



Maritime Consortium  
Of Environmental  
Science and Technology

**MUST**

**One stop shop for sustainable R&D**

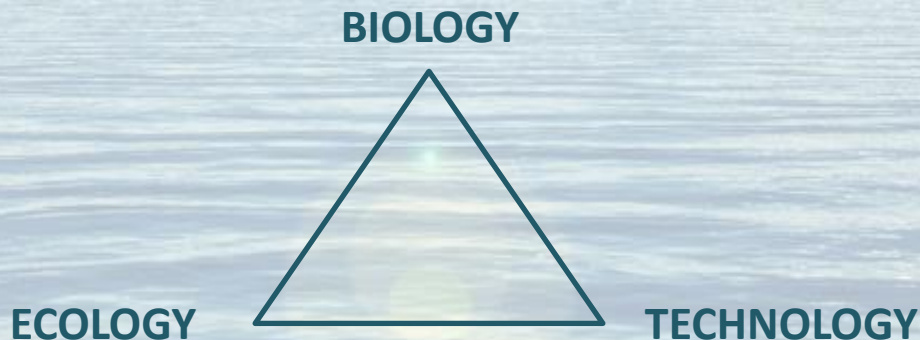
Ir. Zinzi Reimert  
Program Leader MUST

- Food
- Resources
- Transport
- Energy

- Legislation
- Governance

# It's a MUST...

## ...to join forces!



# Who are MUST?



# What is MUST?

## Vision

Independent shared research and development for sustainable exploitation of the world ocean resources

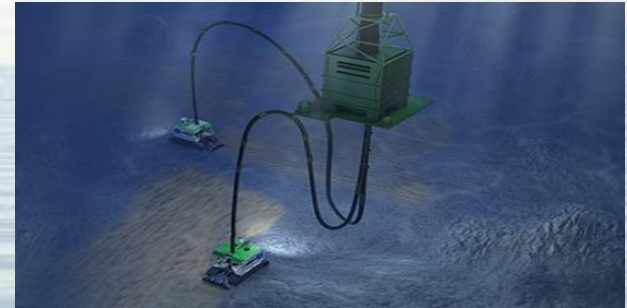
# Some example projects

- TO2 Food security - seaweed
- Dutch independent labs for ballastwater management systems
- Protecting with Nature - fouling organisms to prevent corrosion of steel
- TREASURE - deep sea mining
- DMEC - knowledge platform of technological development for extraction of sustainable energy from water

# TREASURE

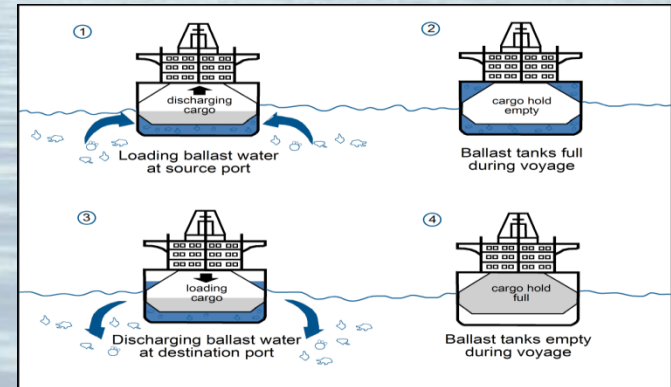
## Towards Responsible Extraction of Submarine mineral Resources

- Develop a framework for impact prediction, acceptance criteria and responsible Deep Sea Mining practices
- First Dutch deep sea mining trail



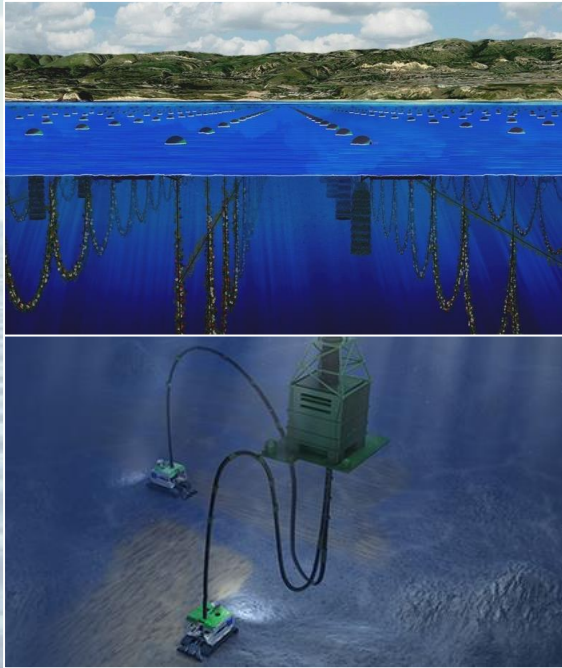
# Dutch independent labs for ballast water management systems

- Legislation quality ballast water
- Dutch test labs to process high quantities of ballast water
- First laboratories to be recognized by the US Coast Guard to test ballast water





# MUST focus areas



## Seafarming

- Large scale
- Sustainable

## Sus. energy

- Wind/tidal/wave
  - Corrosion
- Underwater sound

## Deepsea

- Sustainable mining
- Impact ecosystem

## Arctic

- Sustainable
- Impact



# What is MUST?

## Focus - Global Ocean Innovation

- Environmental Impact Assessments
- Environmental Risk Management
- Anti-corrosion with fouling shellfish
- Monitoring
- Rules & Regulations
- Sustainable Operations

# MUST characteristics

- Your one stop shop for advice and research
- Sharing knowledge and networks
- Institutional & independent
- Part of knowledge alliances
- Certification, research and facilities
- Door opener for Dutch industries - national & international
- Distinctive approaches and concepts through 'joint corporation programs'

# Your help is a MUST!

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**TNO** innovation  
for life



**Deltares**  
Enabling Delta Life 

# Institutes

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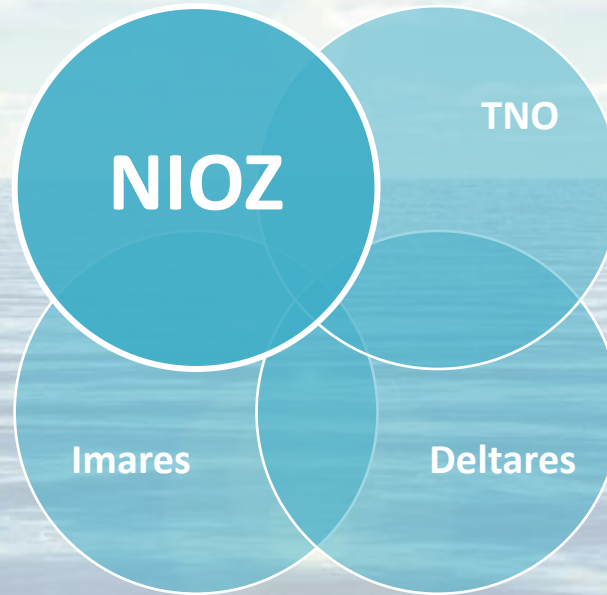


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# MUST institutes

## Expertise

- Biology
- Geology and Geophysics
- Chemistry and Biogeochemistry
- Physical Oceanography
- Ecology and Environmental assessment
- Extreme Environments
- World Ocean floor



## Contribution

- Test facilities and research fleet
- Strong basis fundamental research (NWO)
- Worldwide reputation and playing field
- National presence (locations)

# MUST institutes

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## Expertise

- Underwater acoustics
- Structural dynamics
- Materials
- Corrosion and antifouling
- Subsea communication
- Sensor systems
- Human factors



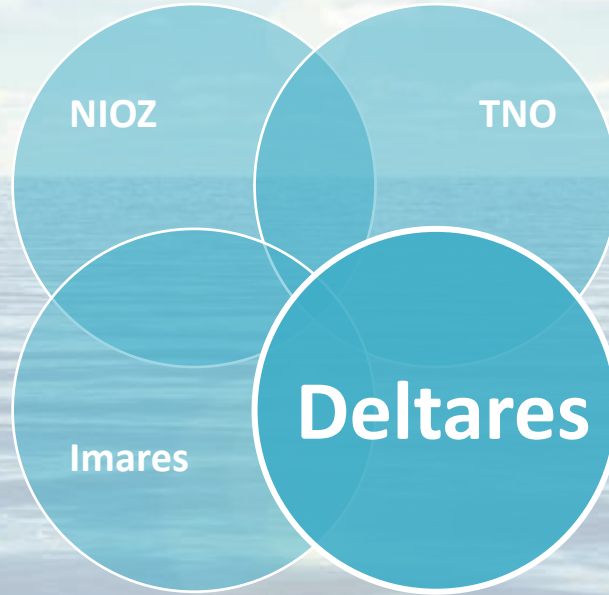
## Contribution

- Test facilities
- Connection with Dutch Navy
- Commercial network (industry)
- Management of large complex projects
- National presence (locations)

# MUST institutes

## Expertise

- Aquatic & marine system understanding
- Hydrodynamics, waves, morphology, water quality
- Ecosystems analysis
- Oil spills
- Metocean conditions
- Scour
- Geotechnics & geohazards



## Contribution

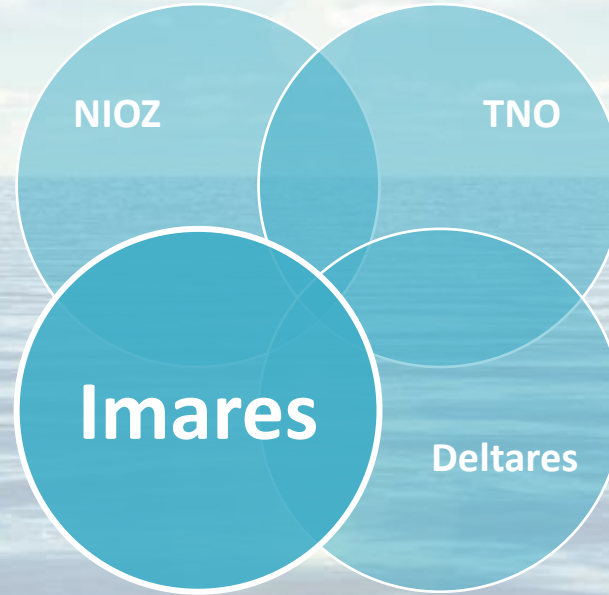
- National & international network & expertise
- Large-scale testing facilities
- Large, multidisciplinary projects
- Integrated modelling
- Operational systems



# MUST institutes

## Expertise

- Marine Ecology
- Fisheries and their techniques
- Environmental Impact Assessments
- Arctic
- Experimental research
- Ecotoxicology
- Rules & Regulations



## Contribution

- WUR
- Advising role with Government
- Strong commercial organisation
- Commercial network (industry)
- National presence (locations)



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