eHealth in Estonia

PROF. **PEETER ROSS**, MD, PHD

TALLINN UNIVERSITY OF TECHNOLOGY, ESTONIA

EAST TALLINN CENTRAL HOSPITAL, ESTONIA

CONSULTANT OF THE WORLD BANK AND ASIAN DEVELOPMENT BANK

E-GOVERNANCE CONFERENCE 2019

22. MAY 2019

SWISSOTEL, TALLINN

1918 TALLINNA TEHNIKAÜLIKOOL
TALLINN UNIVERSITY OF TECHNOLOGY

HCT Health Care Technology

Content

- Background and first steps of implementation of Estonian Health Information System (EHIS)
- Design of a solution
  - Findings and results
- E-health strategy 2020
- Motivation to create new services

Facts about Estonia

Background & first steps of implementation of EHIS in Estonia

Solution design

IHAN

International Human Account Number

Motivation to create new services

Facts about Estonia

- **Basic facts**
  - Population is 1,3 million
  - Every citizen has unique ID-code
- **Health care system**
  - Compulsory solidarity based health insurance paid by employers; 13% of payroll tax (95%)
  - Health care costs make up to 6% of GDP (9,5% in OECD)
  - Healthcare providers are private, municipal or governmental
  - Hospital system – publicly owned private hospitals
  - General practitioners are private entrepreneurs

- **Facts about e-services**
  - 90% of households have broadband connection (2018)
  - 82% of households using a mobile internet connection (2017)
  - 96% of income tax declarations are made via the E-Tax Board (2017)
  - 44% of votes were cast over the internet on (2019)
  - 99% financial transactions (bank transfers) carried out electronic

- **General**
  - NATO Cooperative Cyber Defense Centre is located in Estonia (2008)
  - Skype is made in Estonia

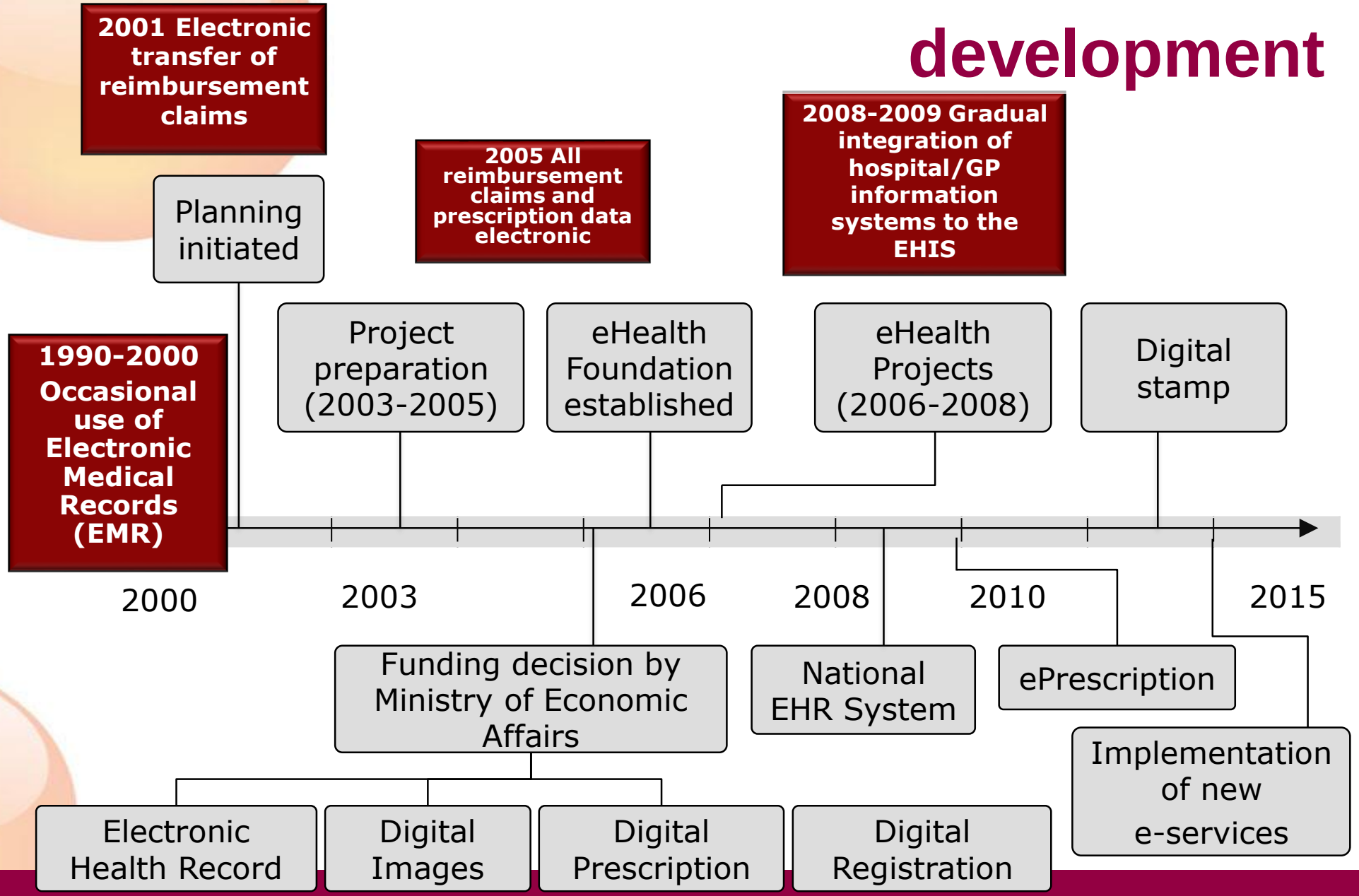
CCDCOE
NATO Cooperative Cyber Defence Centre of Excellence Tallinn, Estonia

Skype

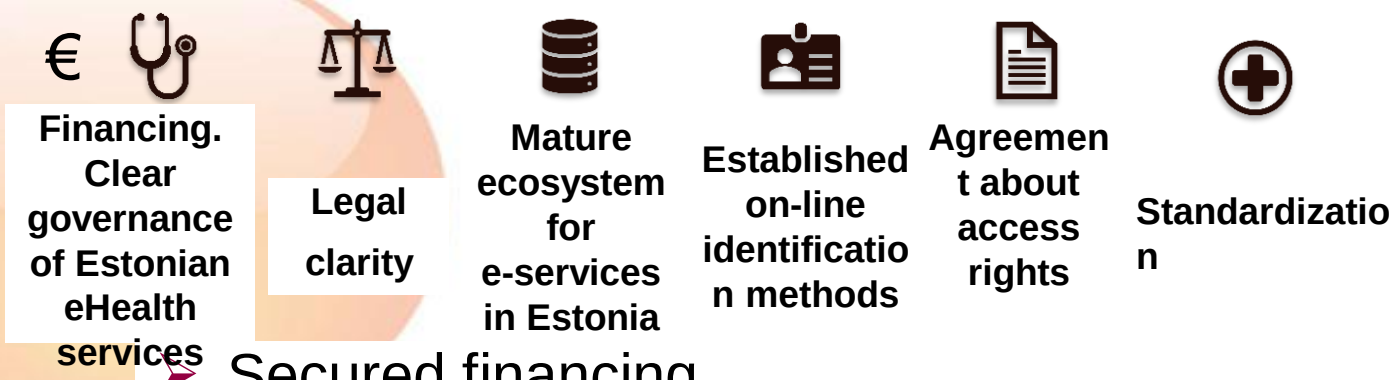
Estonian nation-wide Health Information System (EHIS)

- The Estonian Health Information System is unique as it
  - Encompasses the whole country
  - Registers virtually all residents' health history from birth to death, and
  - Is based on the comprehensive standard based IT infrastructure

EHIS and health care IT development



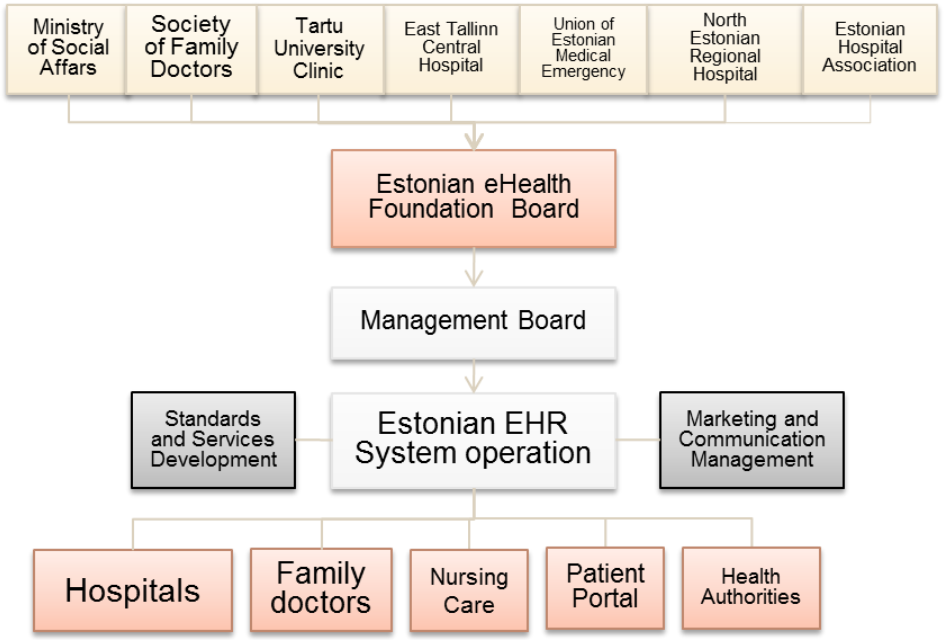
Main drivers



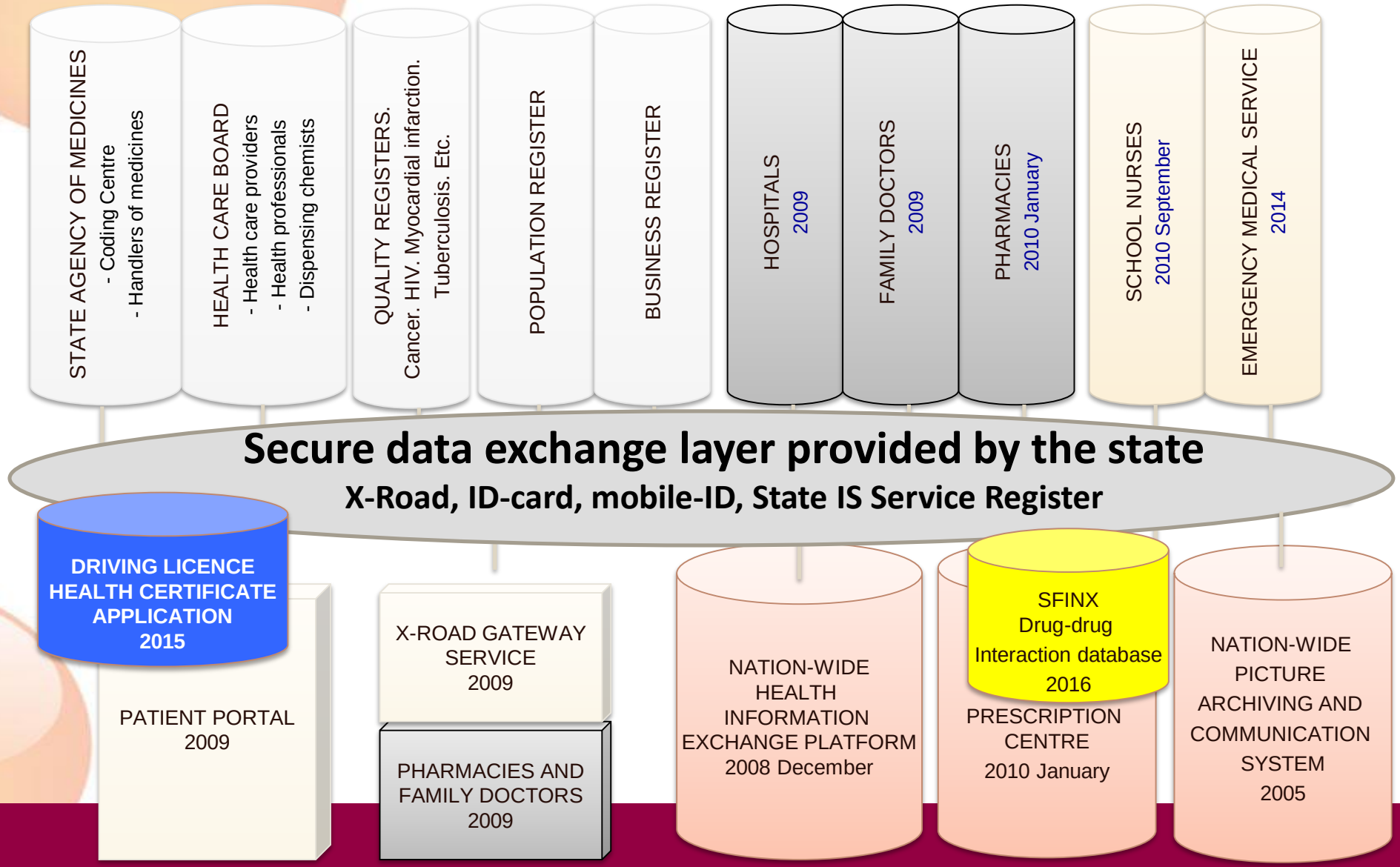
- Secured financing
  - Ministry of Economy and Communication
    - Not Ministry of Health (eHealth is not in top 3 priority)
- Clear governance of Estonian eHealth services
  - Estonian Health and Welfare Information Centre (Estonian E-Health Foundation)
- Legal clarity
- Mature ecosystem for e-services in Estonia
  - Secure data exchange platform provided by the state
- Established on-line identification methods
    - ID-card
    - Mobile-ID
- Agreement about access rights
- Standardization
  - Medical data
  - Data exchange

Governance

- One responsible organization – eHealth Foundation
  - Founders were main stakeholders orchestrated by Ministry of Social Affairs
- We missed support of one major stakeholder
  - Estonian Medical Association – Professional association of medical doctors
- Parties not involved
  - Patients´ societies or associations



Architecture of Estonian Health Information System (since 2008)



eHealth services in Estonia

Exchanged data

- Available documents
  - Time critical data (allergy, chronic diseases)
  - General practitioners and hospital visits
  - Summary of ambulatory and stationary case
  - Link to medical images
  - Referral letter

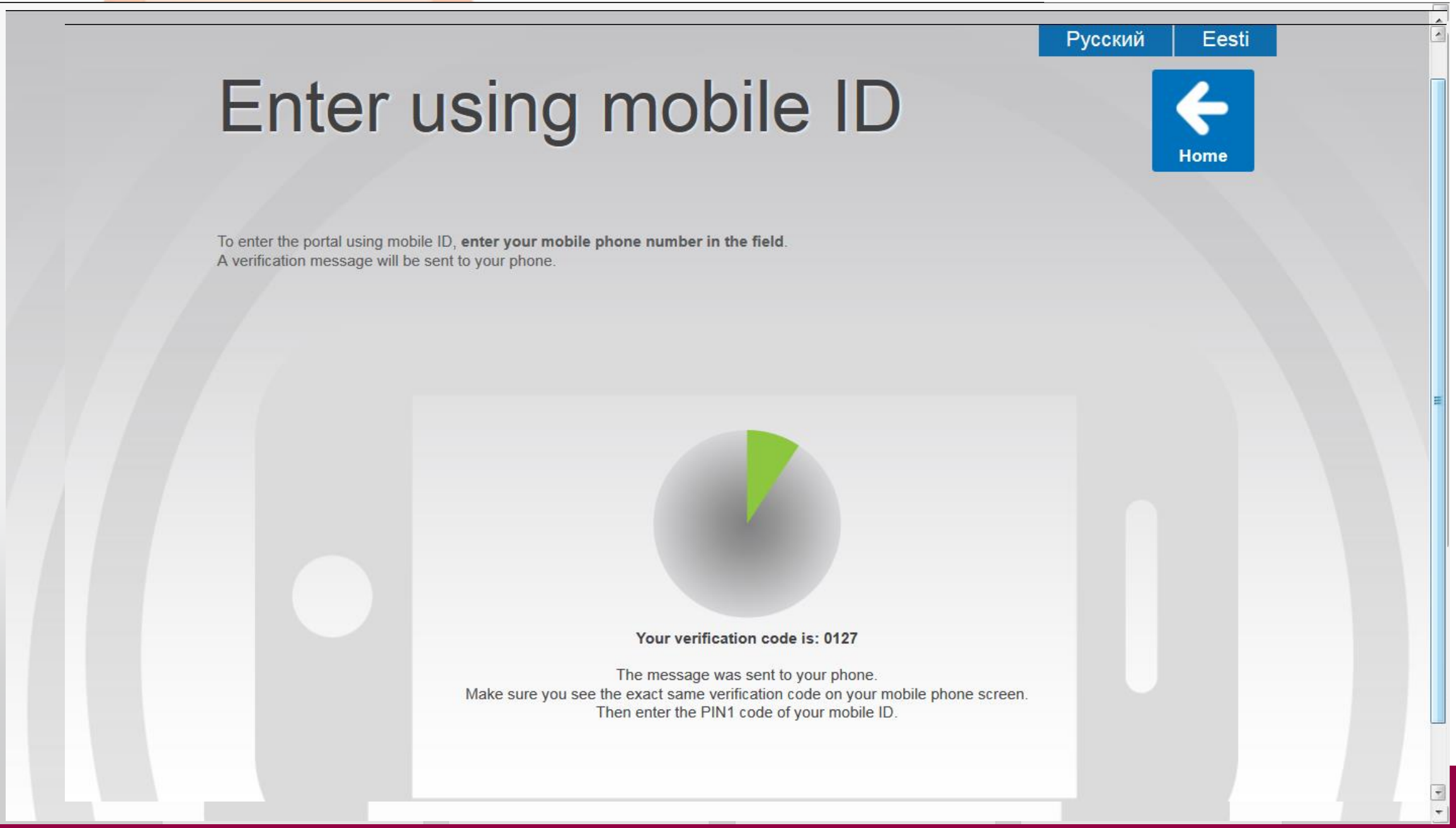
Nation-wide EHR System services

- ePrescription
- eReferral
- eAmbulance
- Drug-drug interaction service
- Country-wide digital images

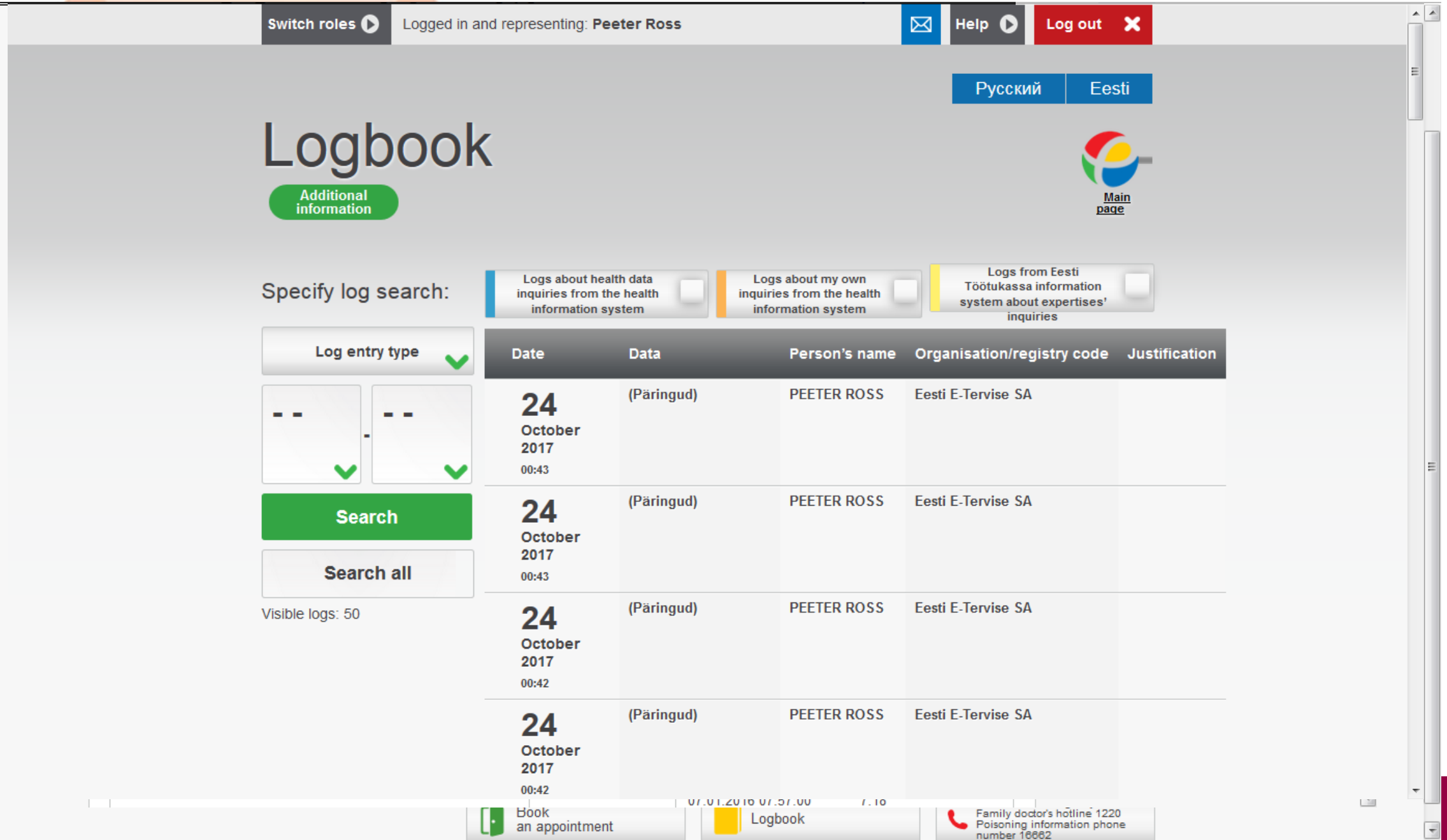
Cross-sectoral services

- Health declaration for driver licence exchange
- Working incapacity assertion

Patient Portal



Patient Portal



Legal environment of eHealth

- The Health Services Organization Act regulates the development and maintenance of the health information system
  - Lays down the necessary requirements to the patient, health service provider, document standards, etc.
- All healthcare providers must send certain health data to EHR System
  - The set of documents is defined by the law
- Access only to licensed medical professionals
  - The attending doctor concept
- Patient has the right to close own data (*opt out*)
- The ethical committee was created to lead the discussions of patients' rights and to select the proper system for the EHR System
- Citizen can
  - Access their own data
  - Declare intentions and preferences

Major architectural decisions of EHIS

Integration through Central system

- Only final versions of clinical documents sent to central system

Opt-out policy in form “patient can close data from doctors“

Use of standards

- XML based HL7 v3 (extended) messages
- Documents are kept in XML format (HL7 CDA R2)
- All identifiers have OID-s

Reuse of national infrastructure

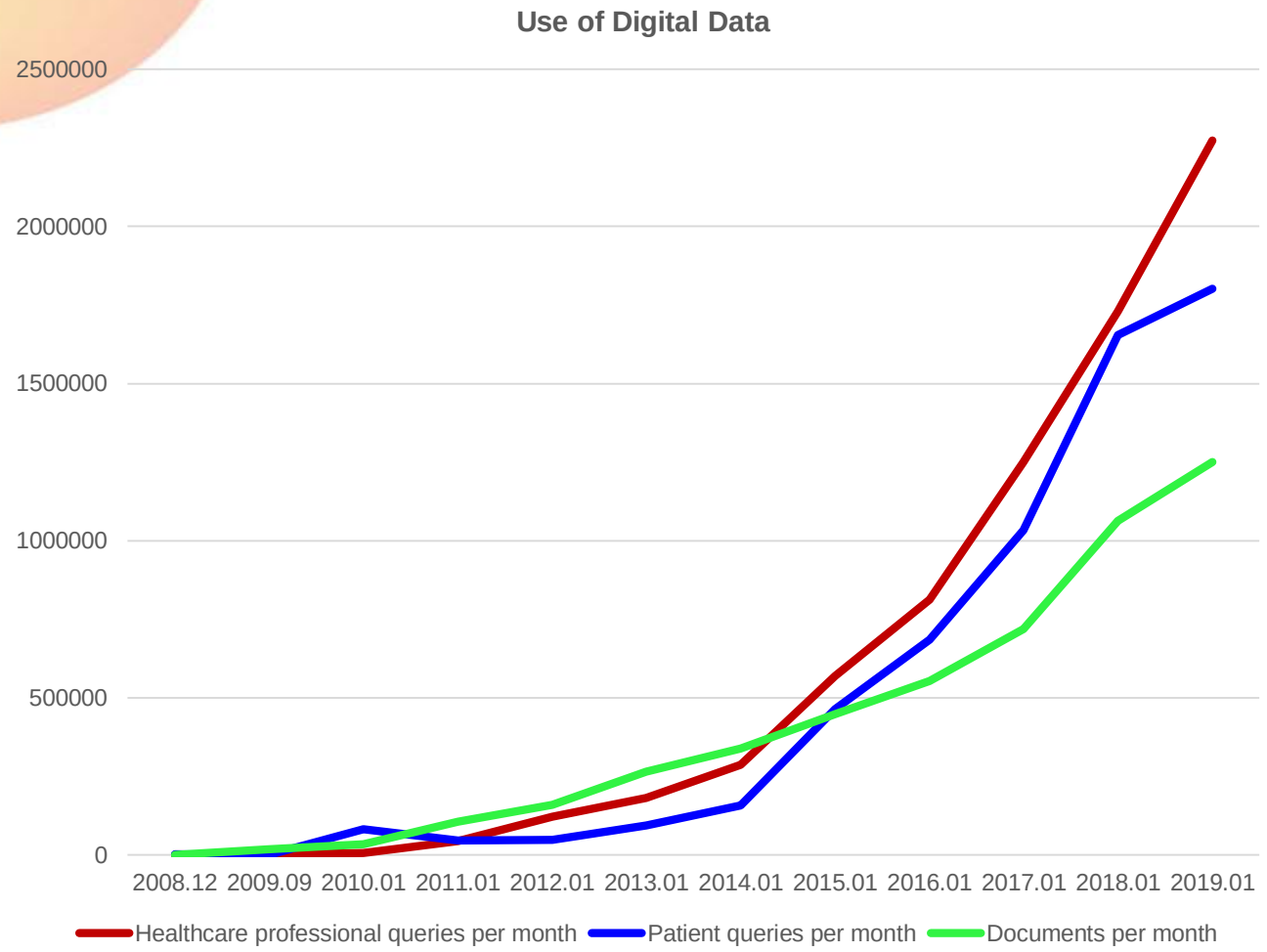
- ID-card or mobile-ID for authentication and digital signature
- X-road (state service bus) for secure communication
- Personal ID-number to identify a person and connect data in different systems

FINDINGS

Current situation (January, 2019)

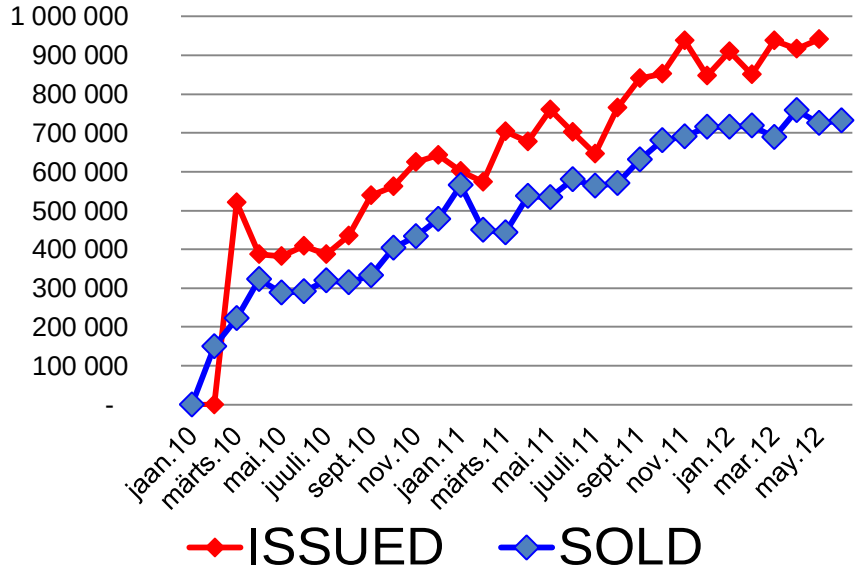
- **40 660 000** medical documents
  - 14 different documents
- Health information about 1.6 million inhabitants (Estonia has 1.32 million inhabitants)
- Out-patient case summaries – 21 million
- Exam reports – 10.5 million
- In-patient case summaries – 1.91 million

Use of digital data



ePrescription, Estonia

99% of prescriptions are issued in electronic form



L. Parv et al.

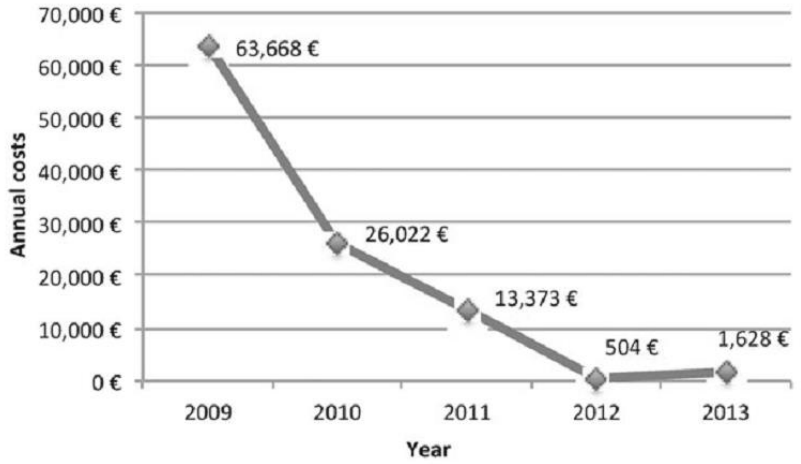
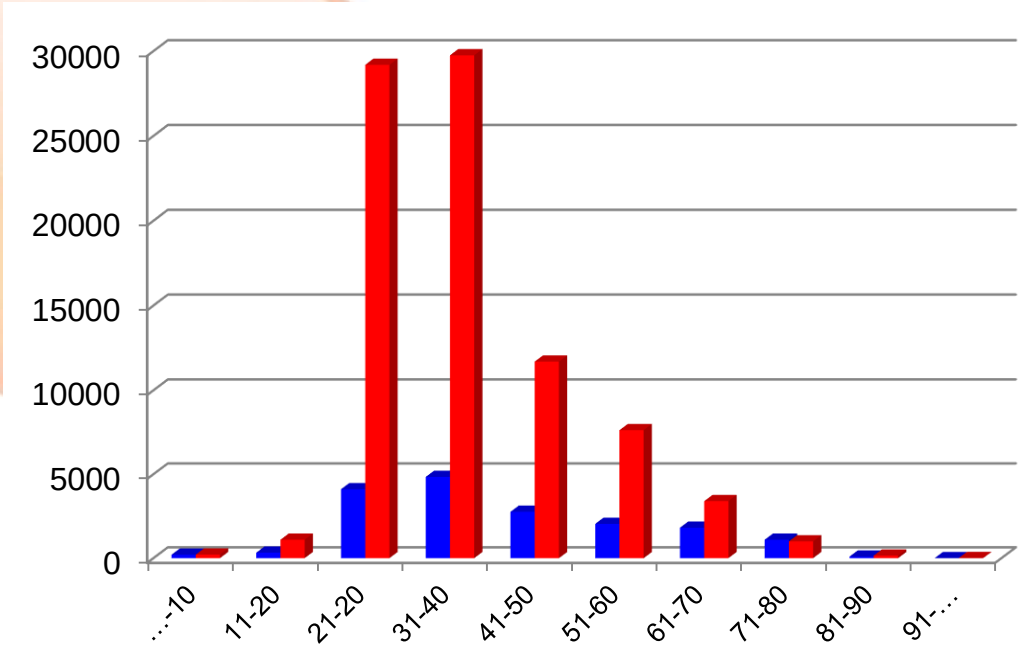


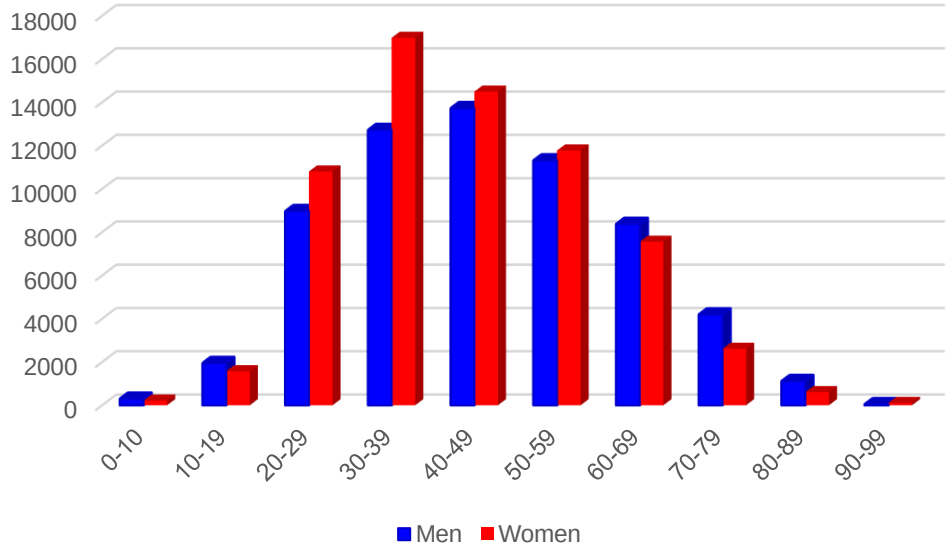
Figure 4. Prescription forms bought by the EHIF in 2009–2013.



iPatient Portal users 2012

Logins to iPatient Portal in 2012 and Patient Portal Users in 2015 by age and gender

Patient Portal users 2015



2015

Estonian eHealth Strategic Development Plan 2020

Euroopa Liit
Euroopa Sotsiaalfond

Eesti tuleviku heaks

The Strategic Development Plan was developed by the Task Force operating within the Government Office from July 2014 to November 2015. The materials created by the Task Force on which the development plan was based are available at http://etervis2025.sm.ee/.

The activities of the Task Force were financed from the activity Task Forces and Expert Groups of measure 12.2 "Development of Policy-Making Quality" under priority direction 12 "Administrative capacity" of the application plan of cohesion funds 2014–2020 financed by the European Social Fund.

Estonian e-health Strategy 2020

Estonian eHealth Strategic Development Plan 2020

- **eHealth vision 2025**
  - **eHealth vision for year 2025** describes the desirable future state of offering of health care services in Estonia at the era of information society.
  - The present vision focuses on the health of people and the health services offered, including the labour market and welfare services related thereto. Thus, the vision associates eHealth also with other areas related to it, in order to ensure their alignment.

Estonian e-health Strategy 2020

Estonian eHealth Strategic Development Plan 2020

FIVE FOCUS AREAS

- **1. High-quality health information and an infrastructure of health data.** Data acquisition is of high quality and data acquisition is efficient from the place of creation until the availability to different users.
- **2. Focus on persons and personal medicine.** People participate in active management of their state of health. Person-based health and gene data analysis and digital decision support allows to offer better targeted services.
- **3. Comprehensive case management and cooperation of organizations.** The provider(s) of health care services and the persons themselves have comprehensive information about the state of health and the action plan of different parties. Health services are smoothly integrated with the social and labour market services.
- **4. Effectiveness of health services and capacity for analysis.** Measure and analyze the effectiveness of the services at all levels of the system.
- **5. Development of remote services.** Possible to achieve a

International Human Account Number (IHAN)

- Deployed by Finnish Innovation Fund SITRA in 2018
- Establish key principles, rules & guidelines for human-driven Data exchange Platform. Build awareness and engage people across Europe
- Test, develop and scale Platform to multiple industries and EU countries. Ensure interoperability through technology Proof-of-Concepts
- Develop common Roadmap for fair Data exchange Method. Build Common Governance Model

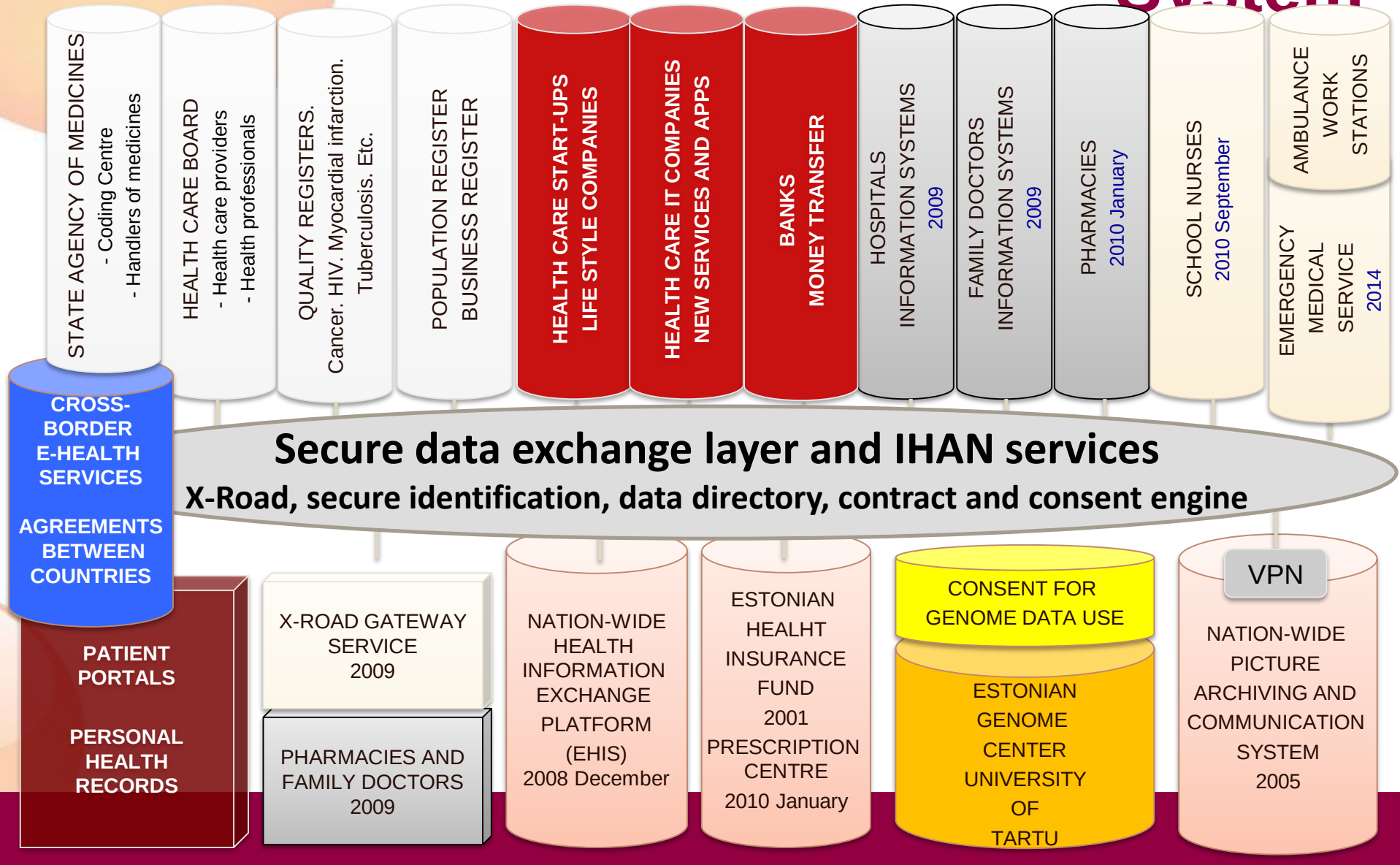
Motivation to create new services

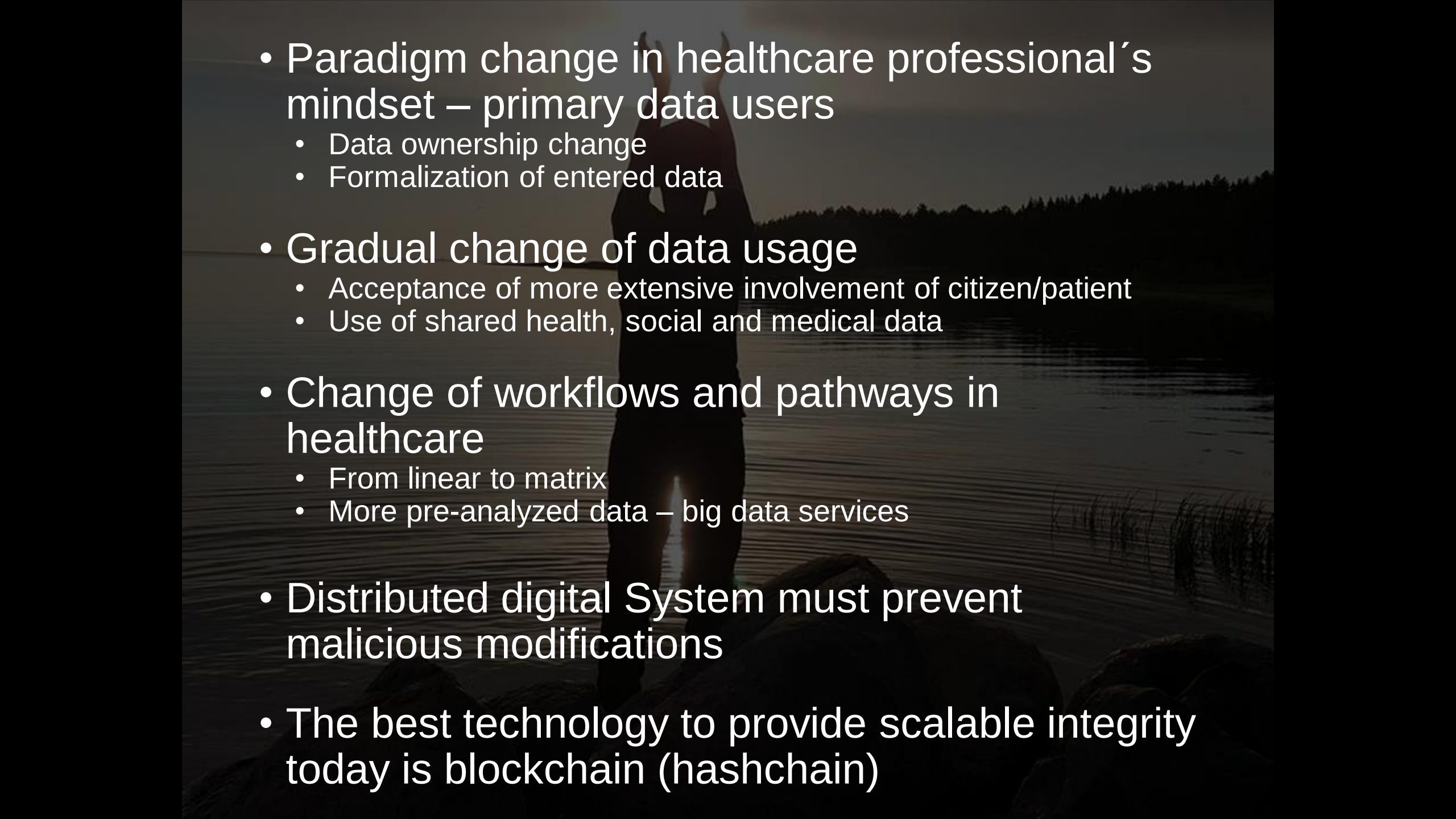
- EHIS is limited to government provided services
- Integration of applications from third party is cumbersome
- Development of new services is slow
- Consent mechanisms are not available for third party services
- Analytical services are hard to implement because of poor data quality
- Medical data is not what people are looking for – they are looking for services

Potential IHAN enabled services

Data services	• Decision support for data entering – increased data quality • Creation of specialty specific registries, classifications, terminologies • Analytics – care quality and performance
Health, medical and social care services	• Integration of different personal health/activity/life style records with governmental health care services • Wider use of apps in health and medical care • Consent engine for users
Cross-sectoral or cross-border services	• Integration of social and health care services • Creation of market for medical services • Opening medical market for innovation from ohter sectors

iHAN implementation in Estonian nation-wide Health Information System





- Paradigm change in healthcare professional´s mindset – primary data users
  - Data ownership change
  - Formalization of entered data
- Gradual change of data usage
  - Acceptance of more extensive involvement of citizen/patient
  - Use of shared health, social and medical data
- Change of workflows and pathways in healthcare
  - From linear to matrix
  - More pre-analyzed data – big data services
- Distributed digital System must prevent malicious modifications
- The best technology to provide scalable integrity today is blockchain (hashchain)

Thank you!

Peeter.Ross@ttu.ee