



IACS & CYBERSECURITY CONFERENCE



April 15th 2025 • Amersfoort • The Netherlands



Quantum Technologie: Dreiging en Kansen

Hoe kunnen organisaties quantum technologie gebruiken voor het beveiligen van
IT en OT infrastructuur

Dr. Ingrid Romijn
CEO Q*Bird

Inhoud

Antwoorden op de volgende vragen!

- Wie is Q*Bird?
- Wat is Quantum Tech? (en waarom moeten we ons druk maken?)
- Waarom Quantum Netwerken?
- Bestaan er al Quantum Netwerken?
- Hoe kunnen organisaties aanhaken?



Wie zijn Q*Bird?

- Oorspronkelijk een groep in QuTech/TU Delft
- Spin-out van TU Delft in 2022
- Team: 25 man/vrouw
- Ons doel: hardware en software voor het quantum internet



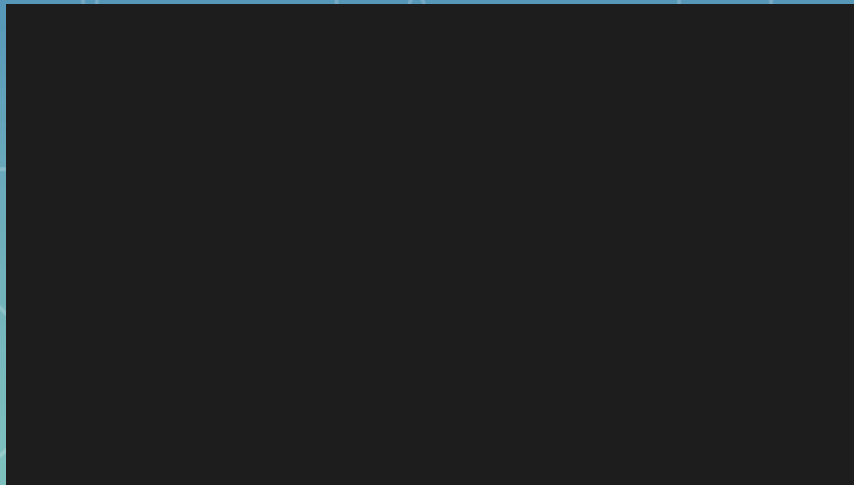
Q*Bird's missie

- Systemen voor het huidige, en toekomstige quantum internet
- Vandaag: quantum secured data communicatie
- Morgen: general purpose quantum connectivity

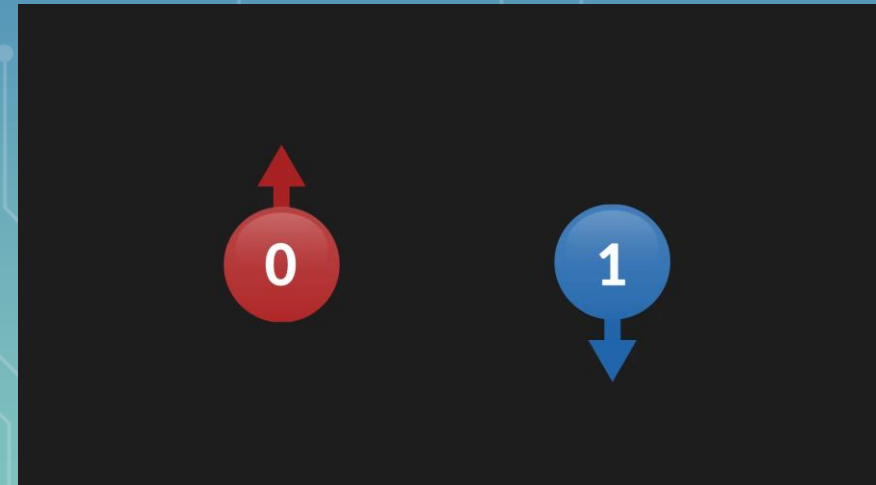


Quantum Technology: een game-changer

Superposition

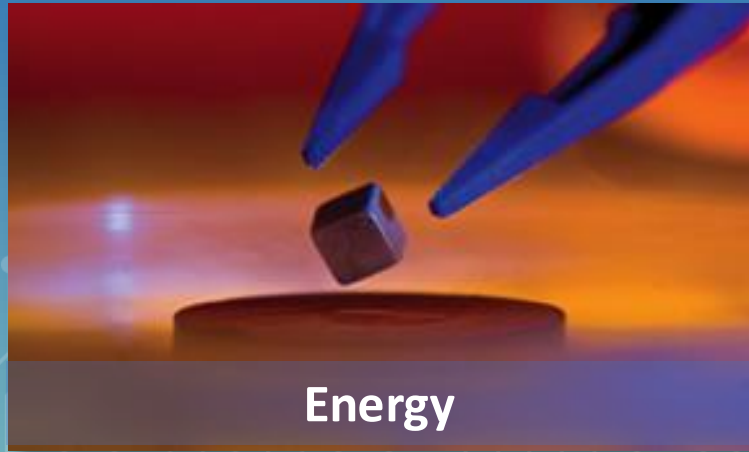


Entanglement





Impact Quantum Technologie



Energy



Climate



Health



Security & Privacy

Dutch Authority for Digital
Infrastructure
Ministry of Economic Affairs

National Cyber Security Centre
Ministry of Justice and Security

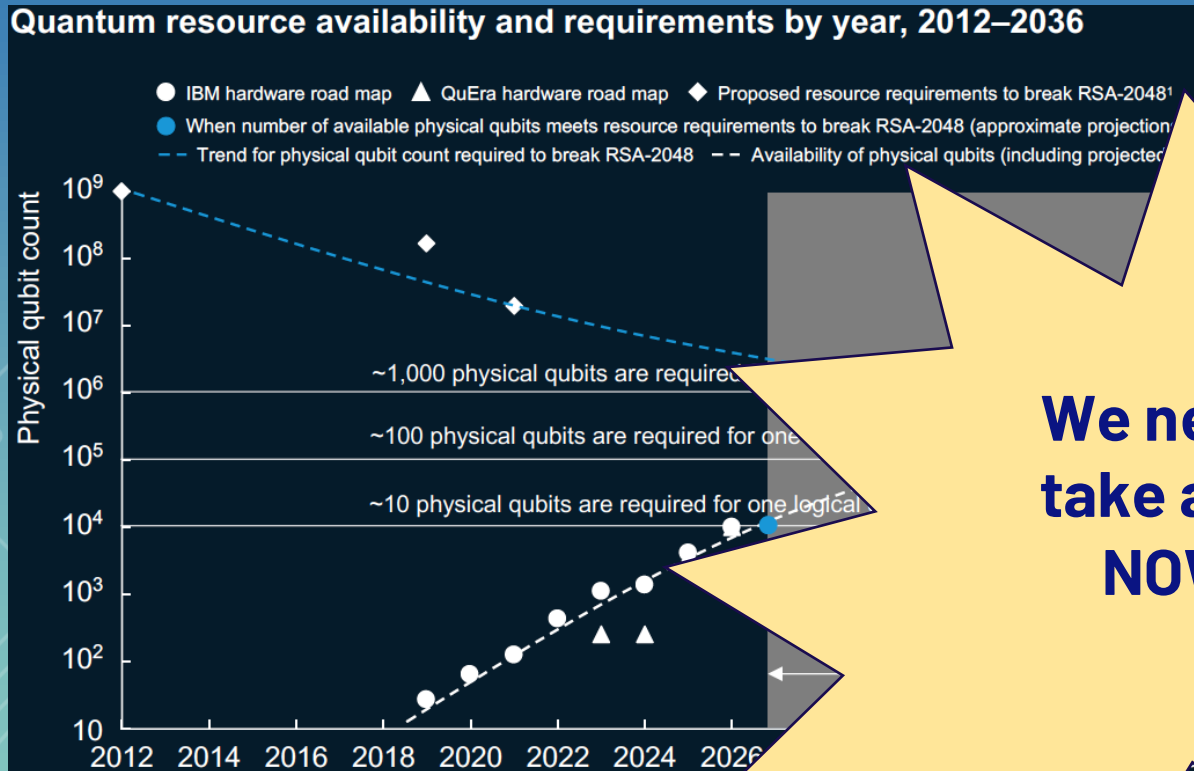
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Netwerken worden kwetsbaar!



Wanneer is/wordt dit een probleem?



"Stop now, decrypt later"

Security lifetime

Compromise



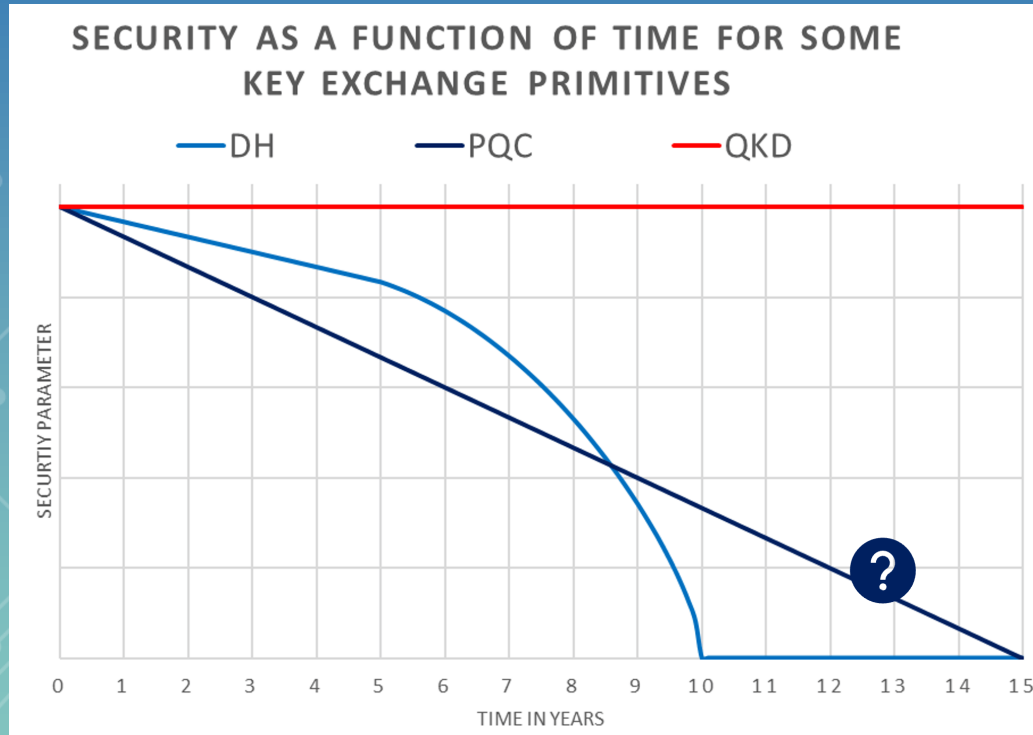
Then worry

**We need to
take action
NOW !!**

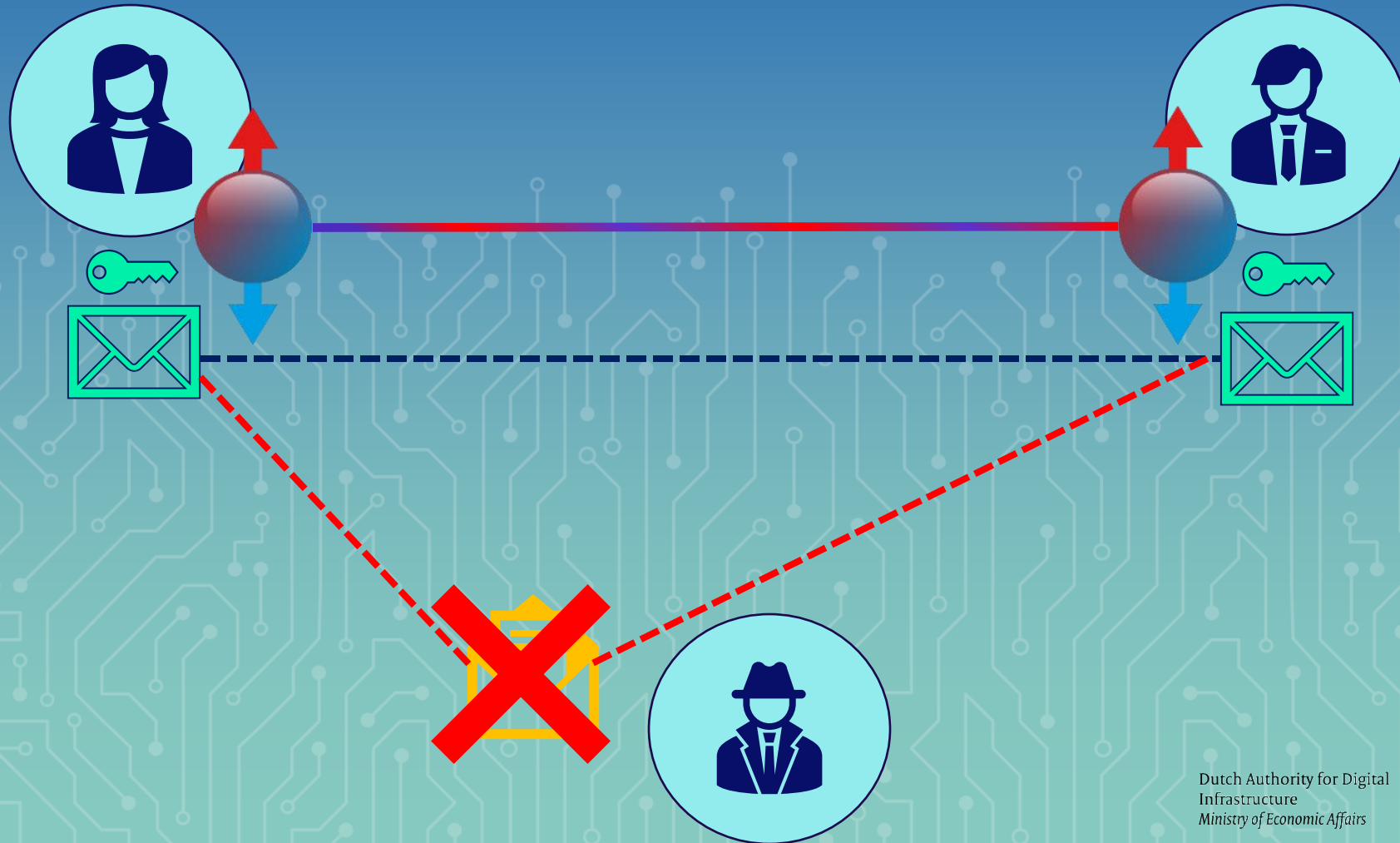
Stefano Mucca's theorem

Decrypting RSA-2048: $\sim 10^4$ to 10^7 physical qubits reached within ~ 10 years in roadmaps of major QC players
Quantum Technology Monitor, McKinsey & Company (2024)

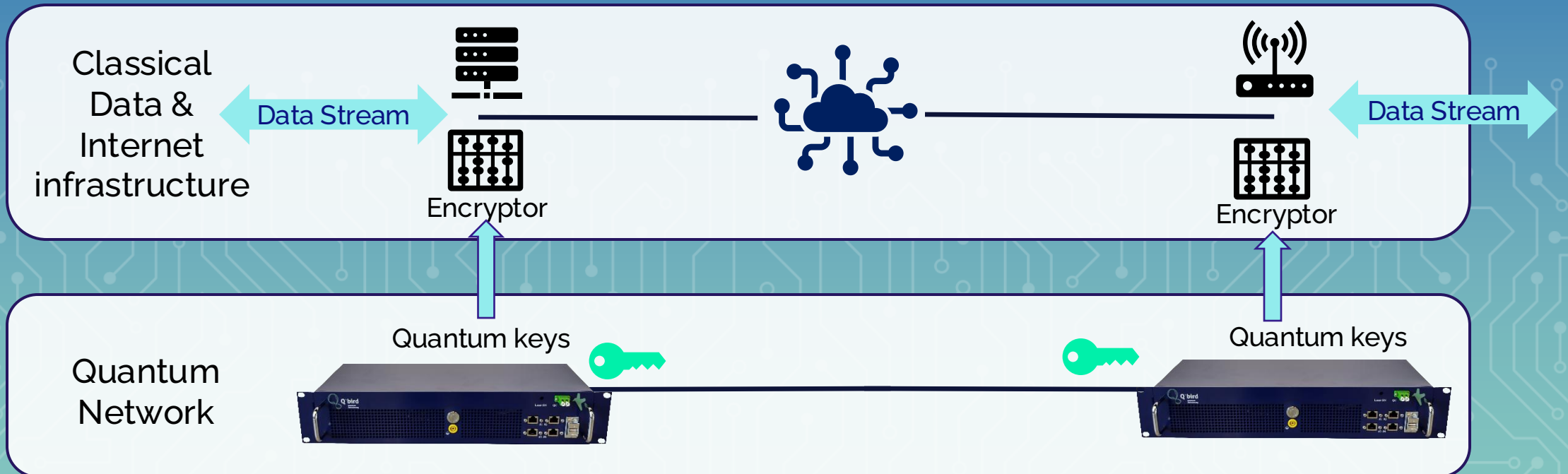
Oplossingen?



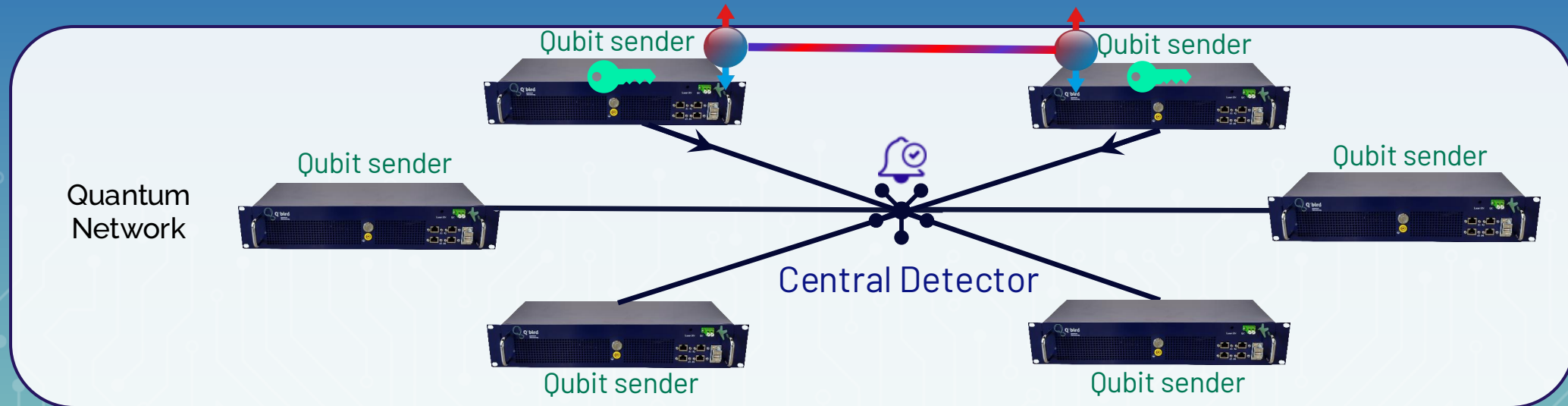
Quantum om tegen Quantum te beschermen!



Eerste generatie quantum netwerken



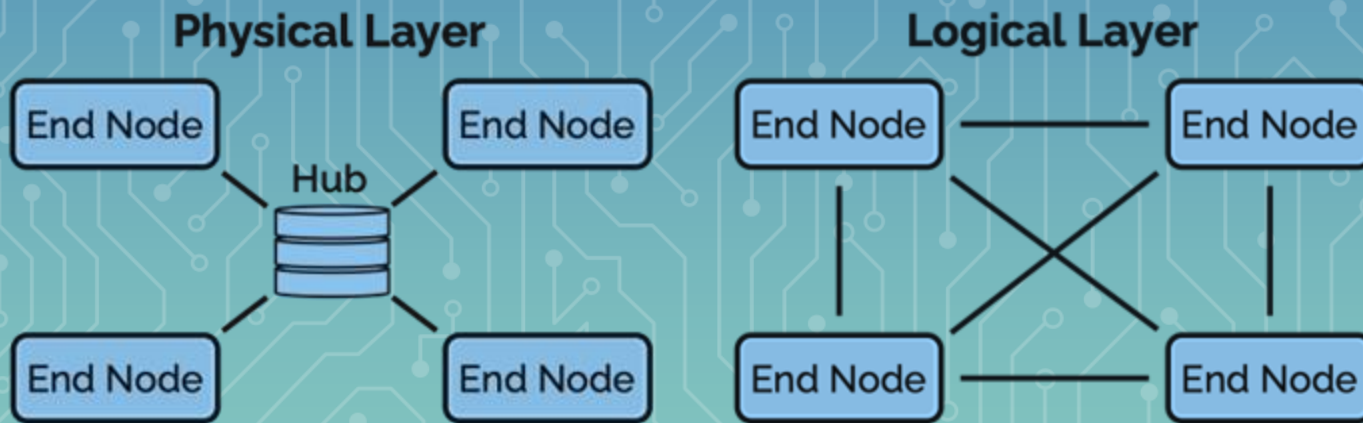
Quantum-veilige netwerken van Q*Bird



- **Scalable** to many users → each user can exchange keys with any other user in the network
- **More Secure:** The detector never knows the key information → not susceptible to detector side channel attacks!
- **Cost effective:** Qubit sender End Node is cheap to add to the network
- **Upgradable:** Central Detector can also connect other quantum devices!



Quantum-veilige netwerken van Q*Bird





Track Record

Integration with Juniper & Cisco Line Encryption

- MACSec and IPsec line encryption
- Key Rollover (AES256) every 30 seconds

POC with Dutch Bank

- Securing a financial transaction for weeks

System installation in the Port of Rotterdam

- Deployed network connecting multiple users in Europe's largest harbor

System installation in Educational and industrial Data Centers

- Deployed network in multiple operational data-center environments
- Running multiple users and use cases

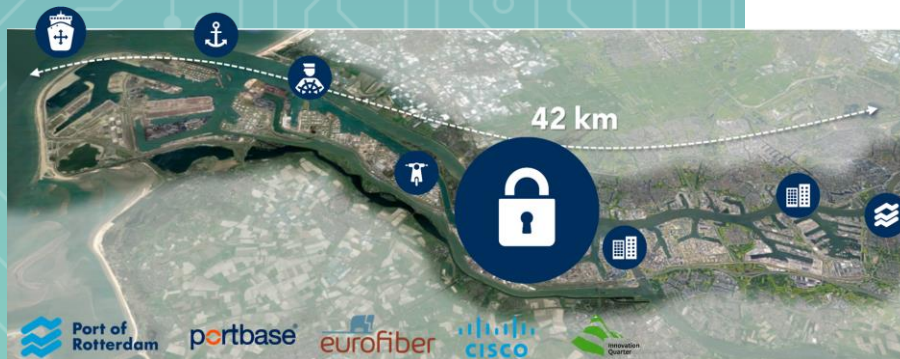
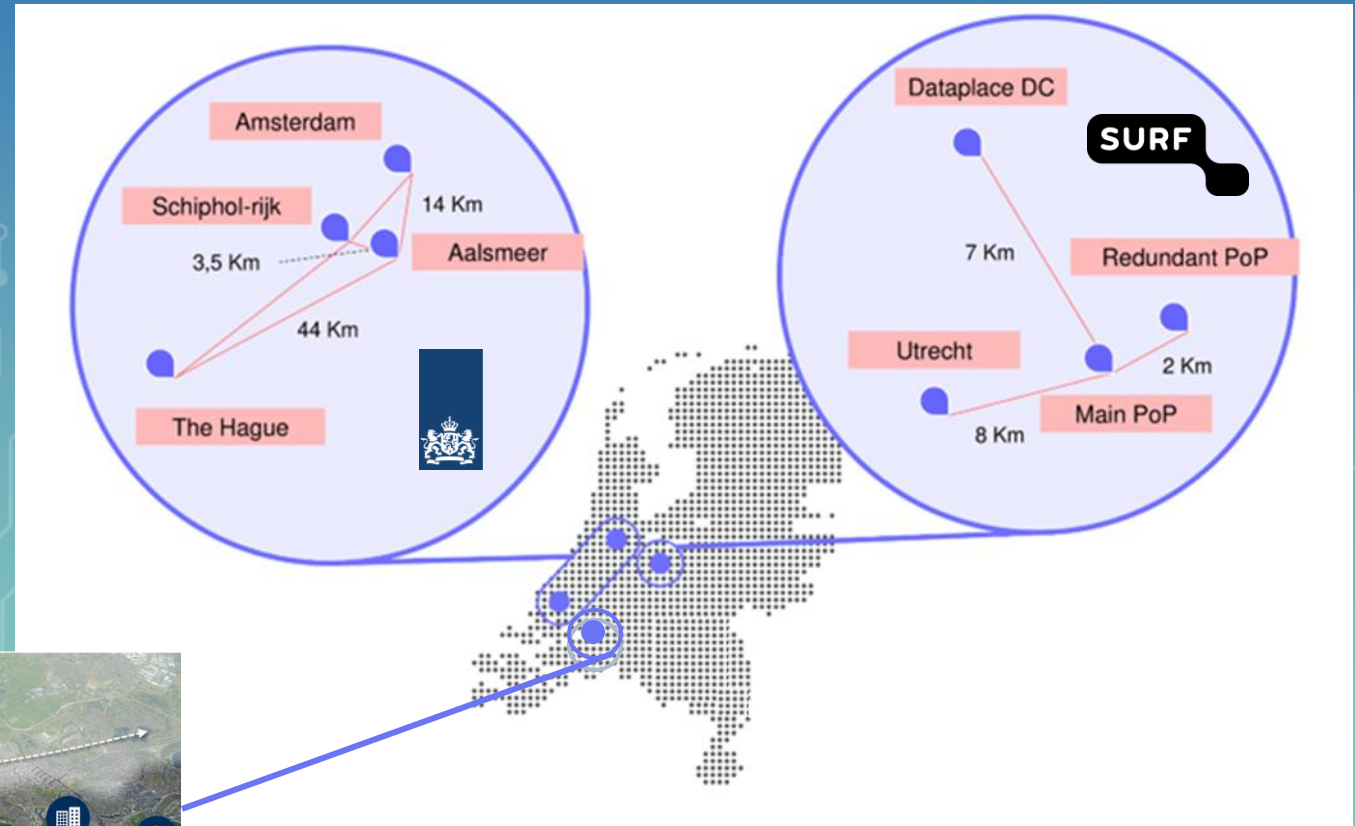
System installation in Dutch government data centers

- Testing secure solutions for gov communications

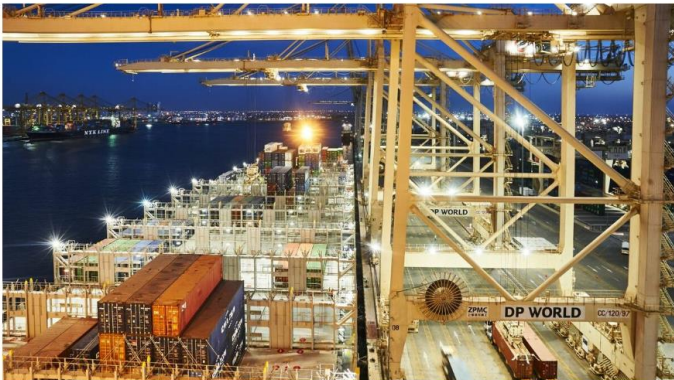


Schaalbare quantum netwerken in Nederland

- ✓ In the Port of Rotterdam:
Securing Europe's largest harbor
- ✓ Amsterdam to The Hague:
Securing Dutch governmental data centers
- ✓ Utrecht area: Securing Dutch Educational network



Waarom in de Haven van Rotterdam?



DP World Australia has been the target of a cyber attack (source: DP World)

Cyber attack takes out DP World Australia port operations

13 Nov 2023 by Jamey Bergman

Some port operations have resumed, but the Australian government said 'it does not mean this incident has concluded'; more than three days into the attack, the company said it is still operating under an emergency 'business continuity plan'



Safety and Security Ports and Terminals Smart Technologies and Digitalization

Port of Seattle shares details of a cyberattack

September 19, 2024

By Syed Rakin Rahman



TWITTER



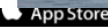
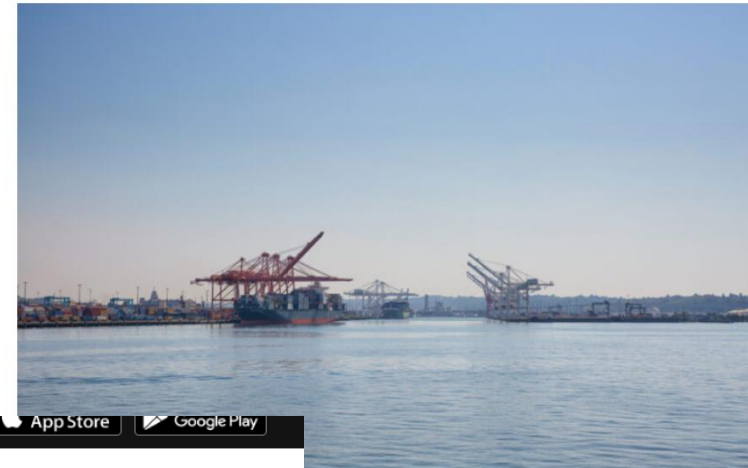
FACEBOOK



LINKEDIN



EMAIL



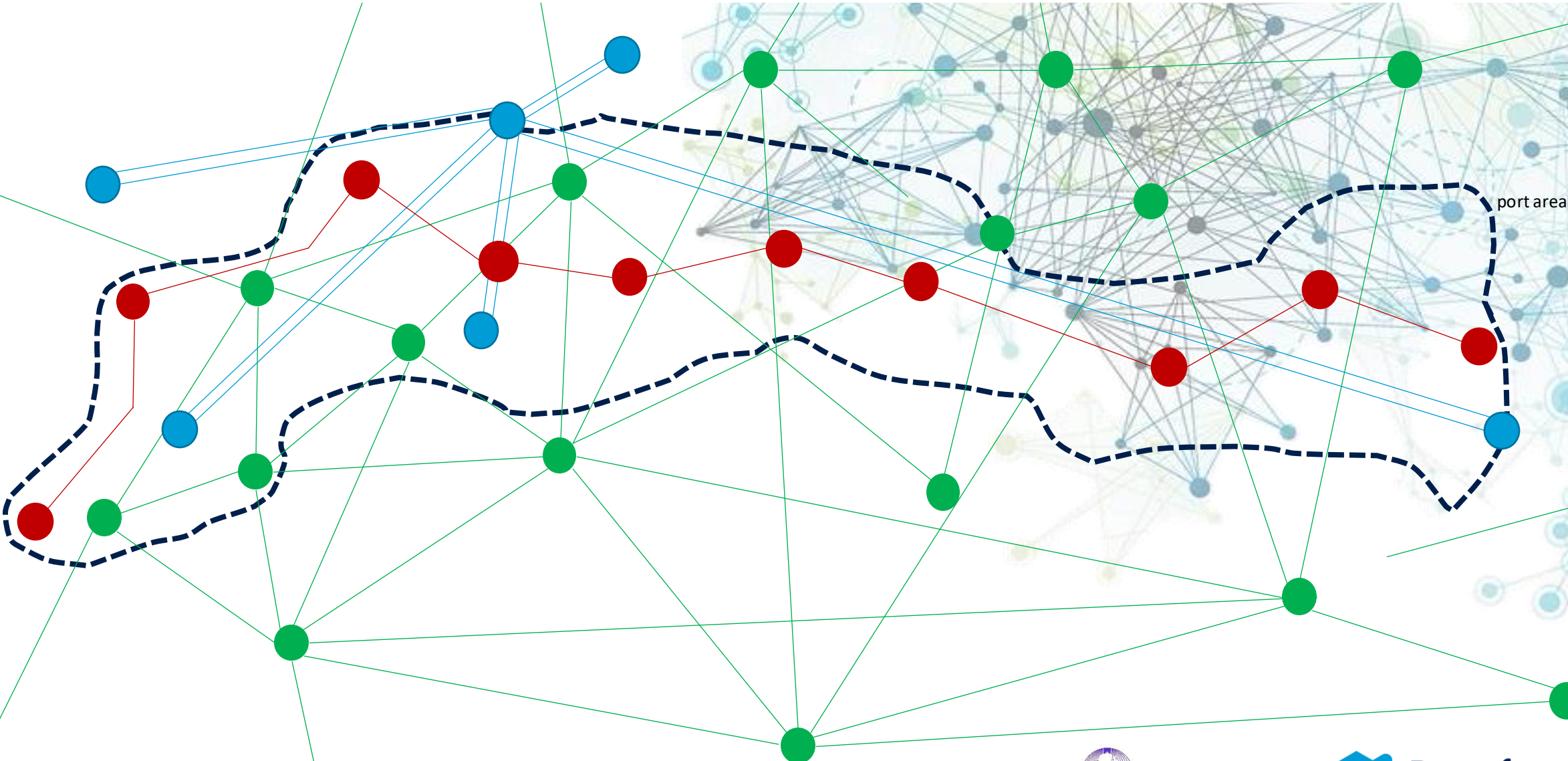
tems after the port identified system outages consistent with a

Economy

Suez Canal: What Was the Blockage's Impact on the Global Economy?

The crucial waterway that connects the Mediterranean to the Red Sea was blocked for nearly a week and caused major disruptions to global trade.

CRITICAL INFRASTRUCTURE NETWORKS & PORTS



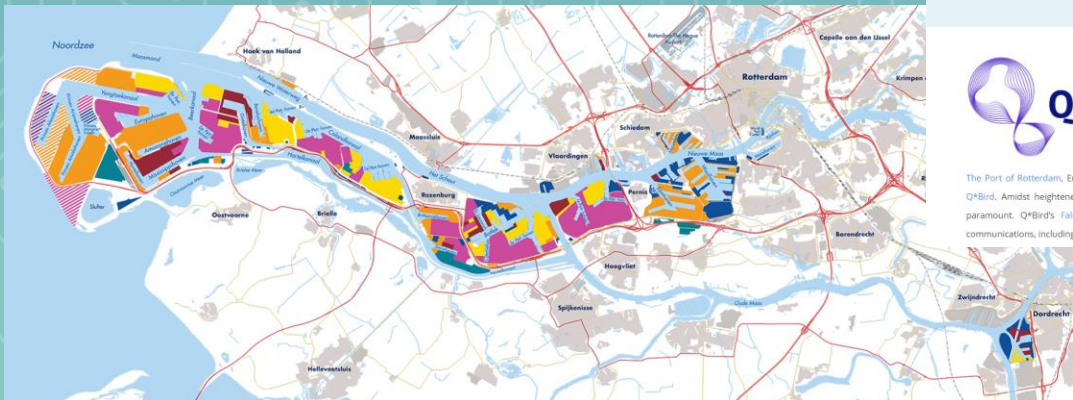
28 april 2025

“A port is a berthing place for ships “
(Van Dale)



Pilot in de haven van Rotterdam

- ✓ High frequency f.e. water levels, ship positions
- ✓ High confidential f.e. container inspections
- ✓ Multi user f.e. port calls





Technologie supply chain

Technologie supply chain

Eco-system



End-User Applications



Network operators / service providers



Hardware systems



Hardware sub-systems



for Digital
ic Affairs

National Cyber Security Centre
Ministry of Justice and Security

IACS Coalition

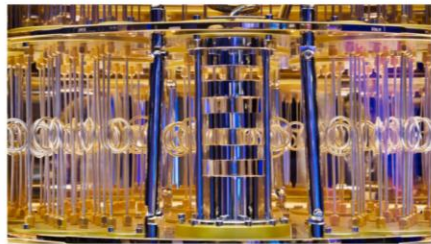


Voorbeelden wereld wijd

HSBC trials quantum protection for AI-powered FX trading

HSBC has piloted the use of quantum key encryption to protect client FX trading data from the threat of increasingly powerful cyber attacks.

06 December 2023 1 comment



For the trial, HSBC armed its AI Markets trading terminal with quantum protection, using Quantum Key Distribution to safeguard a €30 million trading scenario from Euros to US dollars.

J.P.Morgan | CHASE

Technology at our firm > News > JPMorgan Chase establishes quantum-secured crypto-agile network

TECHNOLOGY >

JPMorgan Chase establishes quantum-secured crypto-agile network

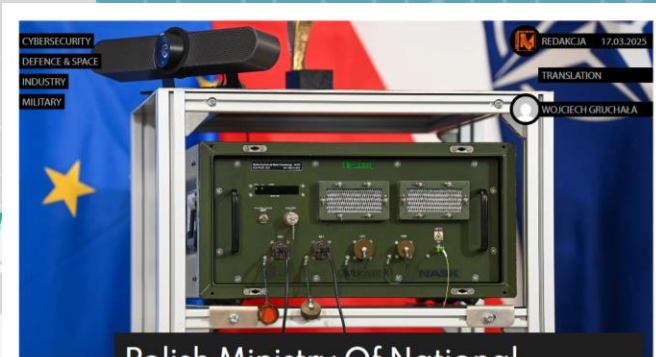
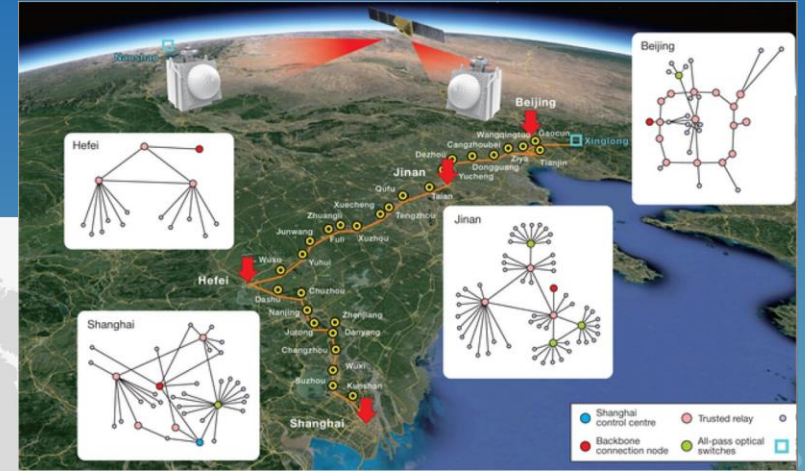
May 08, 2024

Versatile, high-speed and scalable network can provide multiple quantum security features over deployed fibers and production environments.



DECLARATION ON A QUANTUM COMMUNICATION INFRASTRUCTURE FOR THE EU

All 27 EU Member States have signed a declaration agreeing to work together to explore how to build a quantum communication infrastructure (QCI) across Europe, boosting European capabilities in quantum technologies, cybersecurity



Polish Ministry Of National Defense: Quantum key distribution is a breakthrough in the security of state entity communications

A presentation of research findings on the use of quantum key distribution in state communications was held at the Club of the Military University of Technology in Warsaw.

Dutch Authority for Digital Infrastructure
Ministry of Economic Affairs

National Cyber Security Centre
Ministry of Justice and Security

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Europa

Who we are ▾ **About EuroQCI** ▾ **New**

QCINed

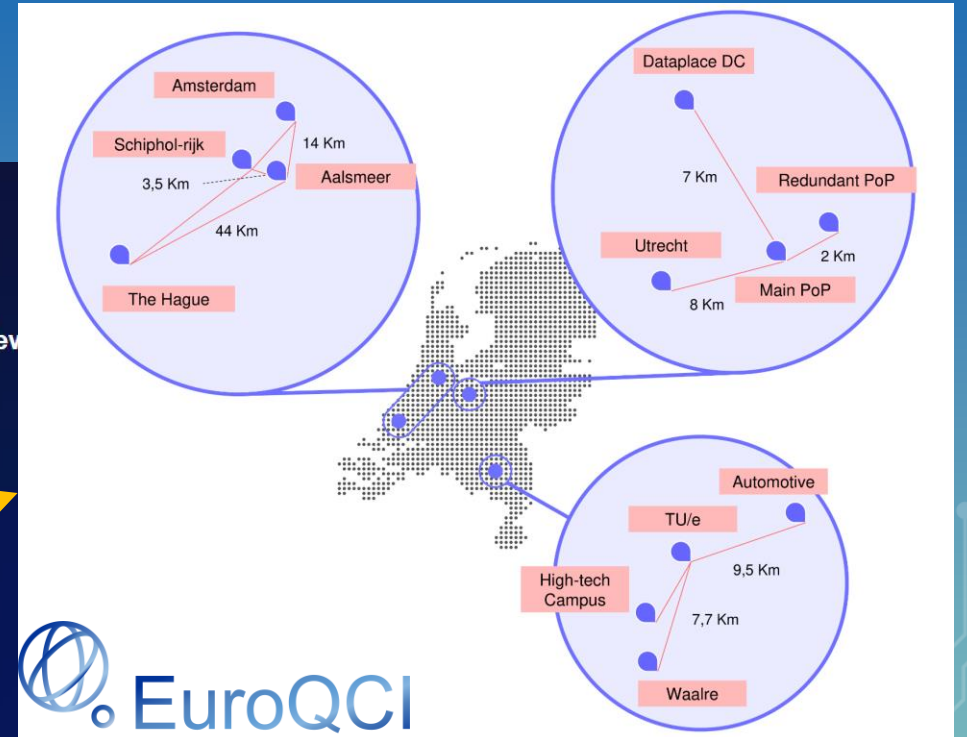
Distances between nodes:

- Amsterdam to Schiphol-rijck: 14 Km
- Schiphol-rijck to Aalsmeer: 3,5 Km
- Schiphol-rijck to The Hague: 44 Km
- Aalsmeer to The Hague: 44 Km
- Dataplace DC to Redundant PoP: 7 Km
- Redundant PoP to Utrecht: 2 Km
- Utrecht to Main PoP: 8 Km
- Main PoP to Waalre: 9,5 Km
- High-tech Campus to Waalre: 7,7 Km

Legend:

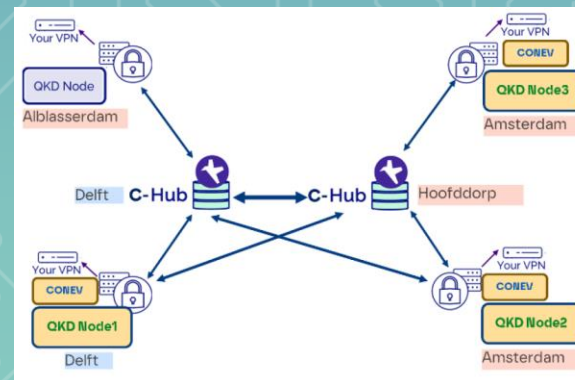
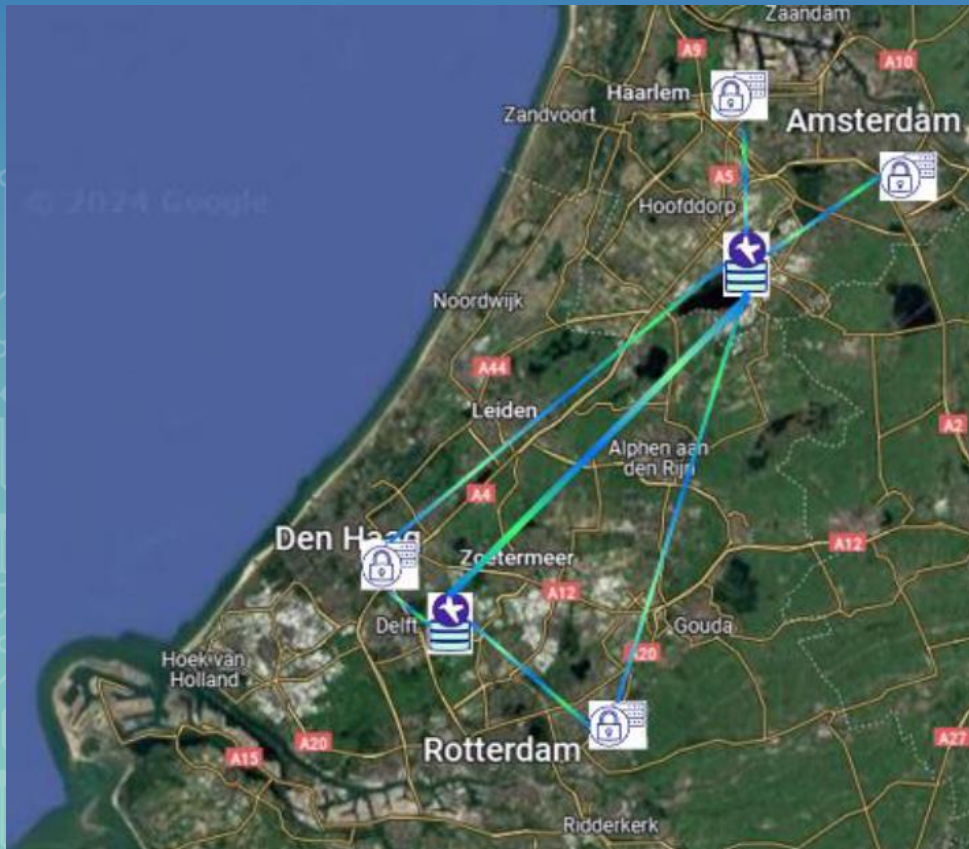
- Hungary
- QCINed** Netherlands
- QUID Italy
- RoNaQCI Romania
- QUID

Intern gebruik





Uitbreiding van het Randstad netwerk



Uitbreiding:

- Afstand
- Dimensie (2x Center Hub!)
- **Nieuwe gebruikers welkom!**



Q*Bird roadmap: verdere ontwikkeling



2024

- **Deploy MVP**
- 3 NL QKD networks
- 2 EU QKD Networks

2025 - 2026

- **Develop QKD**
- Improved architectures
- Redundancy network
- Connect **different qubit types**

2026 - 2027

- **Scale QKD**
- **Certified System**
- Reduced costs
- "plug & play"

2028 - Onwards

- **Quantum Internet**
- Connecting quantum systems / processors



Lay the foundations for quantum internet
Deploy quantum-secured networks for data centres,
critical infrastructure, governments, EuroQCI

Toward general purpose quantum internet

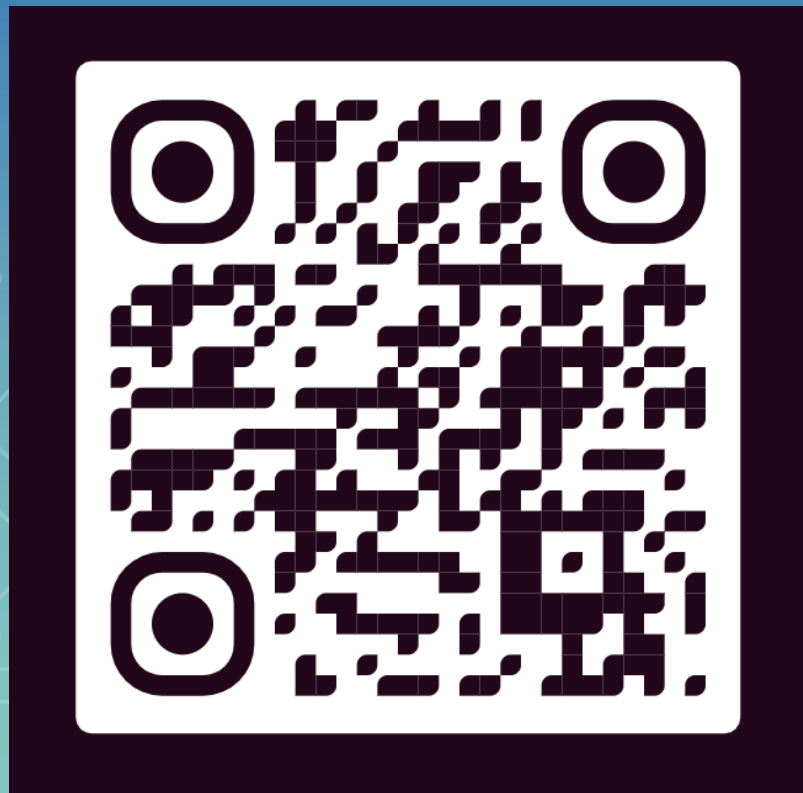
Samenvatting & Take Away



- Quantum technologie: **kansen en uitdagingen!**
- Quantum encryptie is **aantoonbaar veilig** tegen aanvallen van AI, HPC en quantumcomputers
- **Q*Bird (www.q-bird.nl)** biedt **ultraveilige communicatie** en bescherming van digitale infrastructuur, gebaseerd op de wetten van de fysica.
- Q*Bird en partners bouwen een **quantum netwerk infrastructuur** in Nederland, deze is **open voor nieuwe gebruikers!**



Join us in the quantum revolution!



- Meer informatie:
- q-bird.com
- Ingrid@q-bird.nl