

Subsea Control Down Under conference



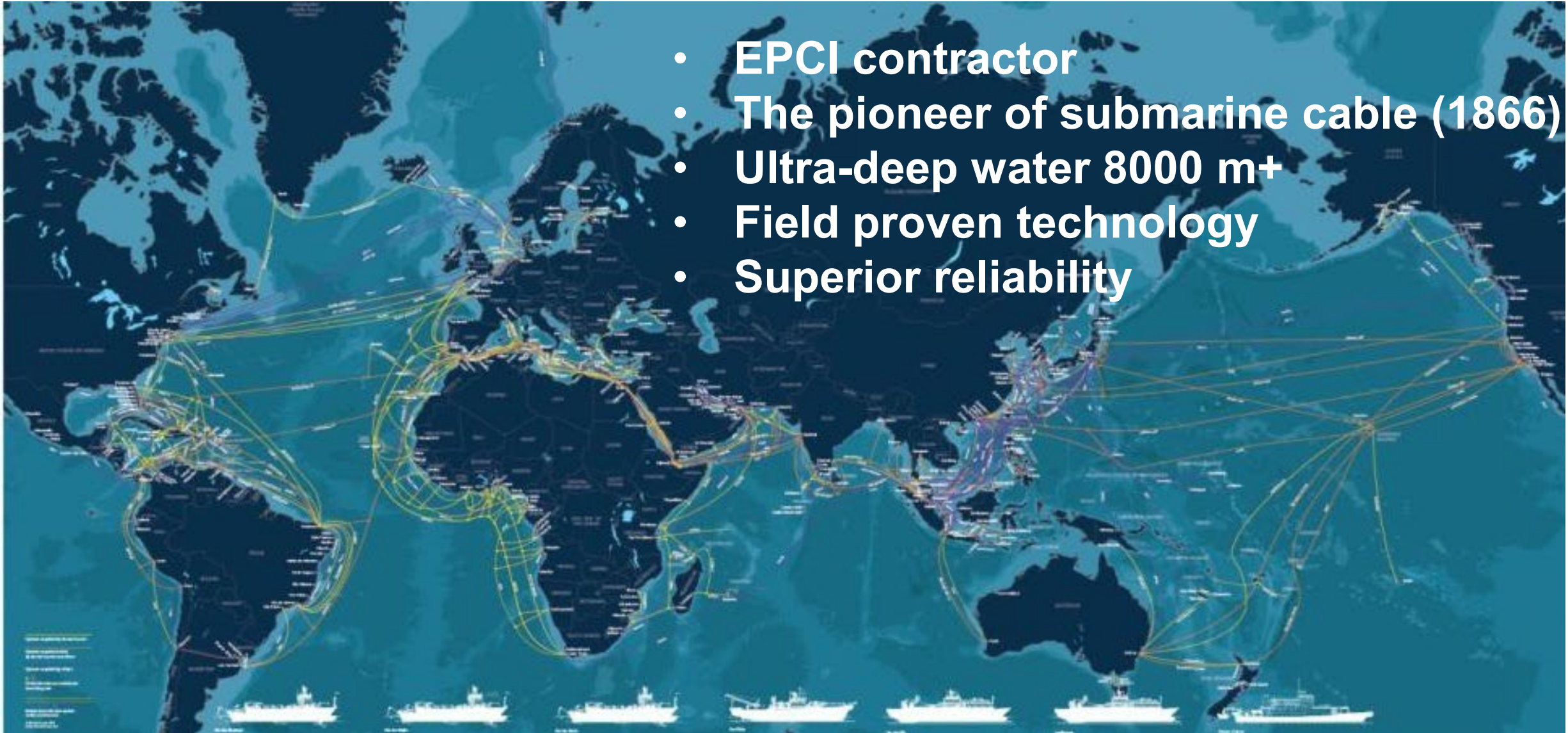
DC/FO: DC subsea control umbilical infrastructure

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26/10/2022

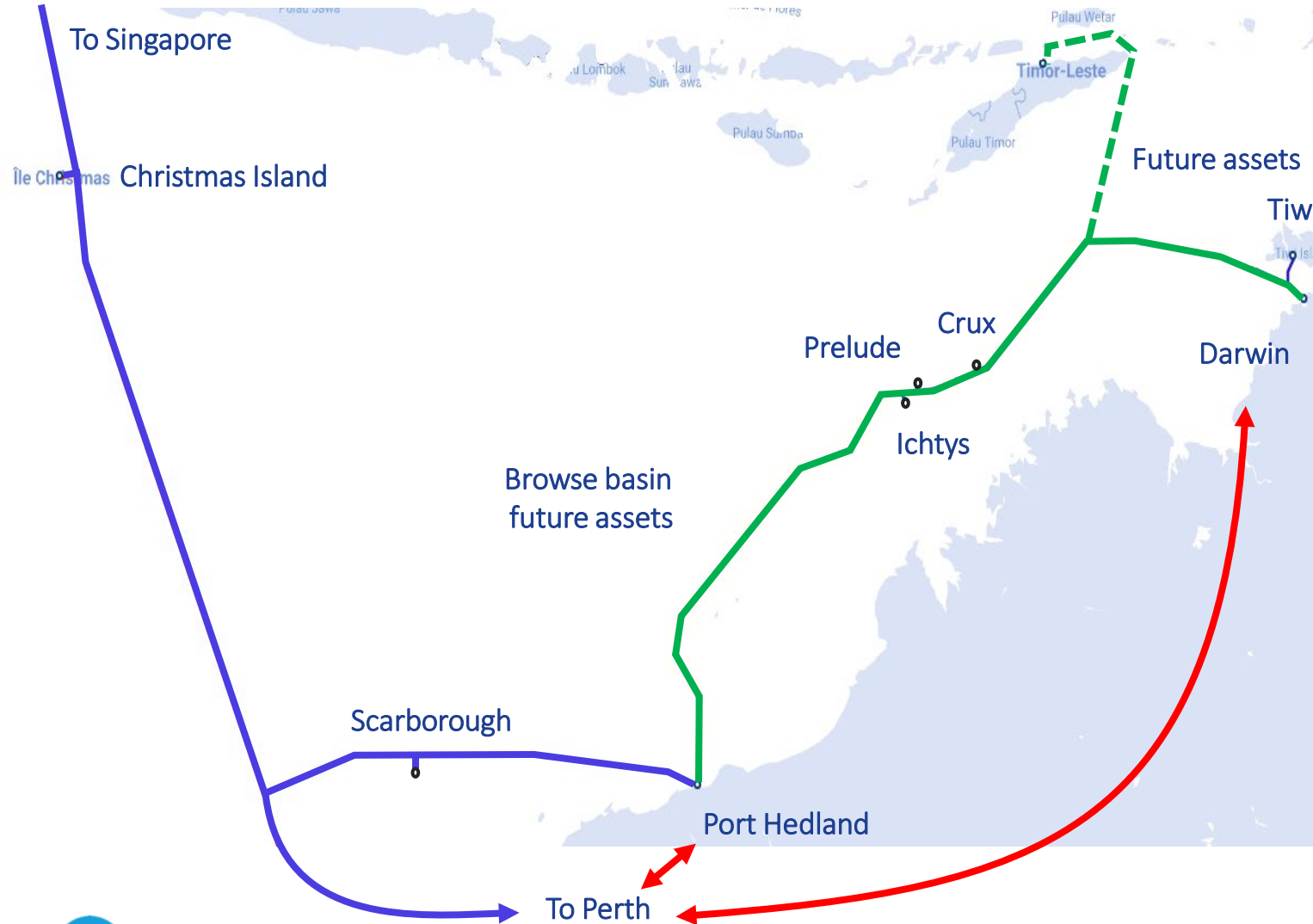
ALCATEL SUBMARINE NETWORKS

- **EPCI contractor**
- **The pioneer of submarine cable (1866)**
- **Ultra-deep water 8000 m+**
- **Field proven technology**
- **Superior reliability**



North West Shelf submarine fibre networks, built by ASN for **VOCUS**

<https://www.vocus.com.au/>



Fitzroy cable from Darwin to Port Hedland:

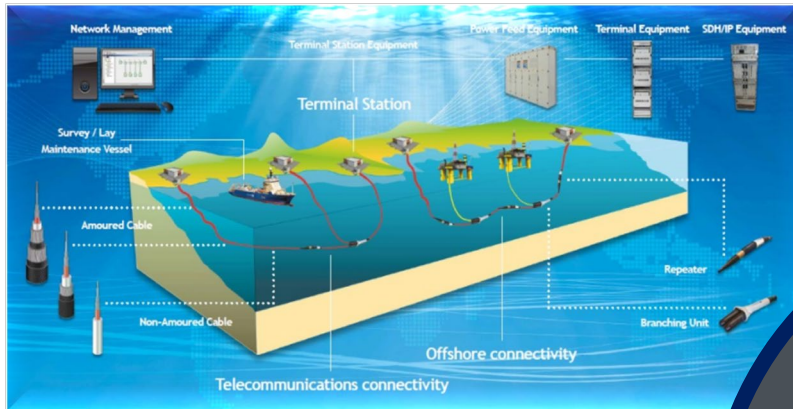
- Connecting to Prelude, Ichty, and potentially future other O&G assets in the area
- Being extended to Timor Leste

ASC cable from Perth to Singapore:

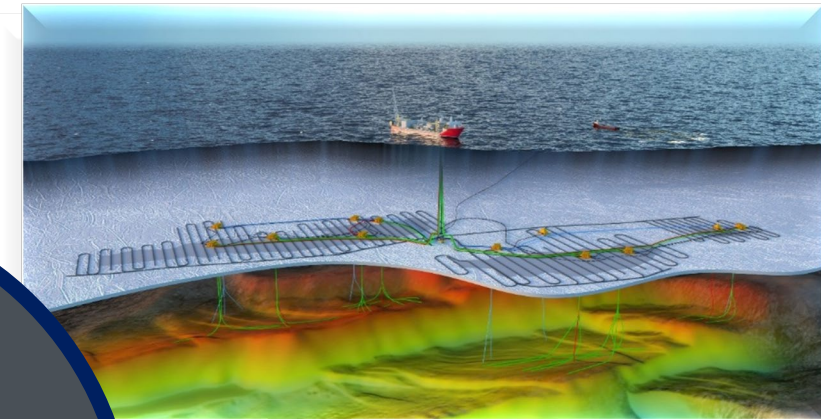
- Being branched to Port Hedland
- Connection to Scarborough

Open to connect future assets

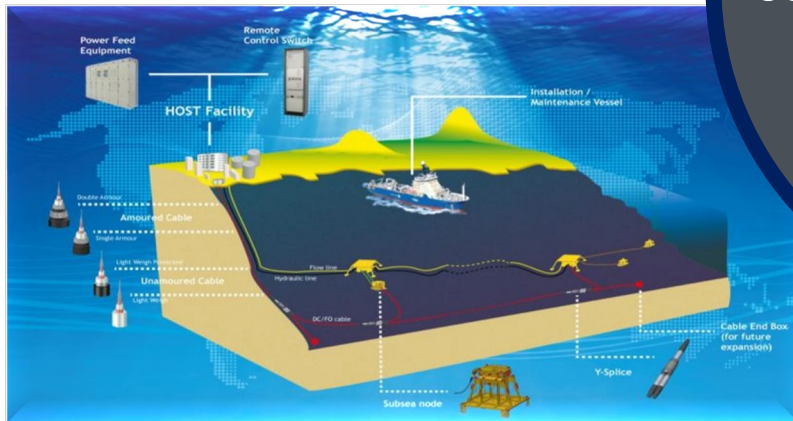
TECHNOLOGIES SUPPORTING OIL&GAS FIELD DIGITALISATION



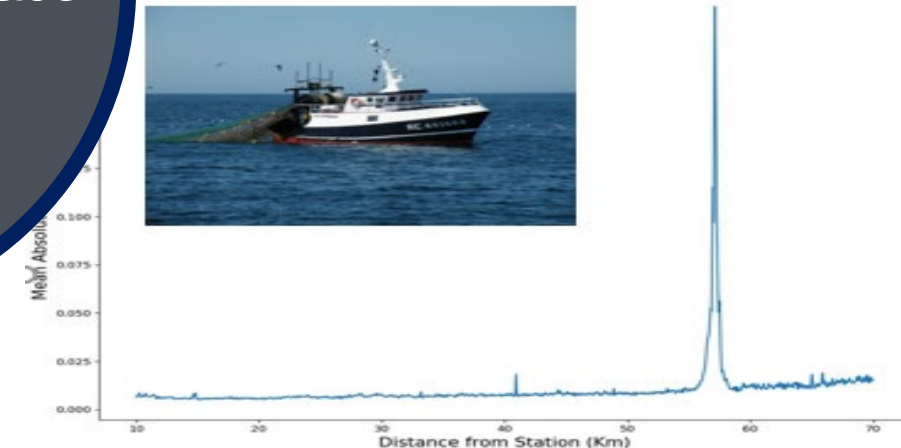
Platform Connectivity



PRM / 4D Seismic



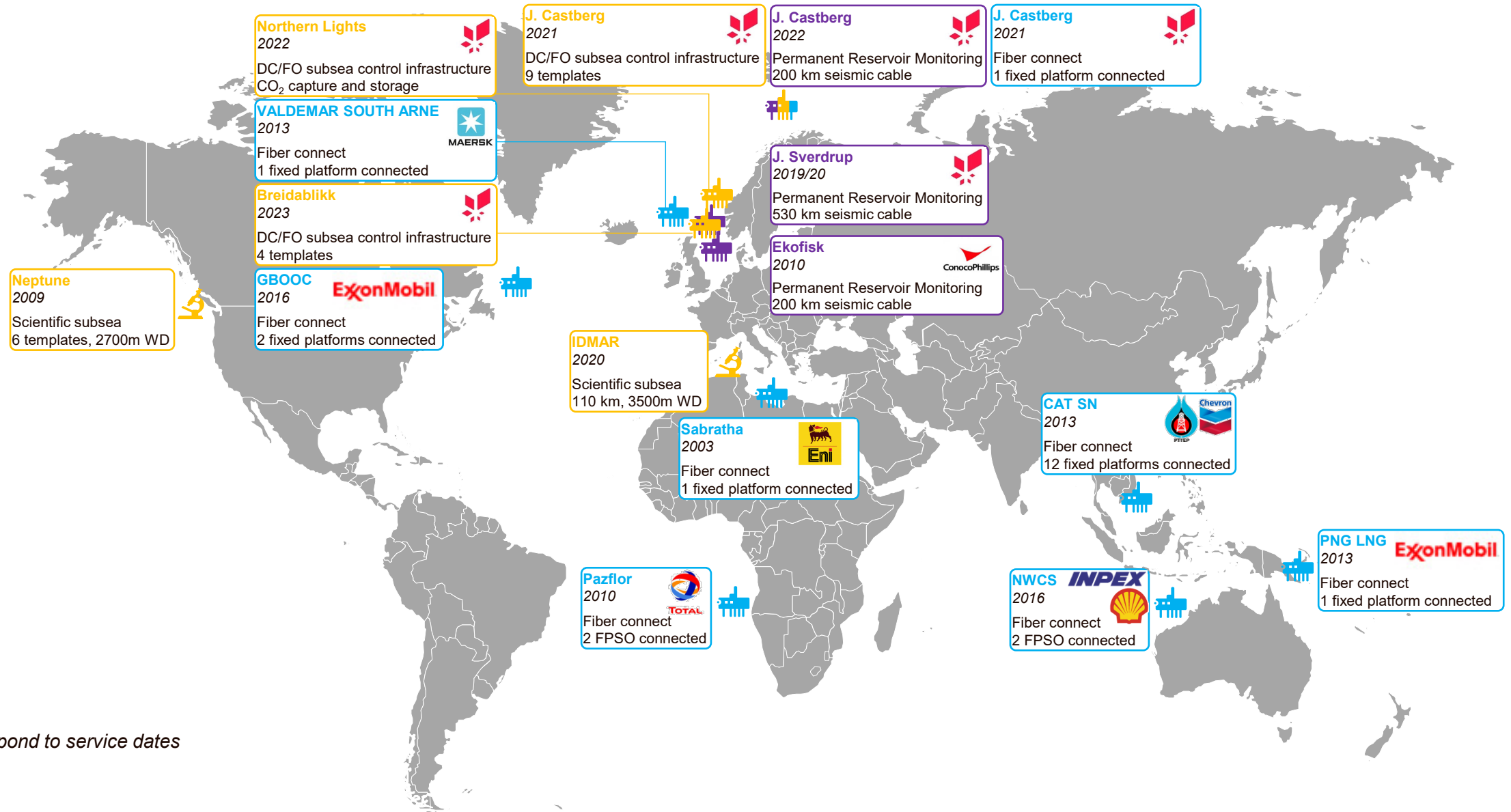
Subsea Control



Distributed Acoustic Sensing

Bridging telecom
subsea fiber expertise
to O&G

ASN's major Oil & Gas and scientific references

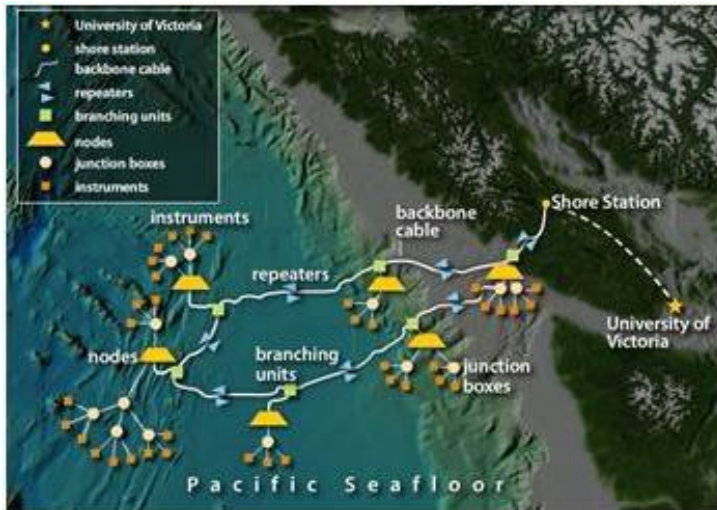


Dates correspond to service dates

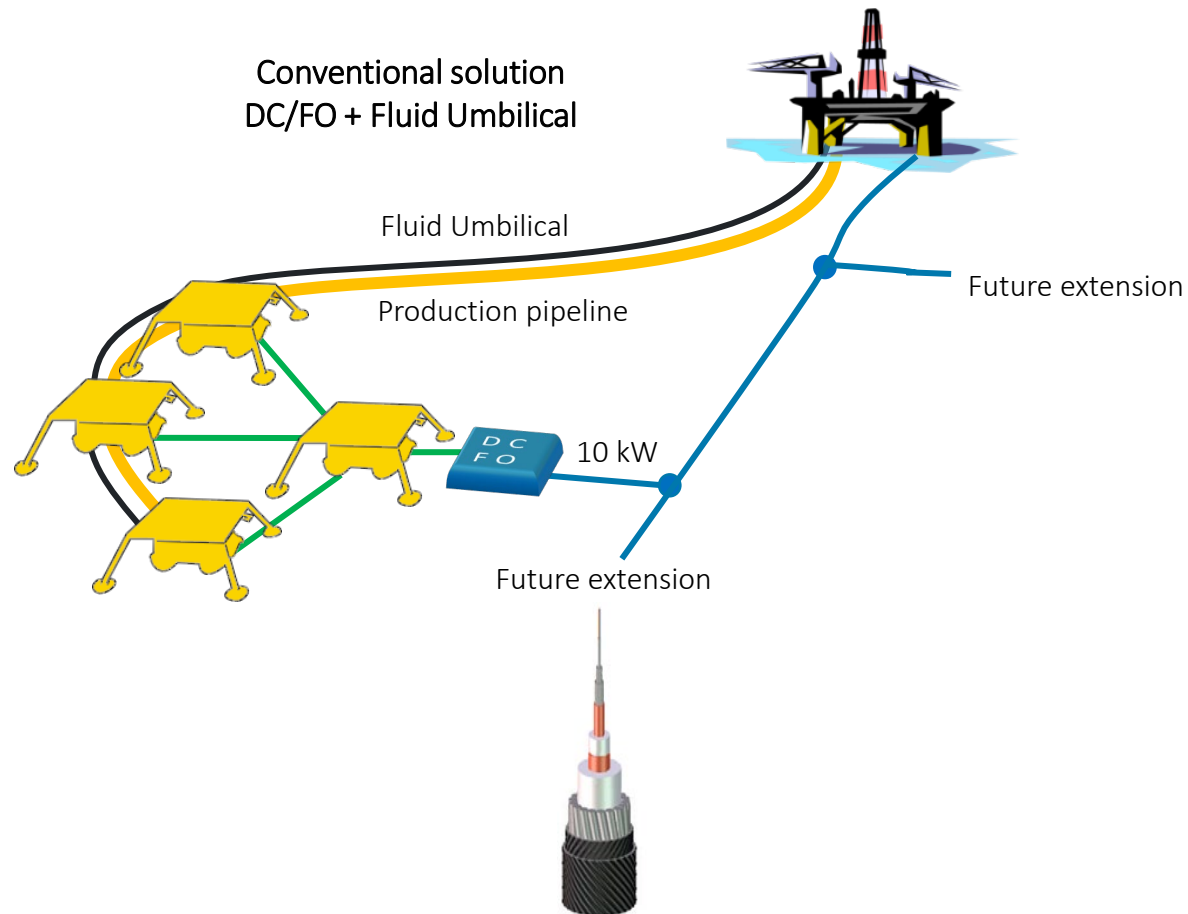
DC/FO IS SECOND GENERATION OF QUALIFIED SYSTEM (1ST GENERATION DEPLOYED IN 2009)

NEPTUNE CANADA (<http://www.oceannetworks.ca/>):

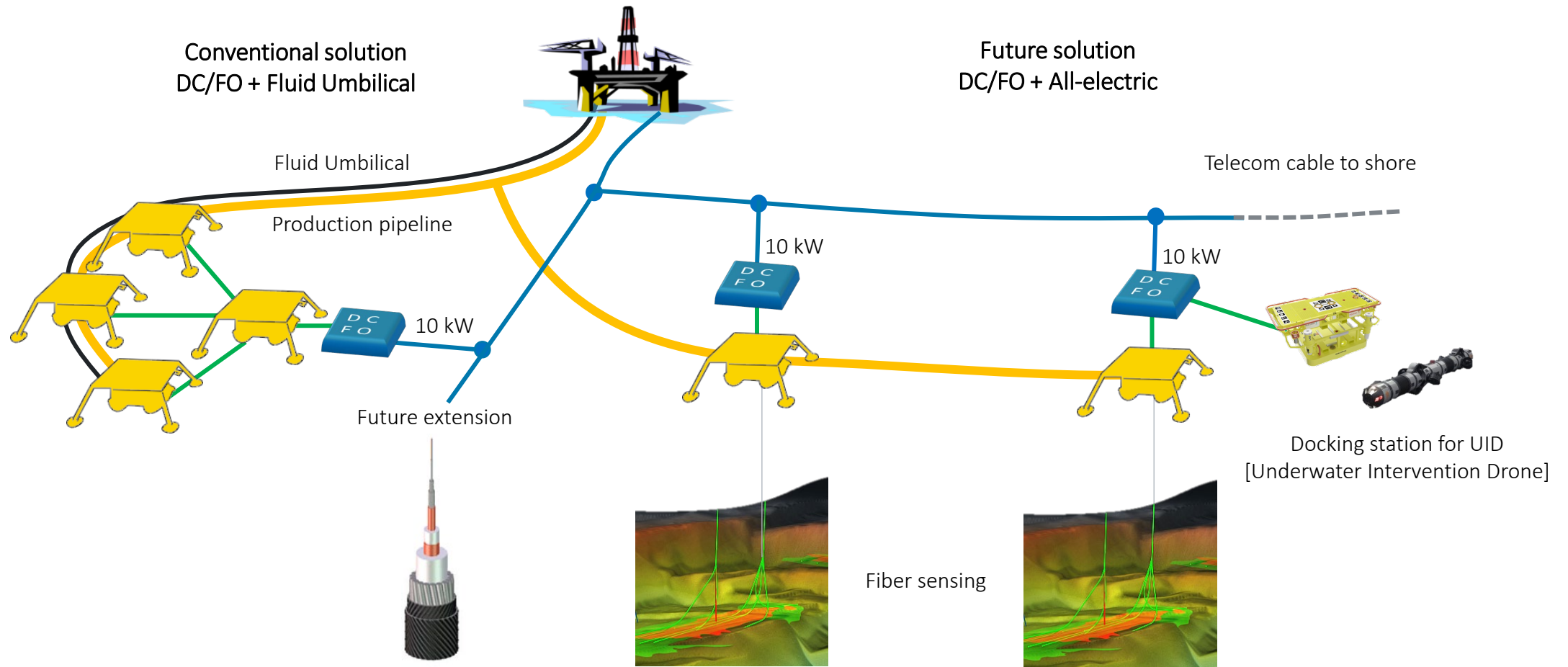
- 800 km subsea cabled infrastructure at water depth up to 2700 m with 5 subsea nodes supplying subsea power and communication connection points toward scientific equipment (1GbE optical fiber and 400V DC interfaces)
- Cabled infrastructure powered from shore through 10kV DC on trunk, with 10kW maximum power supply capability per subsea node



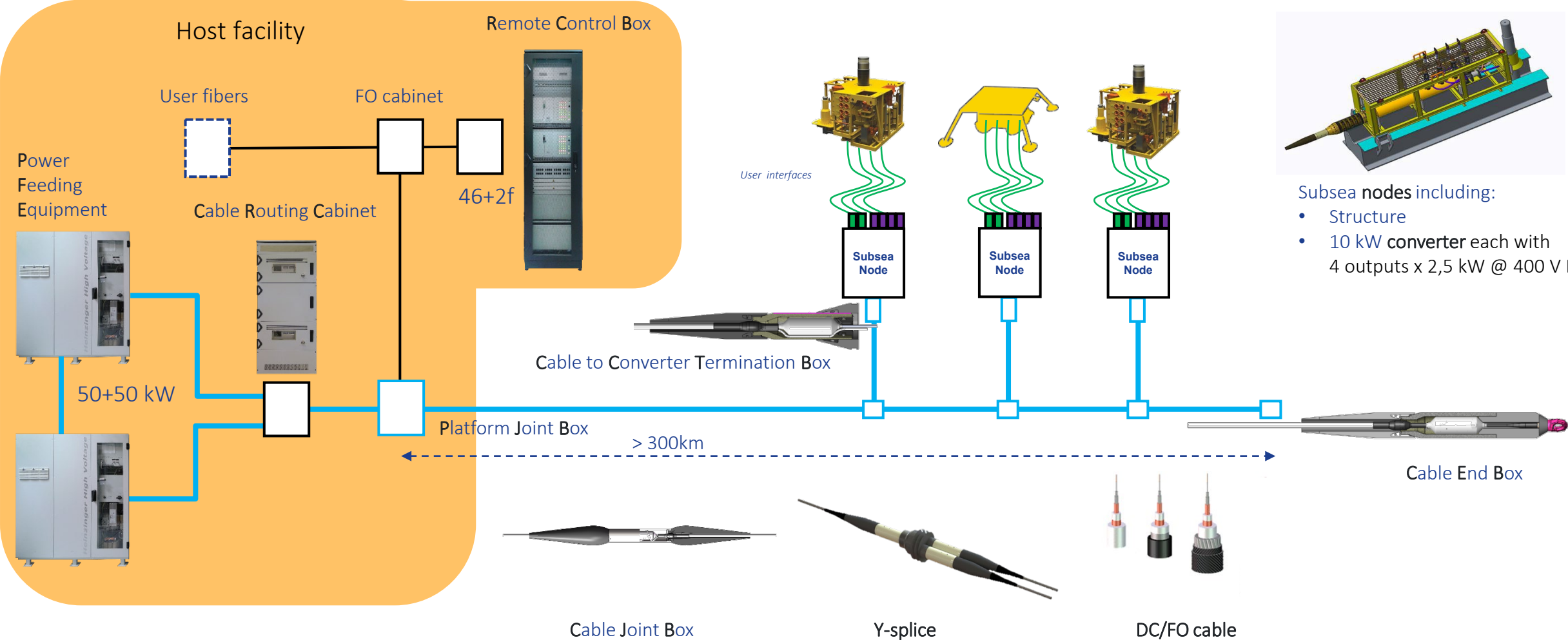
DC/FO™ SUBSEA CONTROL INFRASTRUCTURE



DC/FO™ SUBSEA CONTROL INFRASTRUCTURE

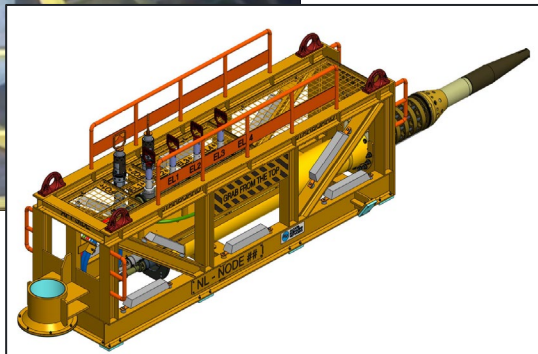
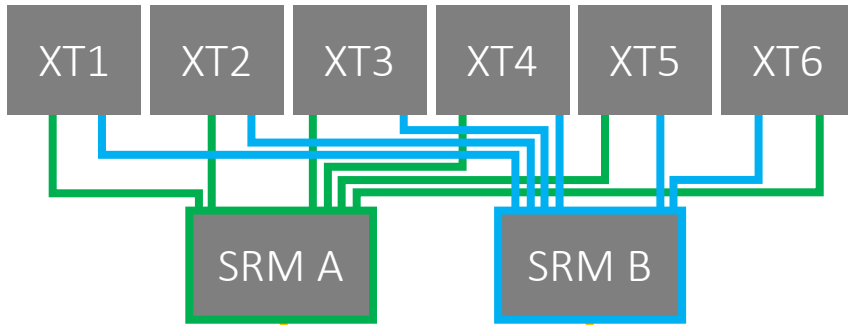


DC/FO TECHNOLOGY OVERVIEW - BUILDING BLOCKS



DC/FO node or DC/FO manifold

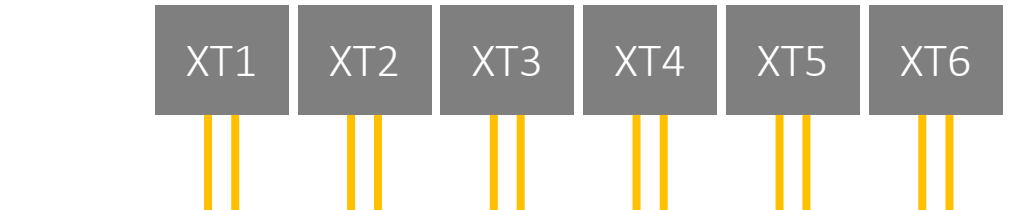
DC/FO node serving SRM/CDU



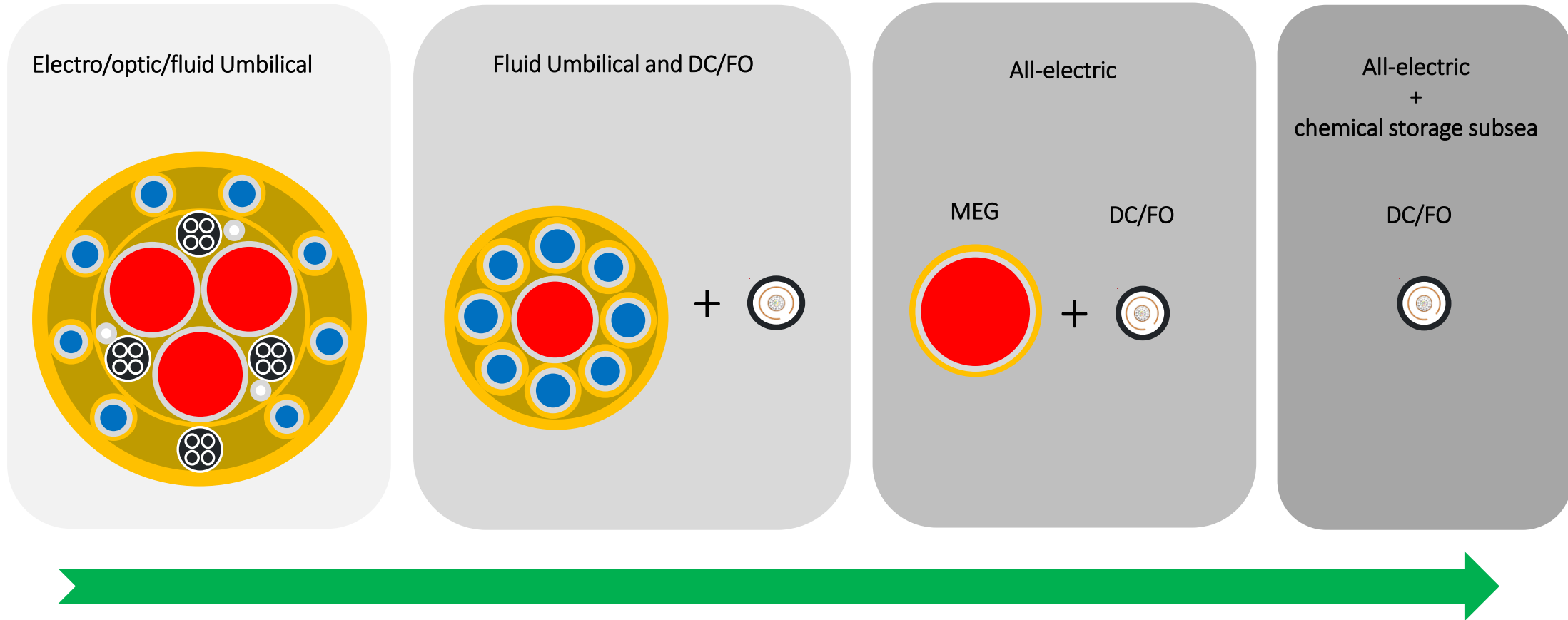
4 x 2,5 kW ↔ 16 x 2,5 kW
2 x FO ↔ 16 x FO

DC/FO hub as a manifold

Fiber sensing to the XT + Saving the SRM/CDU



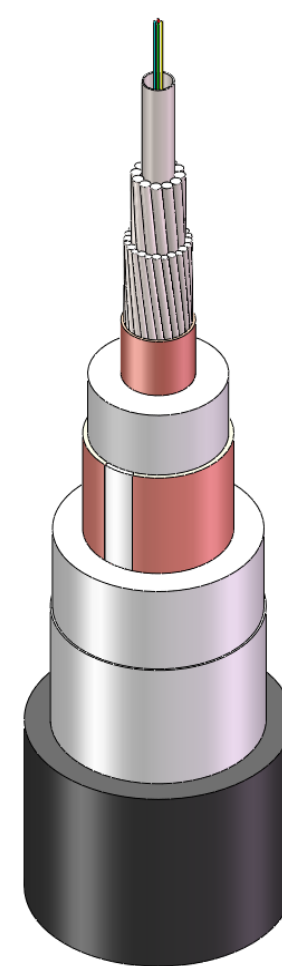
DC/FO TECHNOLOGY = A LEANER SOLUTION DOWNSIZING UMBILICAL



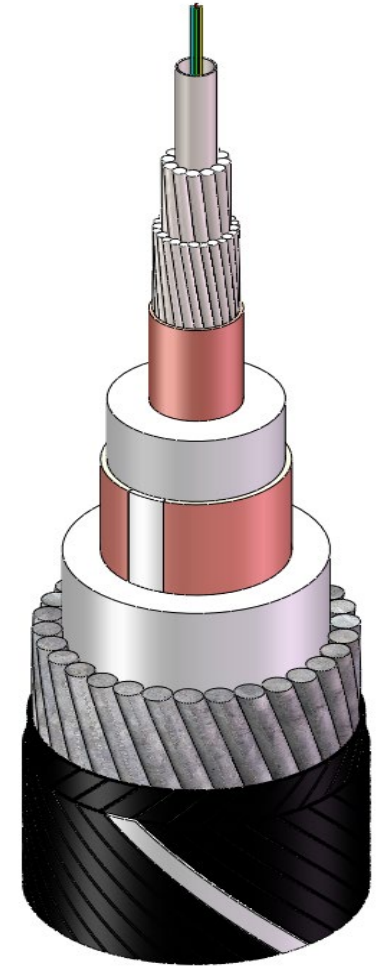
EQUINOR'S requirement for DC/FO Technology

Technical

1. Increased step-out distance.
2. Increased control system power.
3. Independent operation and failure mode of each node and low voltage outlet.
4. Earth fault tolerant.
5. Standardised solution and interfaces, verified system suppliers (4 off).
6. Compatible with existing and future technologies (e.g. UIDs, fibre sensing and all-electric). can be daisy-chained (connected in series).
7. Simplified repairs or upgrades where winter seasons can be utilized.
8. The power part of the DC/FO cable may also be used for some emergency power purposes.



Light Weight Protected
(LWP)



Single Armored
(SA)

DC/FO Technology advantages

Commercial

1. Reduced CAPEX and OPEX plus increased availability (verification needed in each project).
2. Simplified tie-back of new prospects without pre-investments in cables.
3. Simplified implementation of UIDs without pre-investments in cables.
4. Reduced use of J-tubes, riser slots (smaller turret) and reduced topsides footprint.
5. Simplified static umbilical distribution (less umbilical length) since more subsea structures can be daisy-chained (connected in series).
6. Simplified control system / umbilical design and deliveries.
7. Introduction of Telecom vessels



Ile de Bréhat

Ile de Batz

Ile de Sein

Ile d'Aix

Ile d'Ouessant

Ile de Molène

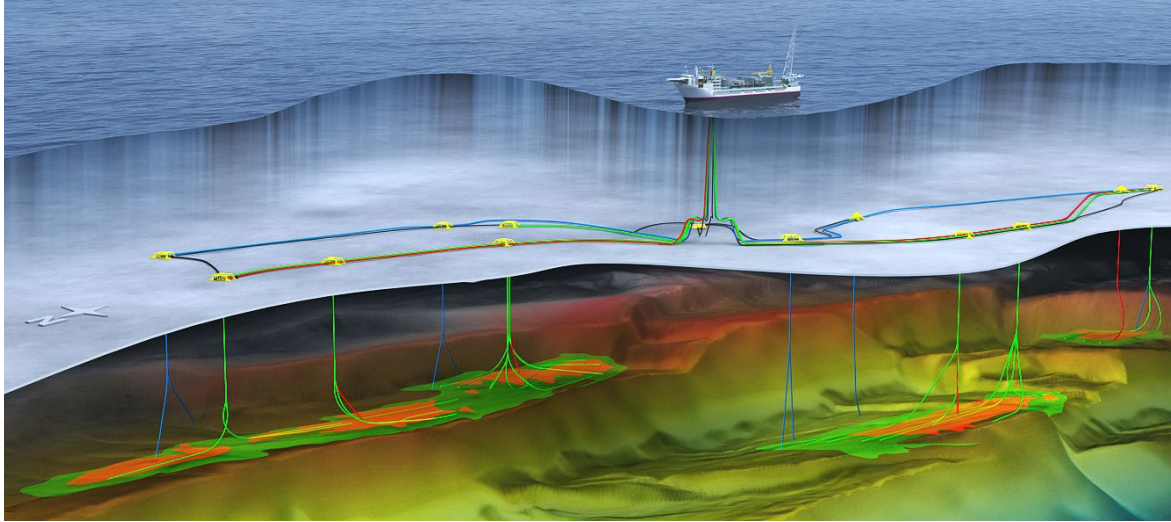
Ile d'Yeu

Installation vessels

Maintenance vessels



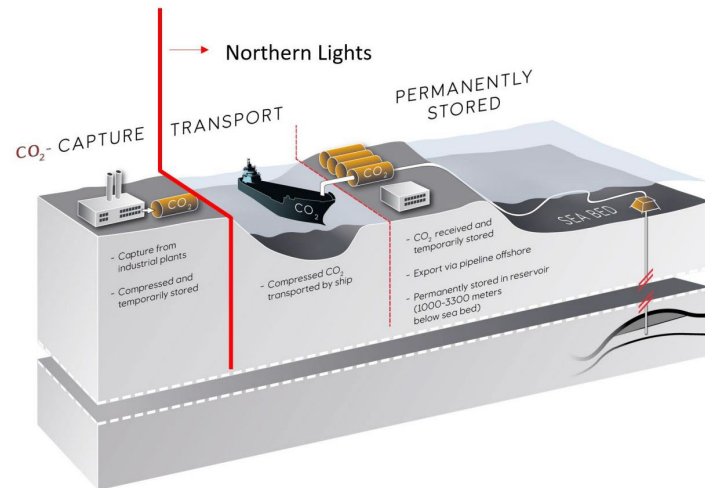
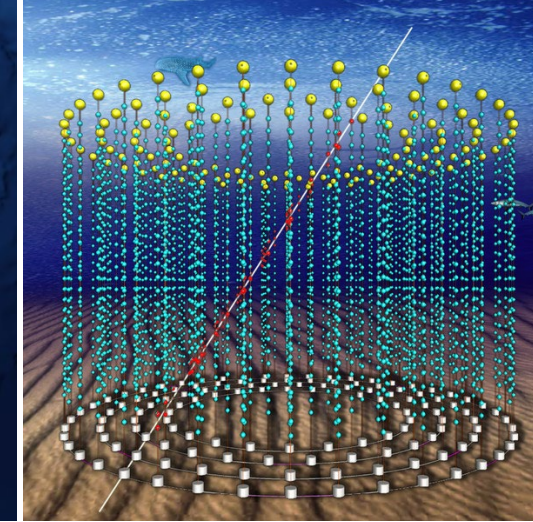
DC/FO CONTRACTS AWARDED TO ASN



Equinor J.Castberg: 9 converters, 50 km cable
+ 300 km FOC to shore + 4D PRM seismic array

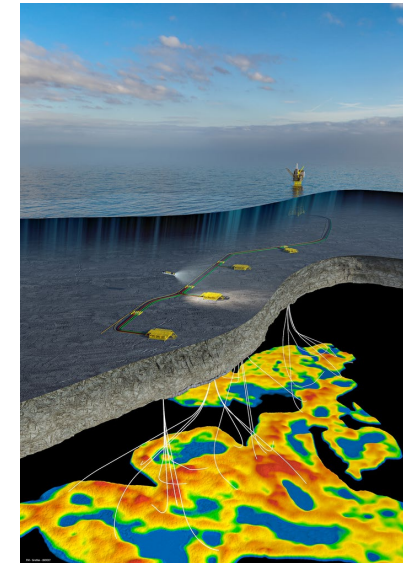


INFN IDMAR: 4 converters, 110 km cable, 3500m WD



Equinor Northern lights:

- CO₂ capture
- 2 converters
- 40 km cable
- Potential expansion



Equinor Breidablikk:

- 4 converters
- 20 km cable

DAS – A technique for dynamic monitoring of strain distribution along an Optical Fibre

- Over 150 km range
- Superior sensitivity
- Superior long-range resolution

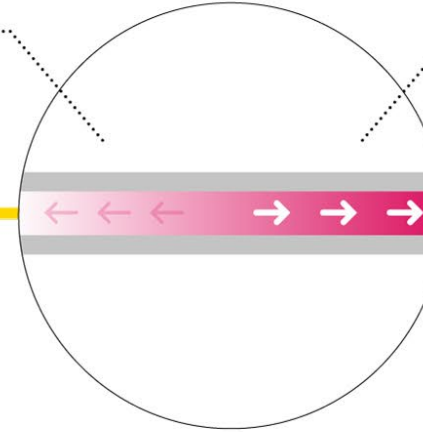
OptoDAS

Interrogator

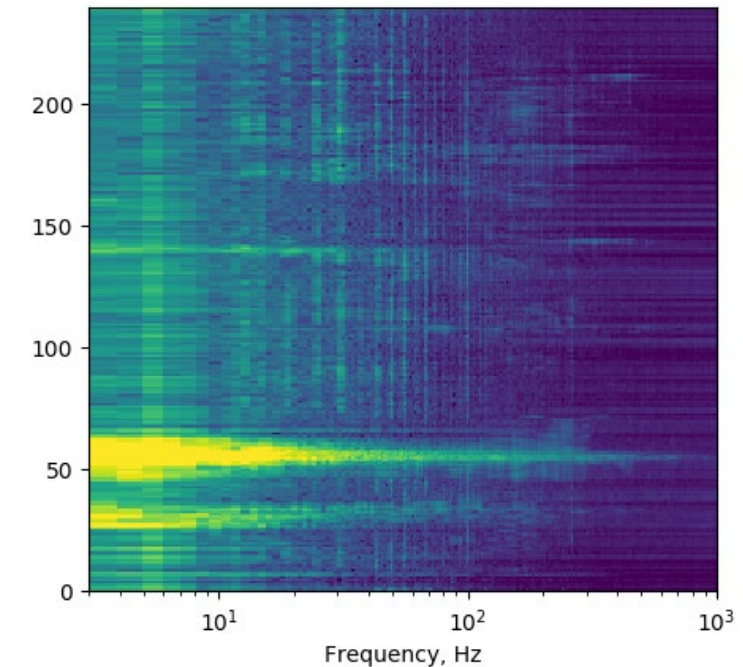
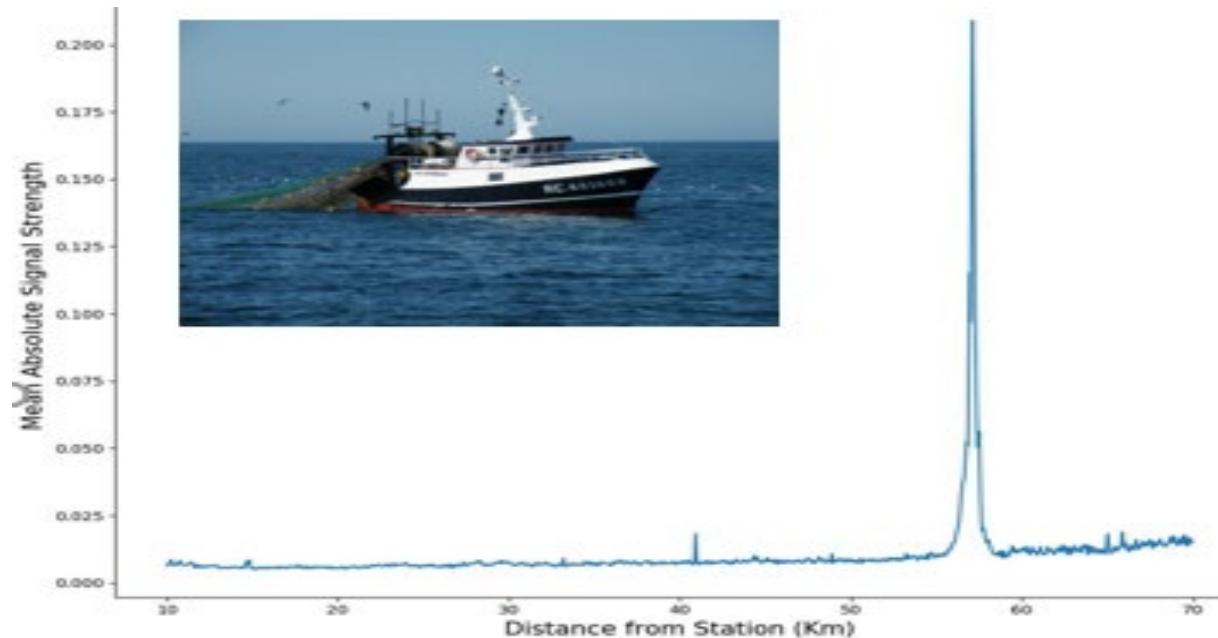


A very small part of the light is back-reflected to the interrogator

Optical fibre

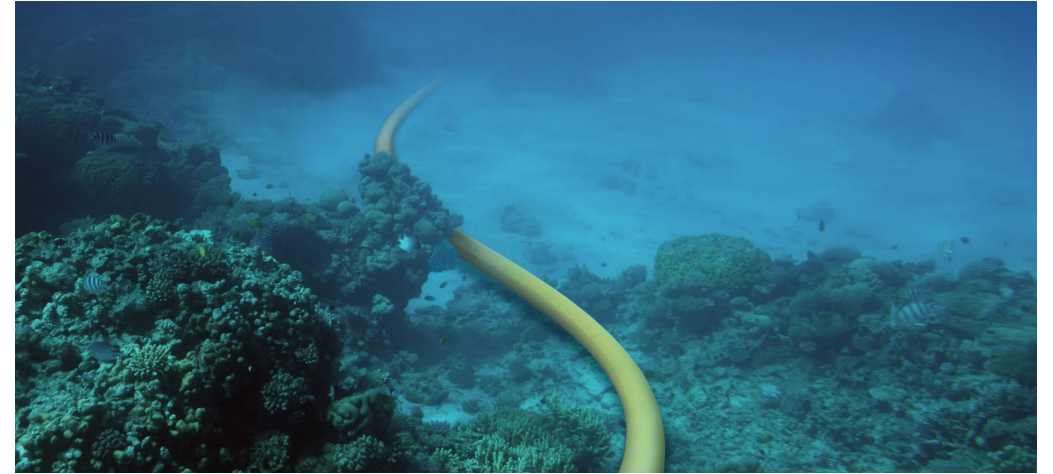


Laser light is launched into the fibre by the interrogator. When the light propagates along the fibre, it will be subjected to Rayleigh scattering



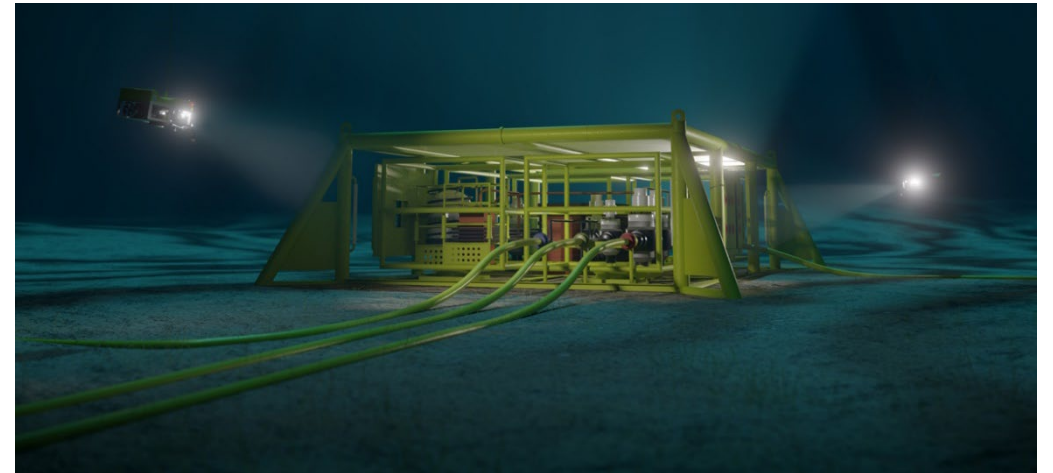
Submarine Cable Applications

- *Corridor protection (external and natural threats to telecom/power cables and pipelines)*
- *Condition monitoring (on-line monitoring of power cables)*
- *Scientific measurements (seismology and oceanography)*



Offshore Oil & Gas and Carbon Storage Applications

- *In well monitoring – flow characterization, well integrity and seismic*
- *Seabed monitoring – seismic reservoir and overburden monitoring, seabed infra-structure health monitoring,*



Submarine Cable Threat Monitoring

- *Continuous monitoring of seafloor activity along cable*
- *Positioning of anchors and fishing equipment impacting and moving seafloor up to 3 km range*
- *High sensitivity to objects in physical contact with exposed cable*
- *Surveillance of natural and anthropogenic activity in the ocean space, e.g. marine life, vessel activity, explosions*
- *22 months continuous monitoring of North Sea Telecom cable*
- *Integration of DAS and AIS for asset protection*
- *Real-time surface and sub-surface information as web service*



Onshore supervision
Standardization

Carbon capture

Capex reduction

All Subsea

Increased Oil Recovery

Long tie back
monitoring

SAFETY

All Electric

DIGITAL

OPEX reduction

Un-manned

Contact details at UTC conference:



Alcatel Submarine Networks

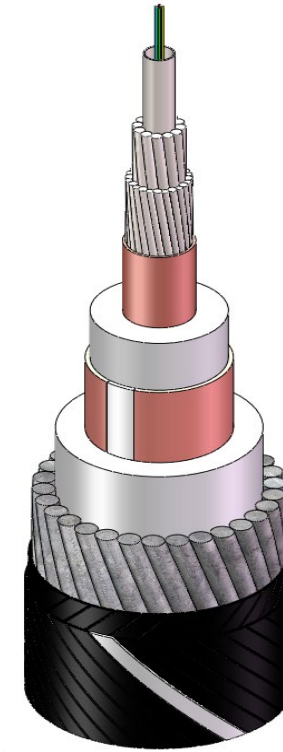


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