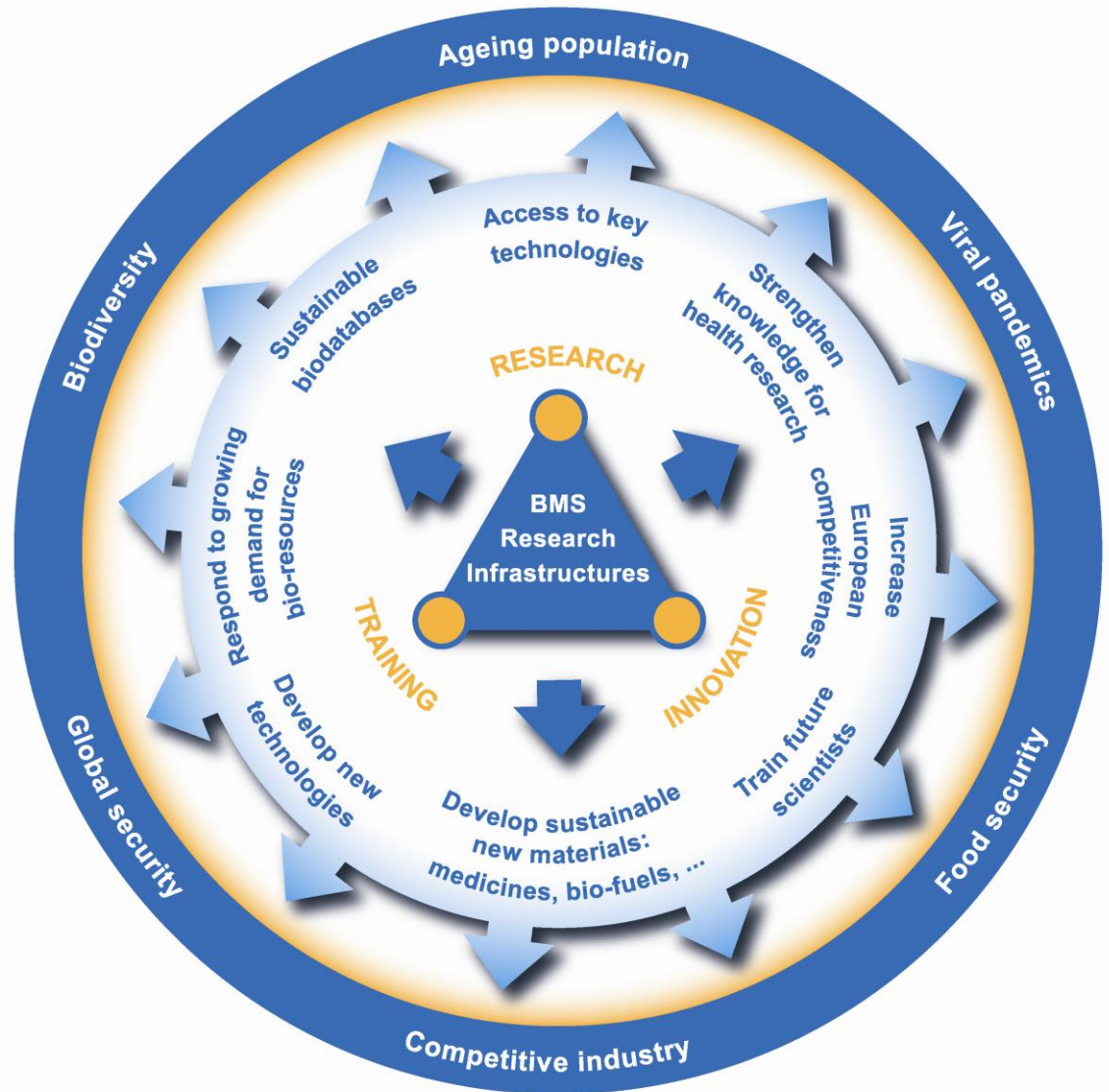


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# Meeting the European Grand Challenges



## The Biological & Medical Sciences RI Mandala



The EMBRC community generates knowledge to address major societal challenges such as Climate change, Biodiversity loss and Securing the provision of food, bio-materials and bio-energy from the marine ecosystems



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# Marine biodiversity, an under-tapped resource for biotechnology



Global market of marine biotechnologies in 2010: € 2.8 billion, growth rate 4-5%