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Science-Industry Collaborations

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MarTERA Project Meeting
Brussels, Belgium

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MARITIME



DEFENCE



DISCOVERY



DIGITAL



12 000
EMPLOYEES



40
COUNTRIES



31.8 BNOK
80% EXPORT

WORLD CLASS – Through people, technology and dedication

Protechting People and Planet From Deep Sea to Outer Space



OUTER
SPACE



AIRBORNE



SEABORNE

DIGITAL
FRONTIER



LAND-
BASED



DEEP SEA





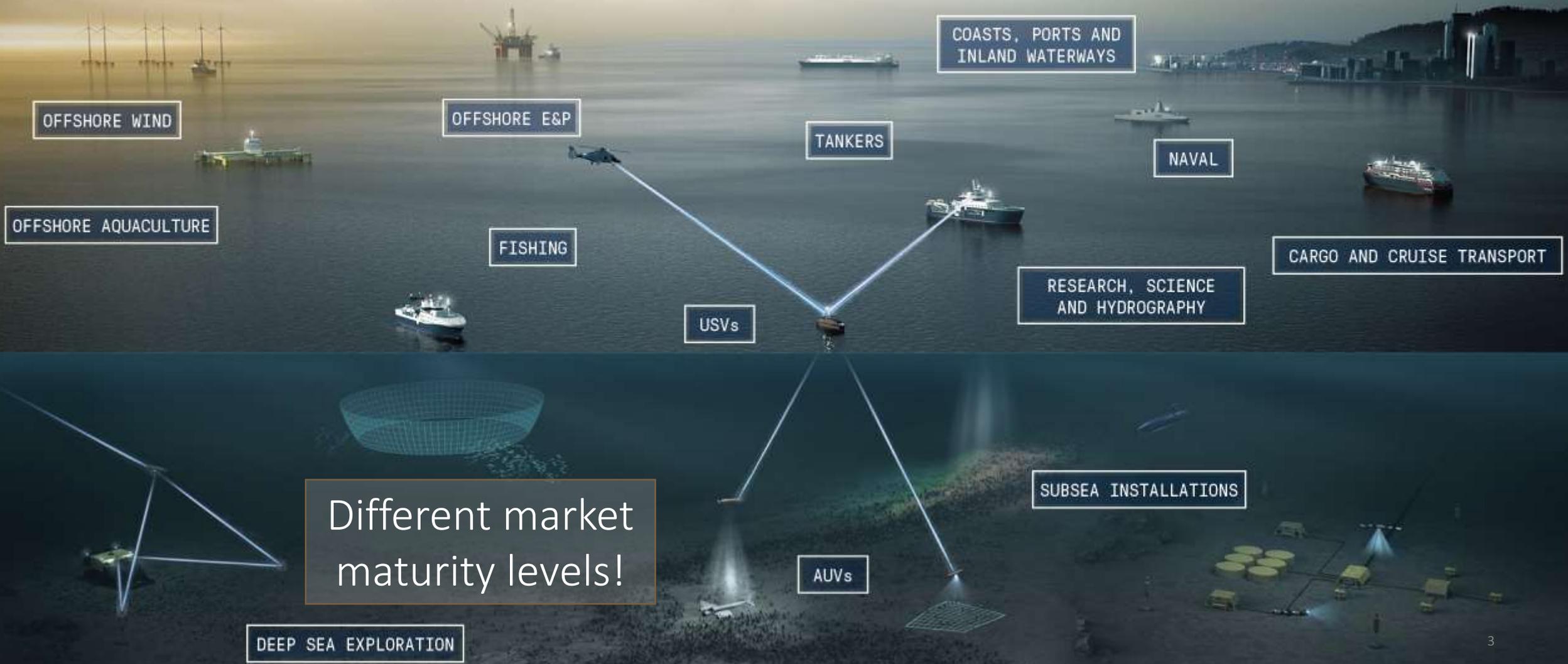
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Serving the entire ocean space

ENERGY | FOOD | TRANSPORTATION | RESEARCH | MINERALS | LEISURE TRAVEL | NAVAL

SURVEILLANCE

ONSHORE SERVICE CENTRES

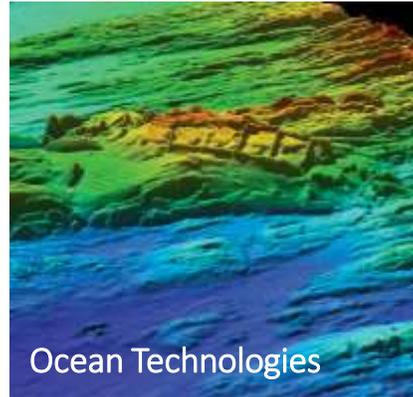
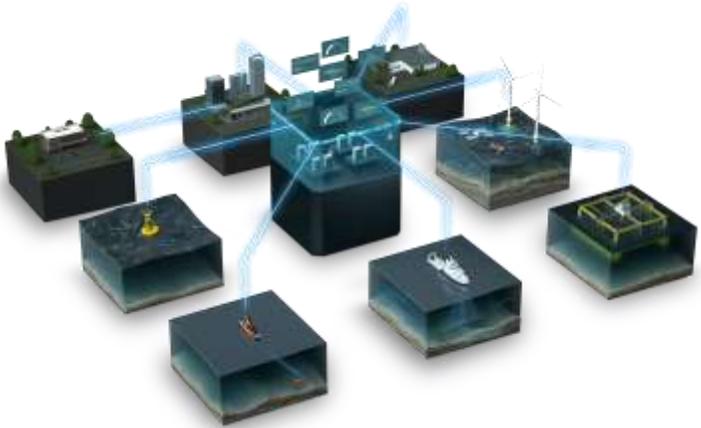


Different market maturity levels!

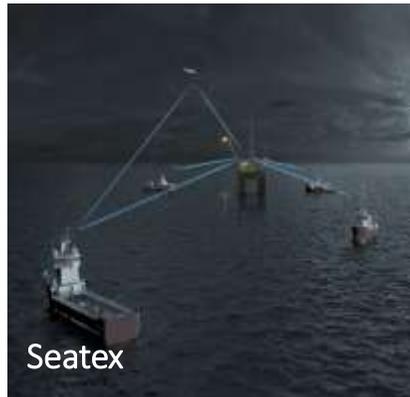


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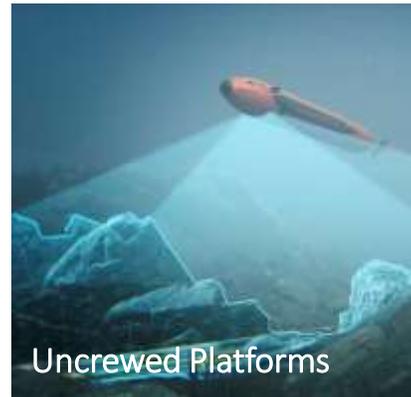
Kongsberg Discovery with four Divisions



Ocean Technologies



Seatex



Uncrewed Platforms



Marine Life Technologies



~1000 employees



~3.6 BNOK order intake



Strong technology backbone

Facilitator, enabler, supporter, technology partner,... ≠ Shipping company, offshore energy company, fishing,...

➔ We are a collaborator for developers and innovator for the Blue Economies!

Quantitative Mapping and Monitoring with Acoustics



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Platforms / Instrument Carriers
Mooring, vessels, gliders, autonomous and uncrewed vehicles

Biomass
Fish, plankton, jellies

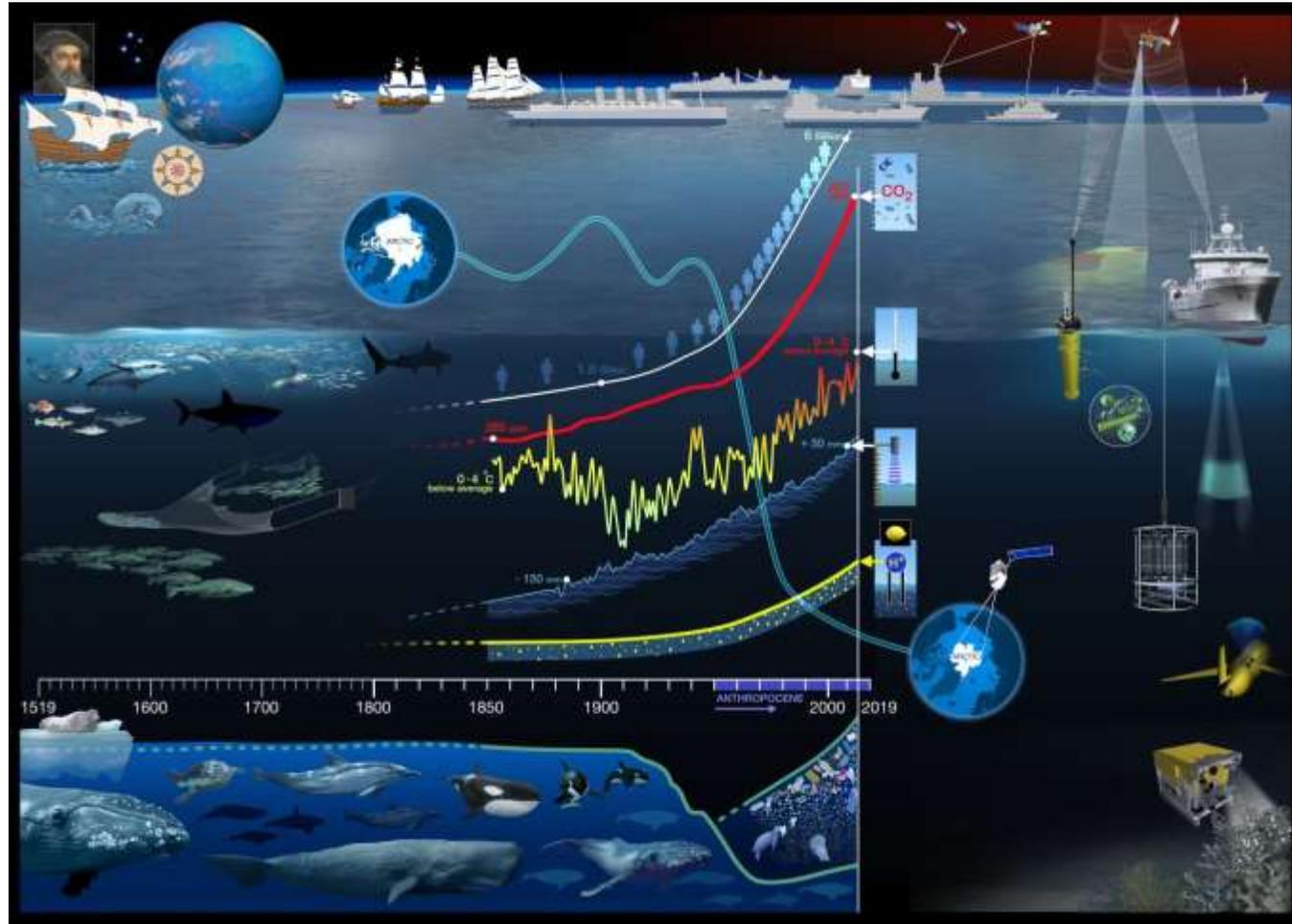
Non-Biological Targets
oceanographic layers, sediment, seabed classification, gas bubbles, marine hazards



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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”



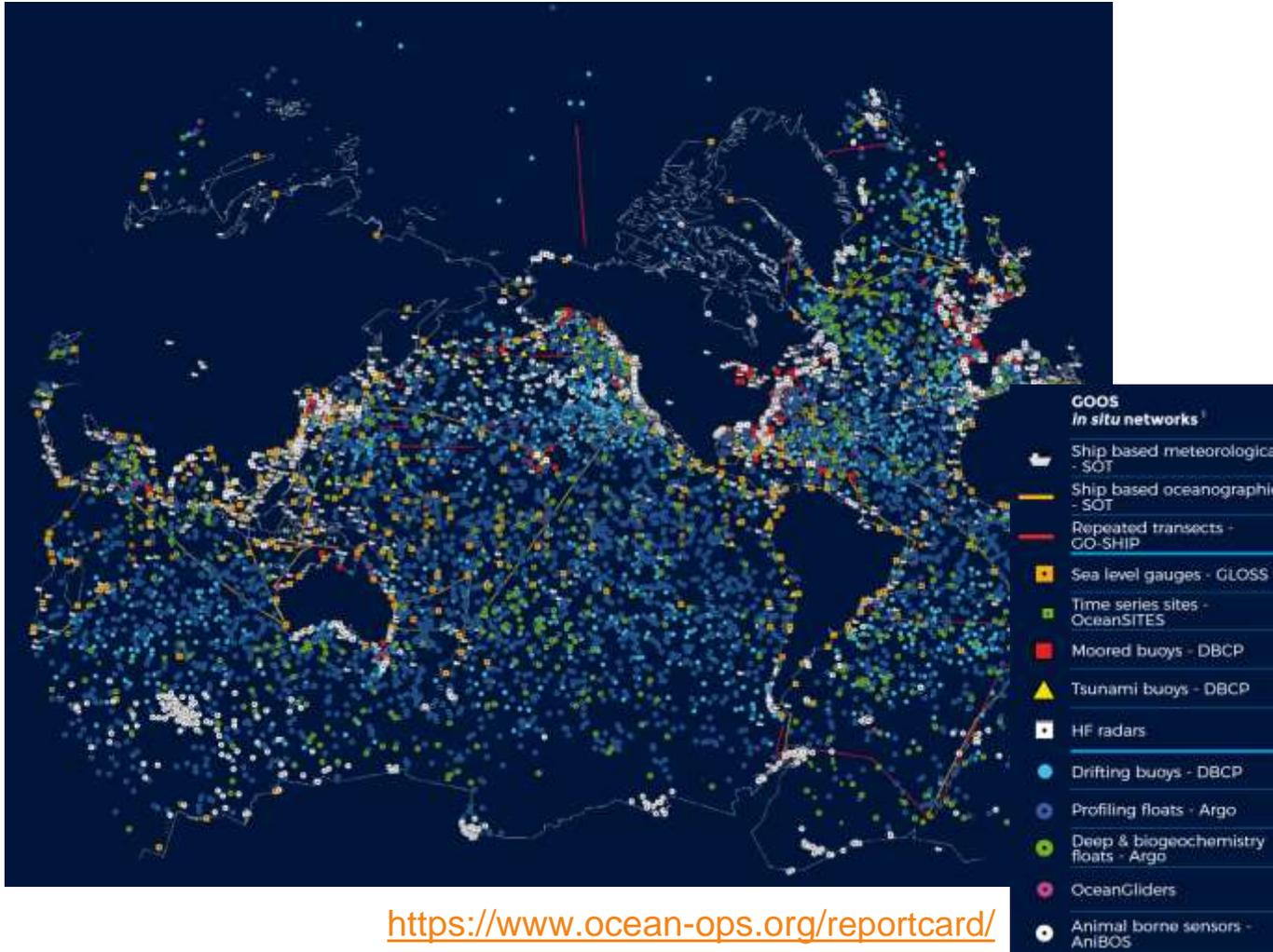
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SDG 14.1 - Marine pollution																
SDG 14.2 - Environmental restoration																
SDG 14.3 - Ocean acidification																
SDG 14.4 - End overfishing																
SDG 14.5 - Marine protection																
SDG 14.6 - End harmful subsidies																
SDG 14.7 - Small Island Developing States																

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

DIALOGUES WITH INDUSTRY

Global Ocean Observing System



<https://www.ocean-ops.org/reportcard/>

- **84 countries, 8,700+** observing platforms, **13** global networks
- Ocean and marine metrological EOVs and ECVs, incl. biological and ecological obs.
- **GOOS is the infrastructure that coordinates the global system**
- **Key infrastructure delivering data for services across weather, climate, hazard warnings and ocean health**
- **50% IOC budget increase in 2023+**



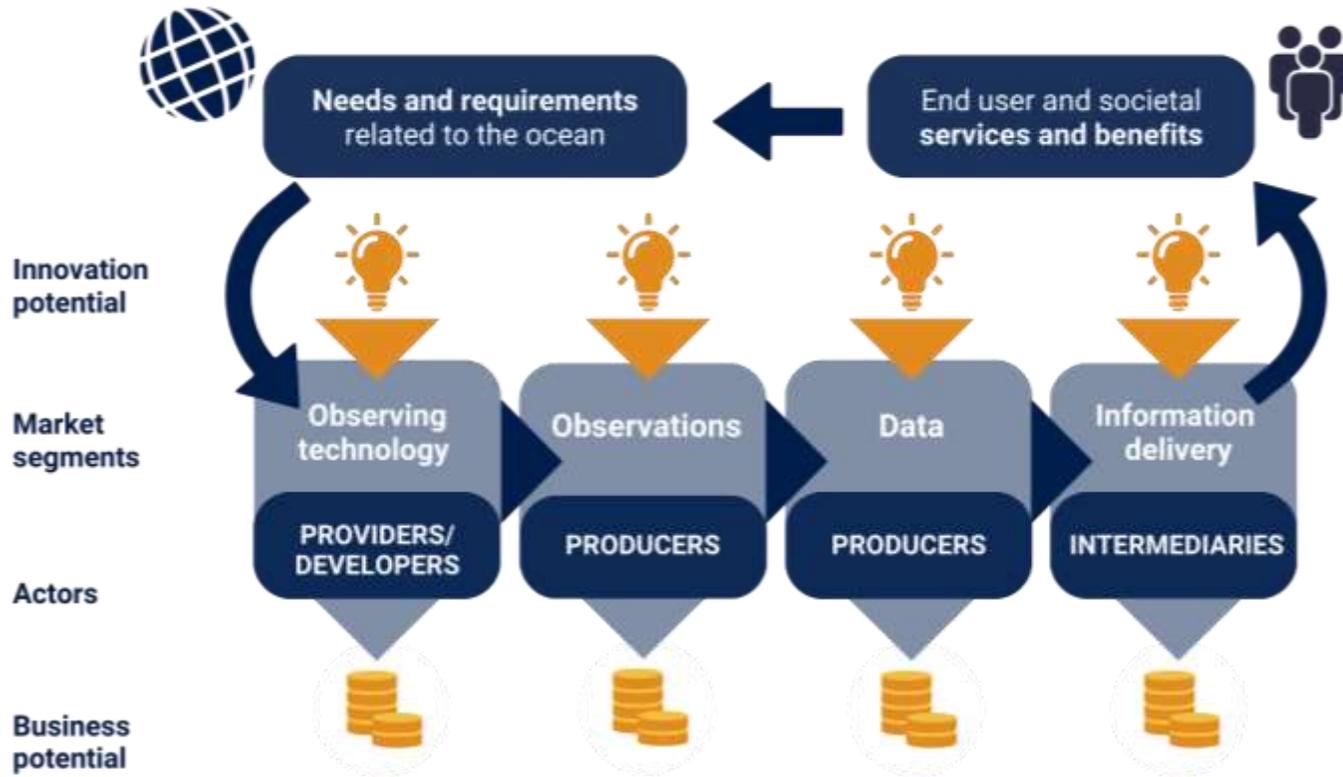
<https://www.eoos-ocean.eu/>

*Good basis for further development and expansion in line with the needs!
Sustained funding? Enhanced mandate?*



DIALOGUES WITH INDUSTRY

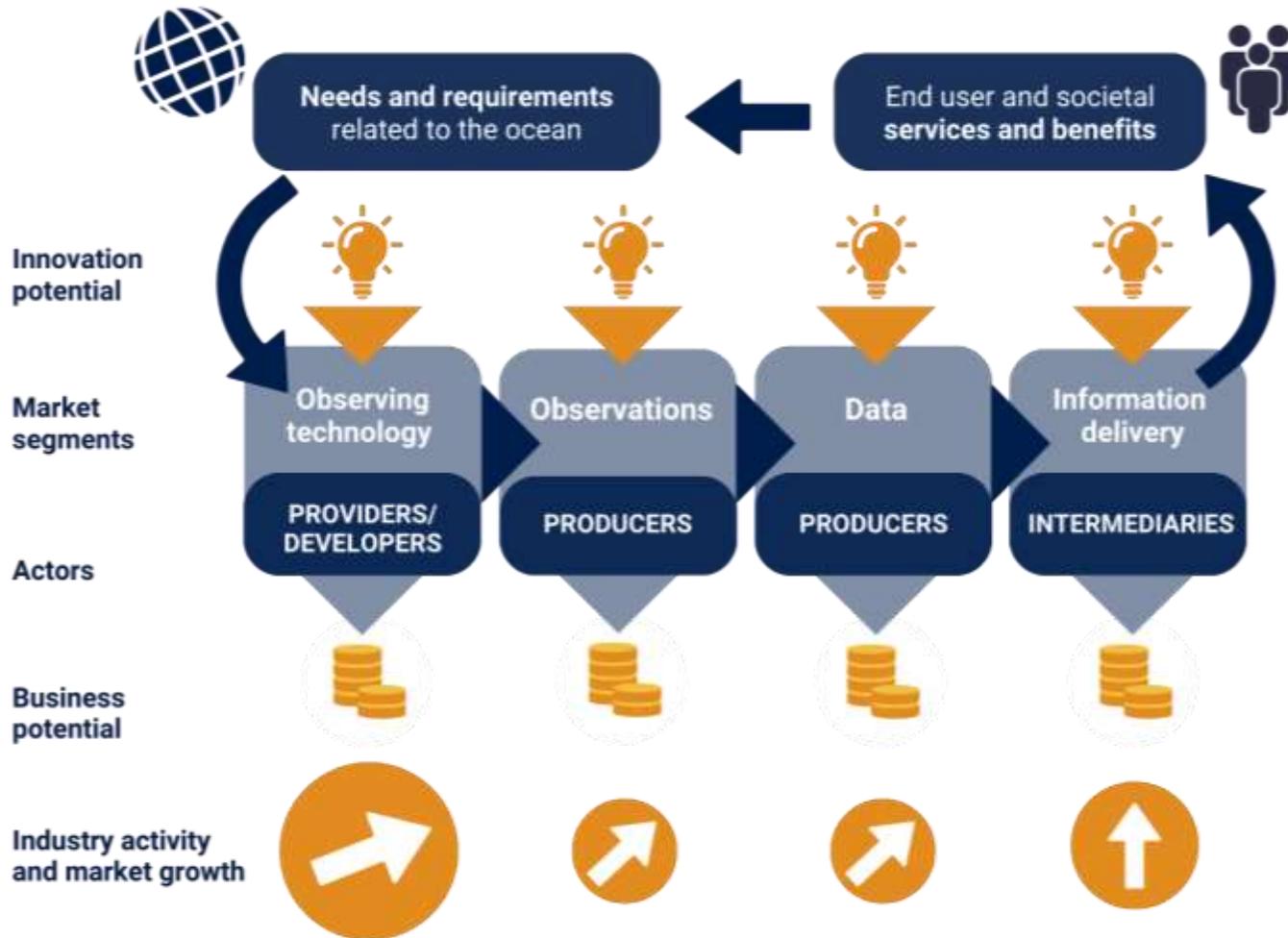
Market Components & Challenges



- No consistent view of **technology needs**
- Lack of visibility of **market potential**; **fragmented** market with small unit numbers
- Lack of visibility of **R&D efforts** in academia; limited **partnering** with industry; **duplication** of development work
- Interaction of **new commercial services** with established operations
- High **unit costs** and no universal standards; **variable** manufacturing/calibration **quality**
- **System resilience** with limited suppliers serving other markets

DIALOGUES WITH INDUSTRY

Market Components & Benefits



A mature market across the value chain would:

- Have more **clarity** and **planning capacity**; **growth** and more industrial **engagement**
- Show enhanced manufacturing **efficiency**
- Foster demand for technological/service and spur faster **innovation**
- Lead to a **drop in cost** for data and more **targeted** products
- Enhance the **data flow** and enable **information products**
- Increase in **sustained ocean observing** system capacity globally

DIALOGUES WITH INDUSTRY

Maturing the Ocean Enterprise

The **Ocean Enterprise** / The **New Blue Economy** are emerging and hold significant economic potential.

Maturing Ocean Observing from *ancillary* to *critical*.

Through **collaborations, partnerships, communication initiatives...**

...across the technology supply chain

...towards new public-private partnerships

...addressing ambitious projects

Dialogues with Industry, a significant opportunity to **connect** the public, private and academic sector **stakeholders** in the GOOS.

Develop **actionable recommendations** for intersectoral **collaboration** to **meet the future needs** of science, society and the Blue Economy by evolving and expanding the OOS and information service delivery.

4 active and vibrant **Dialogues between industry, academia and government** between Sept. 2022 and Jan. 2023.



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Dialogues with industry are the **first format for industry interaction** supported by GOOS until today.

25.9.23; 16:00 CET:

\$3.9M direct investment of NOAA for MTS for the Ocean Enterprise Initiative incl. workforce development



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Achieving a more industrialized and mature Ocean Enterprise

...through enhanced collaboration and a common goal!

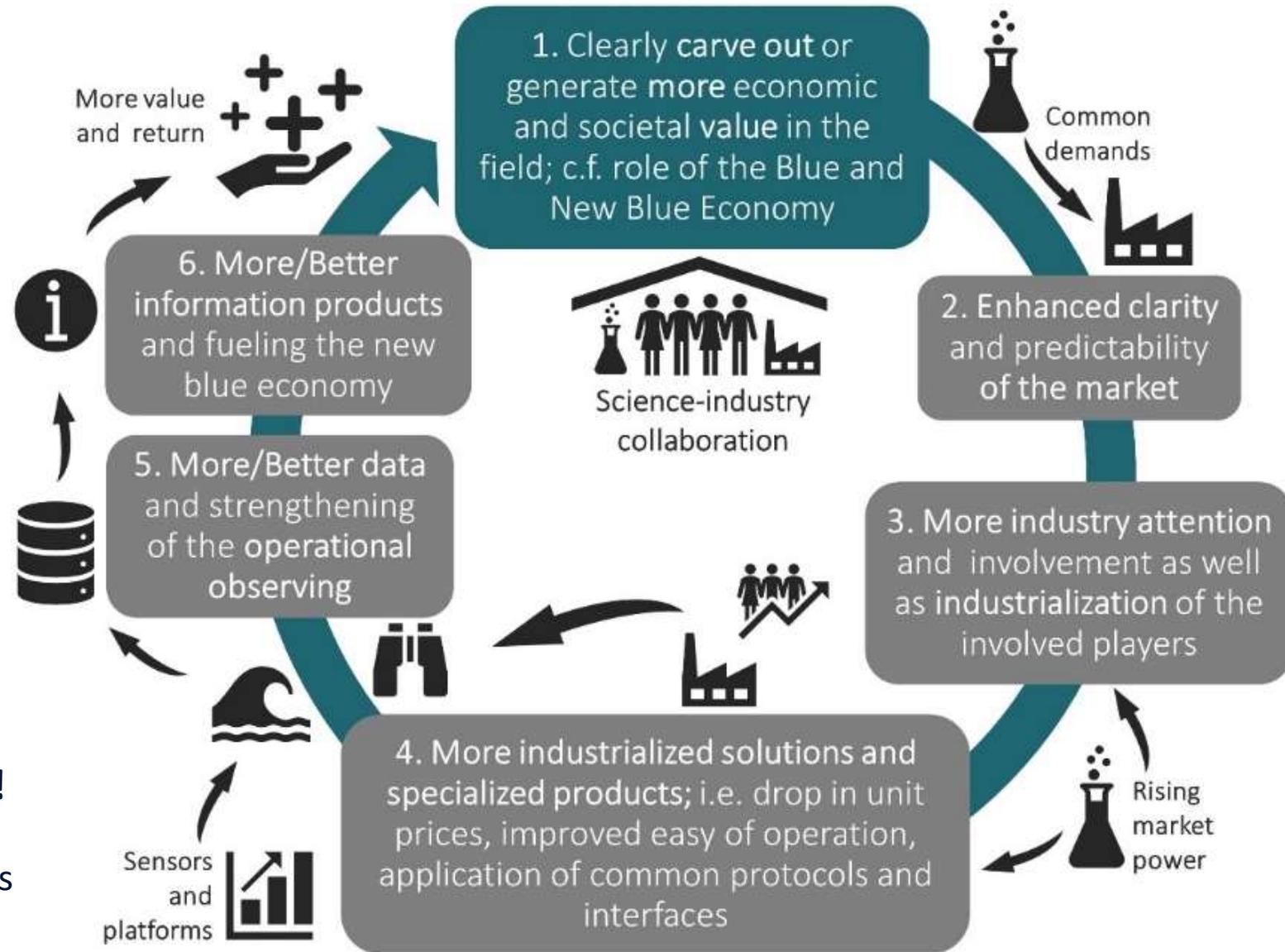
No competition between academia (societal impact, knowledge generation) and industry (economic success, sustainability aspects);

Distinct sectoral strengths

→ **Various options for win-win initiatives!**

KD/OS already develops through collaborations to deliver the best solutions for our users

→ **Time for a step change!**



Source: Fietzek 2021



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Time to be ambitious: Initiate big Initiatives to drive Impact

Examples:

Deep MAHALO

- Seabed 2030 as a motivation
- Comparable initiative for acoustic **backscatter information**
- **3D dynamic Mapping of marine HAbitats, biodiversity, and the abundance of Life in the Ocean**



<https://argo.ucsd.edu/>

THE NIPPON FOUNDATION-GEBCO

SEABED 2030

<https://seabed2030.org/>

Connected vessels as VOS

- **Ltd. # of vessels collecting and sharing data** autom. (in the hundreds)
- Digital transformation of the maritime industry ongoing
- **>33,000 vessels with KM/KD equipment**



Offshore renewables

- Comprehensive monitoring in connection to e.g. offshore wind development
- Hardware and digital solutions



United Nations Decade of Ocean Science for Sustainable Development





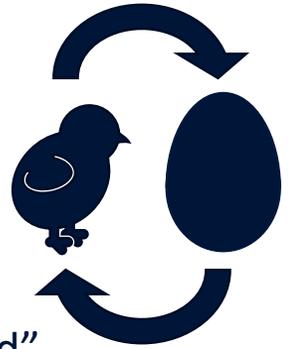
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Chicken-and-Egg Situation of How to mature the Market?

- Not all benefits automatically result from an industrialized sector, but an enhanced industrial maturity might also be needed for the sector to grow.
- **Customer push:** “there must first be a significant demand for advanced sensors and platforms before companies can develop targeted products”

vs.

Technology/ manufacturer push: “there must first be advanced sensors on offer, before orders can be placed”



→ To be overcome by enhanced collaboration between academia (scientists, technicians,...) and industry

INNOVATION PROJECT TYPES/ELEMENTS

Education,
Training

Basic/Industrial
Research,
Fundamental
Science

Applied/Industrial
Development,
Application
Investigation



Initiatives to improve the **communication** between users and developers to **support growth** of the field, **speed up development** times and **minimize friction losses**.



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Recommendations for Collaboration Partners

- Contributions according to/focus on individual and institution-related **strengths and skills**
 - Awareness and clear communication of **individual interests** as the basis for clear **interfaces** and preparation of win-win settings
 - Willingness to **partner on eye level** and conduct real teamwork (→ **trust**)
 - **Realistic expectations** and adequate **goals** (conflict potential with research projects as a **self-purpose** for commercial entities)
- ➔ Successful project characterized by efficient collaboration, good spirit and maximum output

<i>Sensor and platform technology developments</i>	Science / Academia	Start-up	SME	Large Company / Industry
Innovation Characteristic	<i>Ideas, Exploration, Application</i>	<i>Disruptive Innovation</i>	<i>Innovation</i>	<i>Development</i>
Innovation Strength	Agility, flexibility			
Economic Strength	Economic stability, economically thick-skinned, market access, established processes			

Based on Fietzek 2020



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Collaboration Benefits for Academia

- + Direct link to **developers** and access to **product know-how and training**; quick and quality **support**
- + **Goal-oriented**, cost and quality conscious contributions
- + **Engineering** and **production know-how**
- + **Economic mind-set**
- + **Market** and **marketing know-how**; testing of ideas/concepts in real-market environments



Based on Fietzek 2020

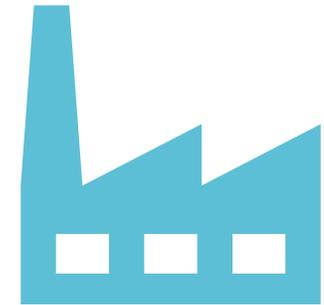


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Collaboration Benefits for the private Sector

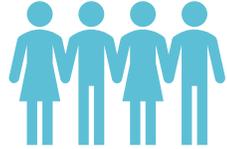
Reputation/Excellence of the involved scientists / the consortium

- + Reveal/Produce promising **applications/business cases**
 - Enhanced product **utilization**
 - **New markets**
- + Application-targeted **developments**
- + High quality scientific **assessments**
- + **Dissemination**: publications (peer-reviewed), presentations, posters, reports, feasibility studies,...
- + Scientists move on (other countries, fields,...)
 - Keeping the company/products **in good memory**
 - **Recruitment potential** of well-trained staff
- + Experienced publicly funded **project management**

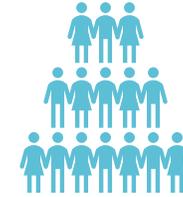




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Collaboration Benefits for the private Sector



Startup/SME:

Large company:

Knowhow access, **new ideas**; IP transfer and subsequent **commercial exploitation** should be feasible;
the larger the company, the larger the desired economic impact (and potential to exploit it)

Secure funding over several years at **good funding quotas** is desirable

Long-term (can also be too long) **basic funding** to mitigate **development risks** possible, but **lower quotas, commercial exploitation embargoes, reporting requirements** demand for **selection** → large, high potential/impact projects

Some companies are **highly selective** (→ growth period) for others **“any project”** is welcome

Selected projects (large-scale, significant fate/impact); possibility for combination of several developments in one project to enhance the success chances and enable flexibility throughout its course



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Private-Public-Partnerships / Projects of the Future

- Efficient collaborations and seamless IP transitions are critical for a successful innovation value chain.
- National interests
- Avoid duplication of efforts
 - engage with market leaders, check developments in other countries
- Attracting not only innovative (young) companies but also (established) sector champions to take big steps
 - Funding rates
 - Commercialization embargo
 - Deliverable based payments
 - Using established/of the shelf technology in a project is unfavorable for companies
 - hinders fast distribution into new applications
- Where there is no(t yet) commercial potential (c.f. basic research) it still makes sense to buy-in private sector know-how/tools (→ speed, duplication of efforts, unforeseen innovation potential).

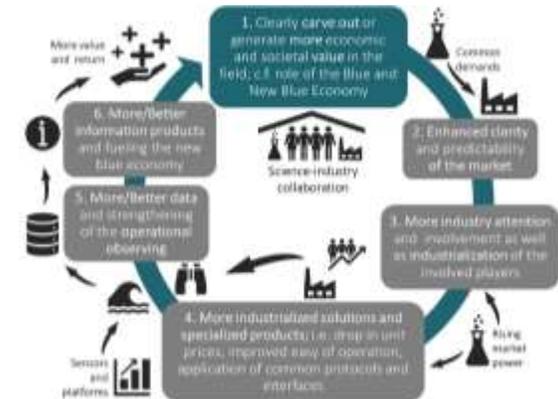




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Summary and Outlook

- **Maturity of the market** the project focuses on
→ different **requirements and capabilities** of the private sector partners
- **Facilitator/Enabler** (→ economic and innovation **multipliers**) vs. **End-user** private sector representatives/project partners
- Seamless **sector transitions of innovations** to enable a quick **commercial exploitation** (also societal benefits)
- **Collaboration** are essential to **grow the market** (i.e. the Ocean Enterprise) with benefits for academia, private sector and society
- Many **win-win options** for science-industry collaborations; size and category of company matters
- Potential in approaching **big and impactful** initiatives





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Thank you!

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References:

- Dialogues with Industry website with Background Paper, Dialogue Reports and the Synthesis Report at: <https://www.mtsociety.org/mts-goos-industry-dialogues>
- Fietzek, P. (2020, February 17). *Science-Industry Collaboration in the Maritime Sector – Analytical Reflections and Experiences from Sensor Innovation Initiatives*. 2020 Ocean Sciences Meeting, 16-21 February 2020, San Diego, CA USA. doi: <https://dx.doi.org/10.1002/essoar.10502302.1>
- Fietzek, P. (2021). *Op/Ed: Enhancing Ocean Observing Through Collaborations in 'Preparing a Workforce for the New Blue Economy'*, Liesl Hotaling, Richard W. Spinrad (Eds.), Elsevier, Pages 377-384, ISBN 9780128214312, <https://doi.org/10.1016/B978-0-12-821431-2.02022-9>