



Estonia's Approach to PQC Transition

Lauri Tankler

Head of R&D Coordination Department

Kaisa Lindström

Lead Coordinator

ENISA WEBINAR | 22 OCTOBER 2026



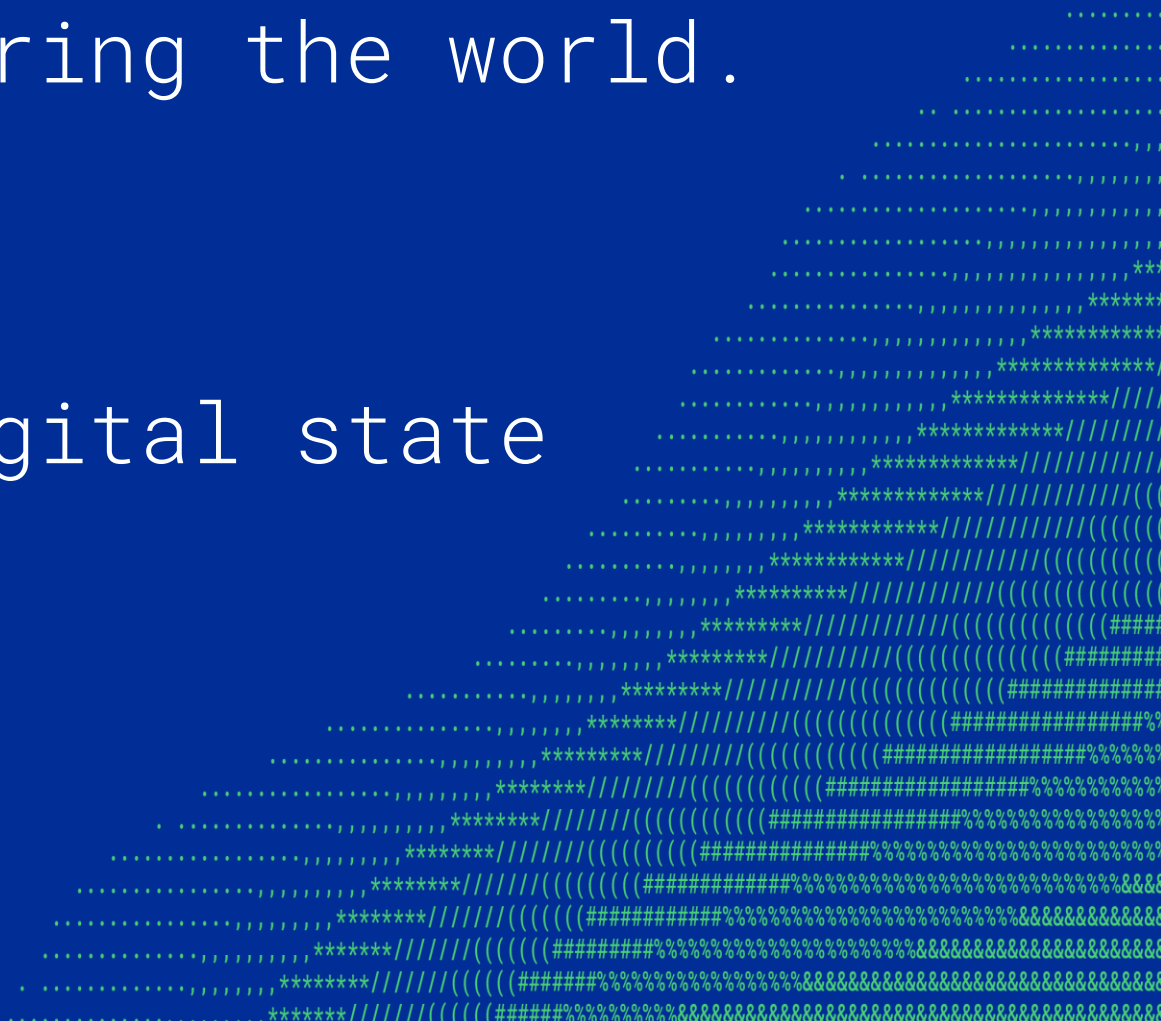


VISION

The world's most trusted digital state –
securing Estonia, inspiring the world.

MISSION

We ensure a reliable digital state
and seamless services –
today and tomorrow.





What RIA does

Ensuring the infrastructure services for the e-State

eID and trust services

Personalized e-services

Data exchange services (X-road)

State Network services (ISP)

Elections and custom projects

Ensuring cybersecurity

Handling cyber incidents, CERT-EE

Coordination of research and development

National information security measures

Supervision (enforcement)

Defence of critical information infrastructure

Analysis and prevention

Security and Service Operations Center

Projects

EU CyberNet



Estonia's e-state

Public and private sector use the same central services:
data exchange, digital identity and the State portal

1,800+

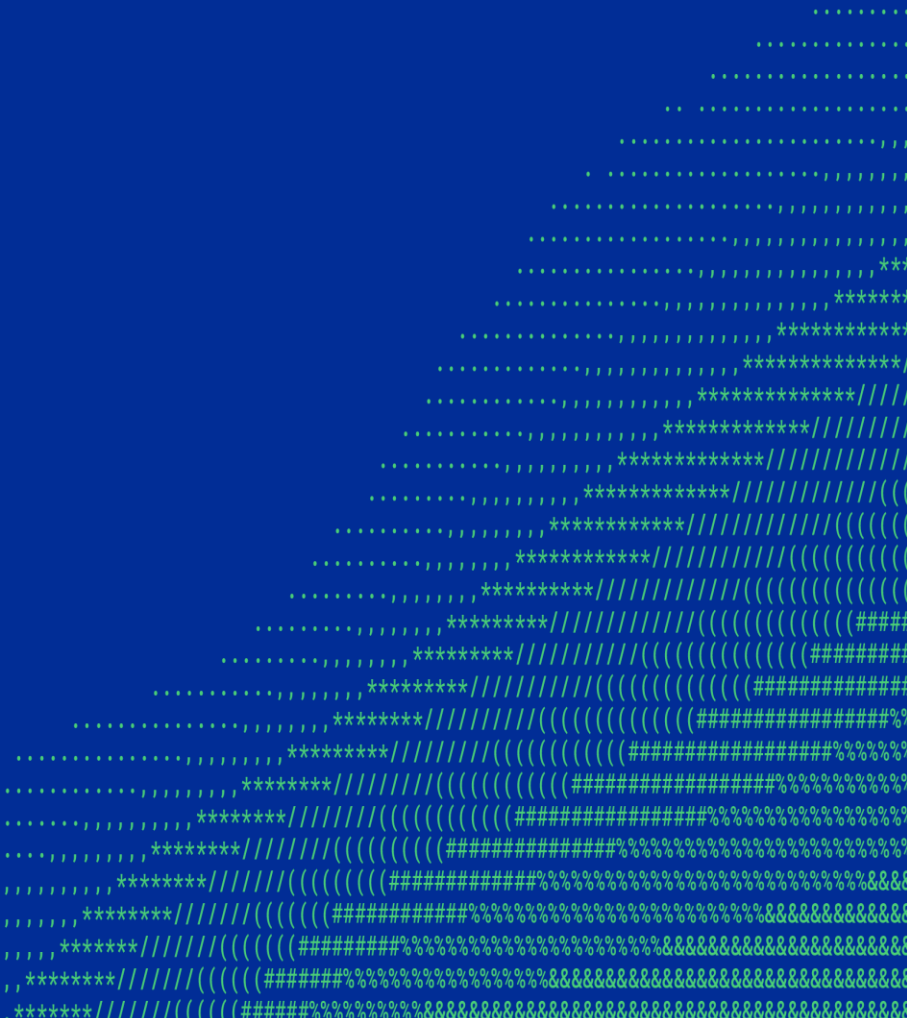
X-Road customers

52,000

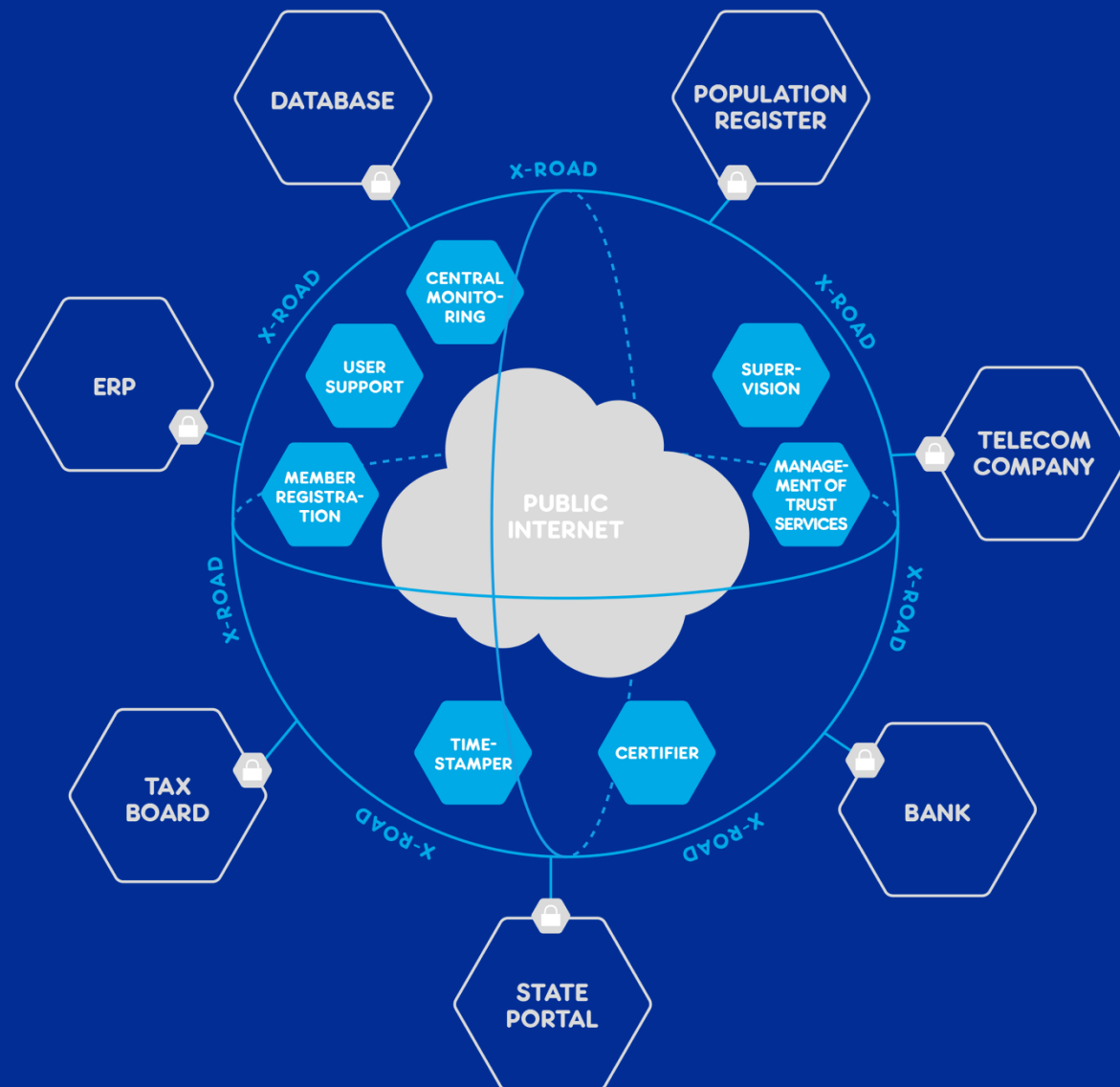
companies and authorities
using X-Road indirectly

1.35 M

authentications and digital
signatures every day



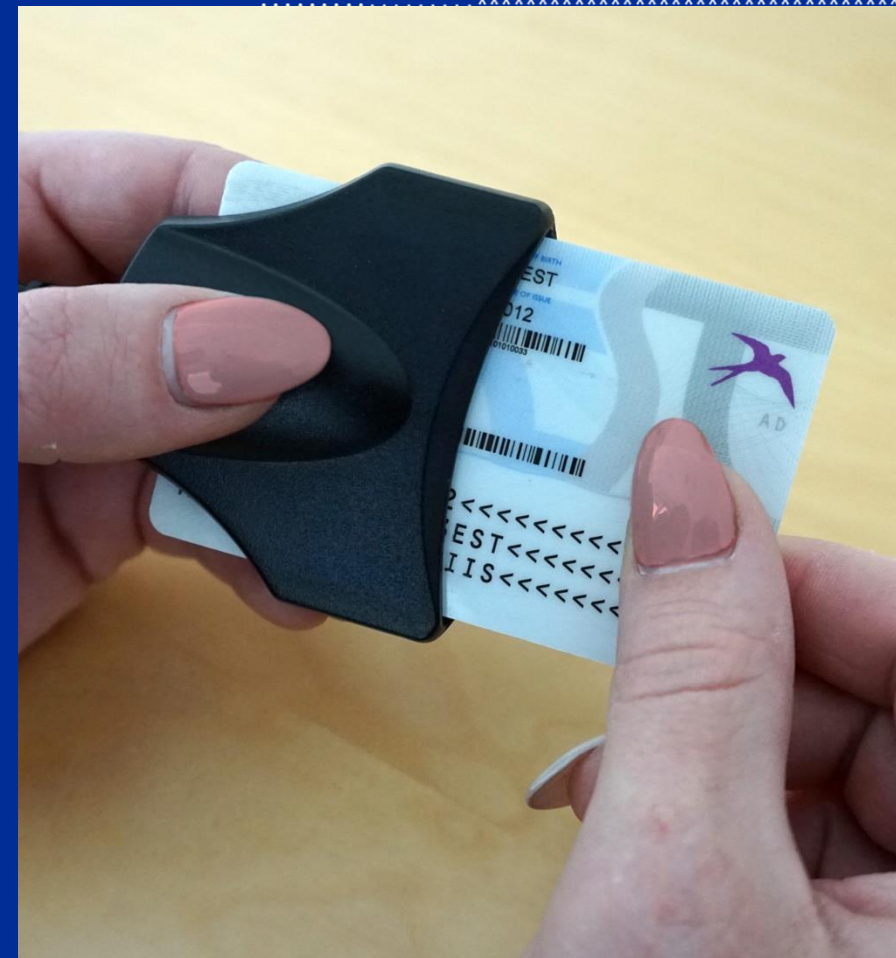
- One of the foundations of the e-State
- Over 1.800 customers
- About 52.000 companies and authorities using the X-tee services indirectly
- Over 4700 data services
- X-Road development with Finland and Iceland (NIIS)





Electronical identity

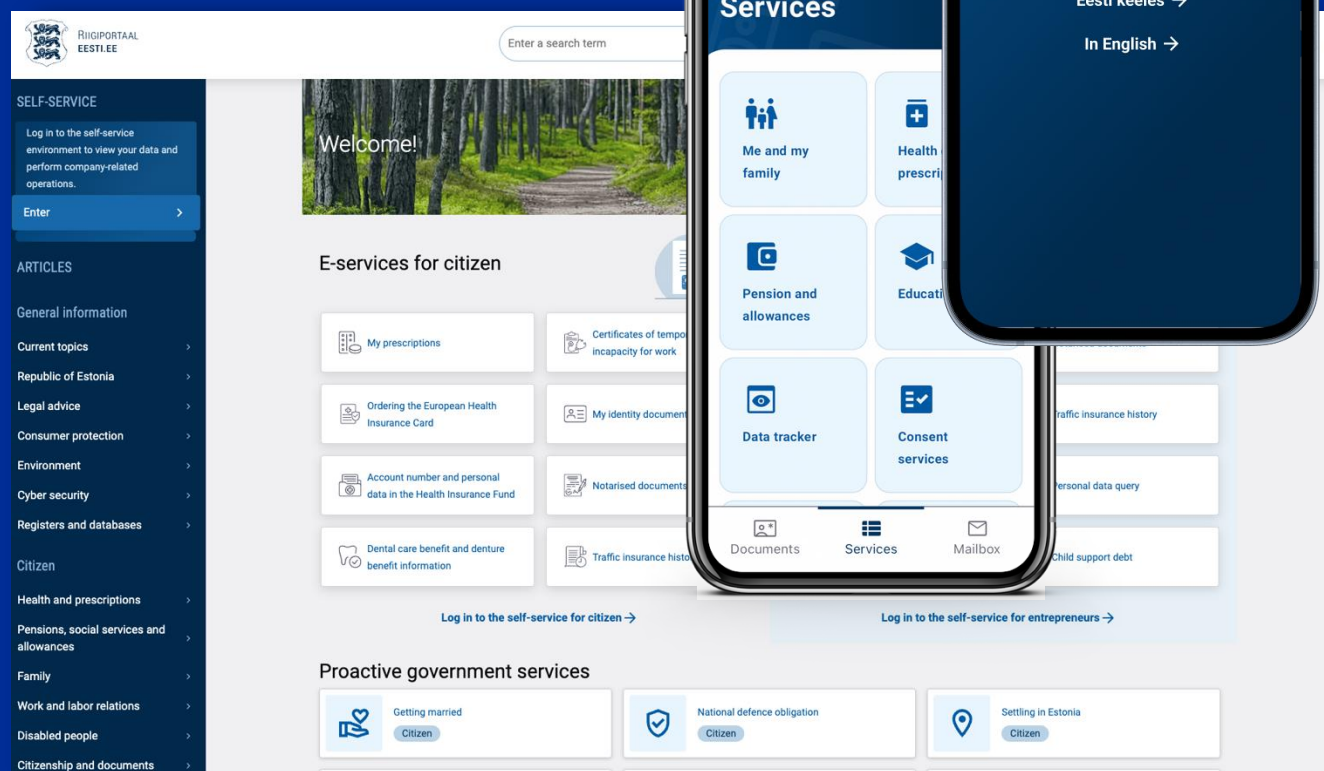
- | | |
|------|---|
| 2002 | first digital signature |
| 2017 | eID has become a vital service |
| 2025 | 1.3 million active ID-cards |
| | 222.500 Mobile-ID users |
| | 781.000 Smart-ID users |
| | 1.35 million authentications and digital signatures every day |
| | more than 71.6 million authentications with State Authentication service per year |
| | more than 8.2 million signatures with Digital Signature Gateway Service per year |





State Portal & Eesti App

- Reliable and up-to-date information
- Services aimed at entrepreneurs, including mailbox service
- 6.6 million visits per year, 72% of visits were logged into the portal
- 4 million notifications are sent to @eesti.ee addresses per year
- Data Consent Service – almost 0.5 million consents have been given
- Event services





Our Approach to PQC Migration

- Estonia's public services are deeply reliant on digital infrastructure, so PQC migration priority is critical
- Research for most complex systems is ongoing (eg i-voting and the X-Road data exchange layer)
- Need to start today to meet target timelines
- Learning and sharing with other countries (NIS CG PQC workstream, QARC)

National Coordination of PQC

COORDINATOR

Ministry of Justice and Digital Affairs

TECHNICAL PARTNER

Information System Authority (RIA)

MANDATE

Roles set by ministerial decree

ROADMAP

National PQC Roadmap published in April 2026



National Roadmap

- Roadmap & Handbook (a 150-page compendium)
- 2030 high-risk use cases; 2035 the rest
- The timelines are based on a risk analysis, NIS CG WS PQC Roadmap and major technology platform migration schedules
- Draws on the AIVD, CWI and TNO “The PQC Migration Handbook. 2nd Edition” (2024)
- Author: Cybernetica AS, R&D IT company



National Roadmap

- Risk and impact analysis
- Translated key sections of the NIS CG PQC roadmap
- Guidelines: steps and timeline
- Current state of PQC readiness in Estonian organisations
- Overview how other nations approach the transition
- CADI (Cryptographic Asset Discovery and Inventory) methods appendix



National Roadmap

4 steps for every organization:

- Dependency mapping
- Cryptographic inventory
- Prioritization
- Migration

HOWEVER:

- **Don't wait to apply PQC-enabled updates (TLS etc)**
- Dependency mapping
- Cryptographic inventory
- Prioritization
- Migration



X-tee (X-Road) path to PQC

Cryptographic Inventory & Risk Assessment

COMMISSIONED BY
NIIS

CARRIED OUT BY
University of Tartu

2025–2026

Implementation and testing

COMMISSIONED BY
RIA
X-Road owner and operator

CARRIED OUT BY
NIIS
X-Road developer

2026–2028

Applied Research

COMMISSIONED BY
Estonian Research Council and RIA

CARRIED OUT BY
Private Company

Target: 2030

Pilot project: register migration plan

01

Architecture
diagrams

How the system and its
parts connect

02

Cryptographic
components

Mapping where
cryptography is used

03

Vendor
dependencies

Most components rely on
suppliers

04

Action plan

11-step action plan

05

Lessons learned

Reusable for other
registries

COMMISSIONED BY
RIA

DURATION
2025-2026

CARRIED OUT BY
Cybernetica AS



Approach to NIS2 subjects

- NIS2 subjects need to adhere to the Estonian Information Security Standard
- The standard is developed by RIA
- The plan is to add requirements regarding PQC to the standard



Challenges

- Central services make it both easier and more challenging to migrate
- Services depend on each other
- ETSI standards still settling
- Earlier deadlines would reduce the risk, but even 2030 is demanding



Working together across EU

NIS Cooperation
Group PQC Workstream

Coordinated EU Roadmap

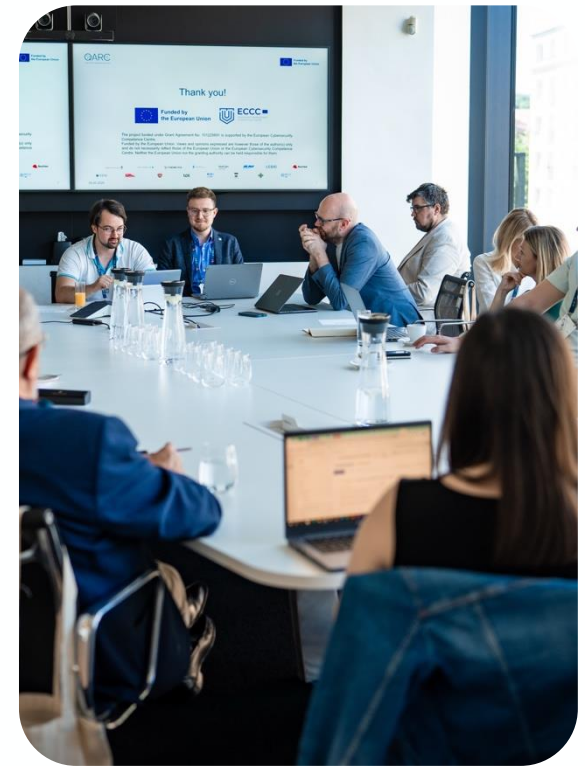
QARC:
Quantum-Resistant
Cryptography in
Practice

EU-funded project (2026-2028)



QARC | Quantum-Resistant Cryptography in Practice

- **Facilitate national transitions** to PQC
- Develop **practical applications** of PQC across Europe's critical digital infrastructure
- **18 partners** (universities, companies and national agencies)
- Project is coordinated by Brno University of Technology and runs through 2026-2028





QARC | Collaboration opportunities

National Agencies

- Knowledge Exchange
- Joint recommendations
- Workshops
- Possible to join as an Associated Partner or individual events



Thank you!

Lauri Tankler

lauri.tankler@ria.ee

Kaisa Lindström

kaisa.lindstrom@ria.ee

