QMill

Quantum-powered solutions

Accelerating the utilization of quantum computing

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Janne Heikkinen
Chief Product Officer, QMill

QMILL VISION

Advanced quantum algorithms will be indispensable for global well-being

QMILL MISSION

We accelerate the utilization of quantum computing through world-leading quantum solutions



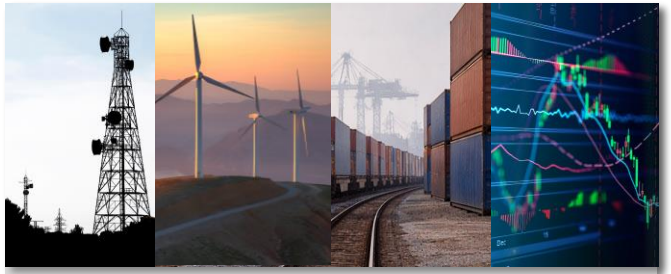
QMill makes quantum computing practical and accessible today

FOCUSED ON ALGORITHMS AND SOFTWARE



Quantum security

RESEARCH & PRODUCT DEVELOPMENT



Quantum optimization

RESEARCH & PRODUCT DEVELOPMENT

FOR REAL-WORLD INDUSTRIAL CASES

- Defense
- Finance
- Telecom
- Energy
- Transportation

ABOUT QMILL

Founded in 2024 by
- Hannu Kauppinen
- Mikko Möttönen
- Ville Kotovirta
- Toni Annala

Diverse team:
- 30 people
  ~70% PhDs, 4 professors, 550+ scientific publications
- 8 nationalities

Located in Espoo, Finland

Video: Quantum Powered Security

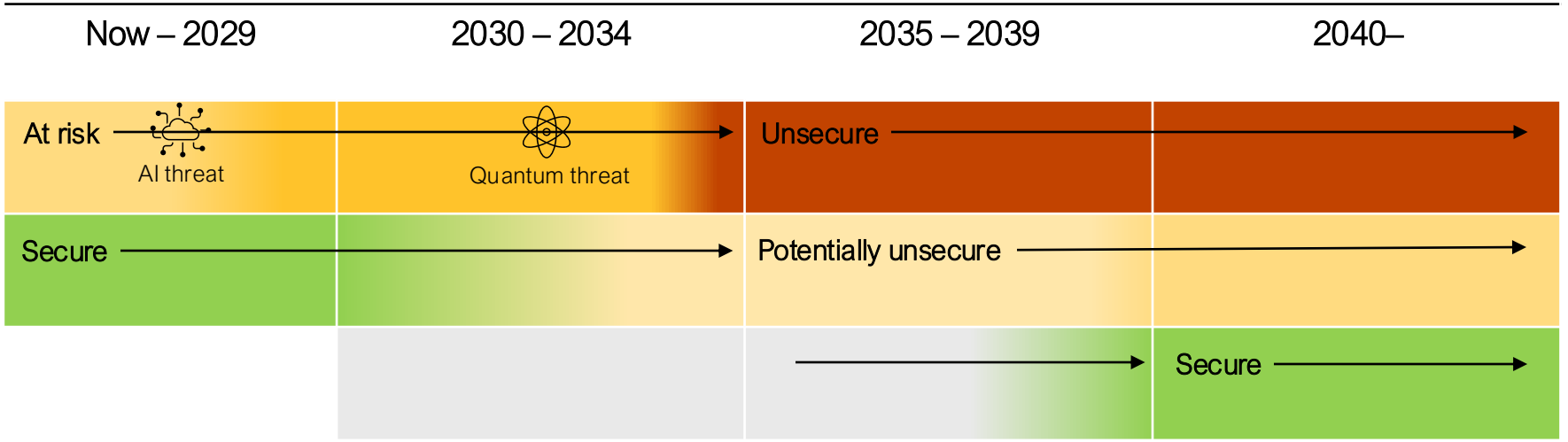
QMill quantum-powered security - An extra layer of security for critical infrastructure.

Projected security level of current data encryption protocols

CURRENT STATE

ENCRYPTION SOLUTION

- Current cryptography standards (RSA, ECC)
- Post-Quantum Cryptography (PQC)
- Quantum Key Distribution (QKD)



REGULATORS MANDATE RAPID PQC MIGRATION

2026: EU inventories and national plans due.

2027: US defense buys PQC only.
France (ANSSI) won't certify without PQC.

2030: RSA and ECC deprecated.
EU critical sectors migrated.

2031: US federal high value systems fully migrated.

2035: EU and US complete.
RSA disallowed.

QMill quantum-powered security methods

TURNING QUANTUM COMPUTING FROM A THREAT TO A SUPERPOWER

Current random number generation (RNG) methods lack verifiability, allowing for a potential backdoor

Verifiable quantum random numbers
QRNG

- Verify it on the spot
- Audit it years later
- Drops into PQC you run

QMill

The already-present AI threat and the near-future quantum threat are risking data storage and transmission security

Quantum-powered security protocol

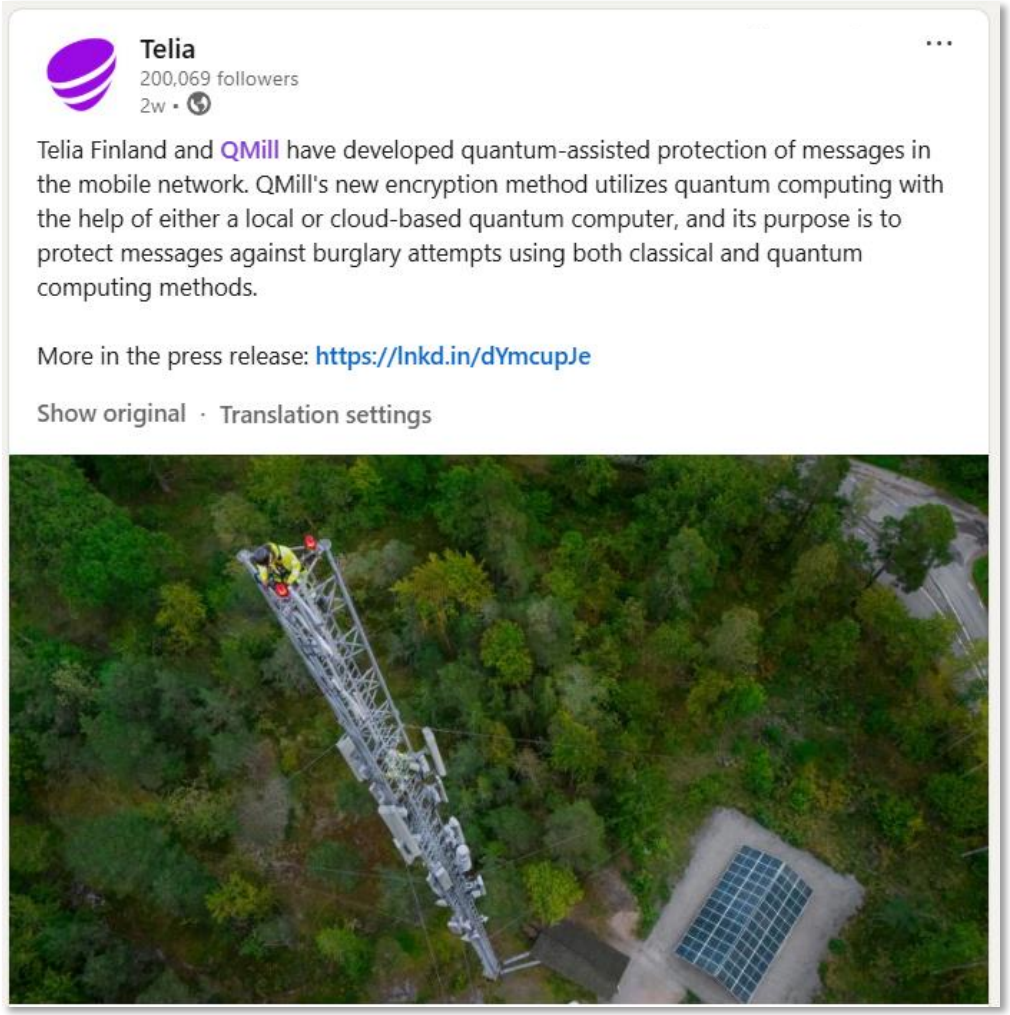
- The underlying method is based on a quantum algorithm
- Keys, decryption and the channel stay classical
- The quantum computer need not to be trusted

QMill

Demonstrated in a live teleoperator network

Demonstrated with Telia to the Finnish Defense Forces on a network — protecting the backhaul between base stations and the mobile core.

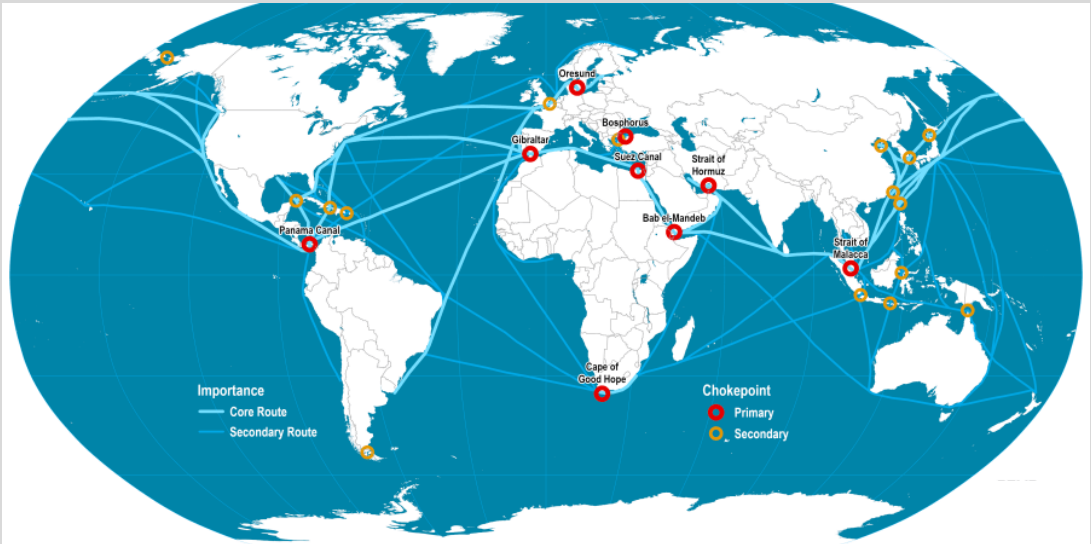
- A real operator network
- A public quantum computer
- No new hardware

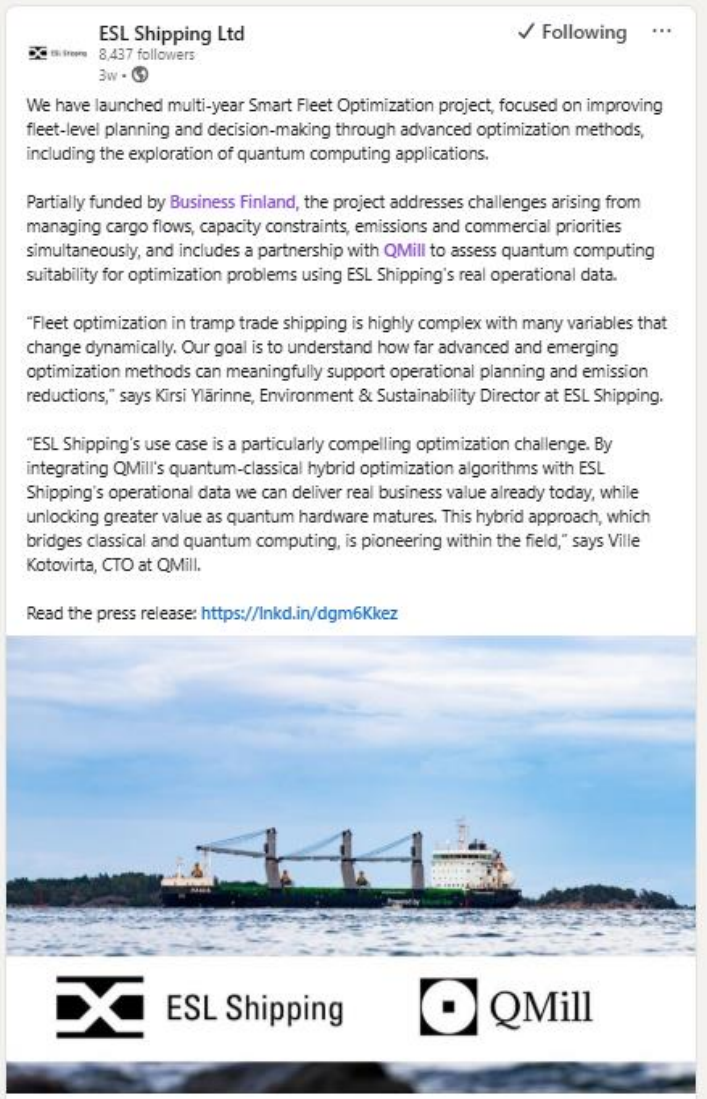


Quantum-classical hybrid optimization in maritime

Significant cost savings

Reduced emissions





USE CASE IN MARITIME ROUTING:

- Integrating quantum-classical hybrid optimization algorithm with real-life operational data
- With hybrid approach, delivering real business value already today
- Unlocking greater value as quantum hardware matures

Picture: Main maritime shipping routes, as presented on PEMP

Thank you!

QMill Quantum-Powered Solutions

Accelerating the utilization of quantum computing

Energy: optimization & security

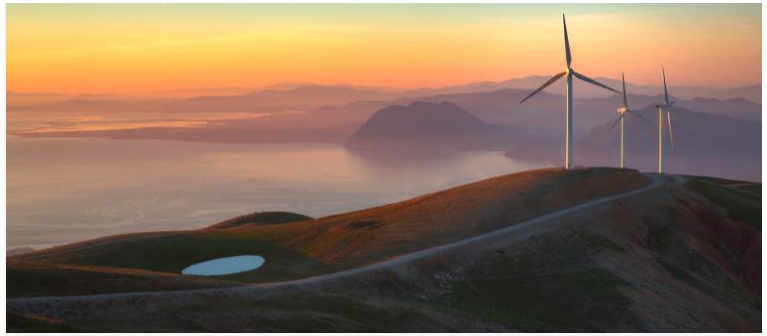
MEASURABLE NEAR-TERM OPPORTUNITIES



GRID BALANCING & UNIT COMMITMENT

- Decide which generators to run and when, minimizing cost while meeting demand.
- QMill's optimization algorithms are designed for addressing such combinatorial problems.

Lower generation costs and fewer outage risks from smarter dispatch



RENEWABLE INTEGRATION & SECTOR COUPLING

- Optimize dispatch of solar, wind, storage, and EV charging across distributed grids.
- Optimize the integration and routing of thermal output from emerging Small Modular Reactor (SMRs), e.g., the 50 MW LDR-50, into complex municipal district heating networks.

Higher renewable utilization and maximized efficiency across both power and heat grids



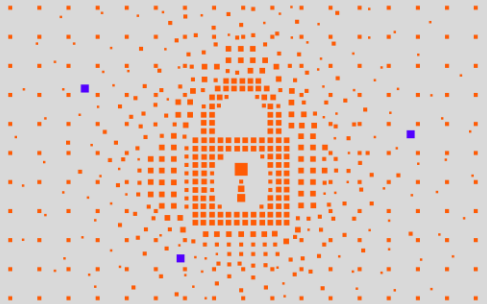
CRITICAL INFRASTRUCTURE SECURITY

- Digitized grids need quantum-safe encryption. PQC addresses the baseline and QMill goes further.
- Quantum-enhanced cryptography provides genuine quantum-level security for the most sensitive grid communications.

Security beyond PQC with genuine quantum encryption for critical energy infrastructure

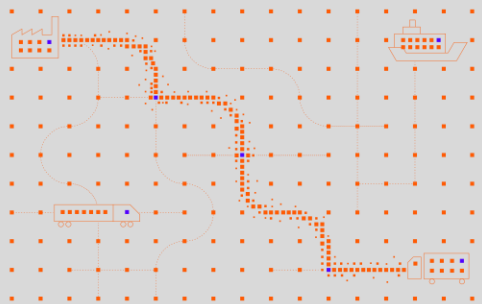
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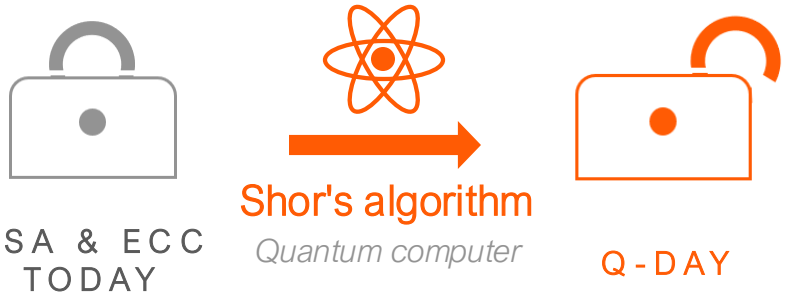
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The cryptographic threat

Q-DAY



The day a quantum computer becomes powerful enough to decrypt everything encrypted with RSA & ECC.

HARVEST NOW, DECRYPT LATER



Traffic is encrypted - and copied in bulk

Data sits in someone else's archive for years

A quantum computer opens it all at once

Combining PQC with Quantum-powered security

QUANTUM-NATIVE

