Coastal Marine Research Stations

A Distributed Infrastructure for 2020

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KRI 2014
International Conference on Research Infrastructures

Research Infrastructures for Global Challenges

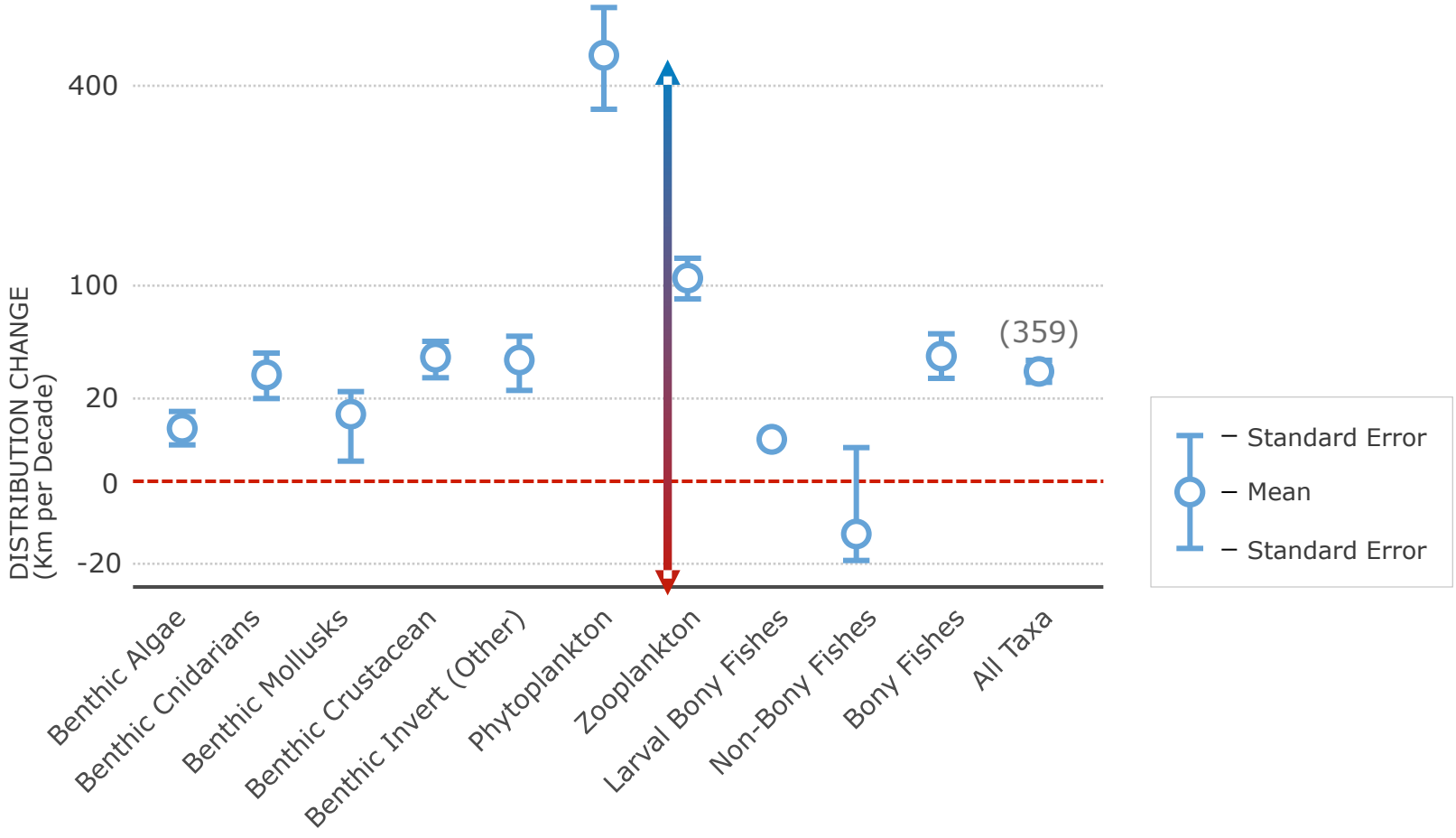
EMBRC
EUROPEAN MARINE BIOLOGICAL RESOURCE CENTRE

ipcc
INTERGOVERNMENTAL PANEL ON climate change

CLIMATE CHANGE 2014:

IMPACTS, ADAPTATION, AND VULNERABILITY




DISTRIBUTION CHANGE
(Km per Decade)
400
100
20
0
-20
(359)
Benthic Algae
Benthic Cnidarians
Benthic Mollusks
Benthic Crustacean
Benthic Invert (Other)
Phytoplankton
Zooplankton
Larval Bony Fishes
Non-Bony Fishes
Bony Fishes
All Taxa
– Standard Error
– Mean
– Standard Error

APPROVED SPM Copyedit Pending
IPCC WGII AR5 Summary for Policymakers
WGII AR5 Phase I Report Launch 1. 31 March 2014
Climate Change 2014: Impacts, Adaptation, and Vulnerability
SUMMARY FOR POLICYMAKERS

- ***"Global warming can force species to move to higher latitudes and higher altitudes where temperatures are better for their chances of survival."***

- ***"It can also cause changes to seasonal events in the life cycle of a species. These include migration and mating, in the case of animals, and blooming, in the case of plant species."***

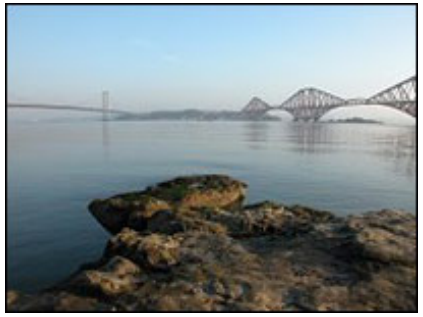
- ***"Fish and other marine animals will shift their ranges, causing invasions of high-latitude seas by low latitude species and local extinctions of marine animals in the tropics….. Ocean acidification also poses substantial risks to marine ecosystems, particularly at the poles and at coral reefs."***

Scientific strategy: ecosystems readily accessible to shore-based marine stations

- Fjords
- Estuaries
- Mud flats
- Sea grass beds
- Kelp forests
- Volcanic seeps
- Coral reefs
- Megatidal seas
- Deep sea environments

















Latitudinal range, regional seas

Scientific strategy: Platforms

Platforms are necessary for ecosystem access and provision of key marine species e.g. coastal research vessels, remote operated vehicles, tethered buoys, scientific diving, and animal borne sensors











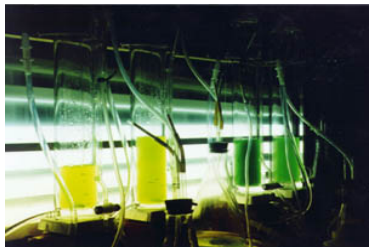




Experimental facilities

Seawater supply, cold and warm water aquaria, environmental control (pH, CO_2, temperature, light, salinity), plankton and invertebrate feed culture, mesocosms



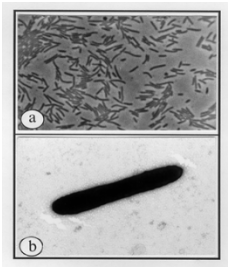


Biological resources

Model species, genotypes, mutant strains including transgenics, genomic resources (e.g. BAC libraries), type culture collections, antibodies



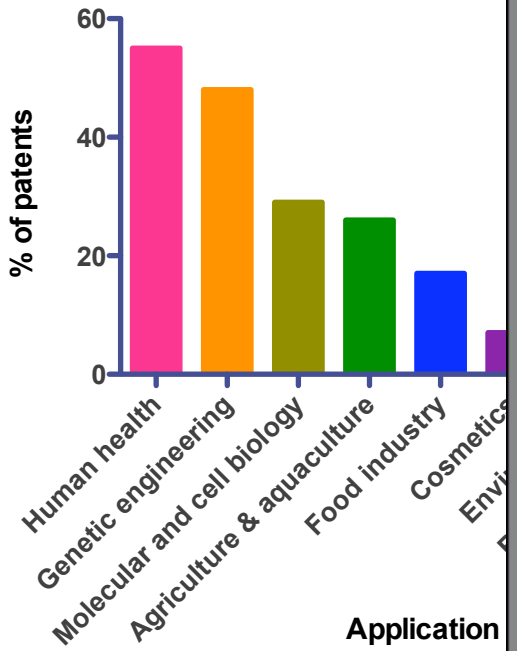




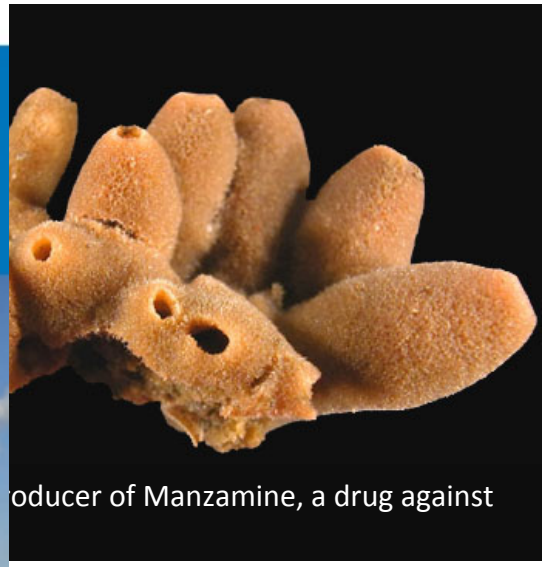
Why Coastal Marine Stations?

Substantial "added value"

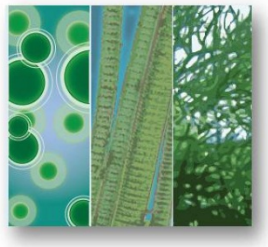
Much biodiversity is or… biodiversity is a potentially rich source of medicine…



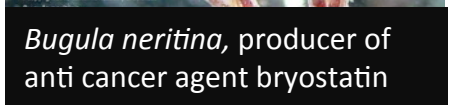




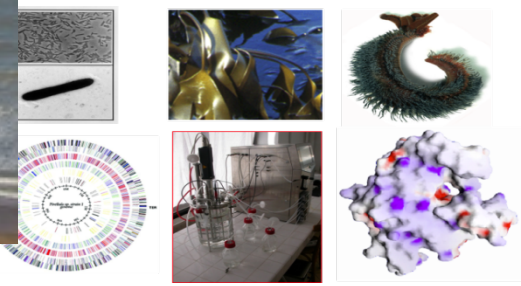
…oducer of Manzamine, a drug against



Algal biofuels



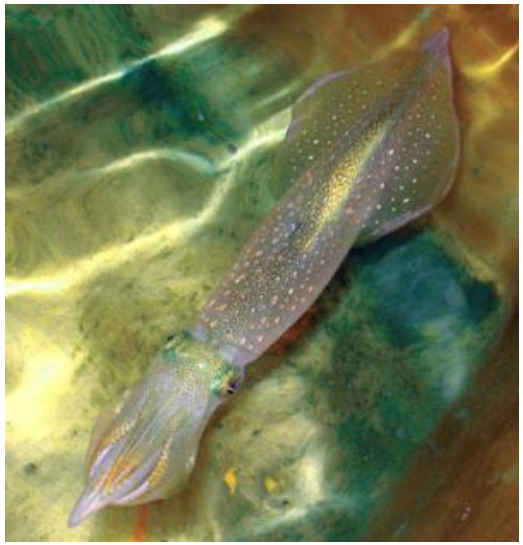
Bugula neritina, producer of anti cancer agent bryostatin



Marine Biotechnology

Moving forward the frontiers of knowledge

More than 50 Nobel Prizes have already been awarded based on research involving marine organisms – development, neuroscience, chemistry, physiology, medicine and others

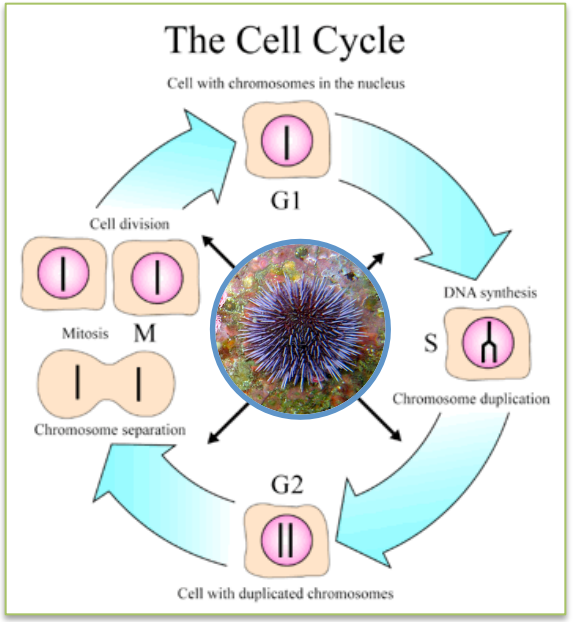


Squid giant axon



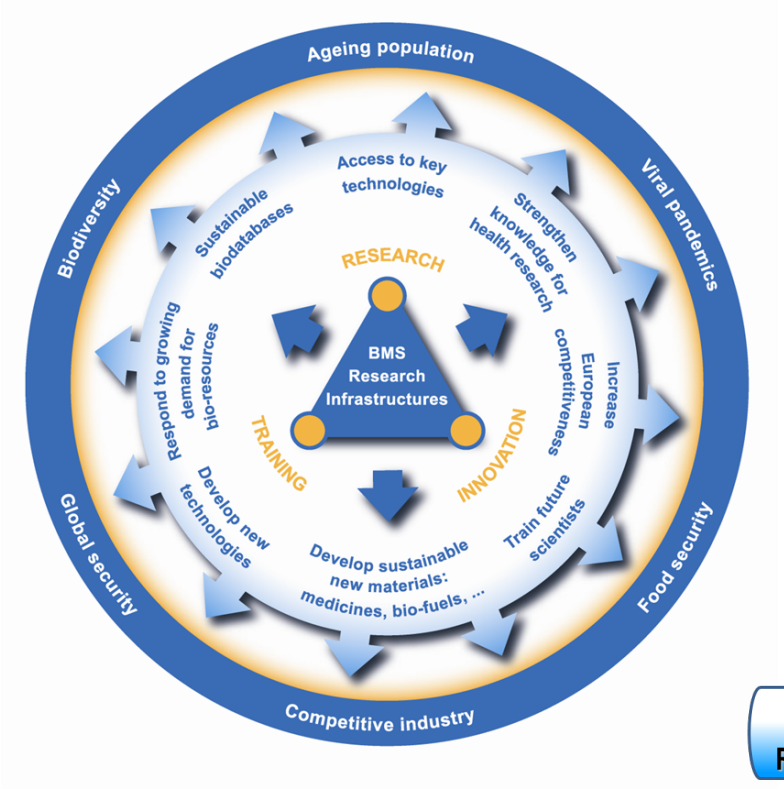
Green fluorescent protein





Basic science provided advances in healthcare and industrial innovations for the future

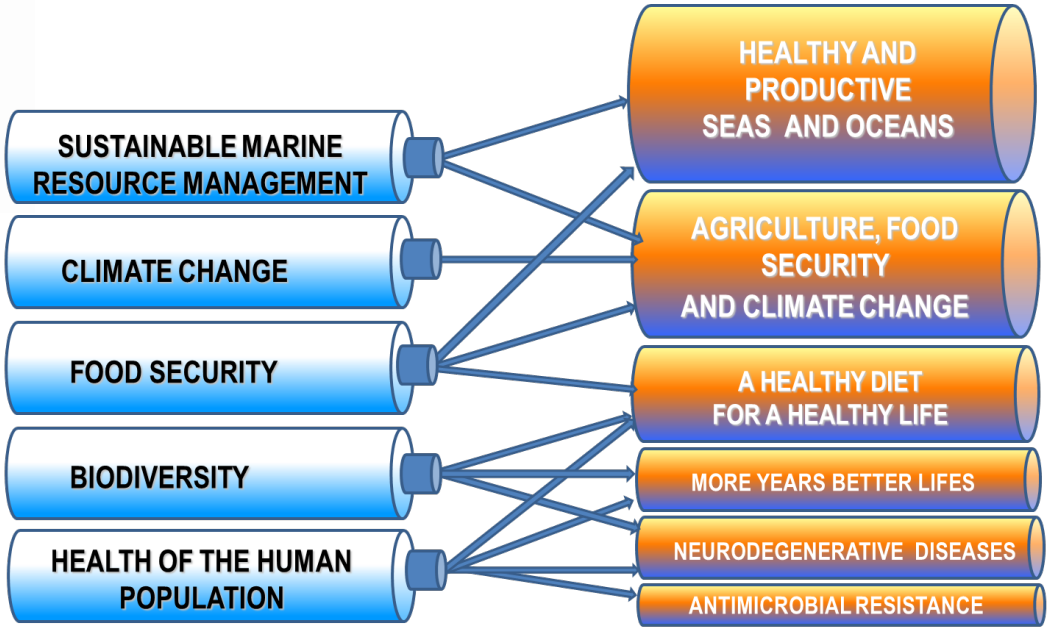
Strategic Landscape and Policy Drivers



Europe's Grand Challenges

Marine Station-specific

Joint Programming Initiatives



Why Coastal Marine Stations?

Industrialisation of the seas is proceeding at a rapid pace, particularly in the coastal zone and is the zone where climate change will have one of its greatest impacts

Marine stations have a vital role in assessing the impact of these economic activities on organisms and ecosystem function underpinning the development of policies and a regulatory framework to ensure healthy seas for future generations. Marine stations are also observatories for monitoring climate change and its impacts on Marine Ecosystems



Fisheries



Aquaculture



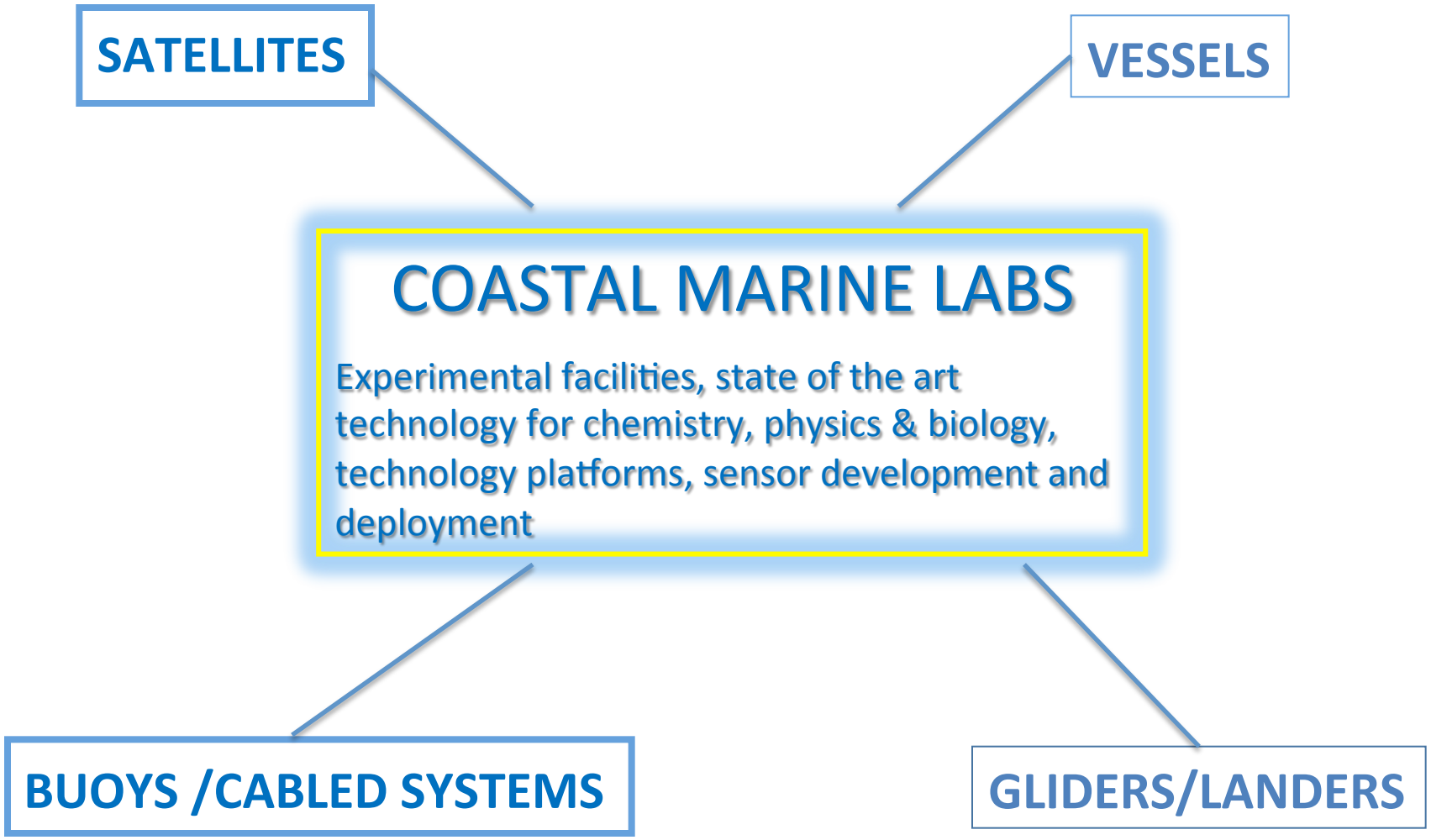
Offshore wind



Tidal power

ECONOMIC IMPACTS; ENERGY; FOOD SECURITY "ADAPTATION"

Infrastructure Needs for Seas and Ocean Research



”WAMS”

The World Association of Marine Stations

(http://www.marsnetwork.org/world-association-marine-stations-wams)

A Network of Marine Stations and Institutes for the 21st Century



Africa

THREE TAKE-HOME MESSAGES

- Marine Infrastructures are Distributed Infrastructures and as such reflect regional (bio)-(ecosystem)- (geophysical) diversity. This is the level that climate change will impact. To exploit the knowledge and expertise base we need to integrate currently fragmented consortia.

- We need much more than mapping and traditional "observatories"; this is important but of limited value on it's own. Now we must be pro-active and build on the several models/ activities already available and the expertise we have available:

ESFRI:

EMBRC (http://www.embrc.eu/index.php)
Euro-Argo (http://www.euro-argo.eu/)
EMSO (http://www.emso-eu.org/management/)
ICOS (http://www.icos-infrastructure.eu/)
Lifewatch (http://www.lifewatch.eu)
SIOS (http://www.sios-svalbard.org)

Marine Station Networks:

MARS: (http://www.marsnetwork.org/)
WAMS: (http://www.marsnetwork.org/world-association-marine-stations-wams).

- **Develop exchange programmes, joint training, shared best practice, KT and KE activities across all categories, students, scientists, technical and administrative staff and regional/ national stakeholders. To share visions and strategies for the long-term operation of MRIs that reflect societal needs.**

Guidelines for Speakers

- potential international cooperation on research infrastructures;
- coordinated support and strengthening of existing initiatives;
- possible needs for additional efforts;
- developing a vision of open science.

- What would be the appropriate international framework for cooperation (this appears to be currently either missing or too complex/difficult to identify).
- How to coordinate and harmonize Marine research activities and operations.
- How to improve access to research facilities and research data?
- Ways to enhance the dialogue and knowledge exchange between infrastructure project leaders.
- How to promote good knowledge sharing practices and contribute towards developing new strategies and modalities in future collaborations.
- Share experiences and lessons on transatlantic co-operation in the development and use of research infrastructures.