CYBERNETICA

X-Road – paving the way to Industry 4.0?

Alar Jõeste
Project manager
alar.joeste@cyber.ee

For a more secure and safe world.

X-Road, the beginning…

- Many registries, all very different, managed and developed by different organizations and financed separately.
- A lot of organisations, most of them very small without security knowledge, without considerable IT capability and with a very small IT budget.
- Very high security requirements. Registries contain personal data that is in some cases used to make high value decisions and in some cases needed in real time.

High-level Requirements

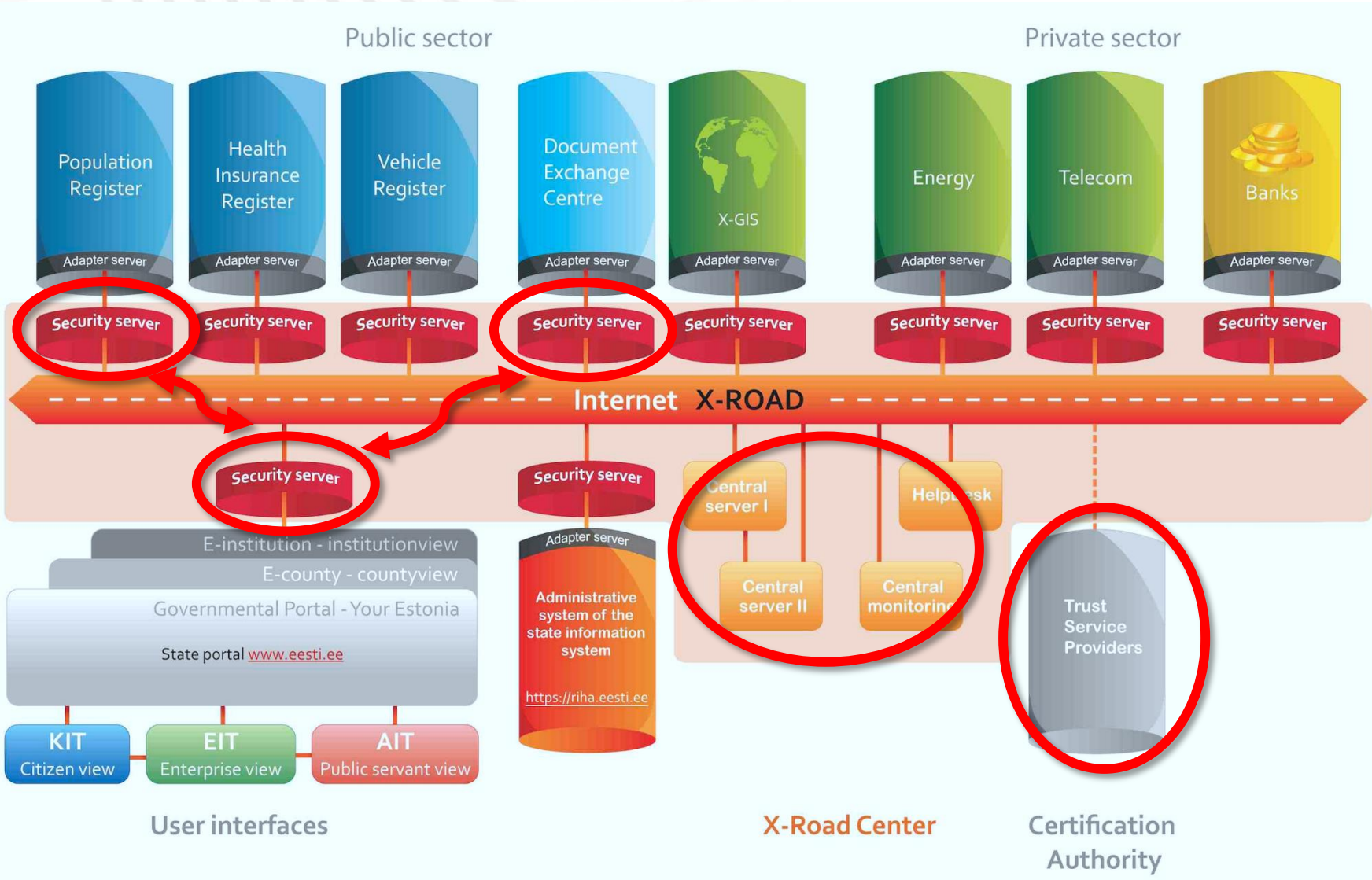
- System must be based on collaboration, not on centralization
  - System must be distributed
  - Data ownership must remain unchanged
- Public sector communication is based on the concept of exchange of documents
  - Every transaction creates liability
- Existing organizational and functional structure must be maintained, major legal changes must be avoided
- System must support cross-border and cross-domain usage

X-Road

- Backbone of the Estonian government

  Unified, secure and distributed way of communication for government organisations

- In active service since 2001
- Over 2000 services
- More than 900 connected organizations, public registers and databases
- Over 450 mil. transactions per year
- Steady growth of usage



Source: https://www.ria.ee/x-road/

CYBERNETICA

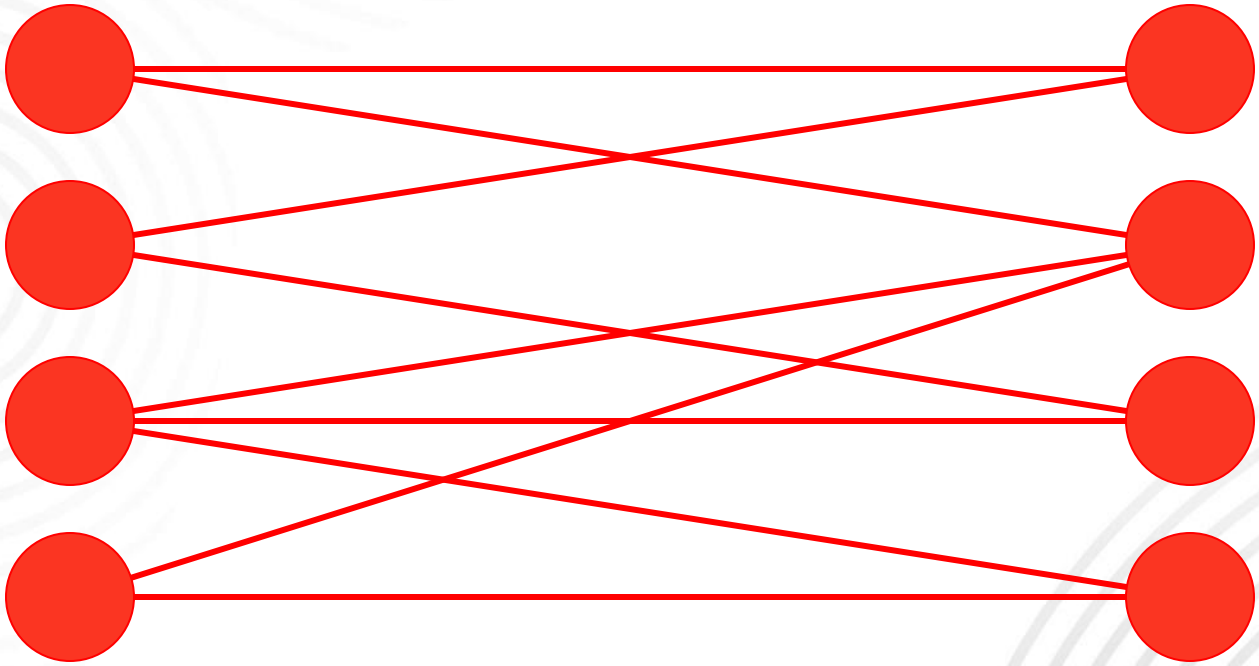
Benefits of X-Road

- Organizations could concentrate on their main business processes. Secure data exchange is not a first priority for them.
- Secure data exchange is priority as whole
- It must be easy to exchange data securely

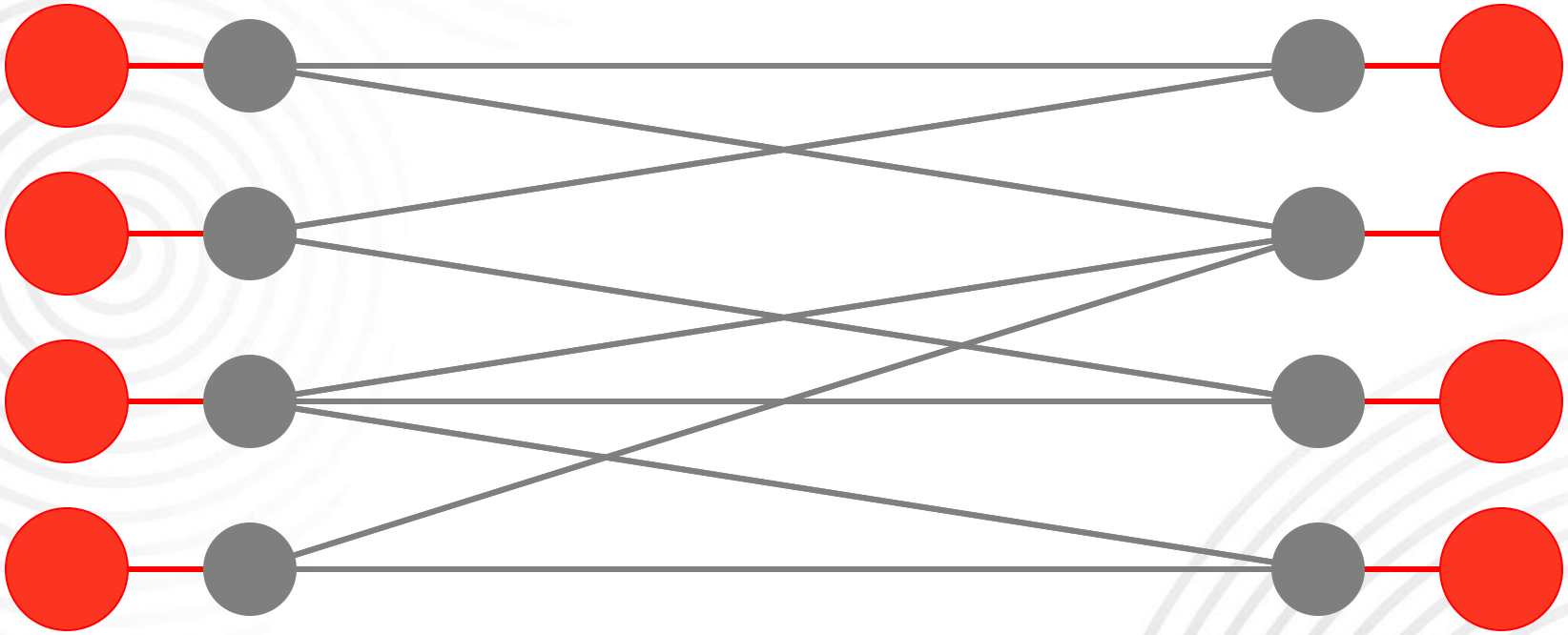
It’s easy to connect everything to Internet...

... problems will arise if they start to communicate

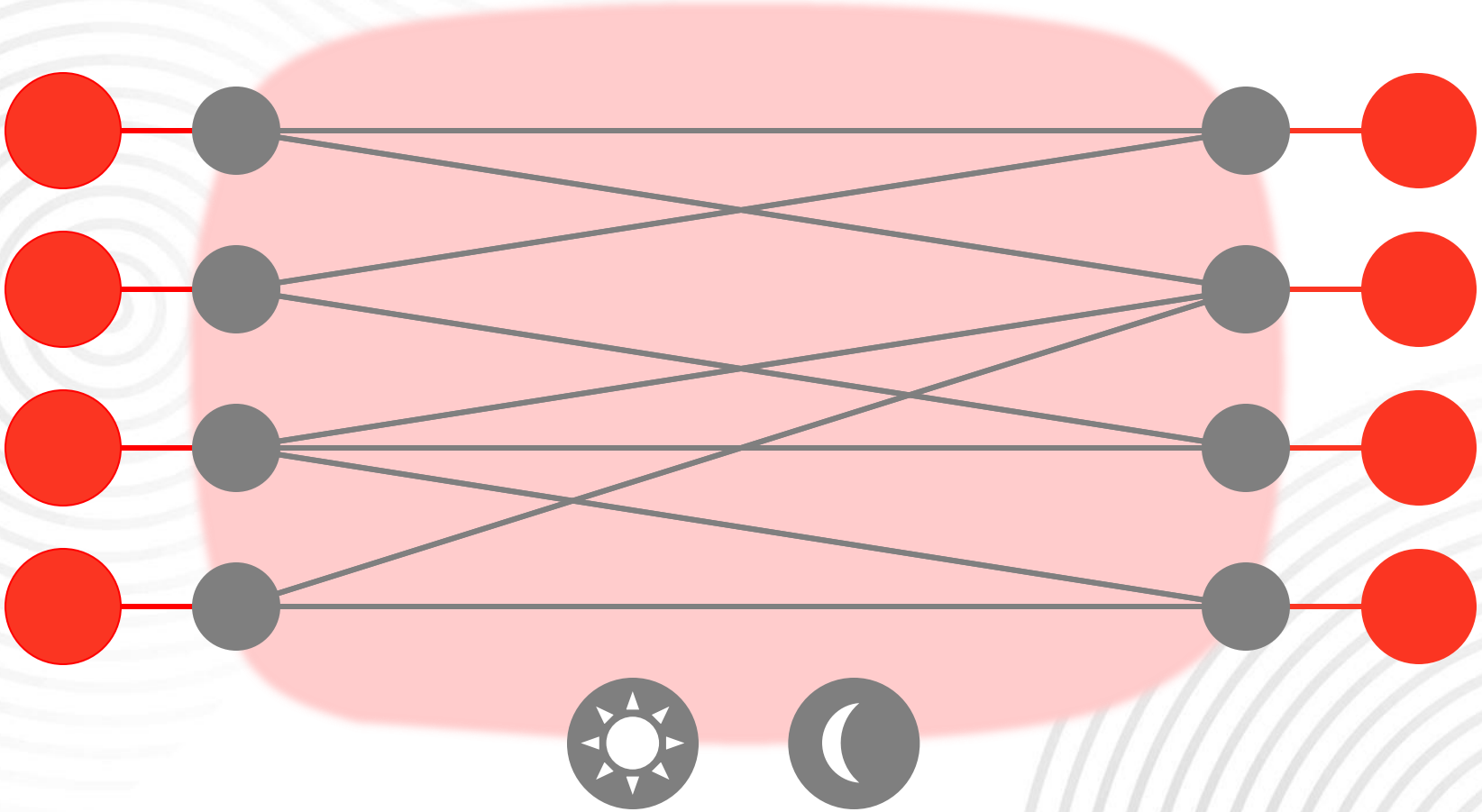
X-Road/IoT Architecture



X-Road/IoT Architecture



X-Road/IoT Architecture



CYBERNETICA

Can X-Road be used in industry?

- Unified way of data exchange ☑
- Distributed system, based on collaboration ☑
- Data security, authenticity ☑
- Unified API ☑
- Scalable ☑

X-Road is Unified data eXchange Platform! ☑

Use-case: Estfeed

- **Software platform that allows collect building electricity, district heating and gas smart-meter readings**, and transmit them to energy consumers or to their authorized agents.
- **Data services allow end users to benefit directly through savings or more flexible service terms.**
- Energy quantities, indicators and monitoring are separate fields of operation, which will become more important in time. The historically unitary monopolistic system is now undergoing change, where data sharing has great importance for free market operations and other parties' commercialization.
- **Fast, verifiable data availability makes the energy market substantially more efficient.**

http://www.estfeed.ee

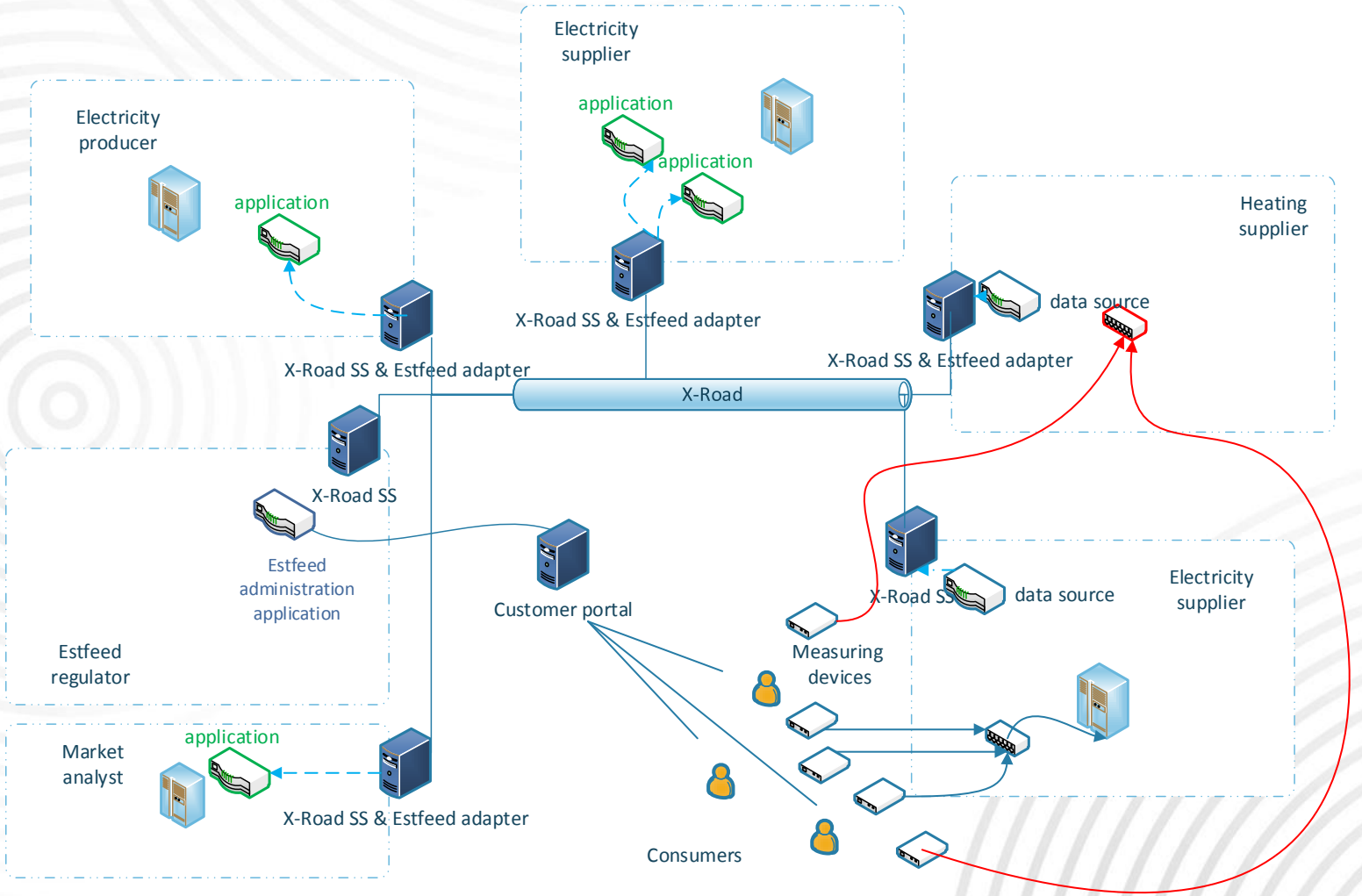
Estfeed -- Applications to start

- Ampere planner
- Heating grid monitor
- Virtual power plant
- Micro generation planning tool
- Consumption aggregator

Estfeed – System Components

- X-Road – Unified data eXchange Platform
- Estfeed adapters – domain specific interfaces to share and collect data (inc. additional rules & restrictions, publish-subscribe, end-user management etc.)

Estfeed – System Architecture



Estfeed - More energy efficient road to go

- Informed consumer.
- Grid gets more transparent.
- Energy consumption gets more needs-based.
- Causes stability in the grid and allows to regulate load and reliability.
- More tools to use in future

Connected X-Road instances

- Members of different X-Road instances can communicate directly with each other
  - Mutual recognition of trusted service providers and digital signatures
  - Mutual recognition of identities
  - Mutual recognition of security categories
- Domain specific instances (energy, health?)

Thank you!

alar.joeste@cyber.ee

CYBERNETICA