Diving together with new tools

The Bergen International Diving seminar 2019

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Equinor ASA

Diving going digital?

Where are we

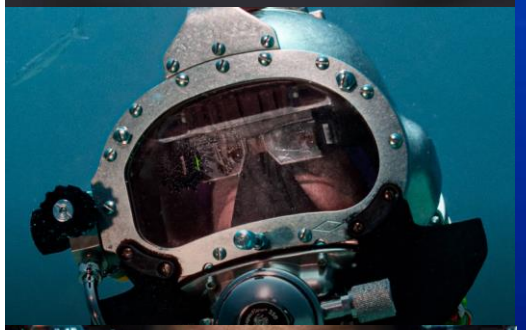
- DSV's with PLC controlled dive systems
- Simulator training
- Diver / ROV interface

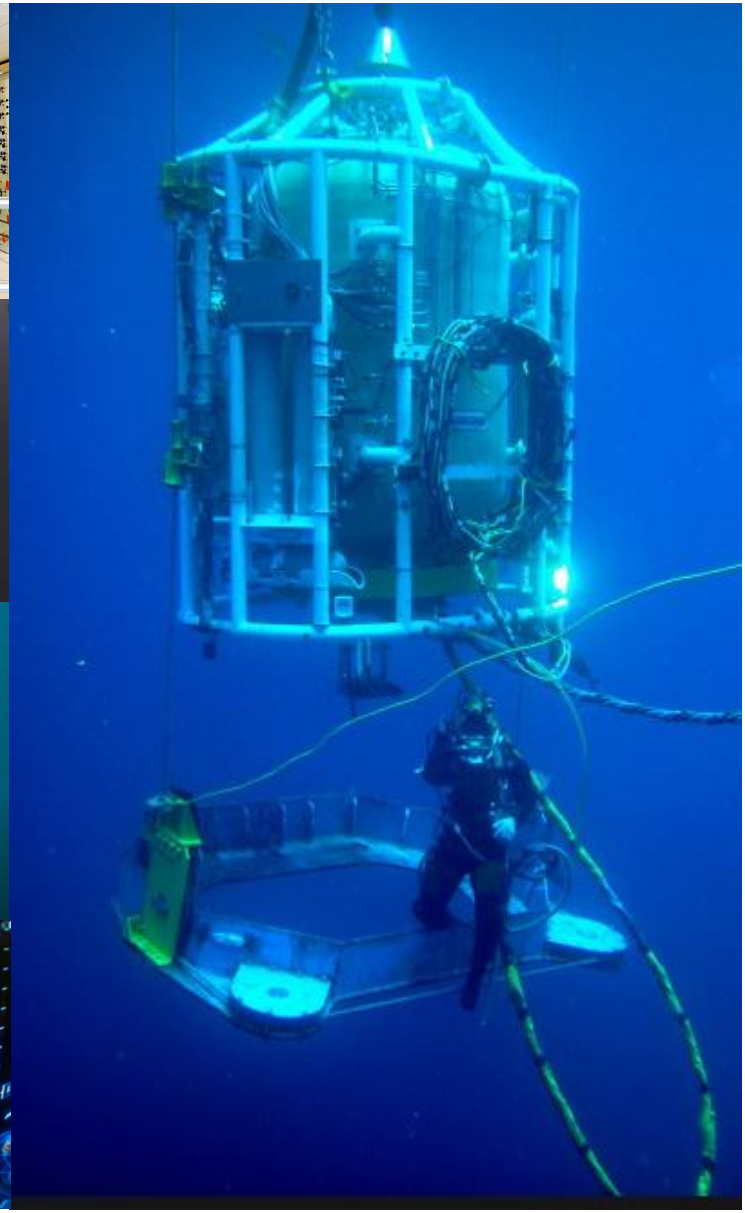
What's out there

- UID - Underwater Intervention Drones
- Head Up Display (HUD)
- Electronically controlled and monitored rebreathers
- Microsoft HoloLens technology

What's the future

- Helmet HUD multiple source information sharing
- Diver personal UID
- PDE autonomous emergency systems
- High bandwidth wireless communication





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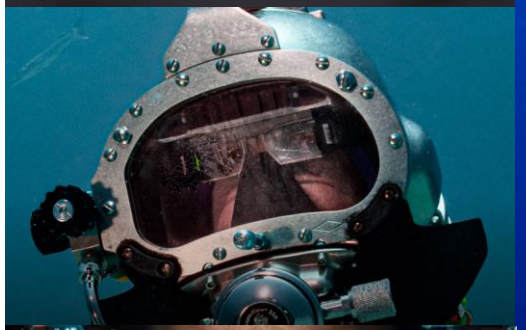

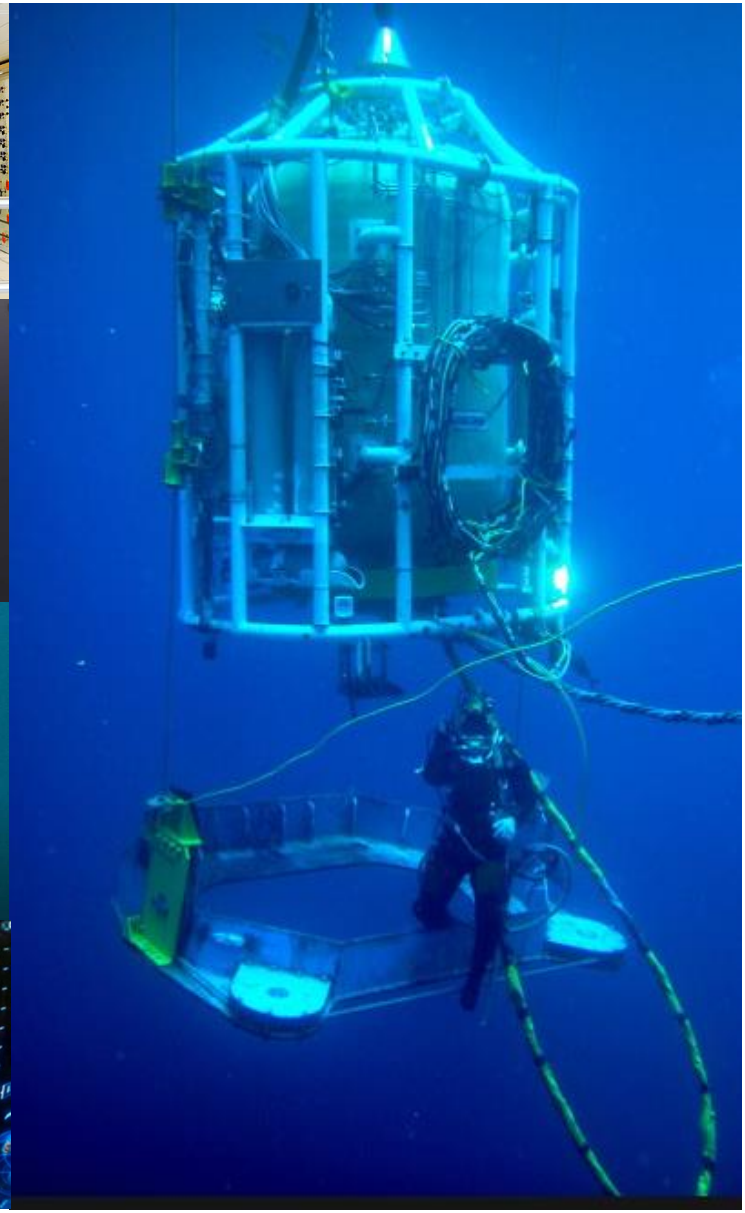

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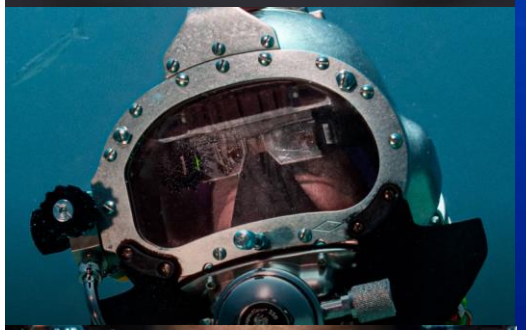
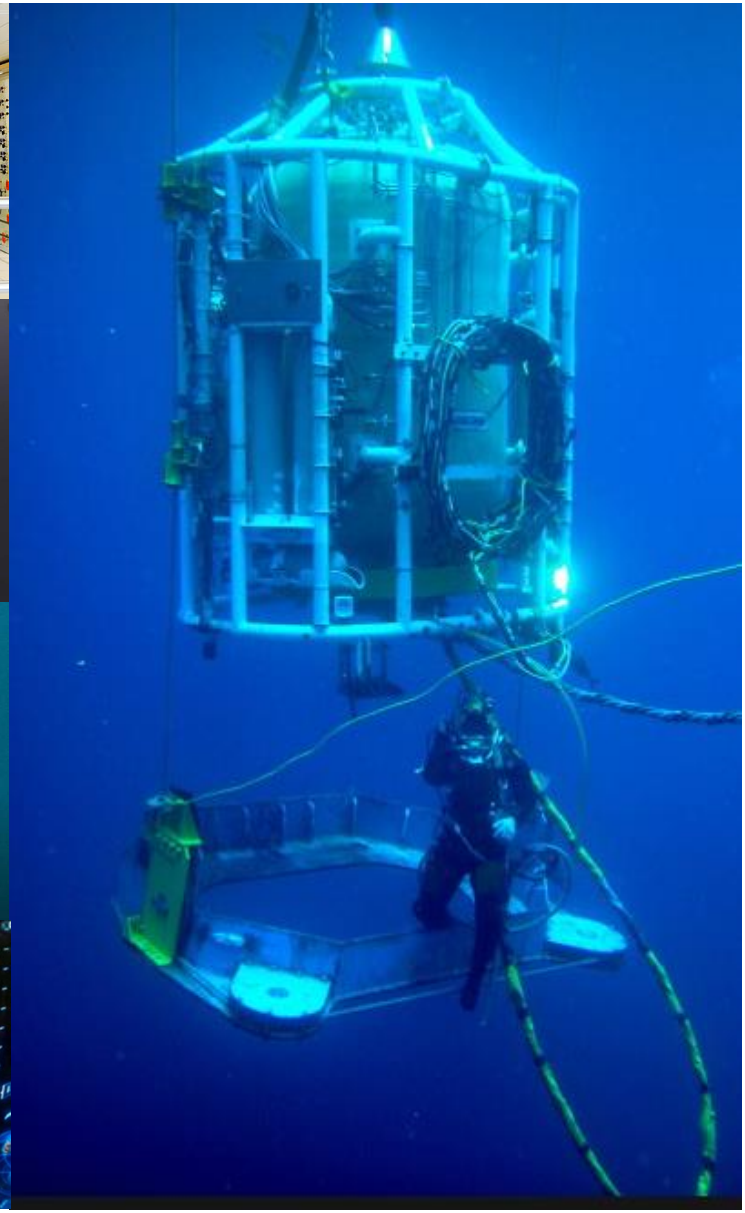
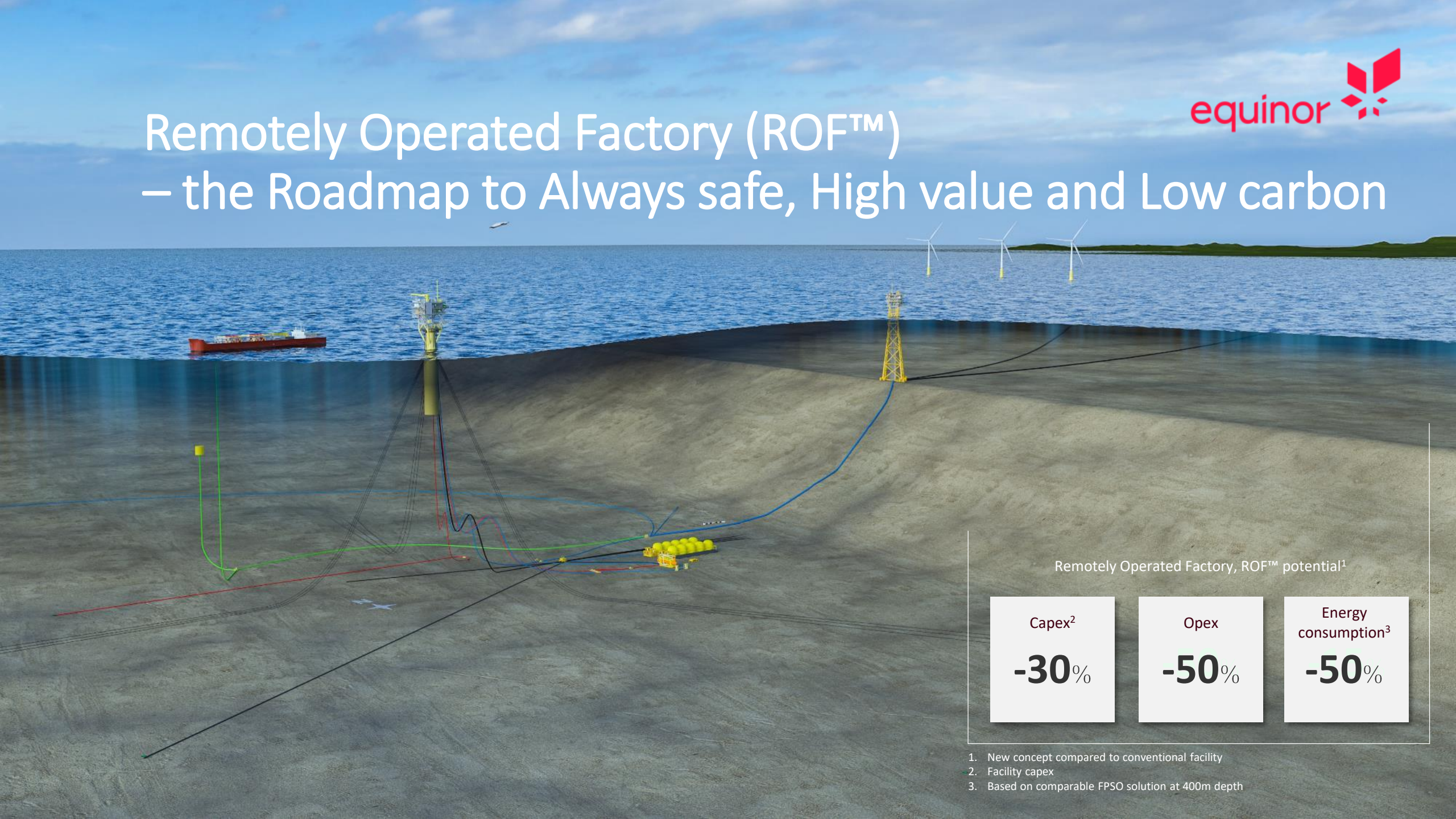




Remotely Operated Factory (ROF™) – the Roadmap to Always safe, High value and Low carbon



Remotely Operated Factory, ROF™ potential[1]

Capex[2]	Opex	Energy consumption[3]
-30%	-50%	-50%

1. New concept compared to conventional facility
2. Facility capex
3. Based on comparable FPSO solution at 400m depth

UID?

Underwater Intervention Drones (UID™)

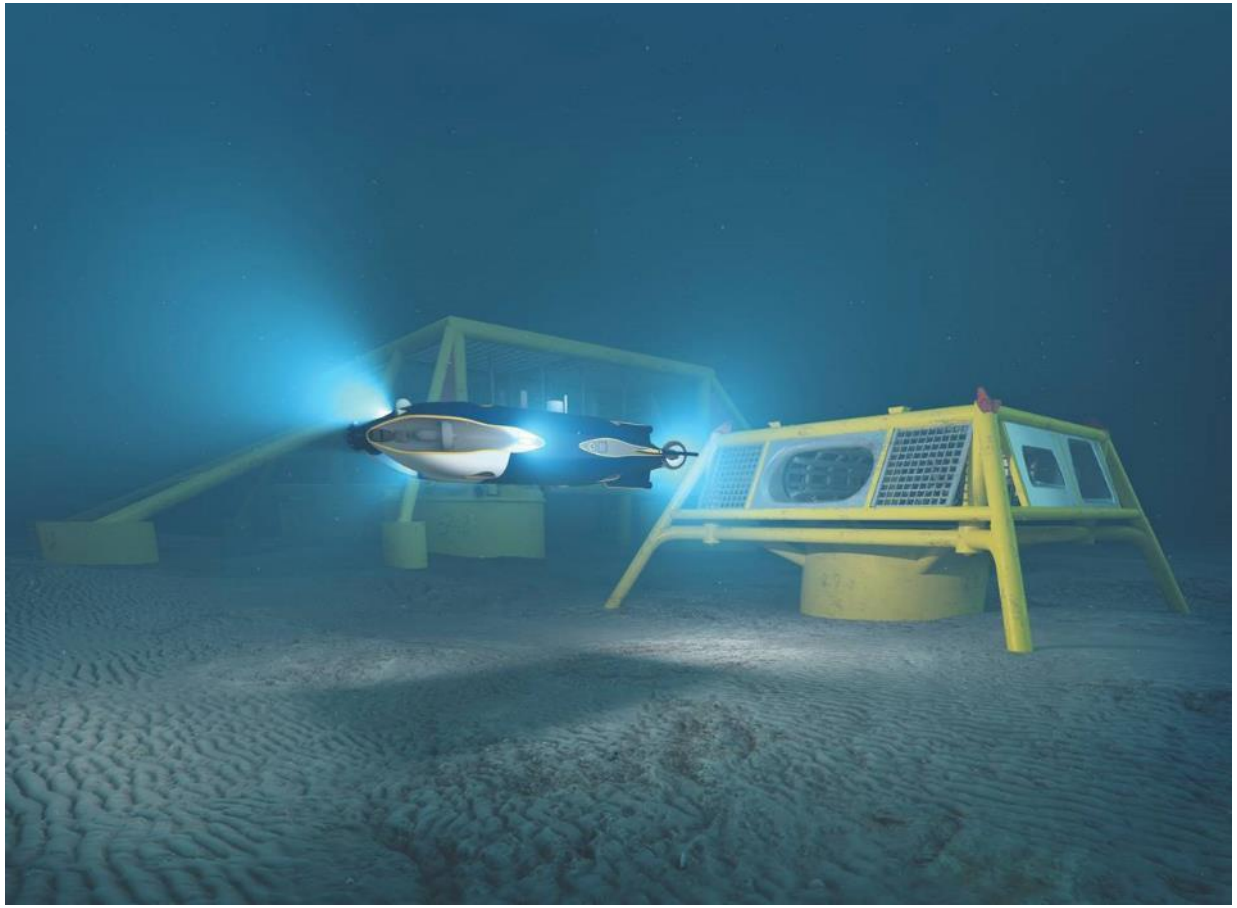
UID™ – Underwater Intervention Drone, is a hybrid of:

ROV – Remotely Operated Vehicle

AUV – Autonomous Underwater Vehicle

UID™ is trade marked by Equinor to secure freedom to use in the industry

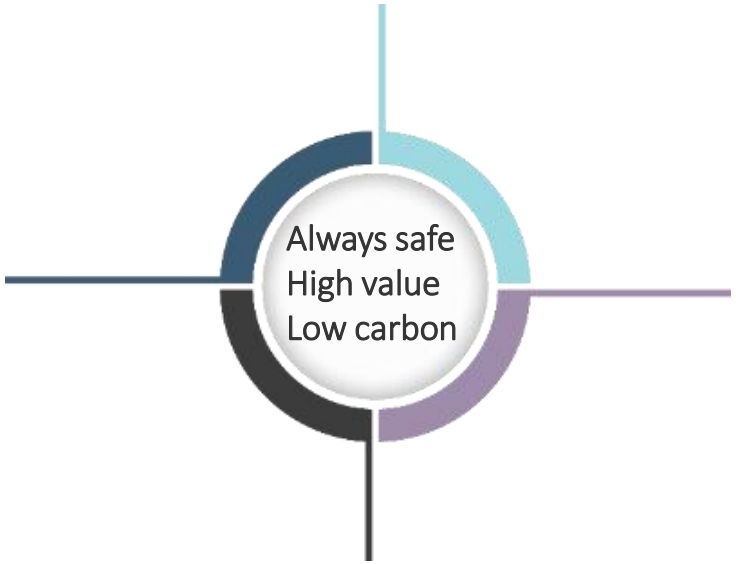
UID™ important part of the sharpened Equinor technology strategy



Equinor R&T Objective:

Develop and implement Underwater Intervention Drones (UID ™) for resident application with semi-autonomous and autonomous functionality.

Subsea operations with use of Underwater Intervention Drones



- Should be able to perform **almost all tasks** that traditional WROV have done.
- Remotely **controlled from shore** based control room
- **No operational restrictions** with regards to surface weather
- Resident and **always available**, perfect environmental monitoring platform

Hydrone-R to be operational at Njord A medio 2020

Exemple of Equinor funded technology

Stepwise development of Eelume functionality

Phase 1 - 2018

(LOOP funding)

- Tethered operation from shore and vessel
- Visual inspection
- 150 meter depth rate

@Trondheimsfjorden

Phase 2 - 2019

(LOOP + start Demo2000)

- 1+ months subsea residence
- Visual inspection
- Operate valves (class 4)
- 500 meter depth rate

Phase 3 - 2020/2021

(Demo2000)

- Wireless operation
- Long term residence
- 100+ km battery range
- Autonomous inspection of pipelines and SPS (operator monitors and can take control)
- Autonomous transit between docking stations
- Tool rack with several interchangeable tooling options
- Onshore control room
- 500 meter depth rate

@ Trondheimsfjorden and Åsgard Pilot test site

Subsea Docking Station –

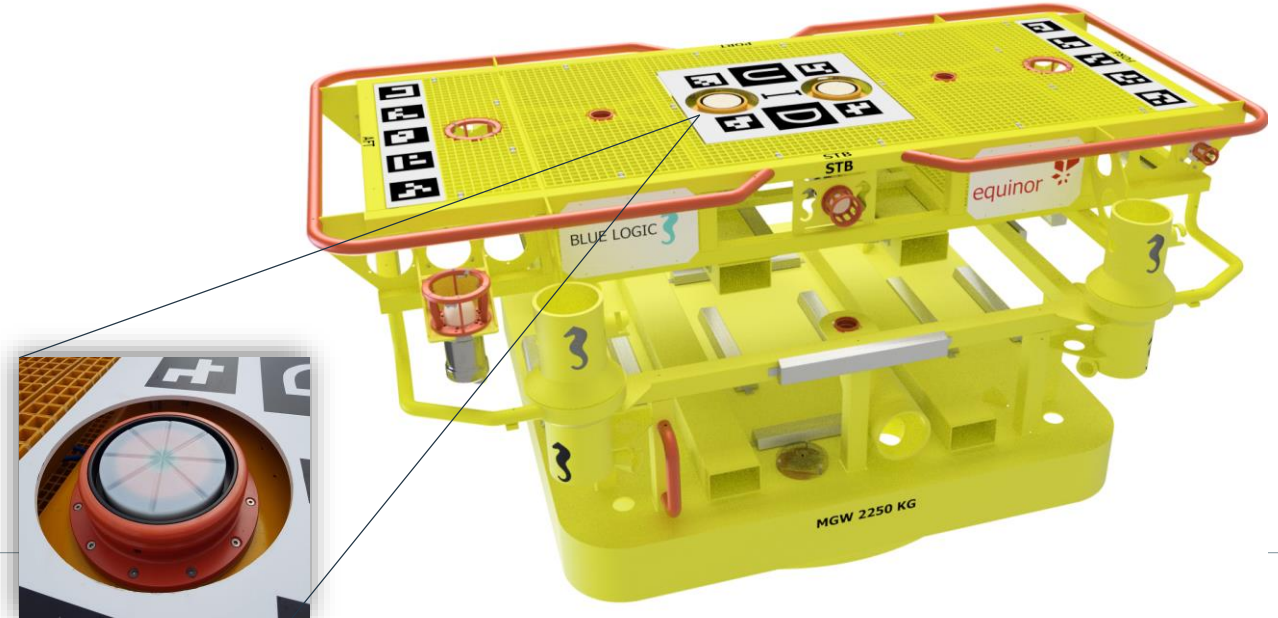
important need for UID development

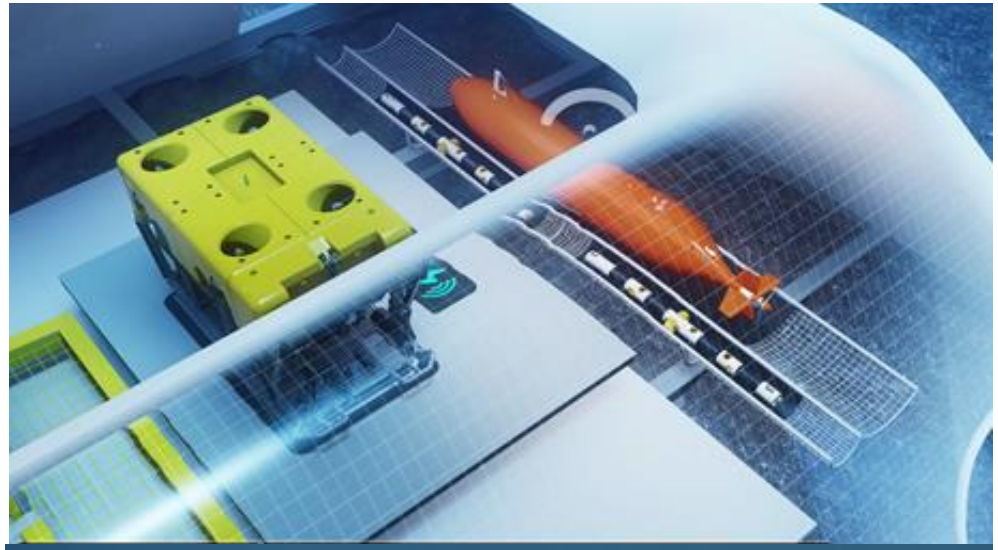
Subsea Docking Station (SDS)

Key enabling technology for the UID philosophy

In general

- make an industry standard for subsea charging and communication, the "**subsea petrol station**"
- increase implementation **speed** of UID's
- the drone supplier industry to focus on **UID development**





equinor

SWiG STANDARD INTERFACE energy API

UID –
is it just talking or does it happens?

It becomes real:

April 2019: Testing Eelume and «no 1» standard docking station

OVERVIEW

A

Trondheim Biological Station

- NTNU premises.
- Control room connected to docking panel.

B

Statoil Pig Loop

- Installed in 2016.
- Allows realistic testing of subsea inspection and intervention.

C

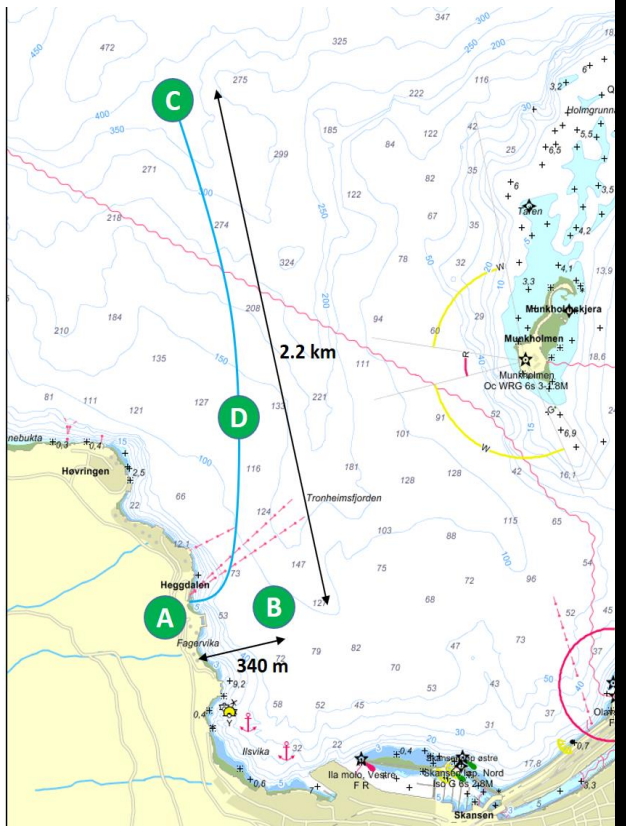
Statoil docking panel

- Under development by Statoil.
- Facilitates power and communication for subsea resident IMR solutions.

D

Seabed cable to docking panel

- Needs to be installed.
- Supplies power and communication to docking panel from shore.




Saipem
Sophie Hi

Thank you!

Time for questions

For further information or discussion, contact:

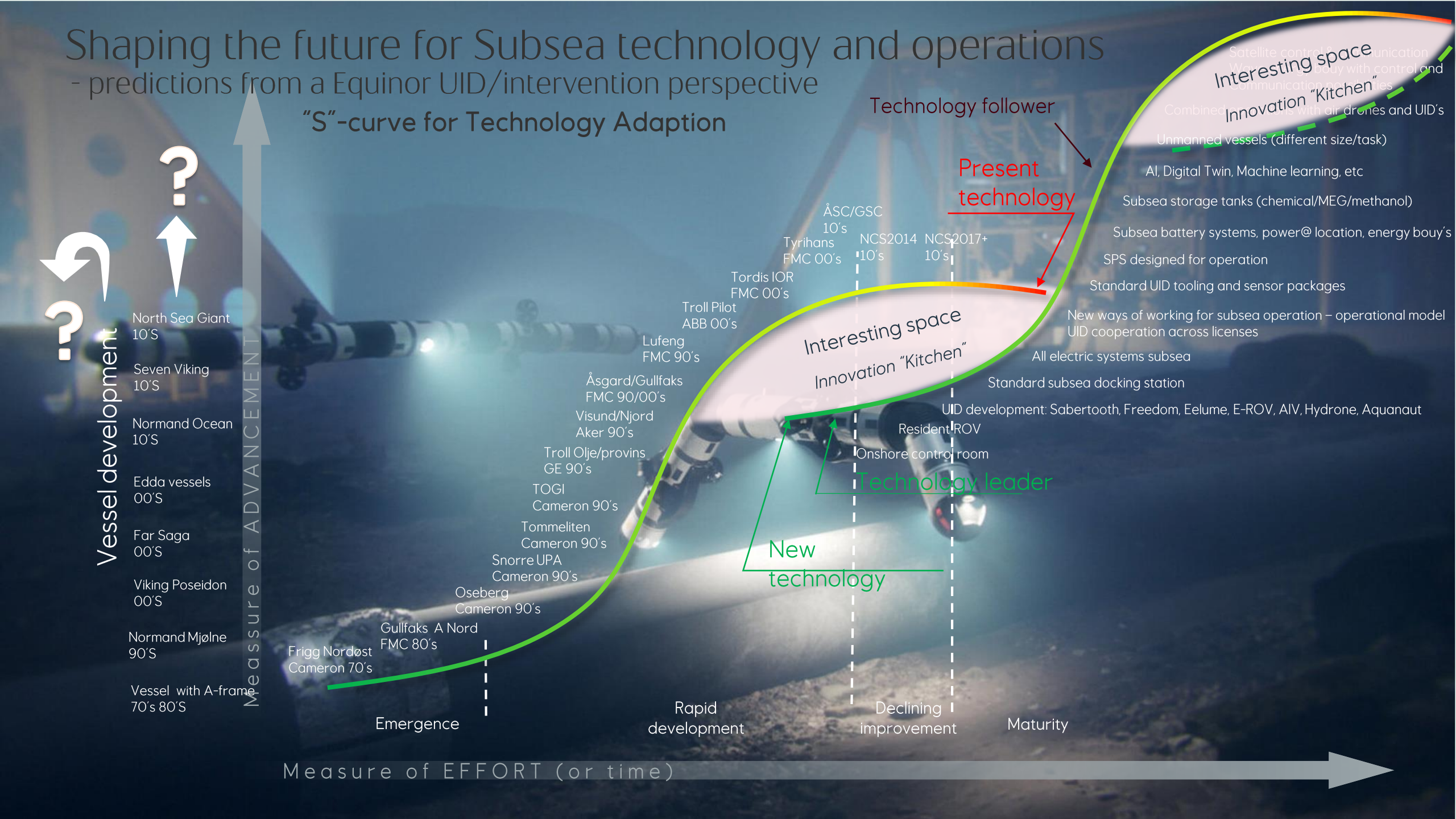
paso@equinor.com

Try to look into the "Crystal Ball"

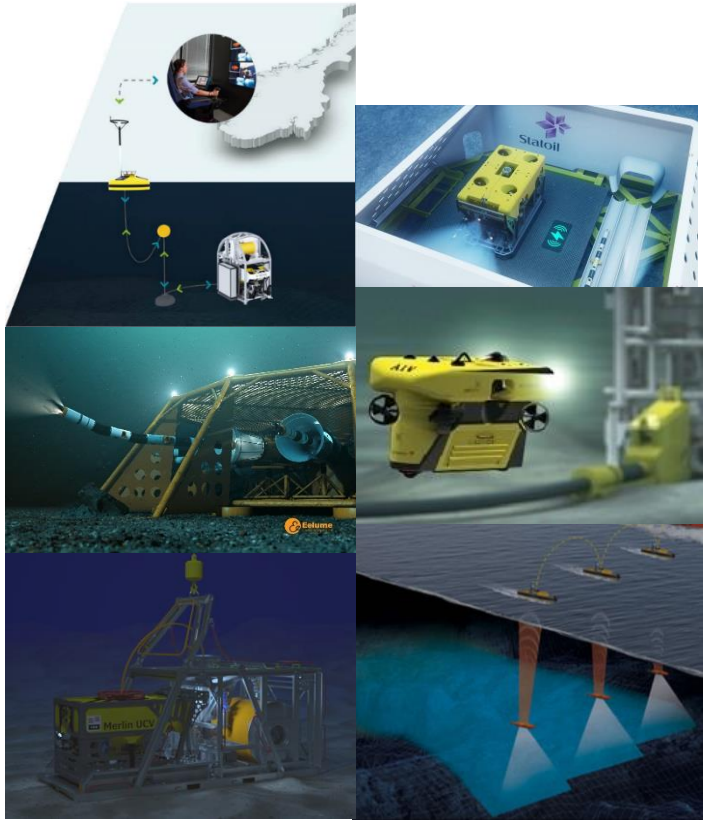
Future development from a UID/ intervention perspective

Shaping the future for Subsea technology and operations

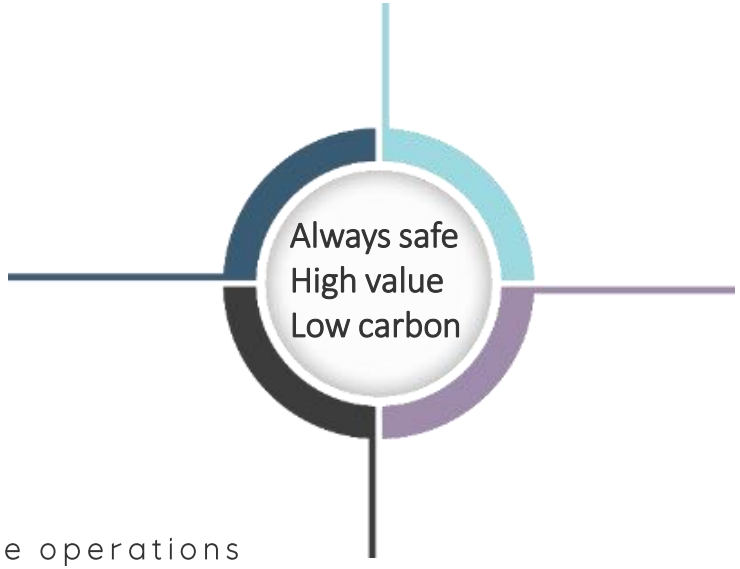
- predictions from a Equinor UID/intervention perspective



UID - Operator Business Case



- **Always safe**
  - Reduce human exposure
  - Simplify procedures
  - Online response
- **High value**
  - Reduce need for specialized vessels
  - Reduce operating cost: onshore remote operations
  - Increase Production Efficiency (PE)
  - Increase usage of installed infrastructure
  - Profitable field development in remote areas
- **Low carbon**
  - Reduce CO_2 emission
  - Improve environmental and condition surveillance



The robots and drones will make our

work easier

The future is robotised, automated and connected

This is especially true for the everyday repetitive tasks and high-risk operations. Autonomous assets keep our people safe and reduce our carbon footprint - freeing up the time and creativity of our workforce to develop better and bolder energy solutions.

Global operations networks are established to optimise performance by connecting operations, knowledge and expertise.

Our solutions for energy production in the future will be lighter, more subsea and remotely controlled. This is not only much safer, but the emissions are close to half compared to conventional solutions.