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Marine Biotechnology and utilization of Marine Bioresources: Mapping existing training/ education and gap analysis

Work Package 5

Joint activities: implementation to joint calls and training & education activities

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EXECUTIVE SUMMARY

Training courses or modules in MBT are provided all over Europe and for different target audiences (Bachelor-/Master students, doctoral-/postdoctoral researchers, technical staff...). However, current expertise in marine biotechnology is often found in scattered spots across the European Union. In order to promote and to reinforce the training and education strategy for marine biotechnology and the utilization of the marine bioresources all over Europe and for different target audiences, the ERA-Net Marine Biotech designed a survey for mapping the existing operational programs, and identifying needs and gaps. In this report, an overview of the different courses (master programmes, doctoral schools, summer schools, hands-on training, online courses...) is given, with the aim of compiling a list of training possibilities within Europe and making this information accessible through an online portal. A total of 48 respondents from 16 different countries responded to the online survey, only 18 out of these respondents completed the Needs and Gaps section of the survey. This report describes the results of the survey and the strategy for making the data accessible via the European Marine Training portal.

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PRESENTATION OF THE SURVEY

In order to promote and to reinforce the Training and Education strategy for marine biotechnology and the utilization of the marine bioresources all over Europe and for different target audiences, the Marine Biotechnology ERA-NET designed a survey for mapping the existing operational programs, and identifying needs and gaps. Programs to be reported or suggested in the context of marine biotechnology (including fundamental knowledge and education on integrative biology of marine organisms and biotechnology exploitation) were attributed to different targets (administrative including environmental agencies, technical, industrial and scientific).

The online questionnaire comprised 8 sections which are listed below, preceded by a short general presentation of the respondents.

Title of Training

- Type of Training
- Duration of training
- Duration type
- Language of training
- Target audience
- URL if available
- Needs/gaps in terms of education and/or training programs

Respondents also had the possibility to fill in these 8 sections for 4 different targets:

- **Management staff** (relevant to existing property rights of marine biotechnology or regulations and laws governing access to - and utilization of - the marine bioresources).
- **Technical staff** (marine biotechnology or utilization of the marine bioresources)
- **Industry** (relevant to marine biotechnology or utilization of the marine bioresources).
- **Scientific staff / users and potential users** (relevant to marine biotechnology or utilization of the marine bioresources).

A detailed template is provided in Appendix 1

The survey was published online in October 2014 and closed in February 2015.

RESULTS OF THE SURVEY

STATISTICS

A total of 48 respondents from 16 different countries completed the online survey (figure 1). This is a rather low level that does not allow an extensive analysis of the existing training programs in the field of Marine Biotechnology in Europe. One reason could be that there were several surveys on training in Marine sciences in the previous years making it difficult to mobilize contribution from the targeted communities. A large majority of the data provided by respondents were related to the "Scientific staff / users and potential users" target.

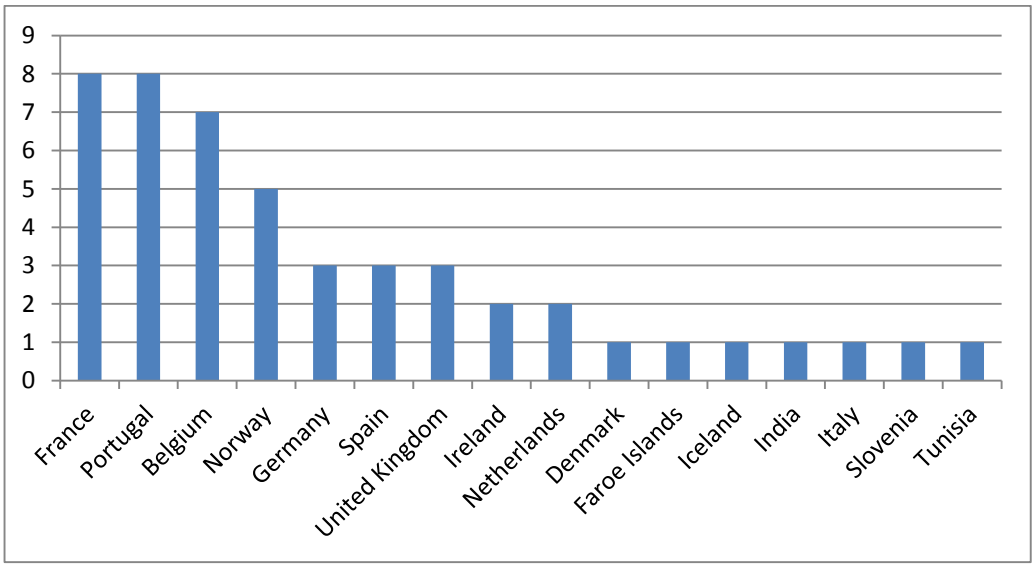

Figure 1: Geographic representation of the respondents to the online survey.

TYPE OF TRAINING

As shown in figure 2 below, the majority of the programs comprising training in Marine Biotechnology are at the Master level**.** However the survey also reveals that some European Universities provide training in Marine Biotechnology at the Bachelor level.

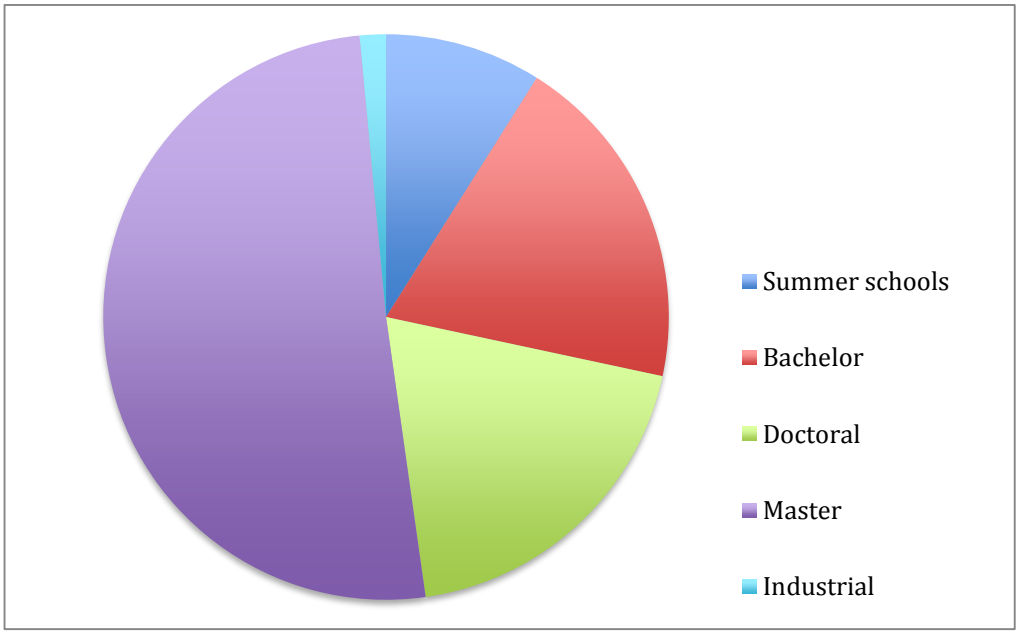

Figure 2: Representation of the type of training programs resulting from the online survey.

TRAINING LANGUAGE

English is the dominant training language although many training courses are provided in national languages (figure 3).

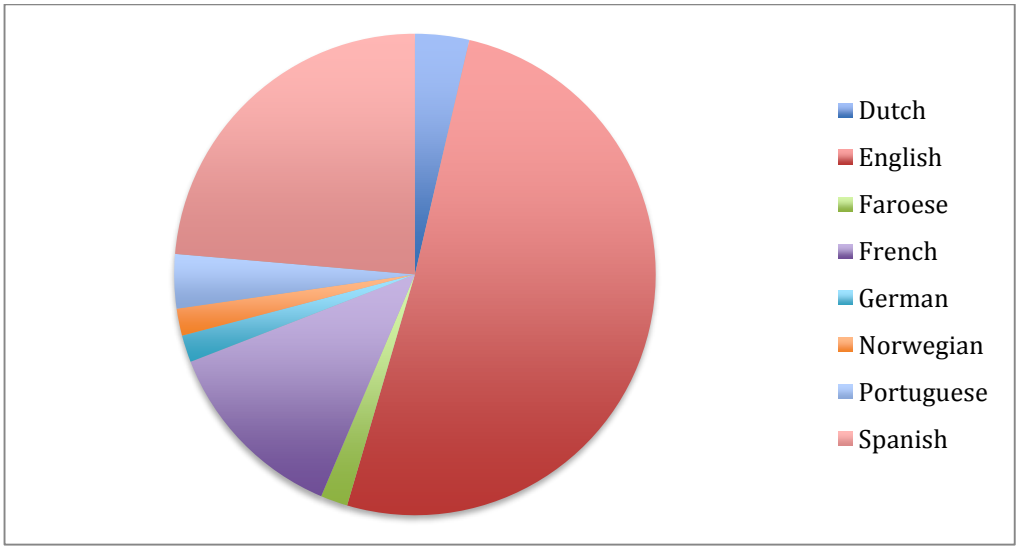

Figure 3: Representation of the language of training programs resulting from the online survey.

FIELD CATEGORIES OF TRAINING

Fields of marine biotechnology in this survey consist of all fields along the value chain from basic general training on marine resources and ecosystems (marine biology/marine biodiversity) to aquaculture, management, legislation and business. Figure 4 below shows that with this approach, the category marine biology and biodiversity is the most frequent followed by aquaculture and biotechnology while the category laws is underrepresented.

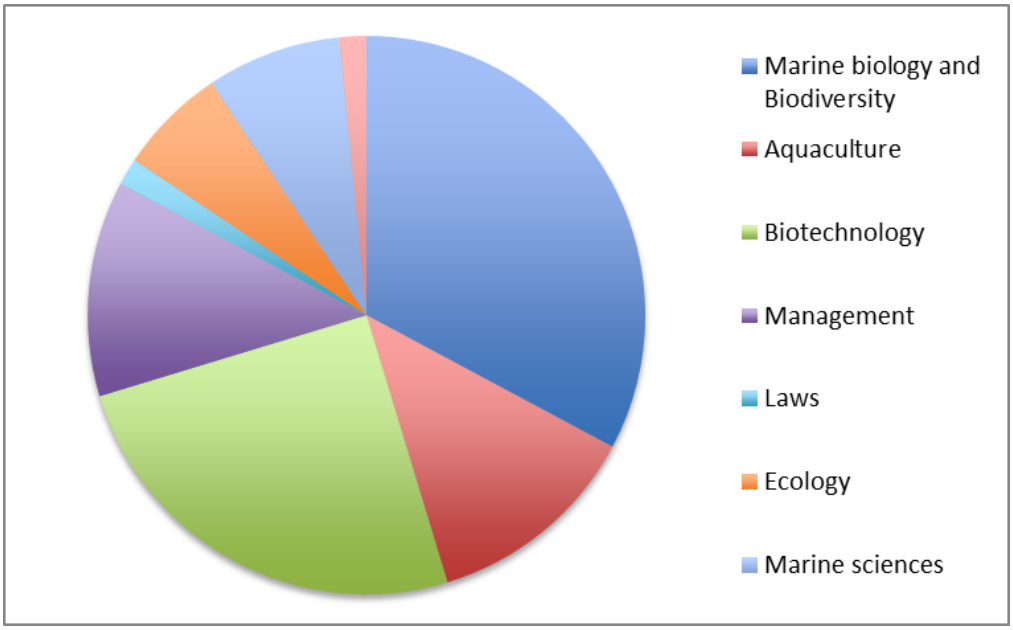

Figure 4: Representation of the field categories of training programs resulting from the online survey.

Duration of training: The majority of trainings is held over the year as shown in figure 5.

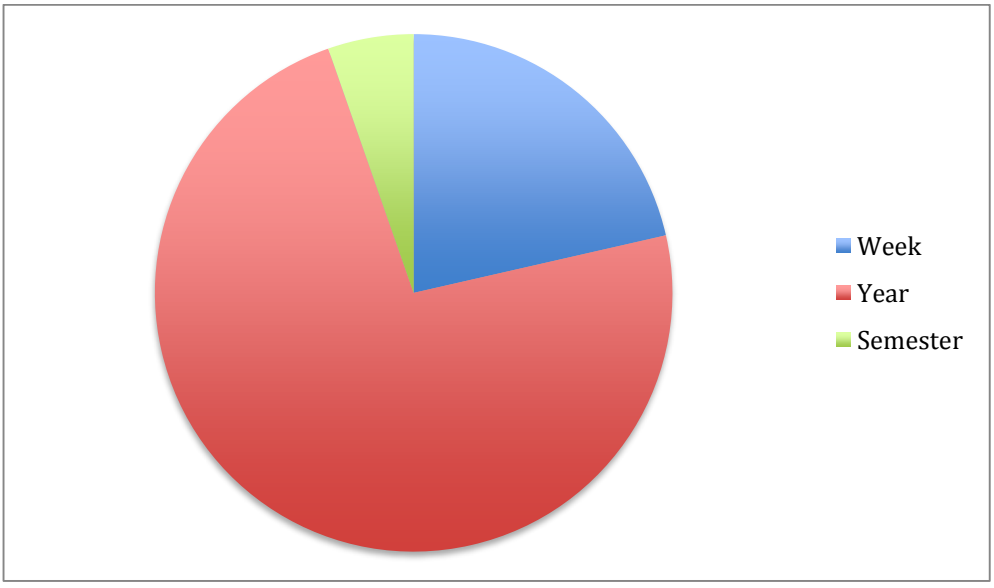

Figure 5: Representation of the duration of training programs resulting from the online survey.

NEEDS AND GAPS ANALYSIS TABLE

Only 18 out of the 48 respondents completed the Needs & Gaps section of the survey. The results are detailed in Annex 2, below is a summary of the main training topics identified as currently missing:

- Intellectual property
- Ethical issues related to the use of marine resources
- Law and economy of the sea
- Entrepreneurship/innovation/business models
- Bridging the gap between Academy and Industry

MARINE BIOTECHNOLOGY TRAINING CATALOGUE

In order to avoid duplication of already existing European initiatives, connections were established with the MarineTraining Office Contact at Gent University, who has developed, in the framework of EMBRC, the European Marine Training Portal (http://www.marinetraining.eu/). This portal is a centralized access point for education and training in the field of marine sciences and offers a quite comprehensive catalogue of training courses related to marine topics existing in Europe.

All records that were sufficiently documented in this survey were added and linked to a special collection in the portal, which can be consulted at:

http://www.marinetraining.eu/grouping/era-net-marine-biotechnology.

The objective now is to enrich this still modest collection on Marine Biotechnology training programmes with courses and programmes that are available through the European Marine Training portal.

APPENDICES

APPENDIX 1: TEMPLATE OF THE SURVEY

General

1. **Please identify your country**

   Dropdown list of all countries

2. **Please identify your Institute/University/Organization**

Textbox

3. **Please identify the contact person (name and e-mail)**

Textbox

V. Existing education or training programs for management staff (relevant to existing property rights of marine biotechnology or regulations and laws governing access to - and utilization of - the marine bioresources).

a. Title of Training

Textbox

b. Type of Training (tick box)

- Personal training
- Master program
- Bachelor program
- Summer school
- Doctoral school
- Group based training
- Other (please specify) *Textbox*

c. Duration of training

Textbox

d. Duration type (tick box)

- Single event

- Upon demand
- Yearly recurring

e. Language of training

Textbox

f. Target audience (tick box)

- Doctoral students
- Graduate
- Undergraduate
- Post-doc/staff
- Other (please specify)

g. URL if available

Textbox

h. Needs/gaps in terms of education and/or training programs for administrative staff

1) Need/Gap:	
Estimated duration of training	
Estimated duration	
Estimated budget	
2) Need/Gap:	
Estimated duration of training	
Estimated duration	
Estimated budget	
3) Need/Gap:	
Estimated duration of training	
Estimated duration	
Estimated budget	

VI. Existing education or training programs for technical staff (marine biotechnology or utilization of the marine bioresources)

a. Title of Training

Textbox

b. Type of Training (tick box)

1) Personal training
2) Master programme
3) Bachelor programme
4) Summer school
5) Doctoral school
6) Group based training
7) Other (please specify) *Textbox*

c. Duration of training

Textbox

d. Duration type (tick box)

- Single event
- Upon demand
- Yearly recurring

e. Language of training

Textbox

f. Target audience (tick box)

- Doctoral students
- Graduate
- Undergraduate
- Post-doc/staff

g. URL if available

Textbox

h. Needs/gaps in terms of education and/or training programs for technical staff

1) Need/Gap:	
Estimated duration of training	
Estimated duration	
Estimated budget	
2) Need/Gap:	
Estimated duration of training	
Estimated duration	
Estimated budget	
3) Need/Gap:	
Estimated duration of training	
Estimated duration	
Estimated budget	

VII. Existing education or training programs for industry (relevant to marine biotechnology or utilization of the marine bioresources).

a. Title of Training

Textbox

b. Type of Training (tick box)

- **Personal training**
- **Master program**
- **Bachelor program**
- **Summer school**
- **Doctoral school**
- **Group based training**

- **E-learning**
- **Other (please specify)** *Textbox*

c. Duration of training

Textbox

d. Duration type (tick box)

- Single event
- Upon demand
- Yearly recurring

e. Language of training

Textbox

f. Target audience (tick box)

- Doctoral students
- Graduate
- Undergraduate
- Post-doc/staff

g. URL if available

Textbox

h. Needs/gaps in terms of education and/or training programs for industry

1) Need/Gap:	
Estimated duration of training	
Estimated duration	
Estimated budget	
2) Need/Gap:	
Estimated duration of training	
Estimated duration	
Estimated budget	
3) Need/Gap:	

Estimated duration of training	
Estimated duration	
Estimated budget	

VIII. Existing education or training programs for scientific staff / users and potential users (relevant to marine biotechnology or utilization of the marine bioresources).

a. Title of Training

Textbox

b. Type of Training (tick box)

- Personal training
- Master program
- Bachelor program
- Summer school
- Doctoral school
- Group based training
- Other (please specify) *Textbox*

c. Duration of training

Textbox

d. Duration type (tick box)

- Single event
- Upon demand
- Yearly recurring

e. Language of training

Textbox

f. Target audience (tick box)

- Doctoral students
- Graduate
- Undergraduate
- Post-doc/staff
- Other (please specify)

g. URL if available

Textbox

h. Needs/gaps in terms of education and/or training programs for technical staff

1) Need/Gap:	
Estimated duration of training	
Estimated duration	
Estimated budget	
2) Need/Gap:	
Estimated duration of training	
Estimated duration	
Estimated budget	
3) Need/Gap:	
Estimated duration of training	
Estimated duration	
Estimated budget	

APPENDIX 2: NEEDS AND GAPS ANALYSIS TABLE

COUNTRY	TRAINING NEED & GAP	TYPR OF TRAINING	BUDGET	DURATION
Belgium	Aquatic Heath management		50ke/student	2 years
France	MB adapted to the needs of industrial users	Lifelong training		1-6months
	Intellectual property, Ethical issues, business intelligence applied to marine resources, synthetic biology & system biology applied to marine resources, production processes from marine bioresources	3 modules of 6 ECTS each	15k€/module	2 weeks
	Management of intellectual property and access to biological resources		5k€	1 week
Germany	Use of genomics and bioinformatics tools for marine biology/ecology, management (i.e. environmental monitoring), traceability (fish, mammals etc), legal aspects of samples origin.	Workshops summer schools	20k€ for 5 days	[2-5 days] 2 weeks
Ireland	Hands use of instruments and e.g. enzymes			1-6 weeks
	Masters programmes in Aquaculture & Fisheries			1-2 years
Netherland	Education on governance and resource economics of the marine and aquatic realm. Biology, husbandry and protection of marine and freshwater organisms as a	MSc and PhD programs	MSc: 1 M€/year PhD: 0.5 M€/year	MSc: 2 years PhD: 4 years

	base for biotechnical applications. Marine Eco-history as a base to restore the marine sphere as humanities largest source for biotechnological application.			
	Throughout the marine biotechnology sector with special emphasis on sustainable cultivation and use of seaweeds		15k€	2 weeks
Portugal	Transfer of scientific knowledge to private companies and industrial use		2k€	1 day
	integrated with current industry and societal challenges, developing proper soft skills, innovation and entrepreneurial mid set and intersection with other potential disciplines useful in the ocean economy context (management, law, entrepreneurship, biotechnology, economy of the sea, innovation models, etc...)			Semestral modules
	transferable skills; Outreach for the public and other interest groups; training to stimulate technology transfer; short courses for Industry distance learning; data management; data handling		10k€	1 week
	Advanced know-how in microalgae production and		100k€	1 year

	bioactive compounds extraction			
	Use of marine derived materials in other fields of application, namely high added-value as the ones related with human health. Specific training should be given not only to scientists in these two research areas, helping to set bridges between them, but also to technical and industrial users, to have impact on economy while learning from them the difficulties of applying marine biotechnological concepts/products/methods in industry.		10k€	1 semester
	Marine biology relevant for marine biotechnology		1 k€	2 weeks
Slovenia	Bridging the gap between public research and industry.			
Tunisia	Intensive workshop focused on marine biotechnology		5k€	2 days
UK	In silico modelling, Bioprocessing techniques, Business models / commercialisation strategies, Market assessment, Regulatory affairs, Techno-economic assessment		10k€/year	12-48 months