

Atlantic Action Plan

Brest 2015

Research and Innovation- Workshop 2.B

Maximising the value of marine bioresources - the future role of marine biotechnology in the Atlantic area



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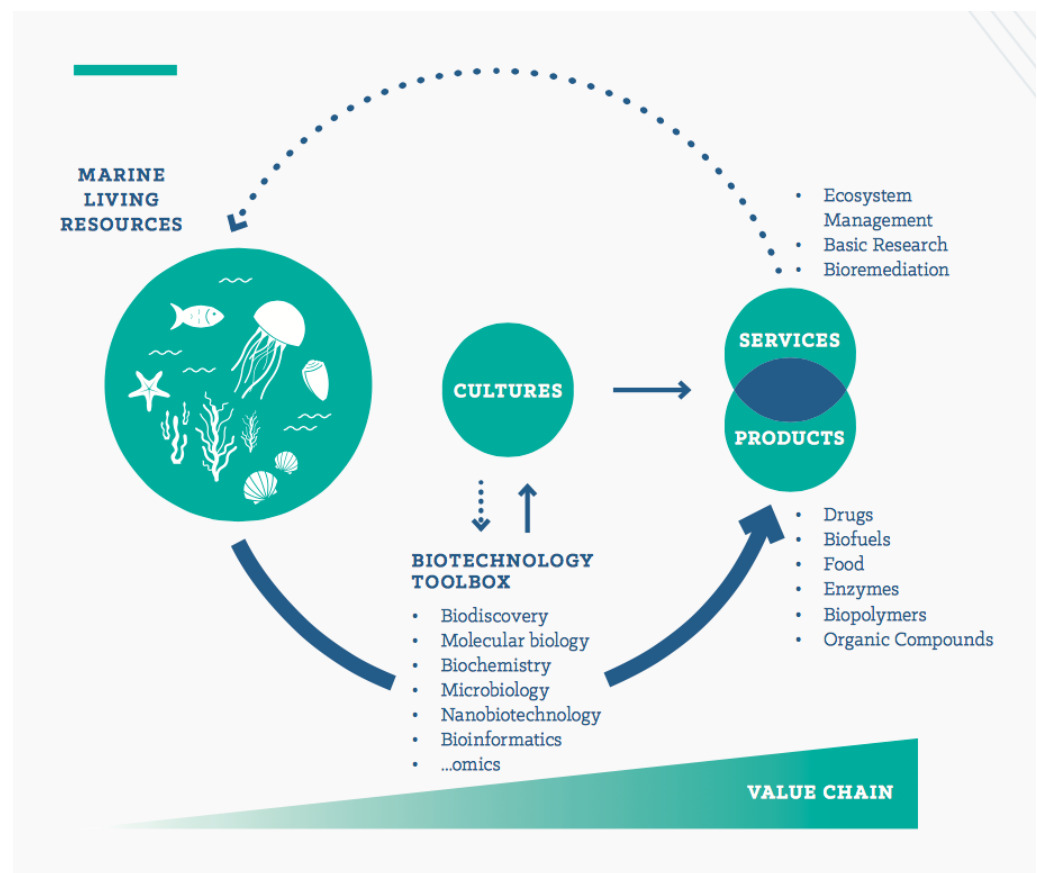
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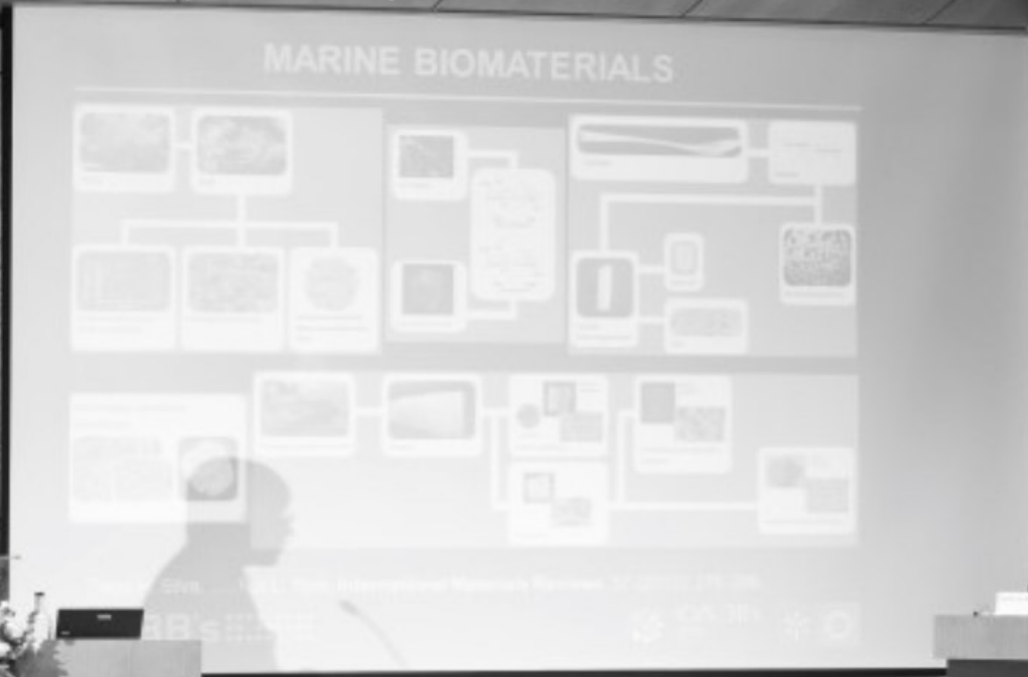
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Marine Biotechnology

Marine biotechnology is the application of science and technology to living organisms from marine resources, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services.



Workshop Objective



- Identify the key challenges for MBT in maximising Atlantic resources to create value
- What action(s) are need to meet the challenges and deliver concrete outcomes?

Some questions to reflect on..

- How to ensure continuity of supply of marine biomass within the Atlantic area?
- How to maximise contributions from marine biotechnology in strengthening the position of the Atlantic area in the European Bioeconomy?
- What conditions are required to allow and encourage European SMEs to participate in developing new marine biotechnology enabled enterprise activity?
- How can linkages between research institutions and industry be made more effective?
- What scope exists for the creation of a marine biotechnology RTDI network(s) within the Atlantic area and how could they be developed?
- What are the prime competitive advantages of the Atlantic area regarding the use marine biotechnology to create value and employment?

ERA-MBT Foresight activity

Insights to the impact of uncertain forces driving the future of marine biotechnology – by creating scenarios



- The panel will provide a wide range of perspectives
- Discuss the BIG changes - e.g., society, economic, climate – drivers (and others you identify)
- Cluster, group or prioritise them
- Sketch some pictures – scenarios (+ve and -ve)



Views on the future – a challenge!



There are no perfect
answers!

Mega trends

MEGATREND	SUBTREND
Changing demographics	<ul style="list-style-type: none"> • A growth in world population to 8.3 billion people • An aging society as the median age rises 5 years to 34 years • Increasing urbanisation reflected in 59% of the world living in cities
Globalisation and future markets	<ul style="list-style-type: none"> • Continued globalisation with exports and FDI growing faster than GDP • Emergence of BRICS as new powerhouses - GDP growth of 7.95 p/a • Growth of 5.9% in the NEXT 11 and strong growth in ASEAN 5
Scarcity of resources	<ul style="list-style-type: none"> • Increase in primary energy consumption of 26% • Half the world will live in areas of high water stress i.e. shortage • Some rare metals will run out • Rising food demand
Climate change	<ul style="list-style-type: none"> • Continued increase in CO2 emissions – by 16% • Average global temperature to rise by 0.5 – 1.5 deg C • Declining biodiversity and increase in extreme weather events
Technology and innovation	<ul style="list-style-type: none"> • Extensive diffusion of technology – at high speed across the globe • Innovations will change our lives robotics and the internet of things • The age of life sciences – challenged by demographics boosted by R&D
Global knowledge society	<ul style="list-style-type: none"> • Know-how base increases as 55% of population complete at least 2nd level education • Gender gap narrows • "War" over talent as demand for qualified people exceeds supply
Sharing global responsibility	<ul style="list-style-type: none"> • A shift to global cooperation as nations share responsibility • Number of and power of NGOs will grow significantly • Increase in philanthropic donations but philosophy of giving will change

^[1] [Bangladesh](#), [Egypt](#), [Indonesia](#), [Iran](#), [Mexico](#), [Nigeria](#), [Pakistan](#), the [Philippines](#), [Turkey](#), [South Korea](#) and [Vietnam](#)

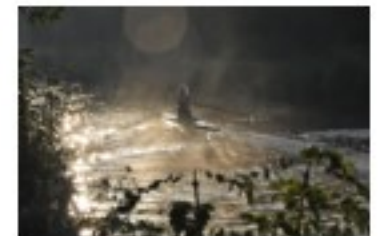
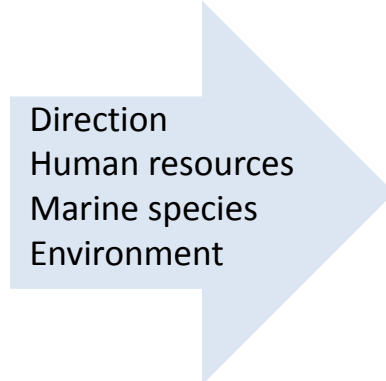
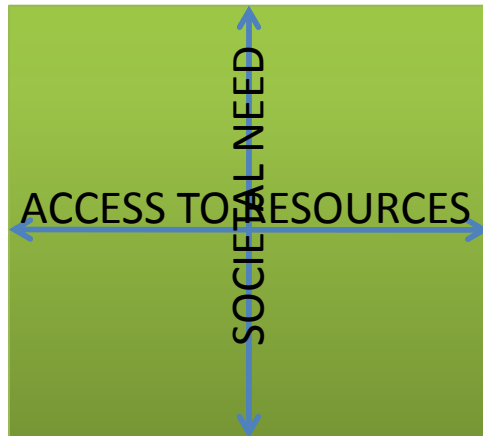
^[2] **Association of Southeast Asian Nations** - Indonesia, Malaysia, Philippines, Thailand, Vietnam

^[3] Internet of things – communications/sensors embedded within common artifacts

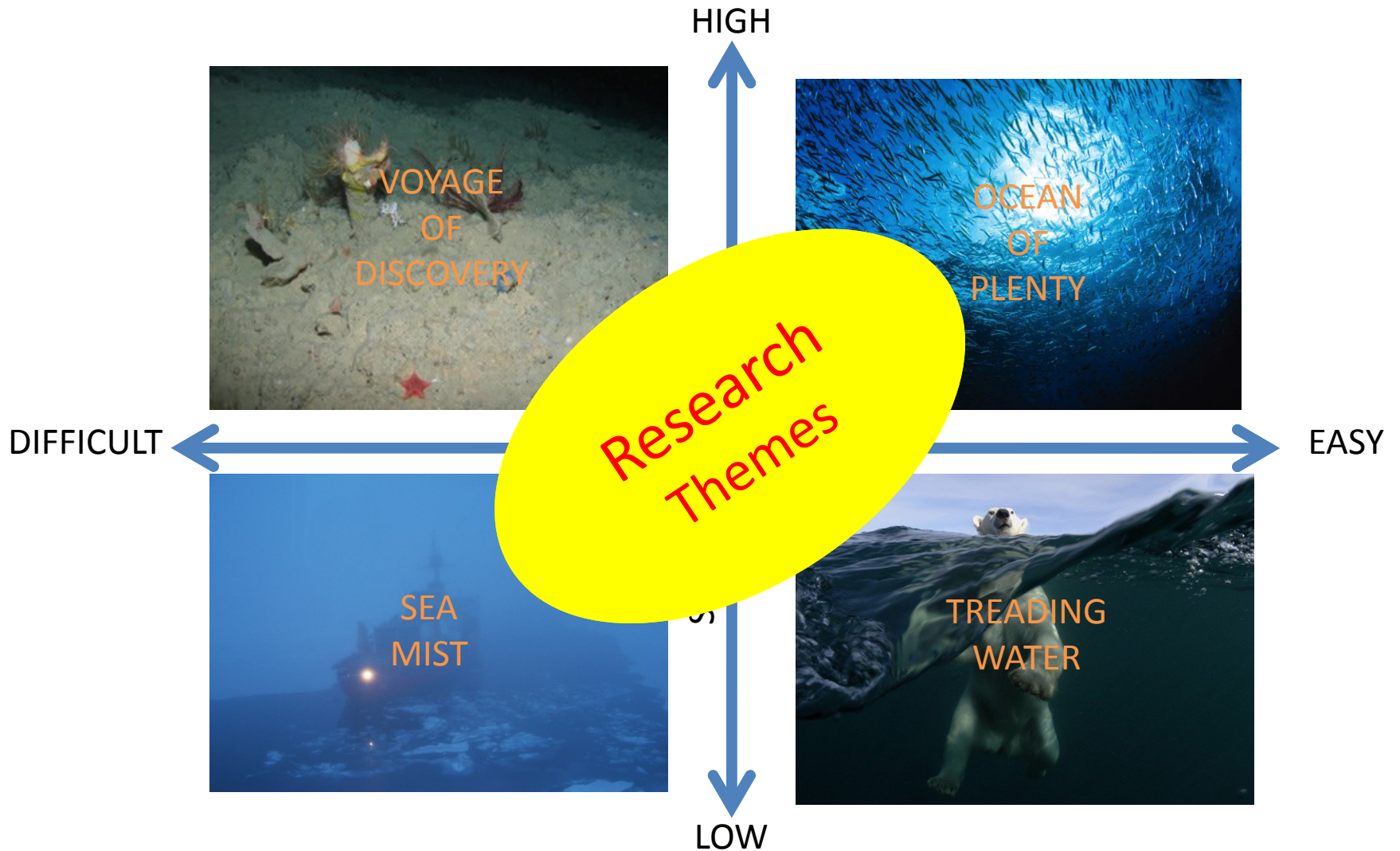
Main drivers

- → Health, Demographic Change and Wellbeing
- → Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Water Research and the Bioeconomy
- → Aquatic living resources and marine research
- → Agri-food sector for a safe and healthy diet
- → Bio-based industries
- → Secure, Clean and Efficient Energy
- → Climate Action, Environment, Resource Efficiency and Raw Materials
- → Europe in a changing world - Inclusive, innovative and reflective societies

- → Demand for materials/biomass
- → Climate change
- → Demographics
- → Economic performance
- → Societal values/needs
- → Technological development
- → Regulatory systems
- → Environmental policy
- → Discovery processes
- → Access to resource
- → Research management



Marine Biotechnology Scenarios



Thematic Research Areas

Exploration



- The development of predictive tools to improve the identification and targeting of biological “hot-spots” in the oceans.
- The discovery of new marine species as a source of novel materials.
- Continue to target microorganisms deep sea sediments, microbial symbionts from sponges and other organisms; macro and micro algae; fish and fish processing discards, bivalves and marine fungi as sources of biologically active natural products.
- Exploring the chemical and biological diversity of marine organisms.
- Develop alternatives to the traditional collection or harvesting of marine organisms, including the development of methods to allow in-situ assessment and screening of marine organisms.

Thematic Research Areas

Biomass production and processing



- Increasing the production of biomass from sustainable marine resources
- Establishing the controlled culture of marine biomass at sea and on land, including developing techniques to culture marine organisms not currently in culture.
- Creating efficient transformation and refining processes, including concepts of multi-stream inputs and bio refining of mixed biomass feedstock.
- Reducing the complexity of the supply chain by integrating biomass production and refining, reducing energy demand in processing marine biomass.
- Enhancing the sustainability of the marine biomass conversion by minimising the creation of waste.
- Remove bottlenecks in marine biomass transformation and conversion
- Research to support the expansion of cultured biomass production (breeding/hatchery/genetics/nutrition and health)

Thematic Research Areas

Product development/applications/diversification

- Maximise the sustainable use of marine bio-resources for applications in human and animal food, as food ingredients, therapeutic compounds, medical devices and biomaterials, cosmetics and cosmeceuticals and as novel industrial materials and processes.
- Create novel biosensors based on marine organisms and explore their use in monitoring the status of marine environments and in assessing safety of marine origin foods.
- Evaluate the role of marine origin enzymes in biorefining and biotransformation processes for industrial use (e.g. food, fine chemicals, consumer products and biopharmaceuticals).
- Investigate the biocompatibility of marine materials and assess their for use in medical devices, for drug delivery or in the repair, replacement or regeneration of tissue.
- Explore the potential of marine organisms to act as experimental models in health related research.

Thematic Research Areas

Enabling technologies and infrastructure



- Identifying opportunities for the marine biotechnology community to adopt new technologies
- Identify and build new competencies and networks to support marine biotechnology research and innovation
- Developing deep-sea equipment for use in habitat mapping, biological resource assessment and screening
- Exploring methodologies to increase the rate of the discovery of novel materials
- Reducing the costs associated with discovery related activities
- Identify and develop emerging technologies to support marine biotechnology knowledge and information management
- Creating pilot facilities to support scale-up activities
- Develop and establish shared and open access marine data and biological repositories

Thematic Research Areas

Policy support and stimulation

- Initiate research to identify ways in which to expand access to marine bioresources for discovery purposes in European waters and on the high seas
- Develop a comprehensive planned policy research programme to apply the knowledge gained from marine biotechnology research to inform public policy, governance and regulation of marine environment and marine derived products
- Provide research to support the introduction of common regulations across member states regarding the harvesting, culture and exploitation of marine biomass
- Establish a knowledge base for efficient and responsive regulation and policy development relating to marine bioresources
- Identify mechanisms to attract greater industry participation in marine biotechnology related research
- Identify policy developments to that advance marine biomass production and processing capabilities and reduce barriers to the development of new markets for marine derived products

Acknowledgements

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