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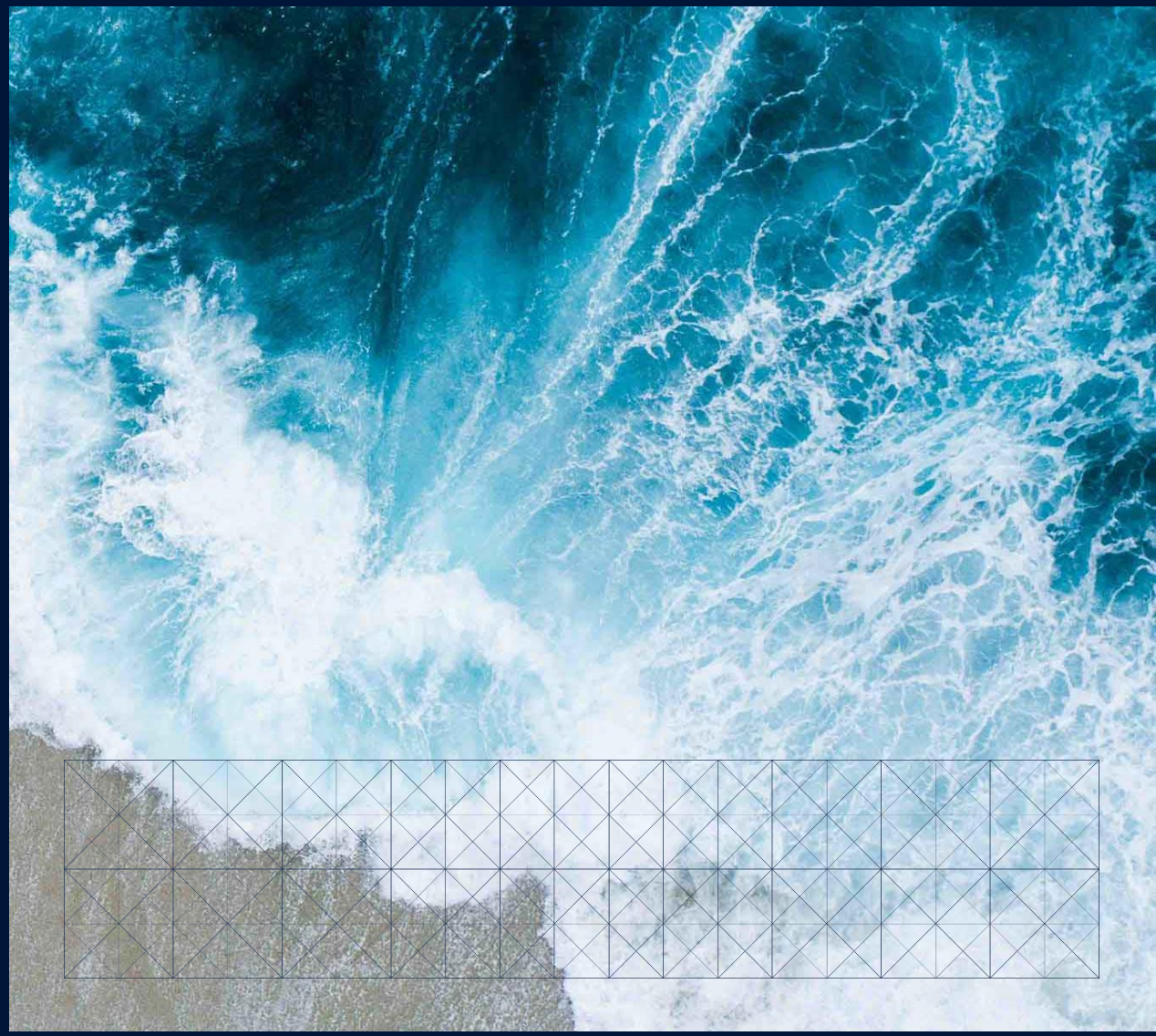
Augmenting Research Vessels with Advanced Sensor and Platform Solutions – Advantages and Challenges

June 12th, 2024

26th ERVO meeting — Round Table

Vigo, Spain

Peer Fietzek, Snr BD Mgr Ocean Science



Delivering Solutions

RV *Kronprins Haakon* (NORW)

"Full" vessel deliveries

RRS *Sir David Attenborough* (UK)

DSSV *Pressure Drop*

Images by courtesy of V. Vescovo

CDR Victor Vescovo's The Five Deeps (2018-19) and The Ring of Fire Expeditions (2020-22)

Where are the 5 deepest points?

Identified and mapped with the EM124

Eminent technology:

- Mapping (MBES)
- Ecological monitoring, biomass, (Scientific echosounder, SBES)
- Omnidirectional sonars, matrix systems, sub bottom, ADCPs
- Positioning systems underwater
- Motion reference solutions
- Data transmission, handling and refinement

Vessel images: Wikipedia

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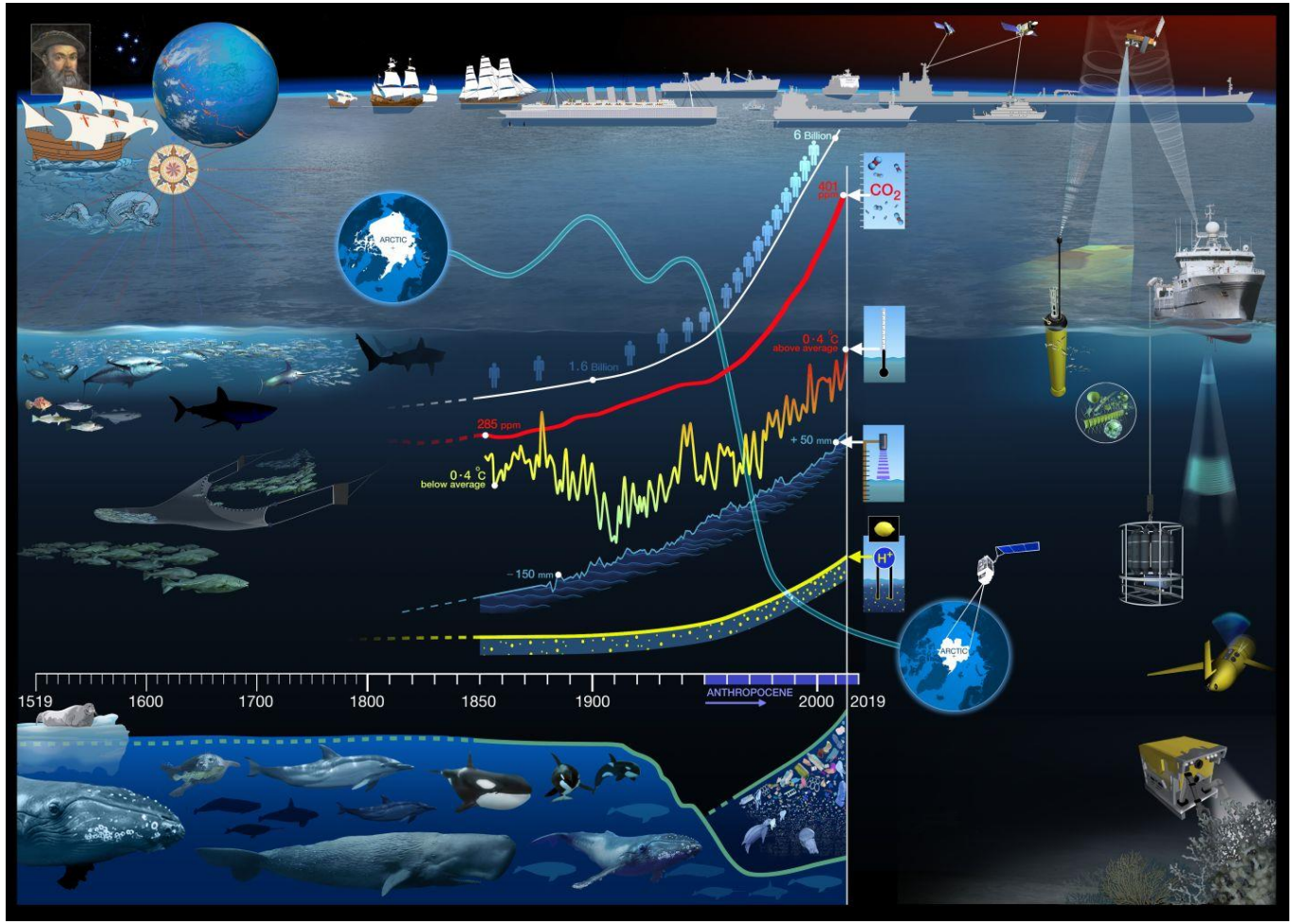
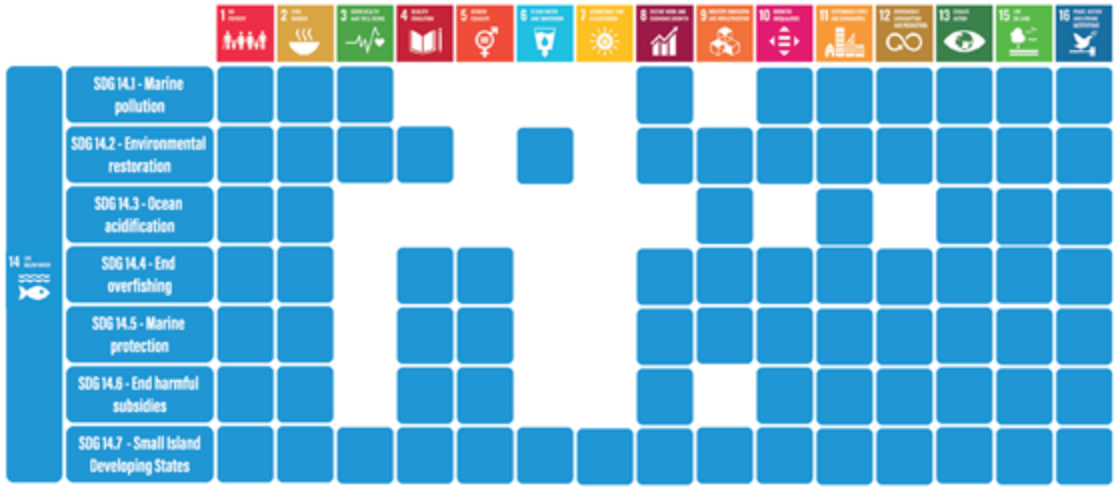
500 Years of Ocean Change

"Many Sustainable Development Goals (SDGs) may not be realized without achieving SDG 14 for a healthy ocean"





Ocean observation data and services are **critical** for the growing **Blue Economy** and **society**.

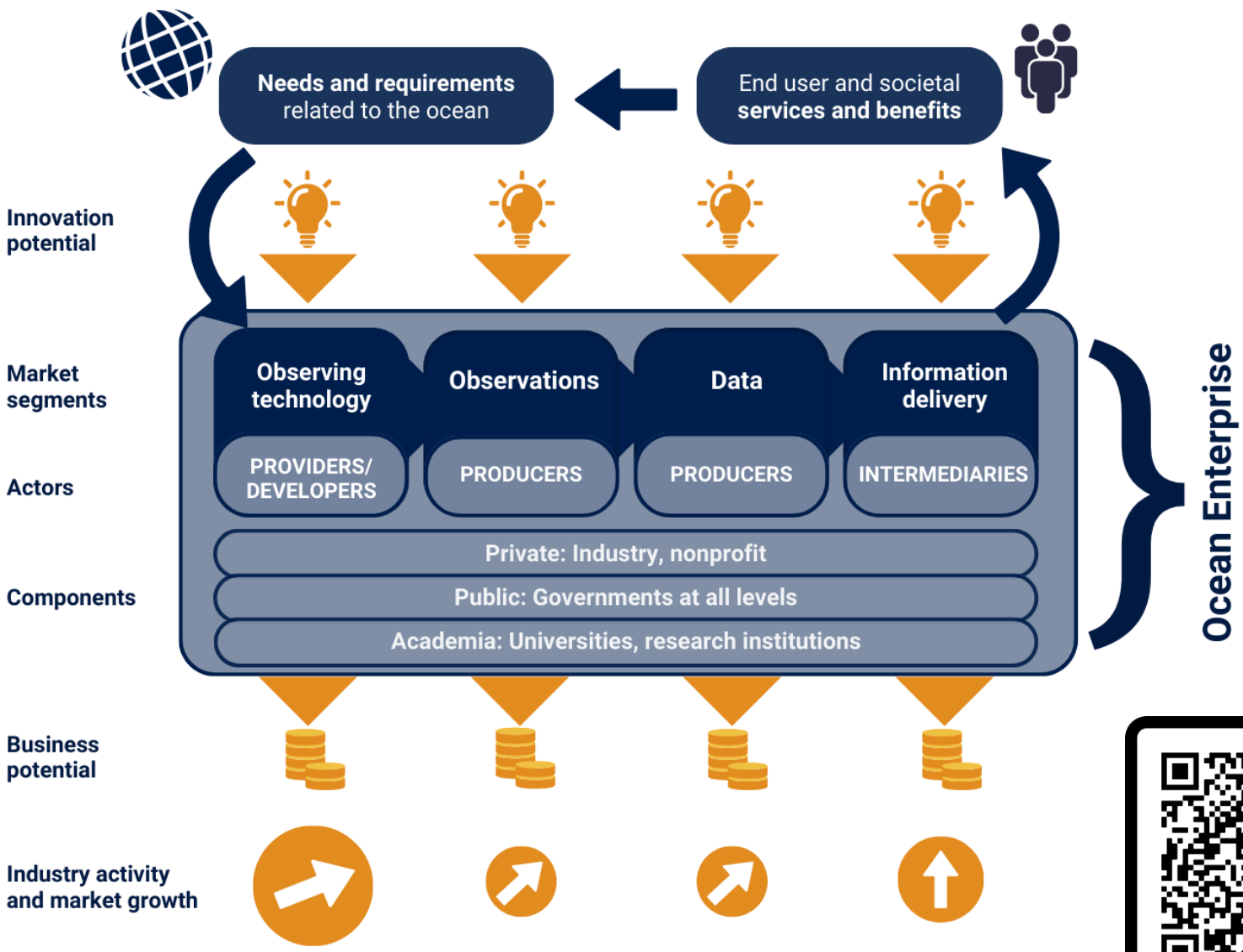
- Ocean management – ecosystem services, sustainable fisheries and aquaculture, **biodiversity** protection
- **Climate Change** – forecasts, adaptation, investment in carbon storage
- Small-footprint transport and tourism
- Sustainable offshore energy

Glynn Gorick, VLIZ, https://www.seachangeproject.eu/

Joachim Claudet et al. 2019, https://doi.org/10.1016/j.oneear.2019.10.012

DIALOGUES WITH INDUSTRY

Market Components & Value Chain



IMPACT VALUE

$8 BILLION USD
U.S. Ocean Enterprise Revenue [estimated]
IOOS 2020 Ocean Enterprise Study

$1.1+ BILLION CAD
Canadian Ocean Enterprise Revenue [estimated]
COVE 2022 White Paper

$1.95+ BILLION £
U.K. Ocean Enterprise Revenue [estimated]
2021 Review of U.K. Marine Scientific Industry

Dialogues with Industry, Background Paper and Roadmap, https://oceanenterprise.com/

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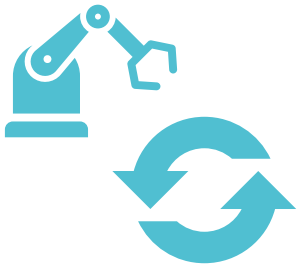
Research and Ocean Observing

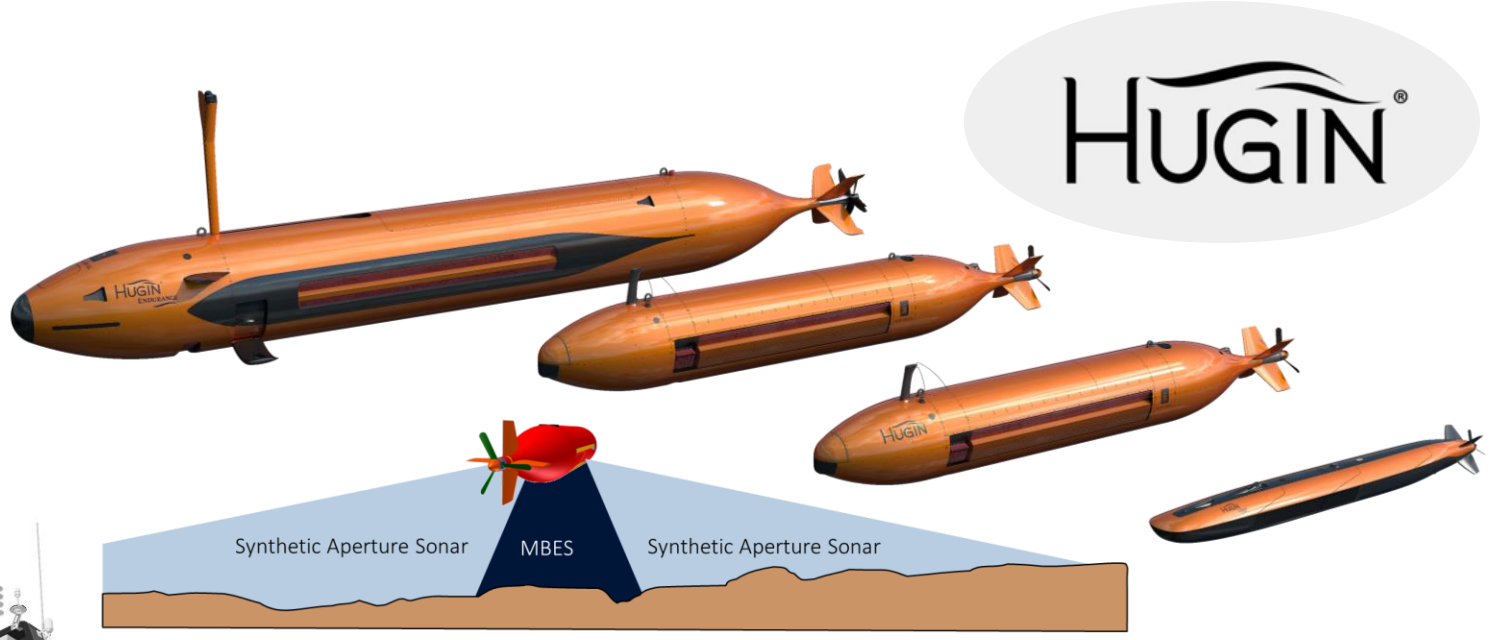


- Research is needed to **innovate and develop** Ocean Observing;
  Ocean Observing is needed to **reliably and efficiently deliver data** for the Ocean Enterprise
  - Transition: research → operations
    How/When/Where does that transition happen? How to deal with that?
    → Funding
    → New business models / commercial services

- Research Vessels support research and ocean observing
  - **Past research** should by now be readily available and operational (c.f. AUVs) to support **new research**
  - It's a process happening faster than the life-time of a research vessel → modularity, flexibility
  - Re-think usage models; i.e. finance investments into state-of-the-art technology through shared usage or service provision?

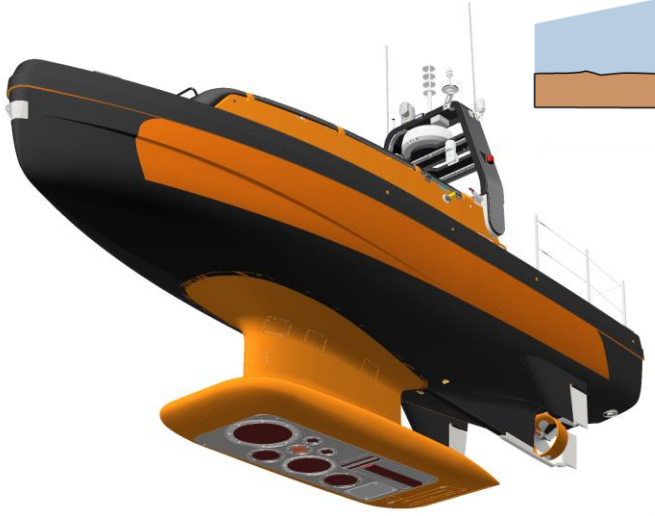
Delivering Solutions

Source: Havforskningsinstituttet



Gondola option with:

- Full wideband EK80
- EM 2040-04
- TOPAS PS120
- EK 80 ADCP
- HiPAP 602



Source: Ocean Infinity

Technology Development

- Technology (sensors, platforms, transmission[!]) gets more powerful and sophisticated to deliver
  - New data
  - More data more efficiently and faster

→ Connection/interaction/joint missions with mobile platforms

→ Collect bathy data (for Seabed 2030) during a chemistry or biology-focused cruise? Operate a scientific echosounder during a geology-focused cruise leg?

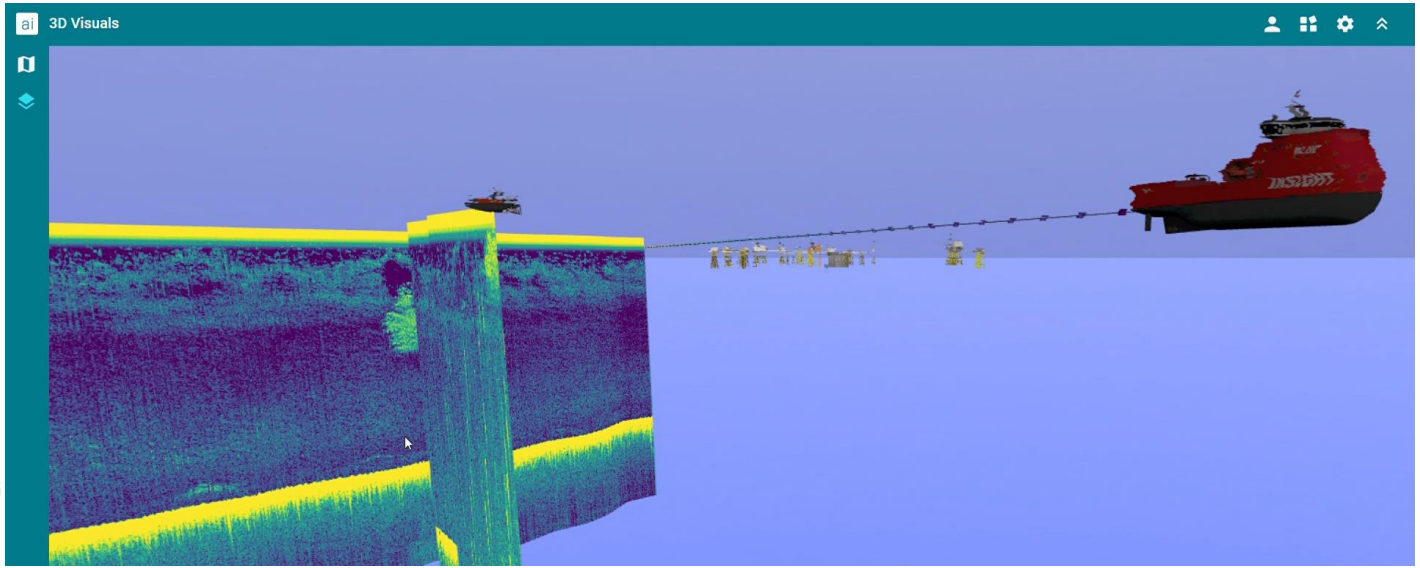
➢ Automation

➢ Remote operation

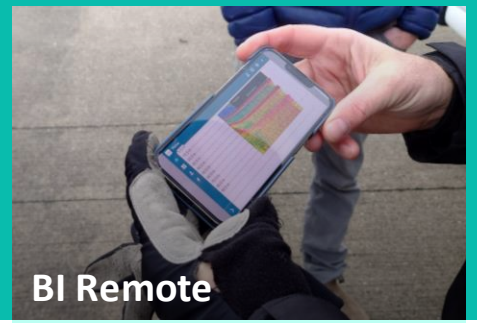
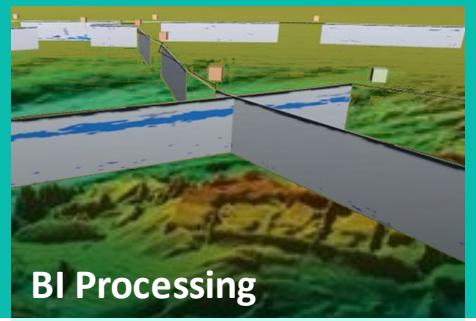
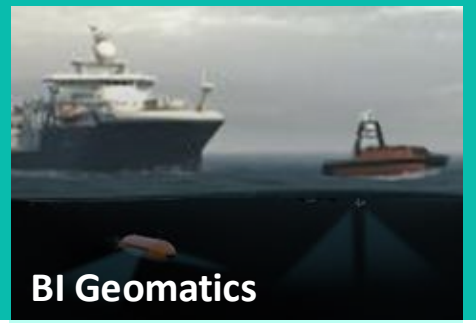
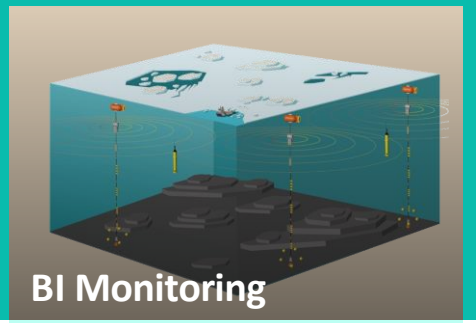
- Behavioral effects on fish from seismic shooting? (Glider 2, ZoopZeis)
- May 2022: Seismic vessel, research vessel (R/V Kristine Bonnevie), USVs,…


Photo: Magseis Fairfield


Photo: Geir Pedersen, IMR



Blue Insight digital platform solutions

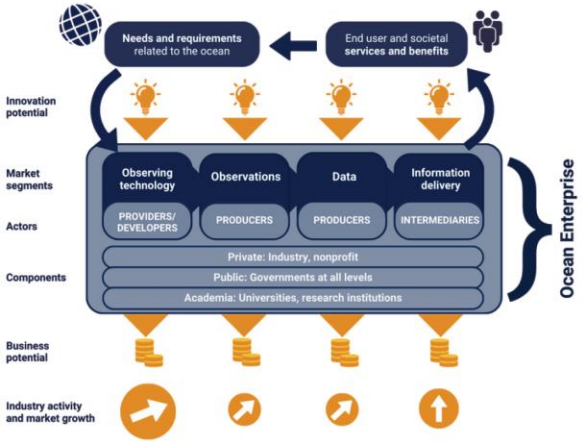
	 BI Remote	 BI Processing	 BI Geomatics	 BI Monitoring
Who?	Vessel operator, scientists	Ocean businesses	Survey/research vessel operators	Institutes, service providers, operators
What?	Control echosounder operation and data quality from remote app.	Simplified deployment of algorithms on vessels with workflow management of automated processing pipelines	Retrieve, organize, and transfer data to across sensor platforms. Includes both raw data and metadata	A digital representation of the physical world. Links and visualize internal and external data
Benefit	Efficient operation of sensors to assist decision making	Faster results and reduced cost with automated analysis	Reliable and secure management of ocean data	Improved understanding of oceanographic processes

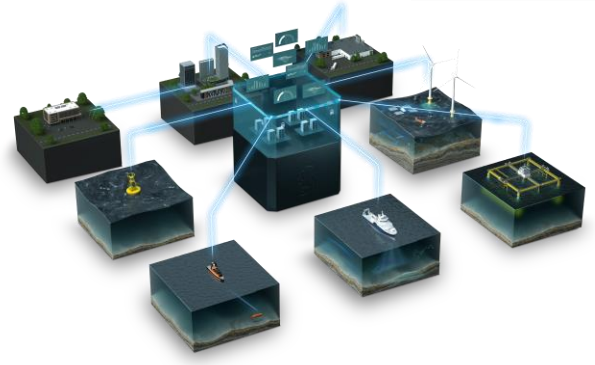
Operational efficiency (automation), improved collaboration (agnostic), more value (information)

Advantages and Challenges

- KM and KD:
  From **eminent technologies** to **complete solutions.**
- **Ocean observation** data and services are **critical** for growing the Blue Economy and society.
- **Maturing the Ocean Enterprise** with benefits for academia, private sector and society.
- **Research and Ocean Observing** (funding, business models); **research vessels support both** (operational technology, flexibility, usage models)
- **Multi-platform** deployments, **remote** operation, **automation**, processing, **outreach and dissemination**

→ **Digital platform** (*Blue Insight*)





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Thank you

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