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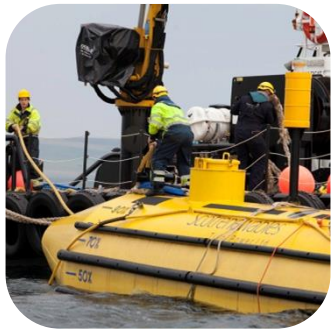

Monitoring for Environmental Effects of Marine Energy Devices at EMEC – Options, Challenges, and Indications

IEA-OES Annex IV Webinar, 21 July 2015

Jennifer Norris
Research Director

Location

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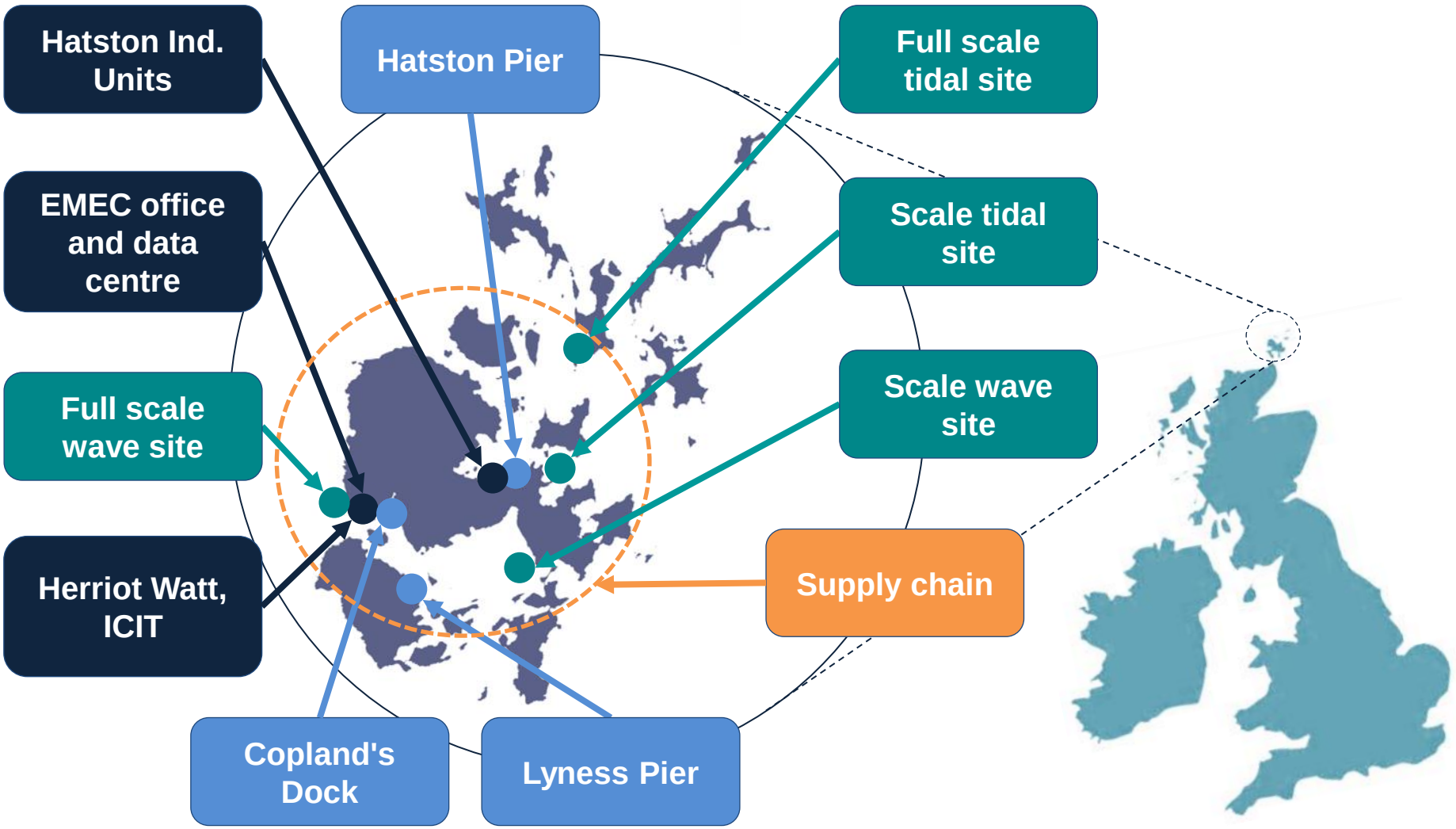

Environmental risks

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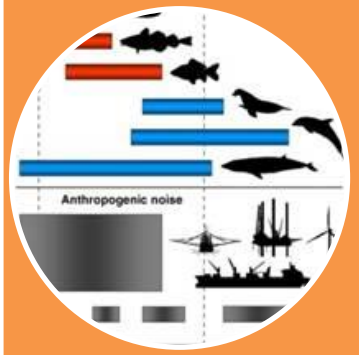
Collision

Potential for physical interactions

Displacement

Potential for marine wildlife displacement from habitual waters



Noise emissions

Noise emitted underwater by installation and operation

Leisure and commercial activities

Notably fishing

Navigational Safety

Clear device marking

Coordinated approach to engage stakeholder and efficiently deliver

Environmental risks

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1. Collision

Potential for physical interactions (collision, causing harm or displacement) between marine wildlife and underwater moving parts of turbines

- Especially marine mammals, diving birds

Environmental risks

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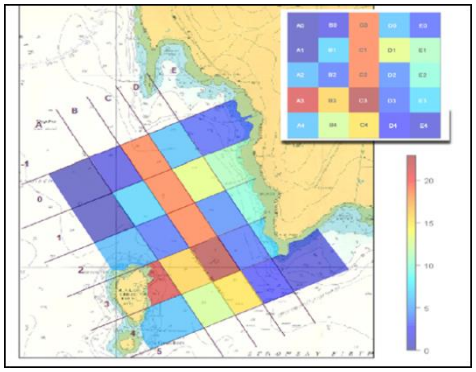
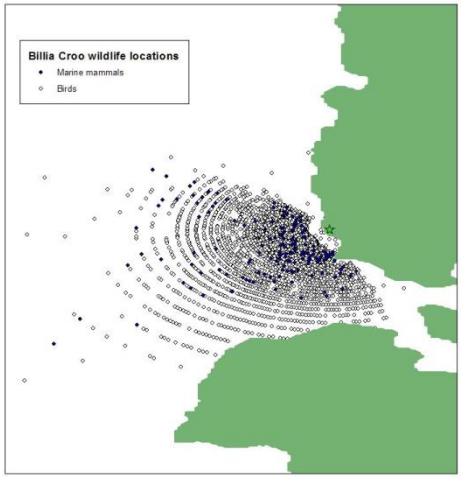
2. Displacement

Potential for marine wildlife displacement from habitual waters

- Especially marine mammals, diving birds





Environmental risks

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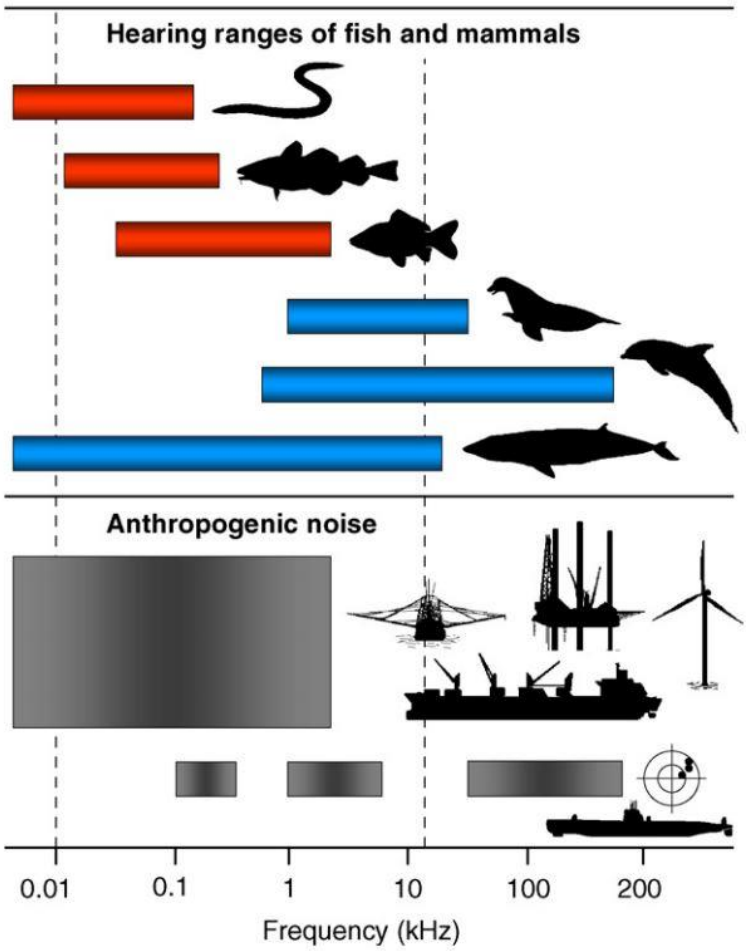
3. Noise emissions

Potential for harmful effects on wildlife of noise emitted underwater by installation and operation of devices

- Displacement
- Physical harm (hearing disruption)



Socio-economic Impact

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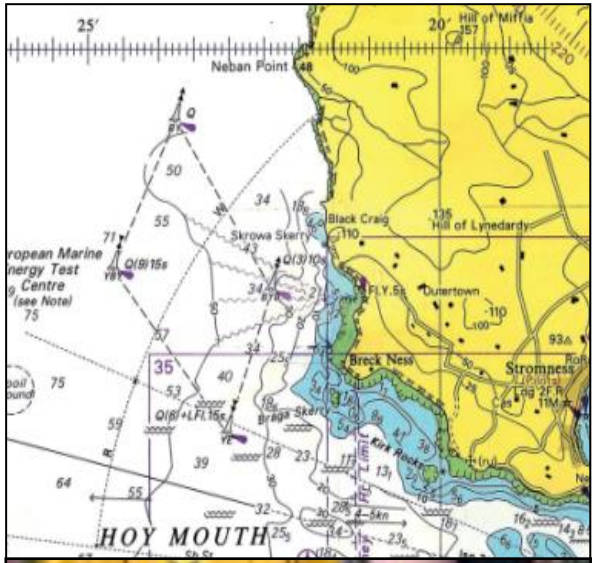
4. Impact on all other sea users

- Shipping
- Tourism
- Leisure
- Primary are of concern – Commercial Fisheries



To Model or Monitor?

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Use of Encounter Rate and other Models

- Need to ground truth behavioural information in models
- Lack of evidence base
- Plan, Deploy and Monitor approach…

Data Gathering by Monitoring Devices *in situ*

- Many challenges …

Challenges of monitoring

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Conditions

- Sub-surface data collection
- Day-light hours
- Weather
- Low light
- Biofouling
- Tidal state

Practical

- Vessel availability
- Costs
- Deployment methods
- Night-time coverage

Technical

- Disturbance caused by sensors
- COTS sensors inadequate
- Data retrieval & storage
- Data interpretation

Approaches to Monitoring at EMEC

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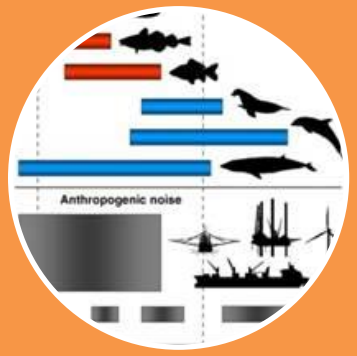
Collision

- Cameras / video
- Strain gauges
- Internal hydrophones
- Active sonar
- Need for an integrated approach

Displacement

- Land-based visual observation
- Analysis of long-term datasets
- Project underway (end of 2015)



Noise emissions

- Record sound of devices in operation
- Characterise output
- Estimate effects on species of interest
- Need consistent & robust studies

Inshore fisheries

- Lobster study
- Dual scientific and socio-economic aims
- Close liaison with fishers
- Further study underway

EMEC Monitoring Advisory Group (MAG)

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- EMEC, regulators & environmental advisors (SNH, SMRU)
- Address key uncertainties from the regulatory process – generic monitoring a EMEC
- Help source funding for generic monitoring
- Review developer monitoring & research projects to assess adequacy & success of different methods
- Advise on future monitoring
- Overall finding –current methods provide limited evidence but show potential for improvement

Case study: Integrated environmental monitoring

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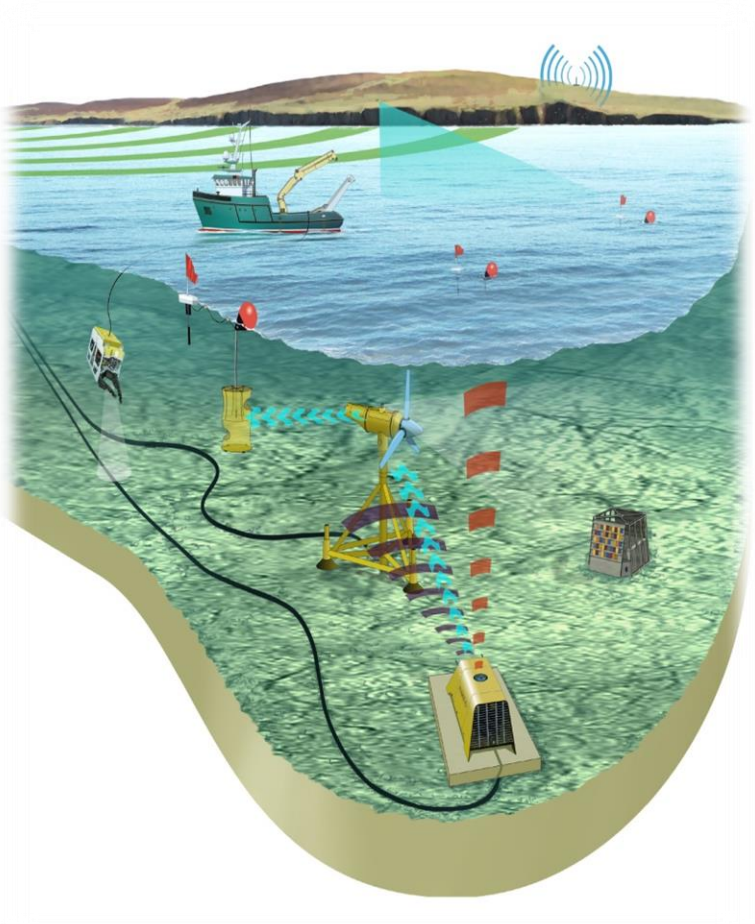
- Main driver: uncertainties from the regulatory process
- Key environmental concerns: Collision; Underwater Noise; Displacement
- Challenge: Complex issue in a complex environment
- Solution: Integrated approach using a variety of complimentary measurement streams



EMEC-IMP

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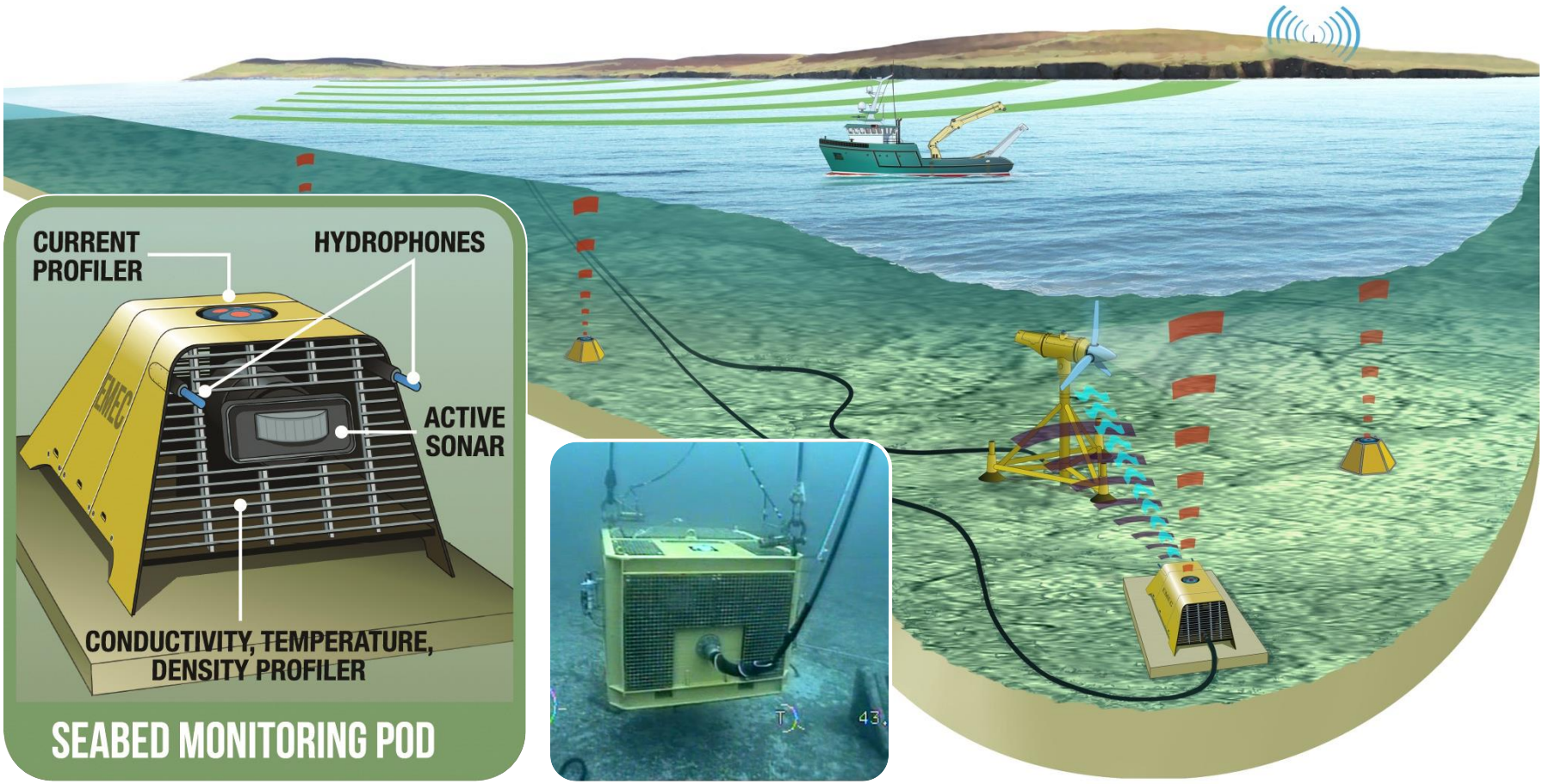

What is needed?

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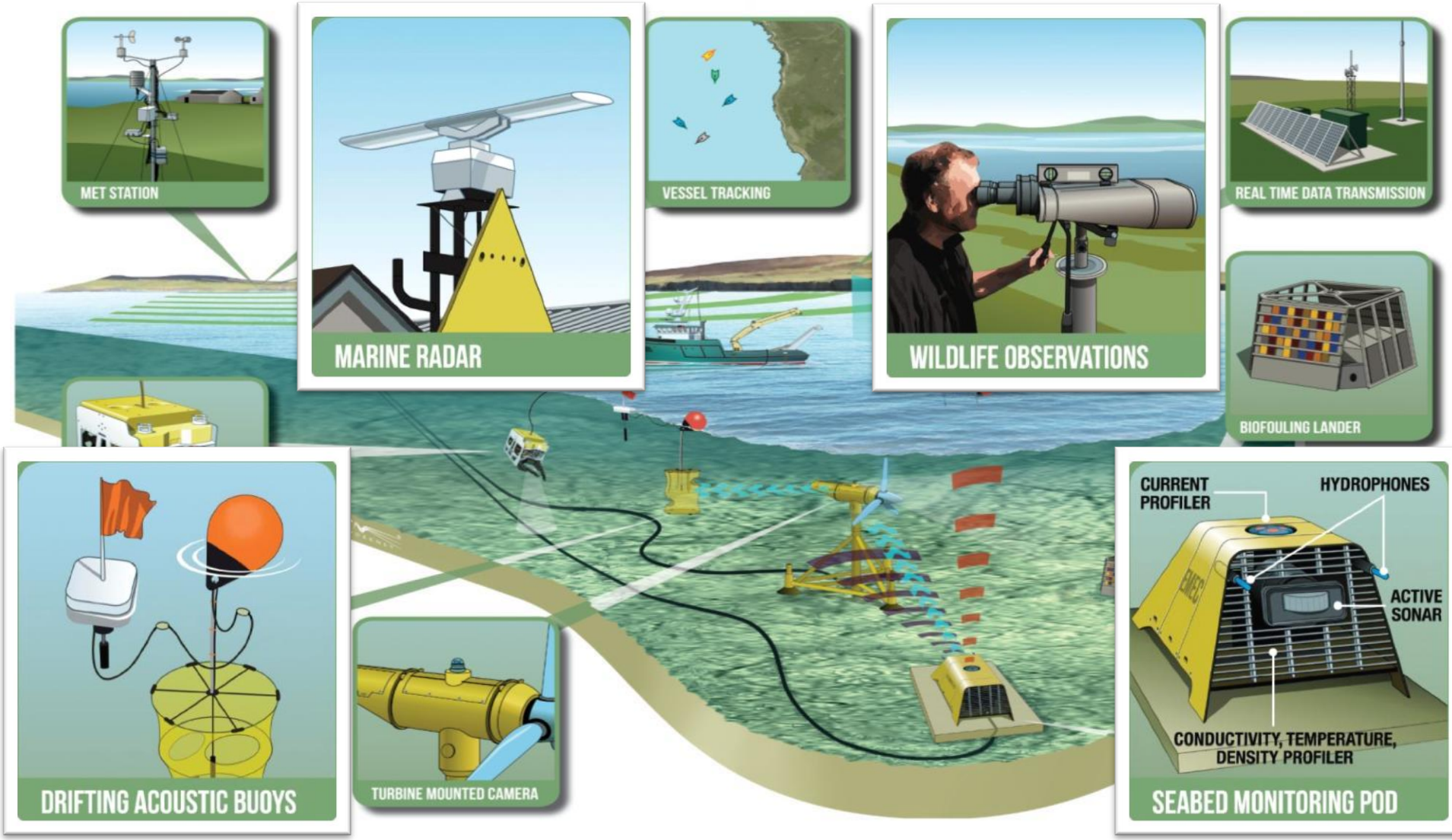

Summary

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- Evidence base still urgently needed to aid regulatory decision making
- Monitoring of devices in situ is fraught with difficulties
- Data analysis needs to be automated
- Automation is problematic
  - Data volume
  - Full integration complex and costly

Dissemination of findings from EMEC MAG expected later this year.

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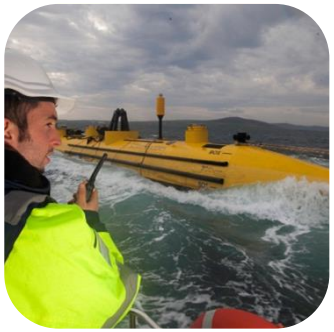



Thank you