



Why Robot?

The case for Marine Autonomous Systems in
Offshore Renewable Energy Developments

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11 Apr 2024

ORE Catapult

- Catapult network established 2013 by UK Gov via Innovate UK
- UK's leading offshore renewable energy innovation centre
- Independent & trusted
- Unique combination of world-leading test & demo facilities
- Engineering & research expertise.
- Convenes the sector, delivers applied research
- Accelerating technology development, reducing risk & cost
- Enhancing UK-wide economic growth & progress to Net Zero



ORE Catapult



NHS

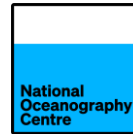



Lifeboats



CATAPULT
Offshore Renewable Energy




National
Oceanography
Centre



BSAC
Dive with us



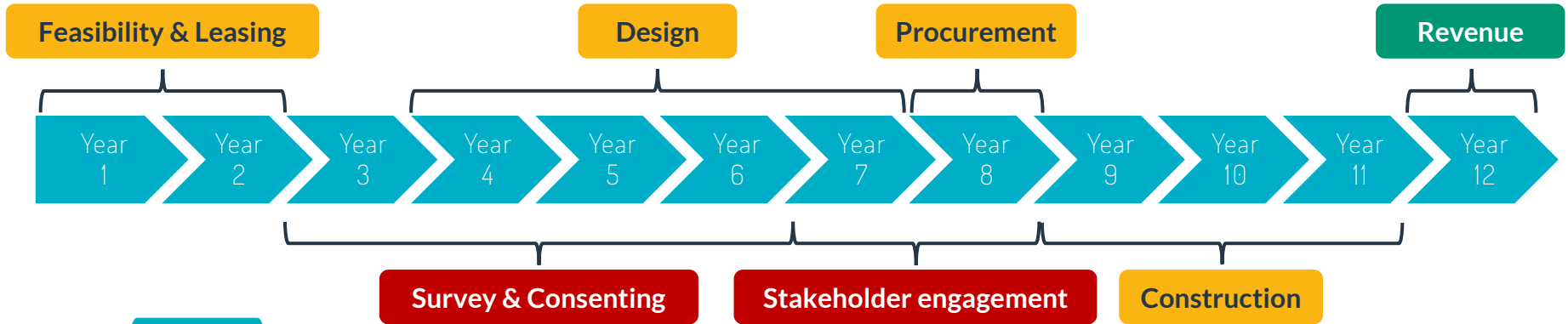
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CATAPULT
Offshore Renewable Energy

Uncertainty in Environmental Consenting

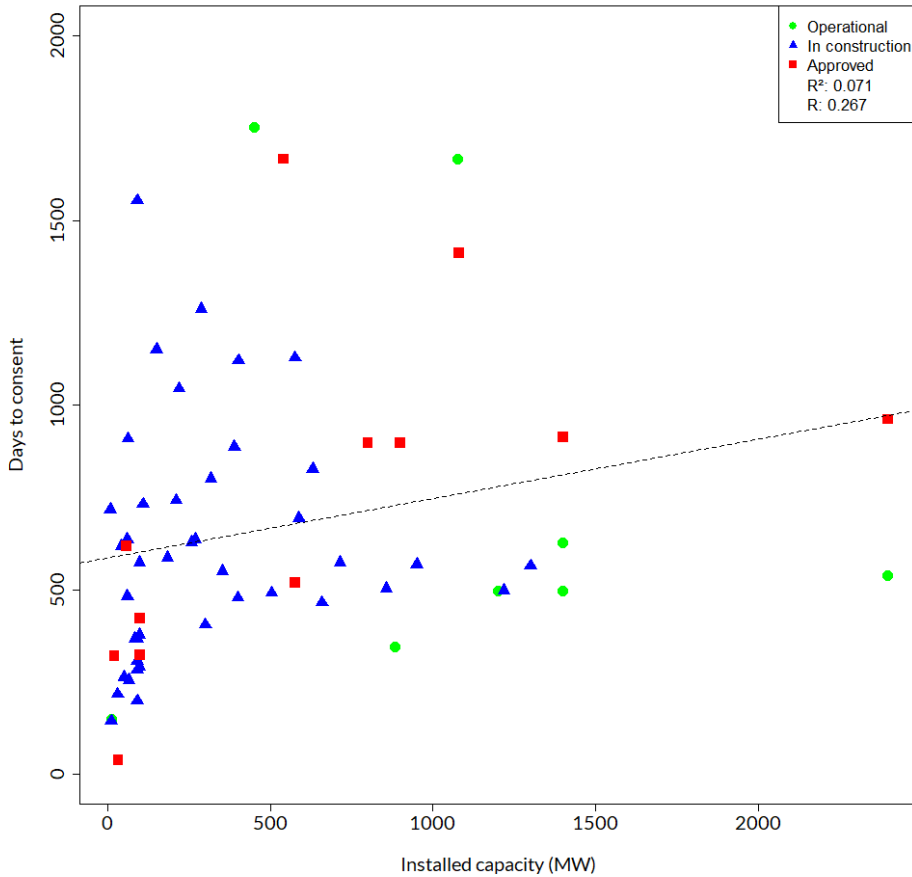


£4 million

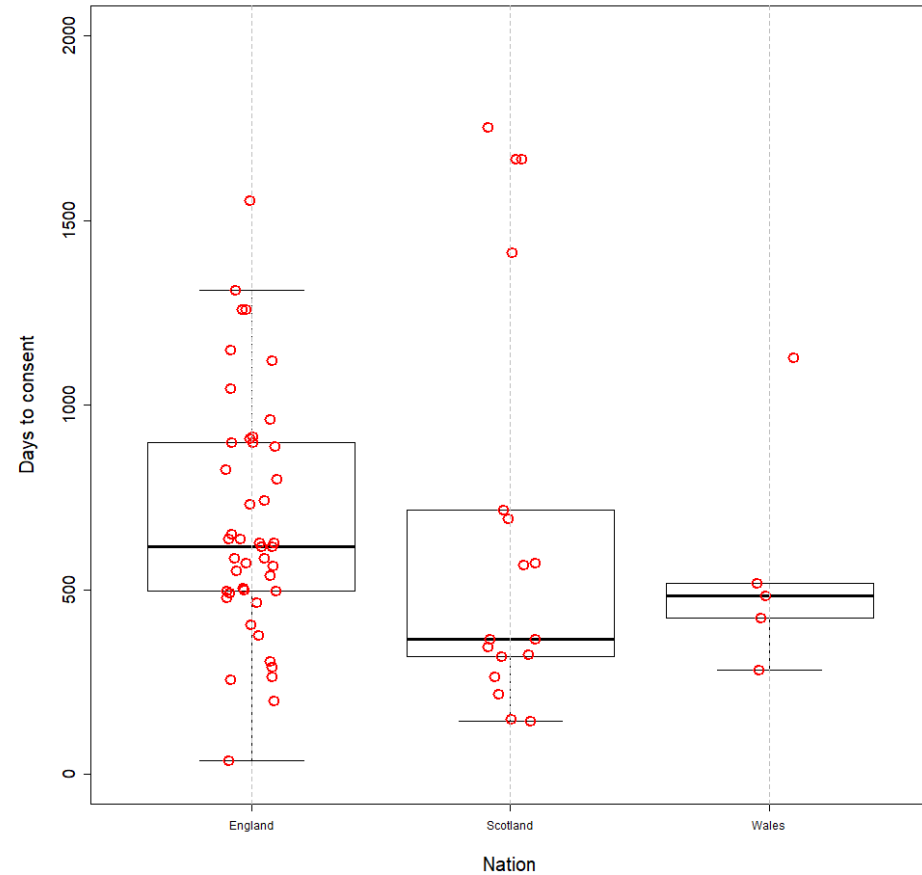
cost of consenting work
per GW of offshore wind
energy capacity

Uncertainty in Environmental Consenting

Offshore Wind developments time to consent (DESNZ Feb 24)



Offshore Wind developments time to consent (DESNZ Feb 24)



Data source | HM Gov Dept for Energy
Security & Net Zero (Feb 2024)

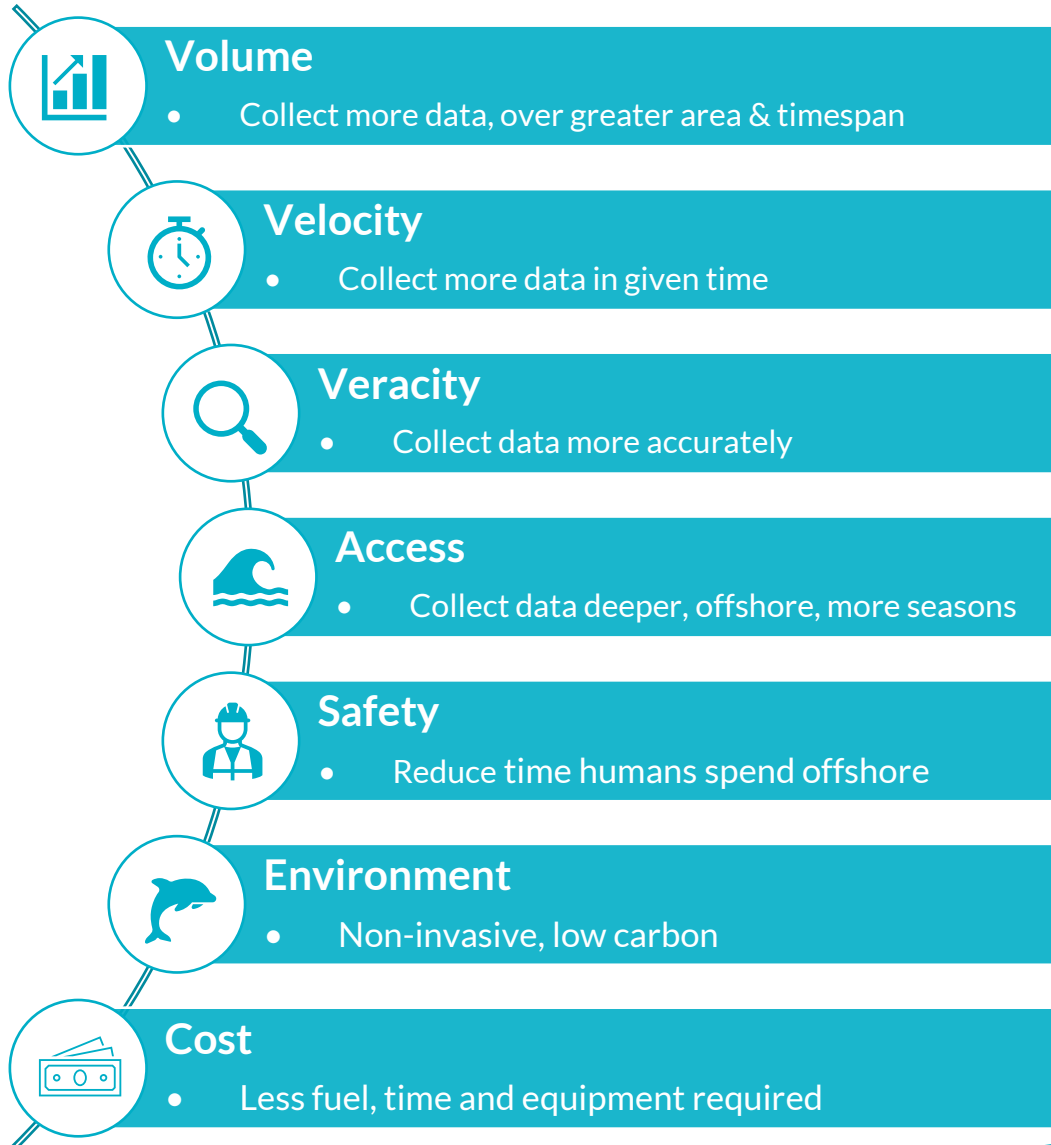
Uncertainty in Environmental Consenting



*“a need to showcase the capabilities, **speed**, and **accuracy** of innovative technologies and their potential to **create a step change** in the way we gather and process **marine ecological data**”*

*“Explore the potential for a **large-scale data acquisition trial** involving....the use of new, **high-autonomy technologies** to help proactively develop this important area for floating wind.”*

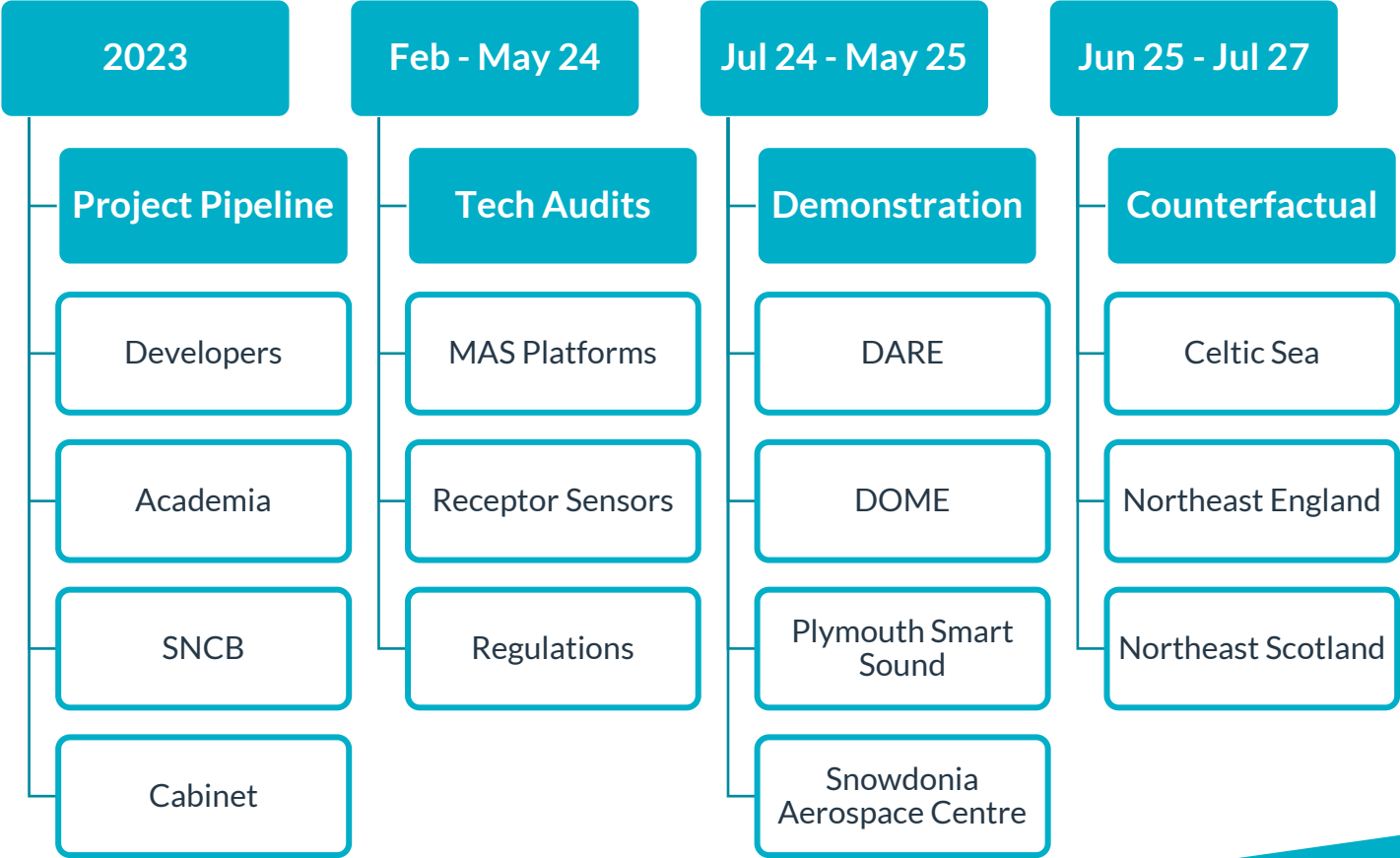
Marine Autonomous Systems advantages



Accelerating Consenting for Offshore Renewables Deployment (ACORD)

Stakeholder Engagement

Government, TCE, CES, SNCBs, Regulators, Developers, Cefas, MMO, IMO, MoD

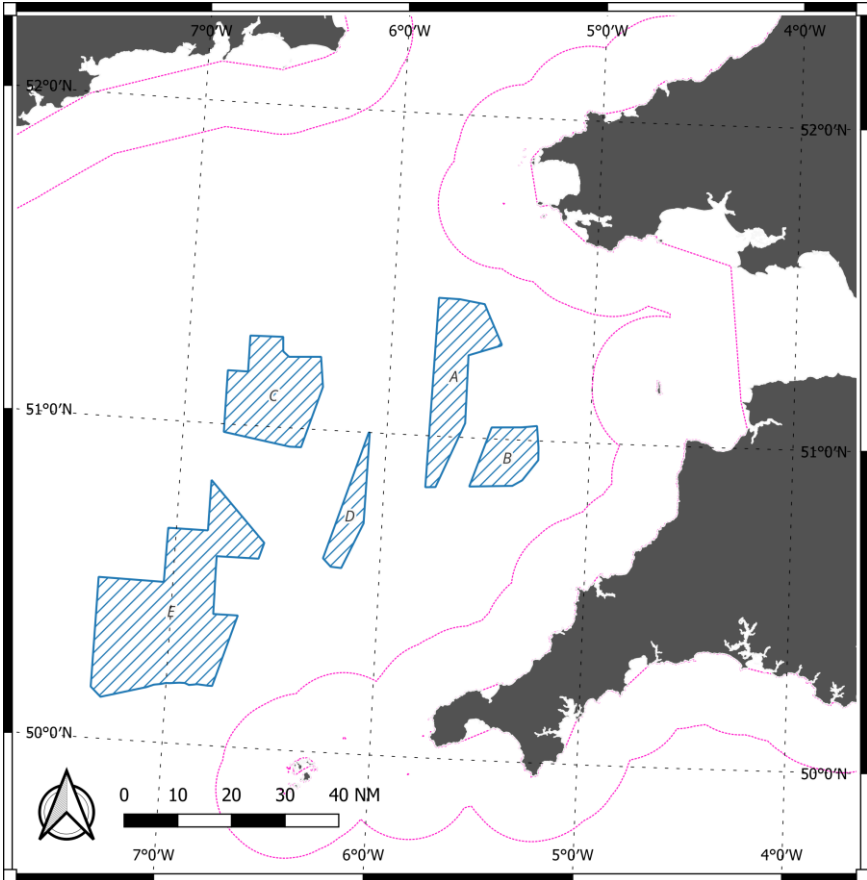


Accelerating Consenting for Offshore Renewables Deployment (ACORD)

PLYMOUTH SMART SOUND



CELTIC SEA PDA



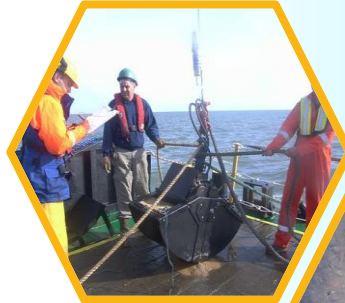
Use Cases

BENTHIC HABITAT



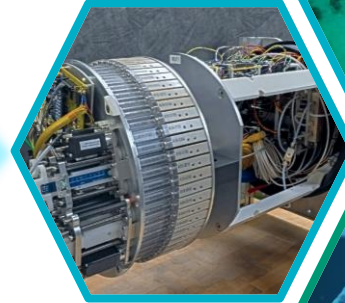
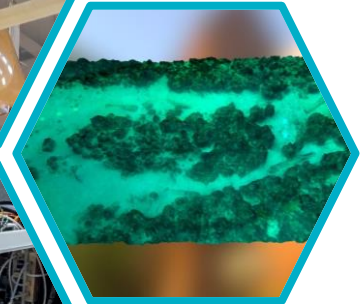
Grab Sample & Drop Camera

- ⊕ 16,000 ha site
- ⊕ 96 samples $1\text{m}^2\text{ ea}$
- ⊕ 8 weeks survey
- ⊕ Manual taxonomy
- ⊕ Invasive



AUV Photogrammetry

- ⊕ 25 ha / day
- ⊕ cm resolution
- ⊕ 2000km range
- ⊕ 1500m depth



AUV eDNA

- ⊕ Taxonomy
- ⊕ Occupancy
- ⊕ Correlate imagery

Use Cases

ORNITHOLOGICAL



Digital Aerial Surveys

- ⊕ Partial transects over season
- ⊕ Crewed flights
- ⊕ Daylight only
- ⊕ Target availability

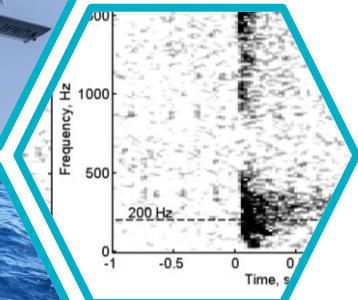
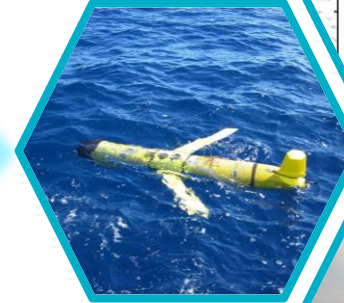


CETACEAN



UAV + lidar & FLIR

- ⊕ Lower cost
- ⊕ Increase coverage
- ⊕ Nocturnal surveys

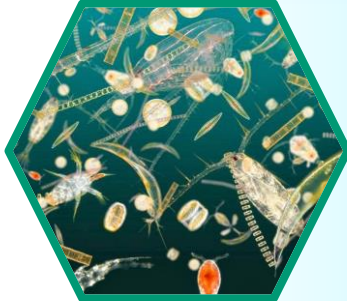


Acoustic Surveys

- ⊕ LP drones
- ⊕ In water
- ⊕ Sustained
- ⊕ Taxonomy & tracking

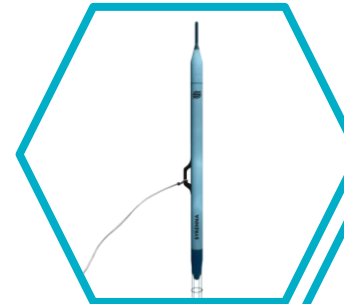
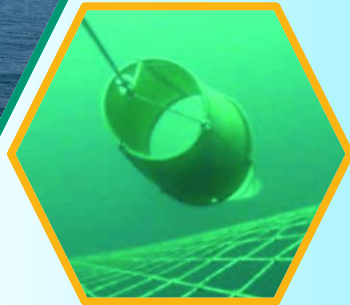
Use Cases

PLANKTON



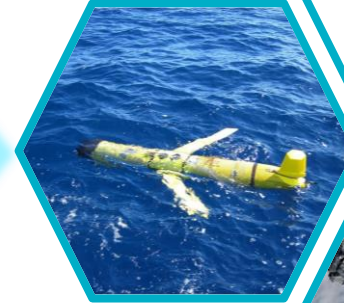
Primary Production

- ⊕ New risk with FLOW
- ⊕ Aggregated effects
- ⊕ Plankton net
- ⊕ Seasonal/annual variation



Variable Depth Drones

- ⊕ CTD, DO, WQ
- ⊕ Chlorophyll
- ⊕ Sustained survey



Earth Observation

- ⊕ LEO satellite
- ⊕ UAV
- ⊕ Surface Turbidity



Challenges



LAW & REGULATIONS

- ✗ MCA
- ✗ CAA
- ✗ SNCBs

- ✓ Legislation Audit
- ✓ Engagement & Information
- ✓ Demonstration



DATA TRANSMISSION

- ✗ Live Data
- ✗ Low Data Rate
- ✗ Expensive
- ✗ High Autonomy

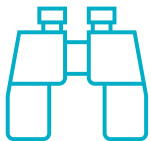
- ✓ Expectation Management
- ✓ Edge Analysis Tech
- ✓ Tech Assessment
- ✓ Market Development



DATA STORAGE & ANALYSIS

- ✗ Volume
- ✗ User Access
- ✗ DIKW Path
- ✗ EIA Focus

- ✓ ACORD Data Platform
- ✓ User Engagement
- ✓ Review access policy



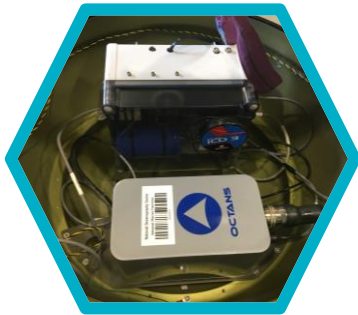
SURVEY MARKET

- ✗ Number of Operators
- ✗ Research - Commercial
- ✗ Knowledge Overhead

- ✓ ACORD Data Platform
- ✓ User Engagement
- ✓ Review access policy

Opportunities

TECH
DEVELOPER



MAS
OPERATOR



ENVIRONMENTAL
SURVEYOR



DATA
ANALYTICS



TECH AUDIT

DEMONSTRATE

COUNTERFACTUAL

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ENGAGE WITH US



GLASGOW

BLYTH

LEVENMOUTH

GRIMSBY

ABERDEEN

CHINA

LOWESTOFT

WALES

CORNWALL