

Marine biotechnology to advance Europe's bioeconomy

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NATIONAL INSTITUTE OF BIOLOGY

1 Intro and basic concepts

- Societal challenges

2 How it all evolved

- Historically
- Future

3 2001-2022

DISCLAIMER

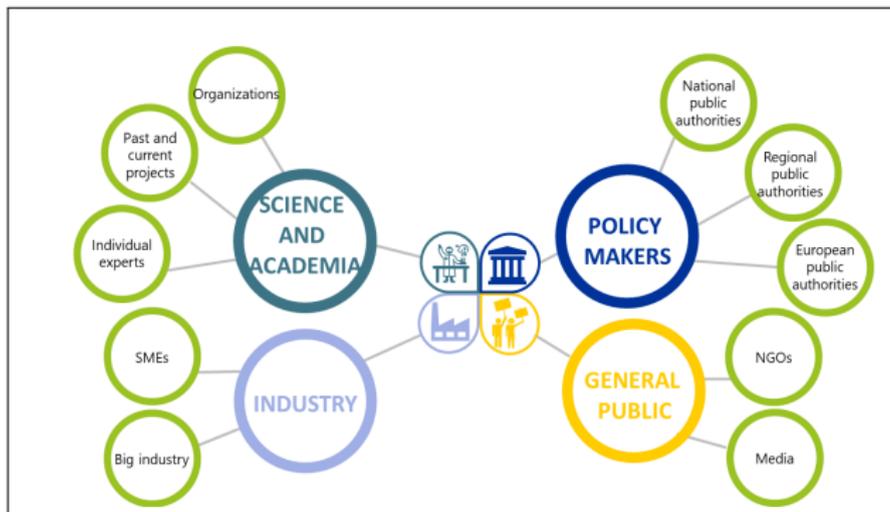
Today's webinar is based on some background research on the current state of affairs, added with my **own, personal point of view.**

WHO AM I?

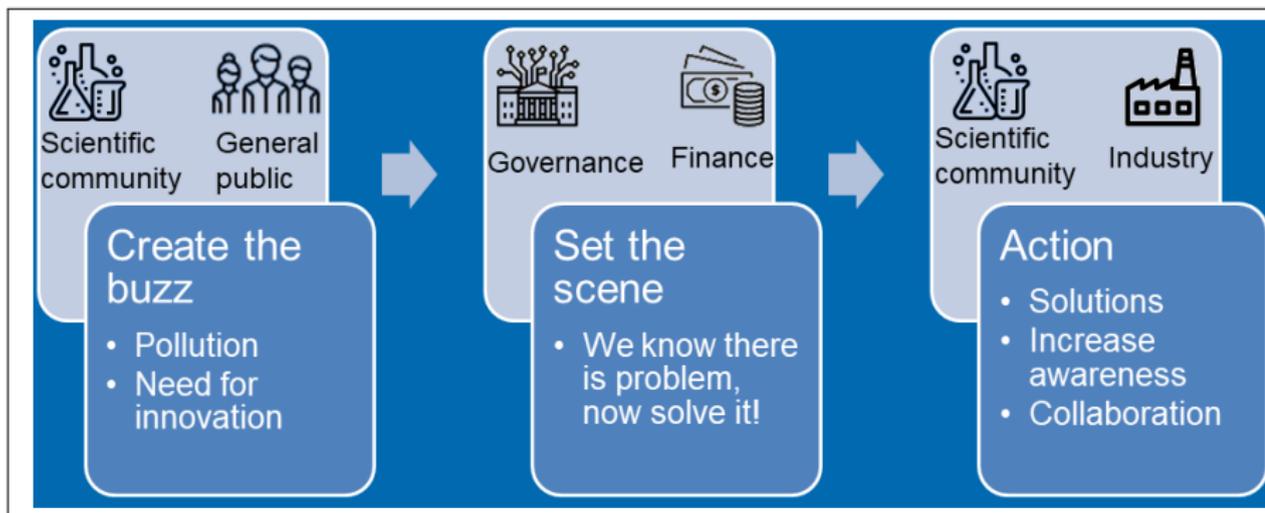
- Microbiologist
- Work in industry
- Statistics
- National Institute of Biology: plants, cancer biology, ecotoxicology, marine biology, marine biotechnology - **empty niche in the region**
- since 2011 (L'Oreal for women in science): policy, science communication, gender equality, trade union

And we have done a lot: **Ocean4Biotech, B-Blue, research programme, many unrealized ideas and side collaborations**

QUADRUPLE HELIX



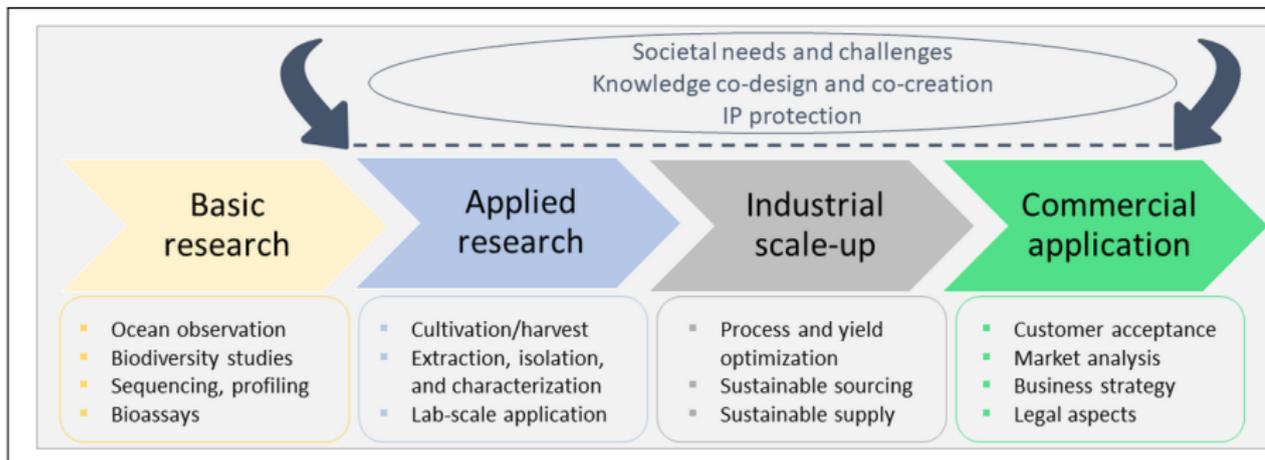
PROCESS



CURRENTLY

Societal challenges Horizon 2020 (2014–20) (European Commission, 2013)	Global challenges Horizon Europe (2021–27) (European Commission, Directorate-General for Research and Innovation 2018)
Health, demographic changes, and wellbeing Food security, sustainable agriculture and forestry, marine/maritime/inland water research, and the bioeconomy Smart, green, and integrated transport Secure, clean, and efficient energy Climate action, environment, resource efficiency, and raw materials Inclusive, innovative, and reflective societies Secure societies	Health Food, bioeconomy, natural resources, agriculture, and environment Climate, energy, and mobility Culture, creativity, and inclusive society Civil security for society Digital, industry, and space

MARINE BIOTECHNOLOGY

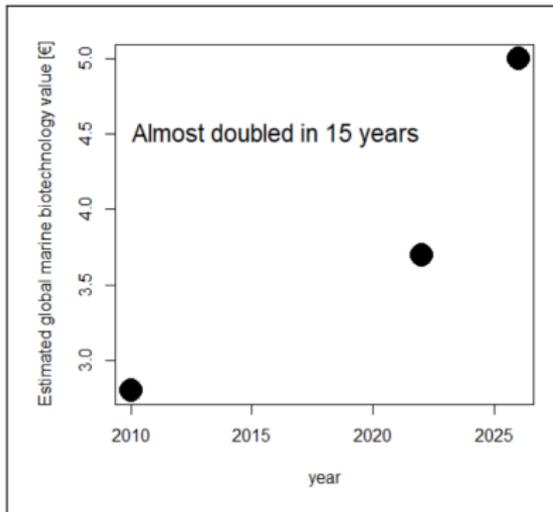


▶ Rotter et al., 2021

A BRIEF HISTORICAL OVERVIEW

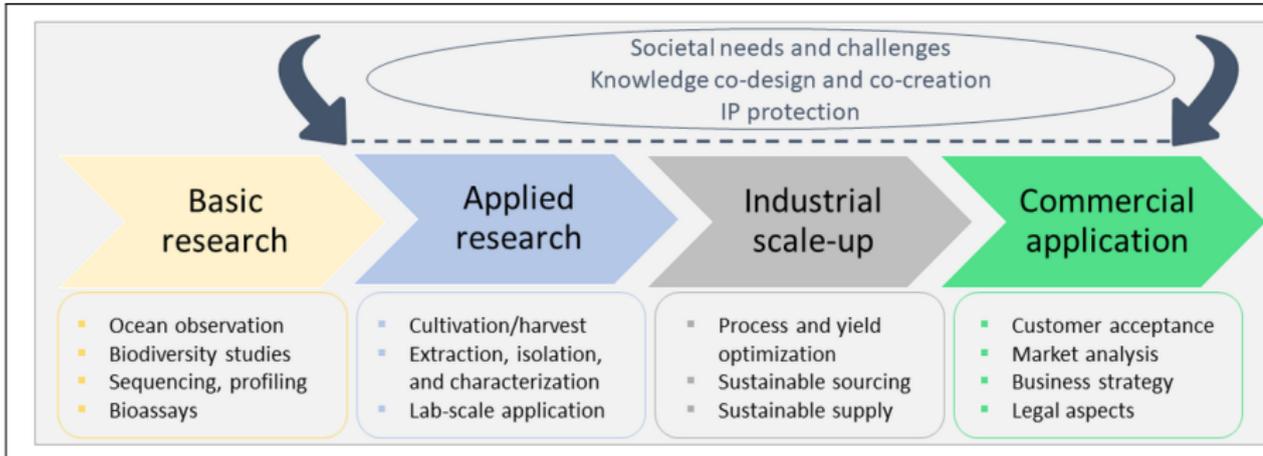
- Since 1980s: Marine environment considered an untapped resource
- Inherently transdisciplinary (biology, chemistry, omics, etc.)
- Networking among QH (formal, informal)
- Competition
- Administration, finances
- Resilience (adaptability to societal challenges, always fishing for opportunities)
- **Not achieved since 2001:** establish Europe as a world leader in marine bio-screening and derived bio-products

POTENTIAL



Between 2014-2020, EUR 262 million for projects supporting marine biotechnology in EU, but only for "alga OR alga* OR aquaculture AND biomass OR blue biotech OR seafood OR spirulin "- **In reality higher**

REFRESH IDEAS



▶ Rotter et al., 2021

AREAS

Sectors:

- Health, cosmetics
- Bioremediation, antifouling, biosensors
- Food, feed, aquaculture
- Materials, biopolymers
- Energy

Organisms:

- Bacteria
- Fungi
- Sponges
- Jellyfish
- Symbionts

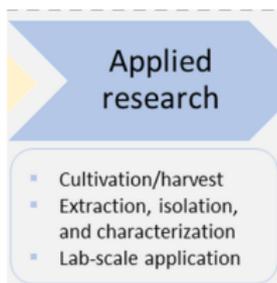
BASIC SCIENCE

Basic research

- Ocean observation
- Biodiversity studies
- Sequencing, profiling
- Bioassays

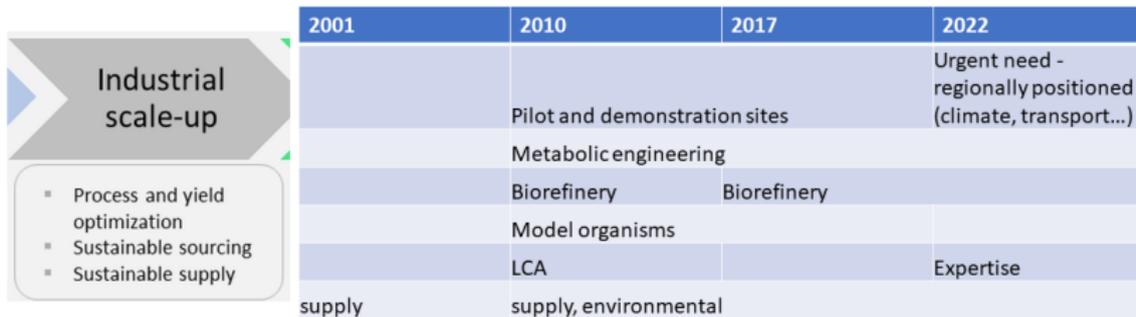
2001	2010	2017	2022
Sampling and screening: include biotechnological aspects in exploration	Maintain sampling and screening	Maintain sampling and screening	Biodiversity calls Often separate (biodiversity, biotech)
HT screening	HT screening	HT screening	
Symbionts	Symbionts		
extreme env.	extreme env.	Extreme env.	
Regulation of production	databases, bioinformatic resources		Regulation of production

APPLIED SCIENCE



2001	2010	2017	2022
culturing techniques	Culturing techniques	Culturing techniques	Ongoing
	Cell lines cultures	Cell lines cultures	
	HT tools for target products production	HT tools for target products production	Better collaboration with molecular experts
	cultivation and harvesting	cultivation and harvesting	
	Separation and purification	Separation and purification	

SCALE UP



COMMERCIALIZATION

	2001	2010	2017	2022
 <p>Commercial application</p> <ul style="list-style-type: none"> Customer acceptance Market analysis Business strategy Legal aspects 	Economic, business and marketing expertise	Economic and social sustainability		Too little in projects
		Consumer acceptance		
		Industry awareness, create surveys		Funding and skills for activities
		Europe as global competitive leader		Not there yet

EDUCATION

	2001	2010	2017	2022
	European Bioscience Marine Network; networking	EMB institute/centre	EMB institute/centre	Ocean4Biotech, societies, EMBRC, ASSEMBLE; not accessible to all
	Traditional marine and biotech	Traditional marine and biotech	Traditional marine and biotech	Increasing, but difficult as difference in approach
				Capitalization and sustainability not monitored; need list of projects and monitoring - audit several years after finalization
	International cooperation	Intersectorial collaboration		EU-OPENSREEN, Ocean4Biotech
		Available biorepositories	Biorepositories	Often in form of projects, local. Biotechnology a course in all marine studies (at minimum)
	Knowledge providers	Education and trainings	Education and training	

Societal needs and challenges
Knowledge co-design and co-creation
IP protection

IP

2001	2010	2017	2022
IP protection (individuals, industry)	IP protection (individuals, industry) and access		
	IP sharing harmonized		
Legal	Access, legal	Access, legal	
	Collaboration with policy makers	Collaboration with policy	Sometimes not key players involved
Technology transfer	Technology transfer		Needs improvement
	Harmonize legislation		
	Biosafety (engineered), ethics		

OVERALL

- Need well-planned funding advocacy and preparation
- Urgent long-term monitoring of funded projects
- Dissemination and involvement of citizens exploration dissemination campaigns. Between sectors, map the actors (Ocean4Biotech)
- Inability of academic and industry partners at EU level to work in a coordinated fashion in order to develop common projects (IP, funding raise, publication culture) - noticed in 2010, ongoing
- Acknowledge and address differences in approaching science and biotechnology (ecology, biotech research, industry)
- Many tasks, need middle people - hustlers
- Competition, regional projects (B-Blue) - but when they finish?

STAKEHOLDER MAP



▶ Rotter et al., 2021

THANK YOU

THANK YOU! For more info ana.rotter@nib.si