



SIXTH FRAMEWORK  
PROGRAMME

# Collective Research on Aquaculture Biofouling

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# What is collective research?

**Aim:** To expand the knowledge base of large communities of small & medium sized enterprises (**SME's**)

Carried out by **RTD** performers on behalf of industrial associations or industry groupings (**IAG's**) in sectors where SMEs are prominent.

# Aquaculture in Southern Portugal:

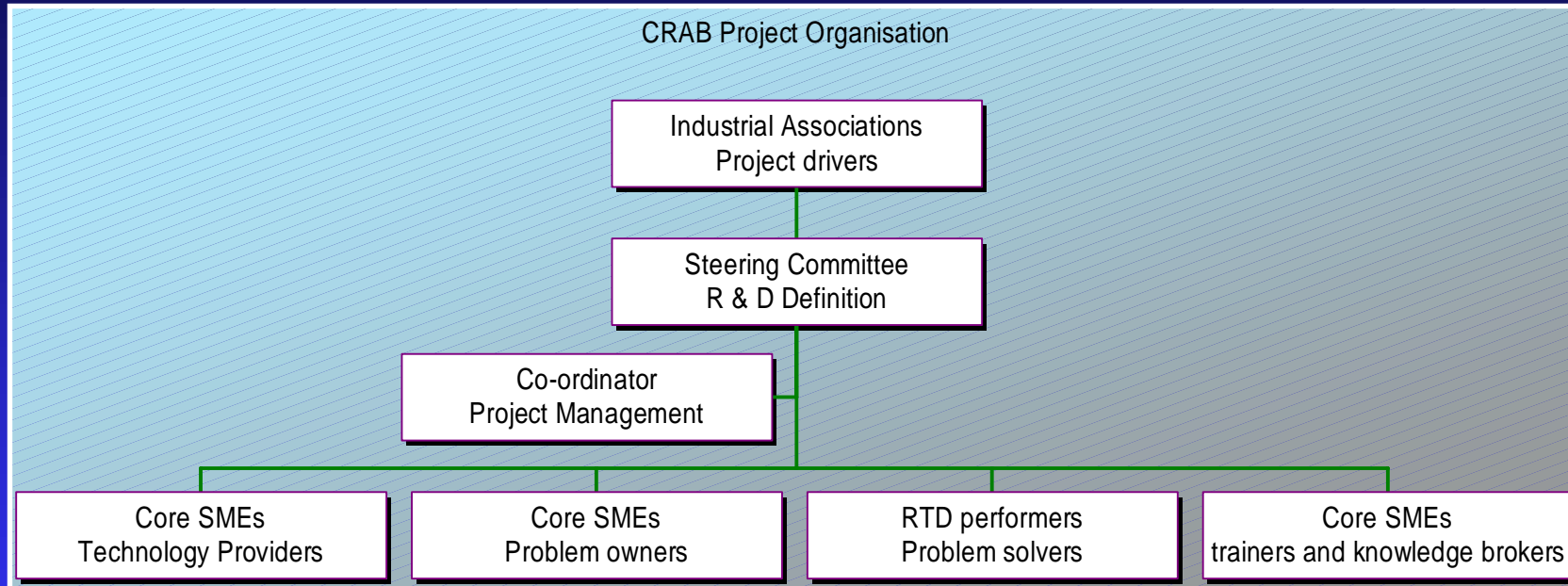
Many **SME's** involved in various aspects of aquaculture in this region.

Ideal targets for the objectives of the EU Sixth Framework for **Collective Research**.

# Some background to aquaculture in Southern Portugal:

- Traditional culture of **clams** and **cockles** in lagoons and estuaries- developments on some concessions to include oysters & mussel.
- Modification of salt pans for extensive and semi intensive culture of **sea bass, sea bream and sole**.
- Some intensive fish farms and hatchery for **sea bass and sea bream**.
- IPIMAR hatchery for **sole**.
- Offshore “long-line” system in for oysters at an exposed oceanic location.

# CRAB organisation



23 partners from 7 countries

# The CRAB consortium

## ■ Co-ordination

- ◆ TNO Industrial Technology (NL)

## ■ IAGs

- ◆ FEAP, the European Aquaculture Society, FHL Havbruk (NO) and the Irish Aquaculture Association (IRE)

## ■ RTD Performers

- ◆ University College Cork (IRE), University of Newcastle upon Tyne (UK), Global Aquafish S.L.(ES)

## ■ SMEs

- ◆ AQUATT UETP Ltd (IRE), Boris Net Company Ltd (UK), Material innovation Center (NL), Bømlo Skjell AS (NO), Val Akva (NO), Jimmy Newman (IRE), John Power (IRE), Fastnet Mussels Ltd (IRE), Promociones Marsan SL. (ES), CUDOMAR SL (ES), Alevines Dorades S.A. (ES), Viveiros Ana Manjuas, Unipessoal Lda (PT), Quinta Formosa, Produções Aquícolas, Lda (PT), Kings Lynn Fishing Industry Co-operative Ltd (UK), Sagremarisco-Viveiros de marisco Lda (PT)

# The CRAB consortium



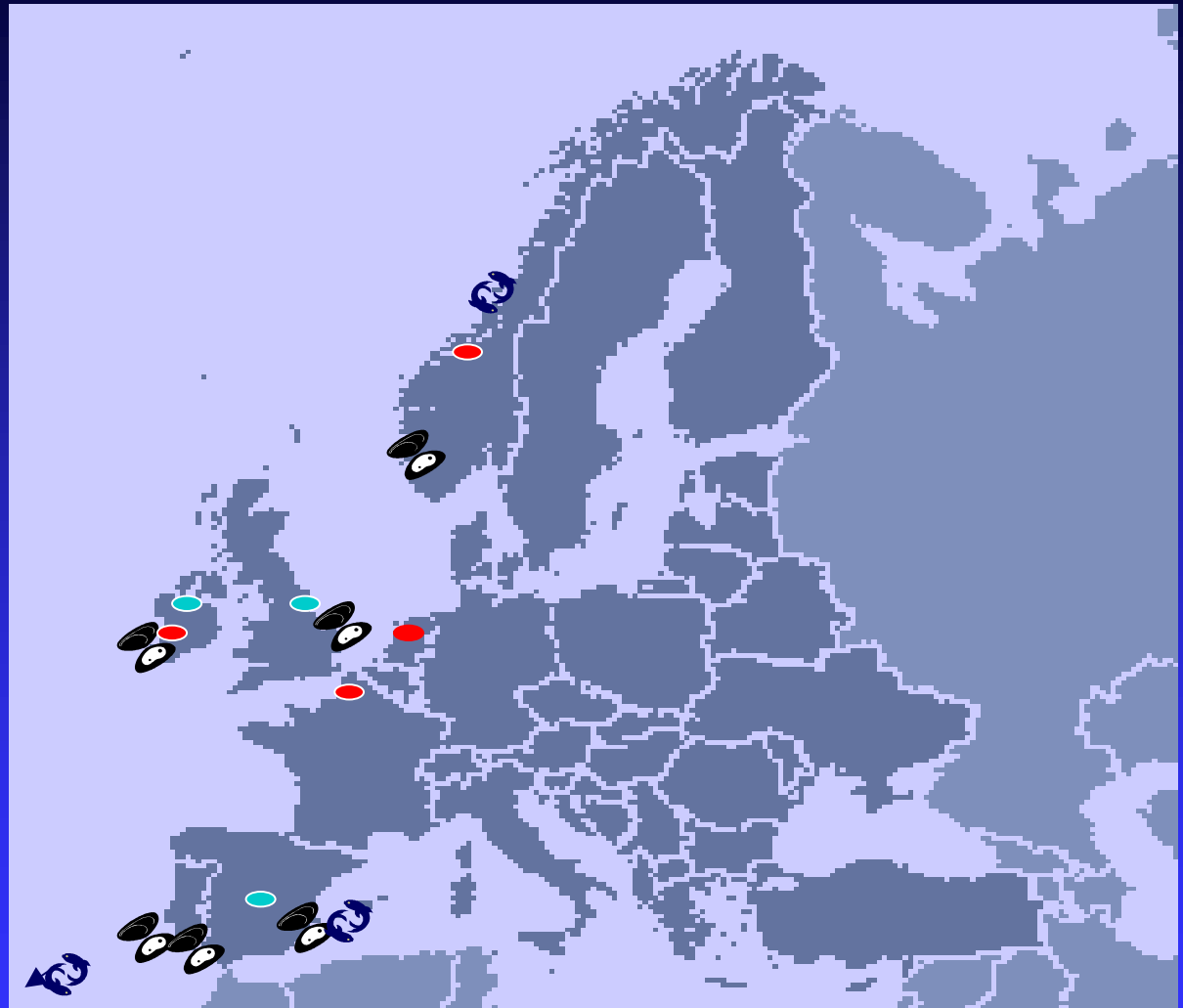
RTD



Co-ordinator and IAG



SME (15)



# CRAB objectives

- To develop **effective antifouling management strategies** for the European Aquaculture Industry
- To develop and disseminate **best practice guidelines** and support moves towards sustainability and environmental responsibility

# Portuguese SME's in the CRAB consortium

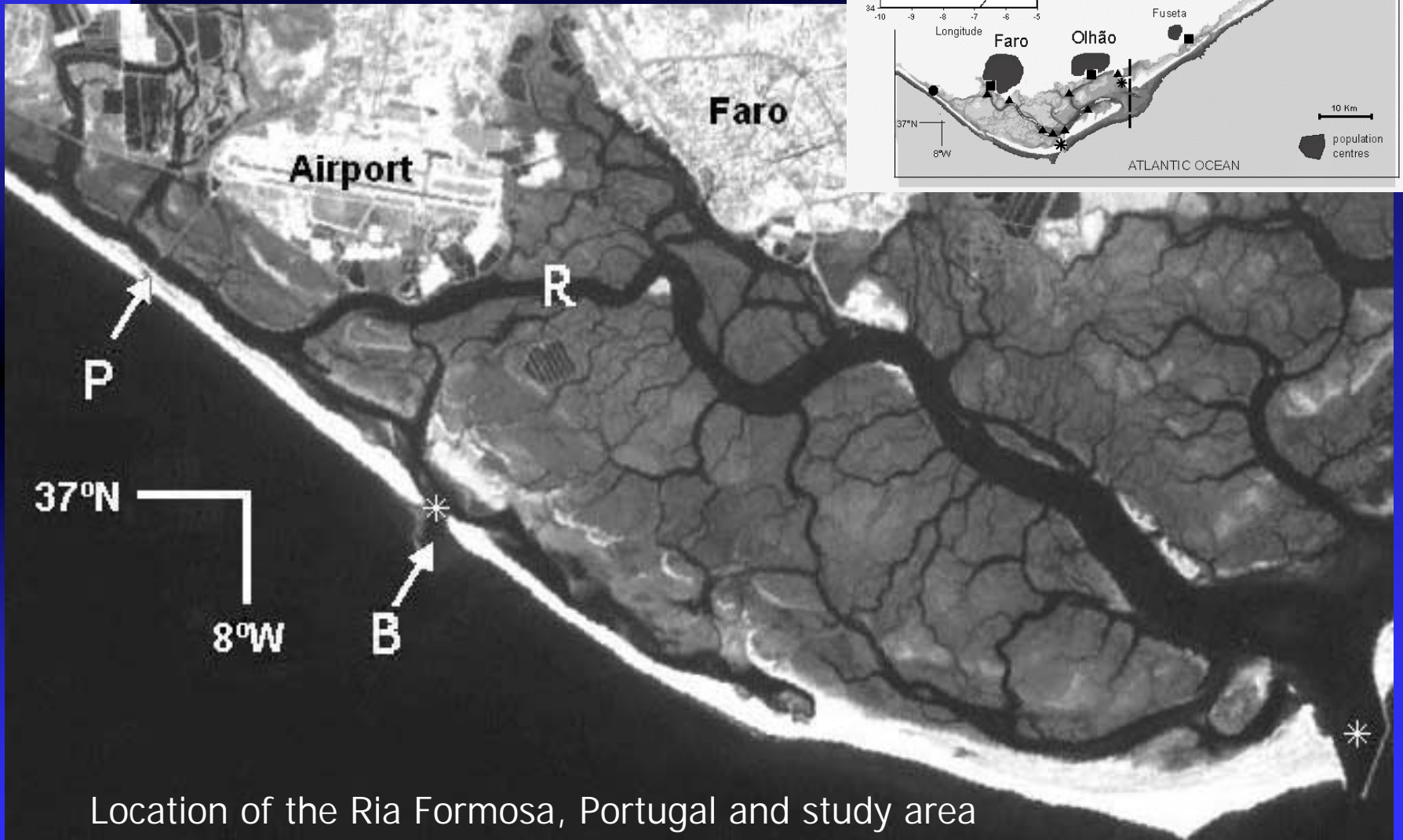
## Sheltered lagoon: concessions on intertidal mudflats in the Ria Formosa

- VIVEIROS ANA MANJUA - unipessoal L<sup>da</sup>
- QUINTAFORMOSA - produções aquícolas L<sup>da</sup>

## Exposed oceanic conditions: concession for "long-line" systems in 25 metres depth off the coast of Sagres

- SAGREMARISCO -viveiros de marisco L<sup>da</sup>

- B : Inlet exchanging with the ocean
- P: Shallow upstream channel
- R: Inner channel adjacent to the UWWT outlet

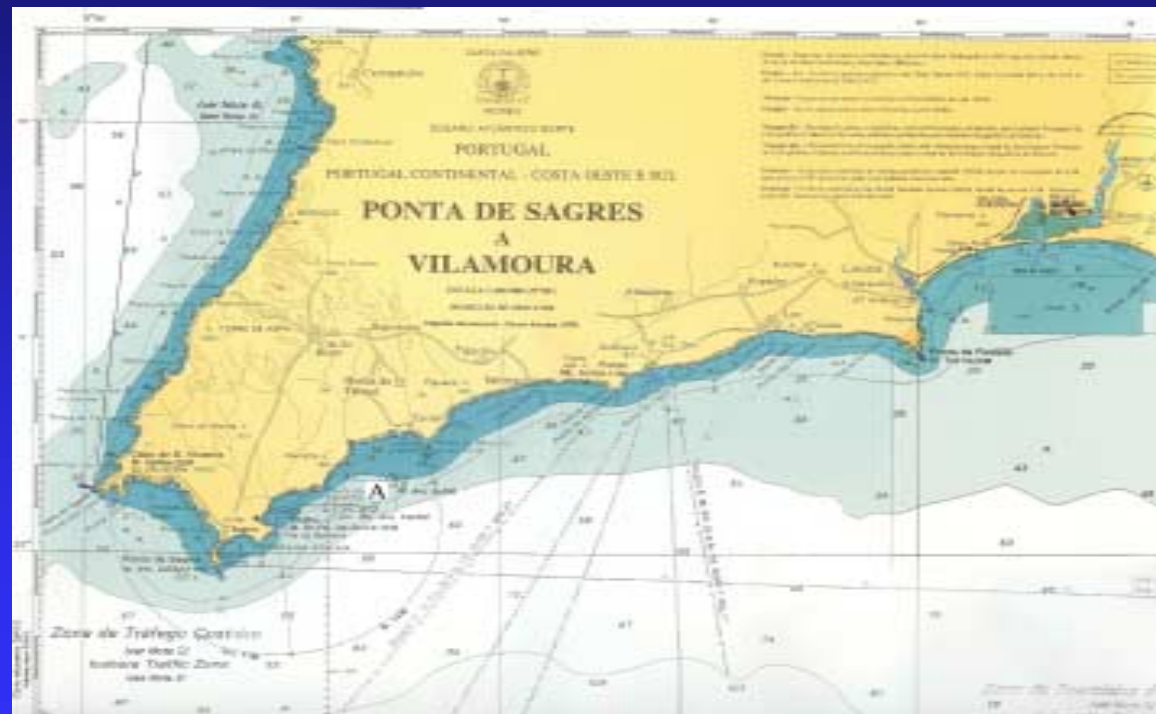


Location of the Ria Formosa, Portugal and study area

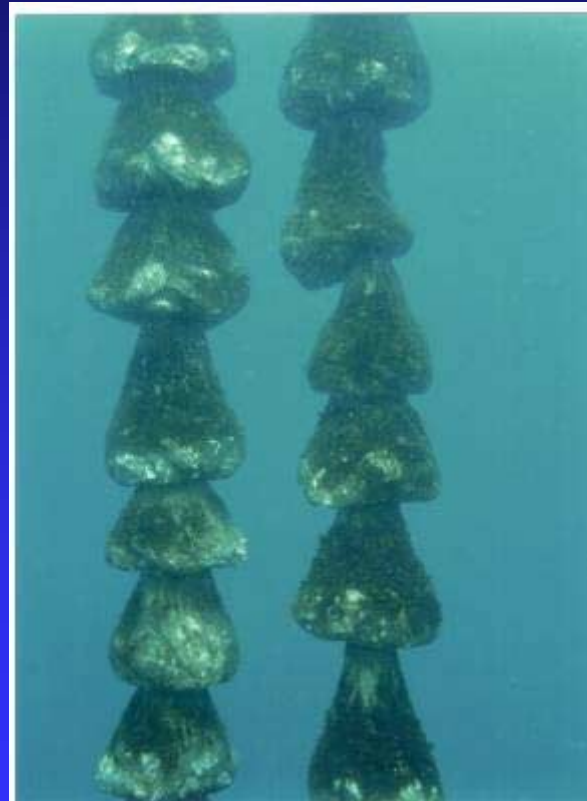
# Culture system for clams and oysters in the Ria Formosa



# SAGRES



# European oysters suspended from a 'long-line'



# Oyster processing at Sagres



# Biofouling costs the industry!

## ■ Infrastructure:

- ◆ Cages, netting, pontoons
- ◆ Tanks, pipes, pumps, filters



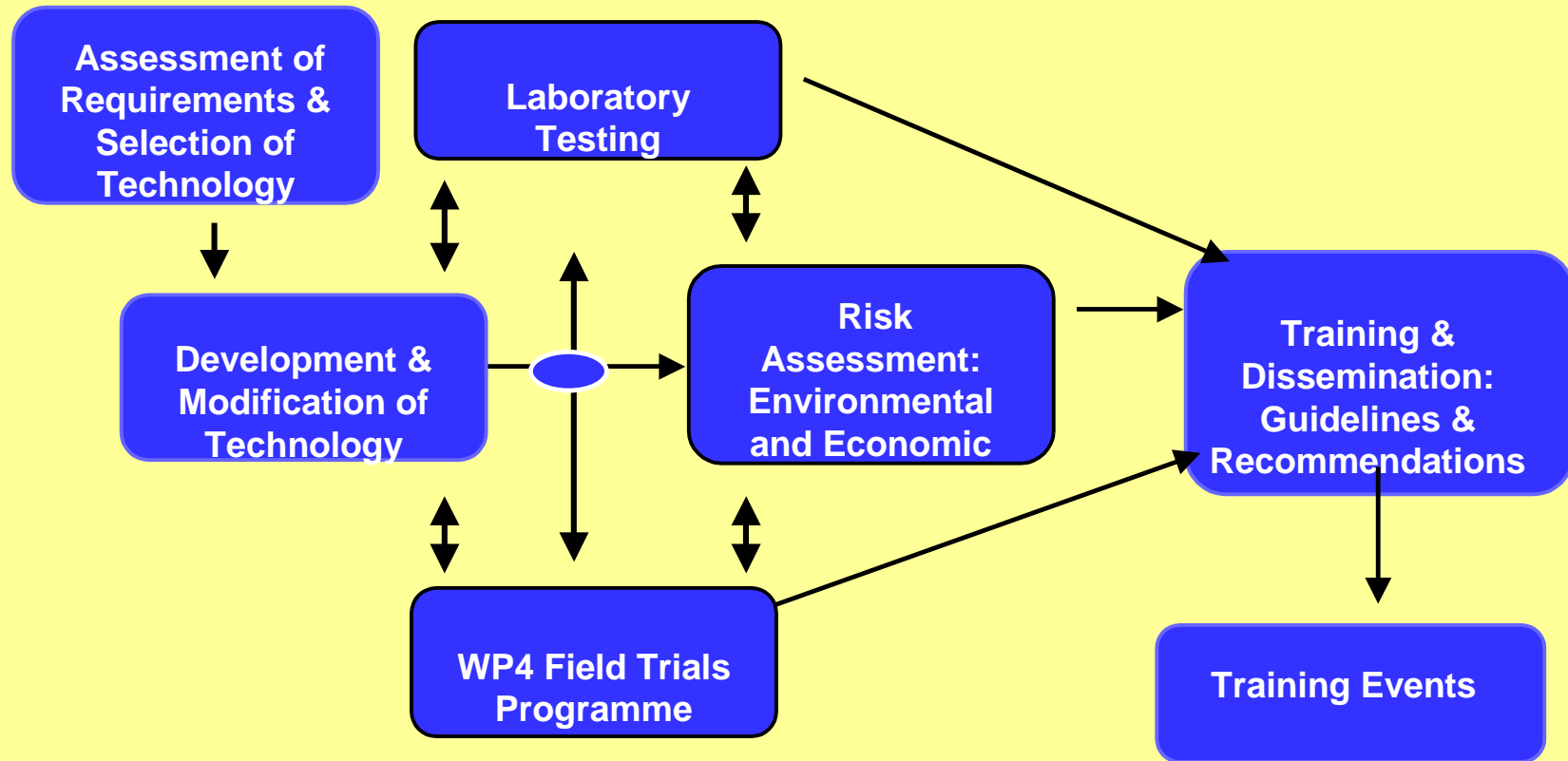
## ■ Stock species:

- ◆ Particularly shellfish
  - ◆ Cleaning oyster cultures = 20% of market value
  - ◆ Biofouling can reduce growth rates by over 40%.



Potential cost savings in Europe €130-€260 mio

# The approach



# CRAB Shellfish Questionnaire

Good morning/afternoon,

The partners (European wide) involved in this study are working on an initiative, which has been co-financed by the European Commission. The objectives of this project are to analyse the issues involved with biofouling and its effects on farming, then to achieve cost-effective methods, which will reduce this burden on the farmer.

We are seeking, through the responses to this questionnaire (24 questions), an initial understanding of the issues faced by the modern farmer. After gaining this insight we will instigate methods to both improve profit margins and the environment.

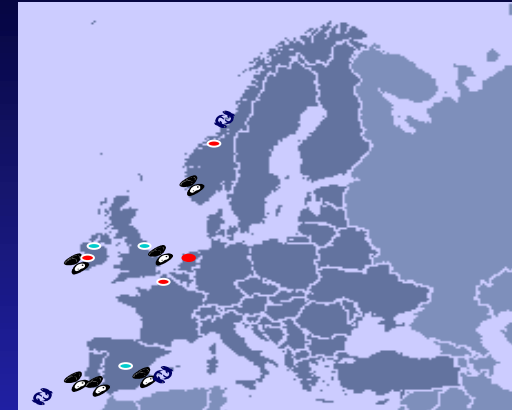
We kindly request a few minutes of your time to complete this survey. If you are unable to answer any of the questions then please leave them blank.

Thank you very much.

Name (including position title) and address of operation \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Biofouling pressure throughout Europe

- Estimates will be made of biofouling pressure at aquaculture farms from Norway to the Canary Islands.
- Settlement panels will be deployed on a monthly basis for 18 months at 2 metres depth. After each month, the biofouling on each panel will be estimated by measuring the thickness and weight of fouling, and by identifying the fouling organisms on the panel.
- Settlement panels will be deployed for a longer term experiment whereby only three panels will be taken off at each monthly interval so that after 18 months there will still be three panels left that have been deployed for the entire period of the experiment. Biofouling will be estimated in the same way as in the short term experiment.



# Technologies

- Biological control
  - ◆ natural grazers such as sea-urchins
- New materials
  - ◆ non-toxic antifouling coatings
- Electrical methods
  - ◆ generating biocides (Cl-) or pH shifts
- New shellfish handling and immersion techniques
- Optimised cleaning techniques
  - ◆ enzyme technology to weaken the bond between biofouling and stock organisms
- Improved knowledge base
  - ◆ allowing avoidance measures



# Biological control

Natural grazers such as sea-urchins



# New materials

## Non-toxic antifouling coatings



# New shellfish handling and immersion techniques

Immersion for some seconds of oyster nets in hot water at a temperature of 63°C.



# Expected outcomes

- CRAB will **select and optimise the most suitable strategies** to address biofouling problems in aquaculture
- Key **deliverables** :
  - ◆ best practice guidelines
  - ◆ training courses and materials for industry workers
  - ◆ sustainable antifouling strategy management and decision support tools

**Training aquaculture managers and workers to make optimal use of the CRAB findings**

# Using the knowledge

## Primary exploitation

- By farmers to improve farming practice and make informed choices

## Antifouling service providers

- To offer better service

## Application of the outcomes

- To aquaculture industry and other sectors

## Commercialise the technology

- Where modified technologies and support tools are marketable

## Training tools

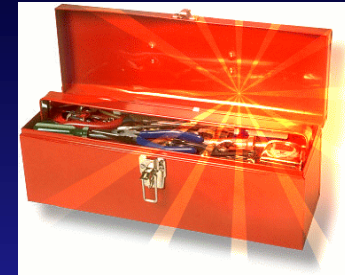
- Freely available to libraries of technical schools and colleges in Europe

# Dissemination



- Web site ([www.CRABproject.com](http://www.CRABproject.com))
- European aquaculture sector:
  - ◆ International workshops
  - ◆ Specific sessions in international conferences
  - ◆ Presence at trade events
- Member networks of IAGs
  - ◆ Printed material and email
  - ◆ Web tools – EAS, AquaMedia, AquaFlow, AquaTT
- Companies and industry networks
  - ◆ For prototypes, products and services developed through CRAB

# Training



- **Development of targeted training tools**
  - ◆ User-friendly stepwise tools to assess best strategy
  - ◆ Hard copy manuals and interactive (web based) diagnostics
  
- **Delivery of targeted training programmes**
  - ◆ Local and regional training courses
  - ◆ Practical demonstration and hands-on training



# More information

Co-ordinator - TNO (NL)

<http://www.tno.nl> ([peter.willemsen@tno.nl](mailto:peter.willemsen@tno.nl))

Web site - [www.CRABproject.com](http://www.CRABproject.com)

EC SME Measures (Collective research)

<http://sme.cordis.lu/home/index.cfm>

Thank you for your attention.