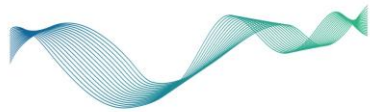


Marine Biotechnology opportunities and challenges

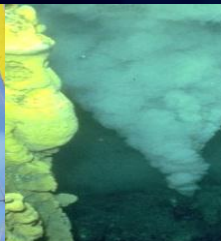
Are we realizing the vision ?

QUERELLOU JOEL, (-Ifremer-)
Former Chair of the ESF Marine Board
Working Group on Marine Biotechnology

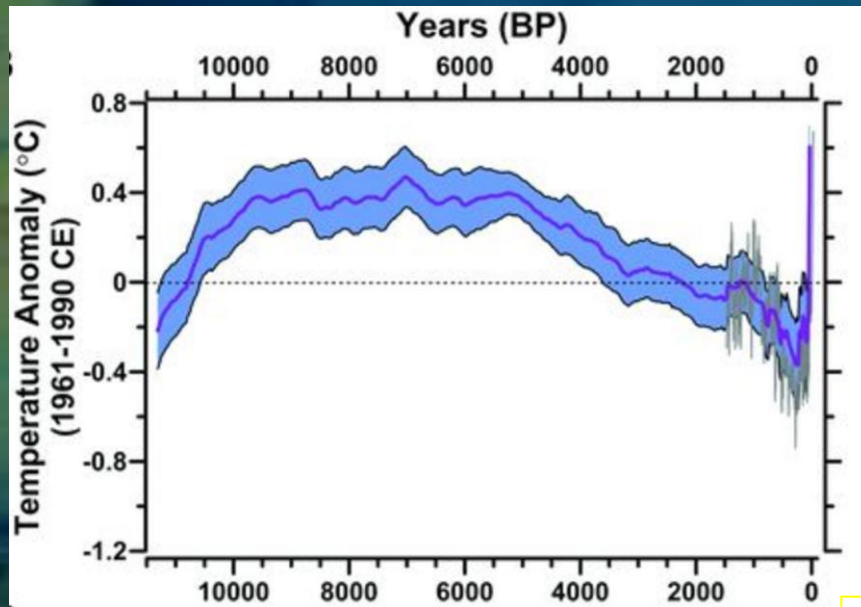
MarineBiotech



CSA final conference
11-12 March, 2013



Historical perspectives, short term decisions...



A Reconstruction of Regional and Global Temperature for the Past 11,300 Years

Shaun A. Marcott,¹ Jeremy D. Shakun,² Peter U. Clark,¹ Alan C. Mix¹

8 MARCH 2013 VOL 339 SCIENCE

Transition driving force



Oil-economy

Bio-economy

Biotech-economy

1000

2000

3000

Marine biotechnology contributions

Address the grand challenges of the 21st century

- Securing human **health and well-being**
- Sustainable supply of high quality and healthy **food**
- Sustainable alternative sources of **energy**
- Protection and management of the (marine) **environment**
- **Industrial** products and processes



Realize

- **A thriving global biotech-economy** - OECD Bioeconomy to 2030
- **EU Bioeconomy Strategy** and Fulfil the **Europe 2020 Strategy**

Source: J-B Calewaert



Key Science Policy docs/events

2001 ESF Marine Board Position Paper

Recognised underexploited benefits of marine biotechnology in Europe, called for European initiative to mobilise scattered human capital & refocus dispersed infrastructure

2006 EC background paper no. 10 on Marine Biotechnology

2007 “The Bremen meeting”. MB experts meet, hosted by German presidency

2008 “Blue Book”. EC-US task force on Biotech (marine genomics), Monaco

2008 EC launched “European Strategy for Marine and Maritime Research”

2009 CWG-MB advocates integrated Marine Biotech R&D in Europe

2010 Updated Position Paper from ESF’s Marine Board > proposed vision

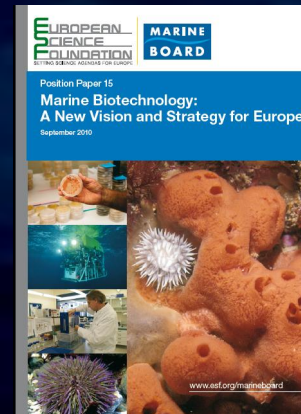
2011 CSA Marine Biotechnology

2013 ERA-NET? And more?



Vision for the future

By 2020 European Union will develop and apply advanced tools, platforms and infrastructures and support to Marine Biotechnology to provide a significant contribution to addressing key societal challenges of the next decades in the areas of food and energy security, the development of novel drugs and treatments for human health and the sustainable use and management of the seas and oceans



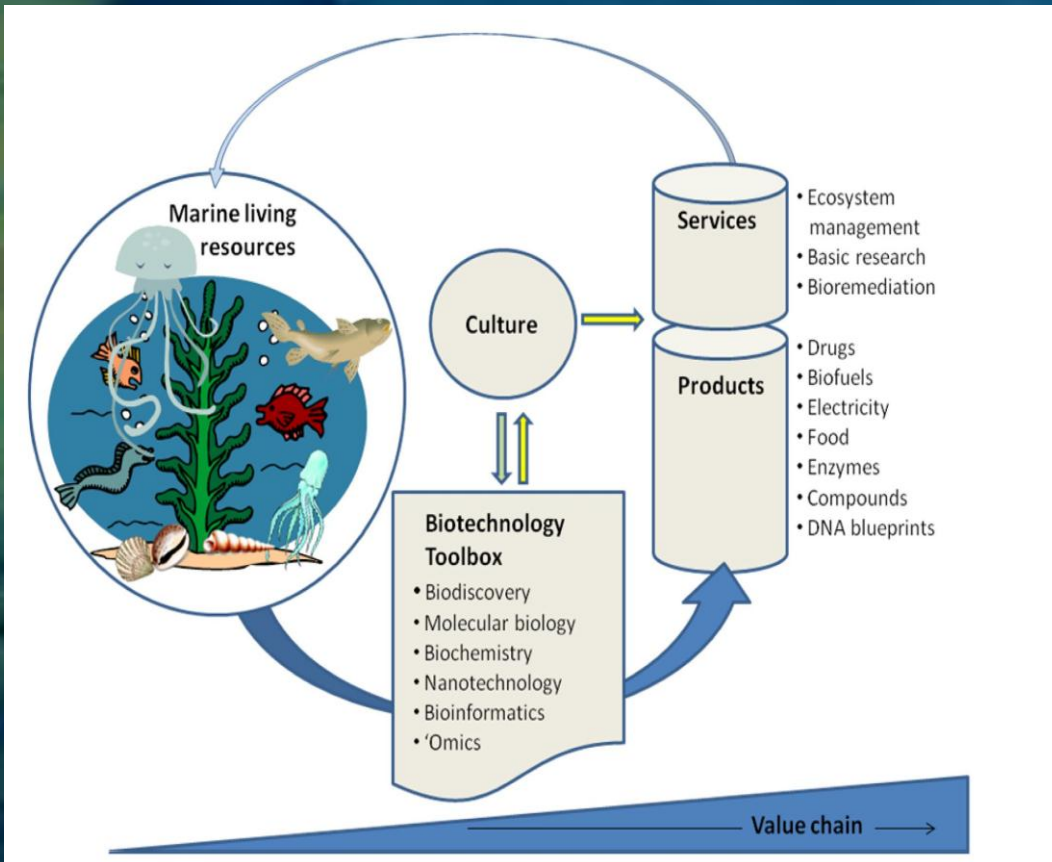
Back to 2001: MBPP4 previous vision

Our vision for the 21st century is that marine biotechnology will apply advanced tools from molecular biology and information technology to a carefully selected suite of marine habitats and organisms representing the total diversity of marine systems, in order to obtain novel genes and processes that can be turned into new products and approaches for the benefit of industry, biomedicine, and the sustainable use and management of the world's oceans.

- ‘Limited impact on marine biotech development’
- Impact of MB PP15? How to improve the full implementation of the main PP15 recommendations?



Method of evaluation?



1. Research programmes and projects launched or construction? EU, (national, regional)?
2. Coordination initiatives? Aligning national policies and more?
3. Legal and jurisdiction framework initiatives
4. Communication and outreach recommendations vs achievements
5. Less Europe or more Europe? Long term *scenarii* for Marine Biotechnology?



Major recommendations - MB PP15

- 1. Create a strong identity and communication strategy to raise the profile and awareness of European marine biotechnology research**
- 2. Stimulate the development of research strategies and programmes for Marine Biotechnology research and align these at the national, regional and pan-European level.**
- 3. Improve technology transfer pathways, strengthen the basis for proactive interaction between academic research and industry**
- 4. Improve training and education to support marine biotechnology in Europe to provide both research and industry with skilled people**



Strategy – how to achieve the goals?

1. Develop a coherent European marine biotechnology RTD policy to strengthen integration

(coordination, alignment, integration...)

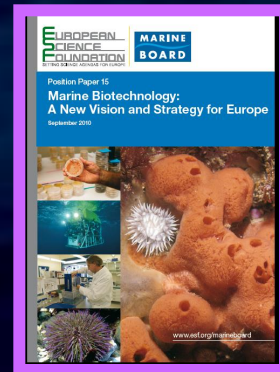
2. Profile marine biotechnology landscape in Europe in international context (CSA)

3. Create a central European portal

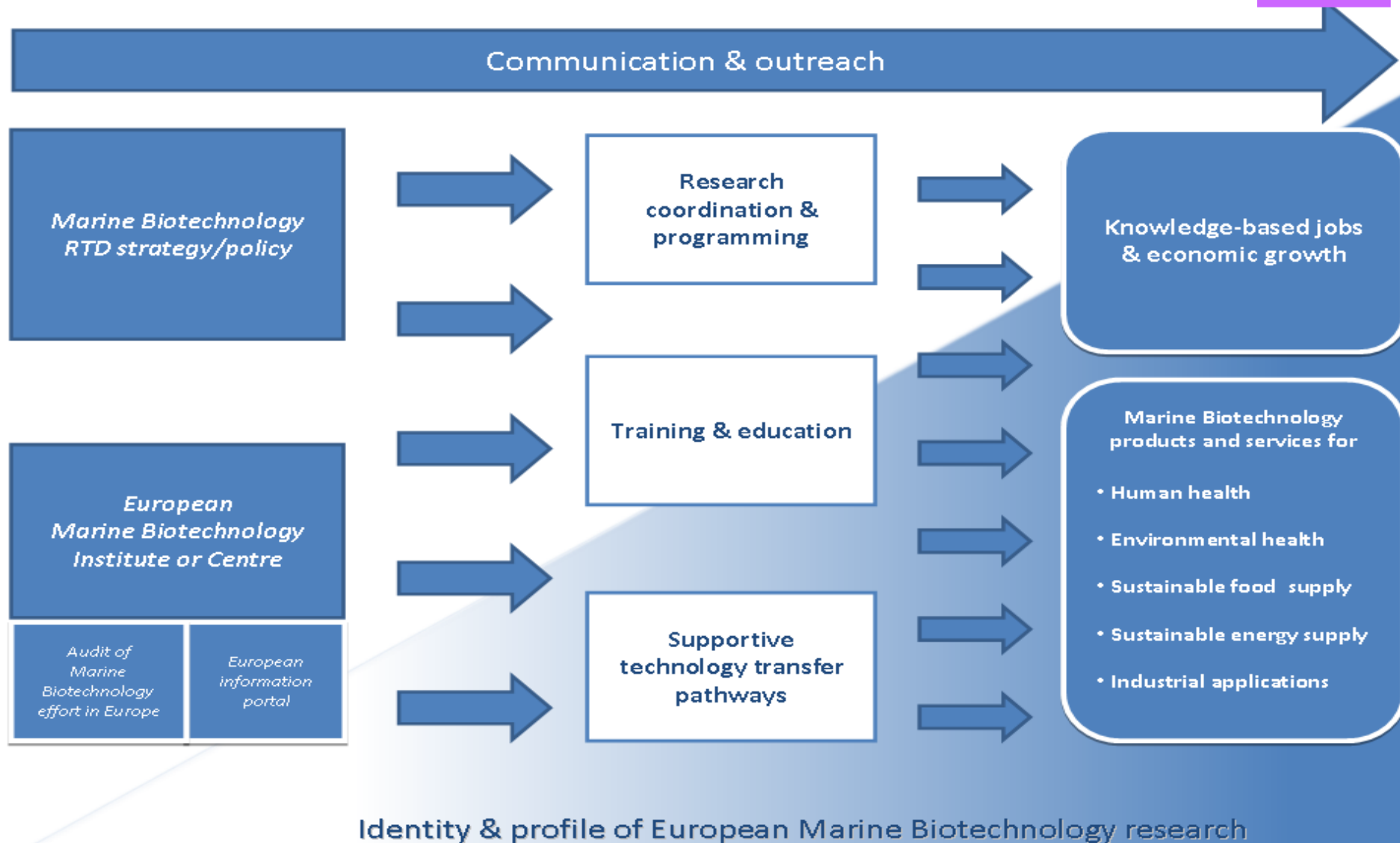
(marinebiotech.com; marinebiotech.org; marinebiotech.eu...)

4. Improve policies in property rights and IP

5. Develop collaborative industry-academia research programmes



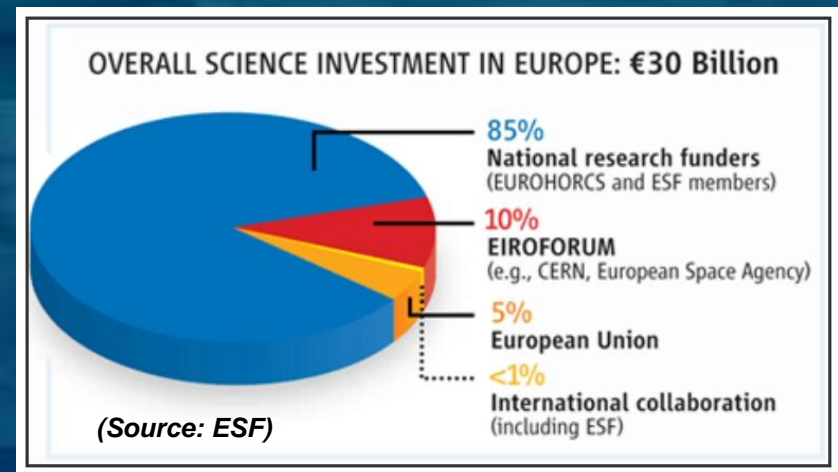
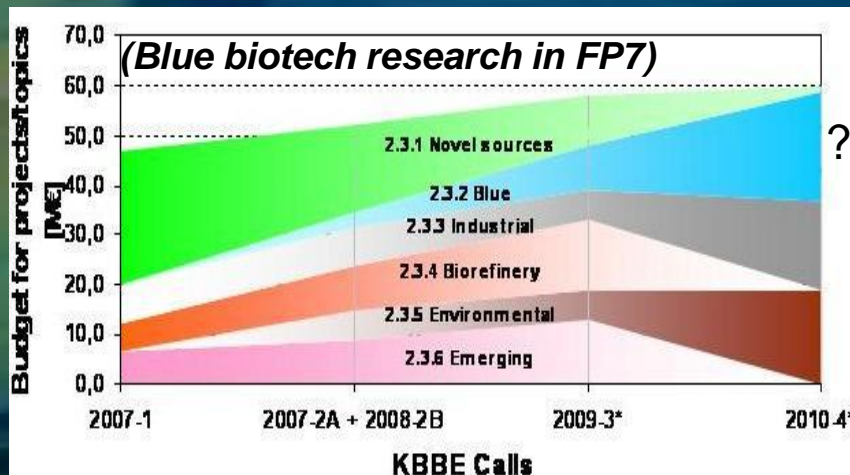
Priority actions for impact



Conditions for success

Analysis of limits of previous policies (FP5-6-7 impact assessment)

- **FP6+FP7 NoEs and IP effectiveness**
- **Fragmented research budget in spite of EU and ESF actions**



- **low priority level in most national research budgets**
- **lack of implementation at all levels of previous PP recommendations (appropriate implementation toolbox?)**
- **need for a strong actions plan and **follow-up** after PP15 + CSA publications**



Conditions of success

- Access to resources

- *property rights in EEZ and the zone and IP (see: 'marine' gene patents)*
- *no common policy except general trend to exclusive protection*
- *sustainability of resources (notably for invertebrates)*
- *shared information and dereplication (ghost portal till 2020?)*

- Shared or distributed infrastructures and equipments

- *Network of marine stations (ASSEMBLE and EUROFLEETS...)*
- *Omics infrastructures*
- *Biobanks and biological resources centres*

- Links between institutions, academic and industry sectors

- *still fragmented and complex at European level, notably between member states.*
- *Need to improve links between acad and industry despite progress*

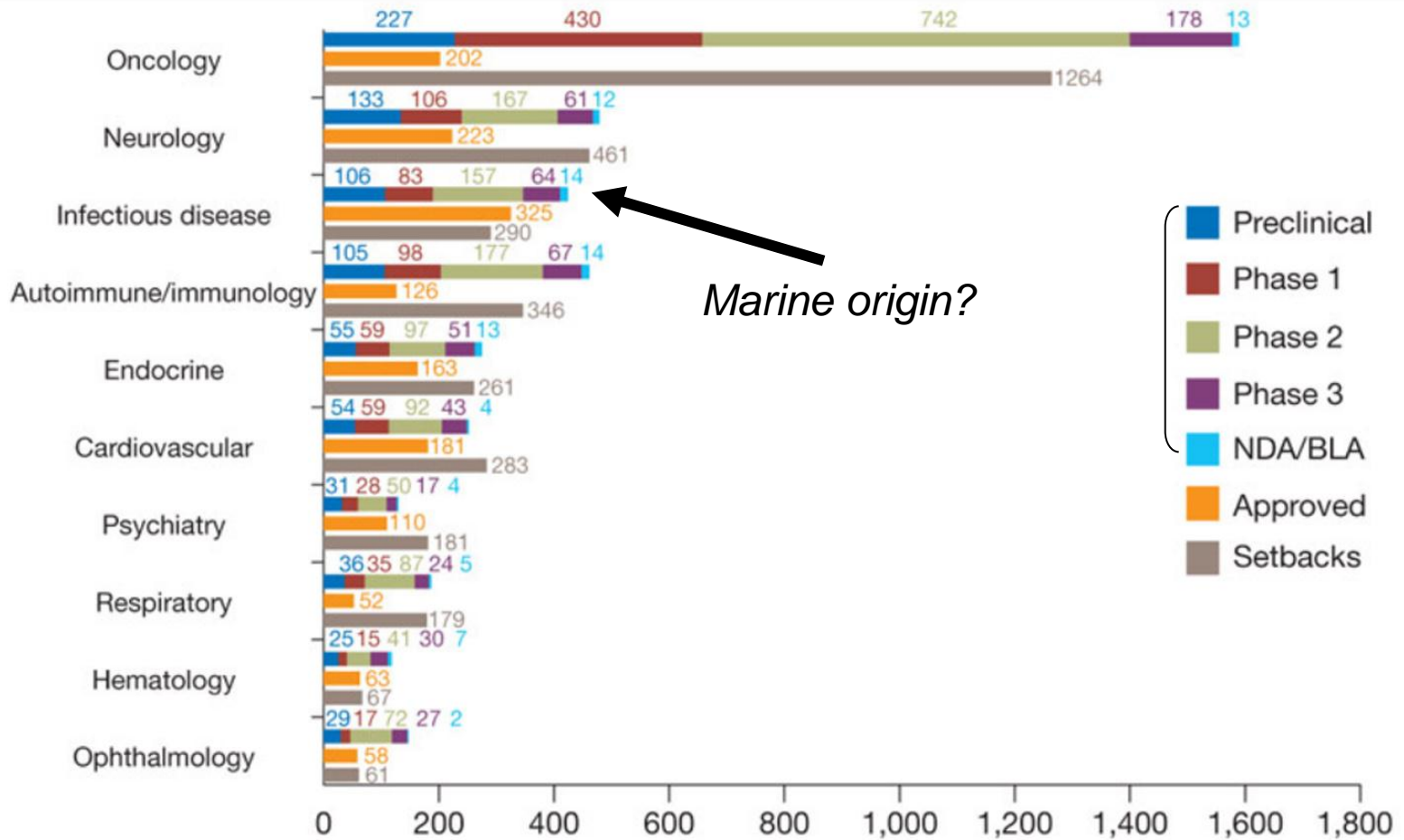


Significant signs of progress in Europe

- **Some key research priorities are being addressed**
 - Projects in accordance with recommendations
 - Legal and policy barriers
 - Biodiscovery challenges
- **European coordination ongoing efforts**
→ **CSA, (marine biotech portal), Euromarine, JPI Oceans**
- **Infrastructures are being developed or improved**
 - Research fleets (EUROFLEETS)
 - Access to marine model organisms and marine stations (ASSEMBLE, EMBRC)
- **International recognition and driving forces (e.g. OECD initiative)**



Antibiotioresistance : a growing threat



Source: BiomedTracker, a service of Sagient Research (<http://www.biomedtracker.com/>).

Key research priorities translated into EU projects

Recent FP7 RTD projects:

- **Search of active compounds from deep-sea and extreme environments as novel drug leads, antibiotics (see the antibiotic challenge) or ingredients for nutrition or cosmetic applications: PharmaSea**
- **Exploiting marine invertebrates biodiversity gene resources, sponges and related microorganisms: BlueGenics**
- **Exploiting biodiversity of marine extreme environments for health products cosmetics, food and industrial biotechnology: SeaBio Tech**
- **Cultivation challenges: MaCuMBA – Marine Microorganisms: Cultivation Methods for Improving their Biotechnological Applications**
- **Exploiting marine microbes gene resources using genomics, bioinformatics for biotechnology: MicroB3**



Very good translation up to now, but many more important topics are still unaddressed

> **importance of future RTD calls in addition to an ERA-NET**

Aligning national policies: MBE-ERA-NET

MarineBiotech



An ERA-NET Preparatory Action in Marine Biotechnology

Coordinator Steinar Bergseth



Belgium Flanders Marine Institute

Denmark MARINE BOARD

France Station Biologique Roscoff

Germany norgenta: **Ifremer**

Italy Consiglio Nazionale delle Ricerche

Norway The Research Council of Norway

Portugal FCT

Turkey XATIBÜT

UK FCT

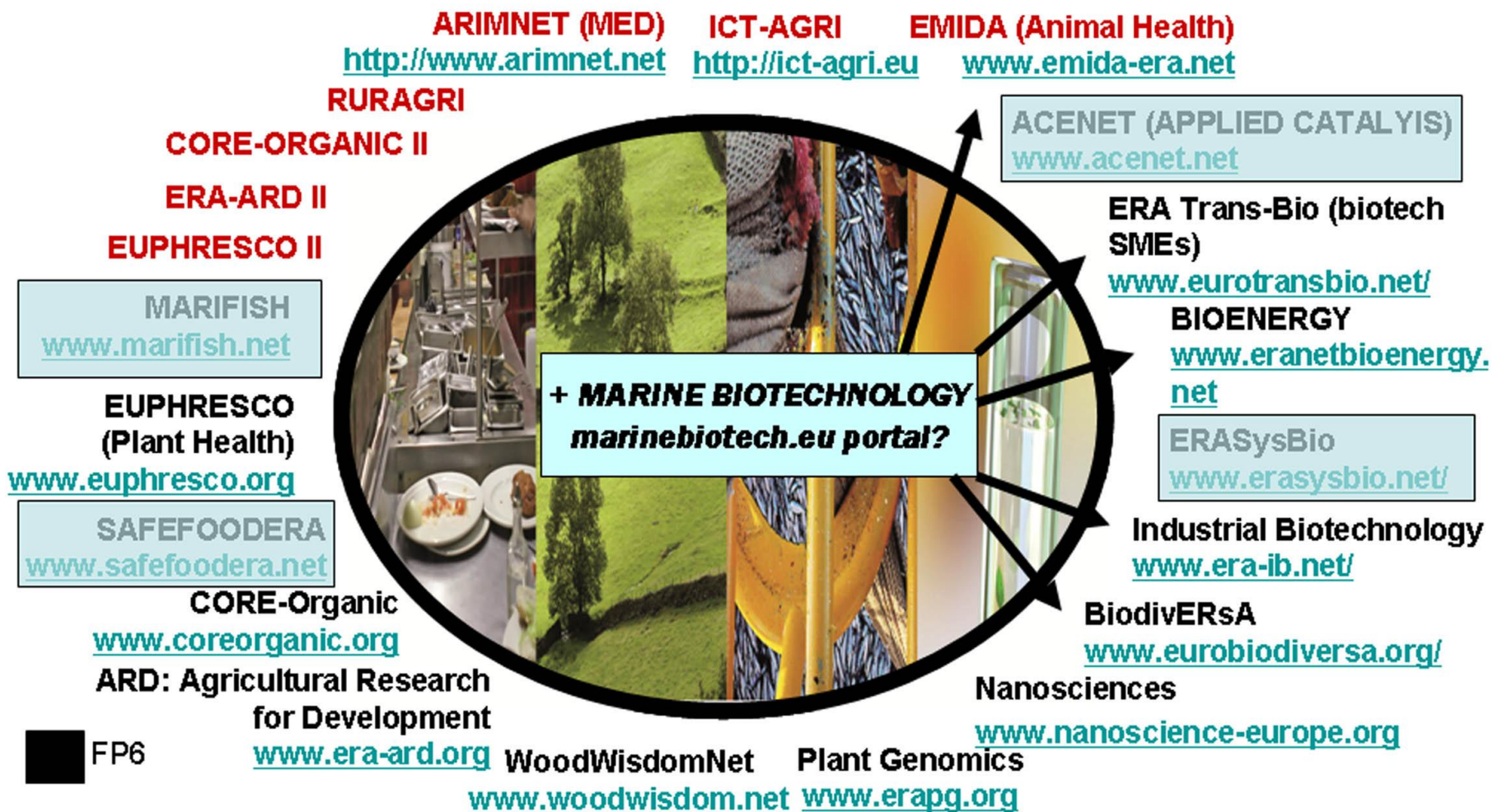
Legend:
- Funding Agencies
- Non-Profit organisation
- Funding Agency Representative
- UK delegate from KBBE

- Funding scheme: EC + MS RD agencies/organisation
- Eligible partners: limited to MS funding organisations
- Reduce fragmentation through transnational projects

MB European portal?

- Risk: possible contribution to North-South unbalance within EU
- Possible reduction of direct RTD support from EC
- Complex coordination with other related programmes

KBBE-related ERA-NETS



FP6

FP7

Source: EC, DGXIII

ERA-NETs coordination in marine biotechnology



EuroTransBio
Boosting International Biotech Cooperations

[Sitemap](#) | [Publication details](#)

- Home
- ETB Initiative
- Joint Calls**
 - Call Documents
 - Joint Call with ERA-IB
 - Previous Calls
- Information
- National contacts
- Contact
- Intranet

» Joint Calls

Joint Calls

ETB is organizing annual joint calls for innovative near to the market R&D&I projects in all fields of modern biotechnology (health, agro/food, industrial biotech, [environment](#), [marine/aquatic solutions](#)). Consortia have to be coordinated by an SME, include at least 2 enterprises from two different countries participating in ETB, and may include additional partners from research organizations.

The next ETB call will be launched in October 2013.

In addition to the annual ETB calls a joint call with ERA-IB2 has opened. The deadline for pre-proposals will be March 26th 2013. You can find further information to this call on the [ERA-IB2 website](#).

Application procedure for ETB calls

(for the joint call with ERA-IB2, please visit the [ERA-IB2 website](#))

Consortia coordinated by an SME and consisting of at least two enterprises belonging to two different countries and coordinated by an SME can apply for ETB funding. A consortium may

Joint ERA-IB-ETB call:
ETB will participate in a joint Call with ERA-IB. More information can be found on:



Deadline for pre-proposals:
26 March 2013

Interactions with KBBE Technology Platforms?



Farm animal breeding



Marine Biotechnology



Global Animal Health



Aquaculture



Industrial biotechnology

European Technology Platforms (ETPs) are industry-led stakeholder fora charged with defining research priorities in a broad range of technological areas.

Transition to biotech-economy: a long-term policy, energy example

Importance of incentive measures with threshold effect

US biofuels policy; 2011; H.R.1149, Latest Title: To amend the Clean Air Act to include algae-based biofuel in the renewable fuel program and amend the Internal Revenue Code of 1986 to include algae-based biofuel in the cellulosic biofuel producer credit. (1) expand the definition of cellulosic biofuel to include algae-based biofuel for purposes of the cellulosic biofuel producer tax credit; and (2) allow accelerated depreciation of property used to produce algae-based biofuel.

Yields to be increased by 10? Implies a 10 to 15 years appropriate incentive policy and a parallel RTDI implementation plan –not limited to short-term projects – positive (*despite recent negative signals from the major US 2G biofuel development agreement (BP/ Verenum) and 3G algal biofuels (Synthetic Genomics/Exxon-Mobil)*) (Source: Nature Biotech. 31-1 Jan. 2013)

EU biofuels policy; **no federal basis for baseline incentives, no common policy, no fiscal harmonisation and at MS level, no comparable biofuels tax regimes**

Biofuels production steps needing RTDI

Potential Variation in Each Step

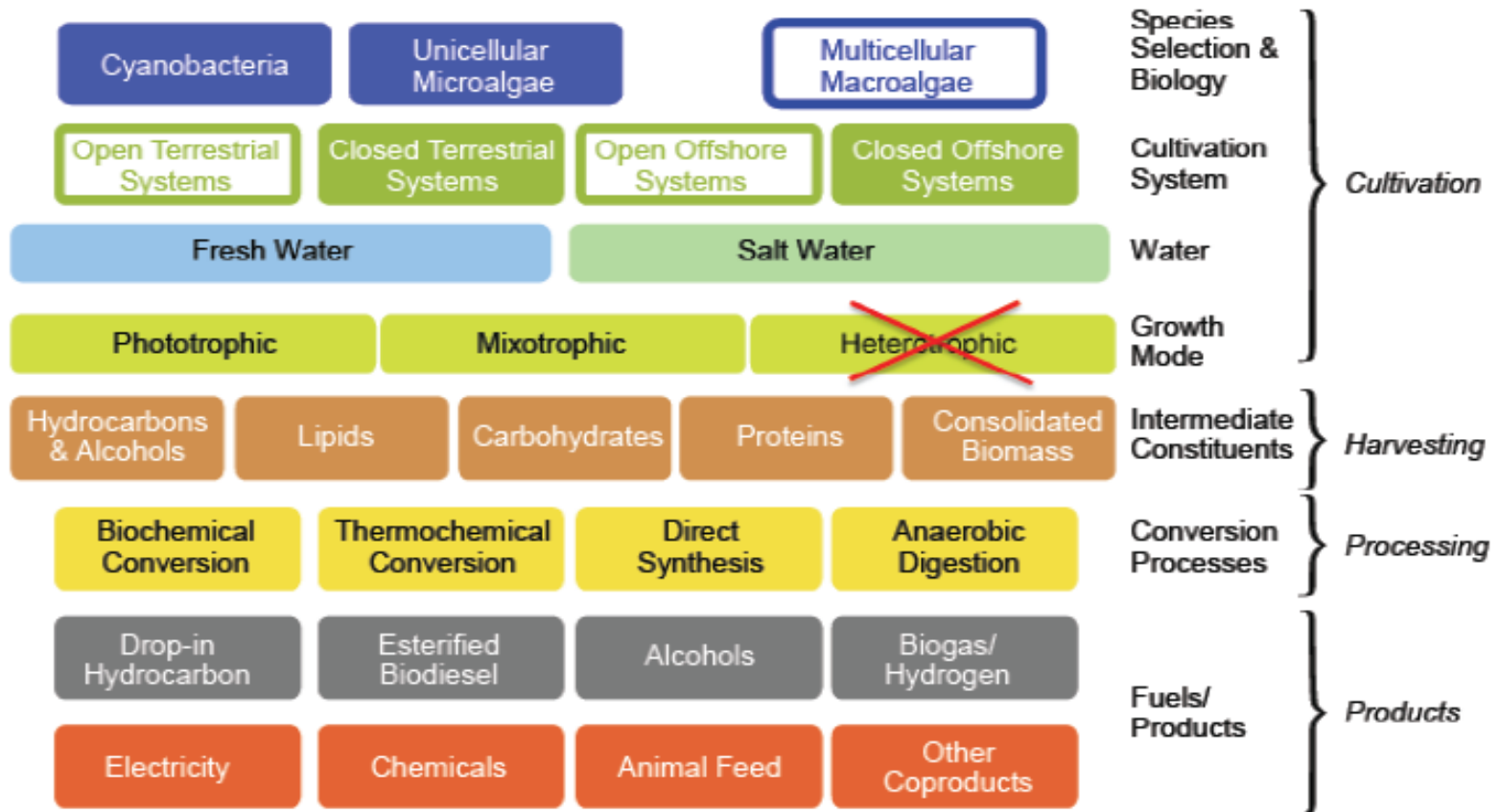


FIGURE S-1 Pathways for cultivating and processing algae to fuels and their products. Heterotrophic routes are outside the scope of this analysis.

Keep the balance

Under the current European treaties, despite differences between MS, the global objective of simultaneous development of economy is still the prevailing paradigm, **and a necessary condition to the stability of EU**

However, the financial, economic and its subsequent social crisis in several MS is impairing their ability to join future initiatives in R&I (see MB ERA-NET composition)

The long-term consequences, if appropriate corrective mechanisms are not established and adopted*, could be dramatic for their research capacities with emergence of possible vicious circles:

- > deficit in funding of projects>>impacting research teams>>>impacting student training>>>>drastic limitation of research positions
 ➡ one way emigration from South to North and West including US.
- > Deficit in funding of projects>>under-exploitation of marine genetic resources>>added value captured by other MS...

**Innovation Union, turning ideas into jobs,
green growth and social progress**

Equally distributed?

* 'I want my money back' principle or crisis period appropriate development policy?

...as the balance is already unbalanced

Table S1. Country of origin and number of patent claims associated with sequences from marine organisms, humans, or crops (wheat, rice, maize, or barley). Numbers in red indicate the top 10 countries for each class of patent.

Countries	Marine organisms	Human*	Wheat (<i>Triticum</i>)	Rice (<i>Oryza</i>)	Maize (<i>Zea</i>)	Barley (<i>Hordeum</i>)	Total
USA	199	156	64	114	239	24	796
Germany	149	106	73	96	95	62	581
Japan	128	82	12	89	11	16	338
Belgium	17	15	25	62	51	14	184
United Kingdom	33	39	15	23	28	13	151
France	34	28	12	9	27	2	112
Switzerland	11	17	12	17	13	3	73
Denmark	24	10	3	2	1	5	45
Netherland	270	13	7	8	4	2	35
Canada	6	7	7	5	4	1	30
Israël	6	10	2	3	3	2	26
Sweden	5	7		3	3	1	19
Italy	12	3	1	5	1		17
Spain	5		4	2	5		16
Norway	9	3					12
India	8			3	1		12
Austria	5	1		1	1		8
Iceland	4	3				1	8
Australia	1	2		2	1		6
China	1			1	1		3
Ireland	1	2					3

Conclusions

Notable progress

- **European coordination efforts ongoing → CSA, ERA-NET, marine biotech portal, euromarine, JPI Oceans**
- **Key research priorities are being addressed**
Several research projects are already running
- **Infrastructures are being developed or improved**
Marine research stations
Marine research fleets
Omics platforms
- **Identity and visibility has greatly improved**

Satisfied?



Conclusions

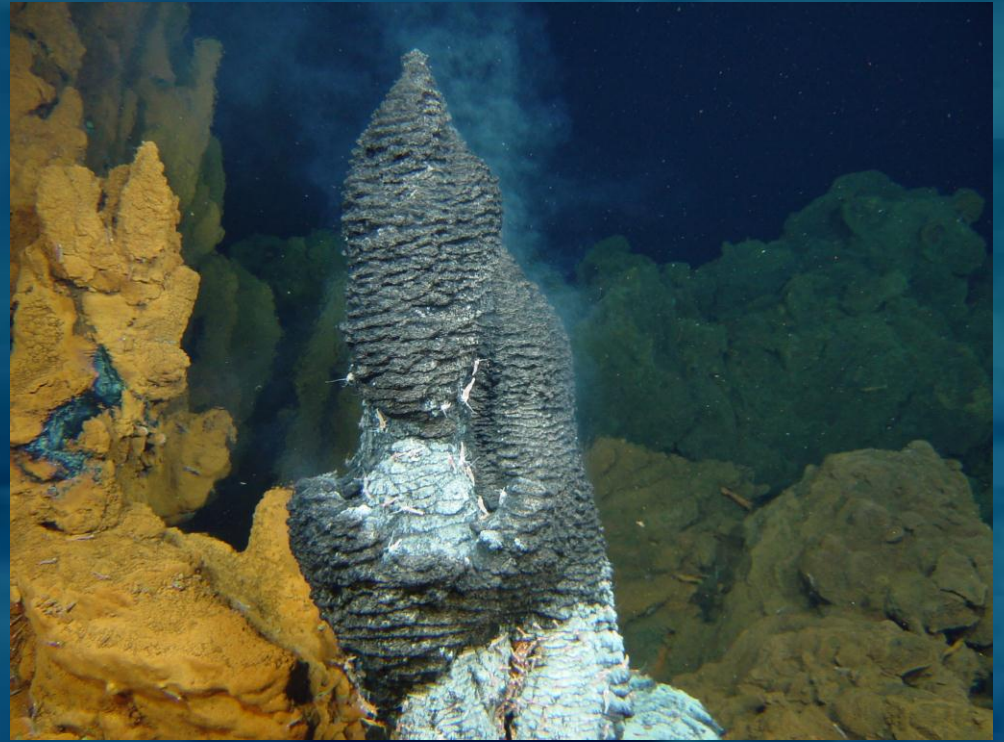
Many challenges remain

- Buy-in from funders and governments
- Aligning the various interests, strategies and programmes at various levels
- Positioning of bluebiotech in the complicated and dynamic landscape: projects, infrastructures, JPI Oceans, other ERA-NETs, etc
- Techtransfer and industry/academic collaborative approaches – developing markets and businesses
- Education and training

and not the least:

- Establishing a lobbying capacity and

Keeping everybody onboard

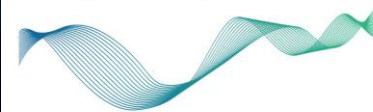


**Thank you for your attention
and your future contribution to success**

__Value chain__



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CSA final conference
11-12 March, 2013