



Morten Bjerkholt / CEO



KONGSBERG



EELUME

THE NEXT GENERATION IMR TOOL

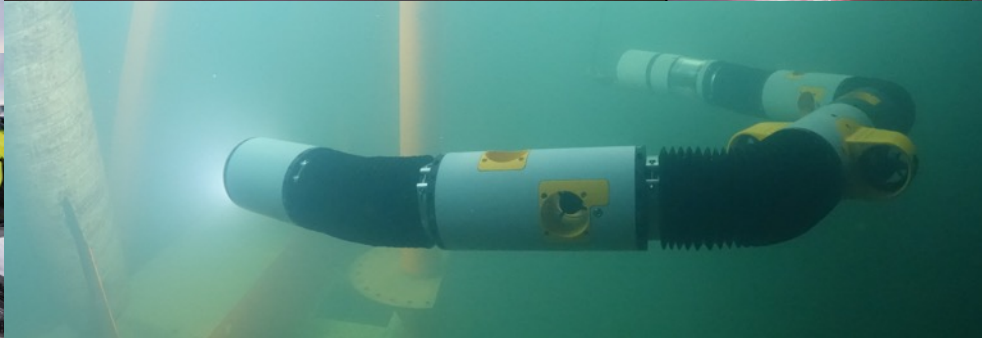
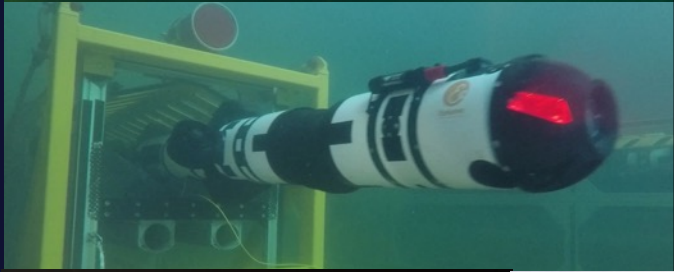
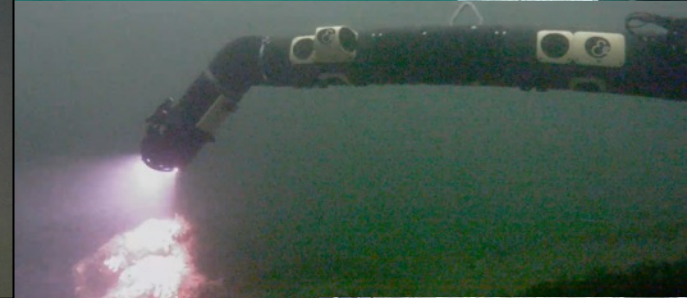
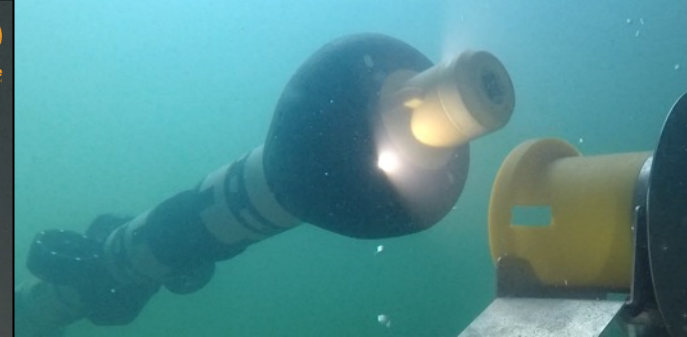
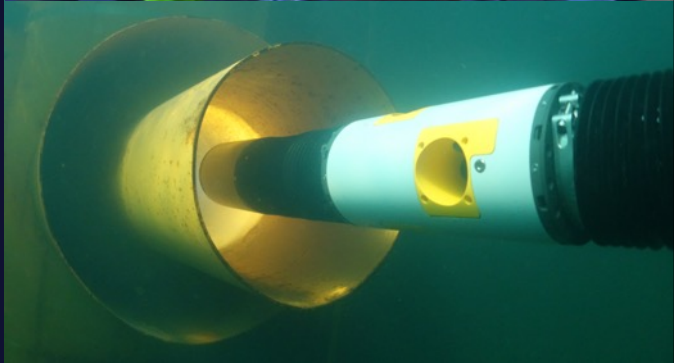
Agenda

- Eelume: Concept and products
- Value proposition, markets and applications
- Development and testing
- Current projects

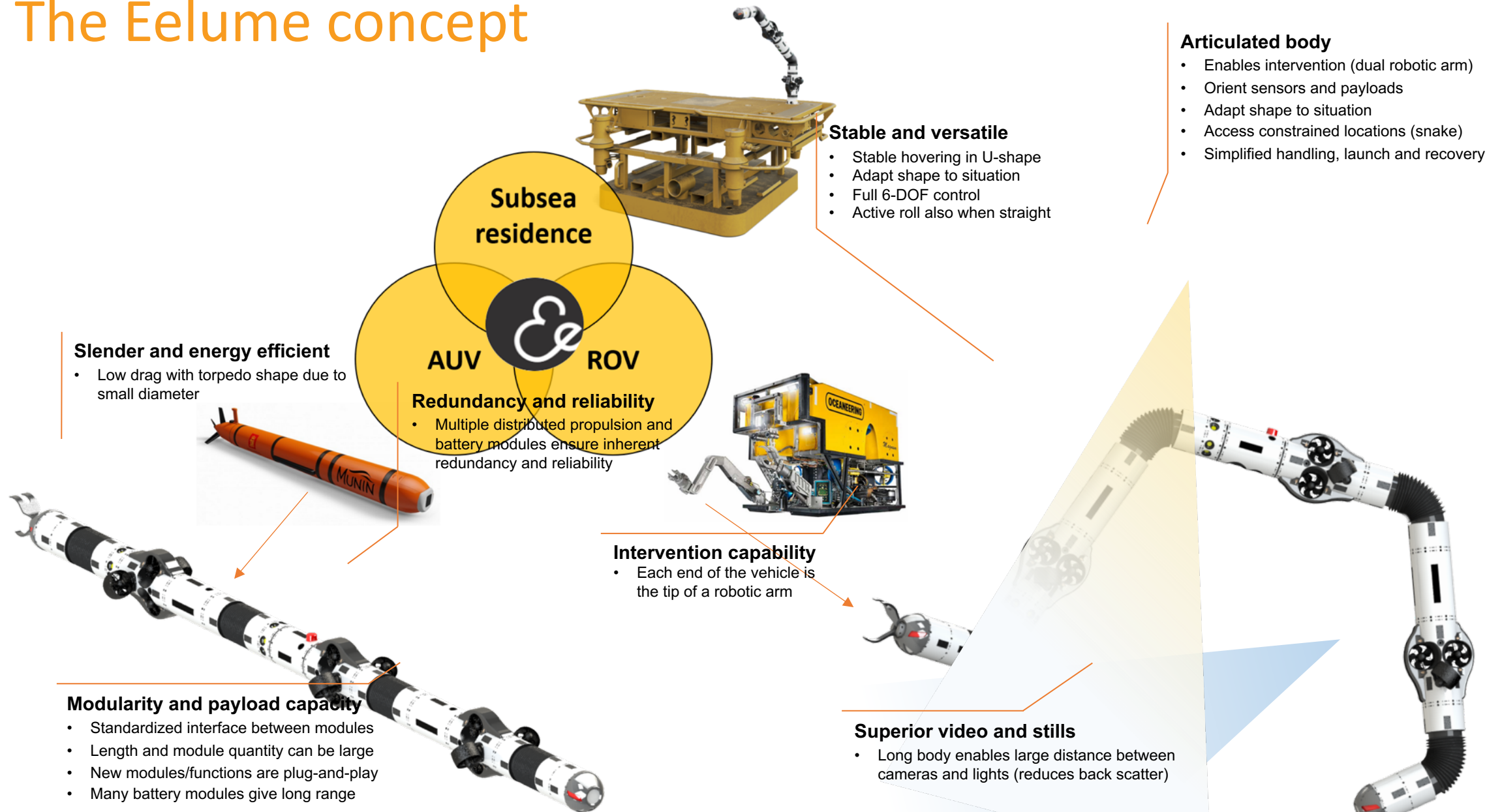
Our vision: Subsea resident intervention vehicles



Extensive development and testing over the last 5 years



The Eelume concept

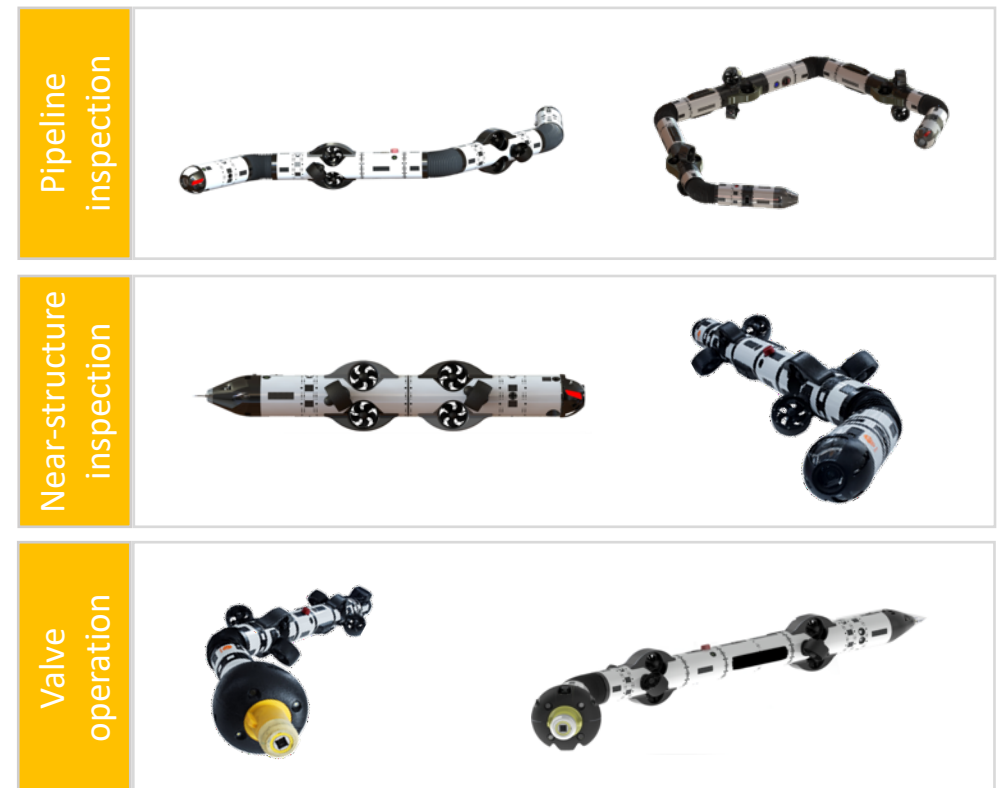


Eelume based on the “LEGO” concept: adapt the vehicle configuration in an optimal way for the pursued purpose

A wide range of modules and payloads



Assembled for the best configurations



Wide number of possible configurations providing the tool with a large scope of relevance.
Module conception and payload integration adaptable to market requirements. “Plug and play” possibilities.

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The Subsea IMR¹⁾ value chain is dependent on costly surface vessels; Eelume concept suitable to disrupt

IMR value chain:

ROV²⁾ manufacturer

Hardware

Surface vessel operator

Vessel operation & crew

ROV operator

ROV operation & crew

Energy operator

End-user

Most costs related to vessel operation

Players servicing operator

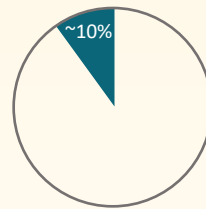
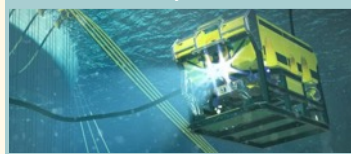
Vessel operator



Typical average share of dayrate



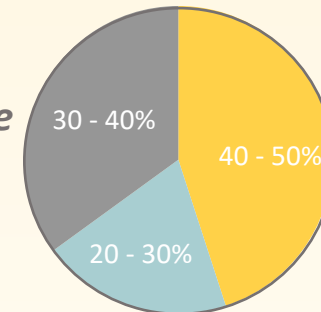
ROV operator



Vessel typically operational only 60-70% of the time³⁾

Typical time allocation of a vessel

Vessel downtime



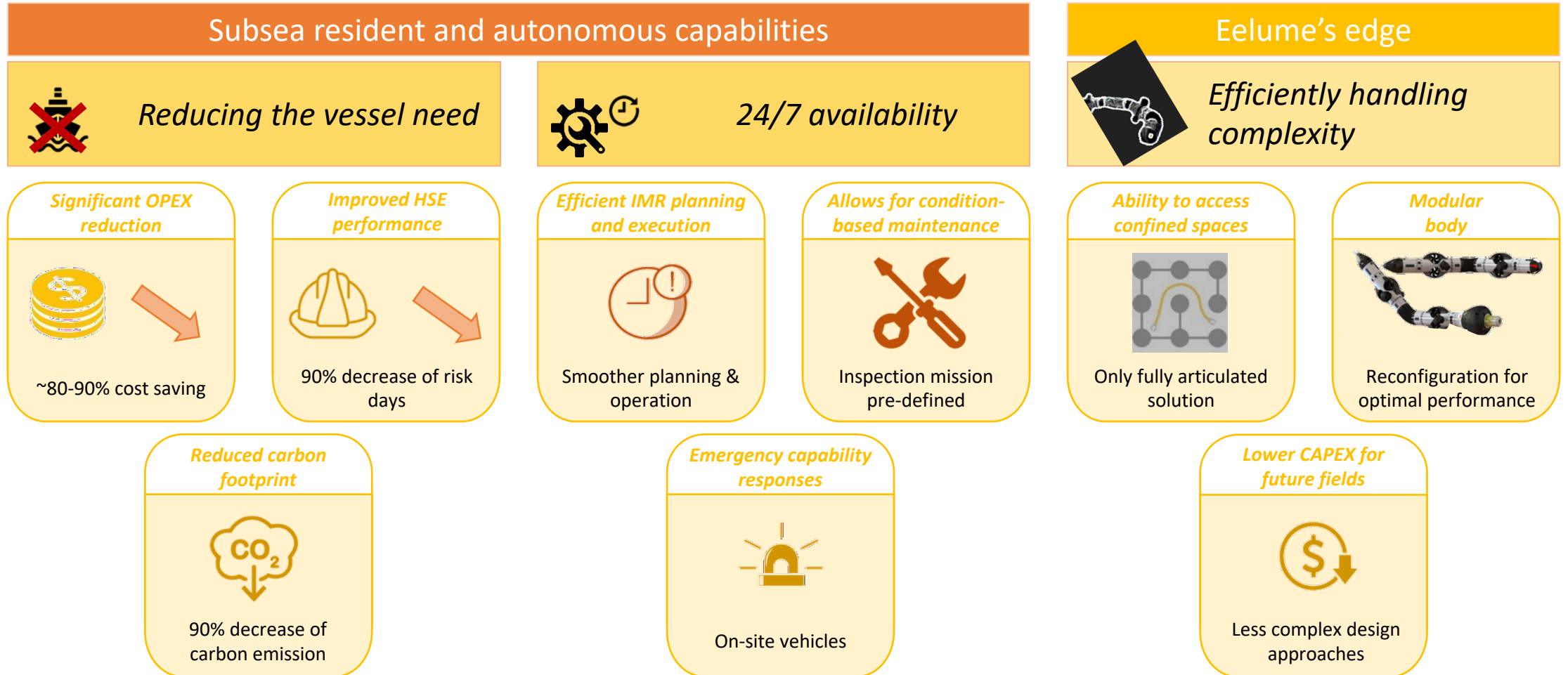
IMR

Other works

High potential benefit for the end-user by introducing a disruptive technology reducing the need for surface vessels

1) IMR: Inspection, Maintenance and Repair; 2) Remotely operated vehicle; 3) Based on selected sample of vessels in North sea spending at least 50% of operational time on IMR in 2014-2018. Extreme values excluded. 16 vessels in sample. Downtime typically includes standby, mob and demob, and wait on weather. Other works typically include light construction
Source: Compiled information from Management, Equinor, Douglas Westwood, IHS, and Arkwright research

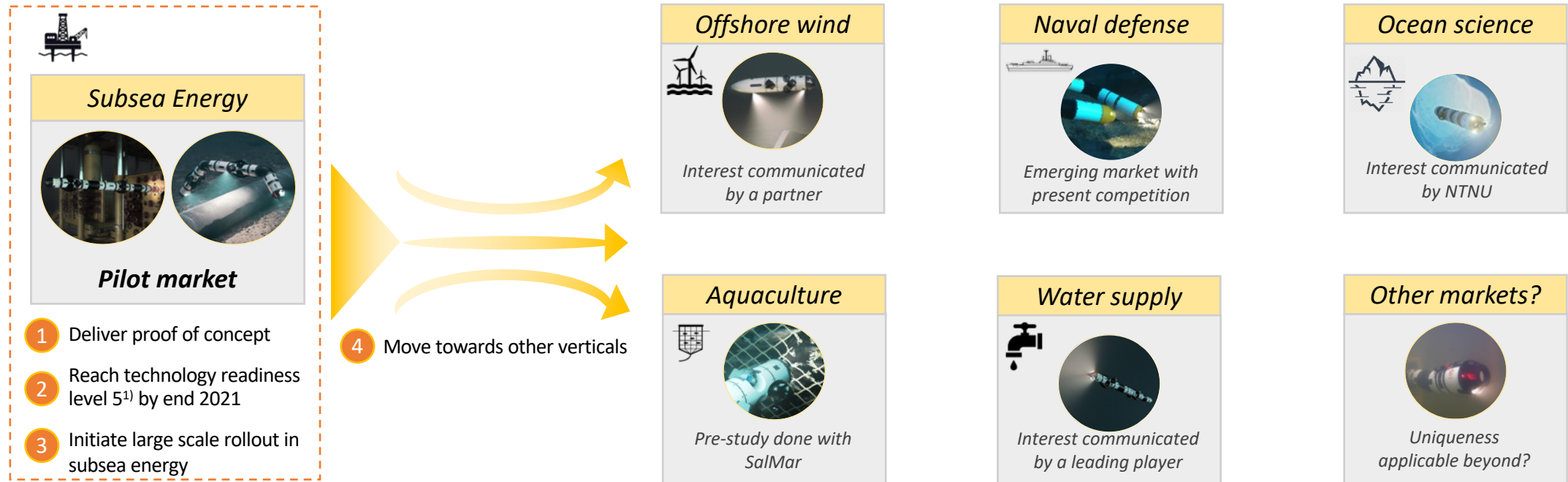
Eelume's value proposition: we can reduce costs, provide increased flexibility, handle what no other can handle



Subsea energy is our pilot market, but many others!

The first step...

...of many



Timeline

2019 - 2021

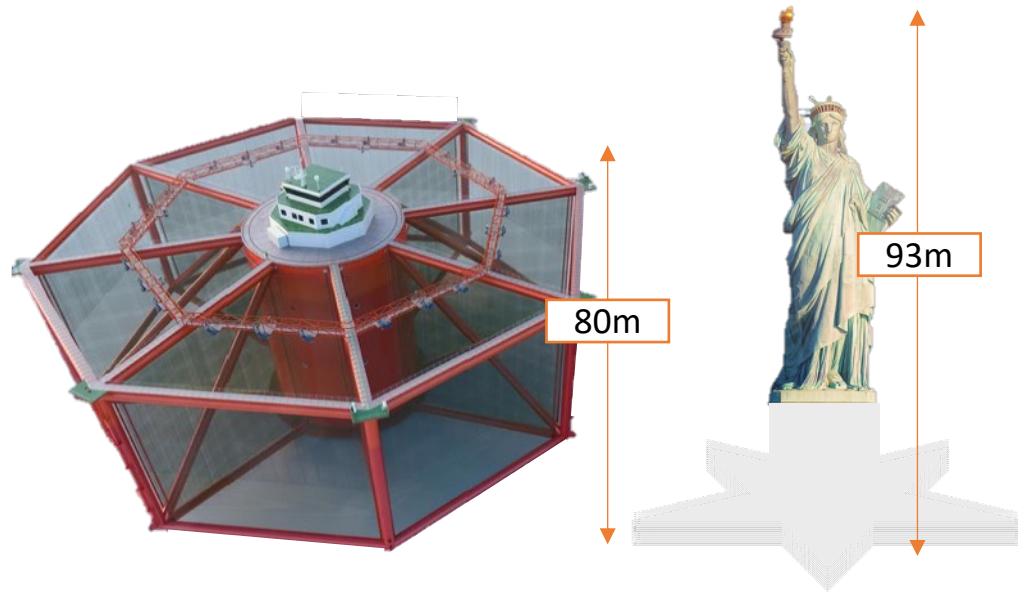
2022 +

1) Equinor TRL scale

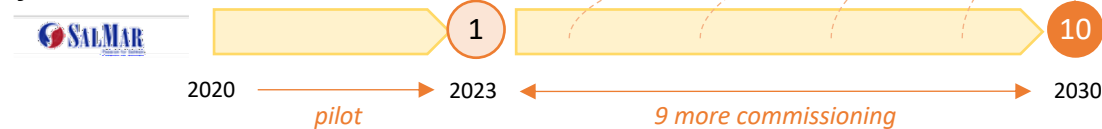
Aquaculture



Example: short- to mid-term considerations for SalMar



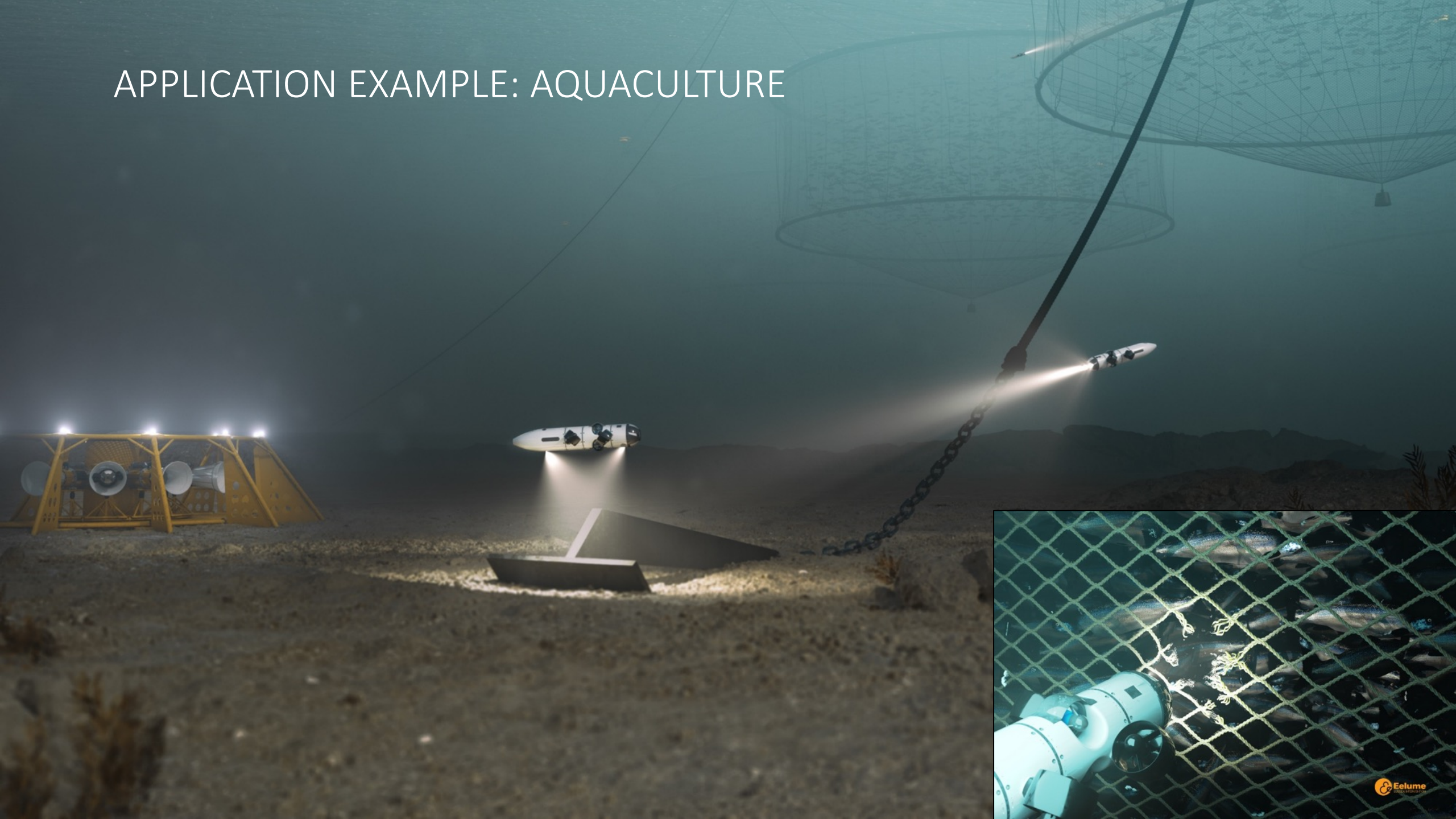
Plans for roll-out



Key take-aways:

- 1 SalMar – and probably other aquaculture players are investigating opportunities within smart fish farms
- 2 SalMar's first farm is likely to be installed 35 – 55 km outside the Norwegian coastline
- 3 Large structures which will need autonomous 24/7 «Janitor» robots for IMR light operations
- 4 First SalMar farm planned for commissioning in 2023
- 5 SalMar's vision is to have 10 such farms within the next 10 years

APPLICATION EXAMPLE: AQUACULTURE



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Front inspection



Torque tool



Joint



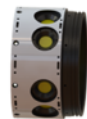
Thruster



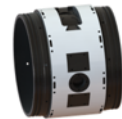
Control and navigation



Battery



LED ring



Buoyancy trimming



Tether connection



INSTALLATION IN TR.FJORDEN MAY 2019



REMOTE CONTROL FROM EELUME LAB

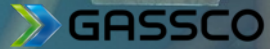
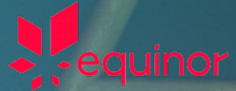


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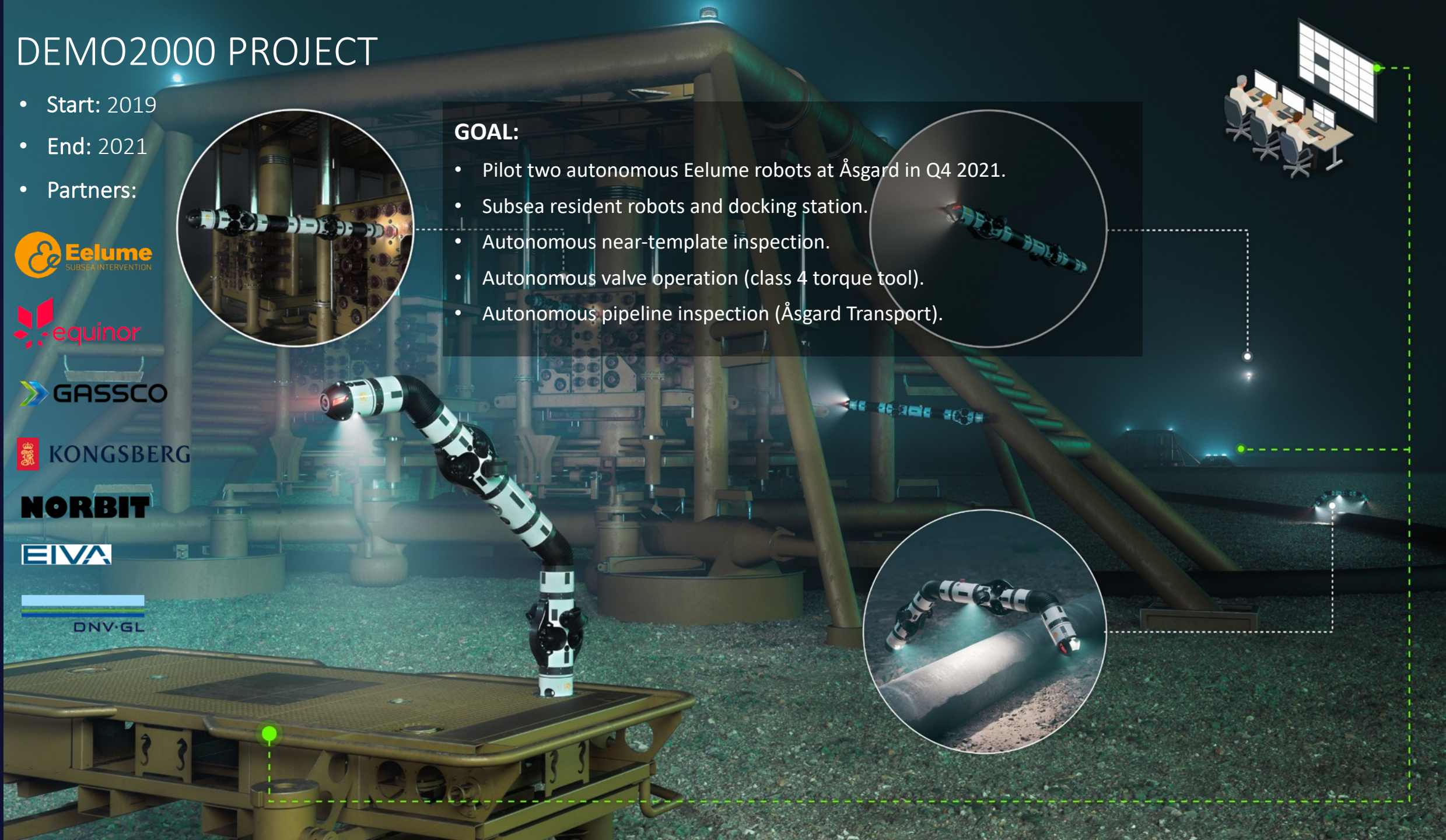
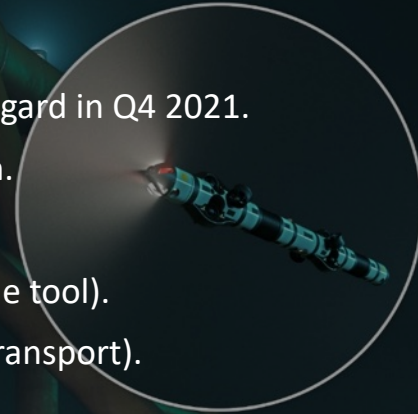
DEMO2000 PROJECT

- Start: 2019
- End: 2021
- Partners:



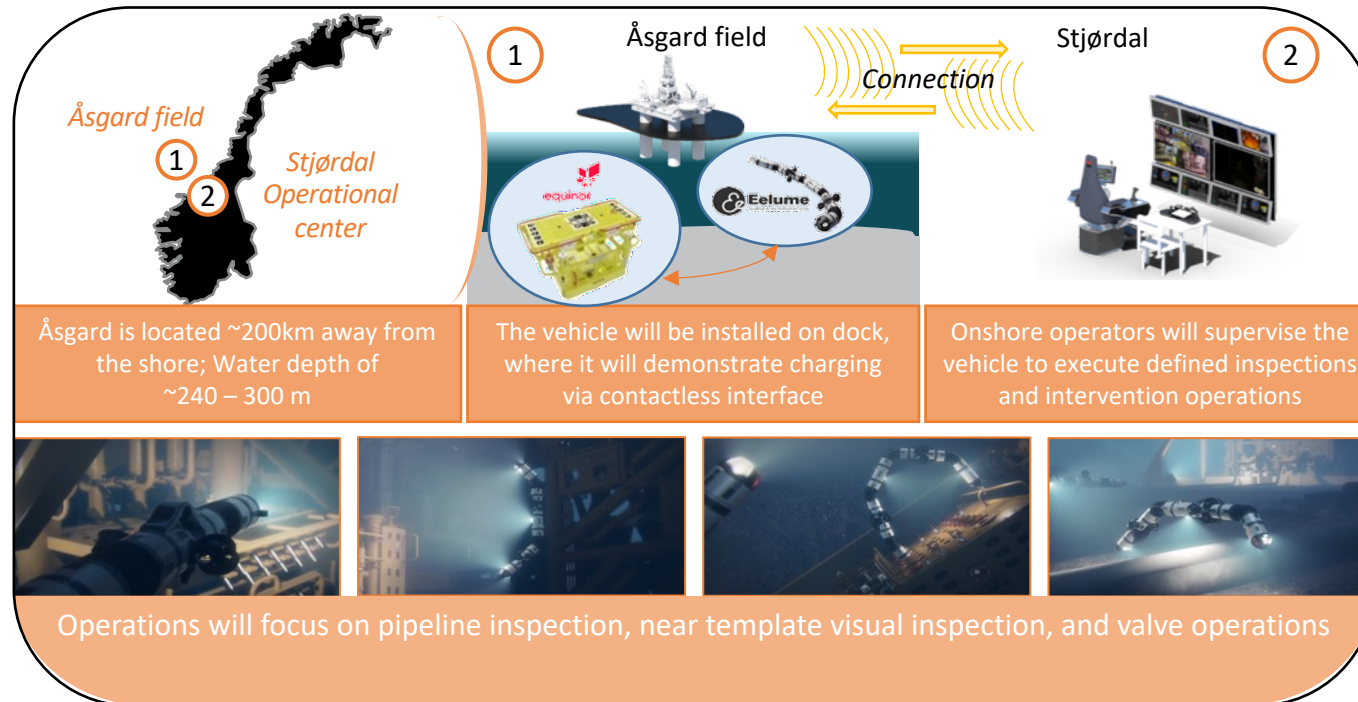
GOAL:

- Pilot two autonomous Eelume robots at Åsgard in Q4 2021.
- Subsea resident robots and docking station.
- Autonomous near-template inspection.
- Autonomous valve operation (class 4 torque tool).
- Autonomous pipeline inspection (Åsgard Transport).



In 2021, the Eelume vehicle will prove its relevance at the Åsgard field, and thereby prepare for commercial rollout

Scope of the Demo 2000 project



Demonstration of:

Tetherless vehicle

Autonomous tasks

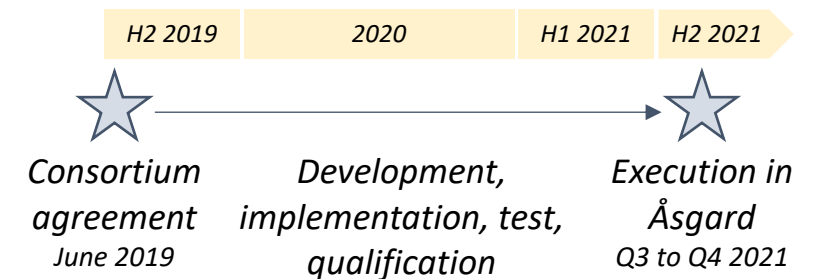
Technology carrier

Results

By end of the project, Eelume will:

- Achieve technology readiness level 5 according to Equinor's TRL scale
- Gain operational experience in offshore environment
- Be prepared for a large-scale commercialization

Timeline



Partners:



Source: Management



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Thank you!

