



# Challenges, risks and barriers for large-scale commercial roll out

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# Background and objectives

## *WP1.1 and D1.1*

### Background

There is a large interest in multi-use, from policy- and scientific perspective

Relevant research project include MERMAID, H2OCEAN, TROPOS, MARIBE, MUSES and SOMOS

*But what is holding back commercial roll-out of multi-use?*

### Objective

Provide an overview of barriers to multi-use as identified in literature

Identify main barriers as identified by UNITED pilots

Link literature and pilots to identify pathways to overcome barriers



# Methodology

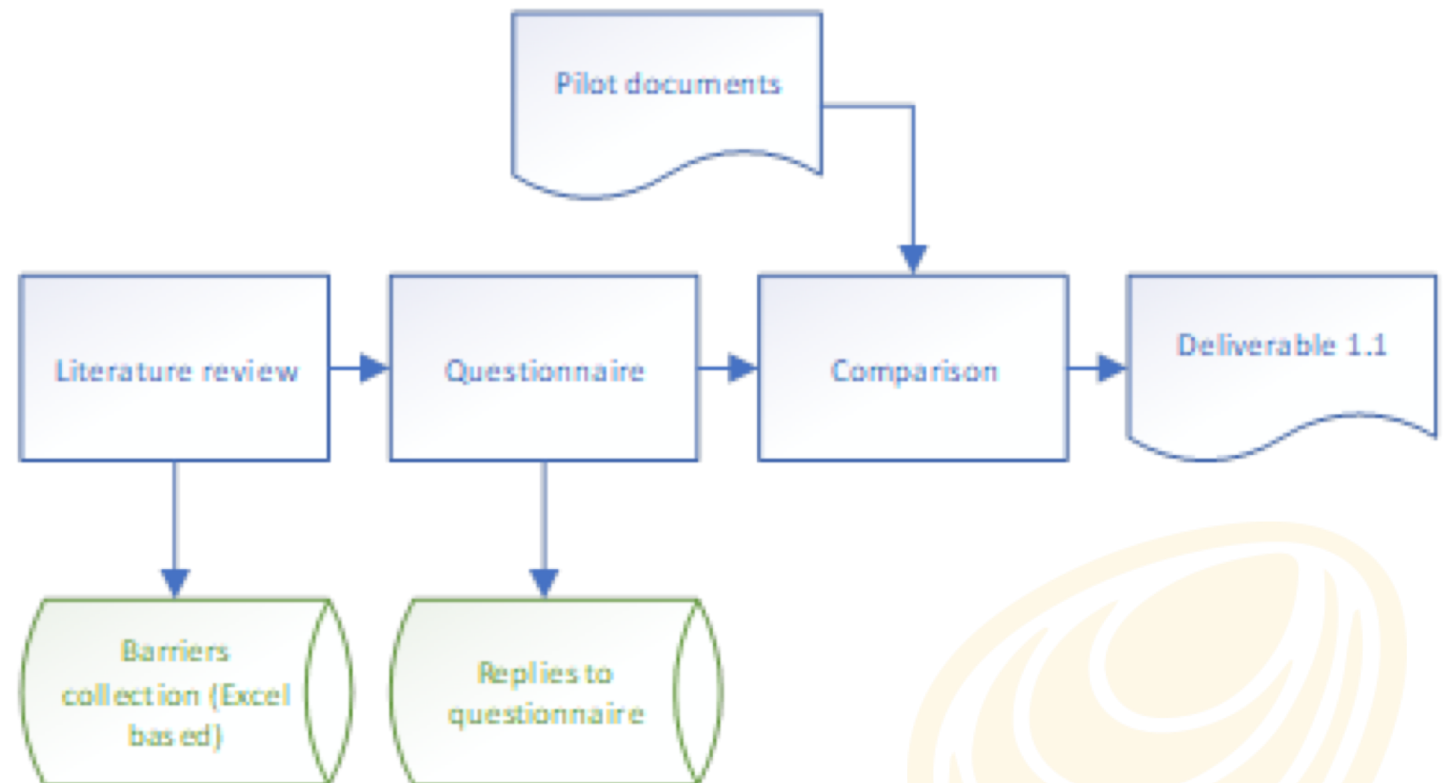
## *Data collection and outputs*

**Systematic review** based on

- Desk study based on scientific literature (41 in period 2011-2020)
- Survey among the 5 UNITED pilot leaders
- Documents describing the pilot

### Outputs

1. Deliverable 1.1
2. An Excel file with barriers identified and classified
3. The replies to the questionnaires



# Methodology

## *Two categorizations to benefit the analysis*

### **Type of multi-use (based on Schupp et al., 2019 and Dalton et al 2019)**

Multi-use Type A: Shared production platform: a situation where two different activities are closely connecting, with shared use of infrastructure.

Multi-use Type B: Shared auxiliary platform and/or co-location. In this type, the two activities share an auxiliary platform and/or are co-located in the same space.

Multi-use Type C: Staggered use (e.g. repurposing): in this type the two activities are not taking place at the same time,.

### **Barriers linked to different pillars:**

- Technological
- Economics
- Environmental
- Societal
- Legal, policy and governance





# Main findings

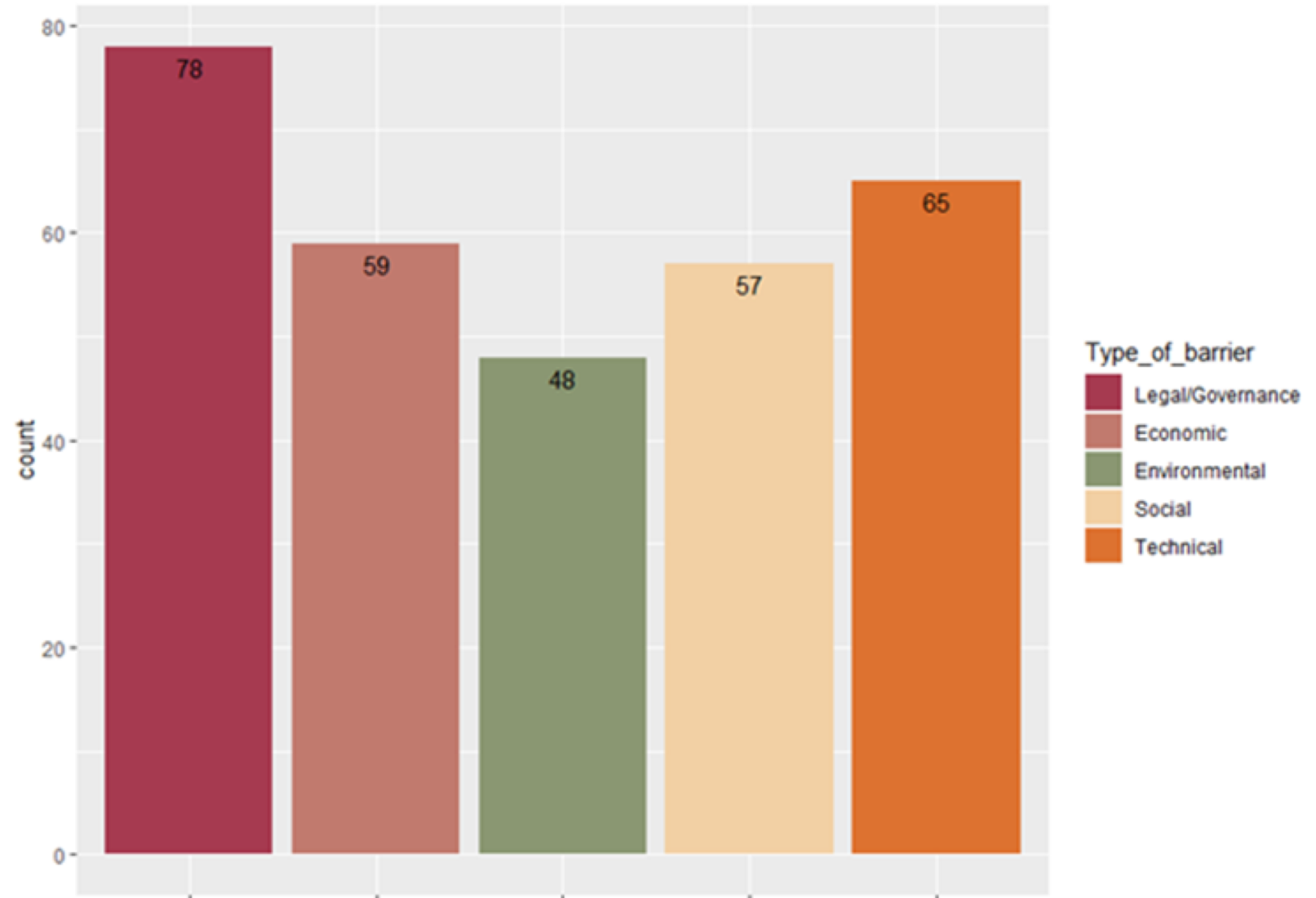
## Quantitative analysis

311 barriers identified

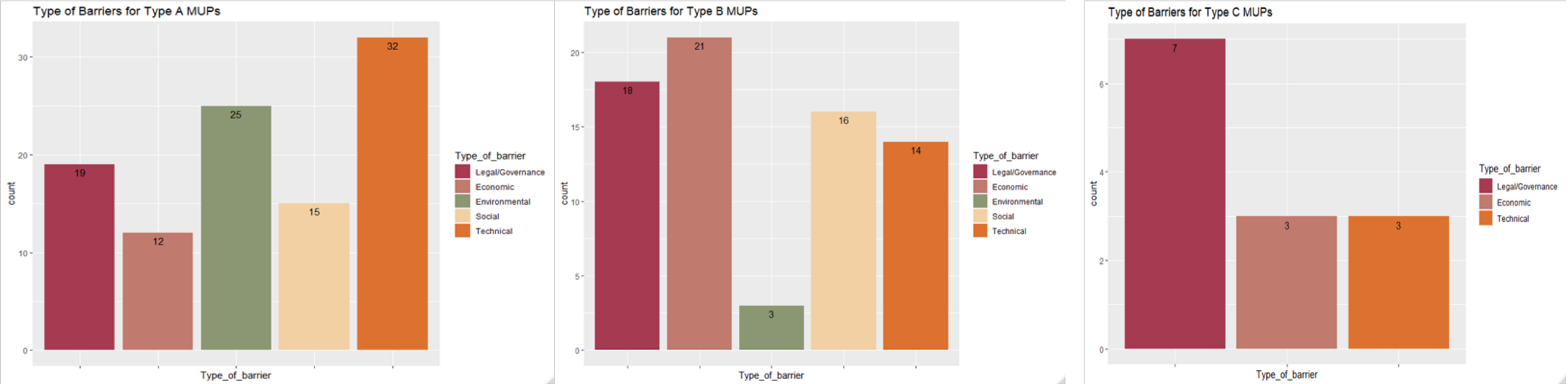
Distributed over the five barrier categories

Number of Legal/governance barriers highest

Environmental barriers lowest



# Division over Types of multi-use



Type A seen as technical and environmental challenge

Type B mostly an economic and legal/policy challenge

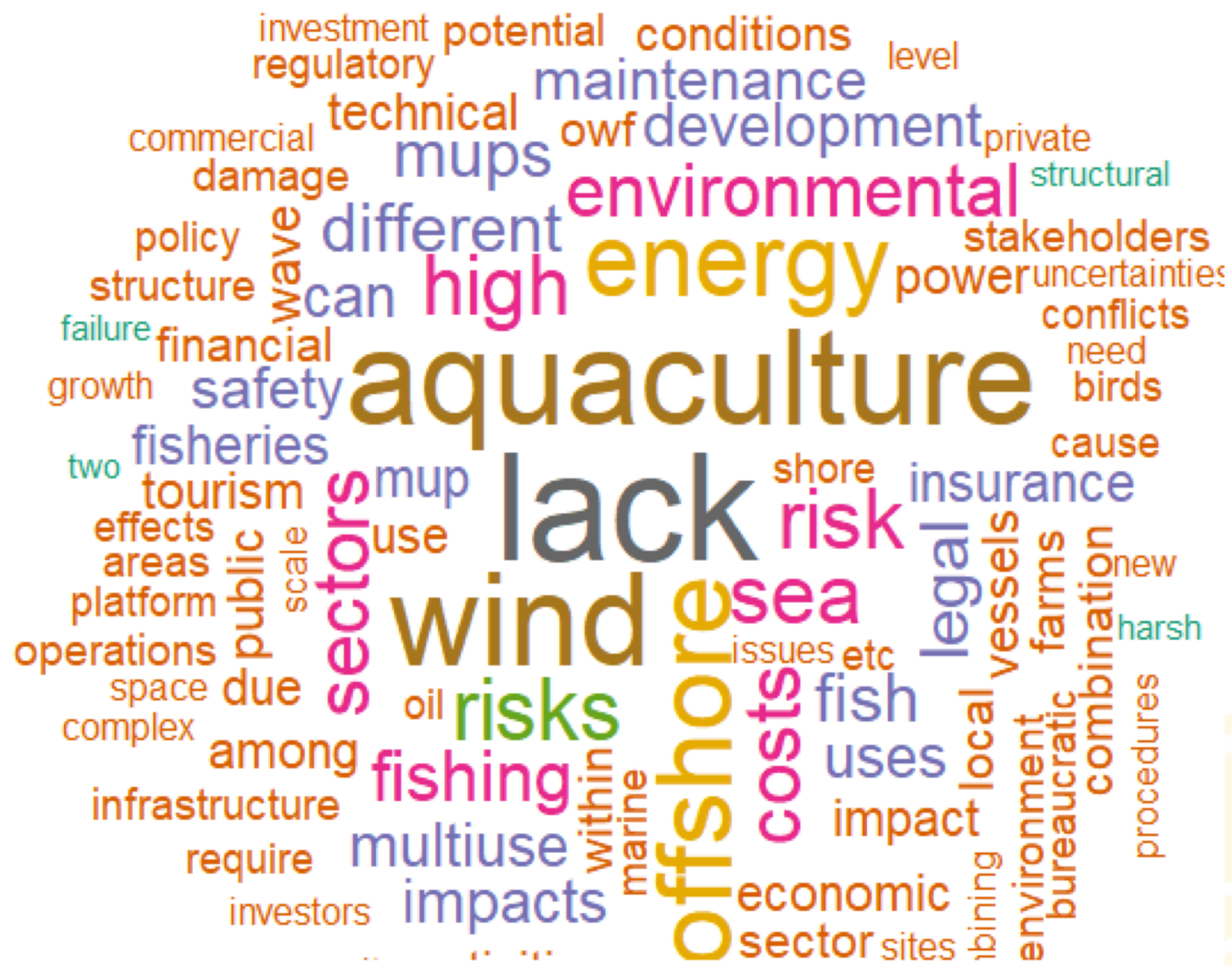
Type C as legal/policy challenge

## Qualitative analysis

## Aquaculture, energy and wind dominate the discussion

This is the combination most studied, with a general focus on co-location.

Operational challenges  
and economic  
challenges dominate.







## Main findings

## Qualitative analysis



## Legal, policy and governance barriers

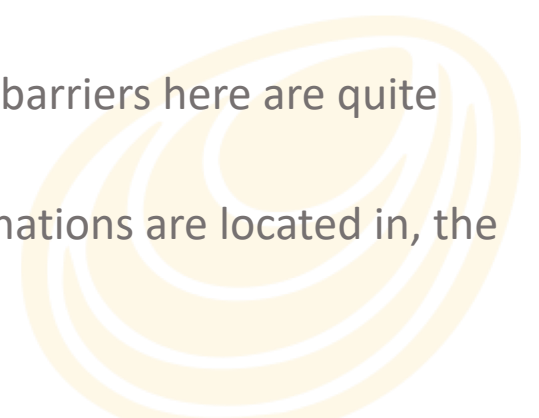


## Social barriers

# Main findings

## *Observations*

- This review points to the wide variety in barriers.
- Realising multi-use in practice is certainly not hampered by technological barriers only.
- The discourse of Technological Readiness Levels used (among others) to describe the progress in developing multi-use is in this respect misleading. A complete understanding of the state-of-the-art requires use of additional concepts such as Social Readiness Level, Financial Readiness Level and Legal Readiness Level.
- Barriers need to be identified in a case-by-case manner, there are no general barriers to multi-use. As multi-use is, by nature, a combination of at least two different economic sectors, the number of possible combinations is high.
- Many barriers focus on the specific combination of two sectors and do not apply to other sectors or other combinations.
- Although many multi-use combinations focus on wind energy and aquaculture, even the barriers here are quite diverse when looking at different examples in the literature.
- These differences can be geographically explained due to the ocean the multi-use combinations are located in, the age of the structure used or the distance to the shore, among other factors.



# Main findings

## *Pilot consultation*

Identified main barriers per pilot, based on documents and questionnaire

### **For example for FINO3**

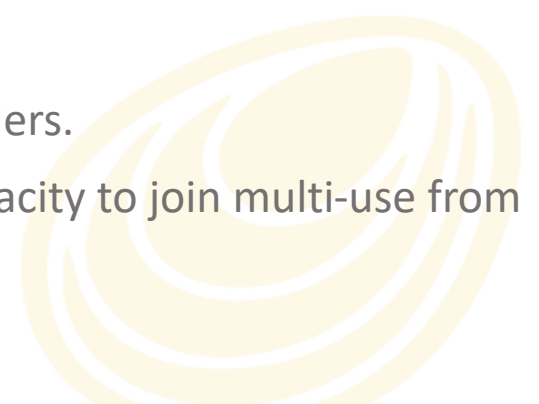
Technological: weather conditions and the high energetic environment; automation of remote data recording; anchoring/mooring; site not appropriate for frequent visits, requiring minimal or automated maintenance of aquaculture.

Economic: lack of standardized procedures; charter costs for ships; insufficient subsidies; insurance and maintenance costs; market price of goods low, scale up necessary.

Environment: harsh environment; wave action and low concentration of spat.

Governance and legal: unclear legal status for multi-use; lack of dialogue between stakeholders.

Social: lack of trust between industry sectors; low individual financial power and overall capacity to join multi-use from local collaborators.



# Next steps

## Linking pilots, earlier projects and scientific literature

Provide relevant links (to project and literature) for the pilot leaders

## Inform next UNITED deliverables

Giving insight into, and references to, barriers already studied and reported on, to be used in Task 1.2 “Review of existing solutions or developed solutions”

Providing input on economic barriers and solutions to inform Task 1.3 “Optimise business cases and requirements definitions”







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