

An Ocean of Opportunities

Owe Hagesæther CEO

GCE Programme

Norwegian Innovation Clusters is a government supported cluster programme, which aims to increase value creation through sustainable innovation.

- Trigger and enhance collaborative development activities in clusters.
- Increase cluster dynamics and attractiveness.
- Increase company's innovation and competitiveness.

Three cluster levels:

- **GCE – mature clusters with global positions**
- NCE – mature clusters with national positions
- Arena – immature clusters



GCE Ocean Technology - Our Mission



A Norwegian industry driven cluster created to promote the members' interests by:

- Reinforcing innovation activity.
- Raising international involvement.
- Increasing capacity, competitiveness and value creation for partners and members and for the cluster as a whole.

Main Goal:

Increase the cluster's competitiveness and global market share and take a leading position in sustainable utilisation of ocean resources.

Facilitator

- Established in 2006
- 10 million NOK in public funding
- Annual total budget about 25 million NOK

Locations:

- Vitensenteret, Marineholmen, Bergen
- Coast Center Base, Ågotnes
- Hub for Ocean, Florø



Marineholmen, Bergen, Photo by G.C. Rieber



Coast Center Base, Ågotnes_Photo by CCB



Fjord Base Florø_Photo, by Harald M. Valderhaug

The Cluster Map



PARTNERS

Industry



R&D



Higher Education Institutions



Development Contributors



MEMBERS



Supported by



Cluster Relations



National Relations



International Relations



Global Centres of Excellence and Gold Label



- It is required Gold Label certification by the European Cluster Excellence Initiative (ECEI) to become a GCE – Global Centres of Excellence
- GCE Ocean Technology's timeline for the assessment for Gold label is as follows:
 - 2013: Awarded Gold Label with a 100% score
 - 2015: Awarded Gold Label with a 96% score
 - 2019: Awarded Gold Label with a 98% score.





Core Competence

Marine Operations and IMR



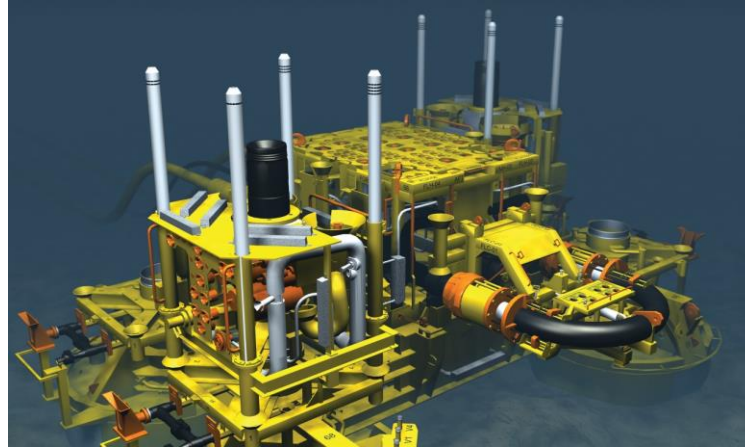
- Inspection, maintenance and repair
- Marine operations
 - Survey and positioning
 - Subsea construction
 - ROV operations
- Yard services
- Technical services and logistics



System Suppliers



- Engineering
- Procurement
- Construction
- Installation



TechnipFMC



OneSubsea



Aker Solutions



GE

Design, Construction and Fabrication



- Design
- Engineering
- Fabrication and surface treatment

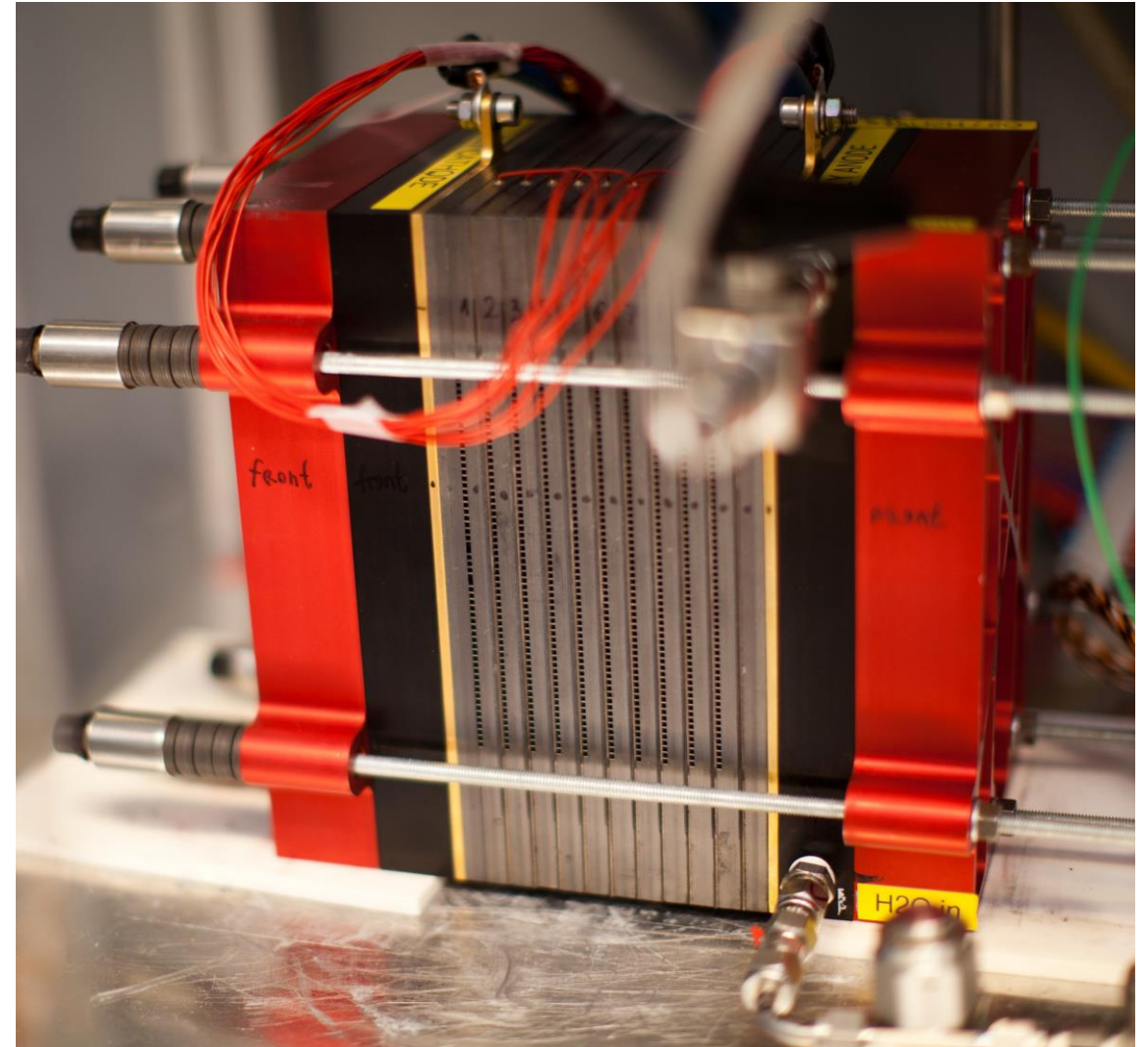
- Example of equipment and systems:
 - Piping and valves
 - Pumps
 - ROV, AUV



Instrumentation, Sensors and Big Data



- Subsea instrumentation and sensor technology
 - Condition monitoring
 - Multiphase flow metering
 - Environmental monitoring and leak detection
 - Reservoir monitoring
- Communication and power distribution
- Big Data
 - Data integration
 - Automation and machine learning
 - Visualisation decision support



Support Services



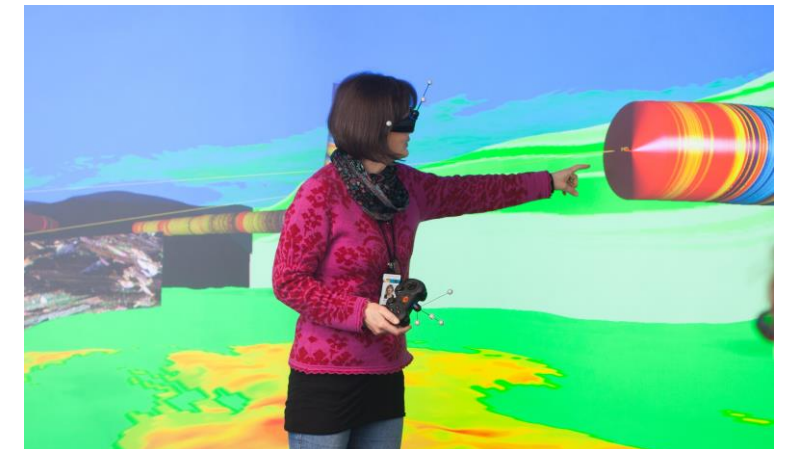
- Financial, legal and IPR services
- Transport and logistics services
- Consultancy and business development



R&D and Higher Education



- Leading R&D institutions
 - NORCE, SINTEF, IMR
- Higher Education
 - UiB, HVL, NTNU, BI
- Technical schools





Challenging change

Key Global Drivers

Potential: The Ocean Industries is estimated to double its contribution to the global economy by 2030 (OECD).

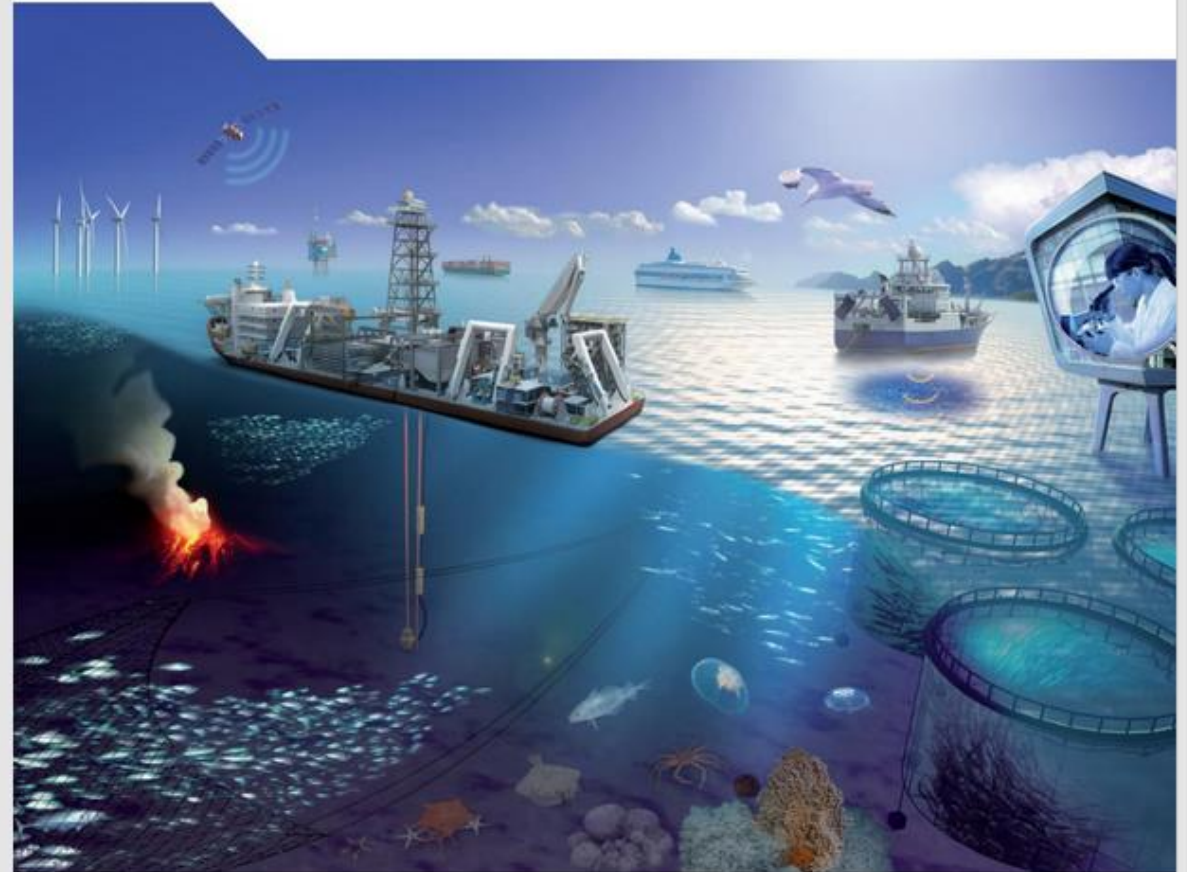
- Increased demand for energy, food, minerals and medicine
- Climate and environment
- Digitalisation/Industri 4.0

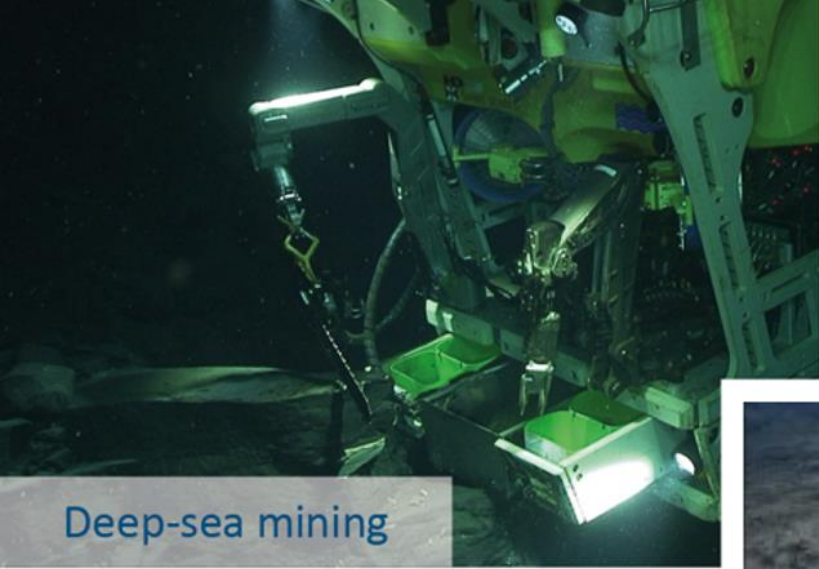
Challenge: Balancing the need for increased productivity while protecting the ocean resources.

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The Ocean Economy in 2030

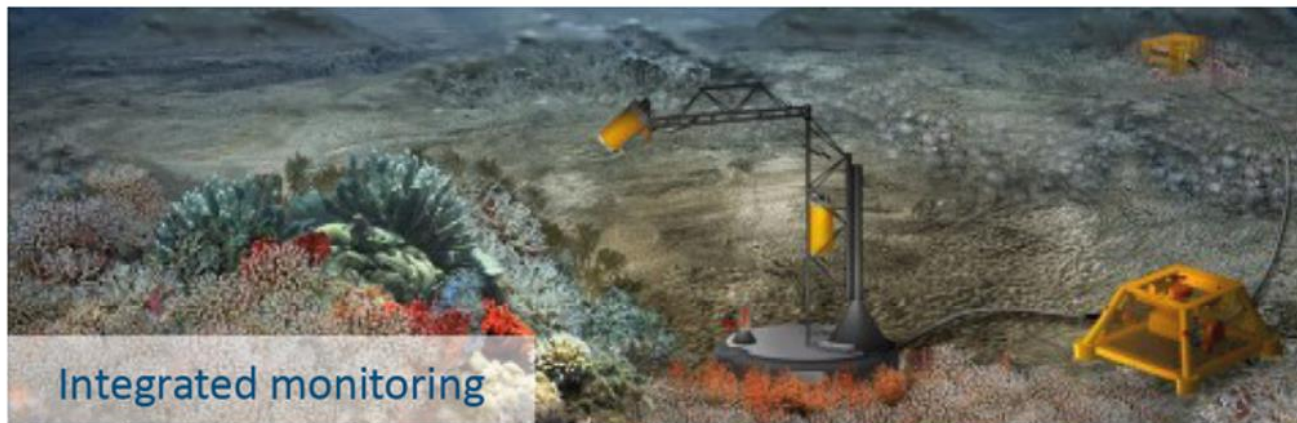




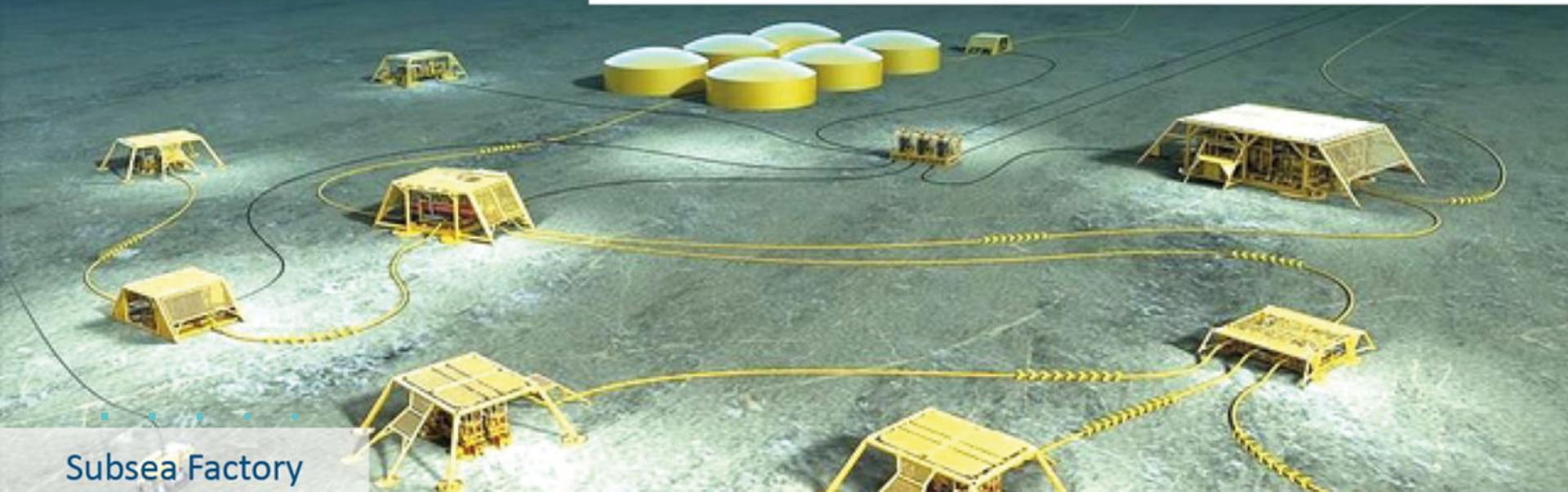
Deep-sea mining



Marine food production



Integrated monitoring



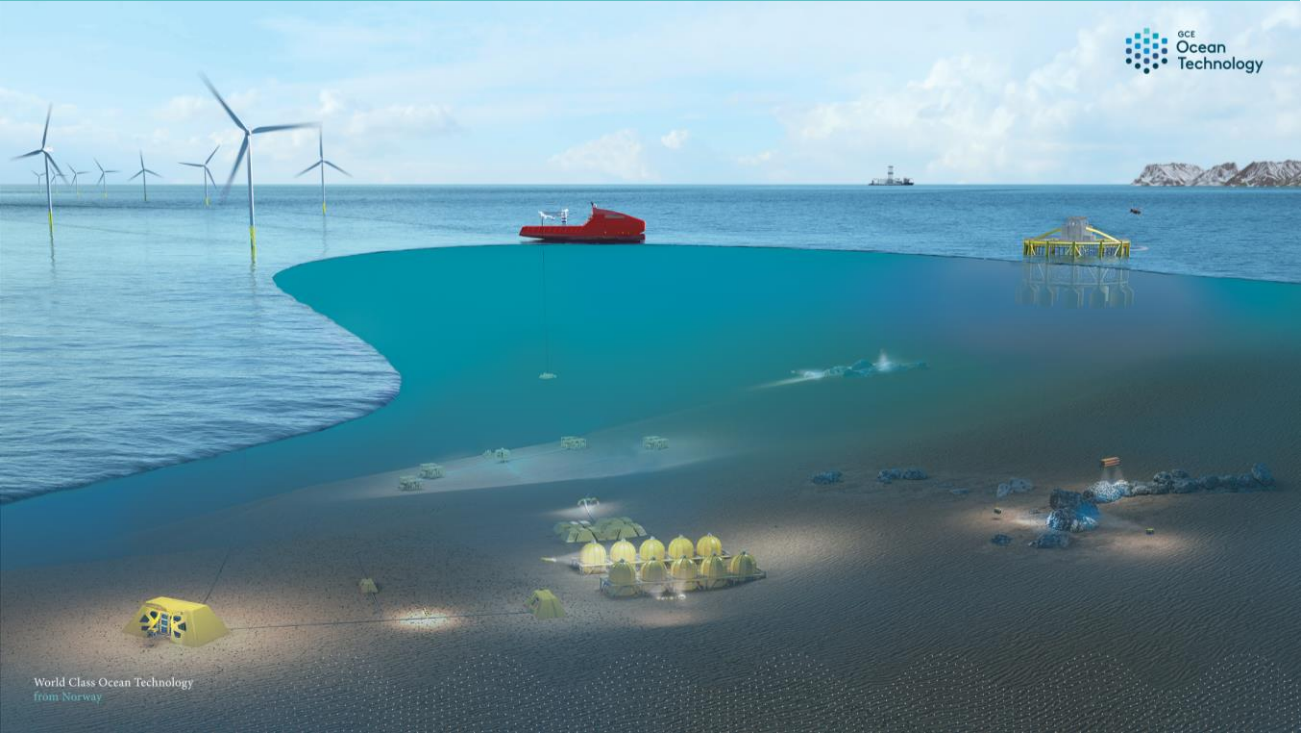
Subsea Factory



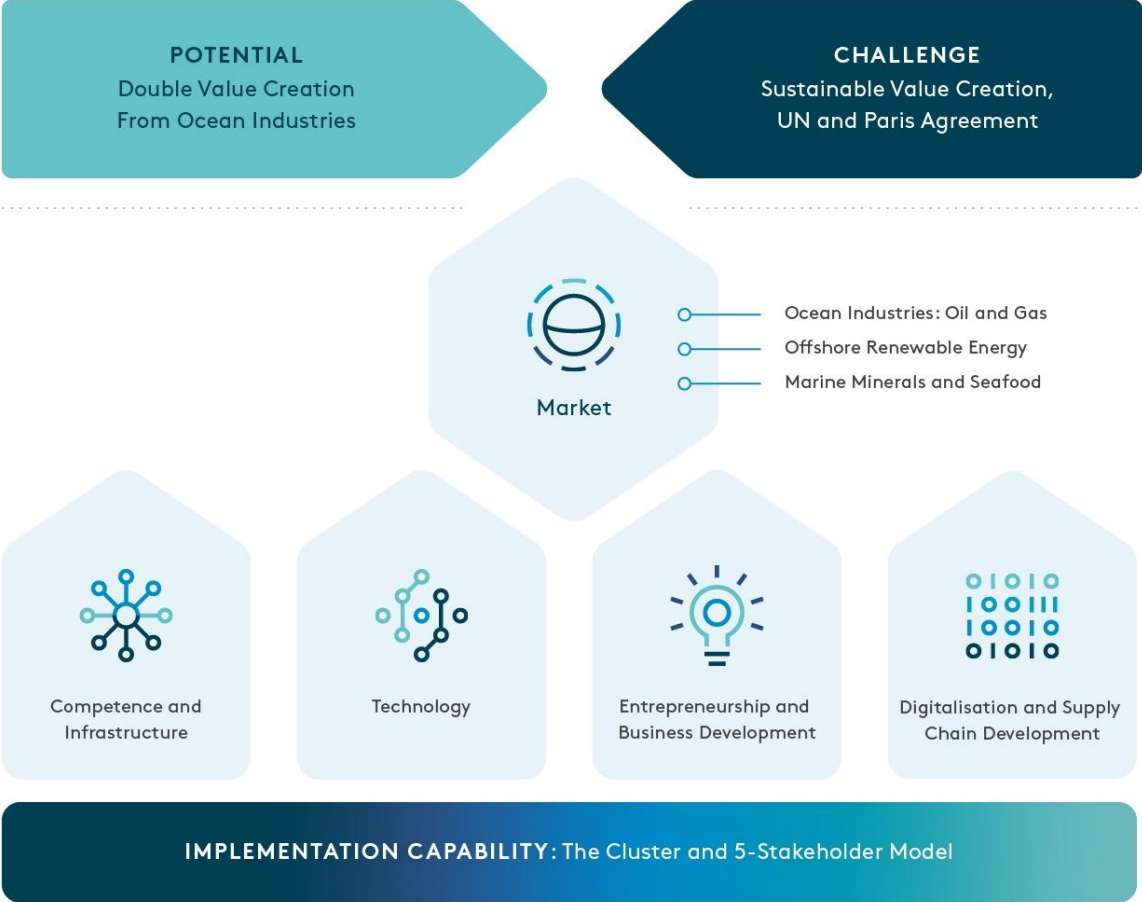
Offshore renewable energy

Our Scope

- Subsea oil and gas production
- Marine renewable energy production
- Marine food production
- Exploration of marine mineral resources

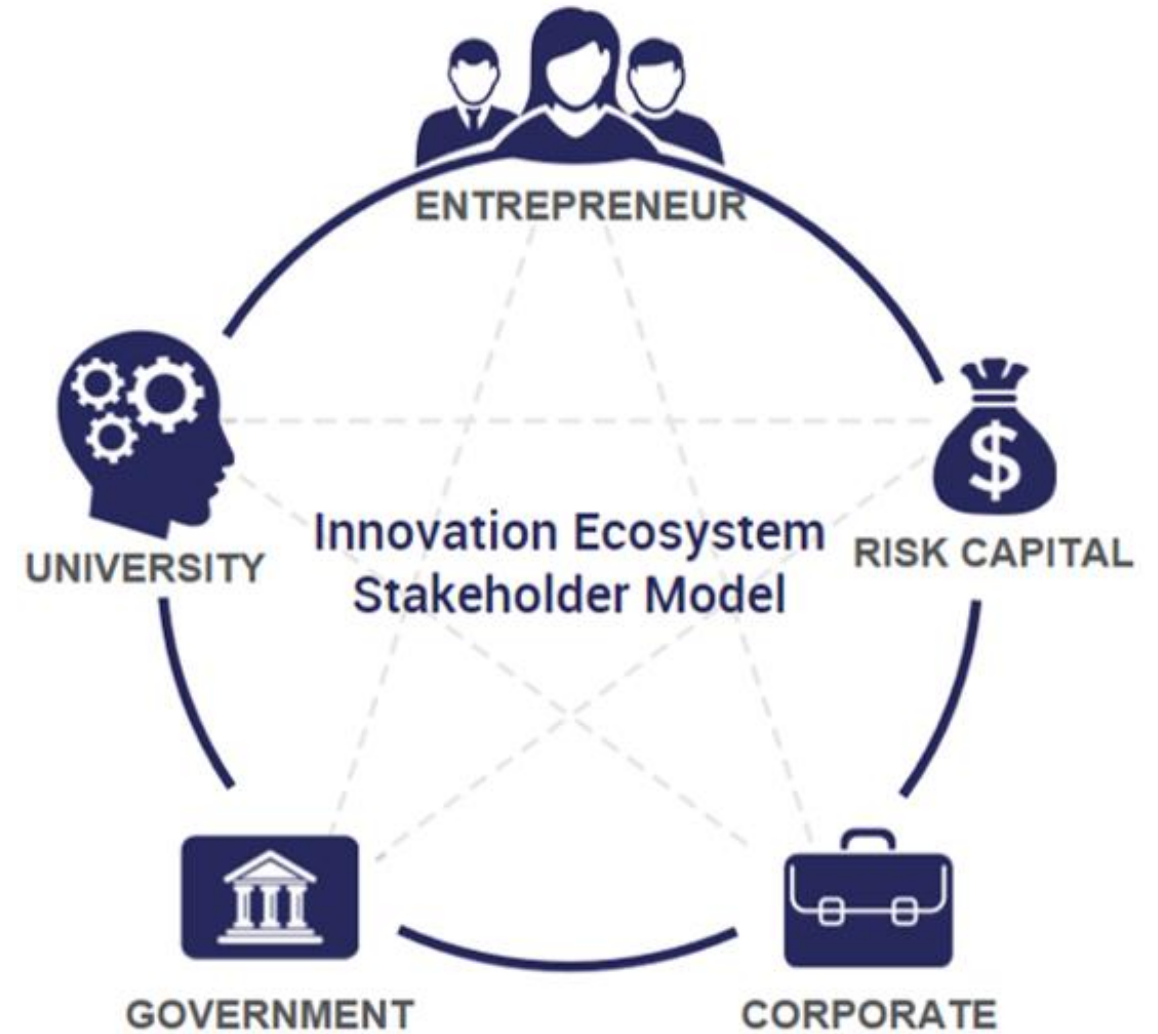


OCE
Ocean
Technology



5 Stakeholder Model

- Optimal innovative ecosystem
- Basis for implementation of our strategy
- Model was developed in MIT- REAP project (2016-2017)



Market

Helping companies succeed in the global ocean industry markets.

- Increasing the proportion of companies that export.
- Provide broad and updated market information.
- Increasing expertise on marketing, branding, strategy and internationalization.
- Develop partnerships targeting international markets.
- Increasing the clusters visibility in international markets.
- Raise awareness of the possibilities and potential in utilizing subsea solutions and the knowledge base in related industries.
- Strengthen multidiscipline collaboration.
- Create new knowledge links.



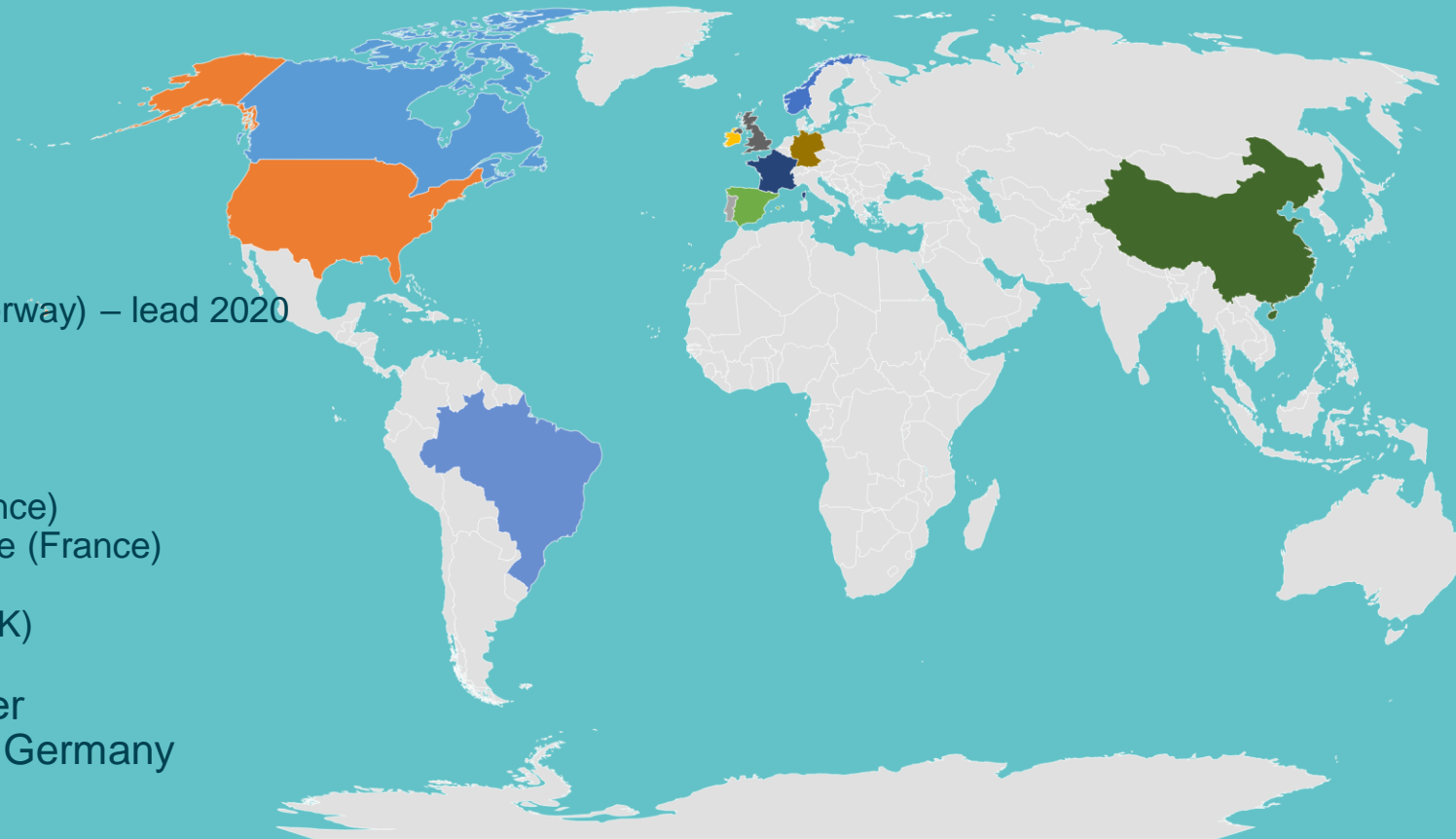
International Collaboration

Collaboration across world leading Ocean Industries Ecosystems

Mission: promote *sustainable investment & growth* of the knowledge-based ocean and water industries, to the mutual benefit of all parties, through active regional, national and international collaboration

- BlueTech Cluster Alliance
 - GCE Ocean Technology (Norway) – lead 2020
 - Forum Oceano (Portugal)
 - Marine Institute (Ireland)
 - Oceans Advance (Canada)
 - PLOCAN (Spain)
 - Pole Mer Mediterranee (France)
 - Pôle Mer Bretagne Atlantique (France)
 - The Maritime Alliance (U.S.)
 - UK Blue Growth Network (UK)

- Canada's Ocean Supercluster
- Subsea Monitoring Network, Germany
- APEX, Brasil



- GCE Ocean Technology
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- Oceans Advance
- PLOCAN
- Pole Mer Mediterranee
- Pole Mer Bretagne
- UK Blue Growth Network
- Subsea Monitoring Network
- EMEC
- Norway Asia Business Summit
- Apex

Competence and Infrastructure

Attracting talents, develop competence and offer advanced infrastructure.

- Strengthening and develop education and training programmes.
- Strengthening R&D infrastructure.
- Improving host attractiveness.
- Increasing expertise in the cluster companies.





Smart Ocean

- **Vision:** Realization of a generic autonomous and flexible wireless multi-parameter marine observation system for reliable management of a productive and healthy ocean.
- **Applications:**
 - Environment
 - Structure
 - Marine life
- **Budget: 285MNOK (8 years)**
- **Activities**
 - WP1 Autonomous sensors and measurement strategies
 - WP2 Wireless network communication
 - WP3 Software technology and bid-data middleware
 - 4xPilots; Environment; local and large scale, Integrity; offshore wind and oil & gas

Partners:

- Aanderaa Data Instrument
- Octio Environmental
- Halfwave Subsea
- Metas
- Kongsberg Maritime
- Tampnet
- Bouvet
- Fiskeri- direktoratet
- PSA
- Aker Solutions
- Conoco Philips
- Repsol
- GCE Ocean Technology
- GCE NODE

FoU-partnere:

- UiB
- HVL
- NORCE
- IMR
- FFI
- NERSC

Centre for Deep Sea Innovation



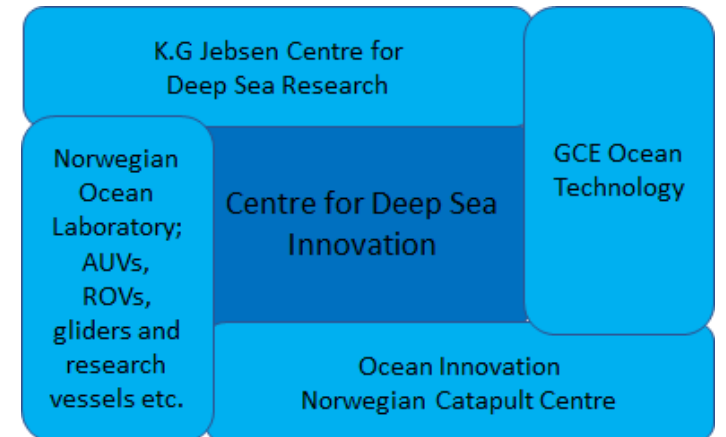
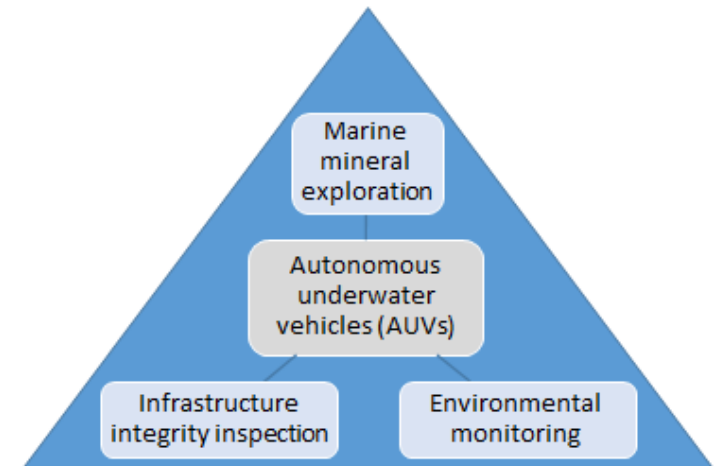
- **Objective:** An internationally leading research-based innovation centre for deep sea exploration, inspection and monitoring, accelerating sustainable value creation.
- **Goal:** Increase deep sea exploration efficiency with a factor of 10 and reduce CO2 footprint to 1/10 throughout the Centre period.
- **Budget: 309MNOK (8 years)**
- **Activities**
 - WP1 Problem def. and pilots
 - WP2 Autonomy and navigation
 - WP3 Hydrodynamics
 - WP4 Communication
 - WP5 Sensors
 - WP6 Data analysis

User partners:

- Oljedirektoratet (mineral)
- Kystverket (environment)
- Lundin-Norway (integrity)
- Swire Seabed
- DOF Subsea
- DeepOcean
- Kongsberg Maritime
- Kystdesign
- Argus Remote Systems
- Aanderaa Data Instruments
- GCE Ocean Technology

R&D-partners:

- UiB
- FFI
- HVL
- NORCE



The Catapult Business model



**MANUFACTURING TECHNOLOGY
NORWEGIAN CATAPULT CENTER**

RAUFOSS

**DIGICAT NORWEGIAN
CATAPULT CENTER**

ÅLESUND

**SUSTAINABLE ENERGY
NORWEGIAN CATAPULT CENTER**

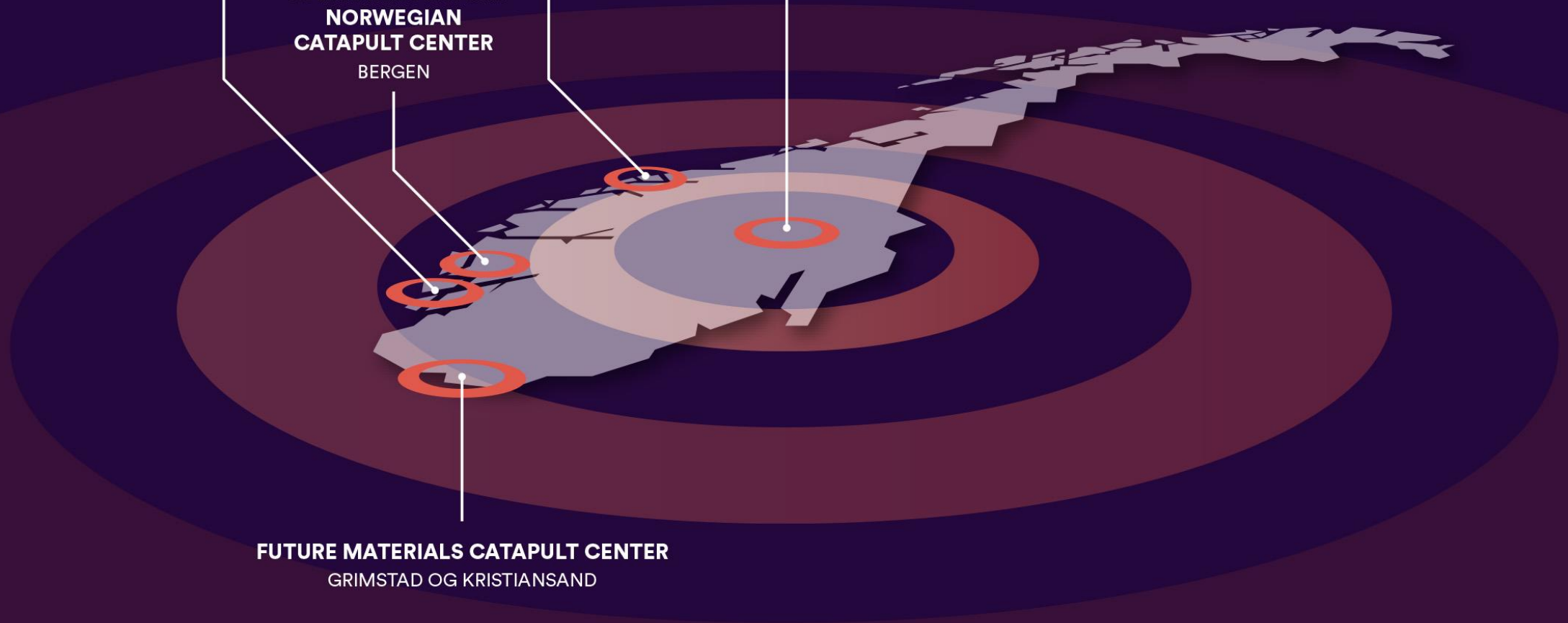
STORD

**OCEAN INNOVATION
NORWEGIAN
CATAPULT CENTER**

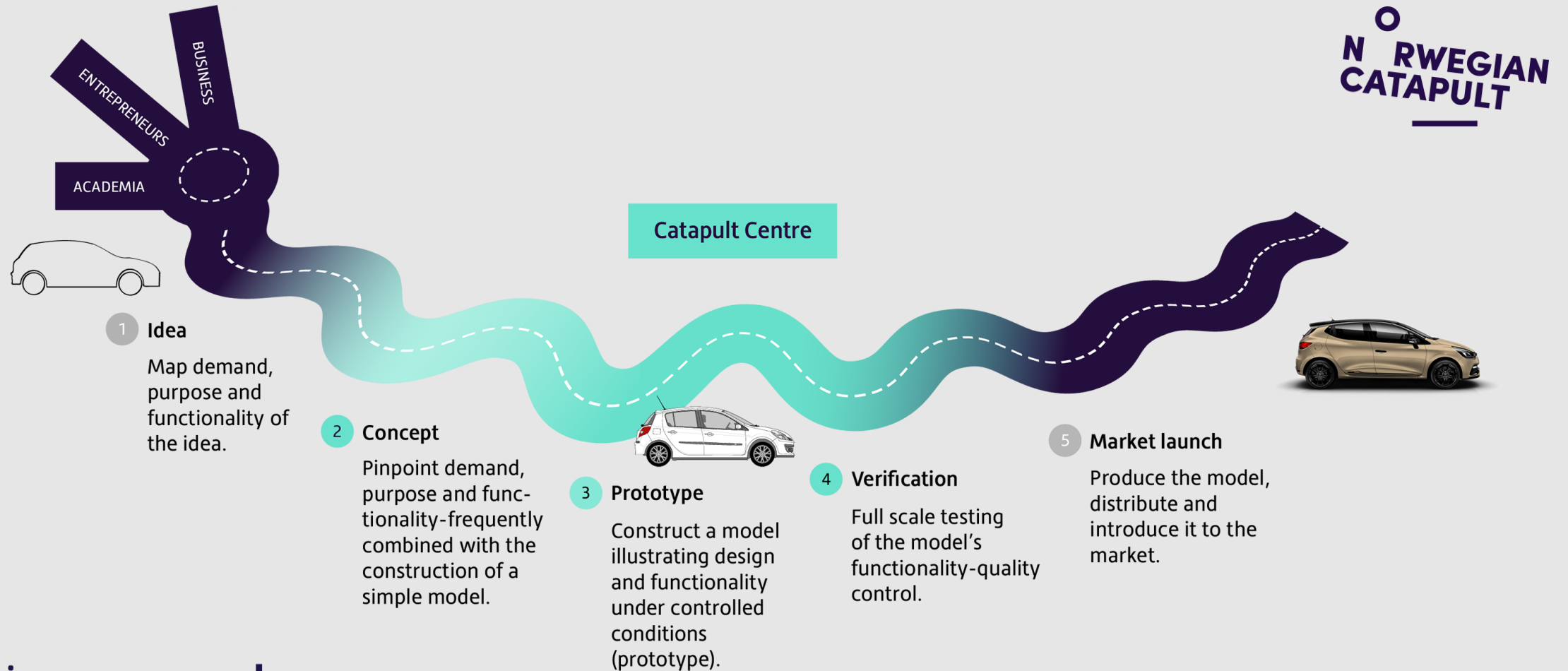
BERGEN

FUTURE MATERIALS CATAPULT CENTER

GRIMSTAD OG KRISTIANSAND



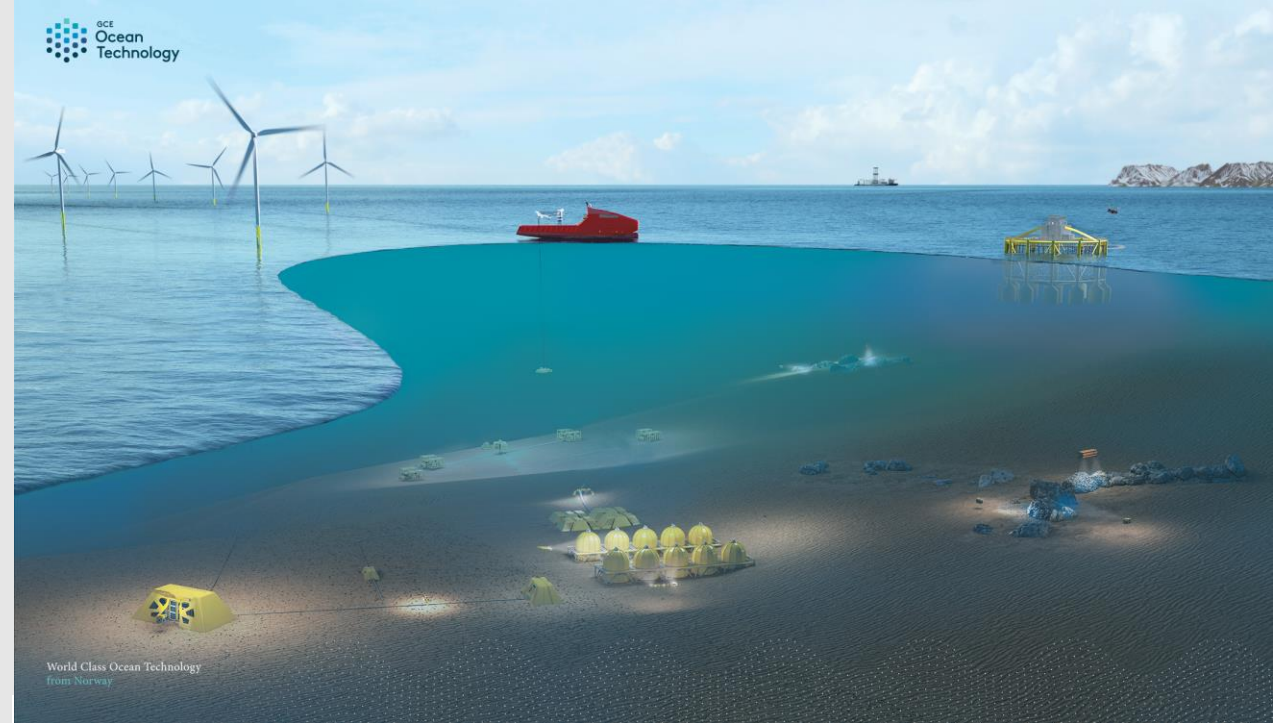
Reduced risk and easier market access



Ocean Innovation Norwegian Catapult Centre

Preferred partner for development of new solutions for the ocean industries (energy, marine seafood production, environmental monitoring, deep sea mining etc.)

- Development of prototypes – from idea to finished product
- **Prototyping**
 - Design
 - Virtual Prototyping, simulation, VR/AR
 - CNC machining
 - **Additive manufacturing** in plastics, composites and **metals**



Ocean Innovation Norwegian Catapult Centre

State-of-the-art test facilities and expertise

- **Recirculating Aquaculture System (RAS)**
 - Water quality
 - Fish biology
 - Feed research
 - Bioreactors
 - Microbiology
 - Sludge and waste treatment
 - Sensor development
 - Education and training
- **Aquacloud 2.0** – digital infrastructure for the seafood industry
 - Standards, data quality, data sharing
- Test facilities in fjords – Institute for Marine Research, Runde Miljøsenner



Ocean Business

Handelshøyskolen BI har etablert et nytt forskningscenter for å fremme forretningsutvikling og bærekraftig drift av havnæringene.

Norge er posisjonert til å ta en strategisk rolle i de fremvoksende industriene i havnæringene på bakgrunn av erfaring fra de sterke klyngene innen olje og gass, shipping og maritime industrier, fiskeri og oppdrett. Målsetningen er å bygge en bro mellom forretningsdrift og bærekraft, sier professor Torger Reve som er leder for det nye senteret.

BI Centre for Ocean Business (OBZ) er et tverrfaglig forskningscenter med en klar ambisjon om å bidra til utviklingen av de mulighetene og ressursene som finnes i havet. Senteret vil samarbeide med ledende internasjonale institusjoner innen innovasjon og kommersialisering, start up og scale up. Internasjonale akademiske partnere inkluderer MIT og Berkeley i USA og Tsinghua University i Beijing.



- Aker Solutions ASA
- Arundo Analytics AS
- Assuranceforeningen Skuld (Gjensidig)
- DNB Bank ASA
- Dr.Techn. Olav Olsen AS
- Eksportkreditt Norge AS
- GCE Subsea (now GCE Ocean Technology)
- Katapult Ocean AS
- Kongsberg Gruppen ASA
- Ministry of Foreign Affairs
- Norges Sjømatråd
- Oslo Maritime Stiftelse
- REV Ocean AS
- Stimline AS
- Torvald Klaveness
- Wikborg Rein AS

EU Funding

Our EU Advisor mobilises for increased collaboration and participation in EU.

- Identifying and informing about upcoming project funding calls in the EU.
- Assist partners and members with producing top quality applications for EU funding.
- Facilitate closer cooperation between and connect different stakeholders to larger initiatives.
- Contribute to establishing European consortia and promote participation in key forums in the EU to influence future calls for proposals.
- Mobilises the business community to increased participation in EU projects.

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Technology

Stimulating technology development.

- Strengthening R&D collaboration between industry, universities and R&D institutes.
- Establish partnerships and secure funding for project development, new products and services.
- Strengthening R&D infrastructure, knowledge base and multidiscipline collaboration.



Pre-Project Funding

- Provide financial and professional support to establish externally funded RDI projects.
- Secured more than 1 billion NOK in external funded RDI projects.



The high-speed pinless data connection by Wisub



The Maxlimer. Photo by Swire Seabed



Cable Protection Systems from Seaproof Solutions

Project example



News Events Courses Projects Membership

uSEA Receives Funding for Autonomy



uSEA Technologies illustration of unmannes surface vessel supporting autonomous underwater vehicles.

Published: 20 Dec 2019

uSEA Technologies has received about 6.5 million NOK from the Research Council of Norway to develop its active towed docking station for AUVs.



We would like to express our thanks to GCE Ocean Technology for the support with pre-project funding. Being a member in the cluster has not only been a great pleasure, but also has made an invaluable difference in our business development

Felipe Lima
CEO, uSEA

Entrepreneurship and Business Development

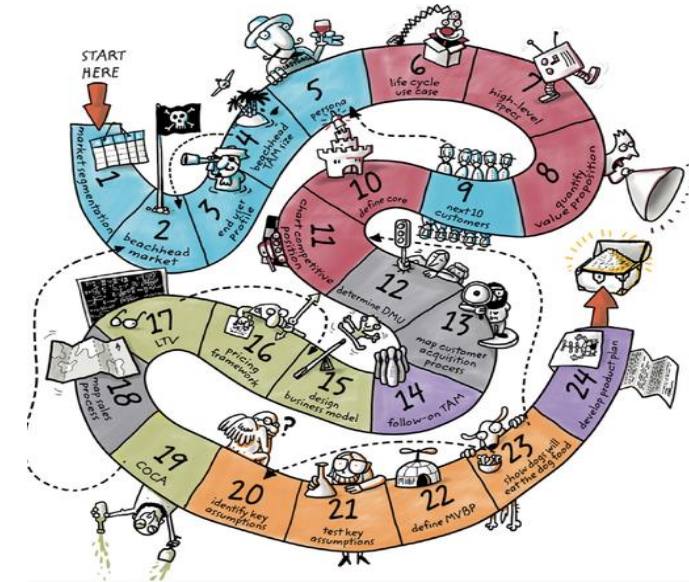
Attracting capital and investors. Creating new entrepreneurs and growing businesses.

- Increase the number of spin-offs, grown-ups and start-ups.
- Improve companies business models.
- Increase number of companies that add services to products.
- Start-up, ScaleUp and Cross-over programmes.
- Summer School and courses.
- Projects.



MIT ScaleUp – 100ScaleUps

- 24 steps to disciplined entrepreneurship
- Targeting SME with growth potential
- 12 week programme
 - Three weeks – full time
 - Nine weeks – 40-50%
- In Norway and Boston
- 8 participating companies in 2019
- New programme Autumn 2020



Learning Transformative Know-How from Boston



The 2019 programme participants at the Martin Trust Center for MIT Entrepreneurship.

Deltakende Vestlandsbedrifter

- Metas,
- Imenco,
- Aquafarm Equipment
- Unitech Offshore





Ocean Industries Accelerator

- Incubator for start-up companies from the ocean industries
- Located in the heart of the innovation community at Marineholmen, Bergen
- Collaboration between GCE Ocean Technology, NCE Seafood Innovation and VIS Innovation (TTO)



Digitalisation and Supply Chain Innovation

Accelerate digitalisation and improvement of work- and production processes throughout the supply chain.

- Improve the feedback loop from operation to engineering.
- Increased use of Lean management and manufacturing.
- Increased standardisation of requirement, work processes and interfaces.
- Strengthen multidiscipline collaboration.



#LeveDigital

Providing companies with a better understanding about opportunities associated with increased digitalisation.

- Following the successful joint GCE clusters digitalisation project.
- Equipping companies with the necessary skills to create structured plans for increased use of digitisation adapted to their own businesses.
- Demonstrating the practical use of current digitalisation tools and technologies.
- Industrial pilot project
 - Customer - supplier





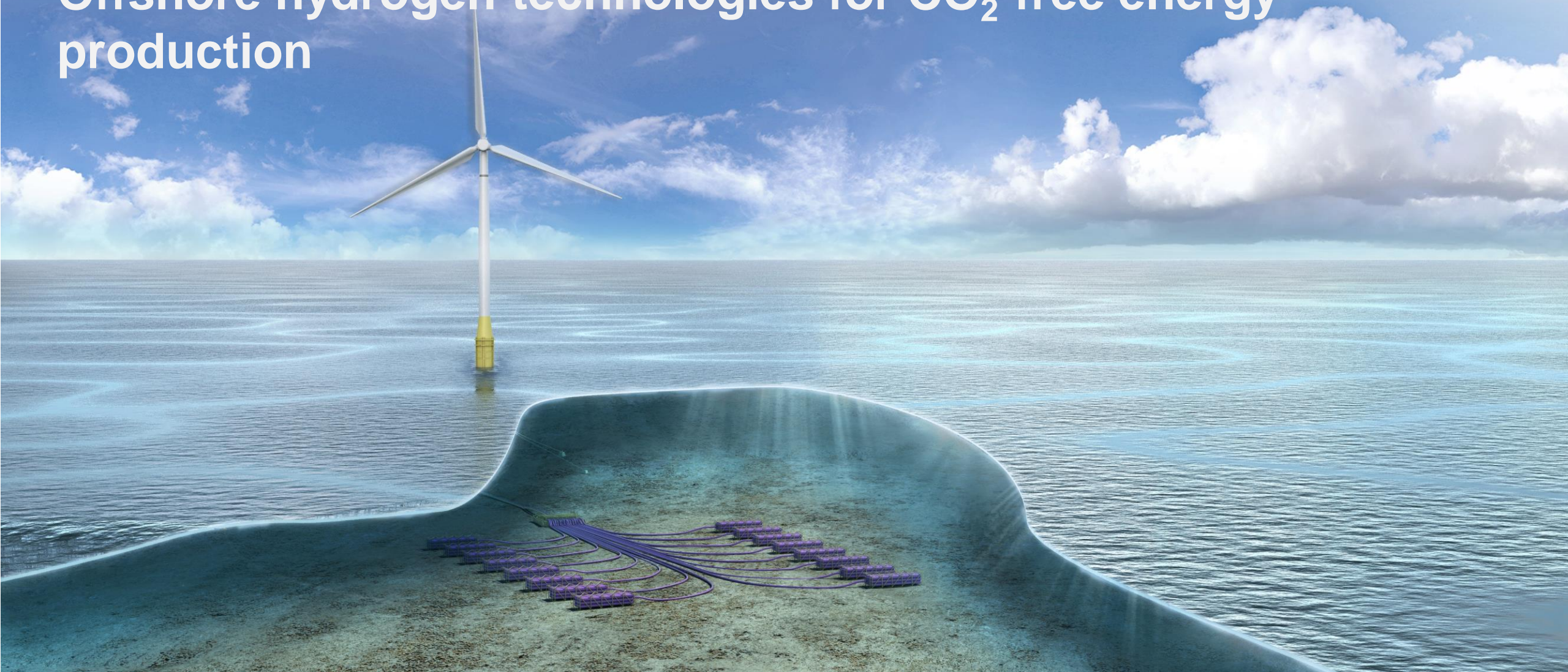
Re-purpose of competence and technology into new applications



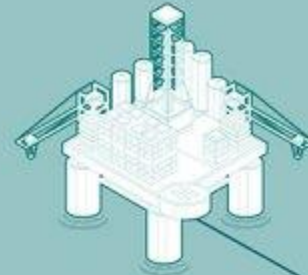
Crossover activities



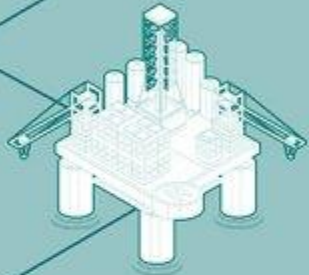
Deep Purple Offshore hydrogen technologies for CO₂-free energy production



Hywind Tampen floating wind farm



Snorre



Gullfaks



Subsea meets Aquaculture

- Subsea solutions to solve aquaculture challenges
- New market potential
- Learn from related ocean industries
- Visits to aquaculture sites
- Matchmaking between Subsea and Aquaculture
- Innovation Challenges
- Hackathons
- ACCEL Crossover

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Orkney Tidal Power - Orbital Marine



Norway as Test Site



Offshore Renewables

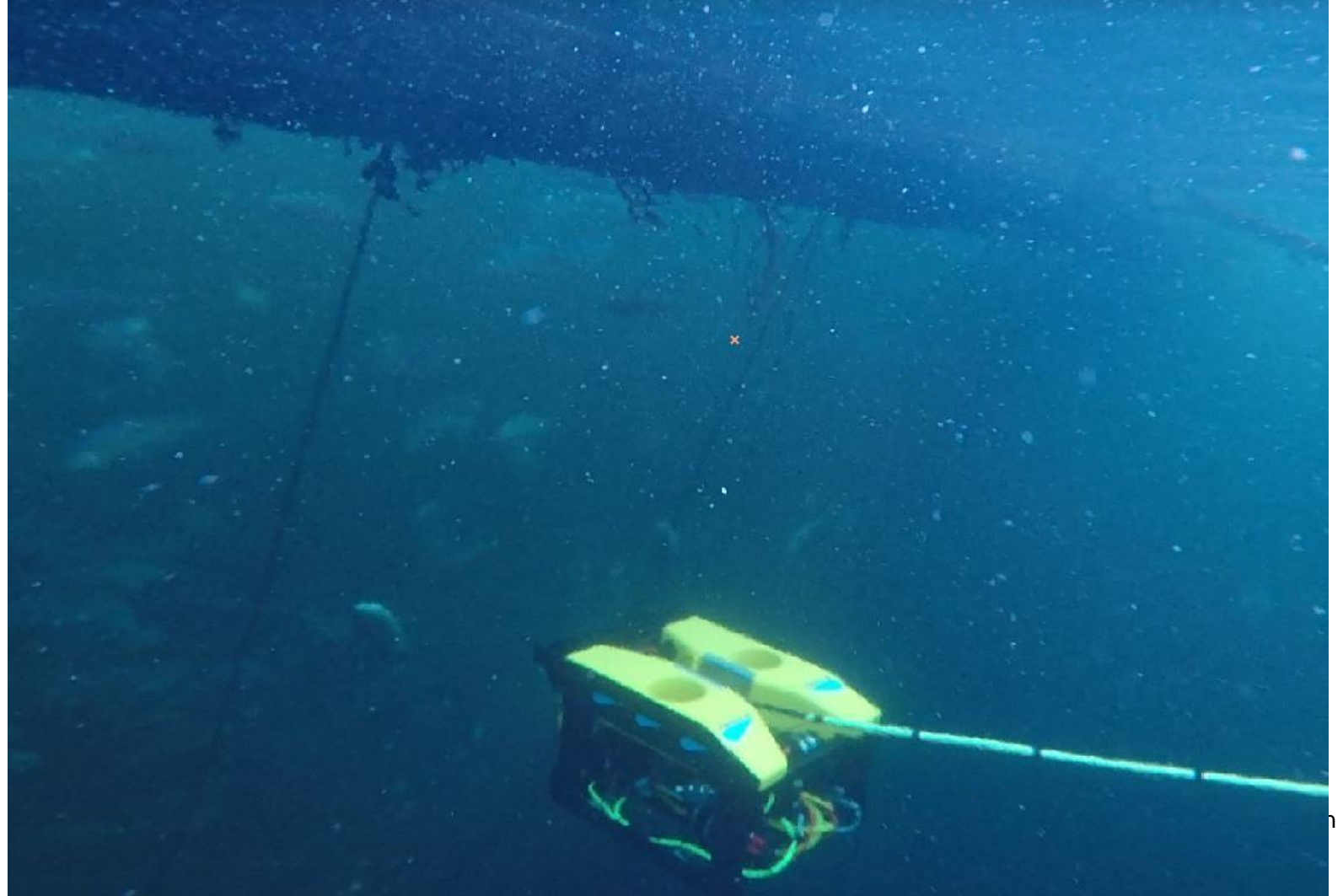
- **Wind**
 - Well known technology
 - Rapid growing industry
 - Cost is dropping quite rapidly
 - Established industry
- **Wave**
 - Huge amounts of energy
 - Challenging energy transmission
 - Still in an early stage
- **Tidal**
 - Huge potential
 - Costal
 - Predictable energy production
 - Technical challenges



Crossover from Subsea O&G to Offshore Renewables



- Anchoring and fastening
- Umbilicals
- Energy transfer
- Sensors and monitoring
- Marine Operations
- Documentation
- Underwater Inspection
- Service and maintenance
- Corrosion Protection



Norwegian Forum for Marine Minerals

- An association of industry and research actors, established in 2019.
- Develop knowledge and expertise, and a Norwegian industry aimed at sustainable and responsible exploration and extraction of marine mineral resources.

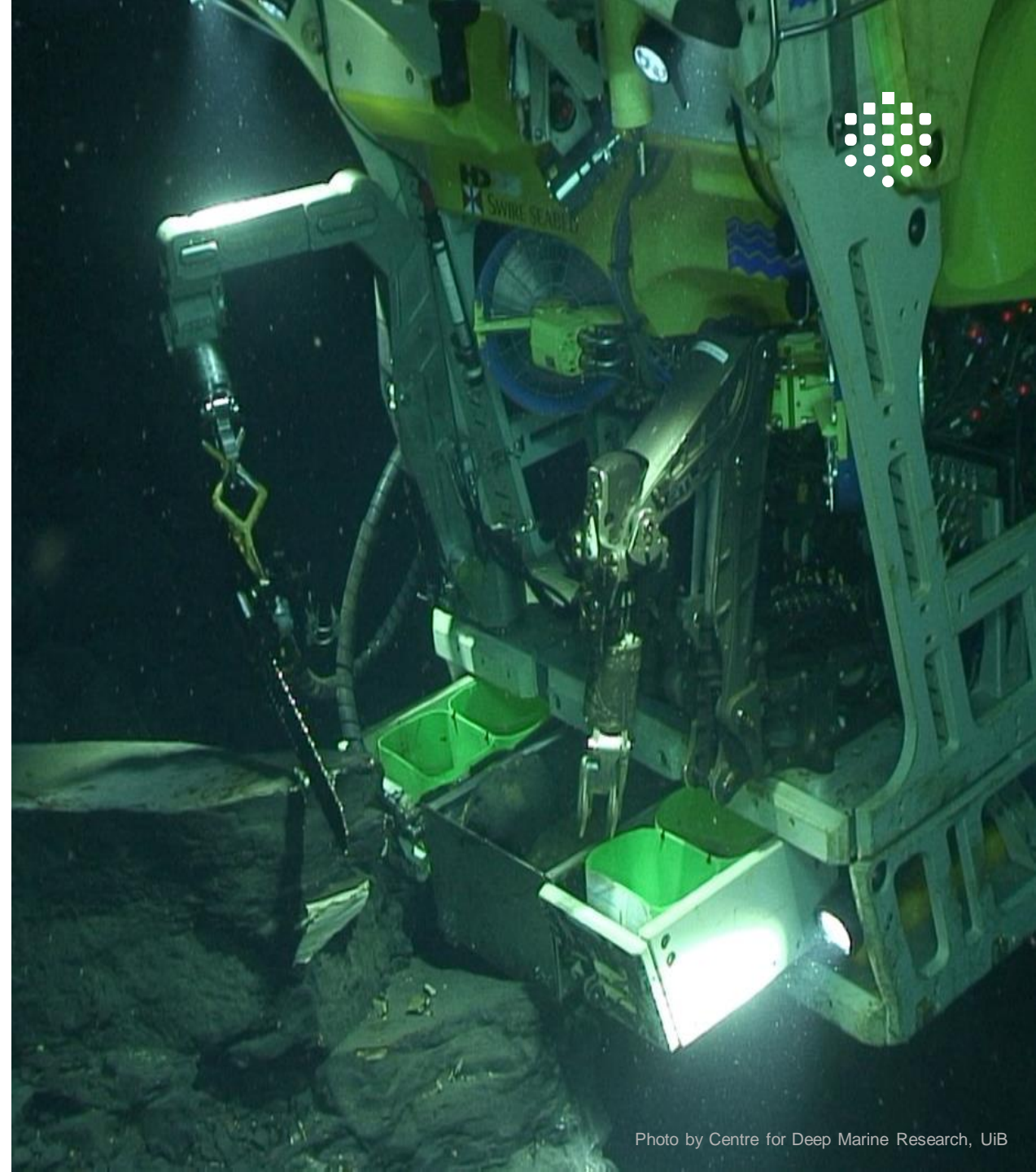


Photo by Centre for Deep Marine Research, UiB

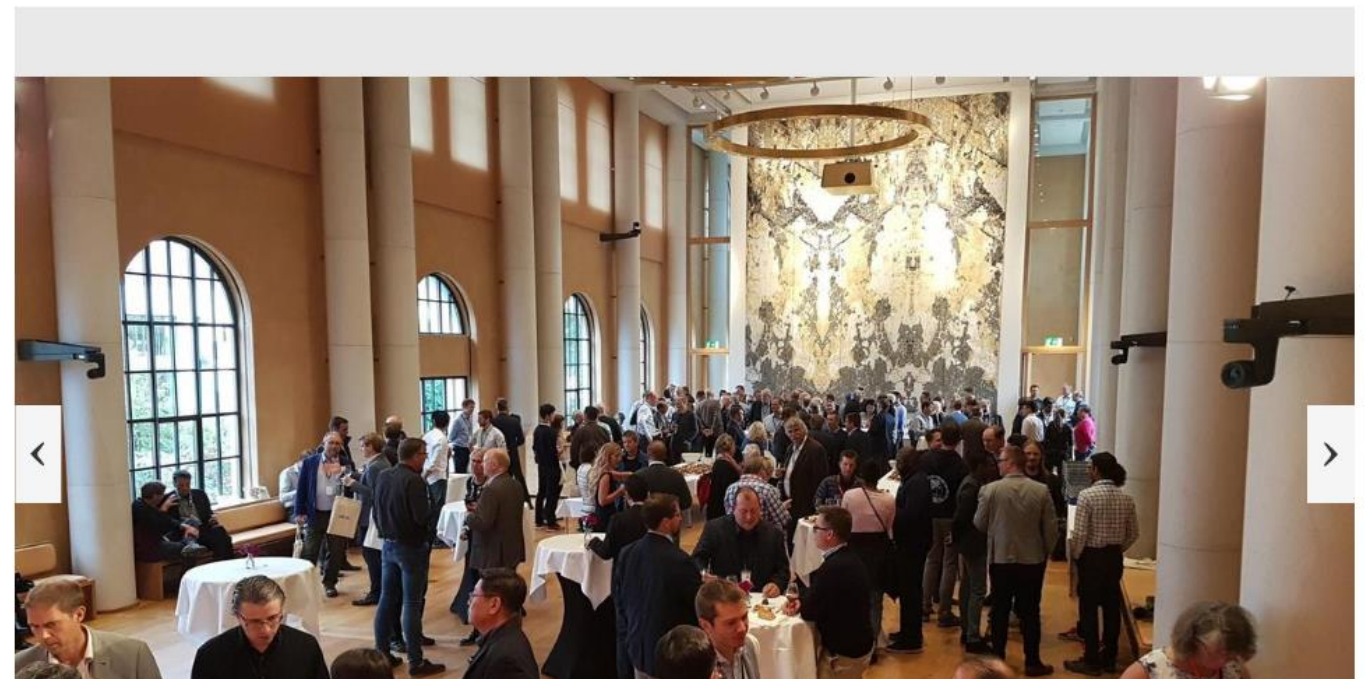
UiB and NTNU – Leading Competence on Deep Sea Minerals



- Prof. Rolf Birger Pedersen – Senterleder, Institutt for geovitenskap
- Prof. Ingrid Schjølberg – Director NTNU Oceans

UNDERWATER MINING CONFERENCE

The 47th Under Water Mining conference (UMC18) was hosted in Bergen, Grieghallen, from 11th to 14th of September. The conference was organized in collaboration with the K.G. Jebsen Centre for Deep Sea Research (UiB), Global Centres of Expertise Subsea (GCE Subsea) and the Norwegian Petroleum Directorate (NPD). We are pleased to announce that the conference was of great success.



Australian Mining

Home News Features Oil & Gas Mine Map Events Resources Magazine

Seven new underwater mining licences issued

July 24, 2014 News Cole Latimer

The International Seabed Authority (ISA) has gotten behind seabed mining after issuing seven new underwater mining licences.

The Authority, which is part of the UN, approved the applications earlier this week.

Three plans of work were approved for the exploration of polymetallic nodules for United Kingdom Seabed Resources, Ocean Mineral

Latest News

[Rio Tinto iron ore production rises on mine expansions](#)

[3M highlights importance of respirator fit testing](#)

[Aus Tin resumes operations at Granville project](#)



Results

Techtransfer.no

Through 15 examples, we have launched a report that shows some of the best cases where competence and technology from Oil & Gas has been re-purposed into new applications.

Portal and cases provided by:

- GCE NODE
- NCE Energy Valley
- Norsk Olje & Gass
- Innovasjon Norge
- GCE Ocean Technology



MARITIME

Longer lifetime with new maintenance solution

A machinery monitoring system which allows shipowners to achieve substantial reductions in their maintenance costs has been industrialised by Machine Prognostics.



SMART CITY

Lighting the way for motorists

Fosstech works with products tailored for extreme environments in such areas as the oil and gas industry. It is now applying its offshore expertise and technology to illuminating motorways.



FISHERIES AND AQUACULTURE

New trawl technology supports fish sorting

Scantrawl Deep Vision has developed a subsea camera system which identifies the species and length of fish entering a trawl. This makes fishing more efficient and sustainable, while cutting fuel costs and greenhouse gas emissions for trawlers.



RENEWABLE ENERGY

Dynamic cables for offshore wind farms

Unitech has specialised for several decades in the design, production and delivery of subsea equipment for the oil and gas sector, including connectors and cables. It is now turning its attention to wind power at sea.



RENEWABLE ENERGY

Cost-effective supports for offshore wind turbines

Wind turbine foundations can be installed at sea faster more cheaply and more safely with the solution Imenco has developed through its involvement in the oil and gas industry.



SMART CITY

Offshore drilling technology to robotic renovation of water distribution

Techni has succeeded in developing a solution for connecting houses to the mains water supply without the need to carry out excavation work.



FISHERIES AND AQUACULTURE

Using sound for mooring line integrity monitoring

Acoustic sensors and wireless transfer allow Scanmatic's system to monitor mooring lines on floating offshore installations. The company is now looking at new markets in offshore wind and aquaculture.



FISHERIES AND AQUACULTURE

More efficient aquaculture and healthier fish

CSUB AS has succeeded in new markets in aquaculture and land-based products on the basis of delivering underwater structures to the international oil and gas industry.



RENEWABLE ENERGY

From fish to drilling to wind power

In 2008 4Subsea had the vision that drilling operations on the Skarv field in the Norwegian North Sea ought to be controlled by actual measurement data rather than design parameters alone.



AkerSolutions™



NORCE

NTNU
Norwegian University of
Science and Technology



THOMMESSEN



Corvus Energy

CR forsikringsmegling

Deloitte.



DCFsubsea



Huisman

idévekst

imenco
smart solutions



KYMSOL



Offshore Sensing AS

proanalysis

cmr Prototech



RundeMiljøsentter



SWIRE SEABED



TESS®
SLANGER - TJENESTER - DVHP



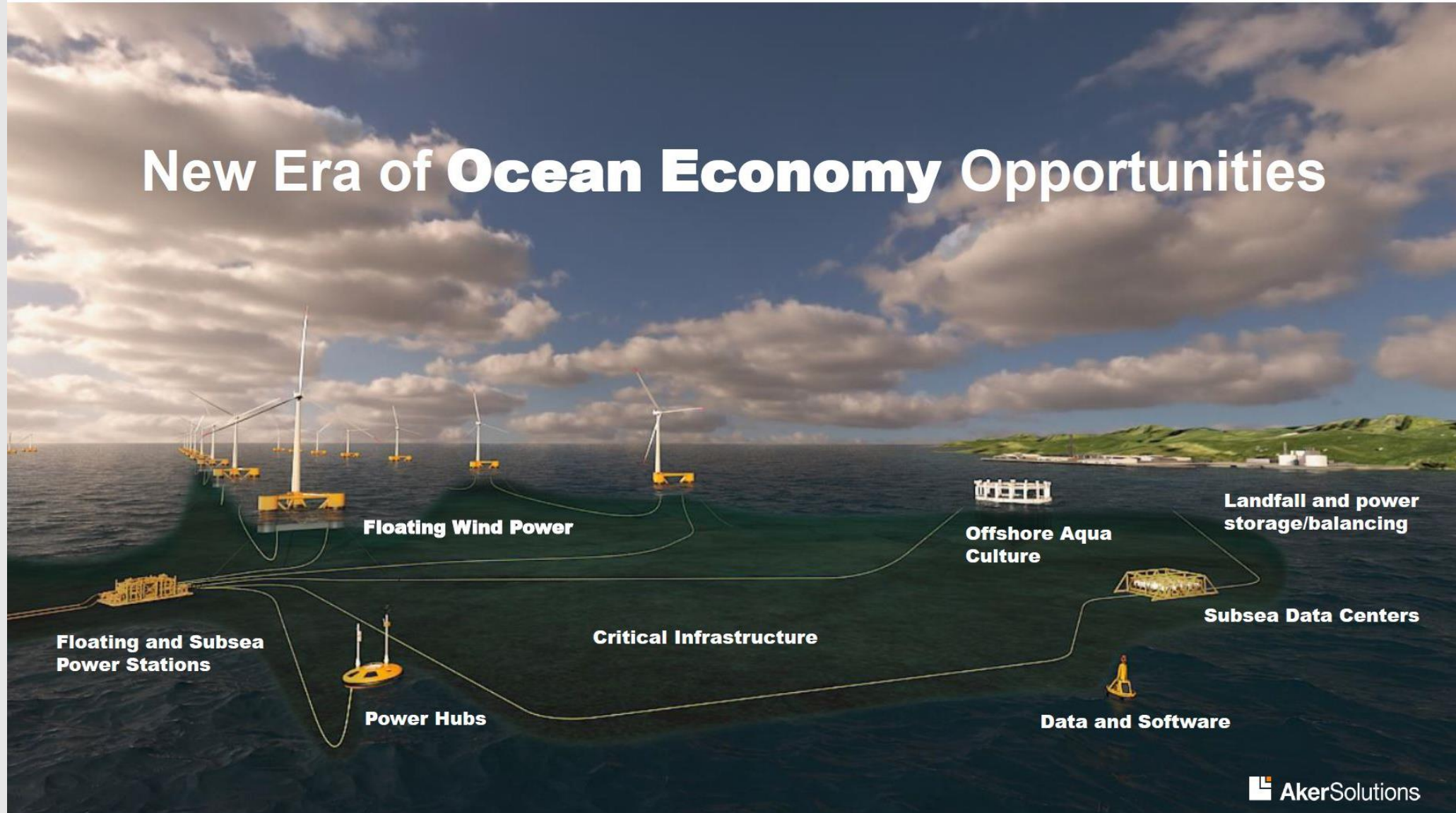
UNITECH



WIKBORG | REIN

From O&G Services to Ocean Industries

New Era of **Ocean Economy** Opportunities



World Class Ocean Technology from Norway



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