The future of energy
Bridging the gap

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A LEADING GLOBAL TECHNOLOGY CLUSTER

GCE | NODE | GLOBAL CENTER OF EXPERTISE

Anne Grete Ellingsen
CEO
GCE NODE

How does the future look like?

- More people – increased middle class – aging world
- Urbanization
- Resource scarcity
- Digitalization – Changing business life, cooperation in the value chain, consumer patterns and cost of energy
- Political stability and digital security
- Increased electricity use per consumer also in industrialized countries (electrification of transport - digital solutions/tools)

- More diverse electricity supply (Wind, Solar, Hydrogen, Geothermal, etc.)
- More diverse fuel supply
- Increased focus on security of supply of energy
- Increased focus on environmental factors – recirculation, reduction of emissions to air and water, water use…

More than ever

Suppliers need a diversified strategy and an agile business model

GCE NODE – 100+ Companies located in Agder

Global suppliers to the energy and maritime industries

Focus: RDI and competence building

Goal: Build centers of excellence

The digital shift

Transforming the way we cooperate and do business

- Impacts all levels and groups
- Alters the way we behave and interact
- Requires ever-expanding information access
- Promote shift in mind-set and culture
- Sharing of data
- Increased focus on data storage/ownership and digital security

GCE NODE strategy:

Use the digital shift to develop more competitive products and services ensuring safer and more environmental friendly solutions for the customers.

GCE NODE – Global suppliers also in the future

Increased competitiveness in existing markets:

- Standardization
- Digitalization
- Robotization and automation
- Manufacturing
- New materials and production technologies

Crossover to new markets:

- Offshore Wind
- Aquaculture
- Deep Sea Mining
- Geothermal energy

Strategic goals set by the NODE companies in 2013/2014

Use the digital shift to develop competitive products and services ensuring cost effective, safer and more environmental friendly solutions for the costumers.

Cross over - Example 1: Offshore wind

Cross over technologies:

- Mooring of floating wind turbines
- Supervisory control and data acquisition
- 3D/heave compensated cranes
- Heave compensated gangways
- Crew transfer vessels
- Maintenance management
- HVDC substations
- Substructures

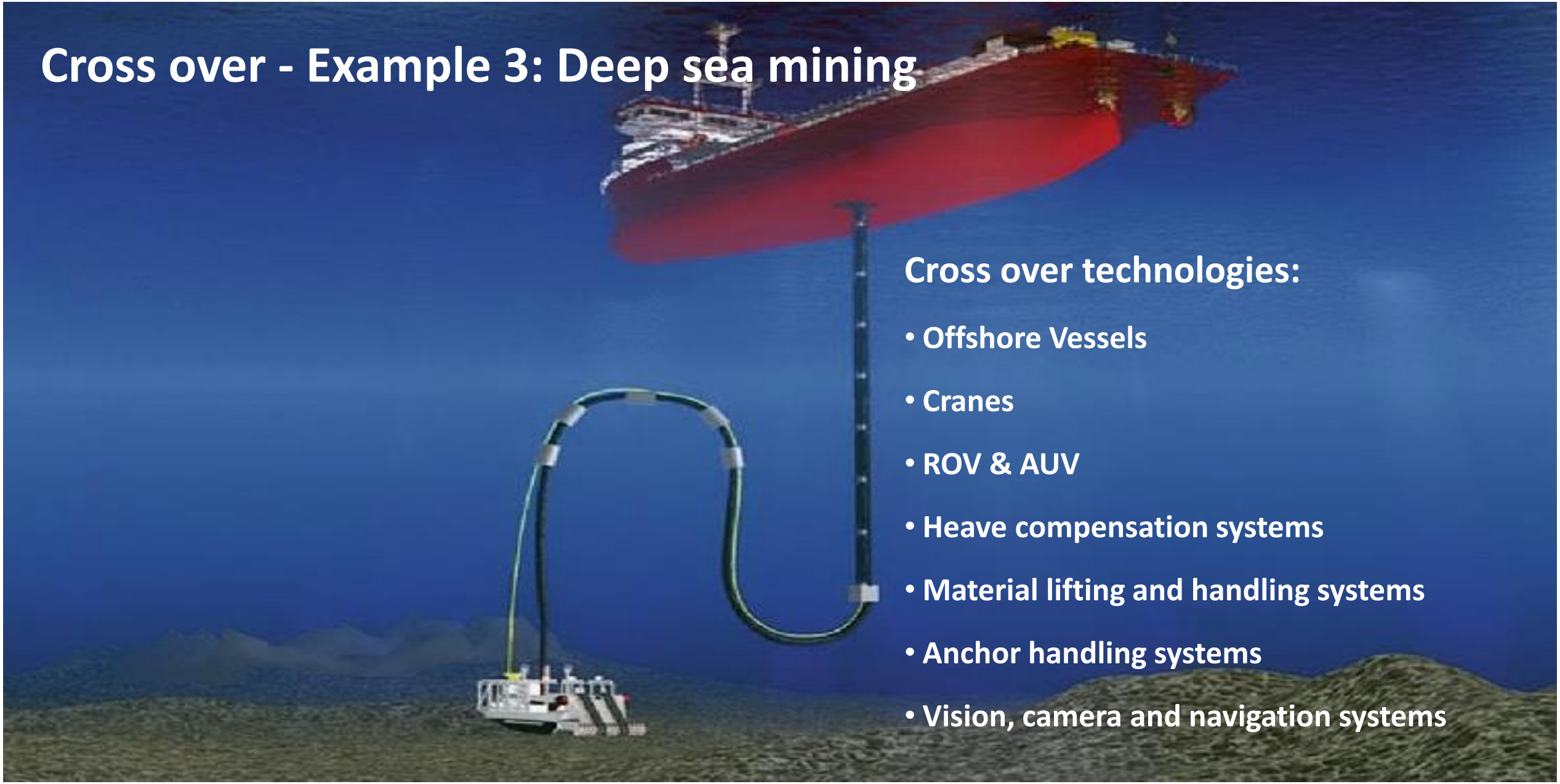
Cross over - Example 2 – Food production

Offshore fish farming & Biomass production

Examples – Cross over technologies:

- Autonomous systems & remote operation technologies
- Vision, camera and navigation systems
- Communication systems
- Offshore vessels
- Monitoring and decision support
- Composite materials

Cross over - Example 3: Deep sea mining

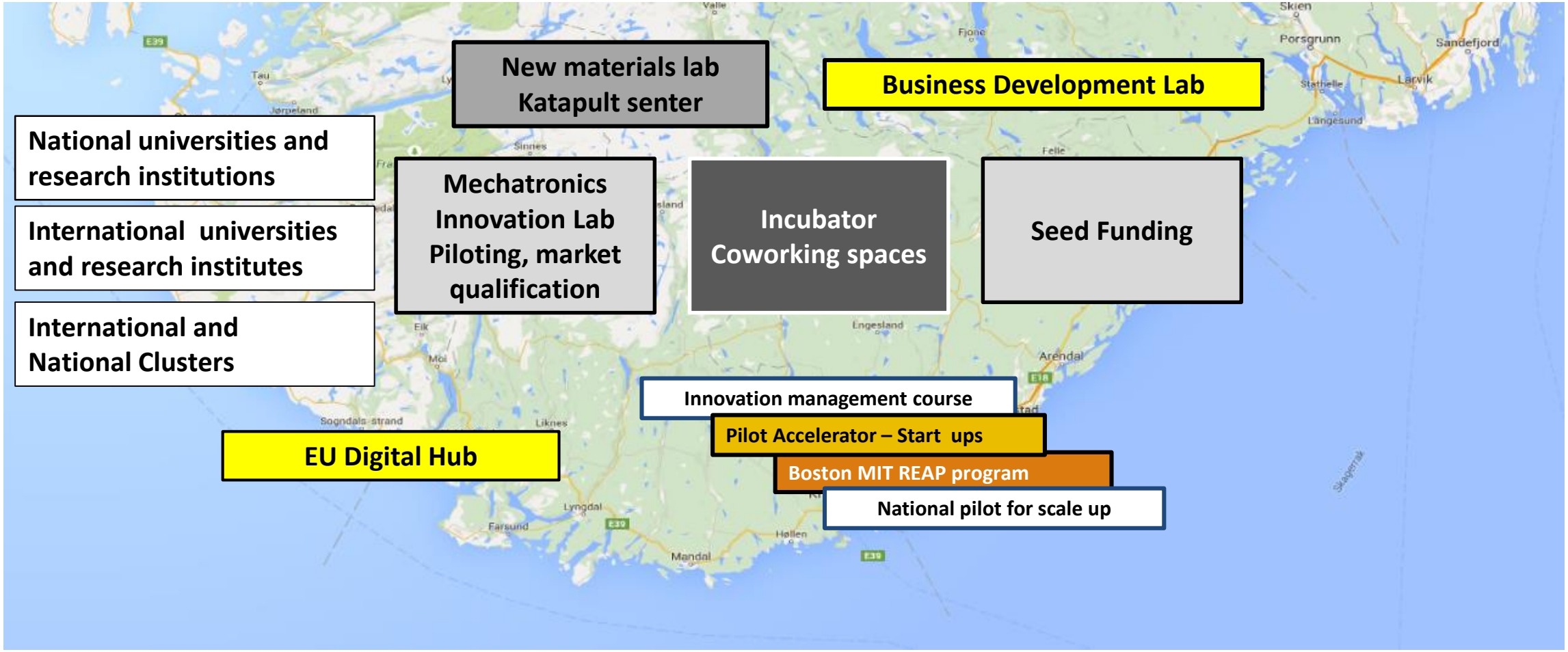


Cross over technologies:

- Offshore Vessels
- Cranes
- ROV & AUV
- Heave compensation systems
- Material lifting and handling systems
- Anchor handling systems
- Vision, camera and navigation systems

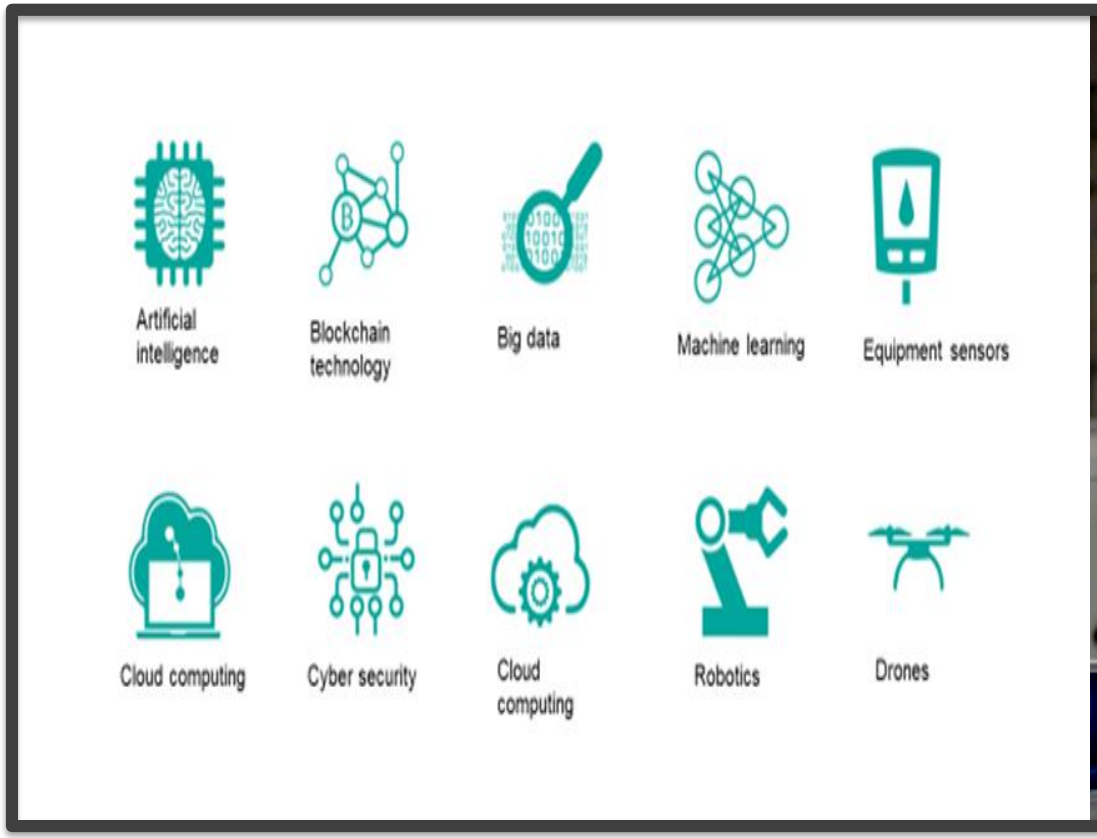
An ecosystem for innovation and business development

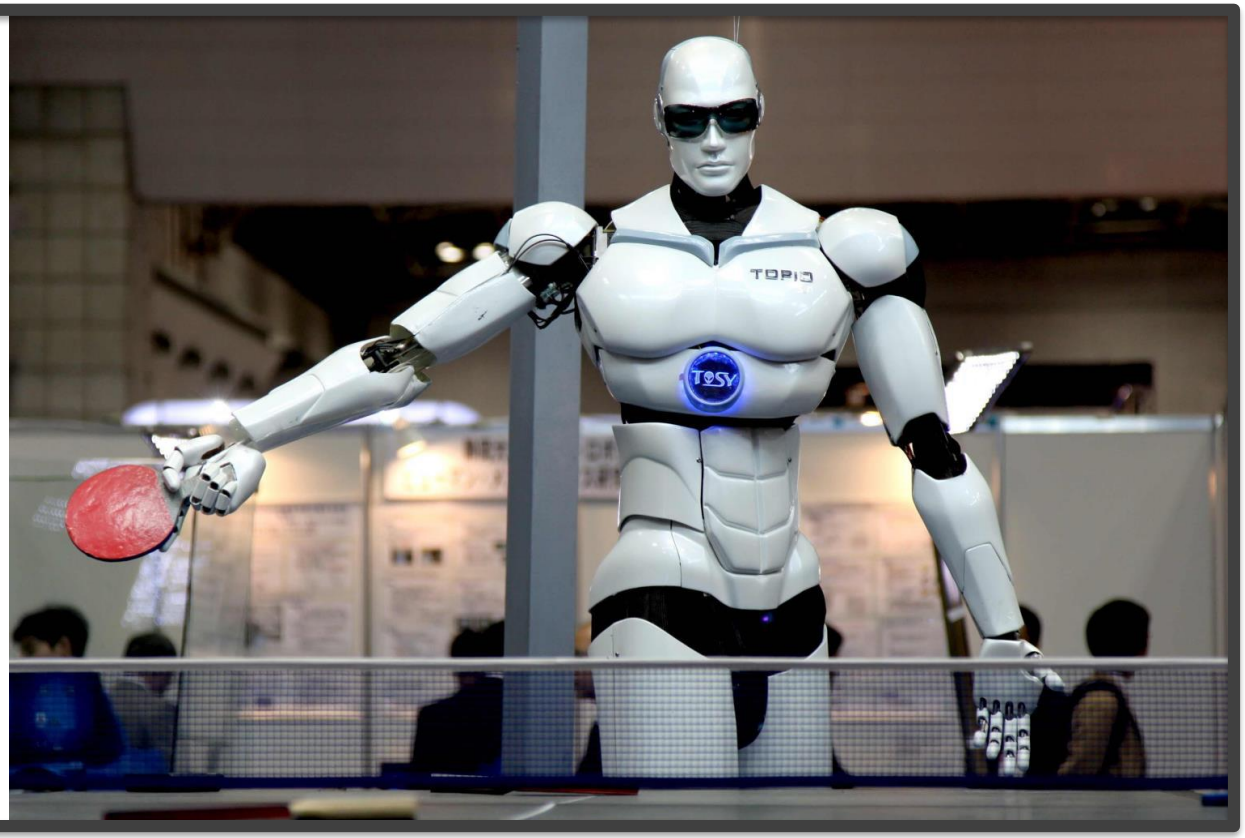
Important to attract investments and develop Centers of Excellence



Mechatronics Innovation Lab

National lab for mechatronics and associated disciplines





Digitalization is generic for all ocean technologies

Competitiveness by knowledge sharing and R&D programs

Value chain

Workshops - SMEs

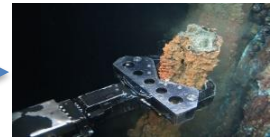
Package Suppliers

Industry Segments

Oil&Gas

Renewable Ocean Energies

Maritime sector



Other Blue Ocean industries
CCS, Subsea mining, fisheries

Cluster Initiatives

- Global standards
- Supply chain management
- Innovation Management
- Digitalization/Robotics/3D printing
- New materials

- Global standards
- NorTex Data Science Cluster
- Data Security
- Common data platform
- Sharing of data
- Future Robotics/3D

- Technology Transfer
- Technology Adaptation
- Networks/Speed dating
- Competence sharing
- Global collaboration

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