

The environmental work within the Vattenfall Ocean Energy Programme

Kristin Andersen, Manager Environment and Localisation OEP

OES-IA Annex IV Expert Workshop on Environmental Effects of Marine and Hydrokinetic Energy Generation

Dublin, Ireland, 27th- 28th of September 2010



Outline

- Vattenfall OEP
- Our projects and the related environmental work
- Thoughts and suggestions about environmental requirements/research
- Conclusions

OEP - Roadmap

Pilot phase

Demonstration phase

Commercial phase

2009 2010 2011 2012 2013 2017 2018 2019 2020 2021 2022

Wavebob



Pelamis



Seabased



Pilot tests

Proof of concept

Using the best technologies

Demonstrations

10-20 MW

100-200 MW

100-200 MW

Making use of national market support schemes

On markets with the best commercial conditions

OEP - Roadmap

Pilot phase

Demonstration phase

Commercial phase

2009 2010 2011 2012 2013 2017 2018 2019 2020 2021 2022

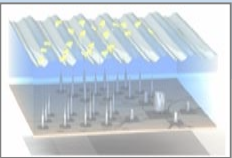
Wavebob



Pelamis



Seabased



Proof of concept

Using the best technologies

One key factor for success:
Permissions!

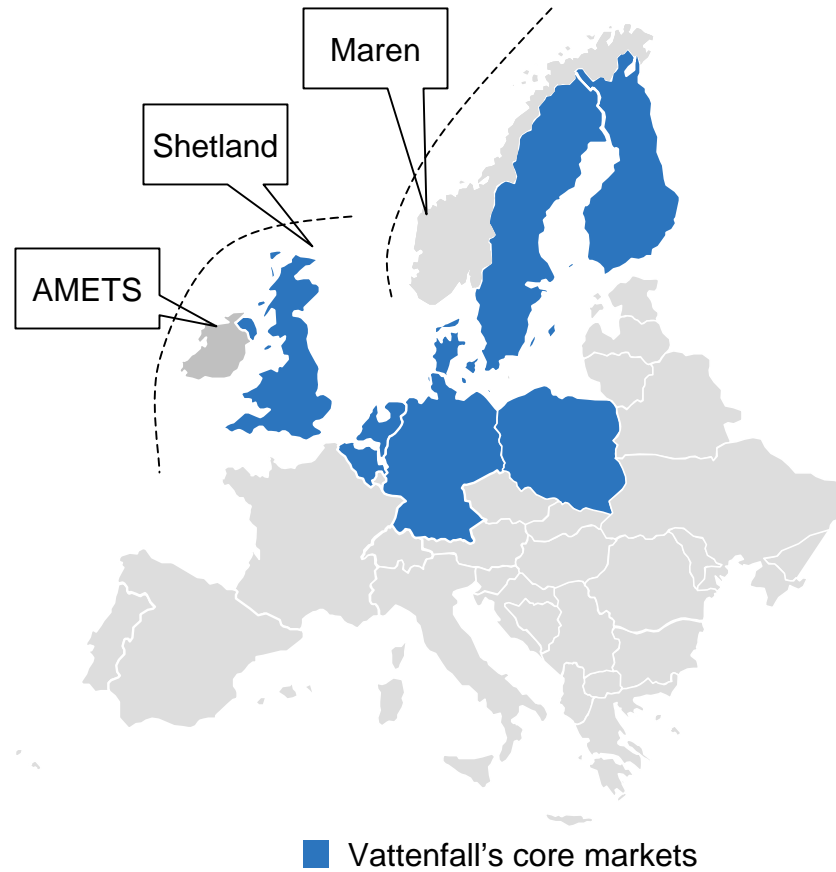
→ Environmental work is a key enabler
for the OEP strategy!

100-200 MW

Making use of national
market support schemes

On markets with the best
commercial conditions

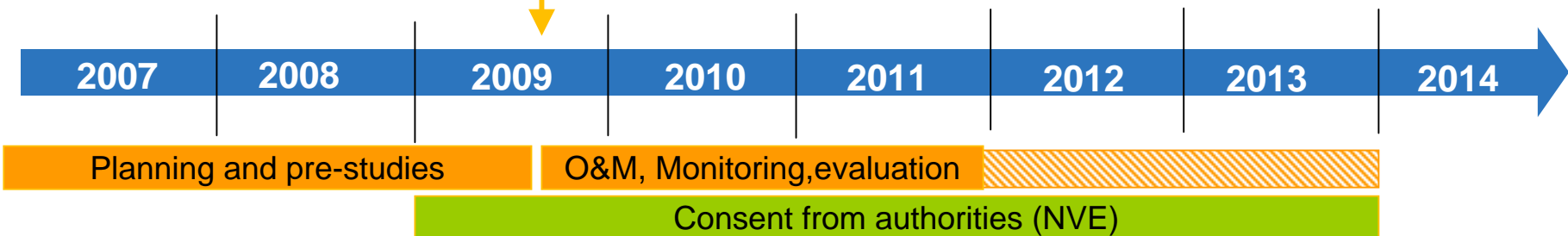
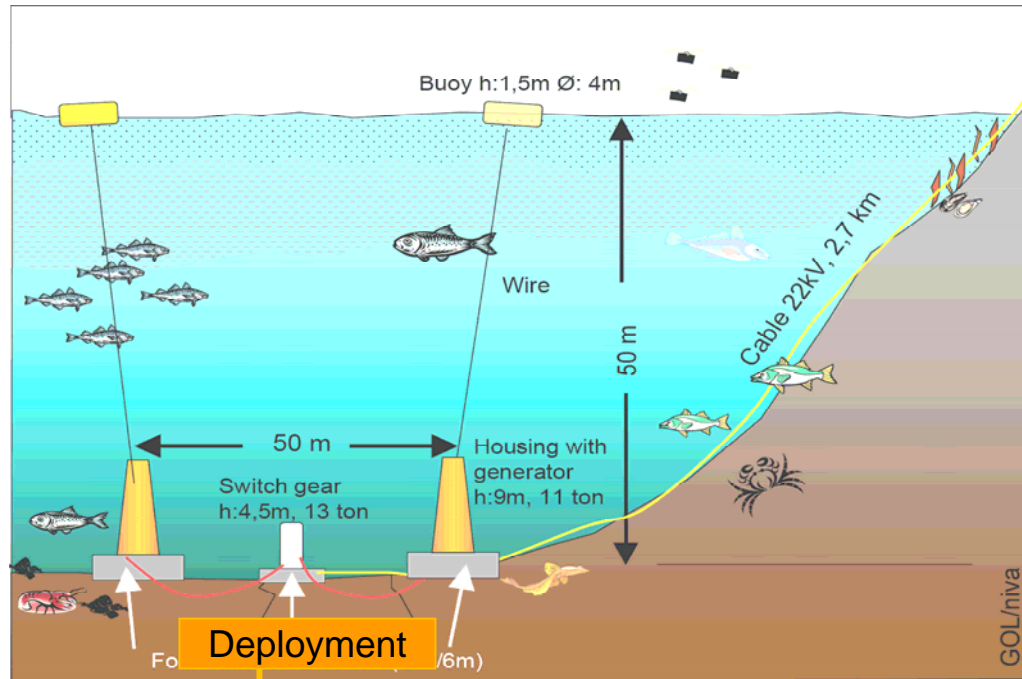
OEP – Markets, companies and projects



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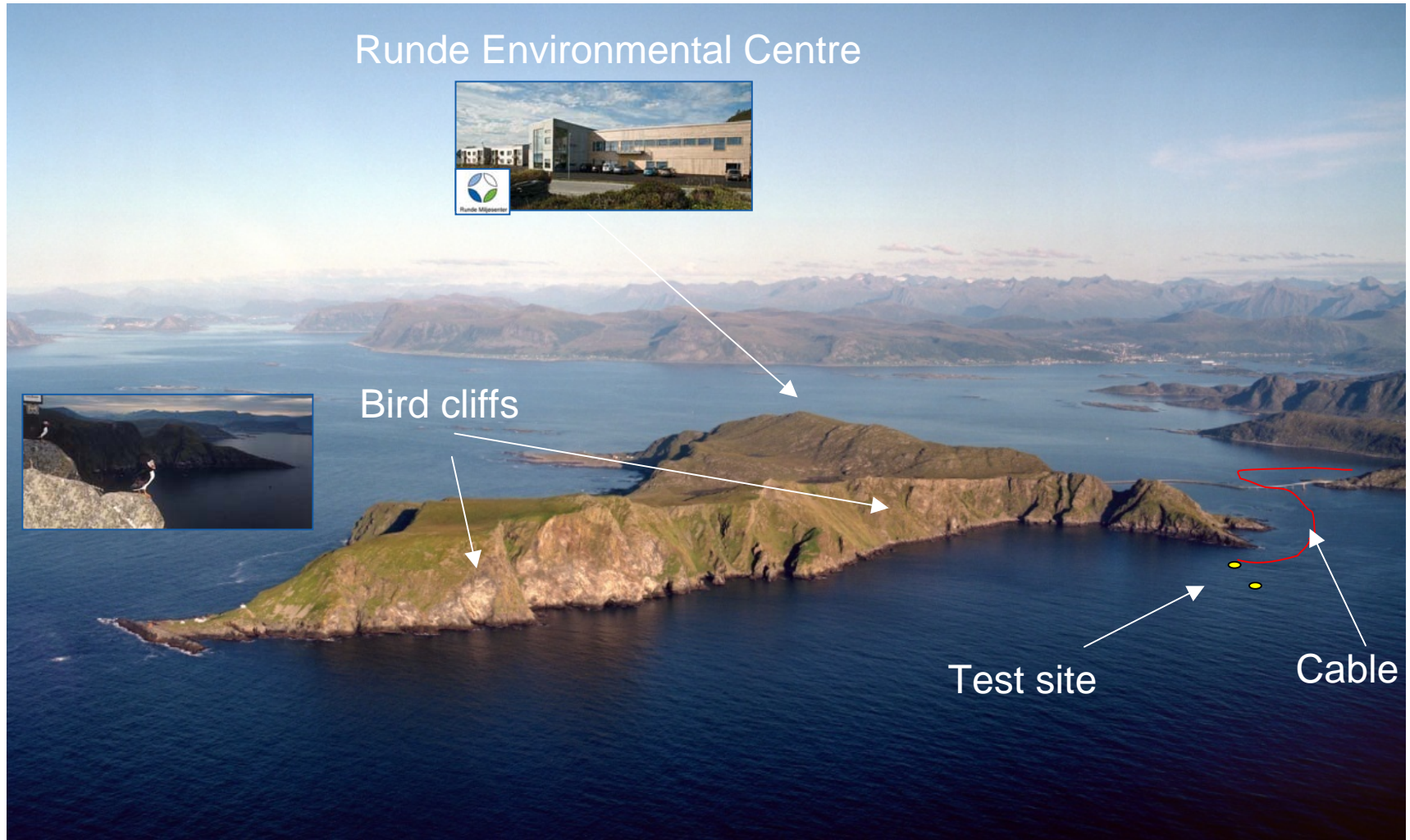
Maren project – initial timeline





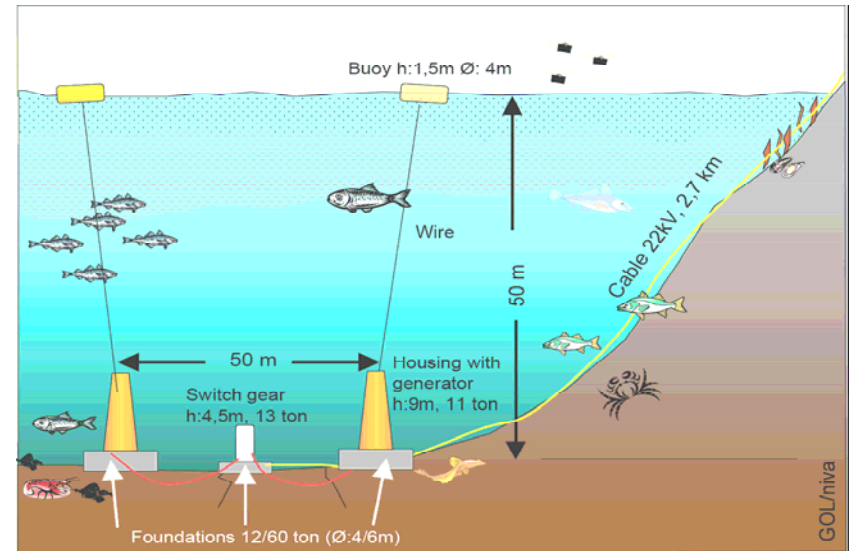


Maren – the location at Runde island



Maren - Environmental activities

- Key environmental concerns:
 - Marine wildlife interaction
 - Bird colony near site
 - Important fishing grounds nearby
 - Fishing and kelp trawling interactions
 - Noise emissions



Site identification

Scoping

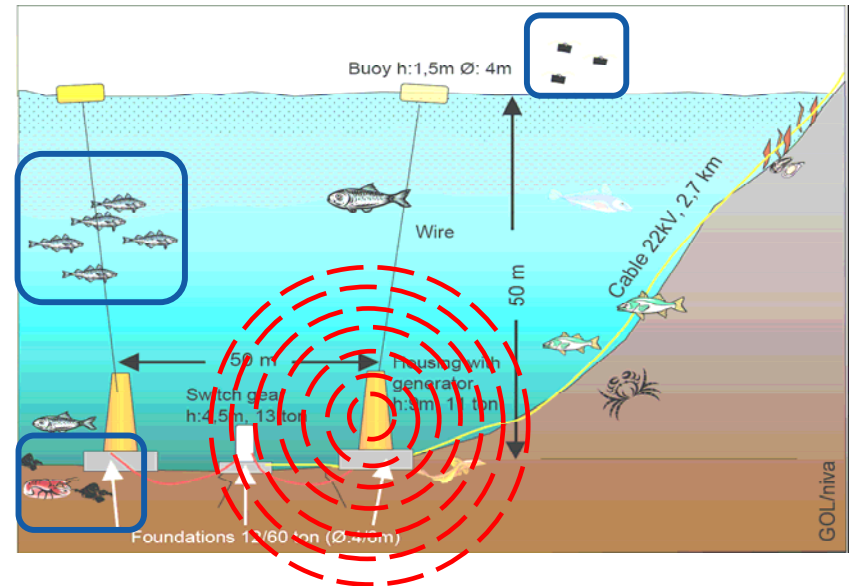
ES

Consenting

Monitor

Maren - Environmental activities

- Key environmental concerns:
 - Marine wildlife interaction
 - Bird colony near site
 - Important fishing grounds nearby
 - Fishing and kelp trawling interactions
 - Noise emissions



Site identification

Scoping

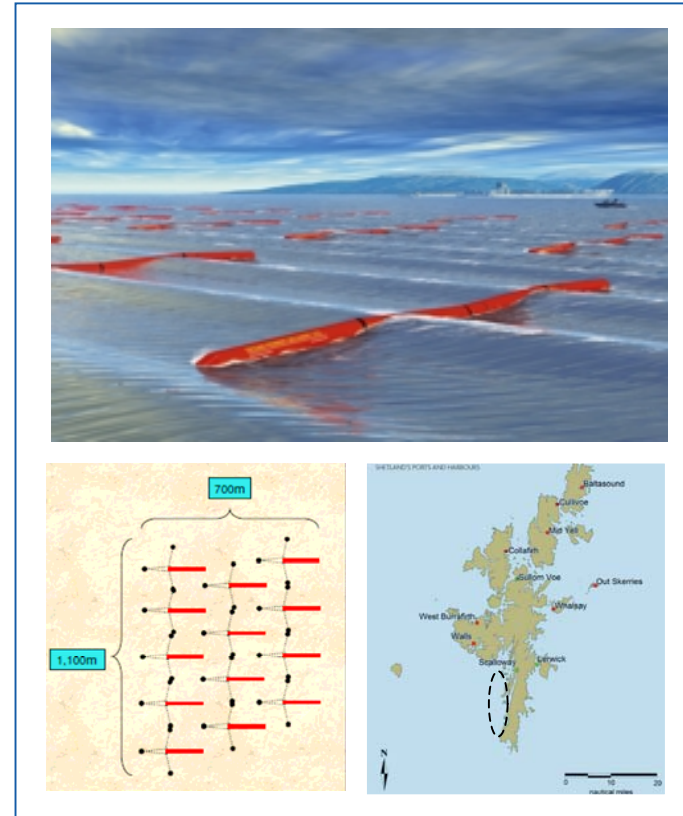
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Consenting

Monitor

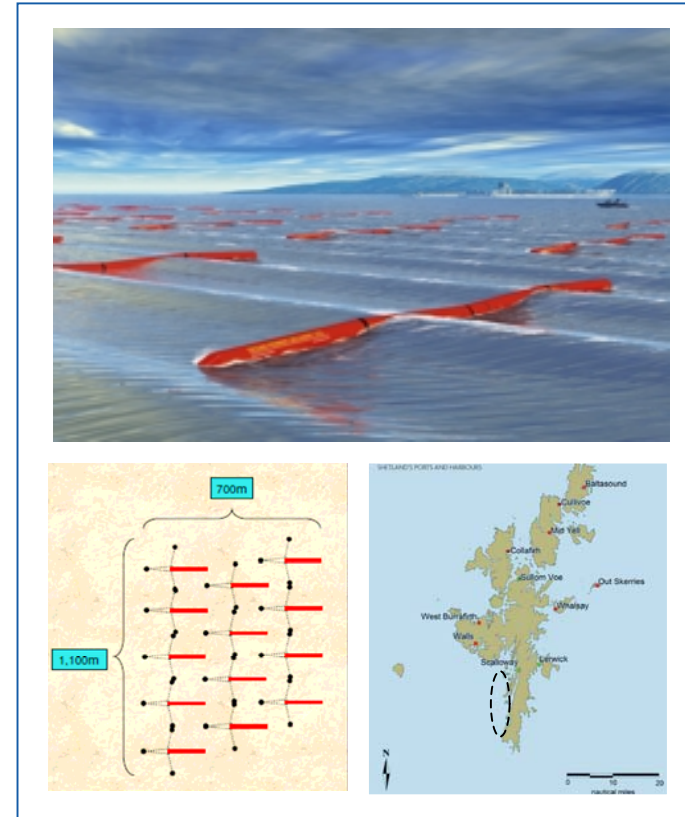
Aegir - Shetland project

- Demonstration plant:
 - 10-20 MW (14-26 Pelamis devices)
 - West coast of Shetland
 - Deployment: 2014?
 - Currently: scoping phase



Shetland - Environmental activities

- Key environmental concerns:
 - Marine wildlife interactions
 - Marine mammals
 - Birds
 - Fishing and aquaculture
 - Navigation
 - Sub-station + cable onshore



Site identification

Scoping

ES

Consenting

Monitor

Cable landing location?

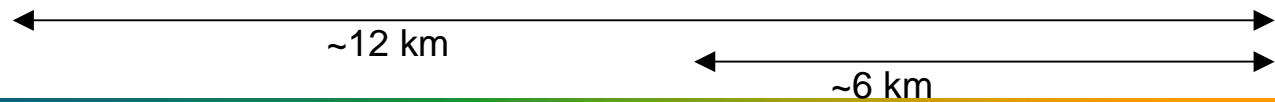
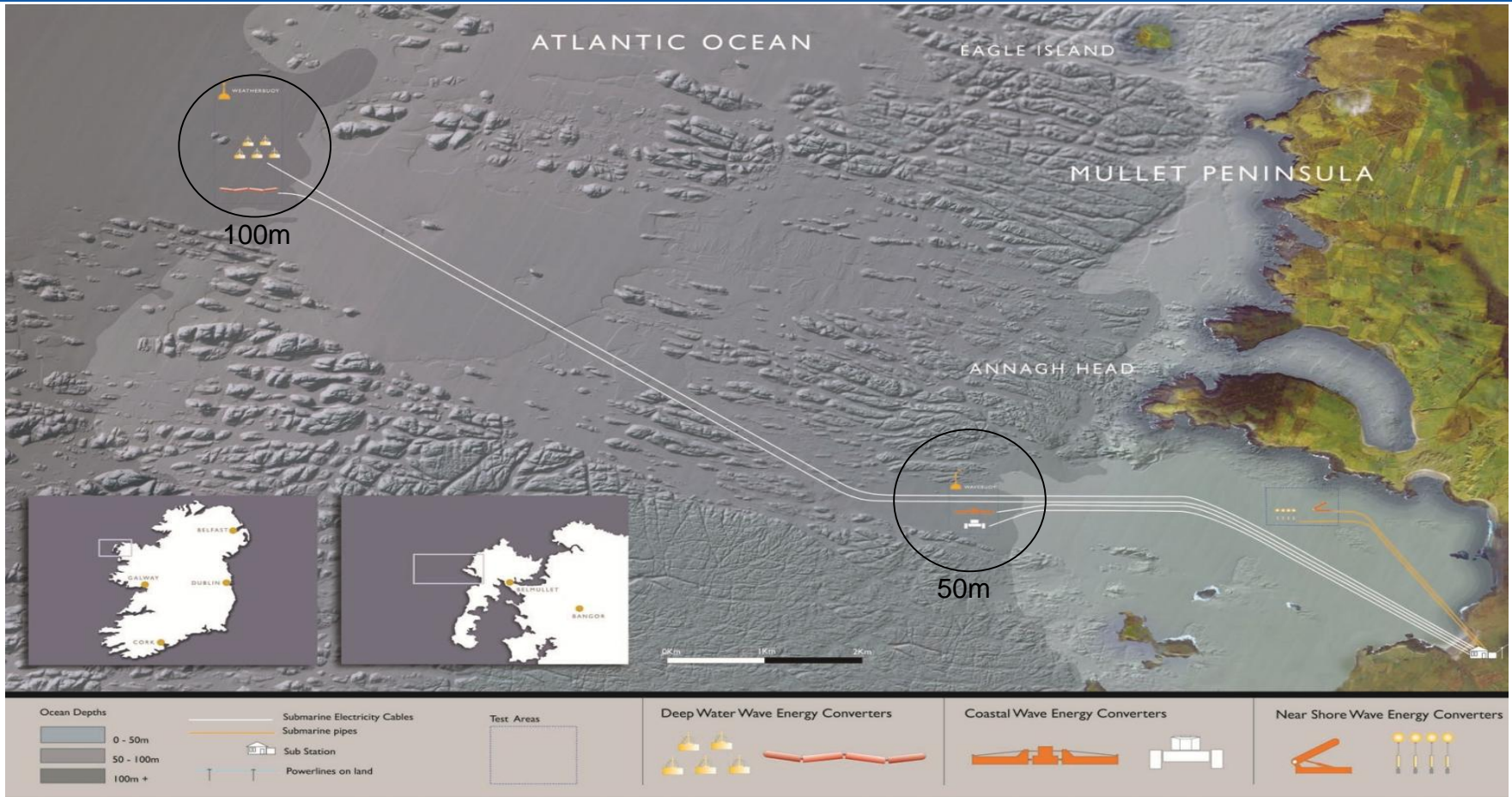


Tonn – Collaborations in AMETS (Ireland)

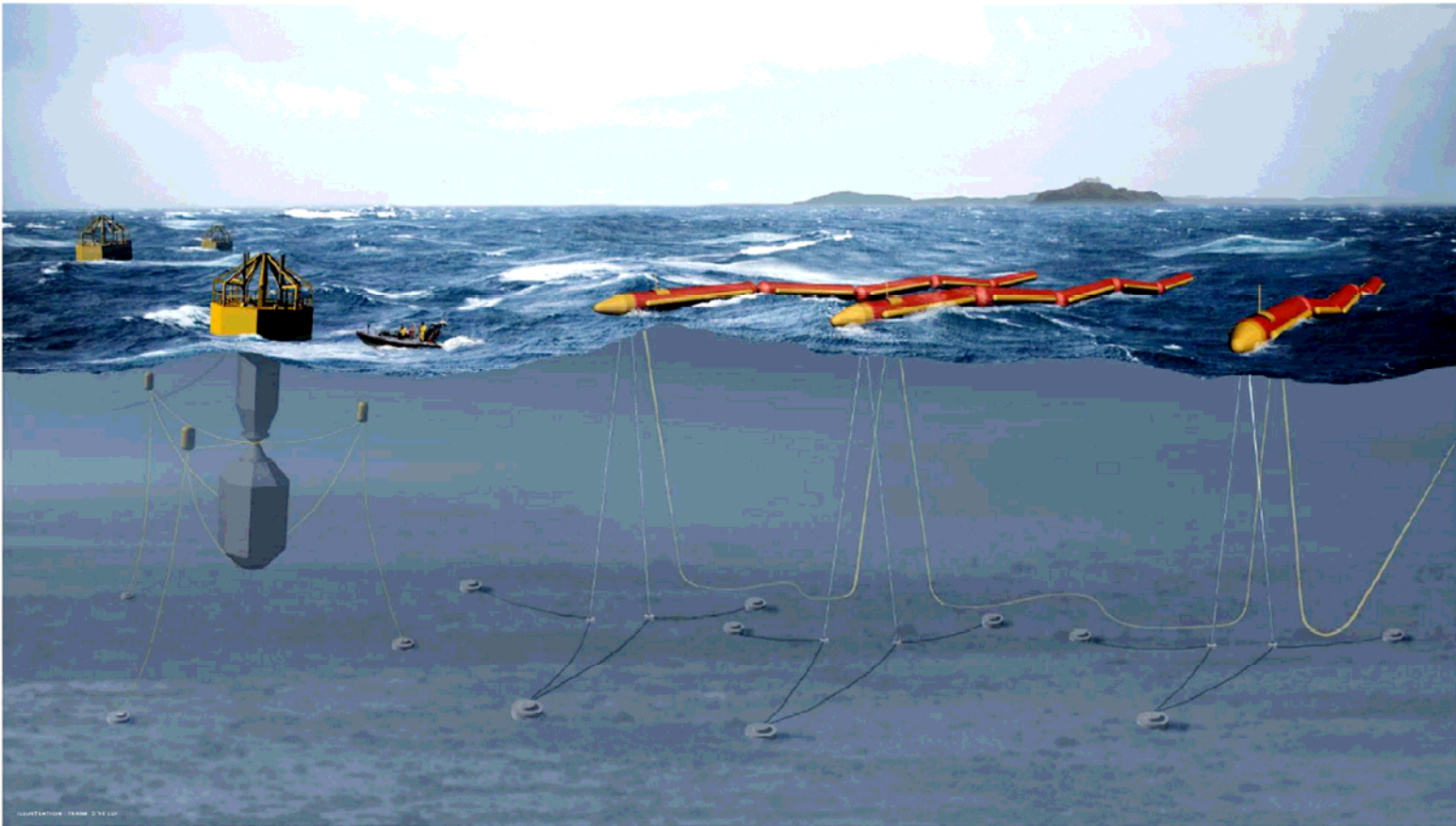
- Demonstration plant:
 - West coast of Ireland (Co Mayo)
 - Part of National test site
 - Atlantic Marine Energy Test Site (AMETS)
 - Sustainable Energy Authority of Ireland (SEAI)
 - Tonn: ~5 MW
 - Deployment: 2013/2014
 - Currently: EIA phase



AMETS – the location



AMETS -- artist impression



Deep-water wave energy converters - Wavebob and Pelamis

Mayo Wave Energy Test Site

AMETS - Environmental activities

- Key environmental concerns:
 - Insufficient data
 - Rare birds near cable route
 - Annex 1 reef structures
 - Coastal and oceanographic processes
 - Loss of grounds for fishing



Site identification

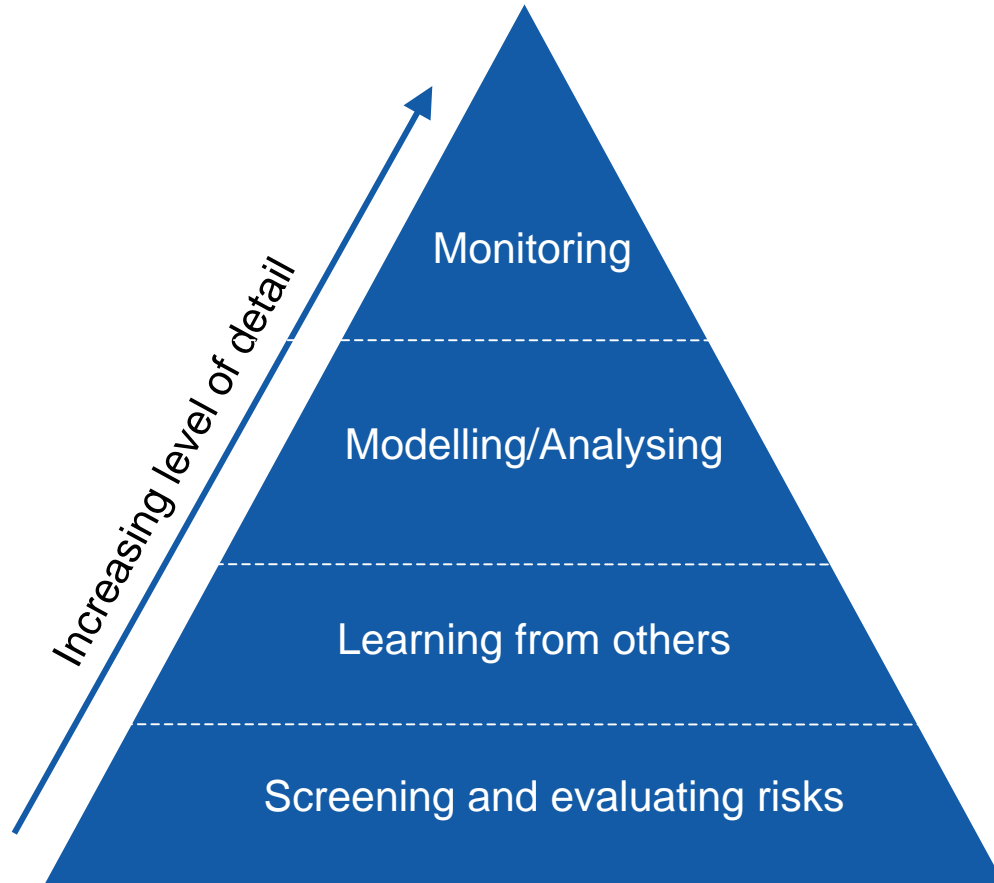
Scoping

ES

Consenting

Monitor

OEP approach for environmental R&D questions



Aim: identify focus areas for our environmental R&D activities

Screening of environmental impacts



← Receptors →

Impact matrix		Receptors																						
		Physical/Abiotic				Organism / Biotic						Human activities												
Damage type	Source of potential impact	Coastal processes	Hydrodynamics	Bottom conditions	Coast and sea water quality	Air quality	Human health	Mammals	Birds	Fish	Politic organisms	Biotic organisms	Mobile biotic organisms	Biofouling organism	Fishery	Recreation	Shipping	Infrastructure like cables	Military activities	Protected environmental areas	Public concern & opinion	Scascope	Archaeology & heritage	
Construction / Installation phase																								
	Port facilities, controlling buildings and substations, cable connections																							
2,3	Transport of material and equipment																							
1	Physical presence of installation plant/equipment																							
1	Mooring / foundation / spuds																							
1	Preparation of Seabased device																							
1	Cable laying																							
1																								
2	Oil leaks																							
Operating phase																								
1,8	Structures presence - floating device																							
1,8																								
1,8	Structures presence - bottom mounted device																							
1,8																								
1,8																								
1,8	Operation of devices, and structures presence																							
5,6,7																								
5,6,7																								
5,6,7																								
14	Sea cable physical presence																							
2	Anti-collision paints																							
2	Leaching from sacrificial anodes																							
2	Leakage of hydraulic fluids/other pollutants																							
2																								
2																								
Maintenance																								
2,3	Transportation of equipment and material																							
1	Physical presence of maintenance equipment																							
1	Temporary removals for maintenance																							
1																								
1																								
2	Oil leaks / Fuel																							
Decommission																								
2,3	Transportation of material and equipment																							
1	Physical presence of decommissioning plant																							
8	Floating device/body removal																							
8																								
8																								
8	Foundation removal incl anchoring																							
8																								
8																								
1	Cable removal																							
1																								
1																								
2	Oil leaks																							
Accidents (including device failure, collision etc)																								
2,3	Unnormal leakage of hydraulic fluid/other pollutant																							
3	Mooring/anchoring failure (release of devices)																							

Source of impact

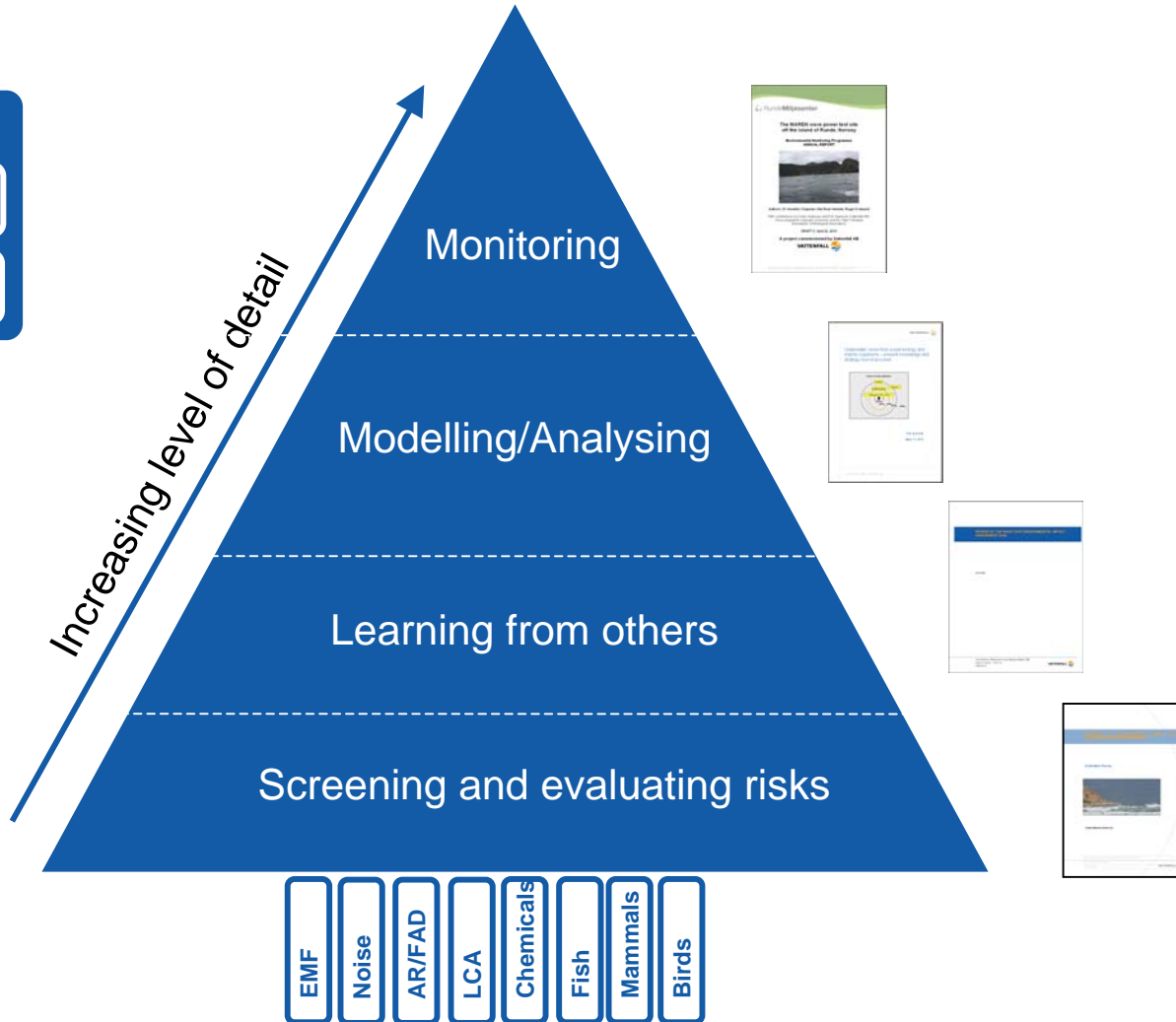
Potential impact	Key
Not relevant	
Major beneficial on environment The impact provides a significant positive gain or activity may contribute to recovery of habitats, improvements of different quality parameters etc. May generate information useful for understanding or management	
No detectable effects on environment Could have detectable effects, mostly not affecting environment Not causing reduced quality, function or production. The effects are either highly limited in time, space or consequence level	
Effects that affect environment Effects that cause reduced quality, function or production with expectation of good or moderate recovery	
Effects that obstruct environment Effects that cause severely reduced quality, function or production, with expectation of poor recovery	

Environmental aspects	Code
Physical presence and/or physical damage to biotopes	1
Emissions	2
Accidents	3
EMF	4
Noise	5
Lightning	6
Physical processes	7
Artificial reef effect	8

OEP approach for environmental R&D questions

STRATEGY:

- Investigate
- Share

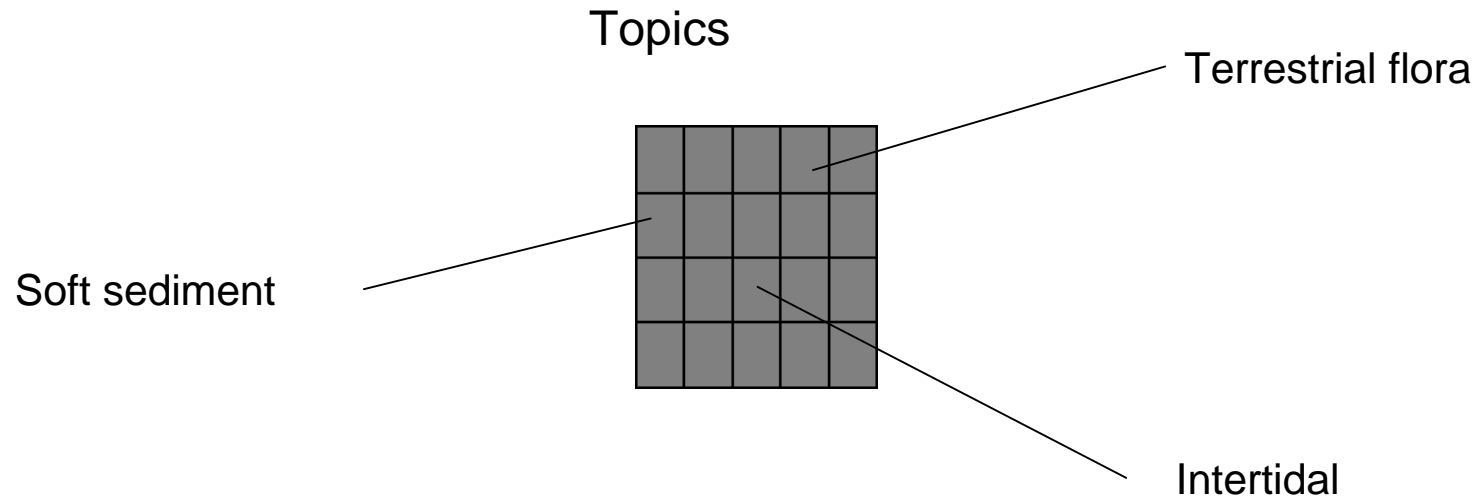


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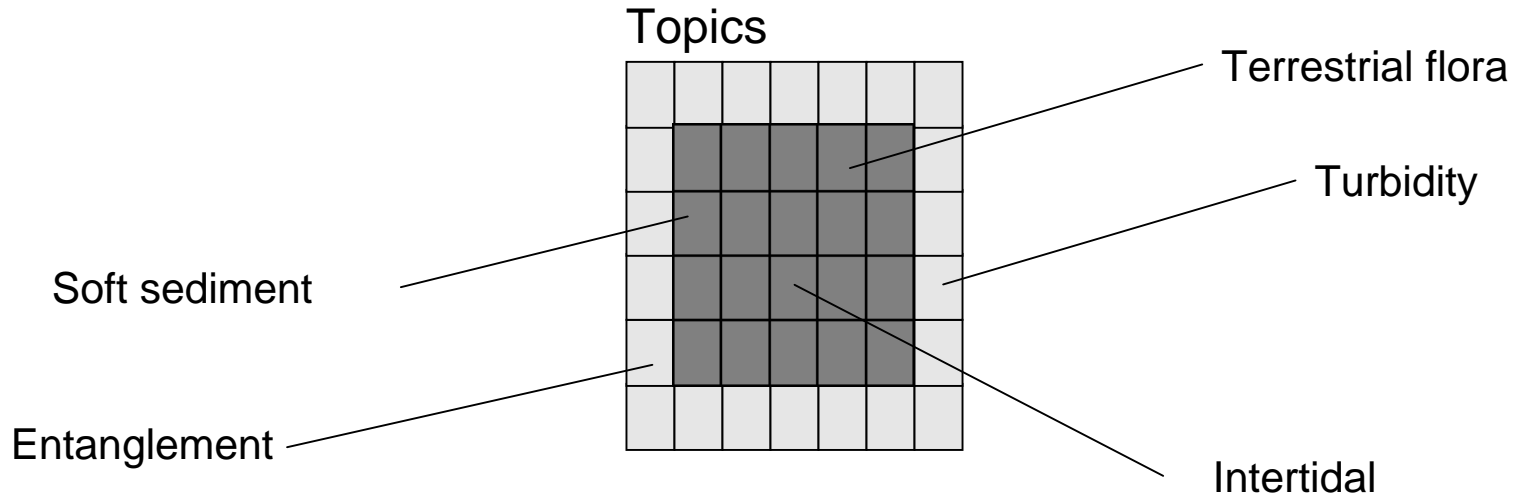
Knowledge required to proceed

For any given project, there are need-to-know topics...



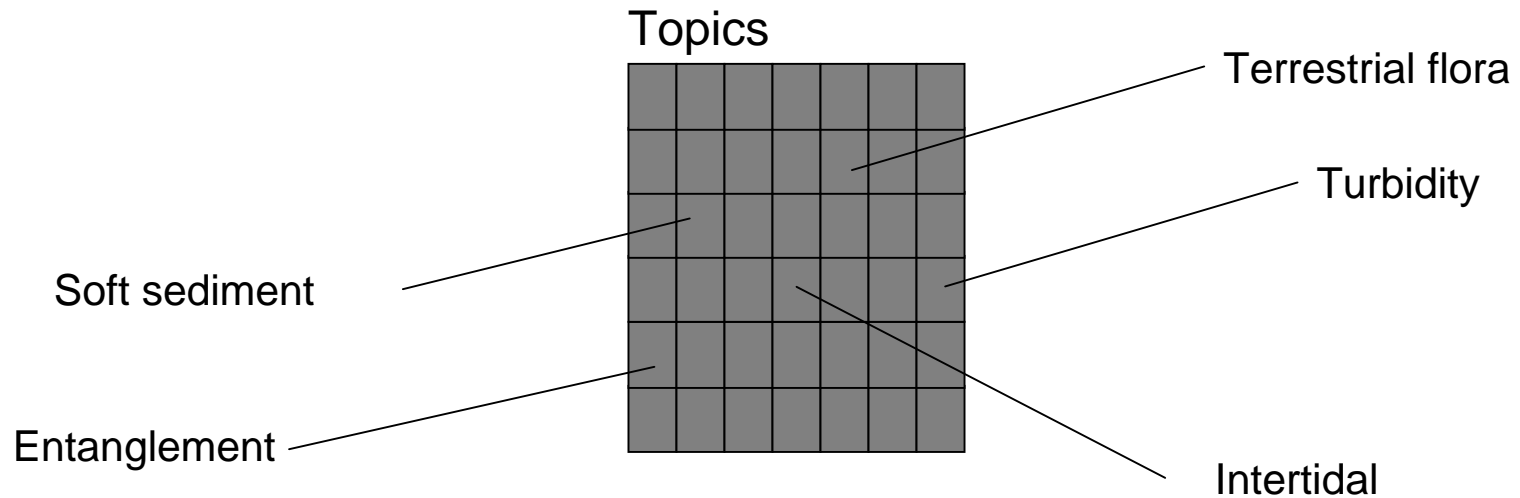
Knowledge required to proceed

For any given project, there are need-to-know topics...
...and there are nice-to-know topics.



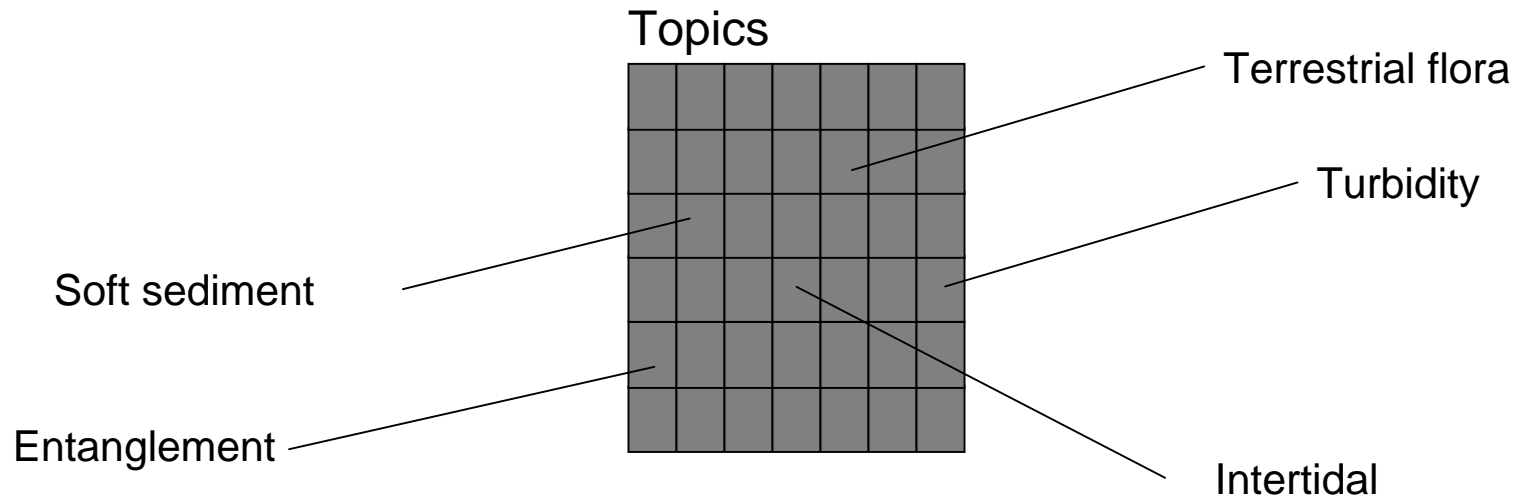
Knowledge required to proceed

Tendency: nice to know is confused with need to know
→ increasing level of requirements on developers



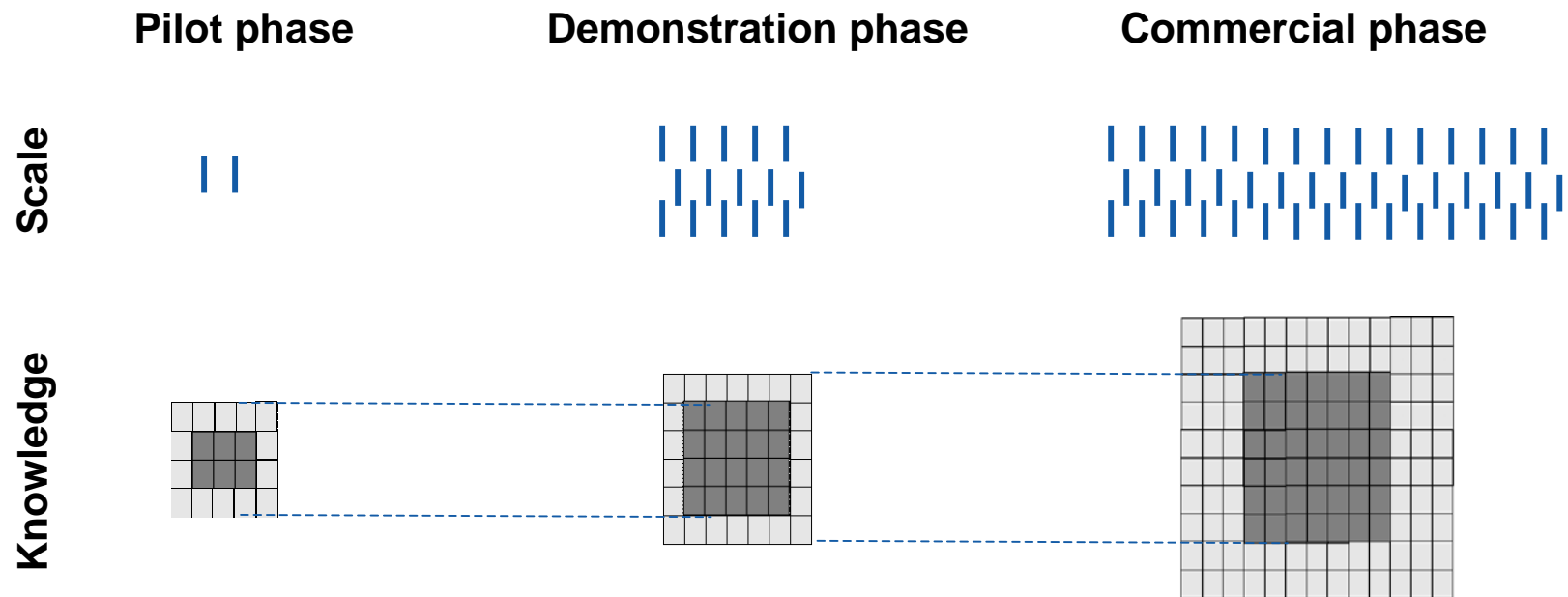
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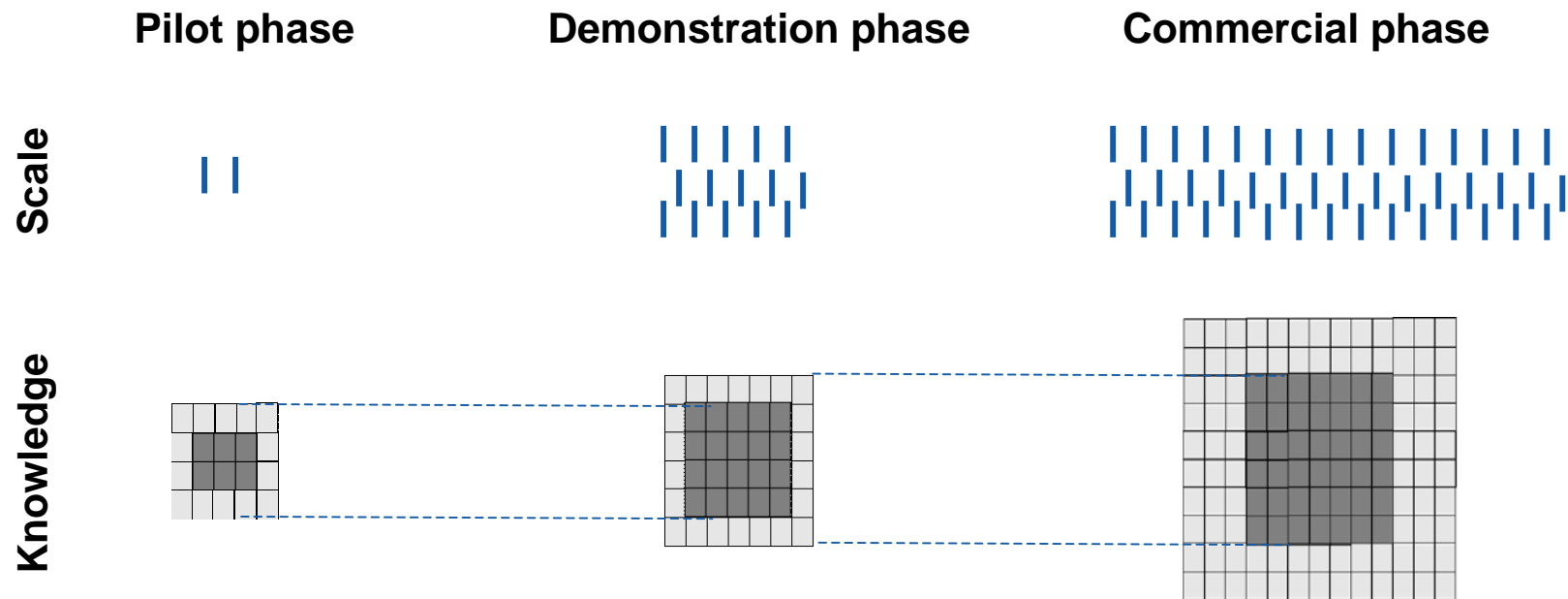


Important to separate these!
Important to divide responsibilities!

Project development ↔ Knowledge level







Project development ↔ Knowledge level

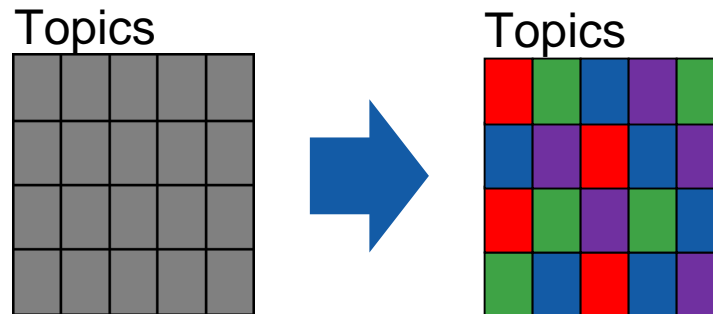


➔ Phased approach needed.
Focus on ticking the right boxes.
Live with unknowns.

Knowledge required to proceed





Topics that are needed, can be addressed in many ways:

-  Modelling & desk top research
-  Baseline field work & assessment
-  Learn from other industries
-  Deploy and monitor

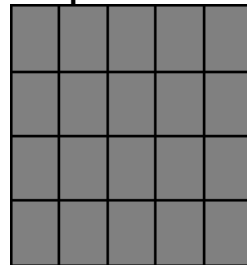


Knowledge required to proceed

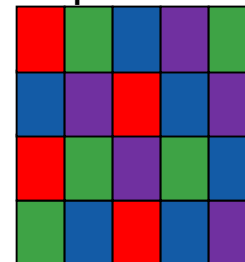
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Topics



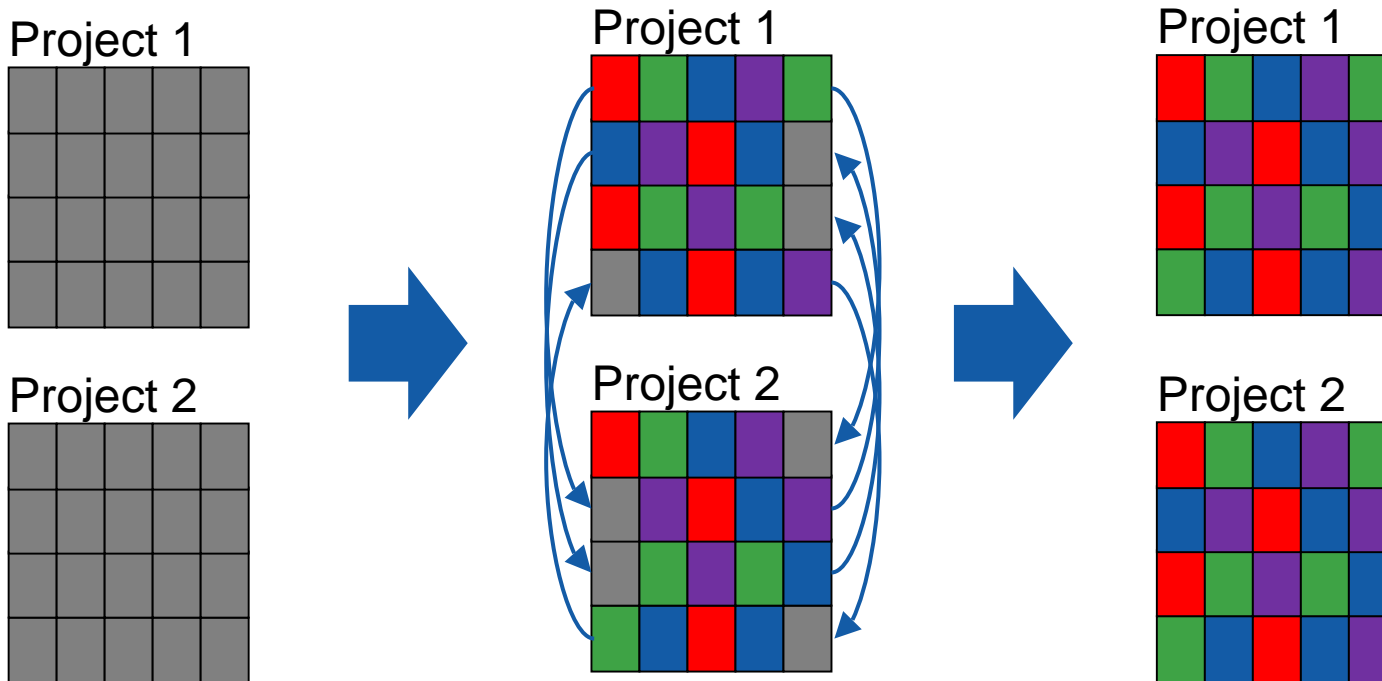
Topics



Different strategies with different delimitations!
Usefulness of results!

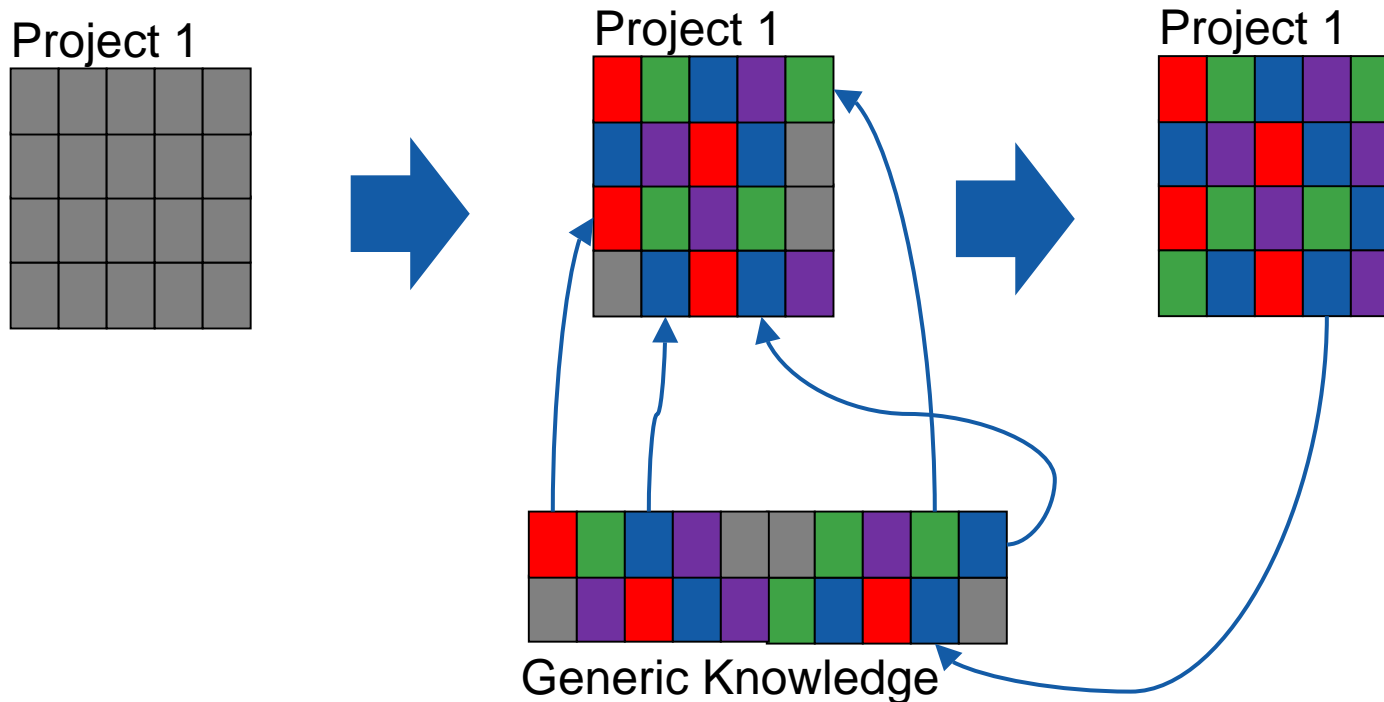
Knowledge required to proceed

Topics that are needed for a project can be filled by **work on other projects**, if standards and protocols exist.



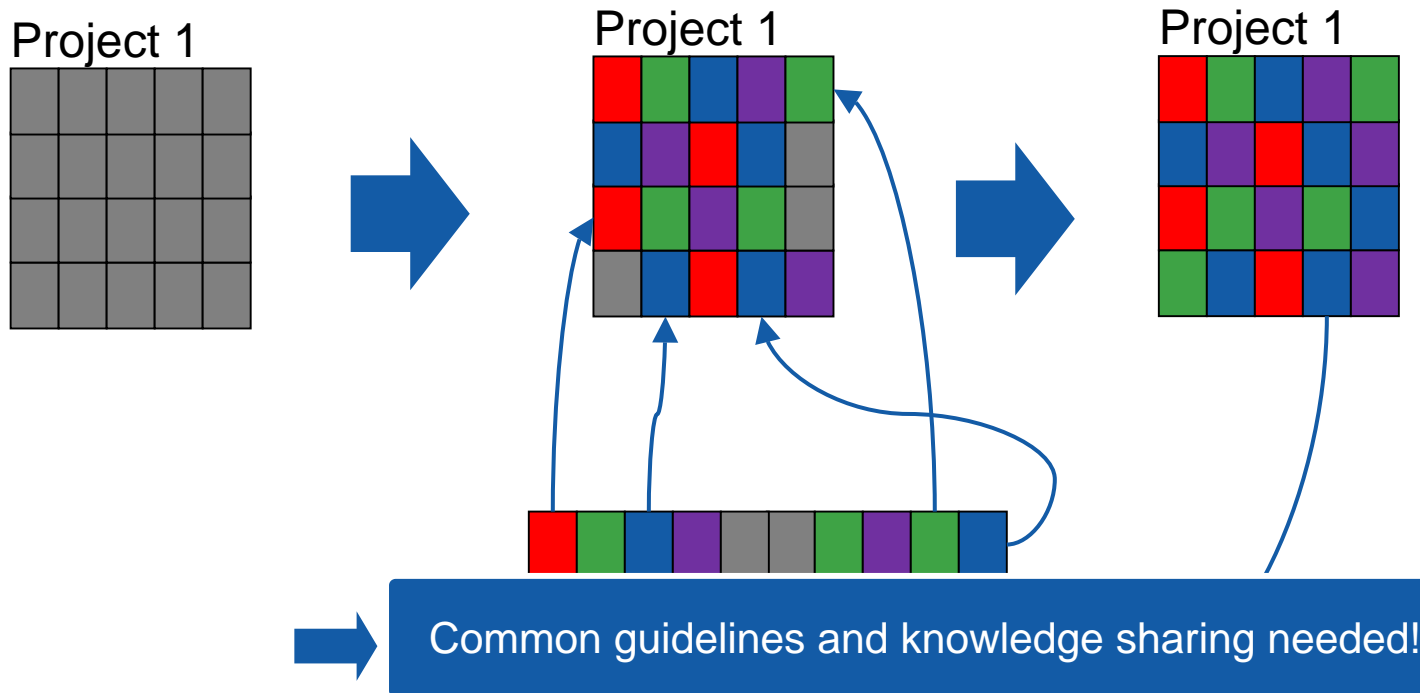
Knowledge required to proceed

Topics that are needed for a project can be filled by **common generic knowledge**, if standards and protocols exist.



Knowledge required to proceed

Topics that are needed for a project can be filled by **common generic knowledge**, if standards and protocols exist.



Conclusions and future needs

- Different and unclear legislative context and processes → clarification
- Concerns → focus on large risks, pragmatic view
- Risks for acceleration in requirements → stepwise approach (phases)
- R&D Responsibilities → clear division between developers/authorities
- Marine environments → many unknowns, live with some uncertainties
- Methodologies → development and streamlining needed
- Field surveying → key objectives and robust design needed
- Information sharing → important to cooperate and tick boxes “for ever”



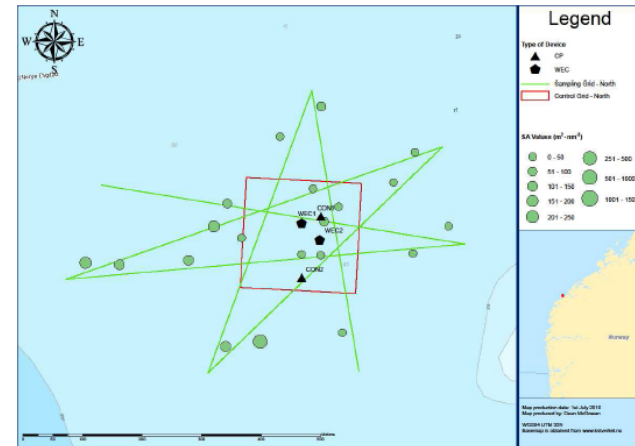
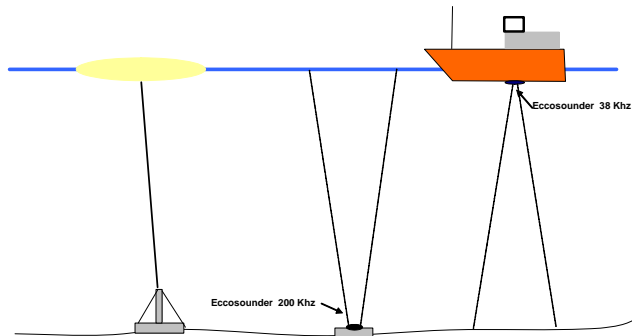
Thank you for listening!

Questions? Please contact me :
kristin.andersen@vattenfall.com
0046-706-183 897



Extra slides – field surveying at our sites

Maren - Fish



Λογισμικό ηθελήνηγ ενάσας. Ορέλιασ sampling γην πωλ ενάσας σταύρος ημωρέσασ σεφθέηηηηη.

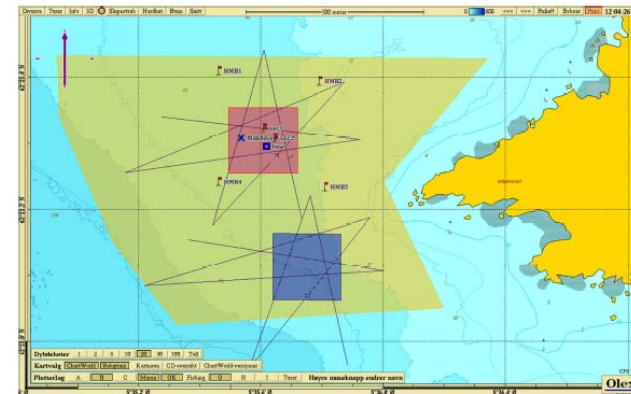
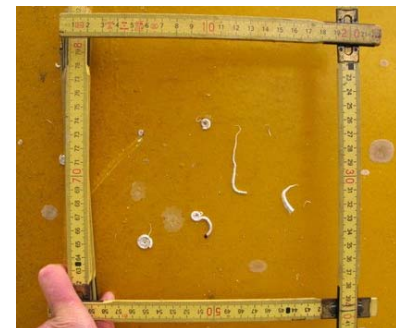
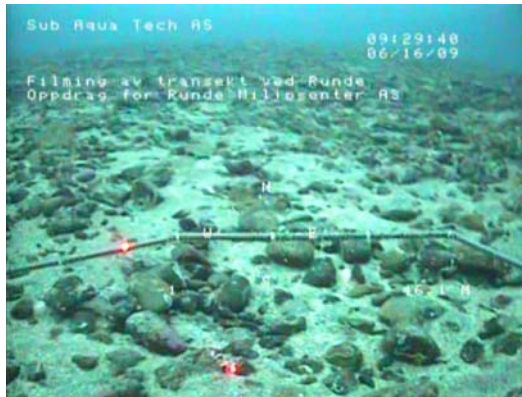
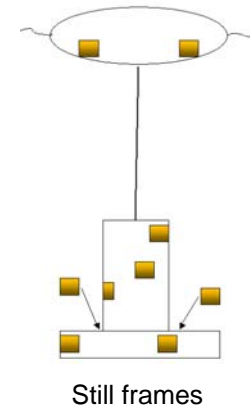
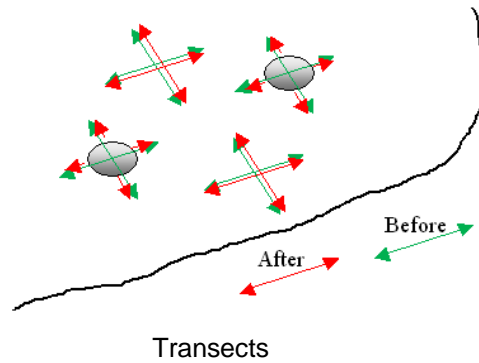
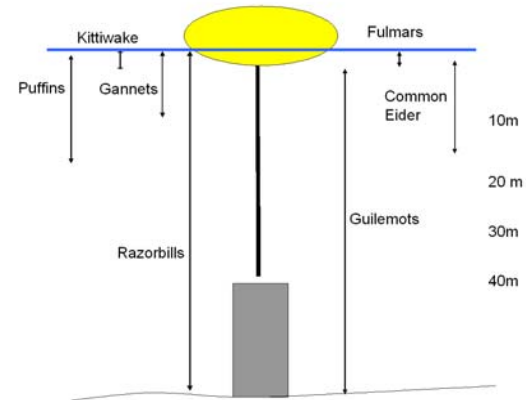
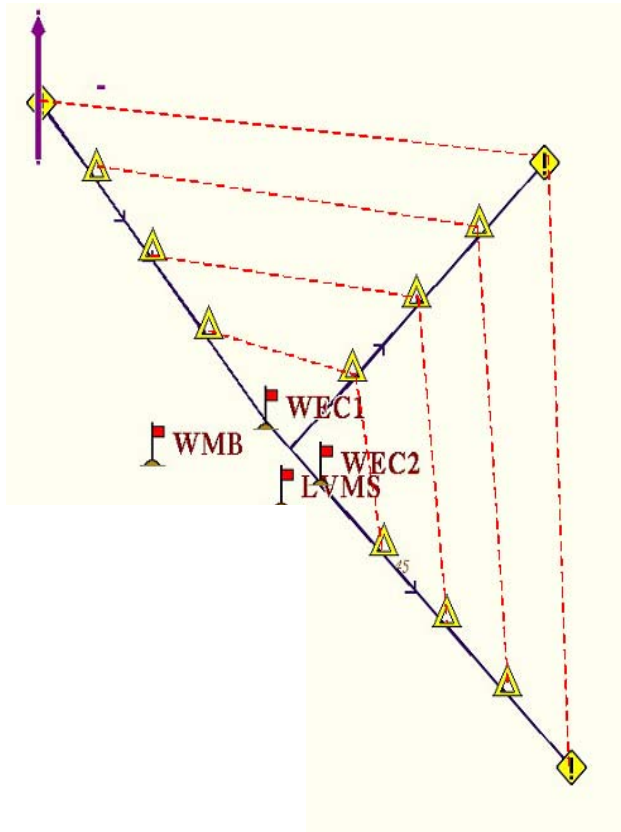


Fig 1b. Sampling patterns for echo soundings at MAREN test site, March 4 / 5, 2010. MAREN installations

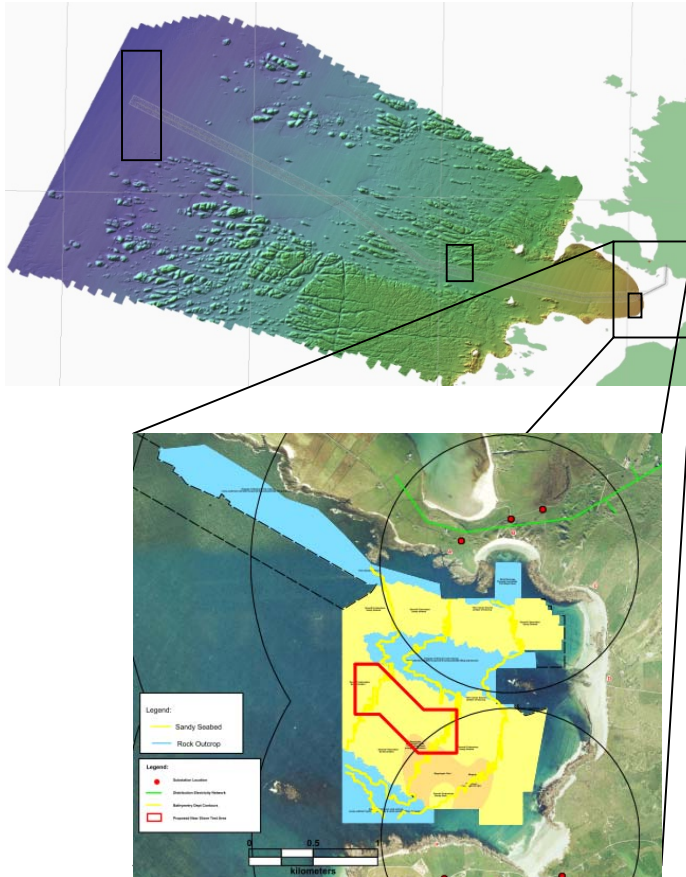
Maren - Benthos



Maren - Birds

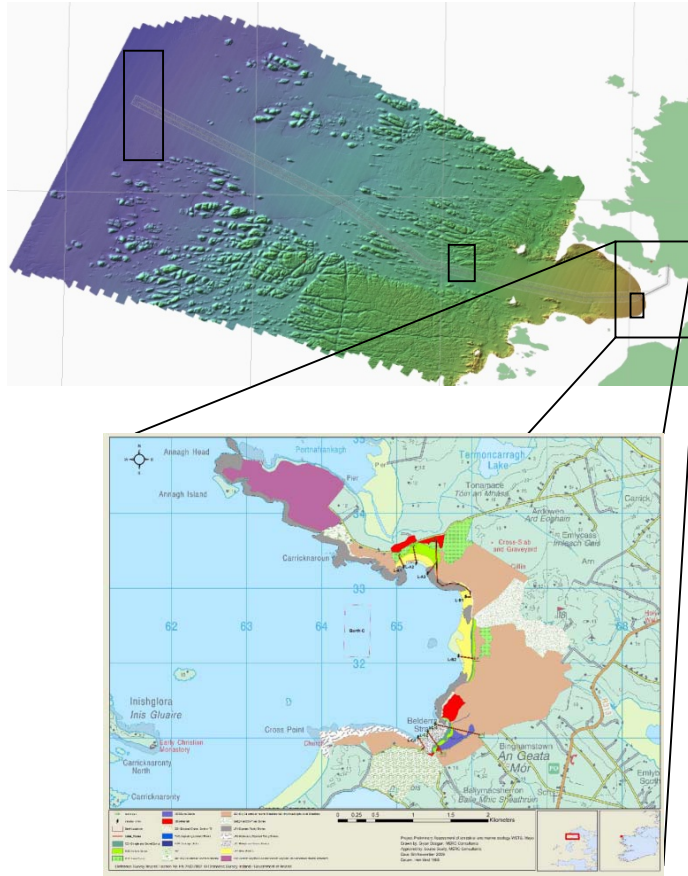


AMETS - Environmental aspects

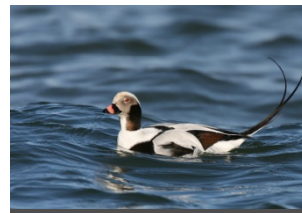


- Focus areas EIA:
 - Archeology
 - Navigation and safety
 - Sea bottom
 - Reef structures (Annex I)

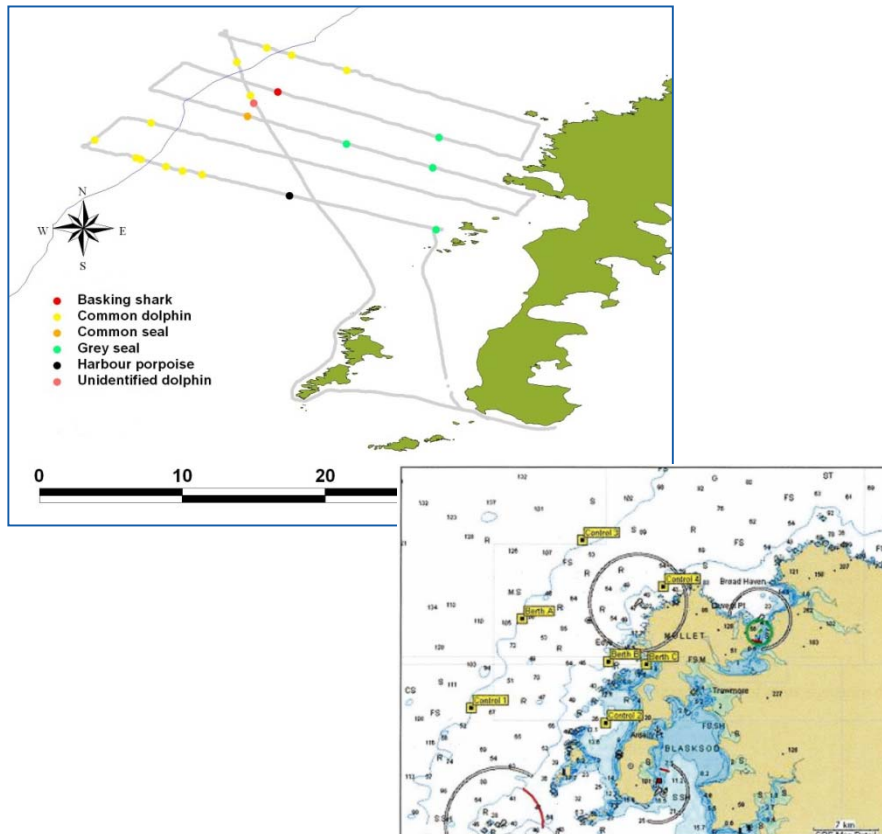
AMETS - Environmental aspects



- Focus areas EIA:
 - Archeology
 - Navigation and safety
 - Sea bottom
 - Reef structures
 - SAC (Annex I and II)
 - Ornithology (pSPA)



AMETS - Environmental aspects



- Focus areas EIA:
 - Archeology
 - Navigation and safety
 - Sea bottom
 - Reef structures
 - SAC (Annex I and II)
 - Ornithology (pSPA)
 - Marine mammals
 - Underwater noise