

# Young Marine Scientists Day– Bruges – 25 February

## Healthy and Productive Seas: What is the EU doing?

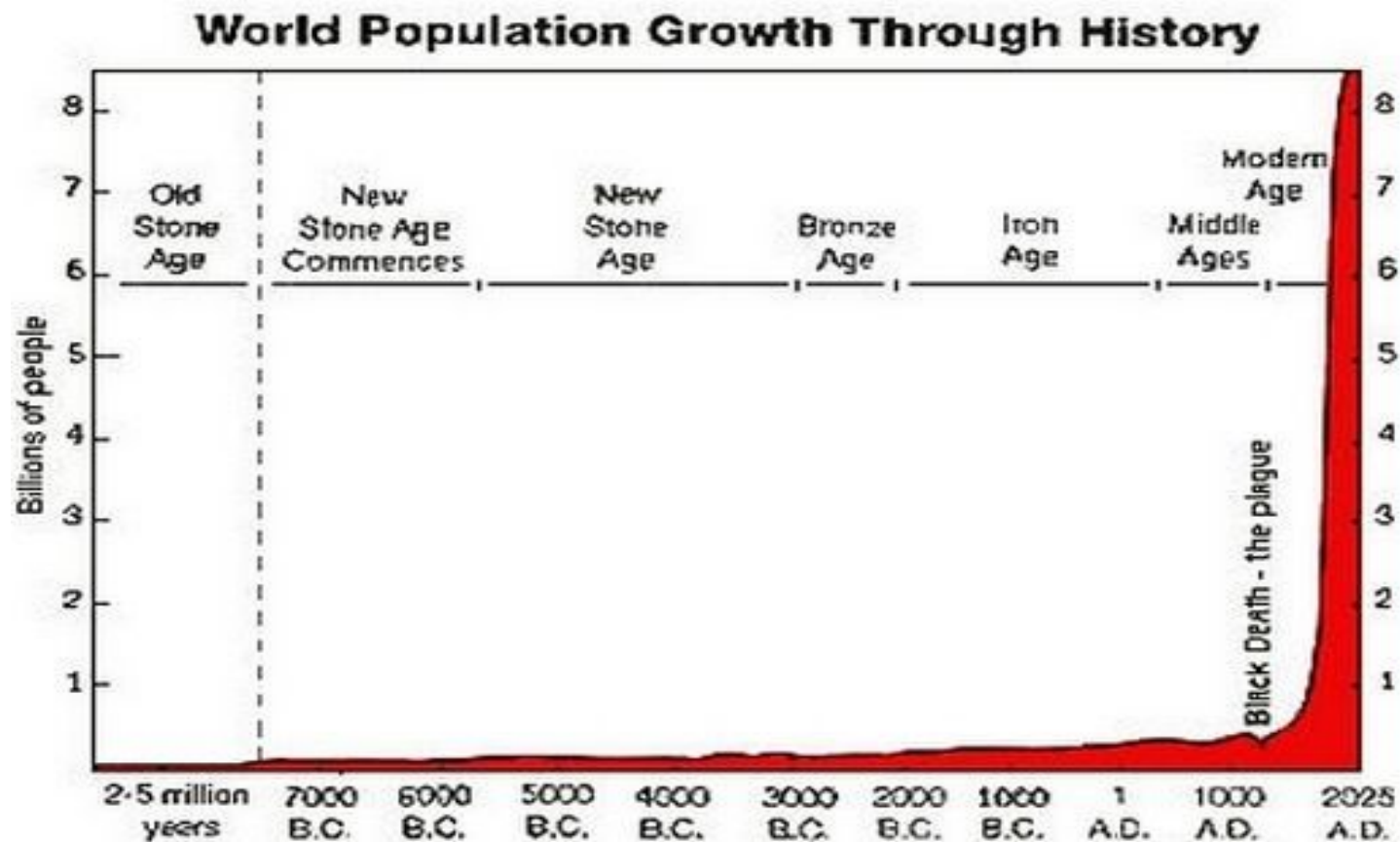
Waddah Saab  
European Commission - DG RTD



200 countries / 200 years  
in 4 minutes

<http://www.schooltube.com/video/7e13116b078f1b661e7d/Hans-Roslings-200-Countries-200-Years-4-Minutes-The-Joy-of-Stats-BBC-Four>

# Another look at the story...



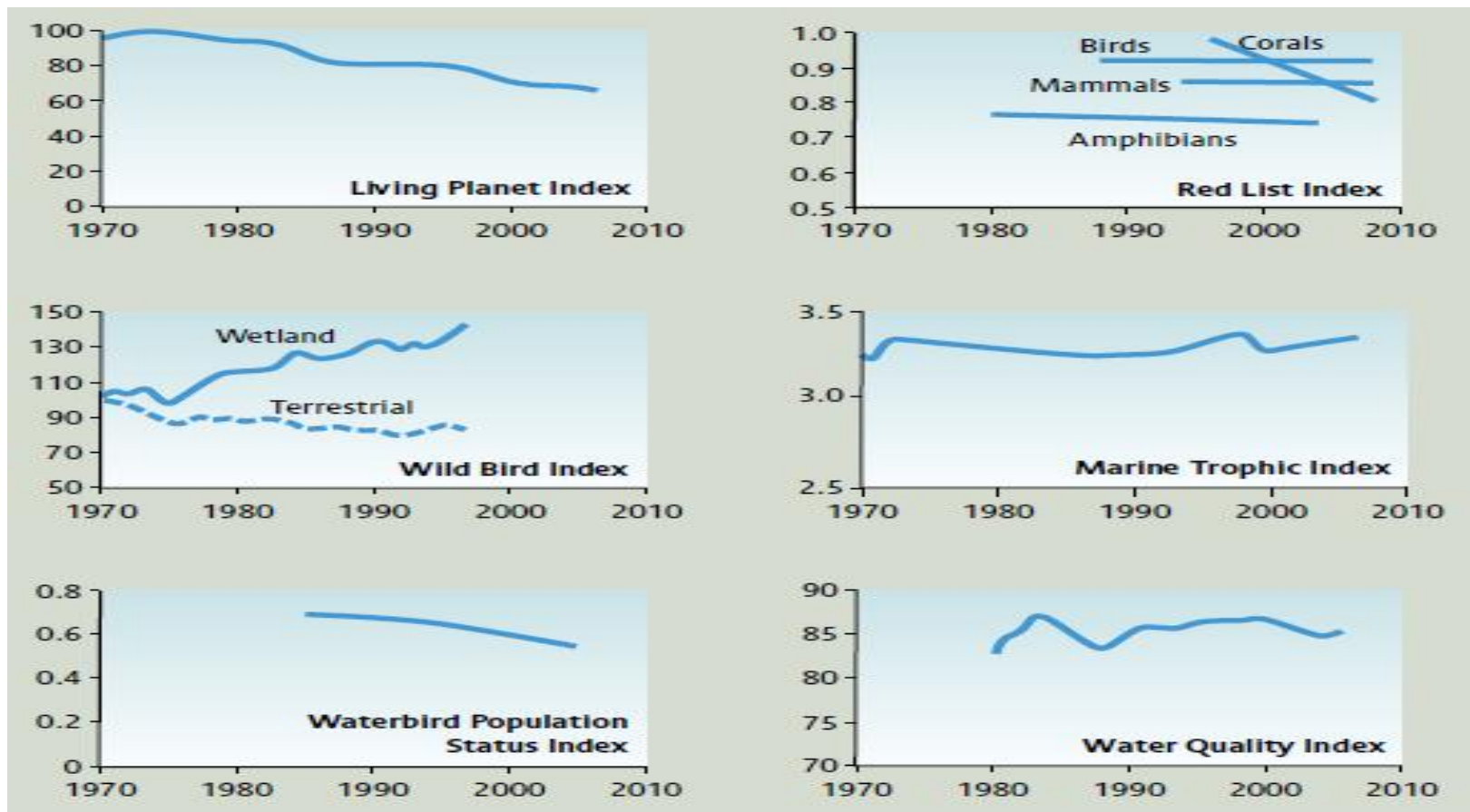


# Contribution of EU maritime economy to wealth and well-being

"Traditional sectors"	<b>Maritime transport</b>	90% EU external trade 350 million passengers/year
	<b>Shipbuilding</b>	0,8 million jobs; €90 billion/y turnover
	<b>Tourism &amp; coastal zones</b>	3 million jobs €72 billions turnover in 2005
	<b>Fisheries</b>	0,55 million jobs, €25 billion/y <b>(EU27+NO)</b>
"New" sectors	<b>Aquaculture</b>	150,000 jobs, €7 billion/y <b>(EU27+NO)</b>
	<b>Blue biotechnology</b>	Emerging sector with predicted growth of 10%/year and global market of € 2,4 billion
	<b>Renewable Energy</b>	Offshore wind farms, tidal & wave power, € 121 millions in 2005 but huge growth

# But with this health and wealth comes...

Biodiversity loss –  
Global Biodiversity outlook 2010



# Global warming – ocean acidification

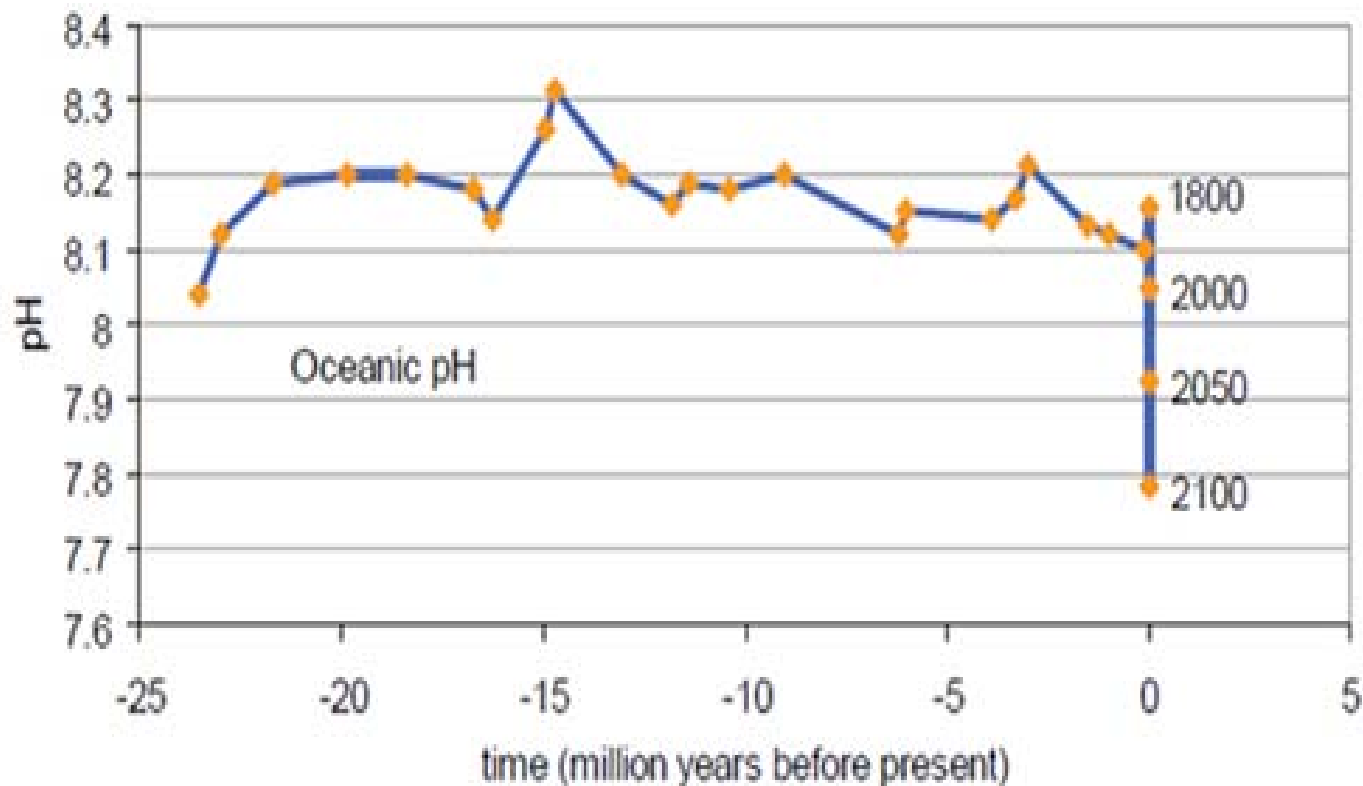
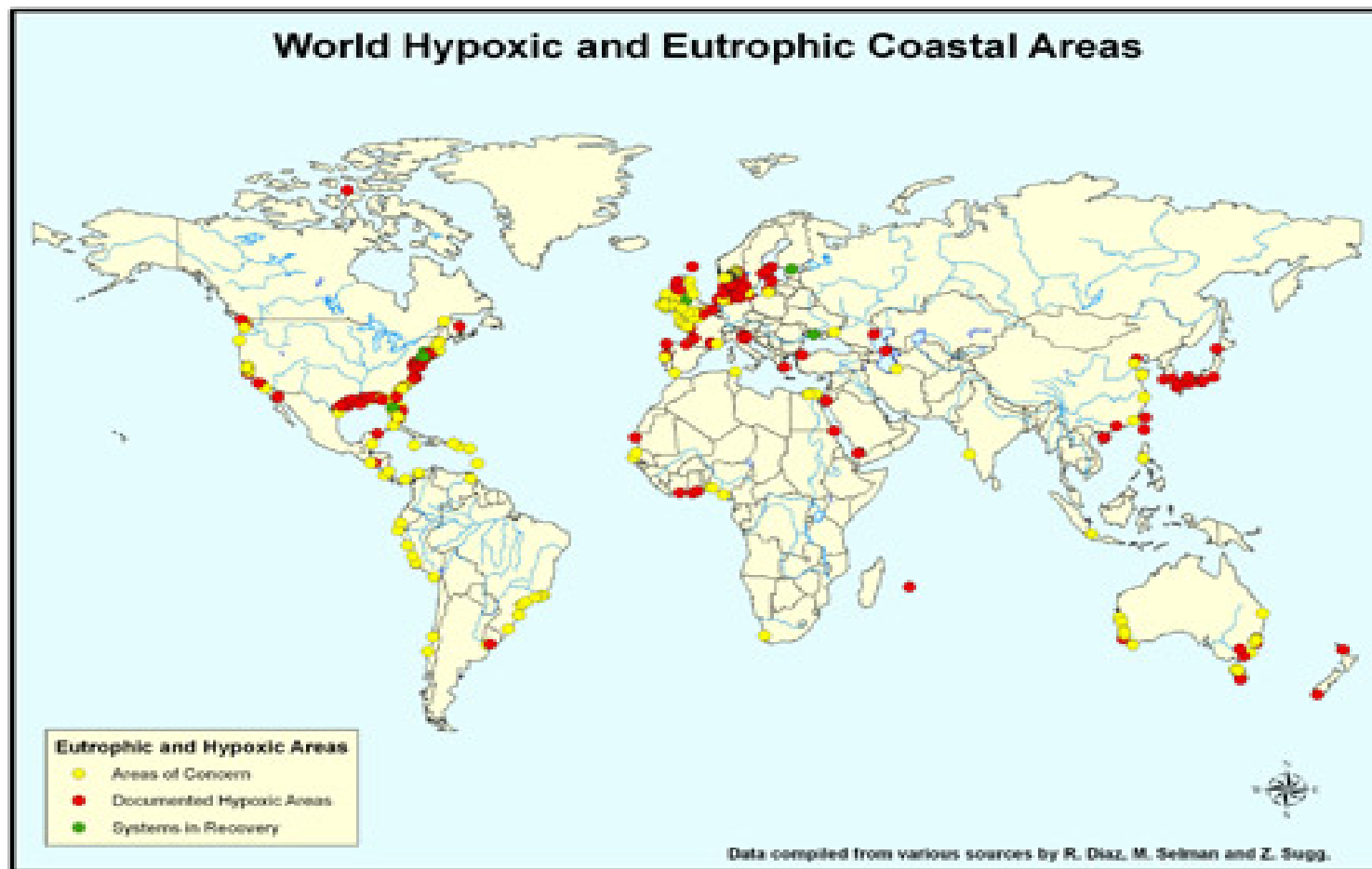


Figure 1. Past and contemporary variability of marine pH. Future predictions are model derived values based on IPCC mean scenarios (from Turley *et al*, 2006. Cambridge University Press, 8, 65-70).

# Eutrophication – Hypoxic zones



# "Pressures" on the marine environment

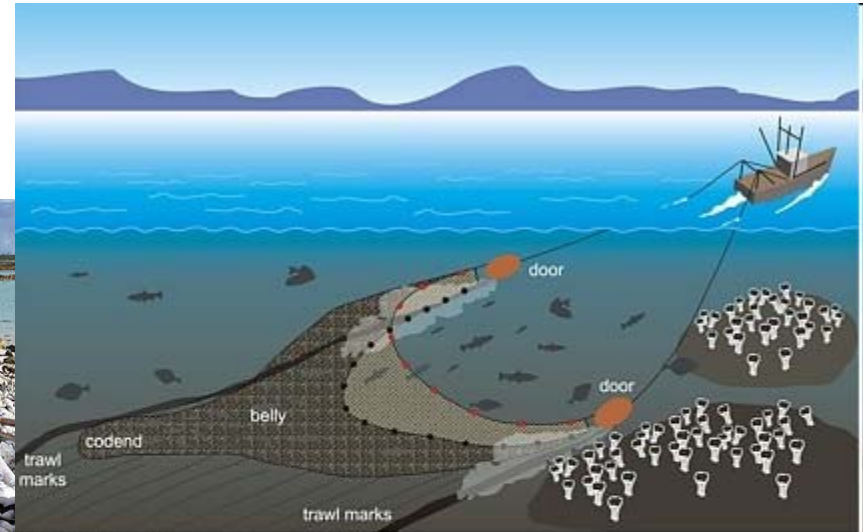


Photo: A. Meinesz

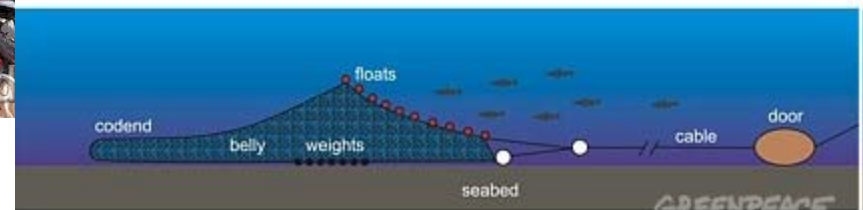


Ceva

# "Pressures" on the marine environment



(after Christen, 1999)

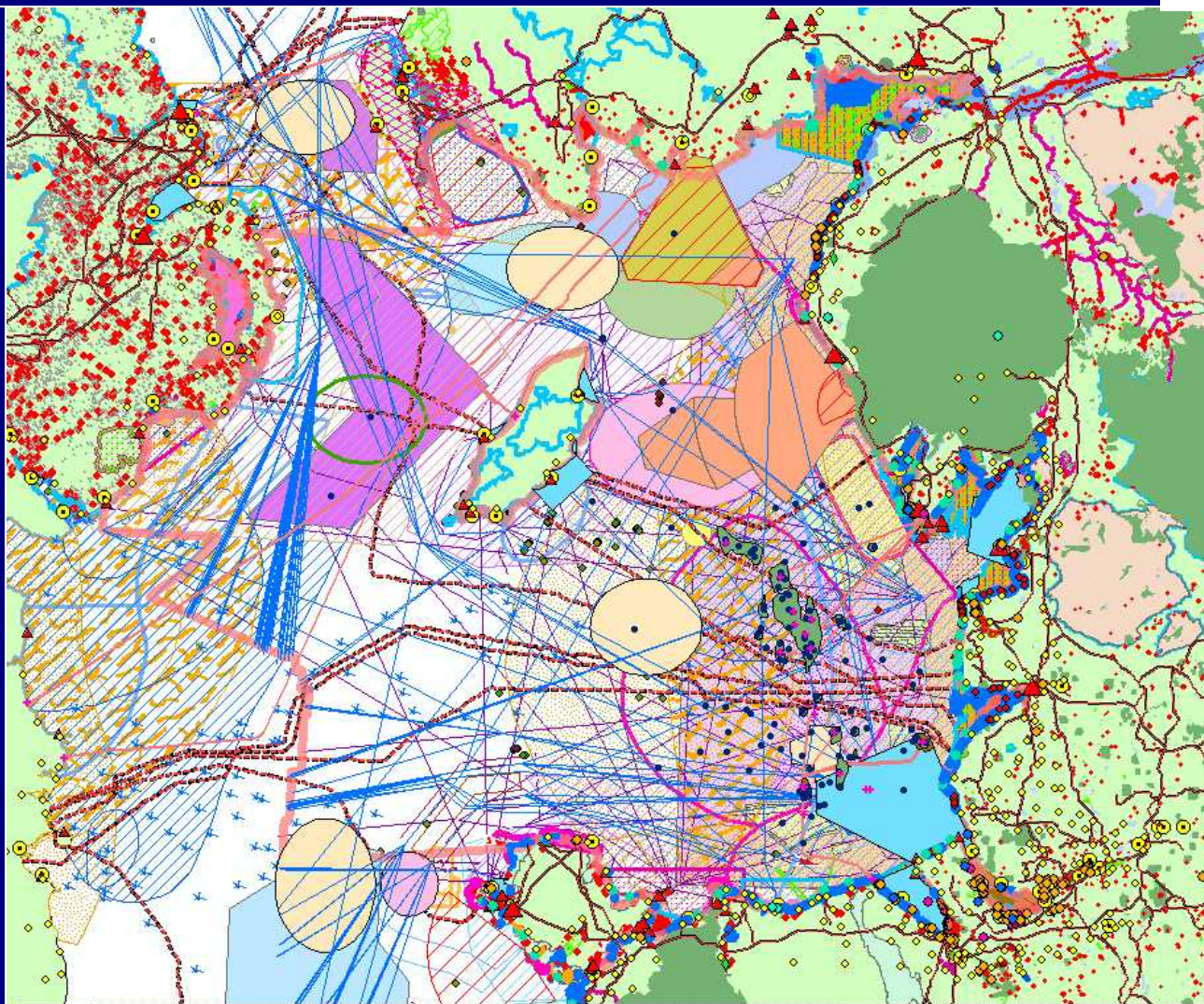


(after Messieh et al., 1991)



# Driver 3: COMPETING CLAIMS

- Land use
- Tourism
- Oil & Gas
- Mariculture
- Coastal Defence
- Ports & Navigation
- Military Activities
- Culture
- Conservation
- Dredging & Disposal



▪ Submarine  
Cables

▪ Fishing

▪ Renewable  
Energy

▪ Marine  
Recreation

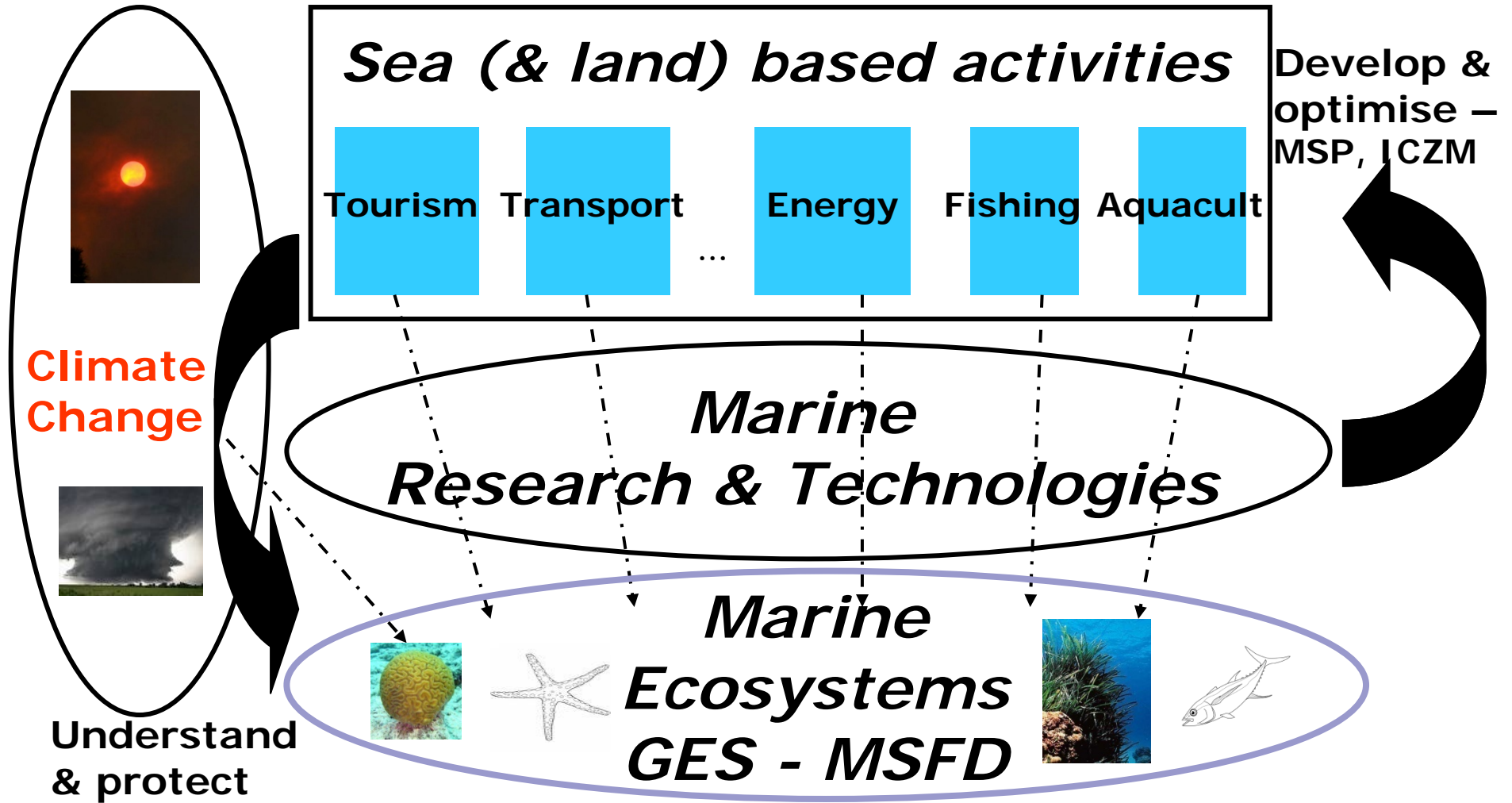
▪ Mineral  
Extraction



## Drivers for the EU Marine / Maritime research strategy

- The maritime economy is of crucial importance and we need to further develop it. But...
- there is an increasing environmental pressure from human activities and climate change...
- and an increasing competition for the marine space

# The ideal vision of the EU Maritime Policy





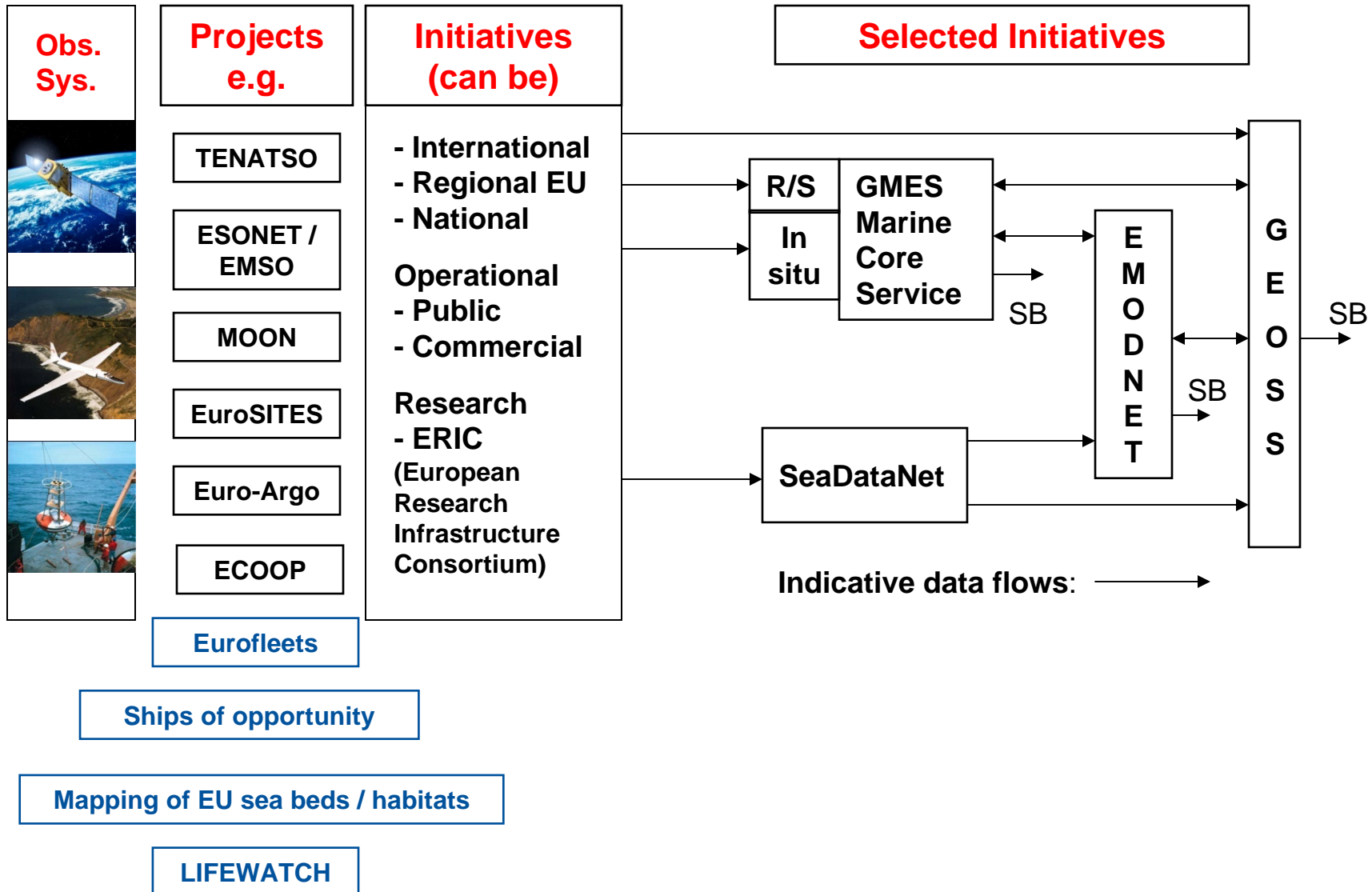
# How far are we from this ideal world?

1. We need more marine research infrastructure to observe & understand impact of human activities & climate change on the marine environment
  2. Issues are inter-disciplinary and our research programmes are thematic → need for integration of knowledge
  3. Seas are shared & major research infrastructure and programmes require funding beyond the capacity of single member states → need for more synergy
  4. The Commission is used to interact with well-defined scientific and industrial communities → we must now deal with an inter-disciplinary, multi-sector scientific & industrial communities → need for new governance
- 
- The 4 areas mentioned provide broadly the structure of the EU marine / maritime research strategy
  - Plus an international over-arching dimension



# Marine Research Infrastructures

# MRI Projects and Initiatives



# MRI – some key issues

- How do we move from a project based approach to ocean observation to a permanent observation?
- Where does the funding come from to implement the sustained observing capacity and EMODNET?
- How do we ensure that a set of European marine observation initiatives converge to respond better to policy / societal needs?
- Can we have an overview and better coordinate EU contribution to global projects (e.g. ARGO) and initiatives (GMES - GEOSS / GOOS)?

An initiative at European level to help address these challenges?

A European Integrated Ocean Observing System – Ostende declaration

# MRI – starting with the needs

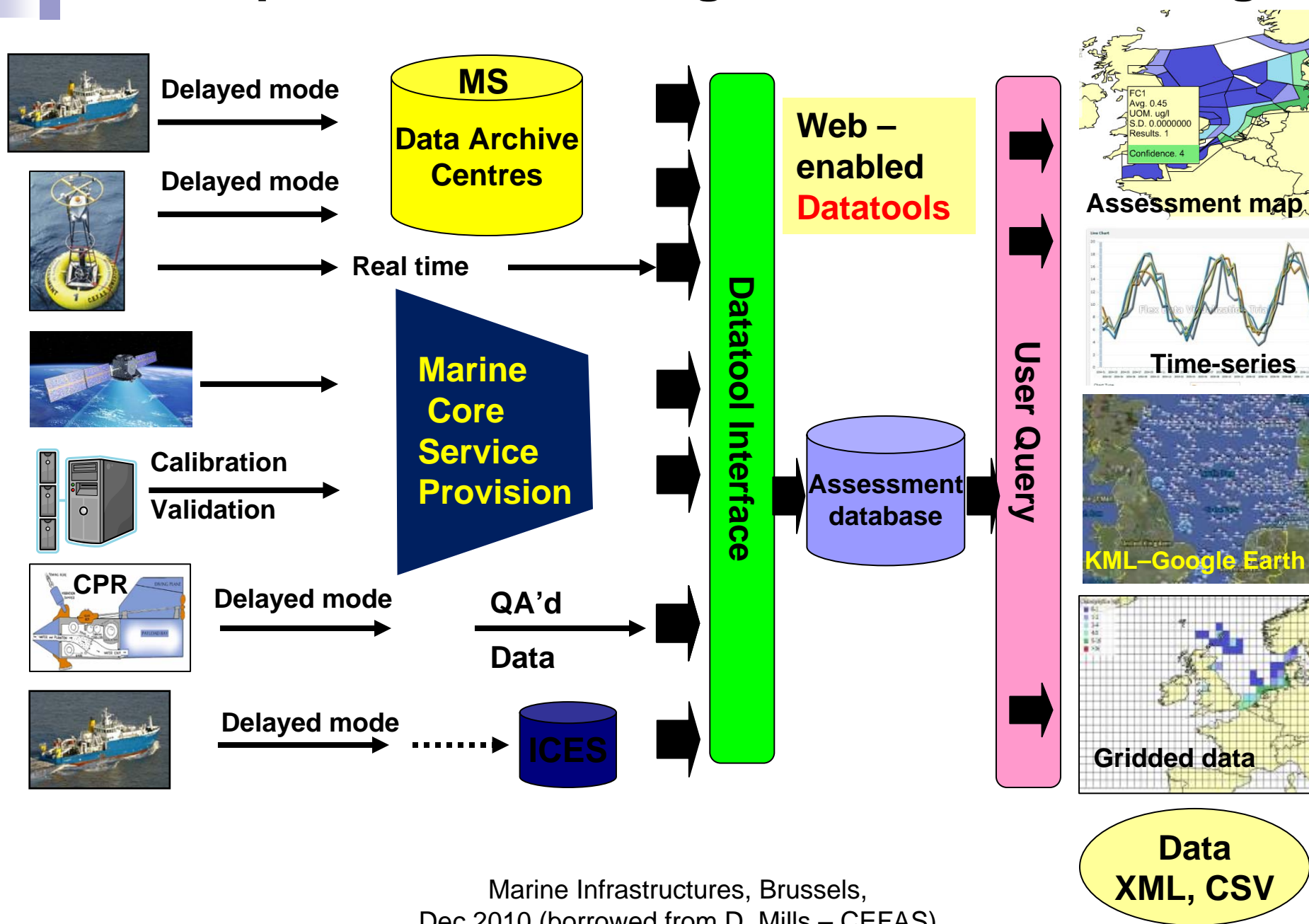
Policy / Societal needs e.g.		Projects/Initiatives e.g.
Marine Strategy Framework Directive	<ol style="list-style-type: none"> <li>1. Biodiversity, alien species, fish stocks, food webs, seabed integrity / habitats</li> <li>2. Eutrophication</li> <li>3. Hydrographical conditions</li> <li>4. Contaminants</li> <li>5. Litter – 6. Noise / Energy</li> </ol>	<ul style="list-style-type: none"> <li>• LIFEWATCH</li> <li>• EMSO, EUROSITES?</li> <li>• Ships of opportunity?</li> <li>• Mapping of Seabeds / habitats?</li> <li>• EUROFLEETS?...</li> </ul>
Ocean / Climate interactions	<ol style="list-style-type: none"> <li>1. Ocean circulation system, ocean / atmosphere interactions</li> <li>2. Impact of climate change on marine environment</li> <li>3. Impact of climate ch. on coastal areas</li> </ol>	<ul style="list-style-type: none"> <li>• EURO-ARGO?</li> <li>• RAPID-ARRAY?</li> <li>• PIRATA?</li> <li>• TENATSO?</li> <li>• GLOSS-ESEAS?...</li> </ul>
Operational Oceanography	<ol style="list-style-type: none"> <li>1. Marine safety</li> <li>2. Marine and coastal environment</li> <li>3. Weather / climate &amp; seasonal forecasting</li> <li>4. Marine resources</li> </ol>	<ul style="list-style-type: none"> <li>• GMES marine r/s?</li> <li>• GMES in situ <ul style="list-style-type: none"> <li>• EURO-ARGO</li> <li>• EMSO</li> <li>• LIFEWATCH?</li> </ul> </li> </ul>

# MRI – starting with the needs

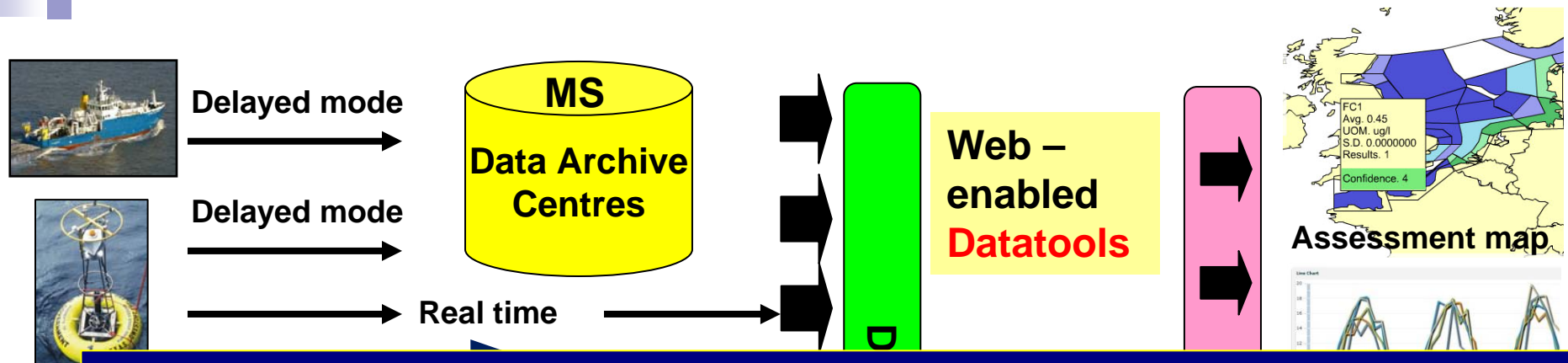
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•LIFEWATCH?

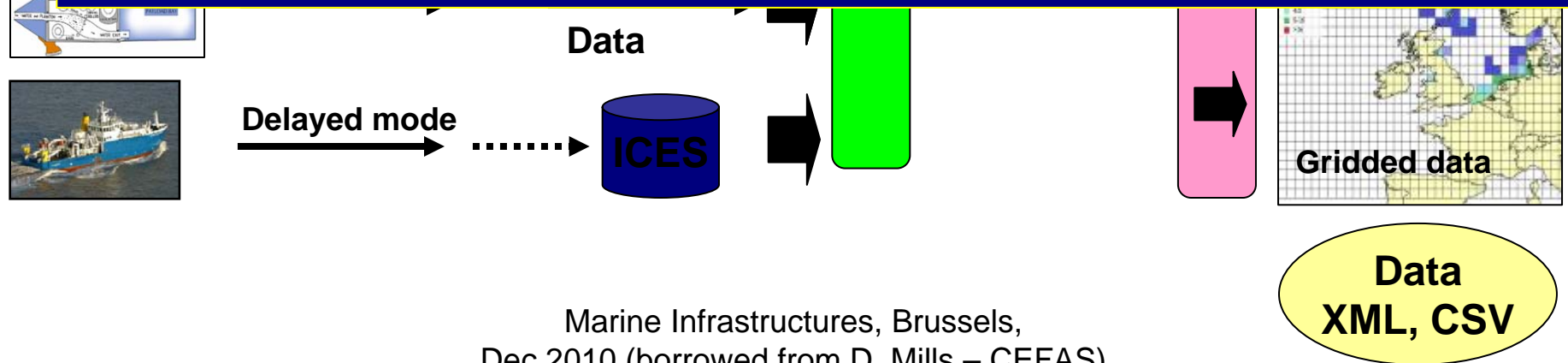
# IOOS, a platform for a range of societal challenges



# ■ IOOS, a platform for a range of societal challenges



A streamlined ‘on-line’ assessment system that:-  
“enables rapid integration and assessment of  
multi-national, multi-agency  
multi-platform, and multi-variate data”



Marine Infrastructures, Brussels,  
Dec 2010 (borrowed from D. Mills – CEFAS)



# IOOS: How? With what money?

- I don't know
- So we develop the concept and prove its value
- Repeat that it is indispensable
- Build progressively commitment to it
- Seize opportunities to get it supported
- JPI « Oceans » is an opportunity → provides ideal framework to build it progressively
- Another opportunity: Discussion on EU next financial framework (2014-2020) – Structural Funds



# Marine Research infrastructures – Structural Funds

- Structural funds represent a big funding source: 250 billions € for (2007-2013)
- But everybody wants them (transport, energy, ICT, ...)
- Regions prefer using them for hard – tangible projects  
↔ growth and jobs
- Need to sensitise them on socio-economic value of MRI and...
- On value of protecting the marine environment ↔ ecosystem services
- Enshrine the ecosystem services concept in structural funds regulations



# Knowledge Integration

# INTEGRATION - THE ARCTIC OCEAN

Observed sea ice September 1979



©NASA

Observed sea ice September 2003



# Integration – Climate change and the Arctic



RUSSIAN TRANSPORT CORRIDOR “NORTHERN SEA ROUTE”  
within the system of international transport corridors West-East-West



**Symbols:** Export: 1-hydrocarbons, 2-metals, 3-mineral fertilizers, 4-products of the Norilsk Mining and Metallurgical Integrated Works, 5-timber, 6-coal.  
Import: 7-products (food).

— Sea transport corridor  
— Railways  
..... Railways to be constructed.

— River shipping lines.  
— Area of the formation of cargo  
— Sources for the Northern Sea Route.



From [www.arcorp.fi](http://www.arcorp.fi)

- An environmental risk for a largely unexploited zone
- Economic opportunities:
  - shorter maritime route between Europe and East-Asia
  - Fishing opportunities, Oil reserves
- Can we define conditions for a sustainable exploitation of these opportunities, protecting the environment?
- We need inter-disciplinary cooperation between marine scientists, maritime - oil & gas industries... etc., to:
  - Define conditions and limits for environmental sustainability
  - Develop technologies that can ensure sustainable development of these new activities

# OCEAN.2011-1. MULTI-USE OFFSHORE PLATFORMS



## Objective:

- to develop several innovative designs for multi-use offshore platforms and to assess the technical, economical and environmental feasibility of constructing, installing, servicing and maintaining these platforms together with the transport aspects.

## Funding scheme:

- EC contribution: 14 M€
- Collaborative Project - large scale integrating projects
- several proposals funded

## Directorates concerned:

- H (Transport)
- K (Energy)
- E (Food, Fisheries and Biotechnology)
- I (Environment)





# Innovation in marine technologies

- All marine activities face common challenges: biofouling, corrosion, high pressures in deep sea...
- Need to develop cross-cutting enabling technologies: materials, sensors, ICT, Hyperbaric technologies...
- Transfer knowledge between marine research organisations and industries / end-users
- Innovation also comes by transferring technologies from one marine sector to another (e.g. from oil & gas / shipbuilding to wave energy / aquaculture...)
- Concept of Knowledge and Innovation Communities (KIC!) integrating actors of the innovation chain
- We hope that EIT will support Marine KIC



# Synergies

# Synergies – EU and Regional dimensions



## **Regional scale:**

- \*Env't coherence
- \*Economic and social integration
- \*Regional conventions

## **European scale:**

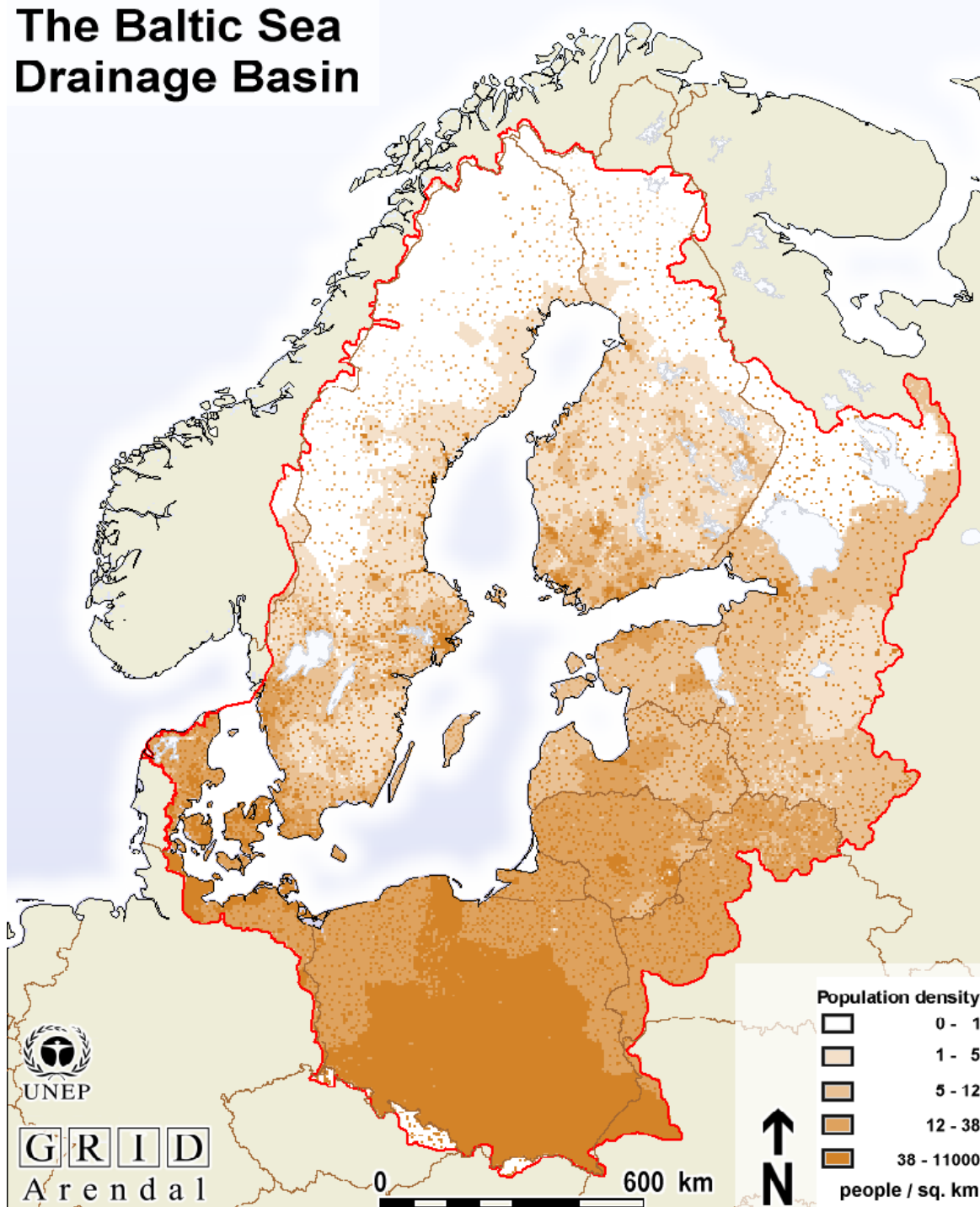
- \*Big technological challenges (e.g. deep sea)
- \*Big infrastructure prog (ARGO, EMSO)
- \*MSFD / EEA
- \*Harmonised methods → services

## HELCOM Baltic Sea Action Plan



**Helsinki Commission**  
Baltic Marine Environment Protection Commission

## The Baltic Sea Drainage Basin



## Baltic Sea System:

0.4 million sq. km of  
sea surface  
+ 1.7 million sq. km  
of drainage

14 countries

95 million inhabitants





# Synergies - the Baltic example

- A model regional cooperation supported by the Commission
  - BONUS → ERANET → ERANET (+) → Art 185
- Modelisation of main environmental risk → eutrophication because of excess nutrients in the sea
- Scientific determination of maximum acceptable limit of nutrients in the whole sea basin →
- Political action plan by all coastal states to reduce nutrients accordingly

## To improve transparency for 1.5 – 2.0 m – 3 billion € needed

	BELARUS	GERMANY	DENMARK	ESTONIA	FINLAND	LITHUANIA
Load 97-03	1,206	534	51	18	0	1,328
WWT decreased load	-1,206	0	0	0	0	-327
remaining load	0	534	51	19	0	1,001
% to total load	0%	4%	0%	0%	0%	7%
remaining load reduction	0	291	28	10	0	545
WWT increased load	0	49	12	0	0	0
Country allocation	0	242	16	10	0	873
F/A	0%	45%	31%	54%	0%	66%

### Example Baltic proper

Needed reductions to the BP  
as inferred from the Marine model

LATVIA	RUSSIA	POLAND	SWEDEN	SUM
266	1,266	13,717	860	19,246
0	-75	-2,810	0	-4,418
266	1,192	10,907	860	14,828
2%	8%	74%	6%	100%
145	649	5,945	468	8,082
3	0	0	177	241
142	724	8,755	291	11,053
53%	57%	64%	34%	57%

TOTAL LOAD	19,246
TOTAL RED	12,500
WW RED	4,418
REMAINING RED(RR)	8,082
%RED	65%

Total needed reductions=12500 tons of which 4418 tons by sewage treatment

Example Poland:

2810 tons potential point sources reductions

$10907/14828=74\%$  Polish input after implementation of sewage directive

Poland takes also 74% remaining reductions to reach environmental targets=

$0.74 \times 8082 = 5945$  tons

Thus total allocation is 2810 (point) + 5945 (non point) =8755 tons

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Poland takes also into account the reduction of the remaining load

0.74\*8082= 5945 tons

Thus total allocation is 810 (gain) + 5945 (loss) = 8755 tons

**9 Baltic Sea Countries  
have politically agreed  
to achieve these  
reductions**

# EMECO - European Marine Ecosystem Observatory

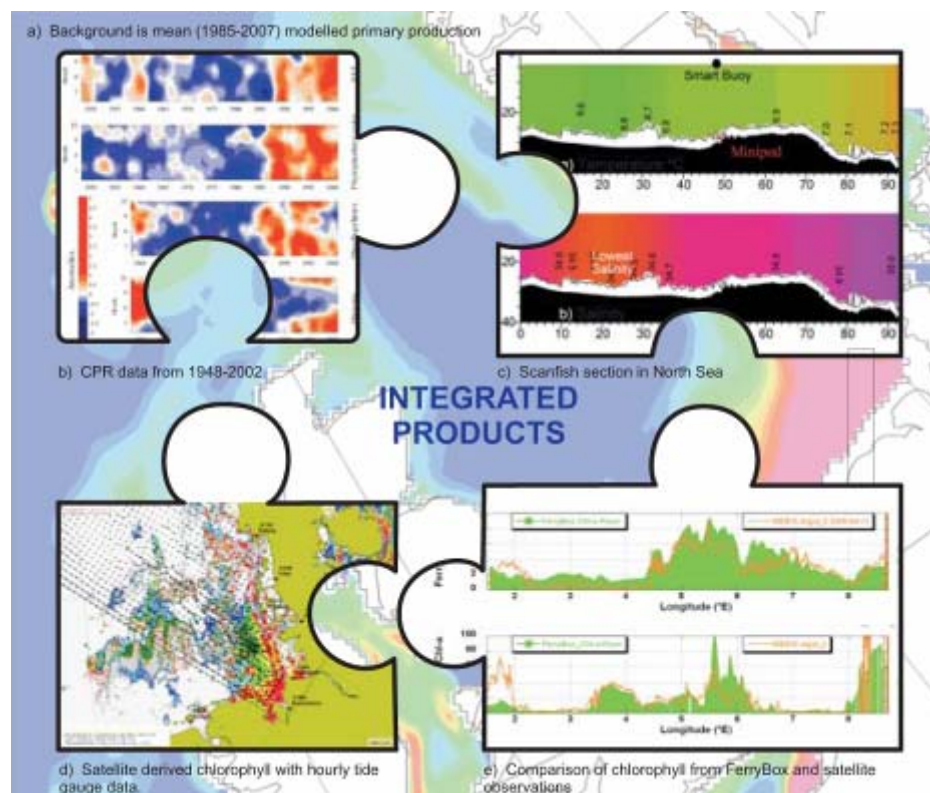
Creating better evidence and new knowledge



EMECO is an informal European network for integration of monitoring, modelling & research.

- Builds on existing infrastructure
- Multi-scale – time & space
- Supports Ecosystem Based Management
- Promotes interoperability
- Anticipates EU current & future policy needs MSFD

[www.emecogroup.org](http://www.emecogroup.org) Marine



UK-Cefas, EA, NOC, SAHFOS; NL-Rijkswaterstaat, Deltares, NIOZ, Norway-IMR, NERSC, Met Off; DE-GKSS, BSH, BE – MUMM, F – IFREMER, RoE – Marine Institute, Denmark – NIVA; S - SMHI



# Synergy : from ERA-NET to JPI

## **FP6-FP7 – ERA-NETs**

- ERA-NET: Network of research funding agencies - Bottom-up exchange of information → coordination → joint research calls
- ERA-NET (+): one big joint call with EU top-up (30%)
- Art 185 initiatives (7 in total): joint research programmes with pooling of funds / strategic objectives / strong EU support (50%)
- Duration 3-5 years

## **FP7-FP8 - Joint Programming Initiative**

- Top-down initiative, starts with political decision by Council
- Designed to address "societal objectives / grand challenges"
- Not a single instrument but a framework, which can make use of many instruments (ERANET (+), Art 185, JTI...)
- Also seeks to coordinate "institutional budgets "
- Duration 10 years +



# Synergy

## Synergy / ERA-NETs

- ✓ SEAS-ERA
- ✓ BONUS 169 in Baltic



Need to articulate  
the 2 levels

### ✓ SEAS-ERA

- ✓ Overarching marine ERA-NET
- ✓ 21 member states and associated countries
- ✓ 2 M €
- ✓ 4 years



# JPI "Healthy and Productive Seas"

## 3 pillars

- ✓ The marine system
  - ✓ The marine resources
  - ✓ Support to policy
- } Marine Research Infrastructures

## What has been done?

- ✓ Secretariat in place in Brussels
- ✓ Interim-Management Board in place (16 MS and AC)
- ✓ Website: <http://www.jpi-oceans.eu/>

## Next steps

- ✓ Vision document by JPI in May 2011, build on SEASERA...
- ✓ Recommendation by Commission in July – Sept 2011
- ✓ Setting-up of governing bodies in Oct-Dec 2011
- ✓ Strategic Research Agenda in 2012-2013...



# Governance – Support to policy



# The quest of the Holy Graal: MSFD and the GES of the Seas

<b>Desc 1</b>	<b>Biodiversity</b>
<b>Desc 2</b>	<b>Invasive Species</b>
<b>Desc 5</b>	<b>Eutrophication</b>
<b>Desc 8</b>	<b>Contaminants &amp; pollution</b>
<b>Desc 10</b>	<b>Marine Litter</b>
<b>Desc 6</b>	<b>Seafloor</b>

<b>Desc 4</b>	<b>Food Webs</b>
<b>Desc 7</b>	<b>Hydrography</b>
<b>Desc 11</b>	<b>Energy</b>
<b>Desc 3</b>	<b>Commercial species</b>
<b>Desc 9</b>	<b>Fish shellfish hygiene</b>

11 descriptors → 1 Good Environmental Status

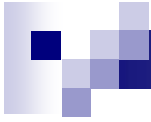
# From local science to EU policy making

Local science (examples picked today)	Sea basin cooper → scaling exerc.	From science to policy recomm.	MSFD Implemen- tation
Infl. of alien macro- crustacea on macro- invertebrate assemblage in Belgium...	<ul style="list-style-type: none"><li>■BONUS</li><li>■EMECO</li><li>■...</li></ul>	A regular science review process to extract relevant knowledge, translate→ policy	<ul style="list-style-type: none"><li>•11 descriptors / indicators</li><li>•Regular reporting by MS on GES – Update GES descriptors / indicators – 6 years cycle</li></ul>
Micropollutants in an estuarine ecosystem...	A "marine / maritime research forum" to: <ul style="list-style-type: none"><li>■Strengthen exchanges across marine science / industrial stakeholders</li><li>■Promote internalisation of GES by maritime industries</li><li>■Promote innovation and greening of maritime industries...</li></ul>		
Phytoplankton role in flocculation of suspended matter in estuaries...			



# GES: a challenge and an opportunity

- With the GES concept, legislation is ahead of science
- It is clearly an enormous challenge
- It is clearly an opportunity → puts marine science / technologies in the picture
- Good or bad, it will shape our lives for years to come



# The International dimension

- We need it because we shared seas with neighbouring 3rd countries (MED, Black Sea, Baltic...)
- We need it because we are dealing with one Global Ocean (IOC global initiatives: GOOS, OBIS, Global assessment of the marine environment)
- The EU is not doing enough...
- Should take example on Belgium!


# So, what's on the horizon?

## ■ in 2020

- Acidification will be stabilised
- Marine biodiversity decline will be stabilised
- Super marine scientists supported by...
- Super marine research infrastructure (IOOS)...
- Will provide super integrated scientific advice...
- To super policy makers...
- Who will guarantee GES of our seas
- With super clean ships and...
- Super selective fishing vessels...



It sounds like a dream...by Hans Rosling



# Can marine science & technologies achieve that dream?

- I don't know, but...
- Without marine science & technologies, there is no chance of doing it
- It is a complex situation, but...
- We have a direction
- A good framework to ensure convergence of efforts at EU level (JPI 'Oceans')
- A good toolbox (complex but flexible)
- Wherever you decide to go, you have a role to play