



# Multi-Use Systems A Solution to Competing Interests in Offshore Space?

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## Overview

- Introduction
- Bottlenecks & Challenges
- Lessons learned
- Way forward
- Conclusion





# Introduction

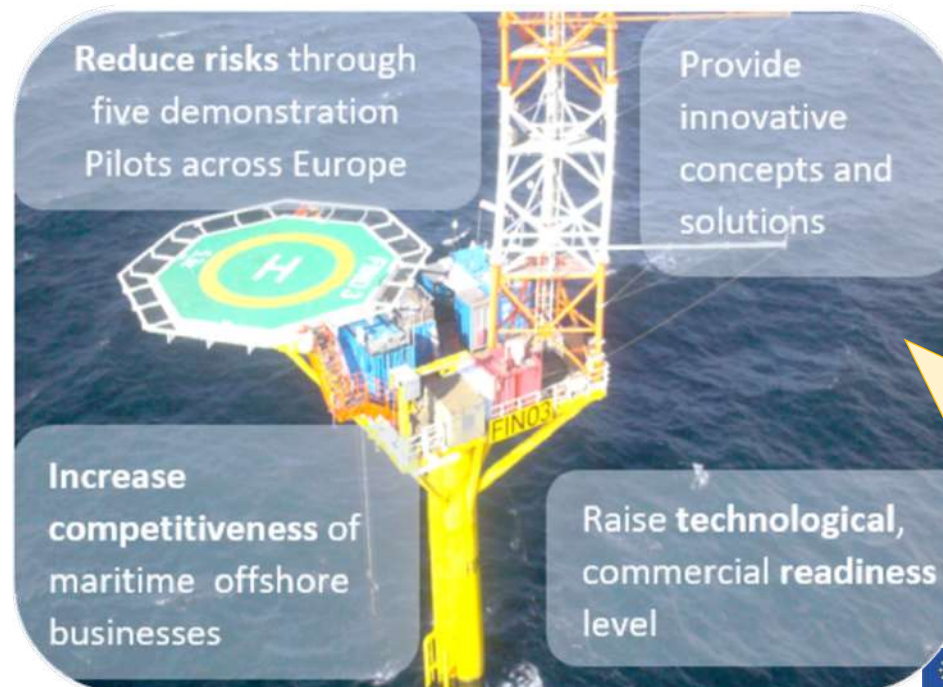
## The Project

- Co-funded by the Horizon 2020 EU programme
- 5 MU demonstration pilots are set up in the North, Baltic and Mediterranean Seas
- 3 of the Pilots developed concepts to remotely monitor environmental conditions at the sites



## The Challenges

- Exposed environment & harsh weather conditions
- Fouling
- Energy supply
- Data storage and transfer
- Inaccessibility



Offshore multi-use can contribute to a more sustainable and efficient use of marine resources providing tangible economic and environmental benefits

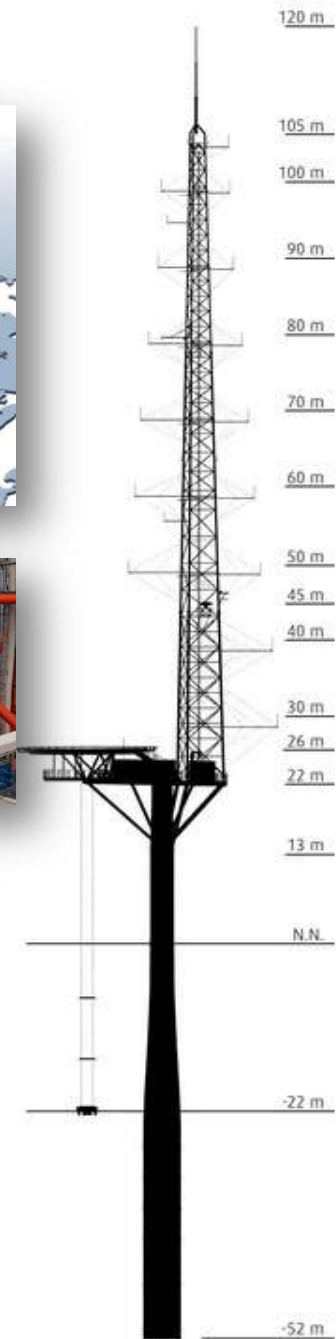
# The German Pilot

## Aim

- Assess the technological, environmental and financial feasibility of offshore seaweed and mussel cultivation

## FINO3

- 80 km west of Sylt (during winter often not accessible for weeks)
- 1 m/s current, 16 m significant wave height
- Infrastructure: helicopter airfield, crane (1t), fresh water tank, storage containers, 3 generators, measuring chain, independent satellite connections for data transmission and VoIP telephony



Height details for the FINO3

## Expected Synergies

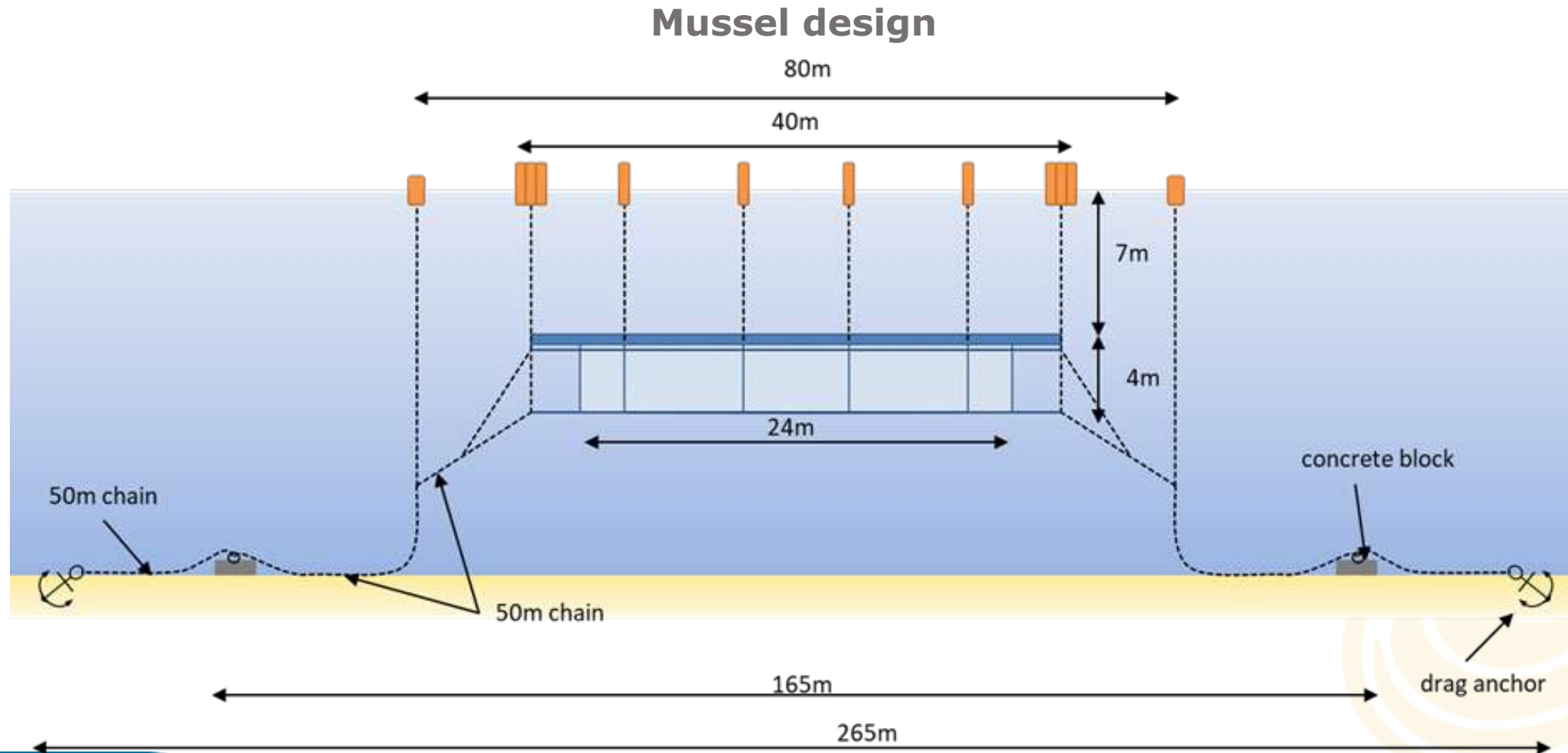
- Sharing logistics, transport, planning and maintenance fully exposed offshore
- Monitoring and surveillance
- Increased environmental sustainability

**TRL5 → TRL7**  
**TRL 5** – Technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)

**TRL 7** – System prototype demonstration in operational environment

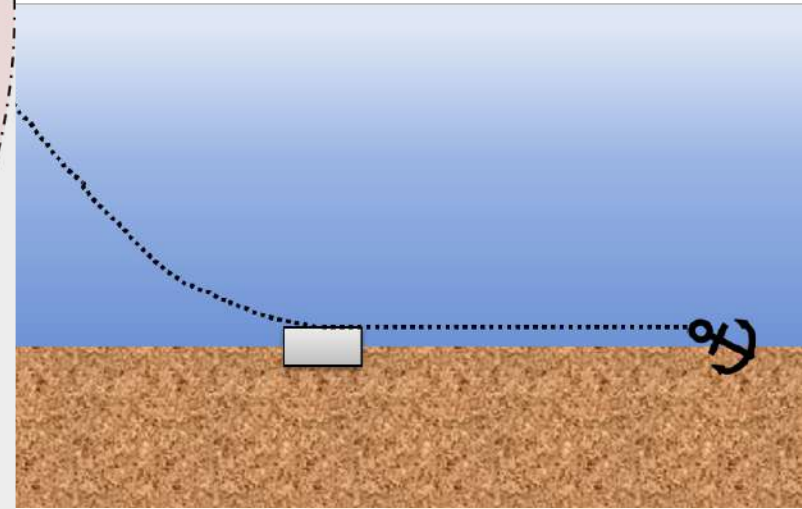
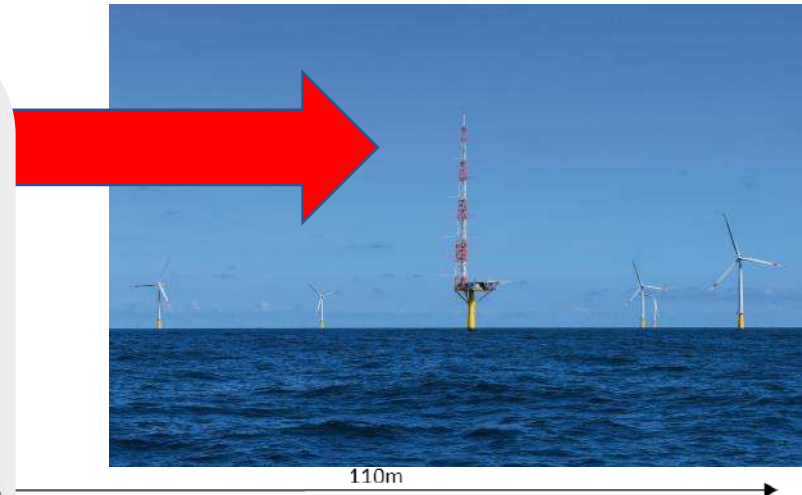
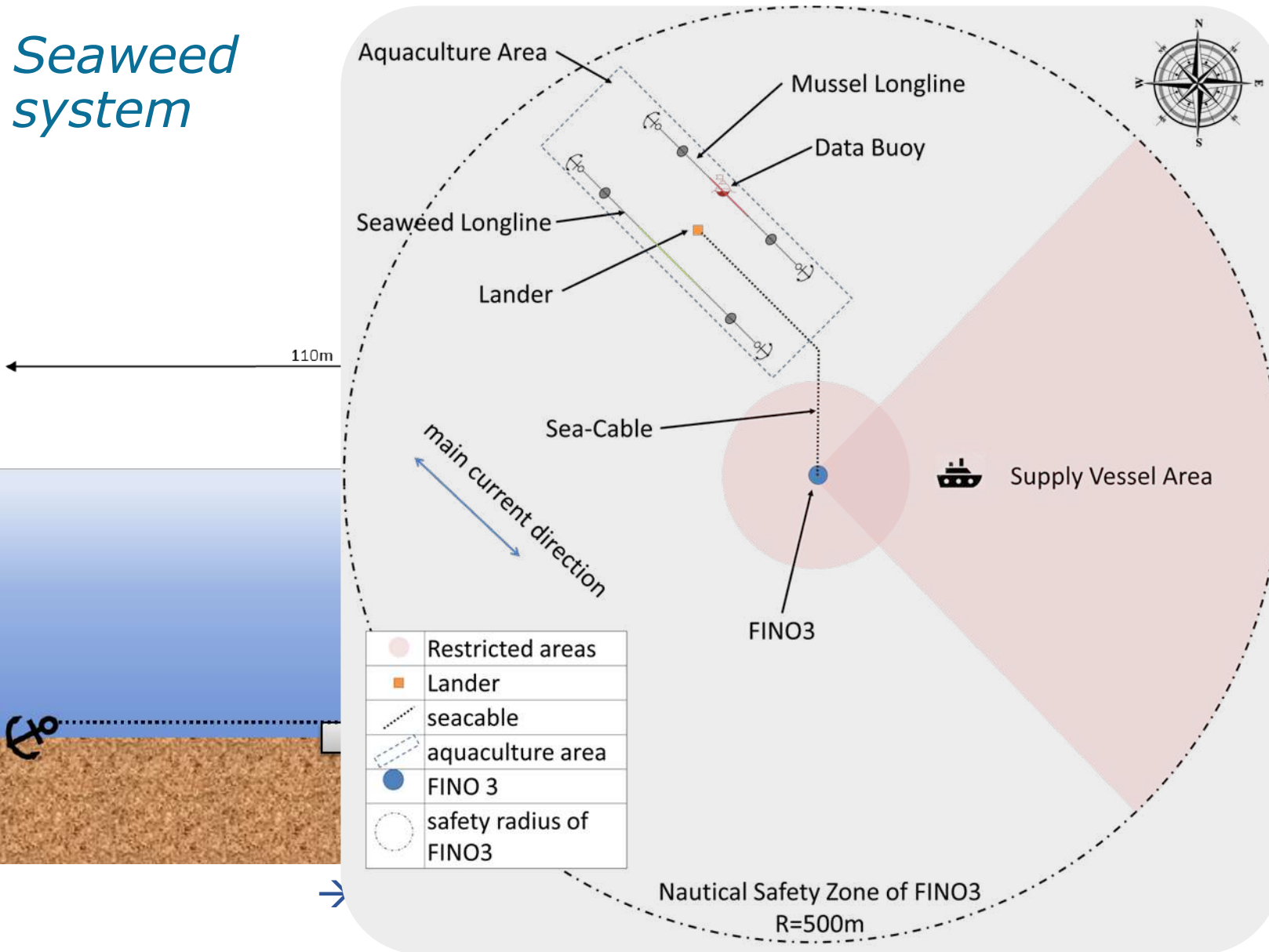
# Stage of multi-use implementation

*Development of an offshore mussel design*





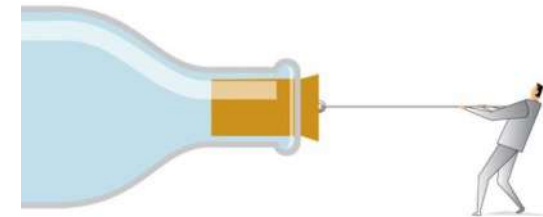
# Seaweed system



## Bottlenecks & Challenges

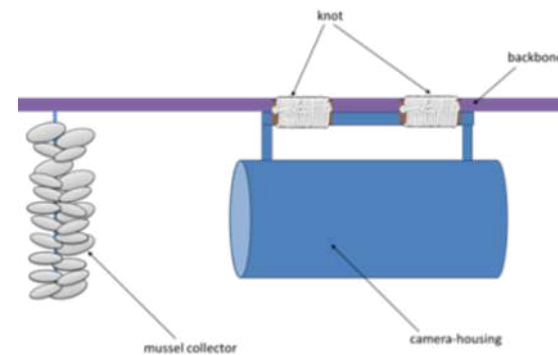
- Extreme offshore conditions (current, waves) require very flexible installation schedules within the budget
- COVID19 in 2021: restrictions, staff, increased delivery times, closed harbours
- Preventing biofouling of equipment
- Missing long term environmental data (time of mussel spat fall)
- Sufficient monitoring of protected species
- Extensive policy landscape regarding multi-use of marine space governance causing delays in permit application process due to extensive bureaucratic orders and requirements

→ **first offshore multi-use Pilot in Germany**



## Lessons Learned

- Antifouling methods: UV-C light & wiping & new materials solutions are most effective
- Seaweed samples for propagation (account sampling date with respect to environmental conditions)
- Different parameters were tested at nearshore site and allowed for adjustments before the start of the offshore experiments → importance of extensive testing
- Flexible schedules, adapted logistics and use of alternative handling guidelines





# Way forward

## Stakeholder Engagement



### Workshop 1                      26 Jan 2022

#### **OFFSHORE PLATFORM OPERATION, SAFETY AND LOGISTICS (MULTI-USE)**

- Health and safety standards, operational needs for land-based support systems
- Case studies for multi-use operational and logistic solutions
- Lessons learned of UNITED pilots

### Workshop 2    Feb/Apr 2022

#### **AQUACULTURE MULTI-USE OFFSHORE: ENVIRONMENT AND BIOLOGY**

- Environment: Identification and the impact of the application of regulations on aquaculture activities
- Biology: Basic knowledge on the target species employed and impact of offshore conditions on performance

### Workshop 3    May/Jun 2022

#### **MULTI-USE OFFSHORE: TECHNOLOGY**

- Understanding the technical challenges of a multi-use facility and evaluation of the impacts
- Addressing risks, geospatial and policy frameworks

### Workshop 4    Sep/Oct 2022

#### **POLITICS AND REGULATIONS AFFECTING MULTI-USE**

- Policy support needed to encourage MU?
- Regulatory framework supporting MU?
- Maritime spatial planning considering MU?
- Regulating ownership of MU systems?

### Workshop 5    Jun 2023

#### **MULTI-USE BUSINESS CASES AND ECONOMICS**

- Have a clear view on (socio- economic) impacts and benefits of MU on an area/pilot
- Provide hands on experience on how to adapt/build a business plan for multiuse
- Define conditions for successful future of MU, and integration with policy

# Conclusion

- Risks and challenges of multi-use systems strongly vary between activities and sites, requiring adjusted planning, and consideration of individual environmental, socio demographic and geographic conditions
- When UNITED proves the success of multi-use activities that are ecologically, legally, socially and economically feasible in offshore wind farms, the way for future implementation of multi-use and co-location systems on a broader scale is paved
- Innovative concepts may offer new opportunities for cooperative programs, e.g. employing fishers in offshore aquaculture multi-use systems, encouraging restoration and aquatic ecosystem management





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