



THE OCEAN WE WANT

HOW ADVANCED TECHNOLOGIES DRIVE
A ZERO-POLLUTION BLUE ECONOMY

Fraunhofer-Gesellschaft | SINTEF Ocean

EU GREEN WEEK 2021 PARTNER EVENT

ZERO #EUGreenWeek
POLLUTION
for healthier people and planet

AGENDA

10:00 a.m. The ocean we want – How advanced Technologies drive a Zero-Pollution Blue Economy

FRAUNHOFER-GESELLSCHAFT AND SINTEF: THEIR RESPECTIVE MISSION AND JOINT COOPERATION

Speakers: Dr. Steffen Knodt and Dr.-Ing. Bård Wathne Tveiten

10:15 a.m. How can state-of-the-art infrastructure help us innovate faster to facilitate a sustainable future through applied research, environmental observations and ecosystem understanding?

SMART OCEAN TECHNOLOGY, FRAUNHOFER-GESELLSCHAFT, GERMANY

Speaker: Dr.-Ing. Marcus Siewert

OCEANLAB TRONDHEIM FJORD, SINTEF OCEAN, NORWAY

Speakers: Kristin Rist Sørheim and Dr. Emlyn Davies

11:00 a.m. Panel Discussion: If you had an ocean lab, what would you do with it?

DISCUSS WITH US AND EXPERTS FROM THE INDUSTRY

11:45 a.m. Momentum for change – How cross-linked applied research enables a Zero-Pollution Blue Economy

EUROPEAN INNOVATION PLATFORM SUSTAINABLE SUBSEA SOLUTIONS

Speakers: Dr. Johannes Nowak



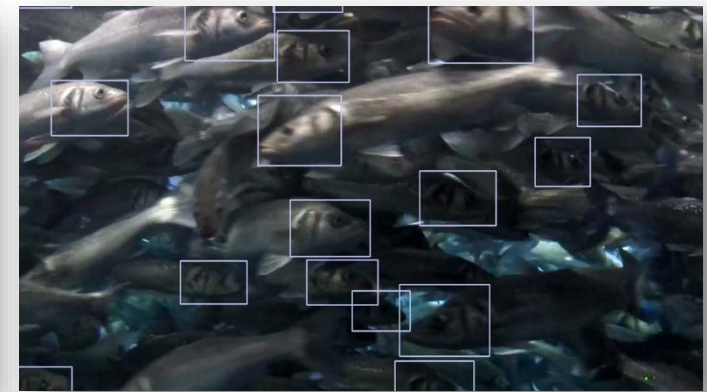
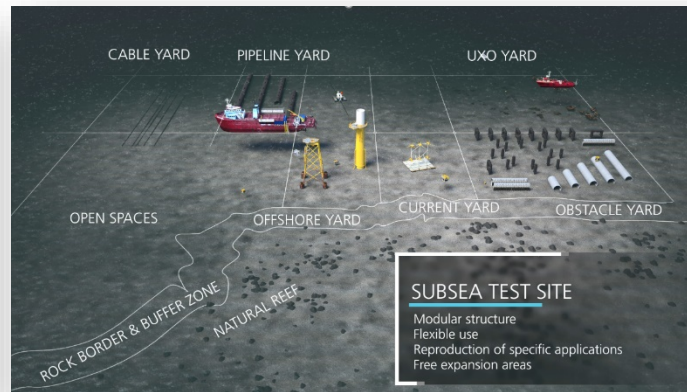
Smart Ocean Technologies @ Ocean Technology Campus Rostock

How can state-of-the-art infrastructure help us innovate faster to facilitate a sustainable future through applied research, environmental observations and ecosystem understanding

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SUBSEA SOLUTIONS FOR GLOBAL MARKETS

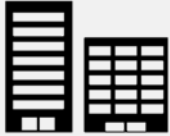


Dr.-Ing. Marcus Siewert
Innovation Platform Sustainable Subsea Solutions
Marcus.siewert@igd-r.fraunhofer.de

Fraunhofer Institute for Computer Graphics Research, Rostock

General information

The Fraunhofer-Gesellschaft at a glance



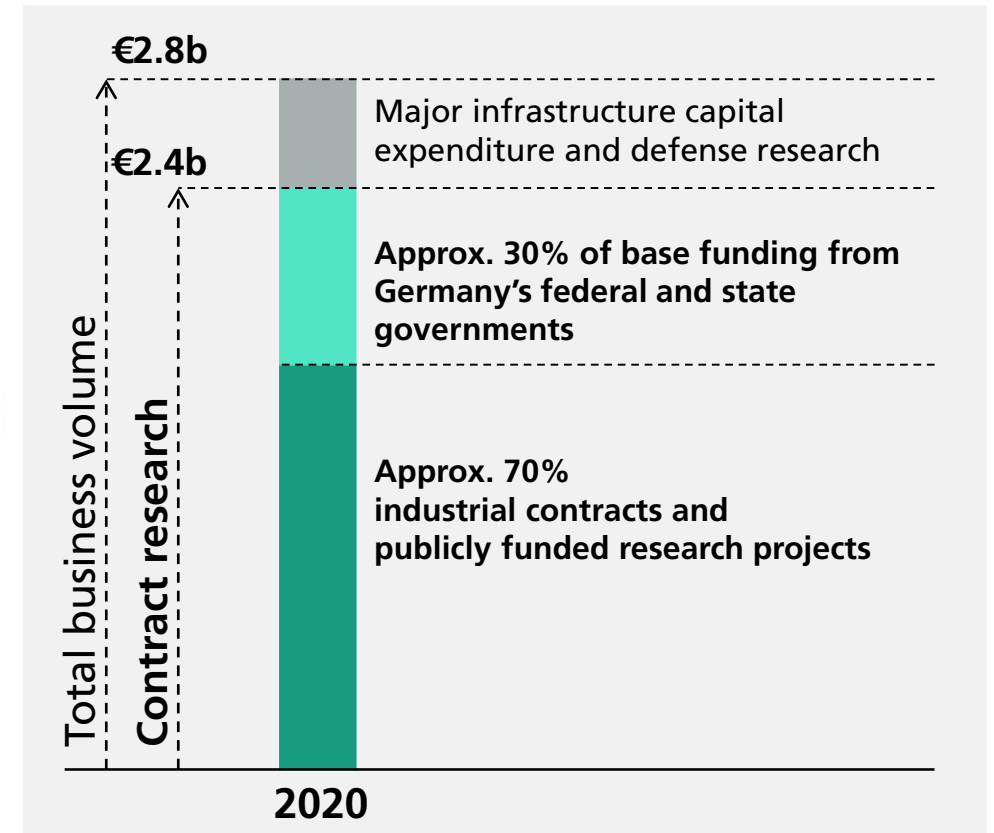
75 institutes and research units

(1/2021)



Approx. 29,000 employees

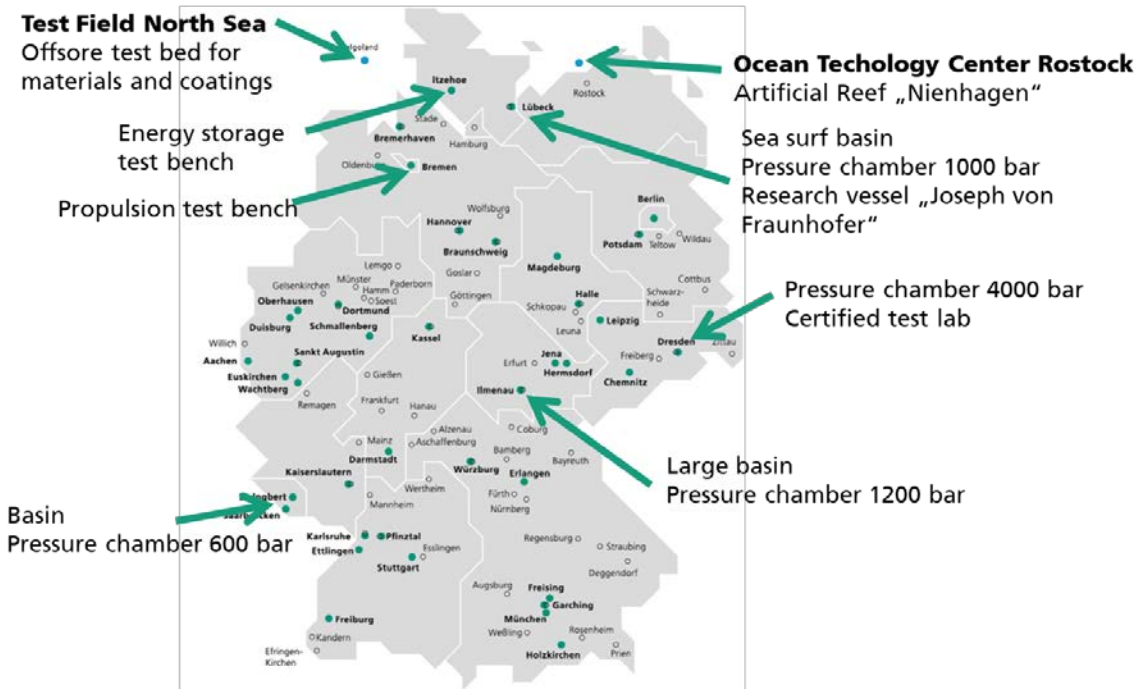
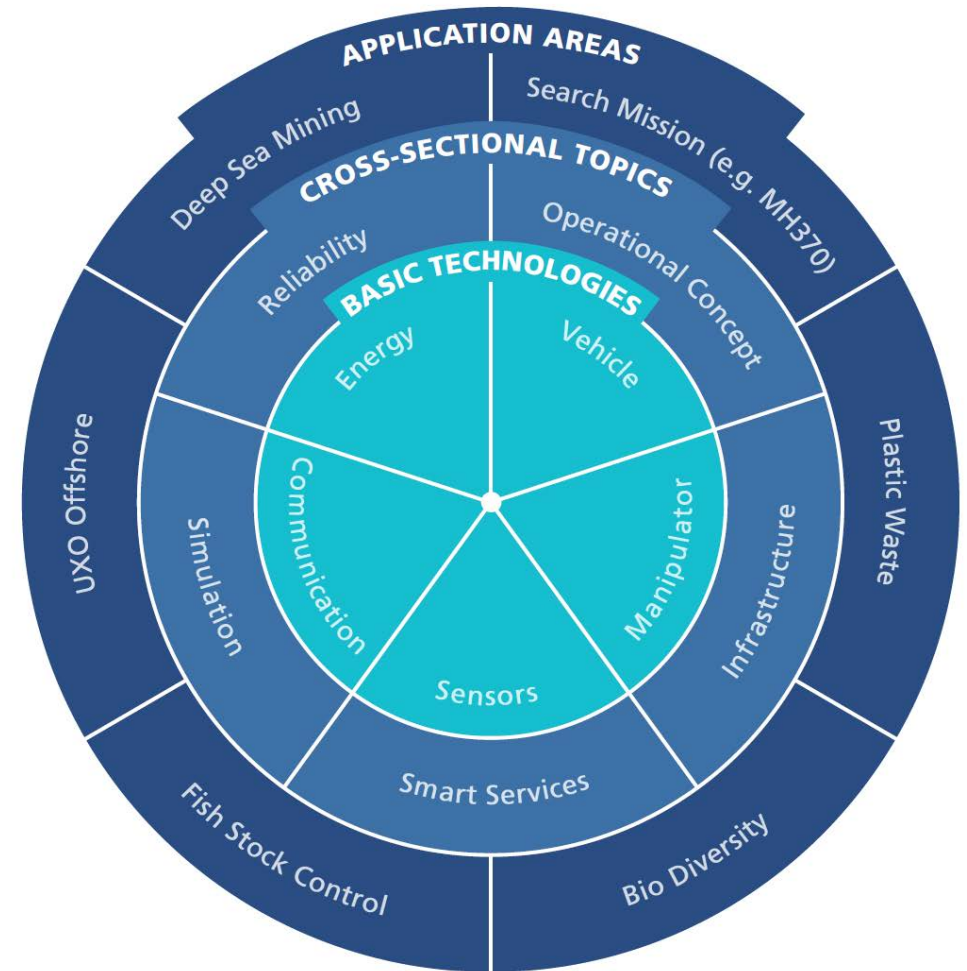
(12/2020)



Our name is synonymous with applied research. Together with companies, we transform original ideas into innovations – for the benefit of society as a whole and to strengthen the German and European economy.

Subsea@Fraunhofer: Bundling interdisciplinary research for ocean technology

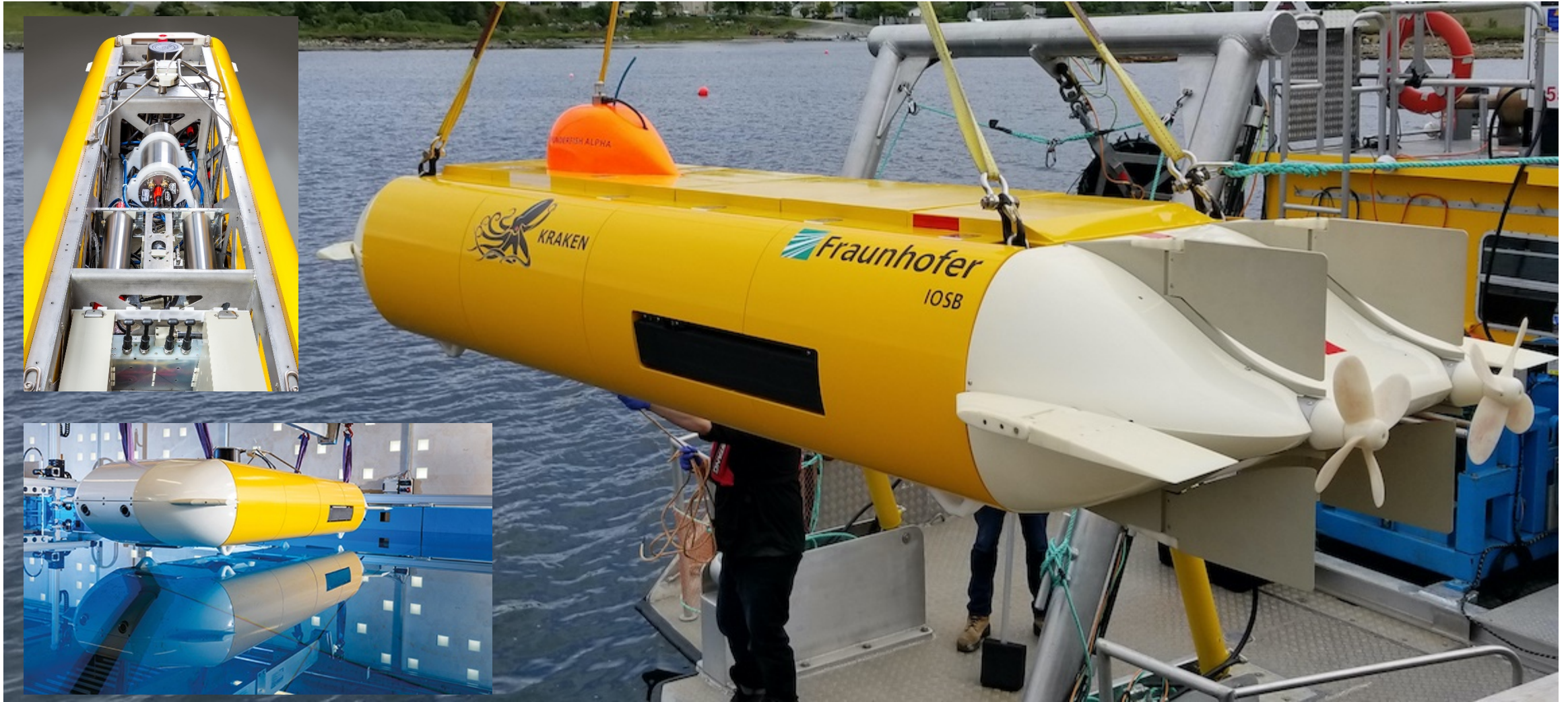
- Association of 13 Fraunhofer institutes
- Coordinated by Fraunhofer IGD in Rostock
- Covering a broad range of technological and methodical expertise



Source: Subsea@Fraunhofer

From applied research and technologies to commercial success (tech-transfer)

DeDave: strategic light-house project of Fraunhofer on underwater technologies



2019-09-26_Vorlage-Abteilung xyz.pptx

Ocean Discovery Xprice about the global, autonomous seafloor mapping

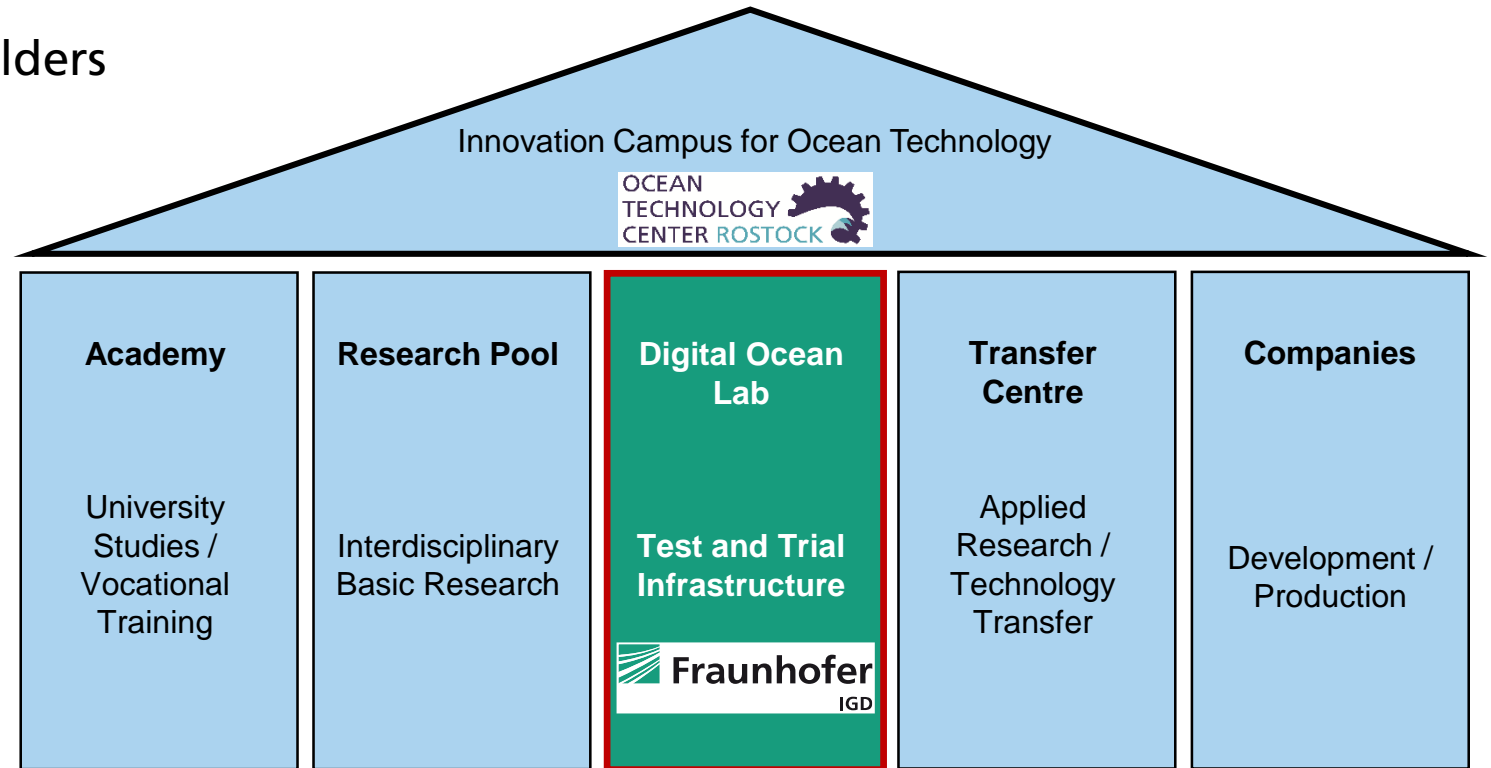
Finalist: ARGGONOUTS collaborative team effort from Fraunhofer and industry



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Complete Vision: „Ocean Technology Campus Rostock“

- Objective: Innovation campus in Rostock with international visibility
- Digital Ocean Lab of Fraunhofer IGD as a nucleus for attracting specialized companies
- Offering optimal environment for innovation
- Covering the whole innovation chain from education to market
- Joint initiative of regional stakeholders
 - Economy
 - Academia
 - Government
- KPIs
 - Scientific excellence
 - Economic growth



Ocean Technology Campus Rostock

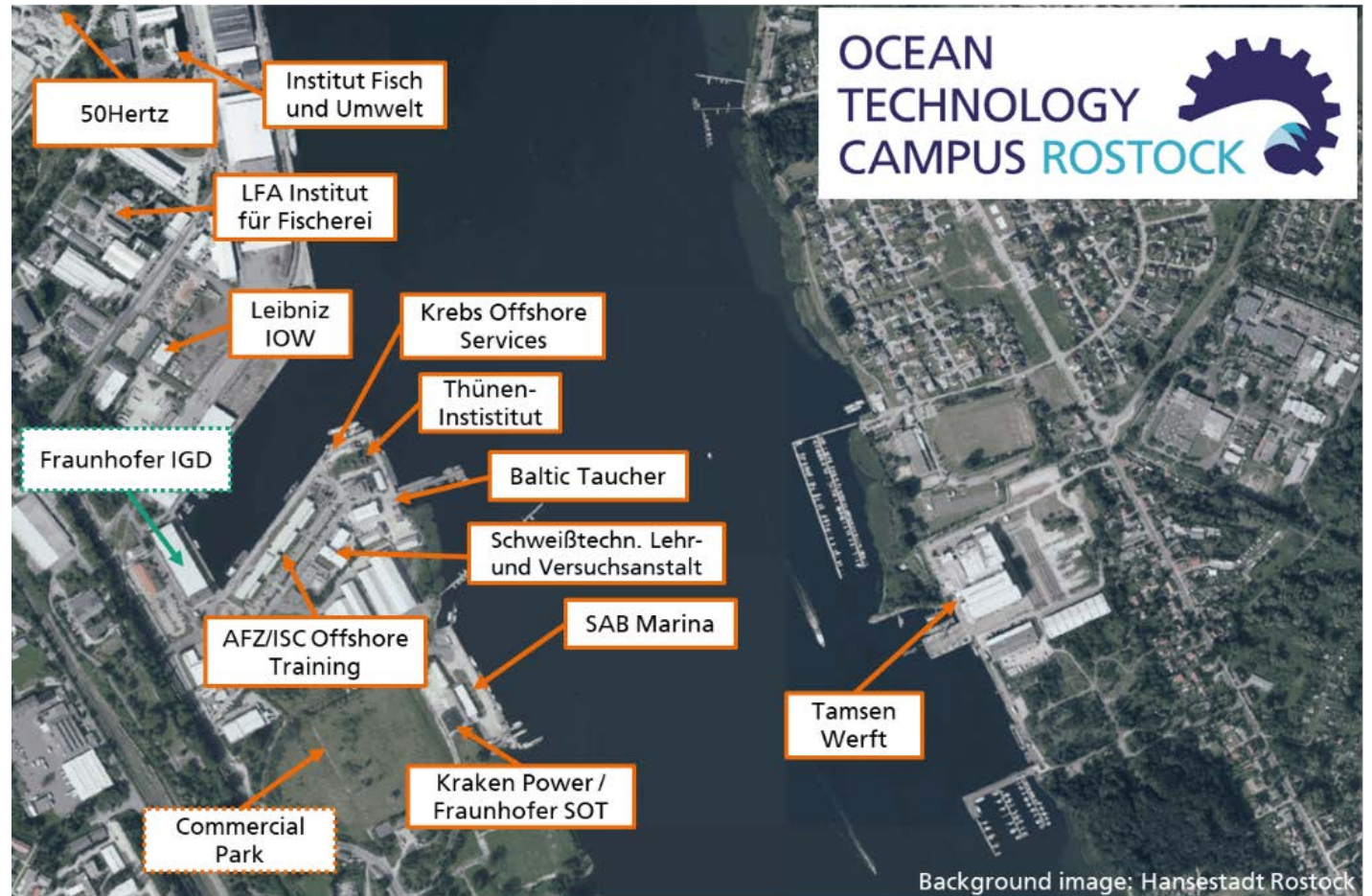
Creating an Innovation Eco System for Sustainable Subsea Solutions

■ Regional Capacity Building

- Skills
- Knowledge
- Data
- Infrastructure
- Ideas
- ...

■ Aims

- Broader networking
- Scientific excellence
- Economic growth



Ocean Technology Campus Rostock

BMBF Cluster4Future for the sustainable usage of the ocean



- Innovation areas
 - Subsea Mobility & Autonomy
 - Digital Mission
 - Ocean Lense
 - Sustainable Ocean Use
- Instruments
 - Expansion of Research Capacities
 - Open Innovation
 - Public Engagement
 - Promotion of Young Talent

Underwater Technology: A growing topic of (applied) research

Challenges

- High Pressure
- Hydrodynamics
- Salt water
- Bio fouling
- Lighting conditions
- Poor accessibility



Application areas

- Technical inspection (offshore wind, oil & gas)
- Exploration and mining of mineral resources (deep sea mining)
- Detection and clearance of underwater unexploded ordnance (UXO)
- Biological monitoring (marine aquaculture)
- Analyzing ecosystems (marine research)
- ...

Research group „Smart Ocean Technologie“ (SOT)

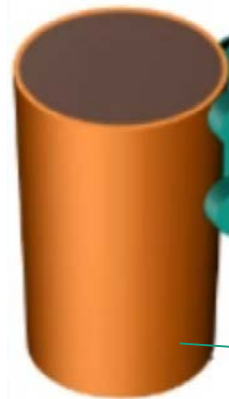
Scientist with different academic backgrounds

Applied research from prototypes to „offshore ready“ solutions



UW Robotics

Releaser



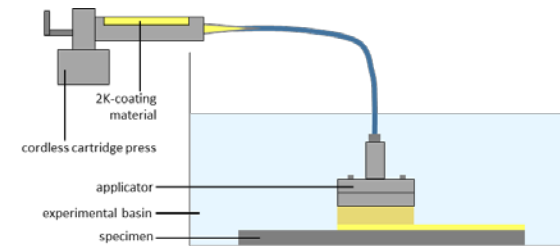
Umbilical

Crawler

Object



UW Inspection



UW Coating

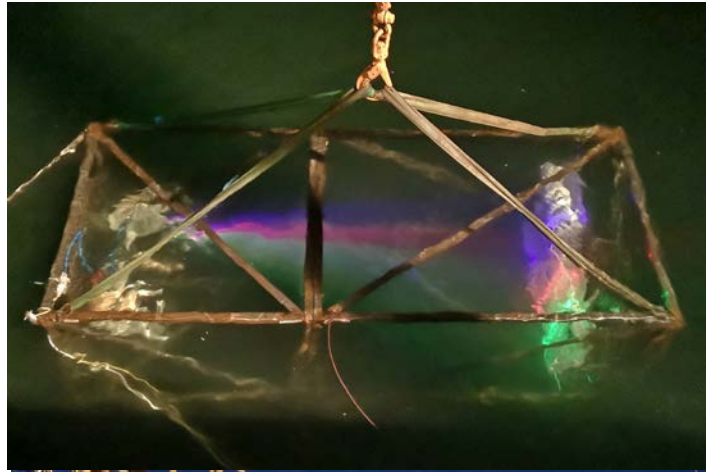


UW Vision



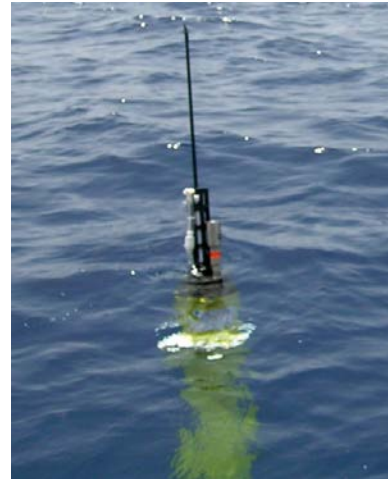
UW Monitoring

Minilab – agile subsea platform



LABORATORY MODULE

basic equipment of sensors
and lighting



COMMUNICATION

live and remote

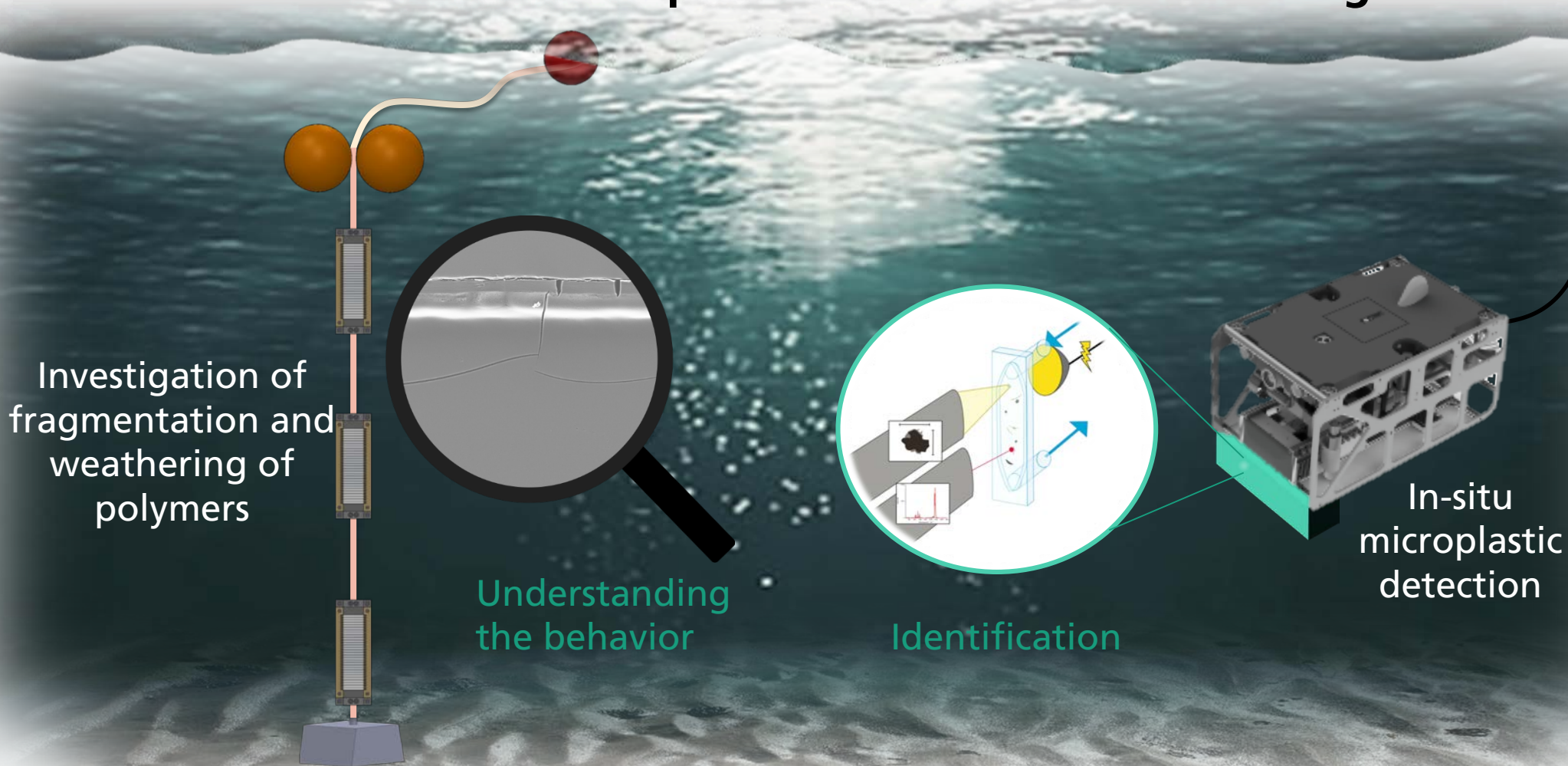


CONTROL STATION

workshop and control room
in close proximity

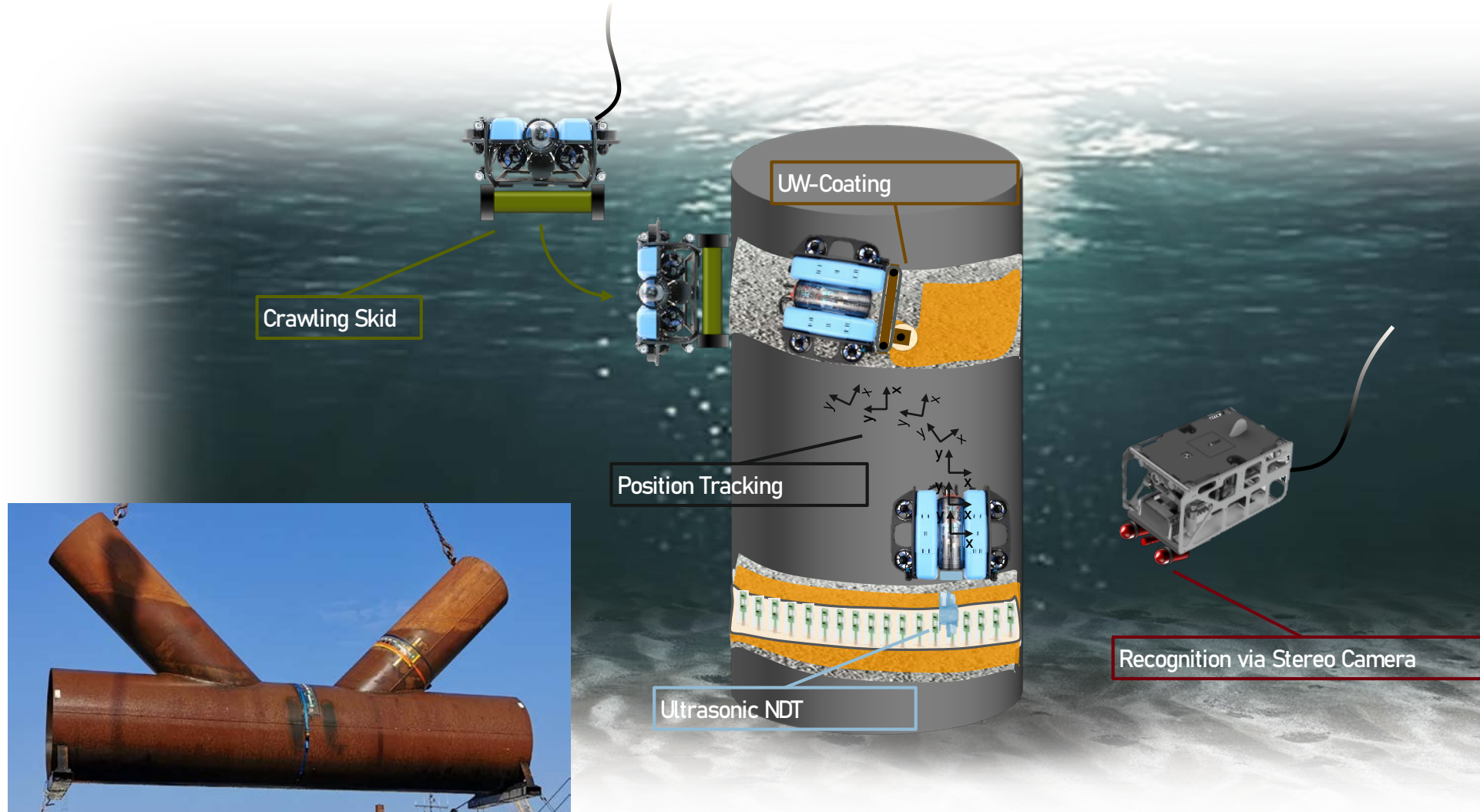
Low-threshold transition from test basin to realistic conditions

Fraunhofer Smart Ocean Technologies: Tackle the microplastic environmental challenge



Support the EU Marine Strategy Framework Directive

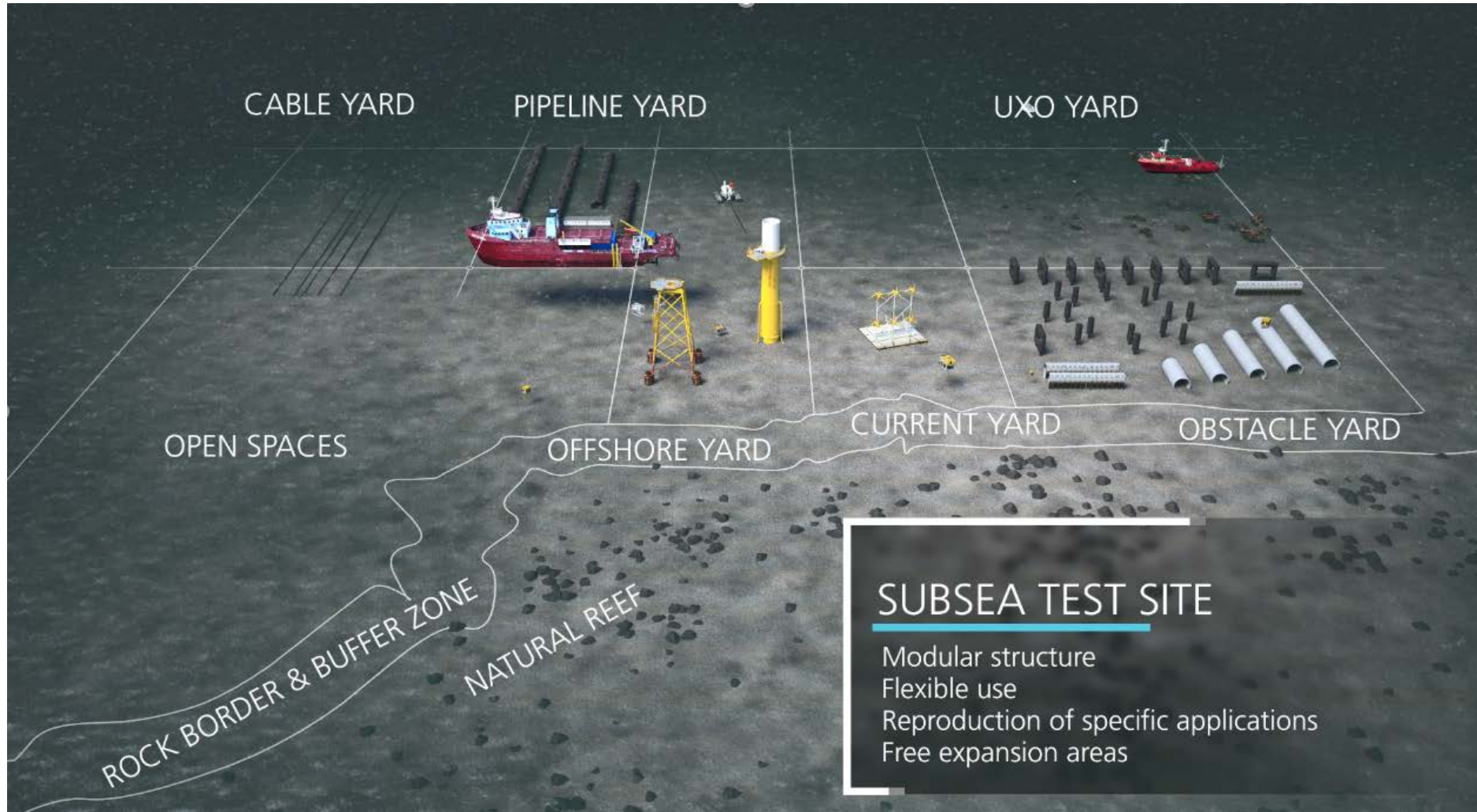
Underwater Maintenance



Digital Ocean Lab

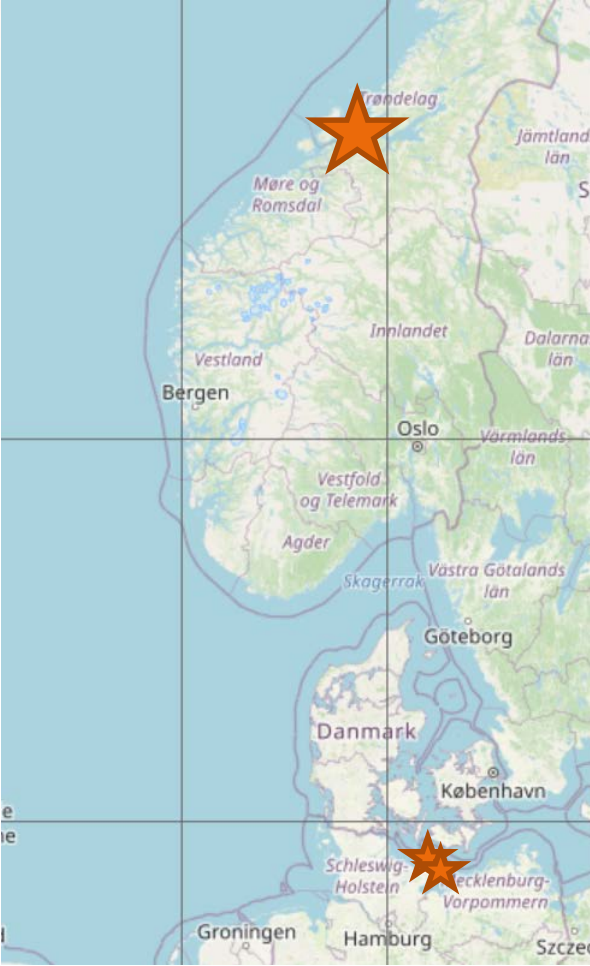
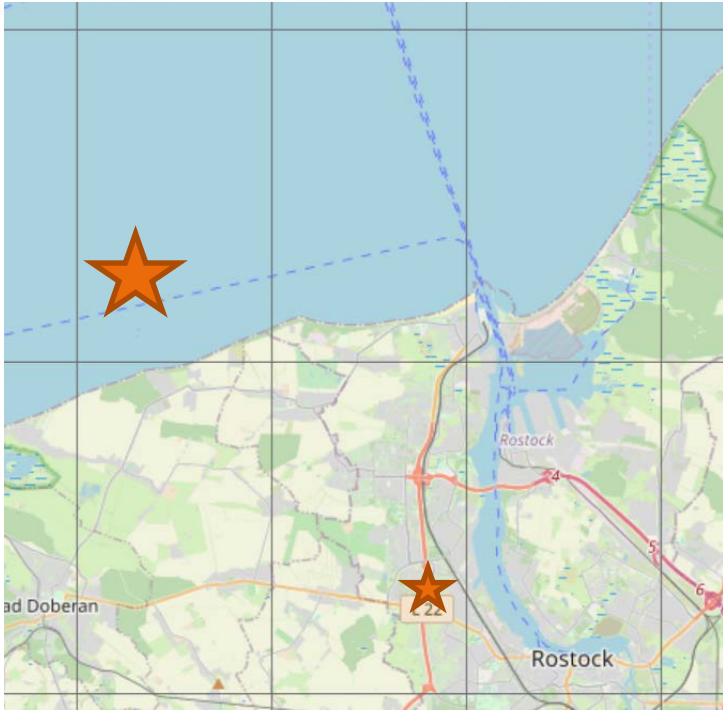
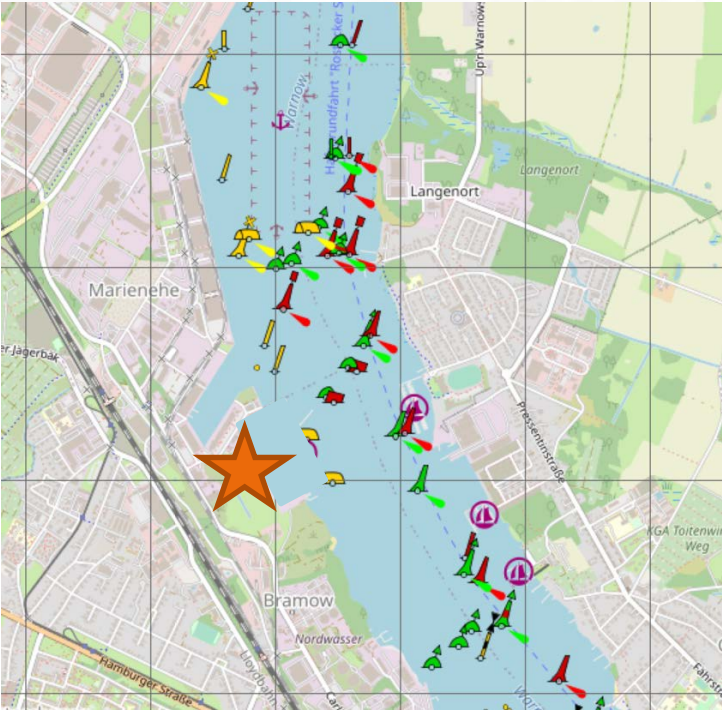


Projected Offshore Infrastructure Rostock – Digital Ocean Lab



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Thank you very much!





OceanLab – "Ocean Space field laboratory Trondheimsfjorden"

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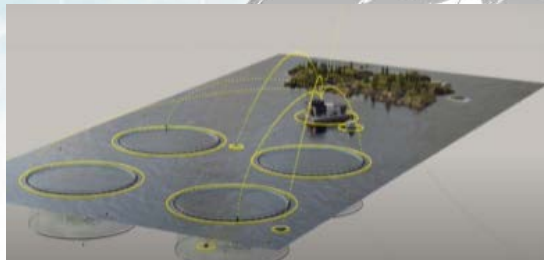
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SINTEF Ocean

Kristin R. Sørheim and Emlyn J. Davies

OceanLab, Trondheim fjord

Aquaculture



Marine observatory



Autonomous shipping



Communication and e-infrastructure



Subsea facility



OceanLab, Trondheim fjord

- OceanLab infrastructure project is funded by the Research Council of Norway, and investments from SINTEF Ocean and Industry
- OceanLab consortium is led by SINTEF Ocean in cooperation with NTNU and SINTEF Digital
- Estimated timeline OceanLab (Phase I):
 - 2020- 2022/2023: Purchasing, installation & testing phase
 - 2023: Operational phase for all nodes



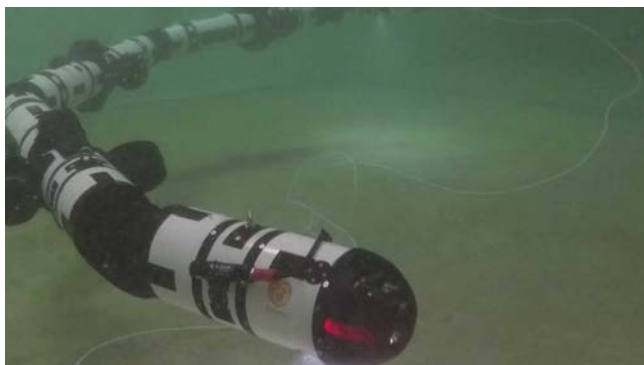
Animation on website:

<http://www.sintef.no/oceanlab>

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OceanLab, Trondheim fjord

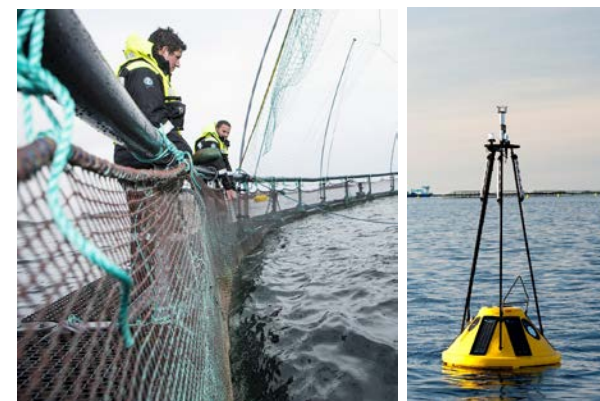
Subsea facility –
Trondheim fjord



Test area for
autonomous shipping –
Trondheim fjord



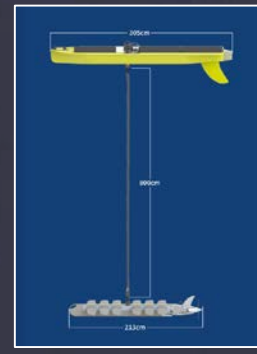
Aquaculture facility –
Trondheim fjord and
beyond



OceanLab: Marine Observatory

FjordLab
2023-2026

Glider 2

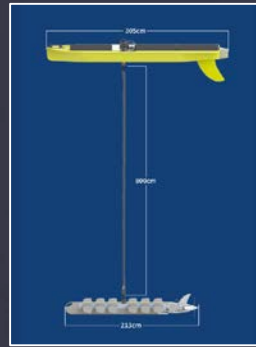


Buoy



Frøya

Glider 1



OceanLab Phase 1
2020-2024

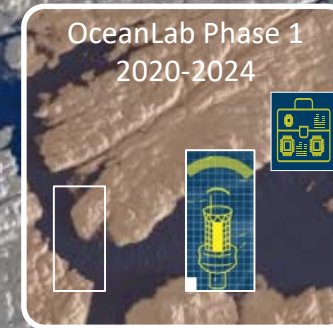
An inset map showing a specific location near Trondheim. A white rectangular box on the map indicates the location of a buoy. To the right of the map is a small diagram of a glider system, including a yellow glider body, a tether, and a buoy.

Trondheim

Ålesund

OceanLab: Marine Observatory

Frøya



Trondheim

Ålesund

Ecosystems



Trondheim's floating lab



Technology innovation platform

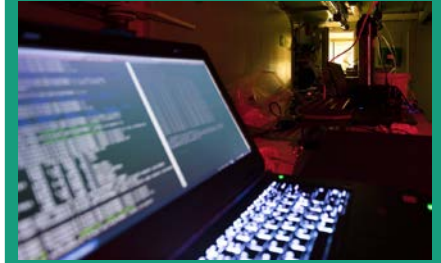
Pollution / Litter



Technology



Software & AI/ML



Data for fundamental research & model development



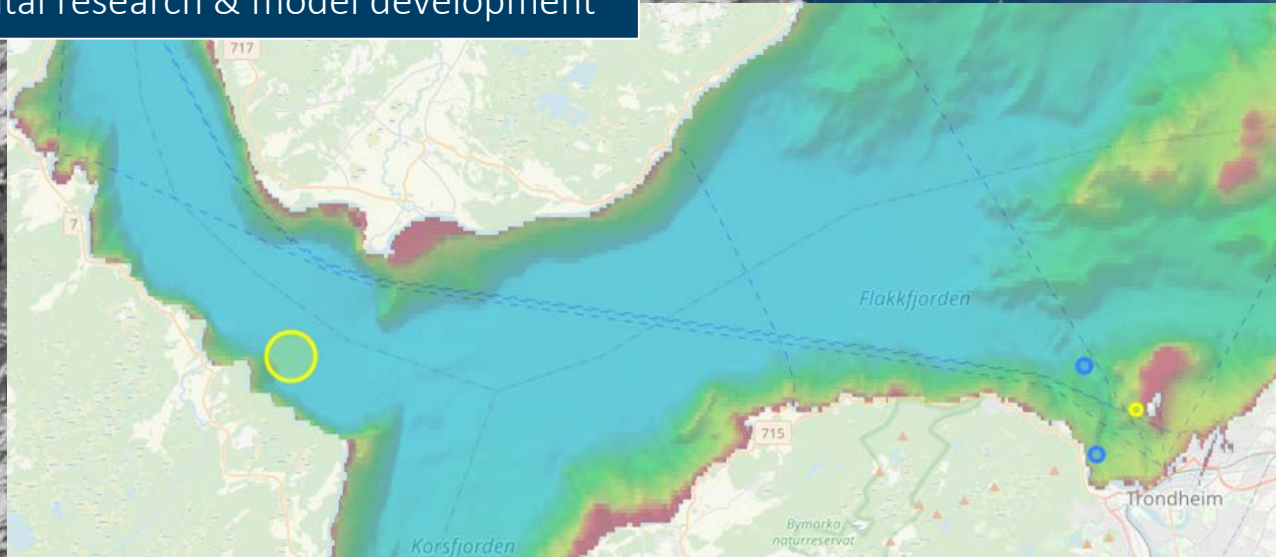
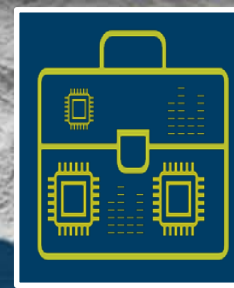
NODE 4

MARINE OBSERVATORY

OceanLab

The unique platforms will provide:

- Sites for in-situ lab experiments
- Sensor technology innovation platforms (plug-and-play sensor integration)
- Mobile sensors available to projects
- Data for fundamental research & model development



RVATORY

OceanLab

The observatory node will also support:

- Communication gateways to underwater vehicles & autonomous ships
- Education and science communication
- Data supporting local environmental policymaking



MOBILIS

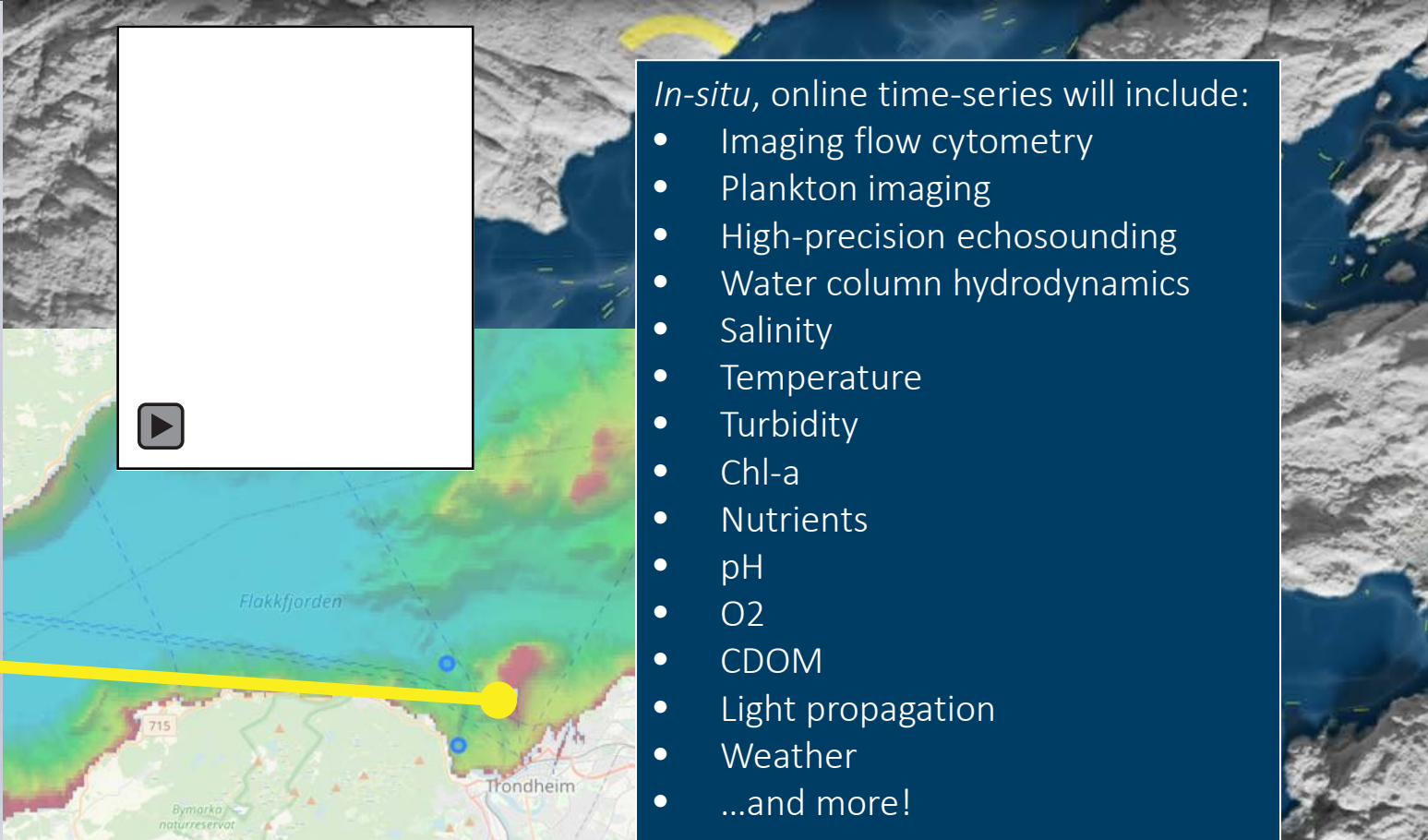
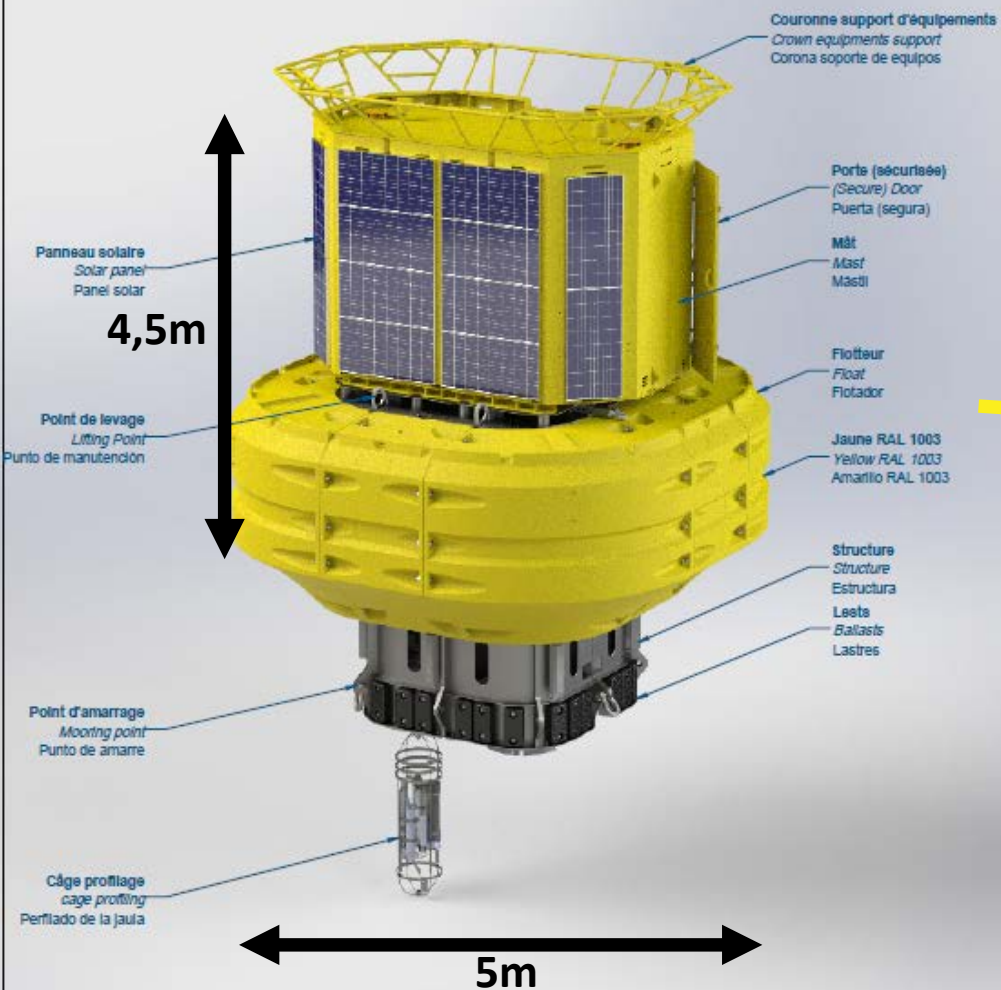


hydrosphere

river and sea equipment

DB 24000

Munkholmen



OceanLab



SINTEF

NTNU

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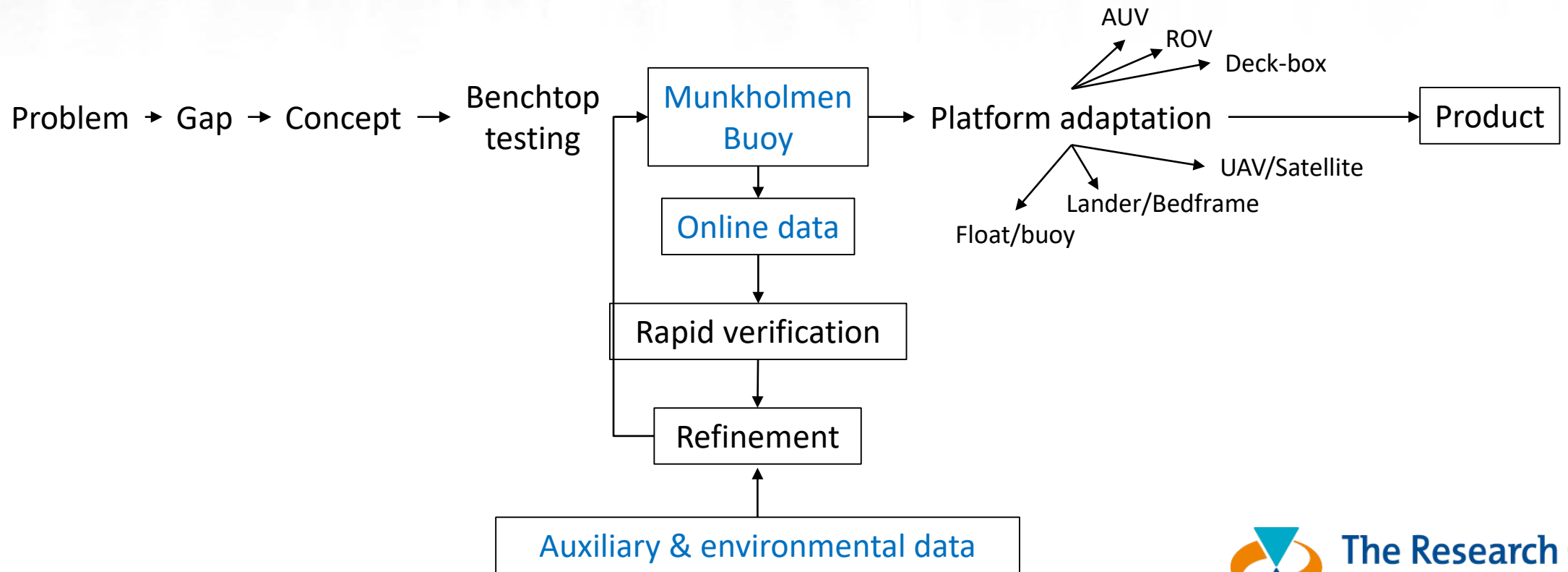


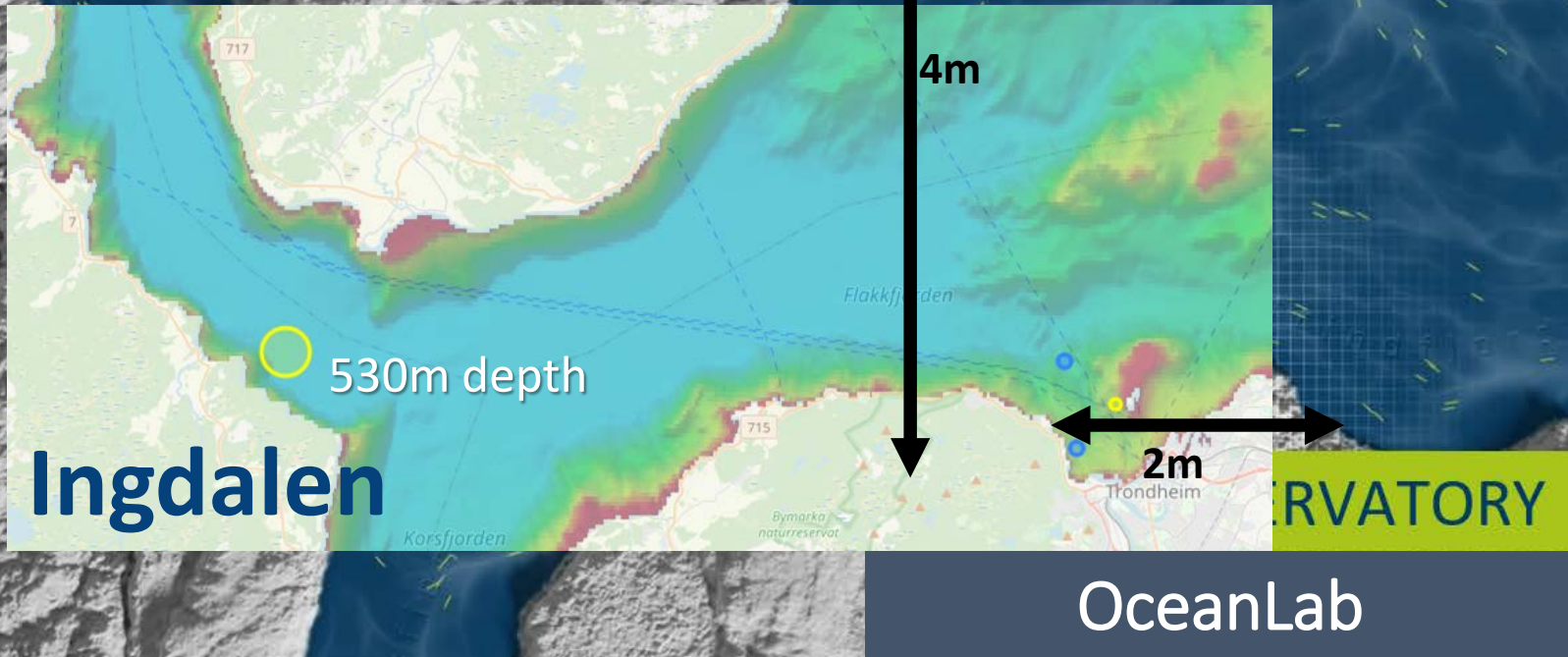
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n°: 1/3 2304/2021

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Images specifications et dimensions non-contractuelles / Images and specifications for information only

Rapid prototyping

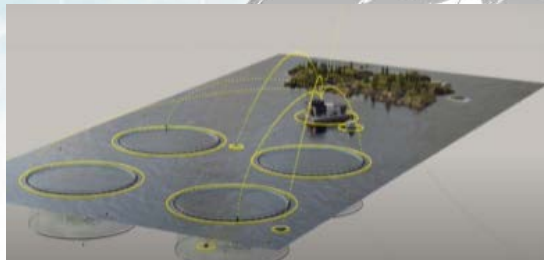
Example technology development roadmap:





OceanLab, Trondheim fjord

Aquaculture



Marine observatory



Autonomous shipping



Communication and e-infrastructure



Subsea facility





Innovation Platform Sustainable Sea and Ocean Solutions ISSS

Dr.-Ing. Johannes Nowak
Fraunhofer-Gesellschaft

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Innovation Platform Sustainable Sea and Ocean Solutions ISSS

Intelligent Technologies for the blue economy

Application Areas

- Aquacultures
- Energy Harvesting
- Ocean Cleaning

Technologies

- Robotics and actuators
- Communications and sensors
- Materials and logistics



THANK YOU FOR YOUR INTEREST AND PARTICIPATION!

Further information:

- **SINTEF Ocean**

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www.sintef.no/en/

www.ntnu.edu/oceanlab

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www.fraunhofer.de/en

www.fraunhofer.de/subsea



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