Cinia NORDUnet
Nordic Gateway for Research & Education

Northern EU Gateways

Nordic NREN "Vision 2030"

Co-funded by the European Union

Erik-Jan Bos

About NORDUnet

NORDUnet
Nordic Gateway for Research & Education

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The NORDUnet Network

The European Nordics

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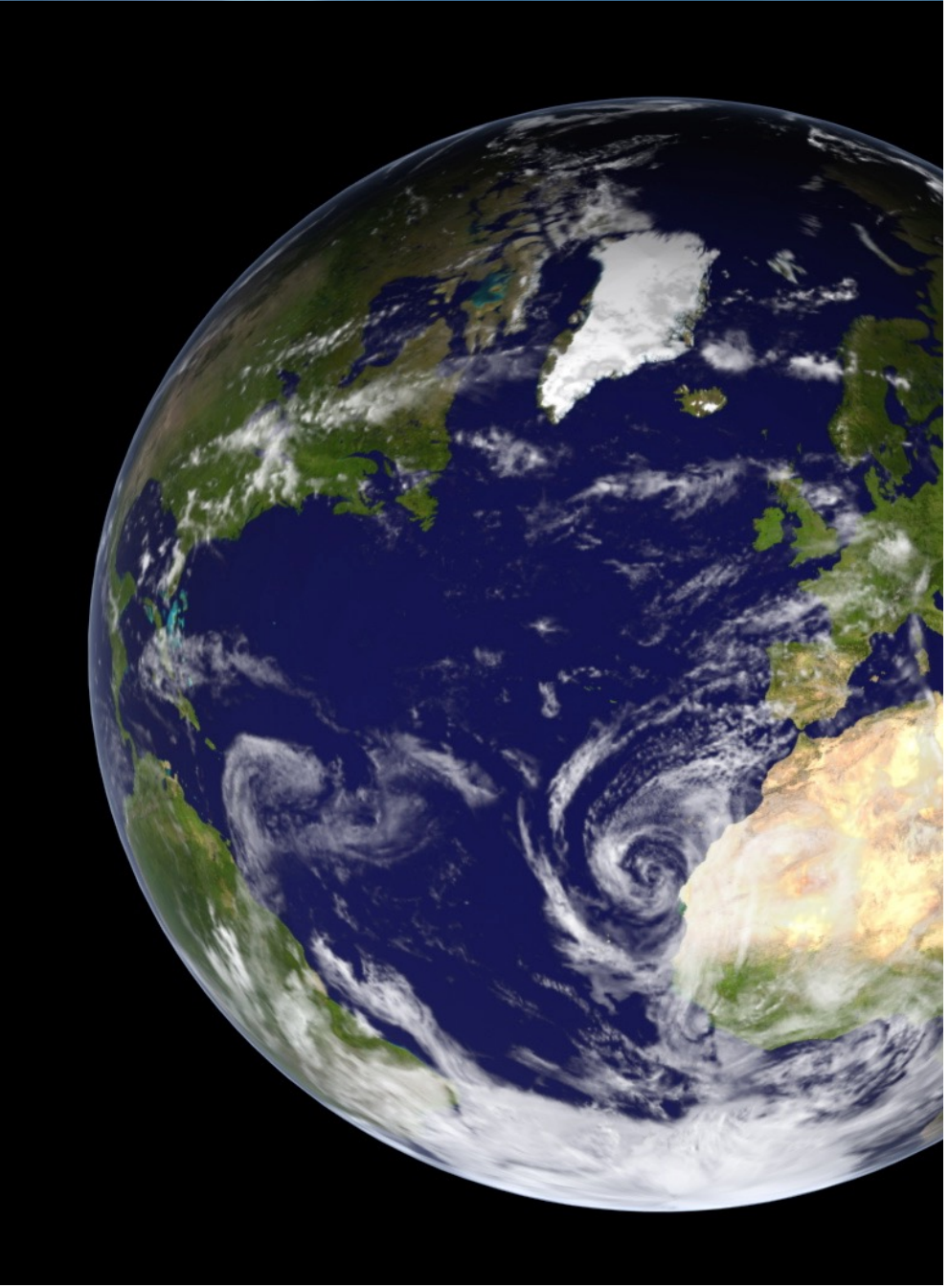
The European Nordics

Kingdom of Denmark	Republic of Finland	Republic of Iceland	Kingdom of Norway	Kingdom of Sweden
Copenhagen	Helsinki	Reykjavík	Oslo	Stockholm

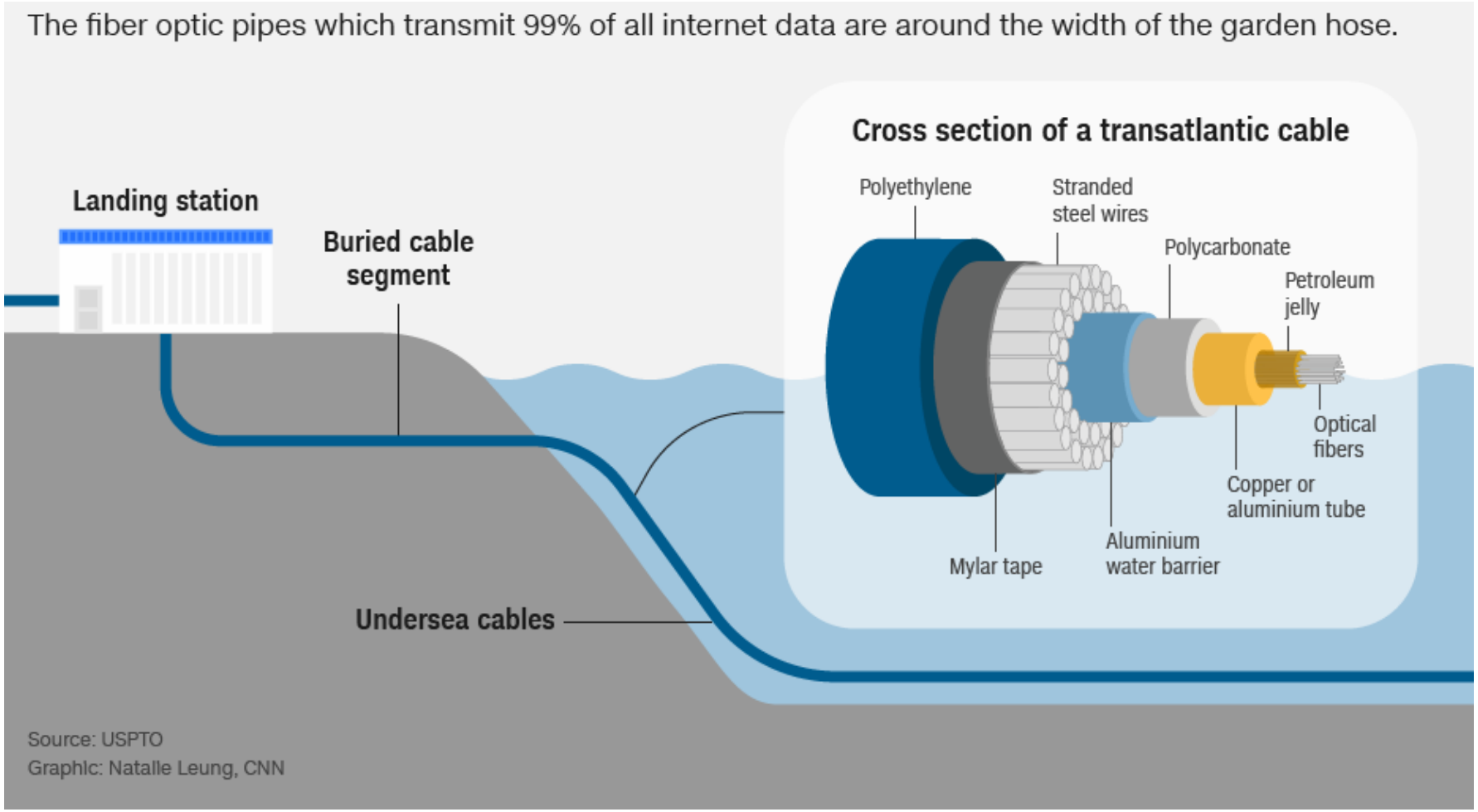
- Area: 6.1 million km^2 (2.4 million sq mi) [7th]
- Population: 27.6 million people (2021) [52nd]
- Nominal GDP: $ 1.8 trillion (2021) [10th]



Connectivity

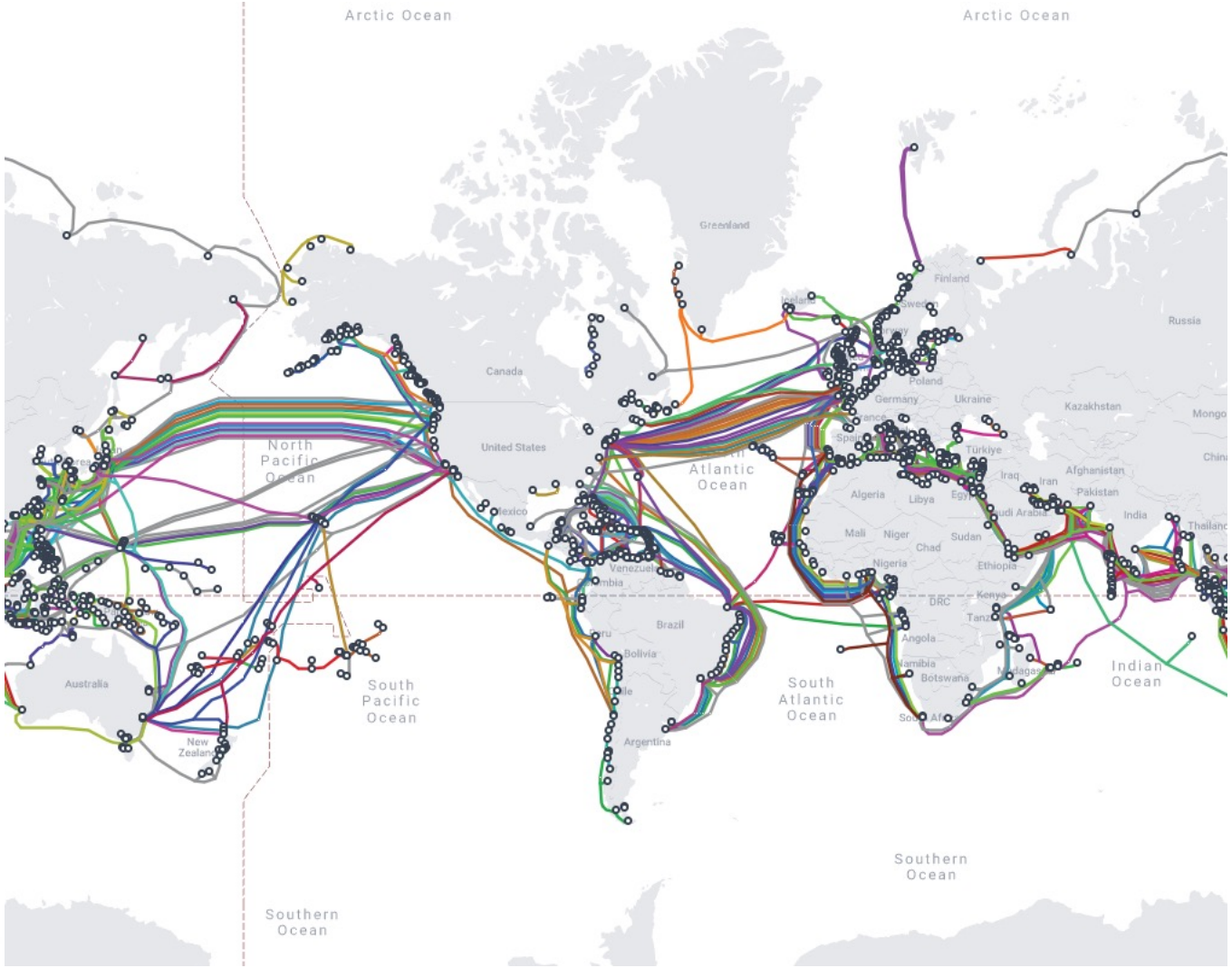
What is a submarine cable system?

Structure of a Submarine Cable System



Credit: USPTO & CNN

The World’s Submarine Cable Systems



Source:
https://www.submarinecablemap.com/

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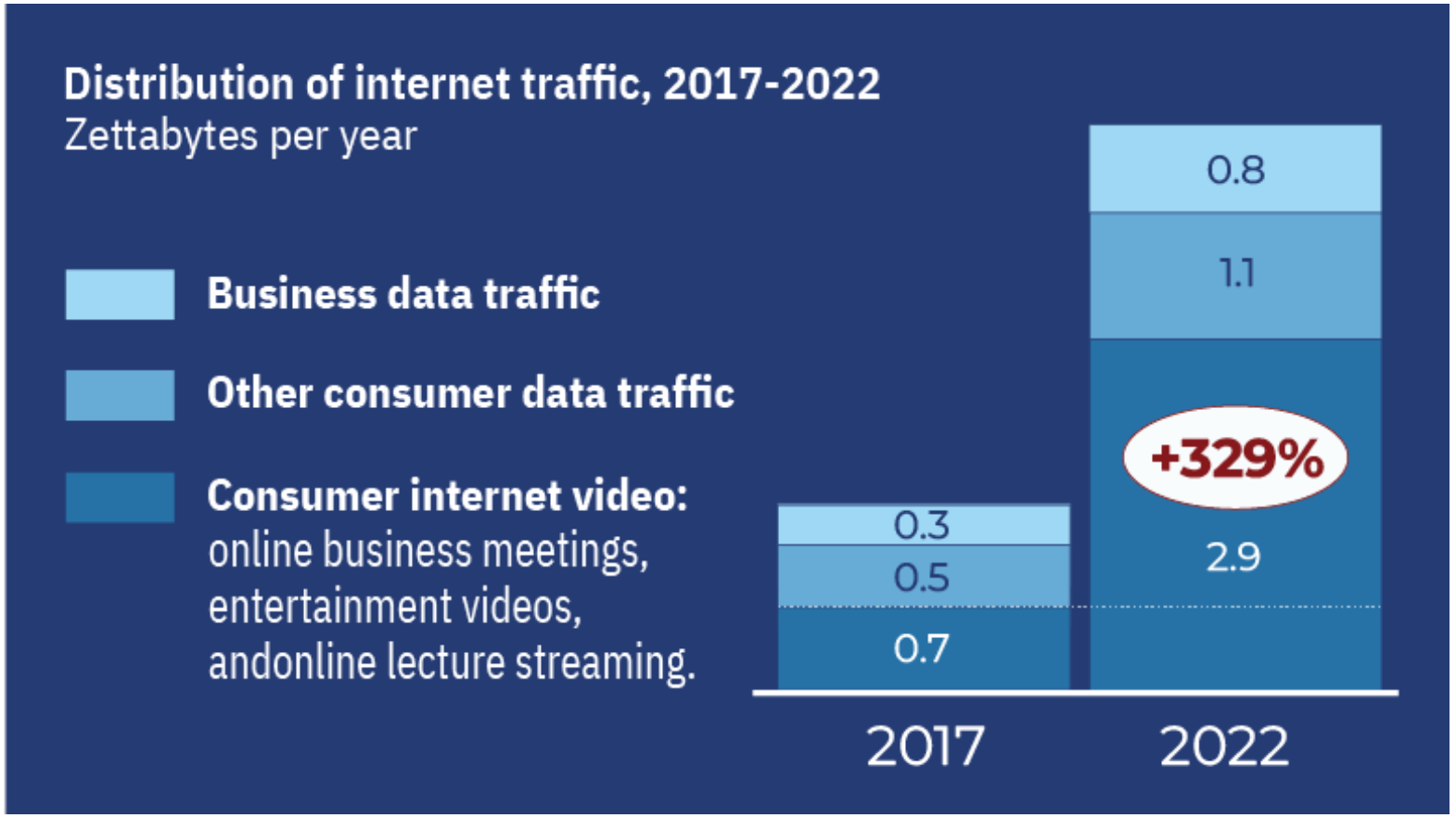
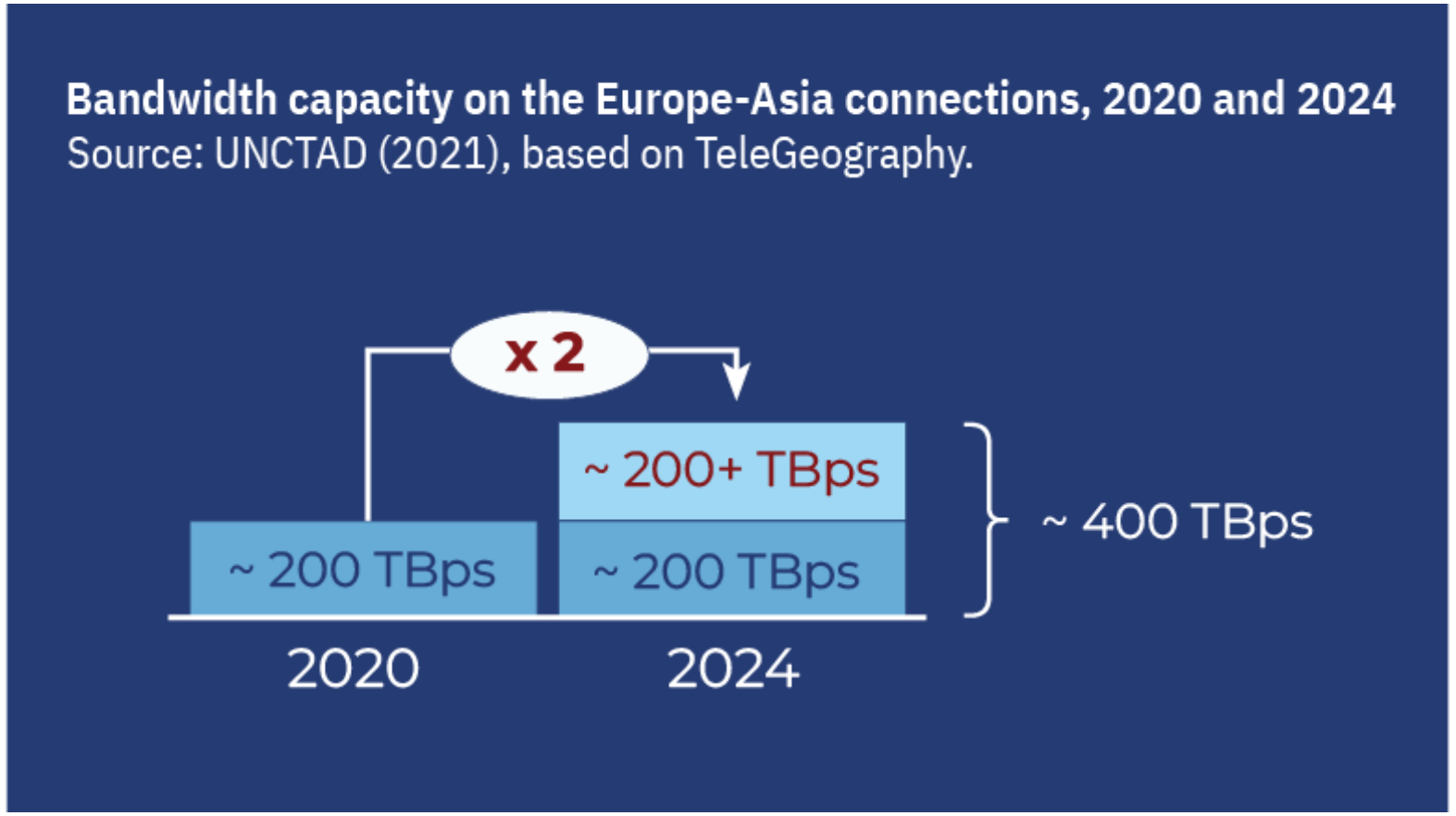
Drivers for submarine cable systems



- Submarine cable systems carry 99+% of the world's intercontinental data traffic

Drivers for submarine cable systems



- All R&E sectors are facing a data explosion, which means a rapidly increasing demand for efficient data infrastructures

Drivers for submarine cable systems
Connectivity

Increasing digitisation demands sufficient backbone connections, within and between EU member states, as well as with EU's strategic partner countries.

Multiple connections (cables) give redundancy and resilience.

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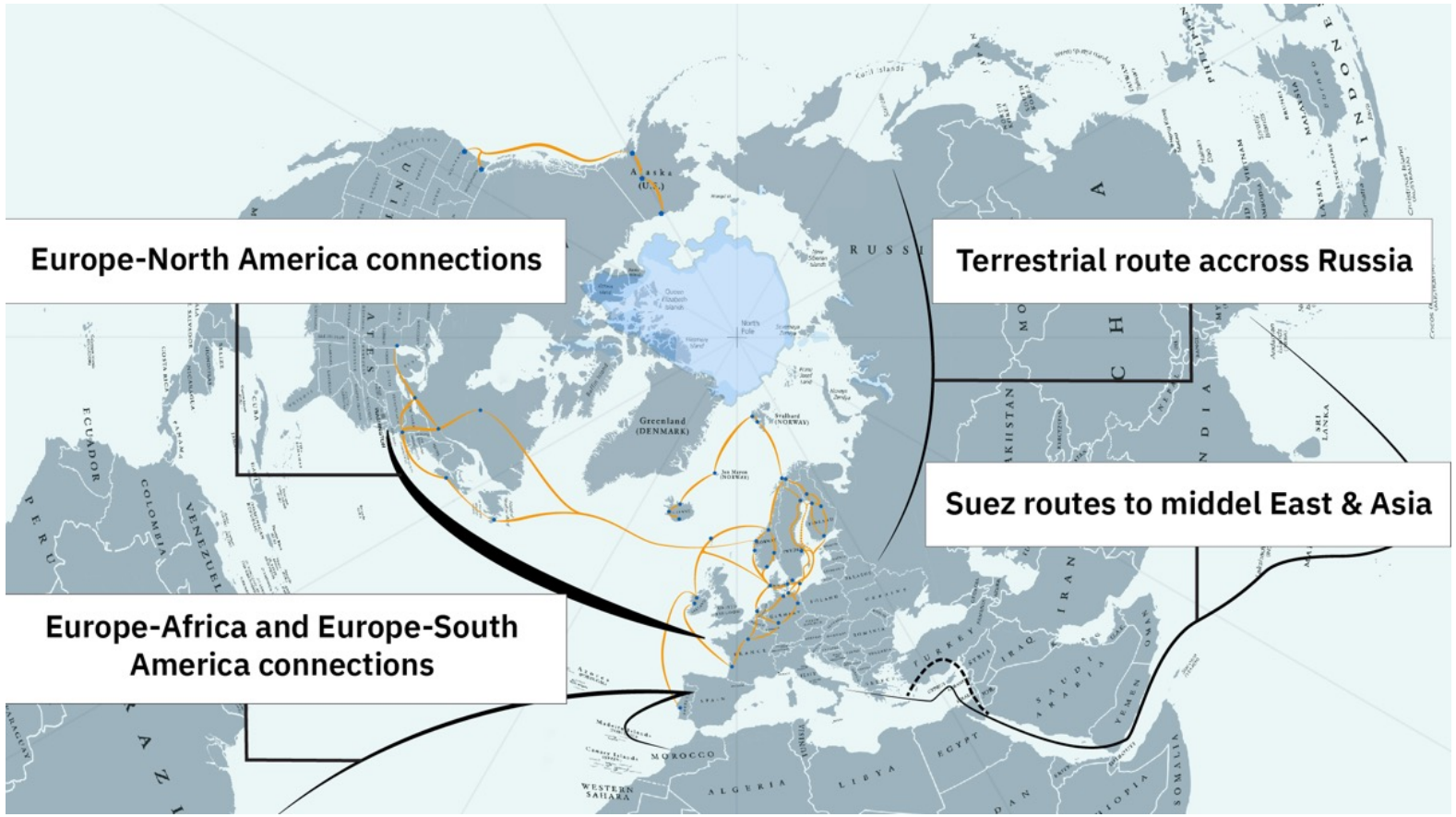
Why towards Asia through the Arctic?



https://copenhageneconomics.com/publication/the-economic-value-of-submarine-cables-in-the-arctic/

Resilience

- Resilience is the ability to cope with and recover from ‘setbacks’
- Importance of resilience in the global Internet is at an all time high:
  - https://thebarentsobserver.com/en/security/2022/02/unknown-human-activity-behind-svalbard-cable-disruption
  - https://www.reuters.com/world/europe/qa-nord-stream-gas-sabotage-whos-being-blamed-why-2022-09-30/
  - https://foreignpolicy.com/2023/02/21/matsu-islands-internet-cables-china-taiwan/

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European Data Gateways

- The Importance for Connectivity for Europe

> The European Council of October 2, 2020 concluded that: "To be digitally sovereign, the EU must build a truly digital single market, reinforce its ability to define its own rules, to make autonomous technological choices, and to develop and deploy strategic digital capacities and infrastructure (...). At the international level, the EU will leverage its tools and regulatory powers to help shape global rules and standards. The EU will remain open to all companies complying with European rules and standards. Digital development must safeguard our values, fundamental rights and security, and be socially balanced."

Source: European Data Gateway Declaration

European Data Gateways

- Four Gateways for Europe, to strengthen its Strategic Digital Autonomy:
  1. EU-Atlantic Data Gateway Platform
  2. EU-Mediterranean Data Gateway Platform
  3. EU-North Sea & Arctic Data Gateway Platform
  4. EU-Baltic-to-Black Sea Data Gateway Platform
- Each able to move at own pace

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About the project

Project Coordinator and beneficiary

Cinia Oy

Beneficiary

NORDUnet

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Project structure

WP1 PROJECT MANAGEMENT AND COMMUNICATION

WP2 FAR NORTH FIBER

WP3 C-LION2

WP4 TERRESTRIAL BACKBONE FINLAND

WP5 VISION 2030

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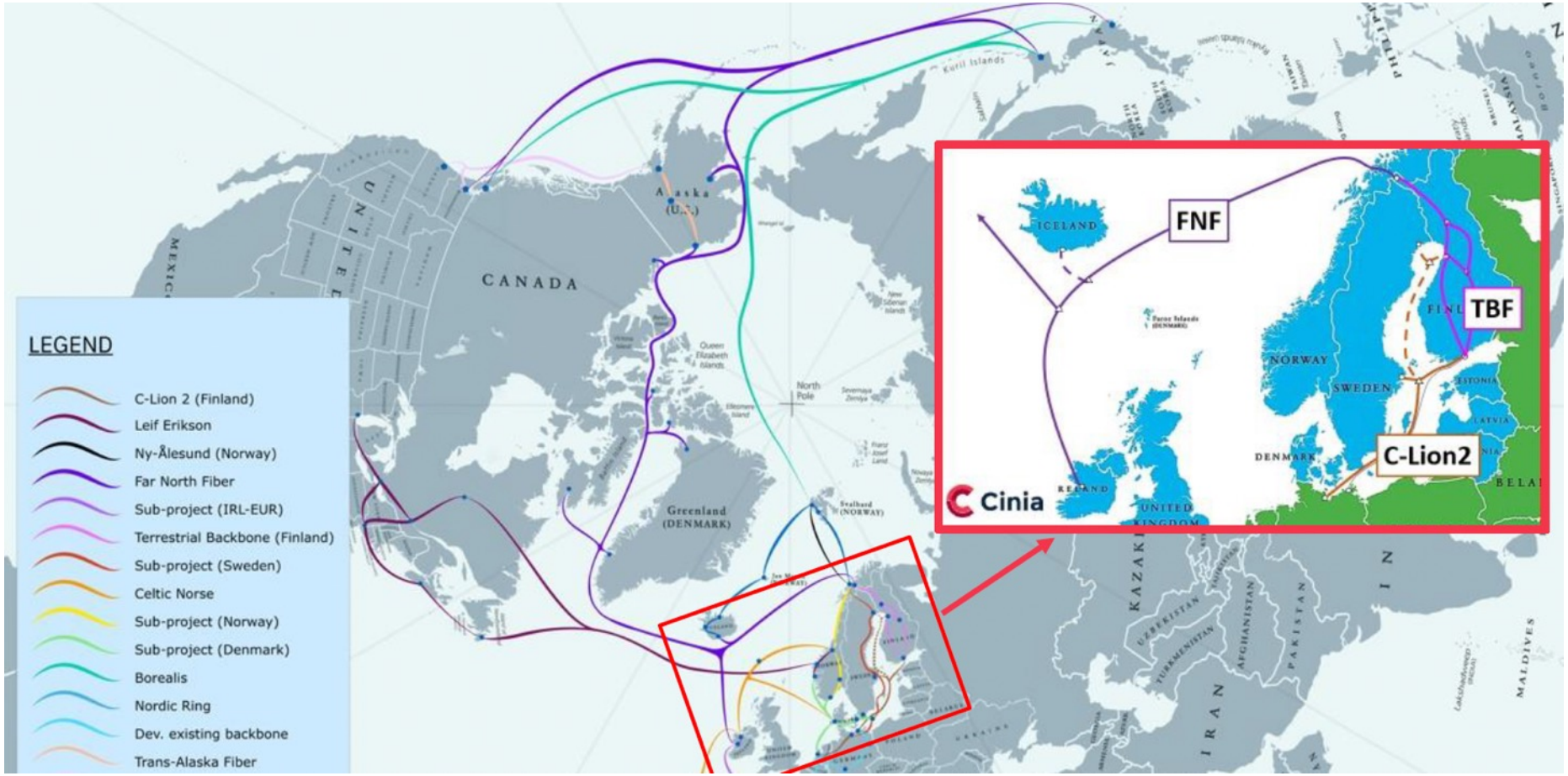
Project Objectives

- Conduct **studies** in order to implement the first concrete design and preparation for three new cable investments, creating a loop in the Northern Europe:
  - two submarine cables, Far North Fiber (FNF) and C-Lion2
  - one terrestrial cable Terrestrial Backbone Finland (TBF)
- The Project will also develop a **vision for the year 2030** for the increasingly needed and beneficial North Atlantic and Arctic section of the Digital Global Gateway
- Connections planned in the proposed Project will contribute to achieving European objectives on **digital sovereignty**, **redundancy**, **resilience** and **security**

Far North Fiber, Terrestrial Backbone Finland, and C-Lion2 in context



Far North Fiber, current planning

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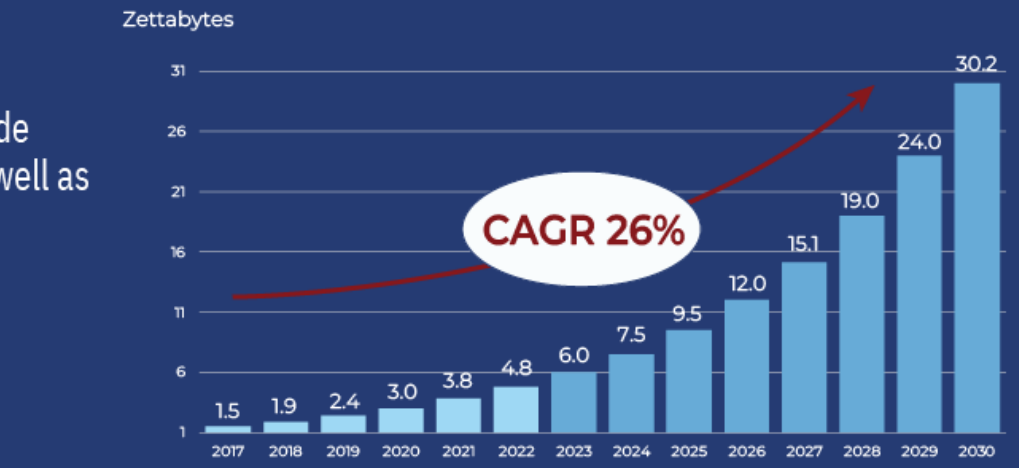
Connectivity

Increasing international collaboration and globalization drives an increasing demand on stable and redundant connectivity.

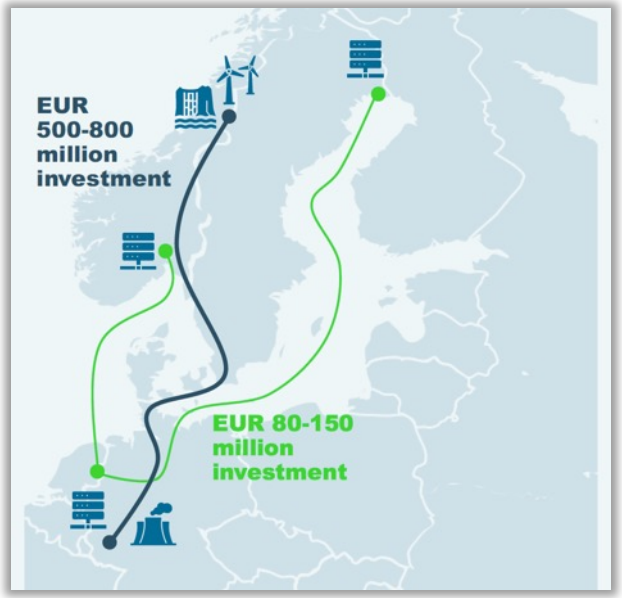
Global internet data traffic demand, 2017-2030 Zettabytes
Source: Cisco Visual Networking Index: Forecast and Trends, 2017–2022

These numbers show consumer and business IP traffic and exclude internal data centre IP traffic as well as IP traffic between data centres.

2023–2030 calculations based on a fixed CAGR of 26% for the years 2017–2022 .



Green datacenters in the far north



MORE EFFICIENT AND CHEAPER TO MOVE DATA THAN ENERGY

FREE COOLING AND REUSE OF EXCESSIVE HEAT

LOCAL EXCESS ENERGY – DUE TO LACK OF POWER INFRASTRUCTURE

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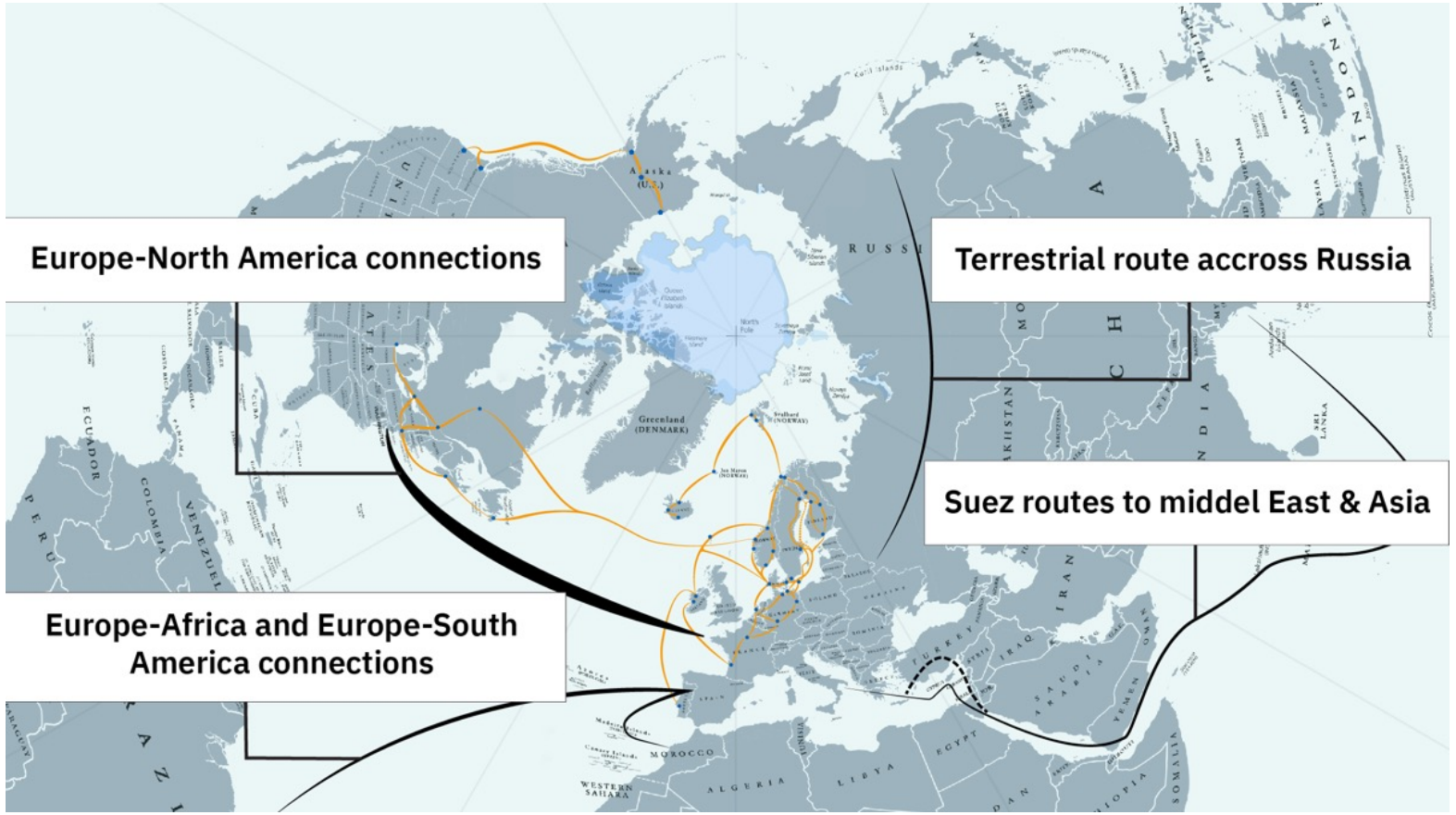
Connectivity



- **Complementary to existing Suez Area connections**
- Northern European fast track to Asia
- Strengthens and supports EU digital sovereignty
- Part of EU Global Data Gateways concept
- Geopolitical considerations

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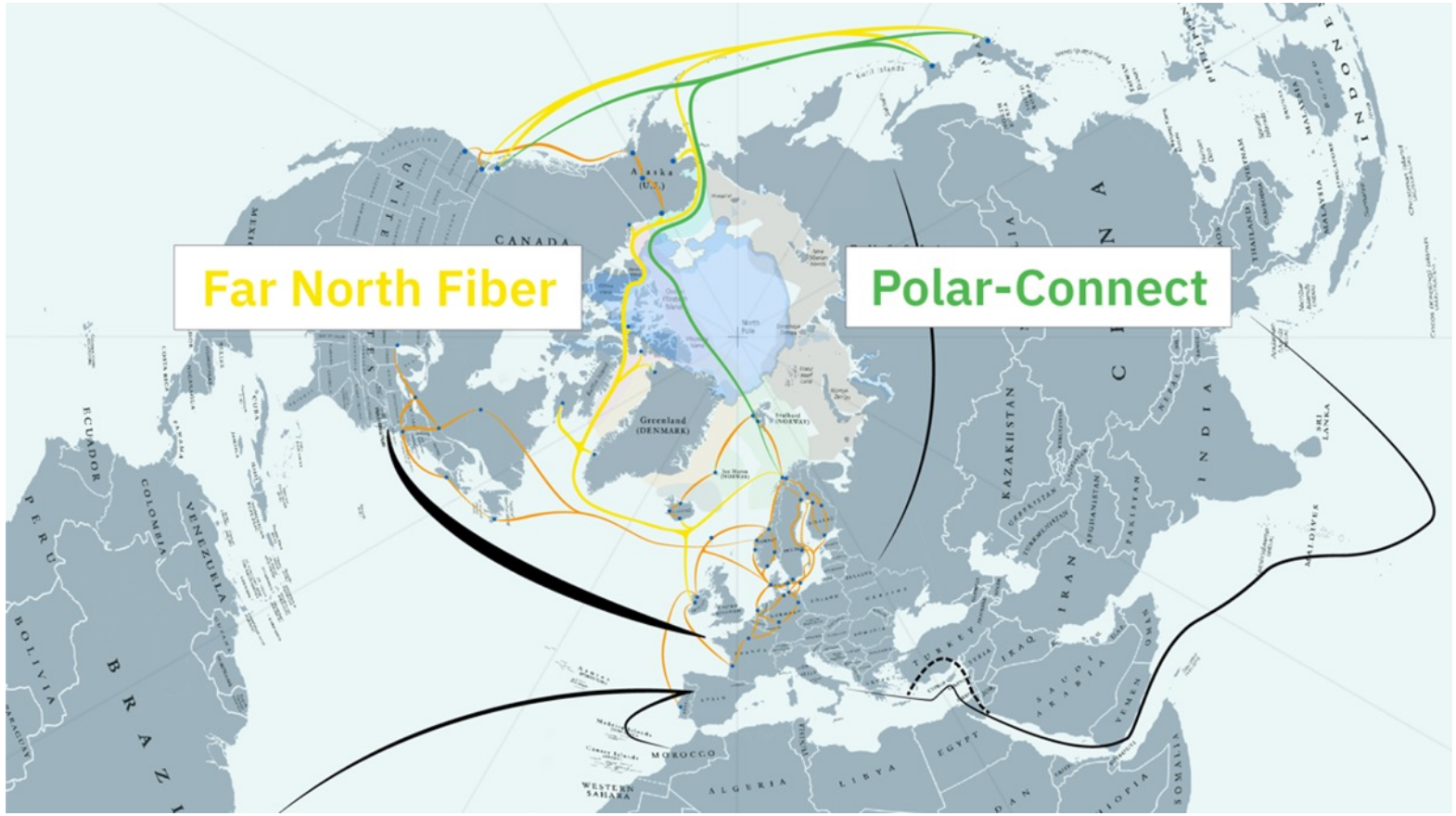
Connectivity



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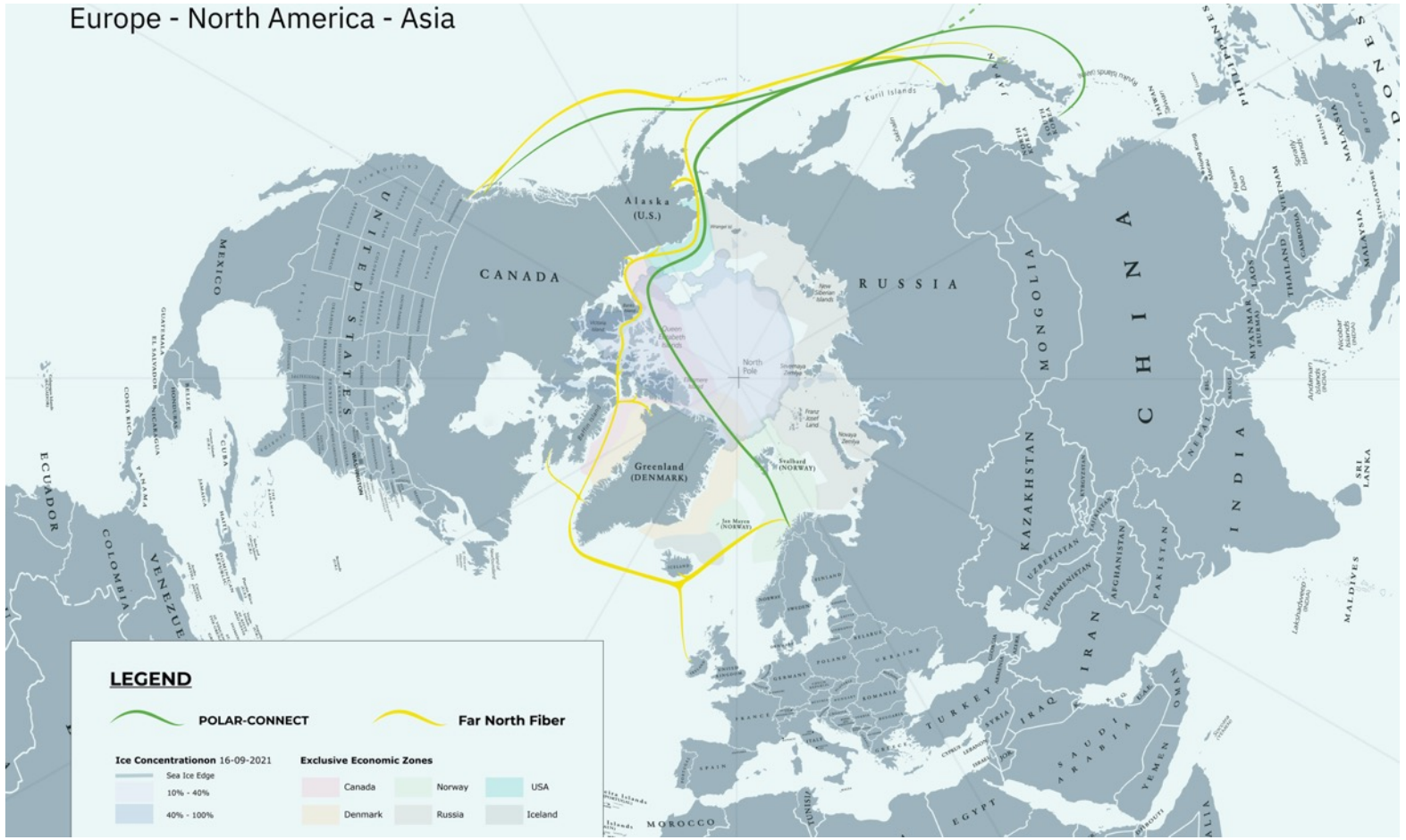

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Benefits

- The Arctic Ocean is unexplored territory for intercontinental subsea cables, yet it offers dramatic advantages for Europe and Asia through a direct route and a much shorter connection, bringing digital autonomy

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Benefits

- Digital infrastructure brings broader economic benefits, productivity, trade and consumer welfare
- Shortest route between Europe and East Asia safeguarding minimum delay time
- Submarine cables can also serve as scientific instruments for Earth observation, marine and seismic research

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Benefits

- Submarine cables over the Arctic add additional digital routes to and from Europe, which improves European digital resilience, autonomy, and **security**
- A ring structure consisting of two or more Arctic cables will lift resilience to an even higher level

WP5 Vision 2030

Produce a high–level plan for new submarine and terrestrial cable systems inter-connecting EU member states, overseas territories and third countries with whom the EU has strong ties and interests.

TASK 5.1 COORDINATING VISION 2030

TASK 5.2 ARCTIC ROUTE OPTIONS

TASK 5.3 SENSING CABLE TECHNOLOGIES

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Task 5.1 Coordinating Vision 2030

- Vision for the North Atlantic and Arctic section of the European **Digital Global Gateway**
- Gain an understanding of the needs of the users and collaborators, overall development in the surrounding society

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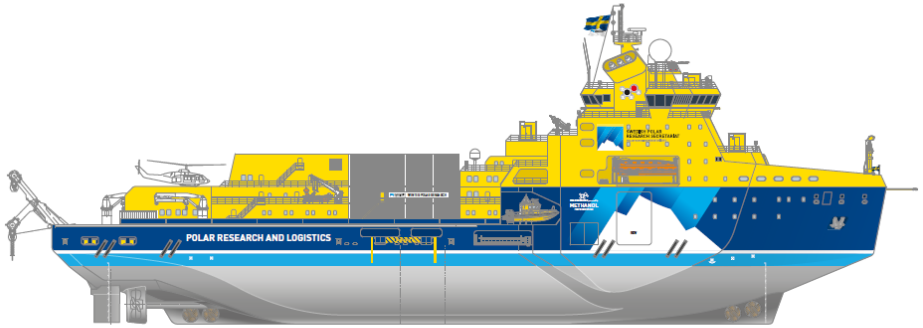
Task 5.2 Arctic Route Options

- Feasibility study to identify and evaluate the different Arctic fiber cable route options
- Assessment of polar class vessels
- Evaluation of the route and ring structure options of the envisioned routes
  FNF and North Pole Fiber
- technology required of the cable laying vessels for crossing the North Pole ice

For Svalbard – North America, we need three ships



Conceptual Icebreaker Design

POLARFORSKNINGS SEKRETARIATET

Sweden has done something similar before

EUROPEAN CONSORTIUM FOR OCEAN RESEARCH DRILLING

Exp 302 – Platforms at Sea

Three platforms were used during the offshore phase of the Arctic Coring Expedition: the drillship *Vidar Viking* and two icebreakers, *Oden* and *Sovetskiy Soyuz* (7 August - 15 September 2004)

Task 5.3 Sensing cable technologies

- Feasibility study to identify and evaluate the Arctic opportunities and obstacles in the field of sensing cable technology
- Impact of using sensing cable technologies on science especially in the fields of climate change, marine biology, oceanography, and seismology

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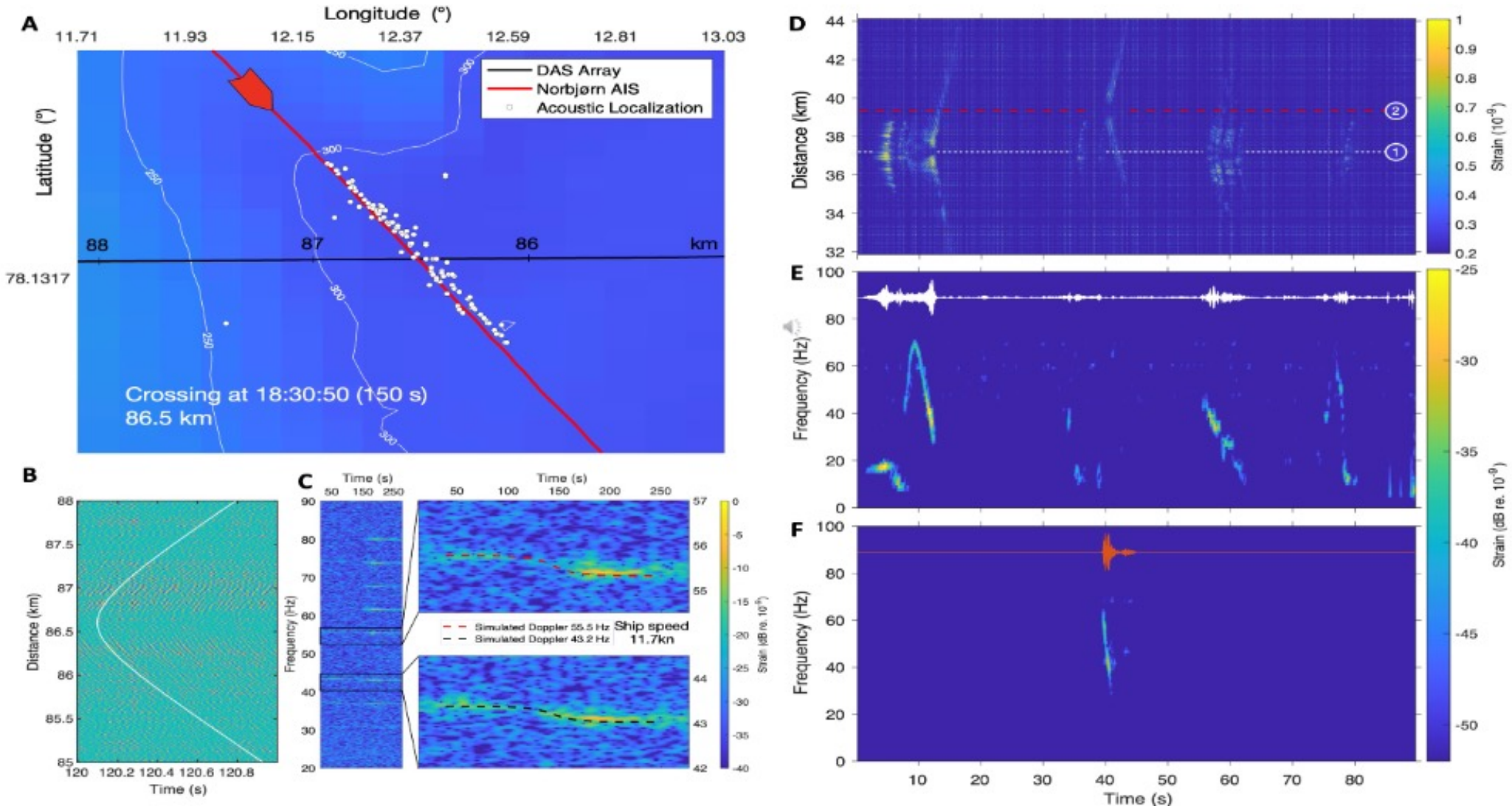
Sensing whales, storms, ships and earthquakes - Arctic fibre-optic cable



Slide by Martin Landrø (NTNU, Trondheim, Norway)

Latest developments: North Pole Fiber ('Stepping Stone Svalbard')

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Summary and next steps

- Looking for Improved Connectivity to Asia
- Increased redundancy and **security**
- Cheaper to move data then electric power
- Gap analysis for the envisioned route
- Gathering requirements from stakeholders
  - Datacommunication
  - Science & Research

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Polar Connect Webinar

- Thursday, **7 September 2023**
- Webinar on Polar Connect
- Duration: 90 minutes

- Starting times (TBC):
  - 6:30am UTC (Europe, Asia)
  - 2:30pm UTC (Europe, N. America)

Please feel free to register at:
https://nordu.net/polar-connect-vision-2030-webinar-september-2023/

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Thank you for your attention!

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