

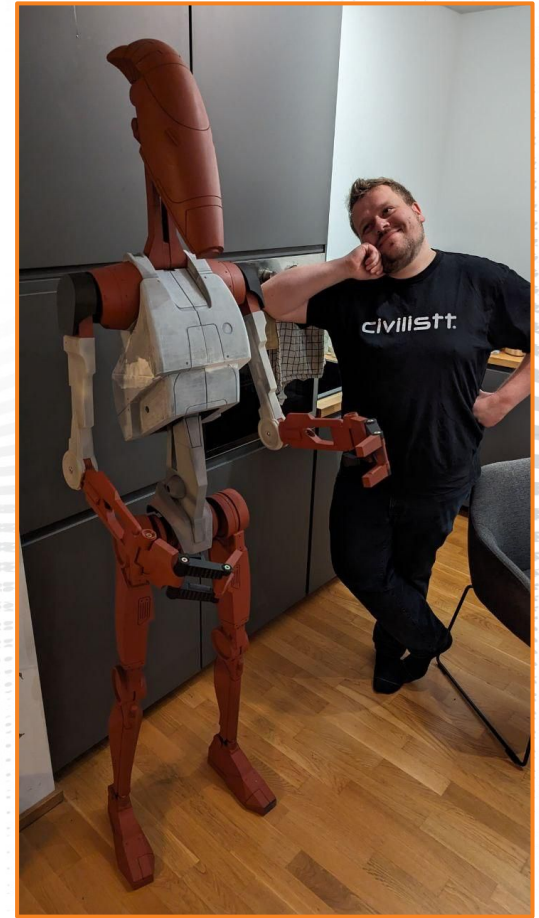
# **Submarine Cables - Lifelines of countries and continents**

DENOG16, Berlin  
Moritz Frenzel

# Who am I?

## Moritz Frenzel

- Head of Globalways by Zayo Europe
- Vice Chairman @ DENOG e.V.
- Network Architect @ Stuttgart-IX
- 30 years old
- Love 3D-Printing
- Based in Munich



# Submarine Cables in Stuttgart?



# Zayo Europe: by the numbers

**2,3M**

Km of fibre  
across Europe

**17**

Metro markets

**5**

Owned strategic subsea  
cables

**2**

Rising Star Winner  
from across the world  
2023 & 2024

**400G**

fully enabled  
network

**589**

data centres  
connected

**7<sup>TH</sup>**

global ISP provider  
ranked

**CONNECTED BRITAIN**  
Sustainability award  
finalist 2023, B2B  
Service Provider of  
the Year finalist 2024.



# United Kingdom

# The Netherlands

Winterton-on-Sea

Lowestoft

Sizewell  
Aldeburgh

Callantsoog

IJmuiden  
Zandvoort

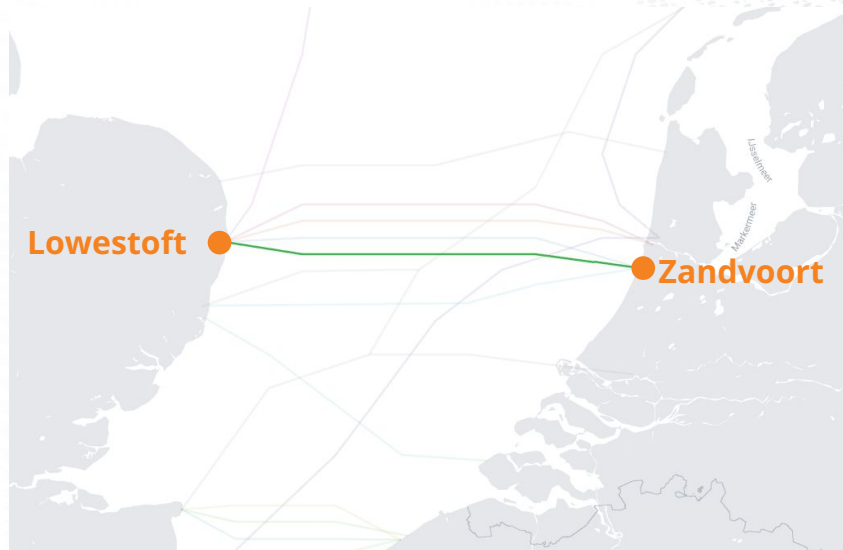
Rotterdam

Domburg



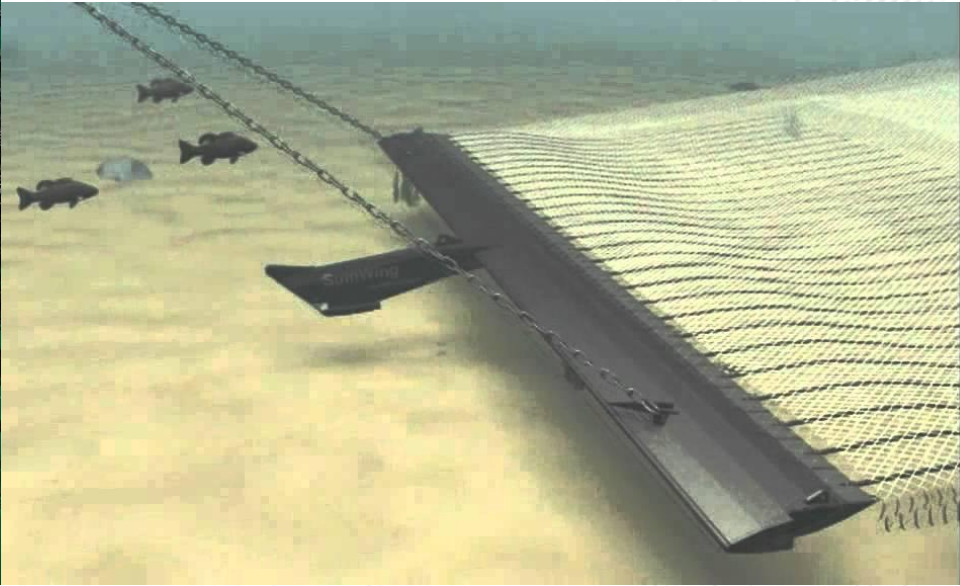
# Circe North

- Lowestoft, UK to Zandvoort, NL
- Completed in 1999
- 201km length
- 48 fiber count G.654 cable
- Historical burial depth of 0.9m
  - Tides exposed parts over the years
- multiple breaks over 25 years





# How do cables break?



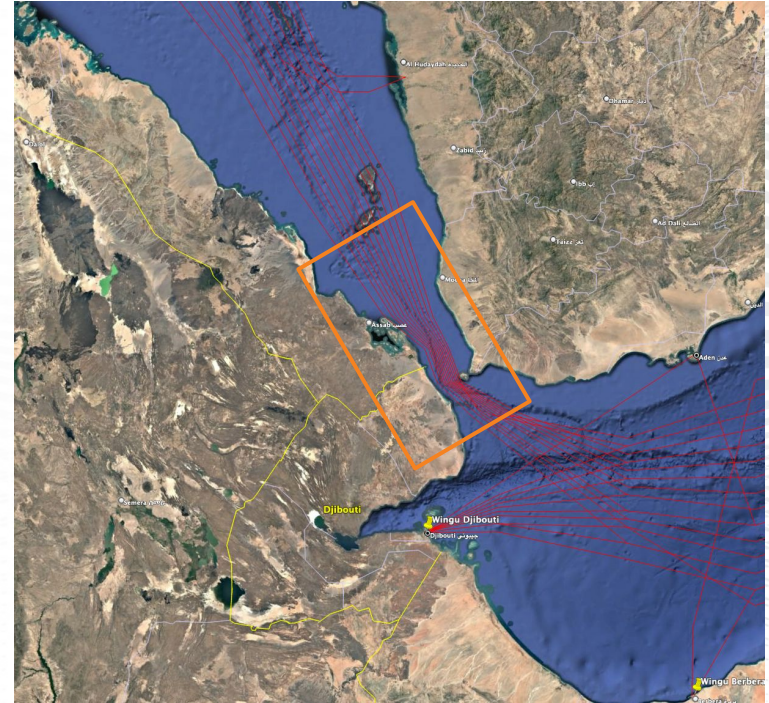
Cut of Circe North, 85 km from Zandvoort due to Trawler Damage



# How do cables break?



Damaged “Rubymar” drifting in the Bab-el-Mandeb Strait (Red Sea)



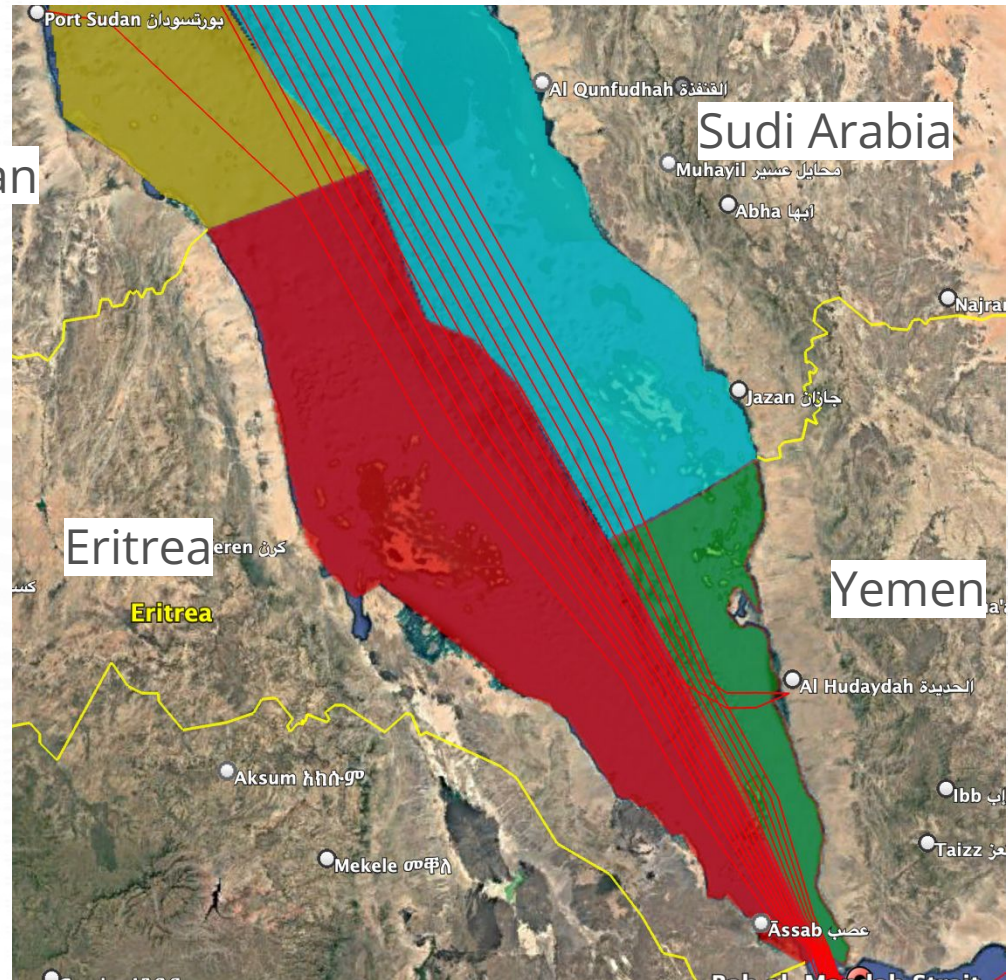


Sudan

Saudi Arabia

Eritrea

Yemen



# What if cables break?

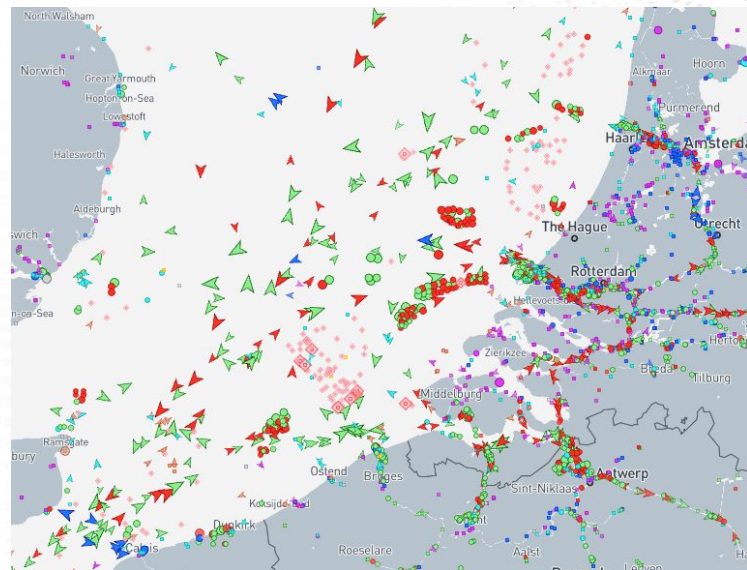
- Cable Ships must be dispatched to the location, which often times takes days or weeks
- Locating the fault and resurfacing the cable is no easy task and may be heavily impacted by severe weather causing additional delays
- There is no quicker option, however some cable systems have diverse paths and will switch to a different path on failure
- Cable ships are a limited resource, only 60-80 exist in the world



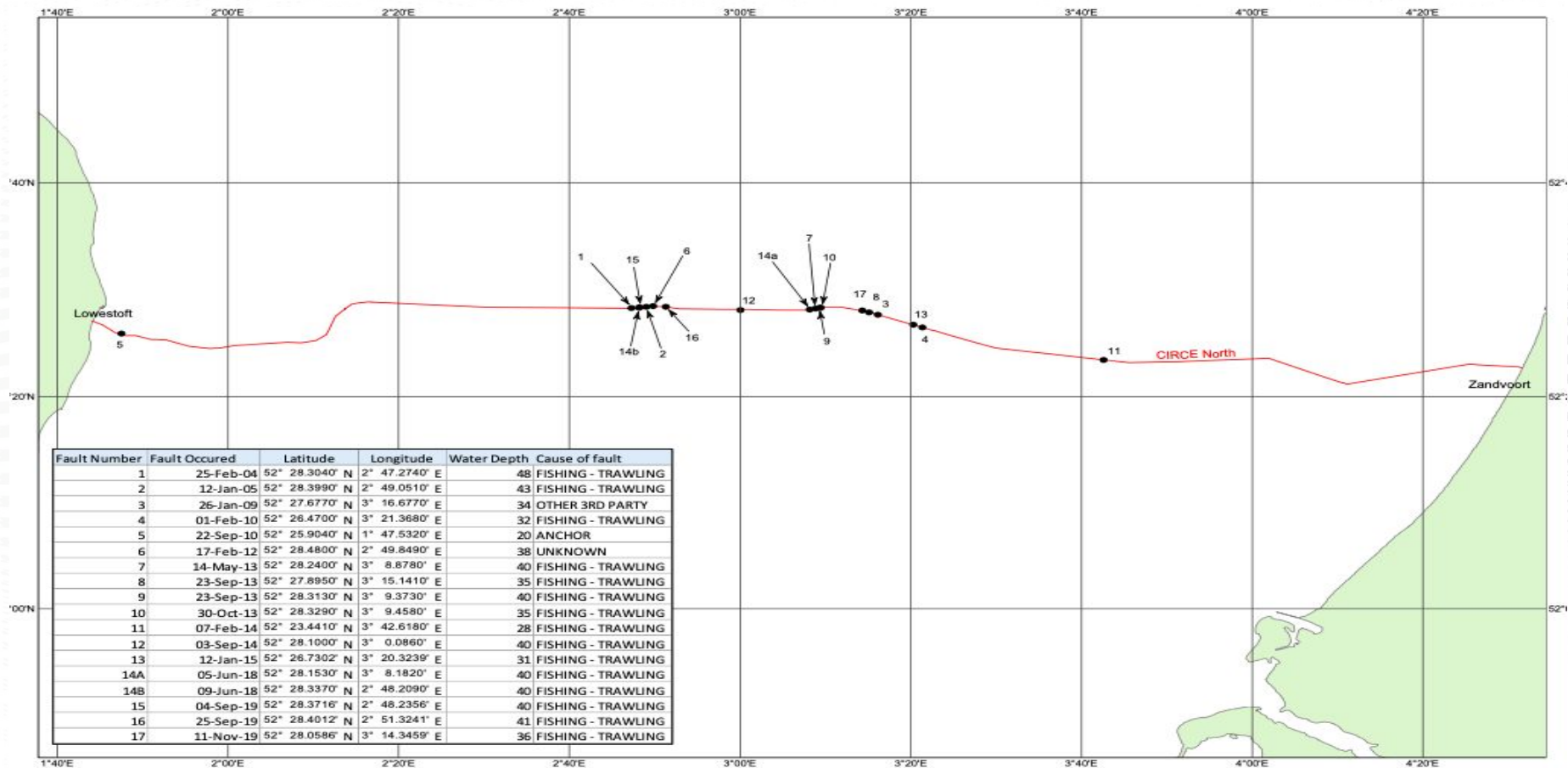


## Prevention mechanisms

- Ensure cables are plotted in all relevant maps, such as KIS-ORCA, and always up-to date
- Address relevant parties and raise awareness for the importance of submarine cables
- Port awareness visits to fishing fleets
- Track AIS Data and alert on unusual activity and proactively reach out to vessels closeby
- Guard Vessels







CIRCE North - Faults

Drawing Number 5433 rev-02 November 2019

# Introducing: Zeus

- Lowestoft, UK to Zandvoort, NL
- Completed in 2022
- 204km
- 192 fibre count mix of Corning Ultra and Corning ULL (ultra-low-loss)
  - Double armoured cable
  - Up to 2.65 Pbps (C-band) and 5.2 Pbps (C+L Band)
- Fully diverse from Circe North
- 2-3m burial depth (depending on area)
- No impacts



# Building a submarine Cable

## 1. Planning & Permitting



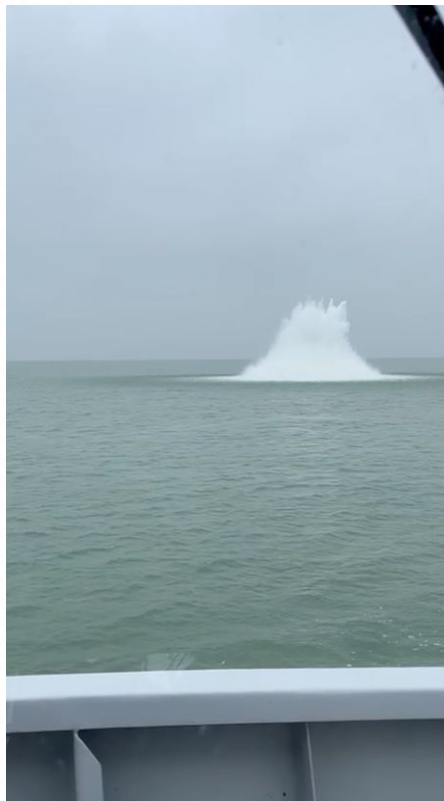
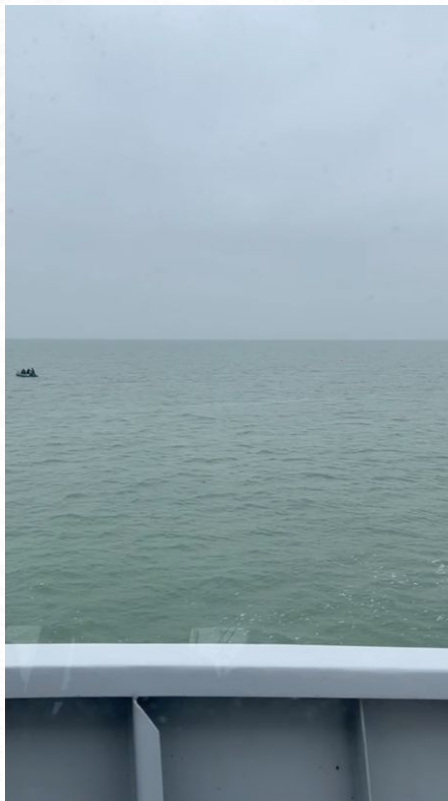
# Building a submarine Cable

## 1. Planning & Permitting

## 2. Surveying









# Building

## 1. Plann

## 2. Surve

## SPORT

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### Dutch Grand Prix: Zandvoort to stage first Formula 1 race since 1985

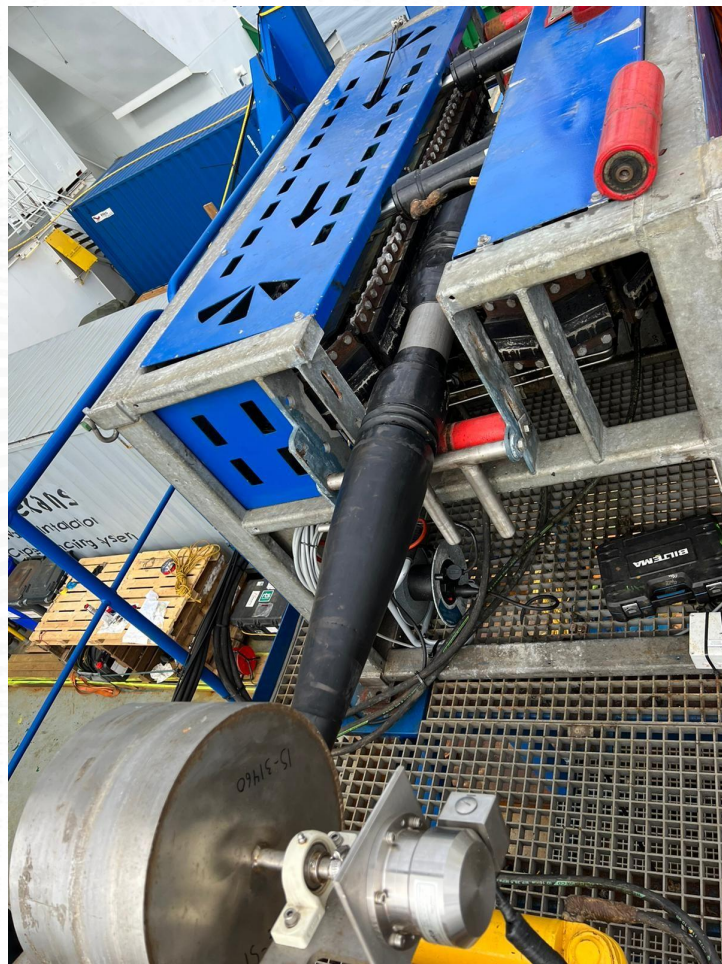
🕒 14 May 2019 | [Formula 1](#) |



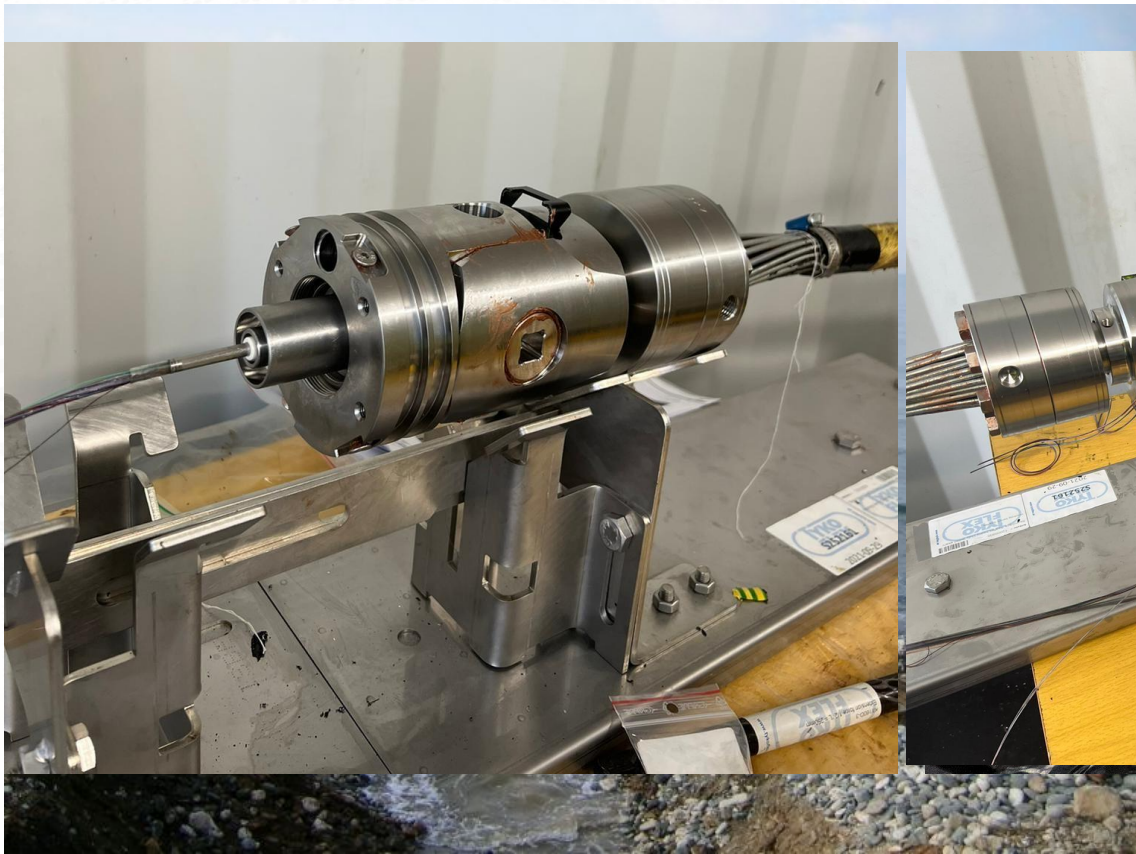
# Building a submarine Cable

1. Planning & Permitting
2. Surveying
3. Building











# What else is out there?

- For simplicity, we only looked at unamplified cables in this presentation
- Longer cables (above c. 240km) require repeaters
- Repeaters are spaced every 50 - 80km
- Repeaters require power and are fed with 10kV or more from the shoreside
- Branching Units (Y-Splitters) may be placed in the seabed to split a cables routes offshore
- Wait for the next talk on other cool stuff that's possible below the sea

# Conclusions

- Submarine cables form the backbone of our internet ecosystem
- Despite being at the seabed, cables aren't safe from their surroundings
- If you're in the market for a connectivity on a submarine route
  - Verify that the carrier of your choosing understands the risks associated and implements safeguards for your system
  - Choose fully diverse cable systems
  - Understand failure scenarios and your providers countermeasures
- Cables buried >2m are more likely to stay buried, thus offering long-lasting protection from the elements and third party damages.

# Further Questions?



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- **Peter Hessler**  
Network Architect
- **James O'Brien**  
Sales Director
- **Steven Caulfield**  
Business Development Director, Europe



**Thank You!**