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# Public e-services in Estonia: e-health and beyond

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31.10.2013, Oslo

**Healthworld2013**



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**E-TERVIS**  
EESTI E-TERVISE SIHTASUTUS



Health Care  
Technology



**KLIINILISE  
MEDITSIINI  
INSTITUUT**

# Facts about Estonia



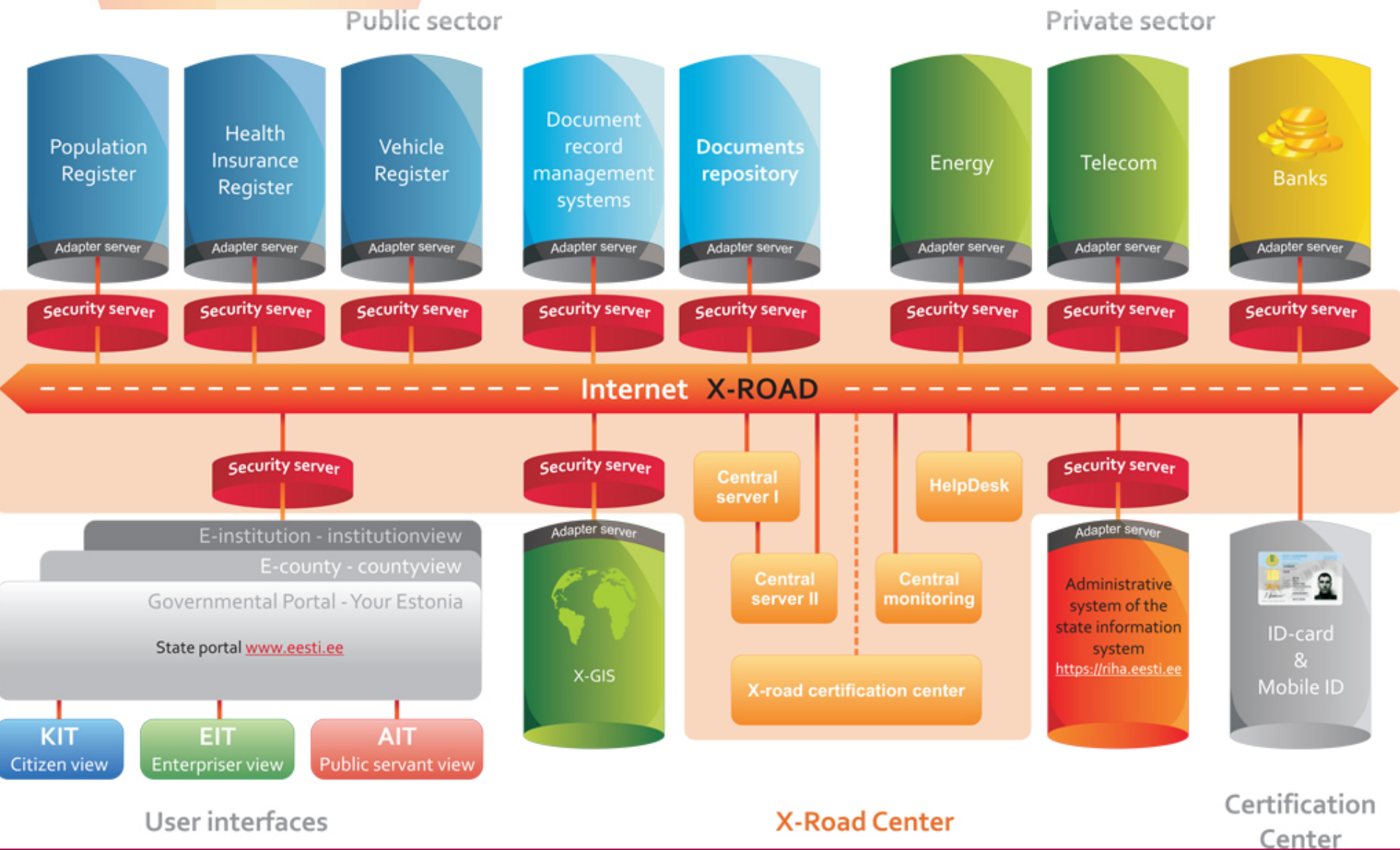
- Basic facts:
  - Population is 1,3 million
  - Area 45 227 km<sup>2</sup>
  - Native language is Estonian
  - Member state of the European Union since 2004
  - Income tax 21% (flat tax); Currency – Euro
  - Every citizen has unique ID-number (like in Scandinavia)
- Health care system
  - Compulsory health insurance paid by employers; 13% of payroll tax
  - 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

- 2000: Launch of e-Tax Board
- 2000: Launch of m-Parking
- 2002: Introduction of national electronic ID-Card
- 2003: Launch of ID bus ticket
- 2005: e-Voting was introduced
- 2007: Introduction of m-ID
- 2007: Launch of e-Police system
- 2008: Launch of e-Health system
- 2010: Launch of e-Prescription
- 2012: e-Census

# Estonian e-state architecture



# Facts about e-services

- Information society strategy 2001
- By 2013
  - All public services are digitally available
  - Public infrastructure is service oriented (x-road, e-ID, m-ID)
  - Data is stored where it is collected and exchanged between those who need it
- 100% of schools and government organisations have broadband connection
- 75% of households have internet access at home (2012)
- 99% of bank transfers are performed electronically
- 95% of income tax declarations made via the e-Tax Board (2013)
- 24% of votes were cast over the internet (2011)



# Estonian nation-wide Health Information Exchange platform (HIE)

- The Estonian HIE 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





# Basic components

- The HIE platform consists of 3 main layers
  - The secure internet-based data exchange layer
  - Health information exchange database and software
  - Application and service layer

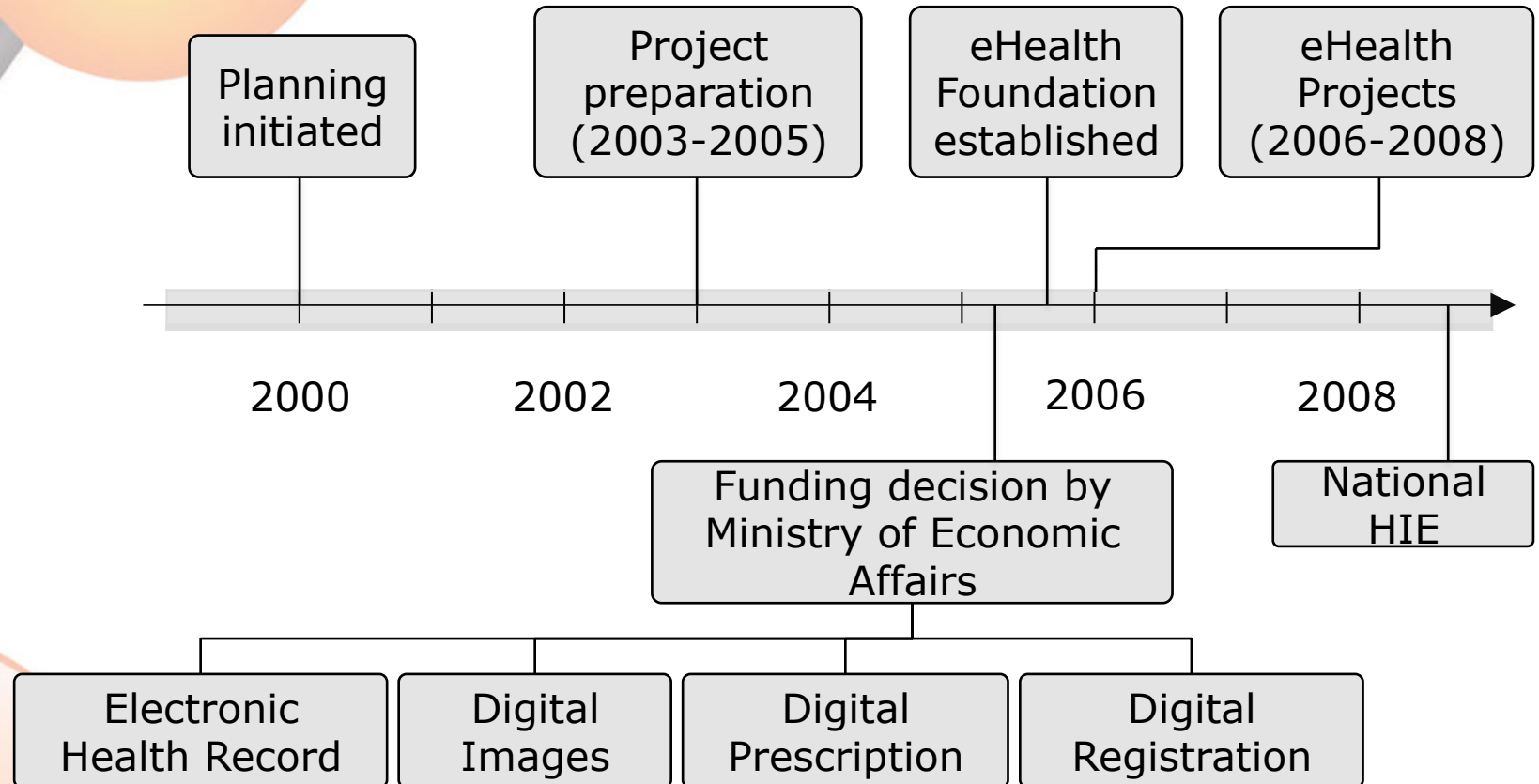




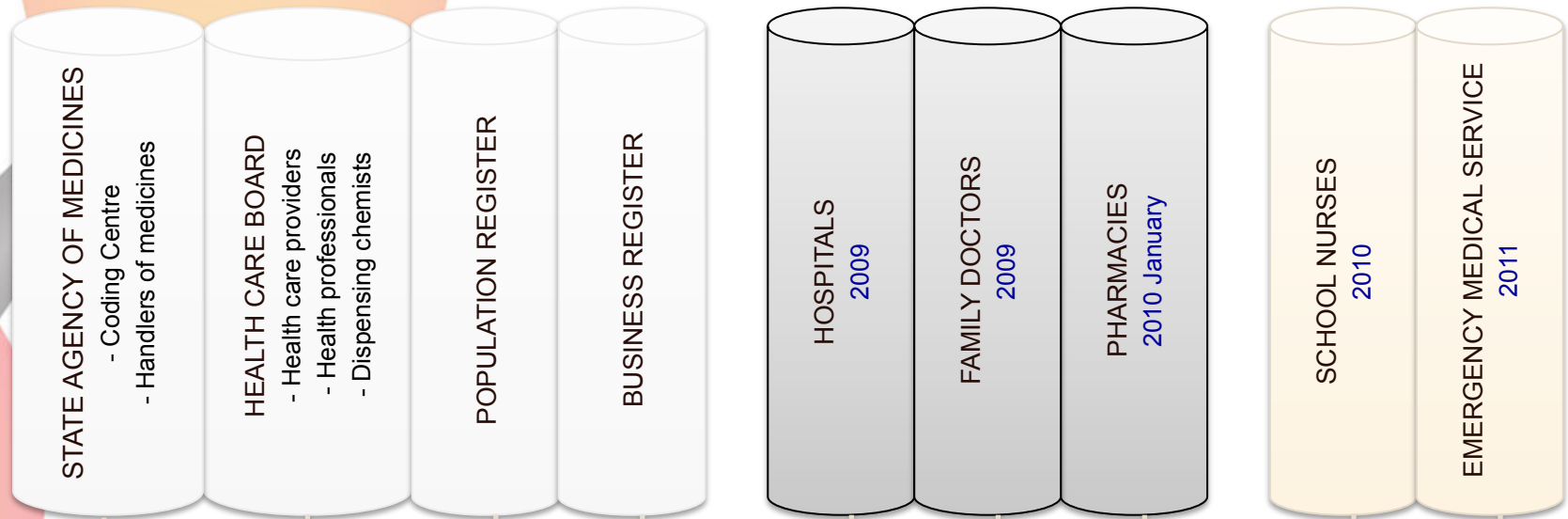
## Main characteristics

- The data exchange layer is a messaging middleware which works as system integration layer
- Based on usage of Web Services
- Meets high security requirements
- Works as a service bus
- Provides uniform way for the offering, discovering and using services
- Highly scalable

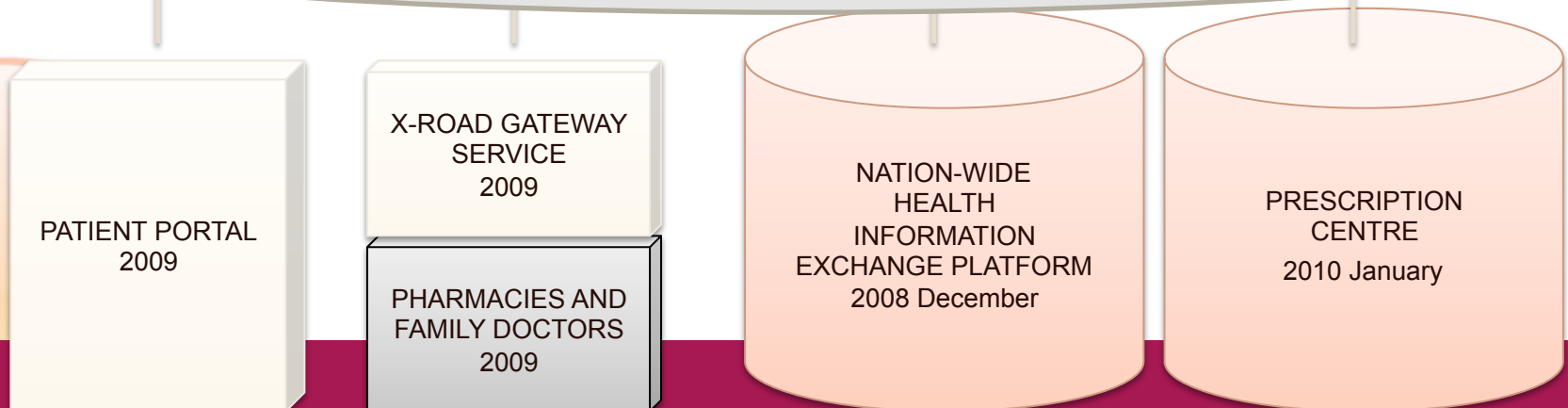
# HIE platform history



# Estonian eHealth architecture



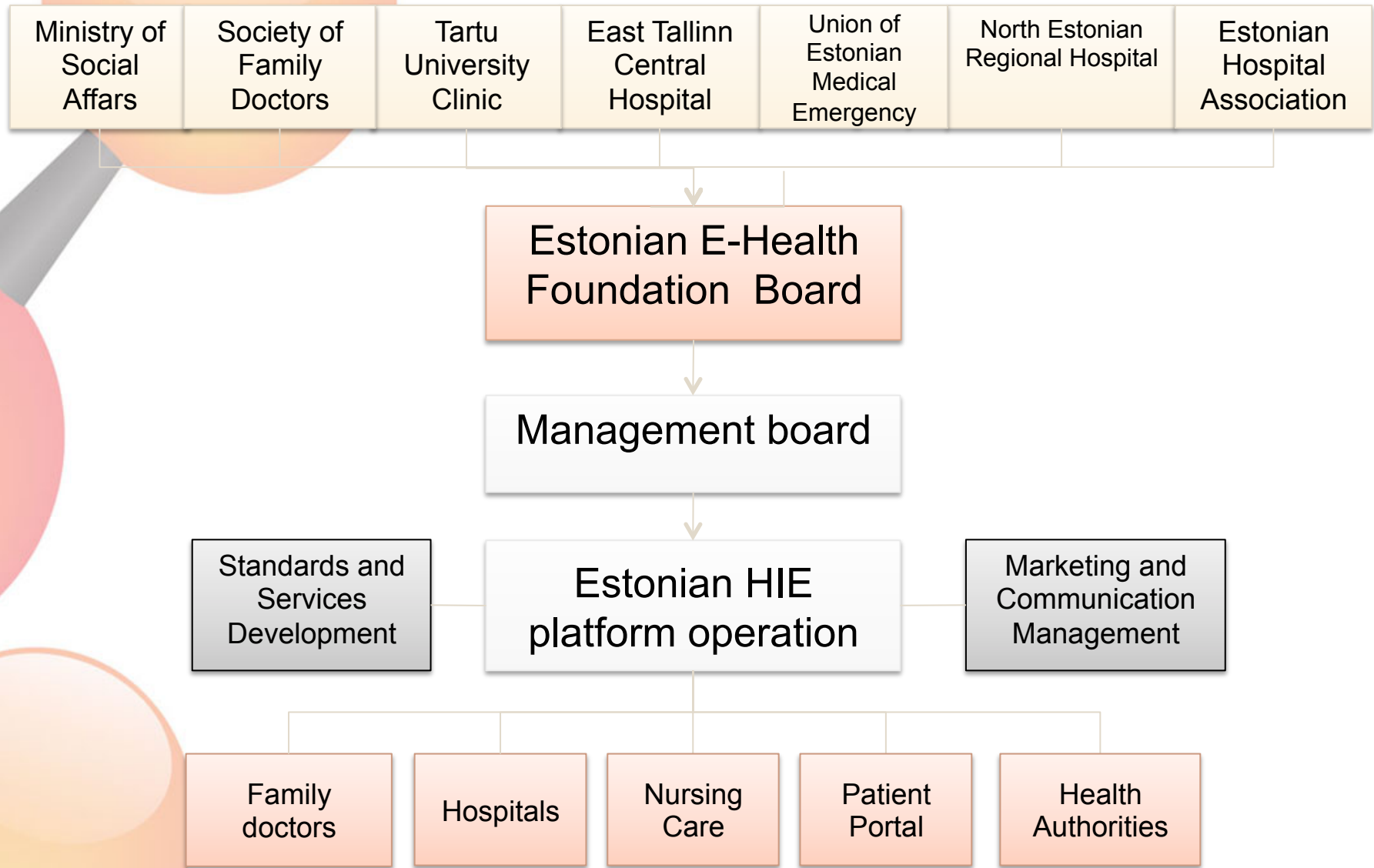
Secure data exchange layer provided by the state



# Main drivers

- Clear governance of Estonian e-health services
  - 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. Organisation

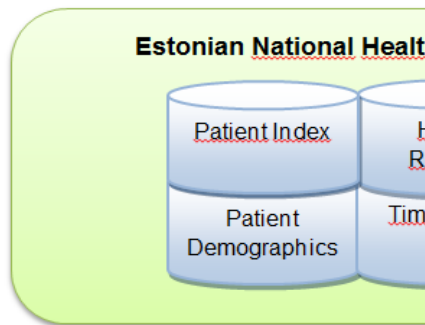
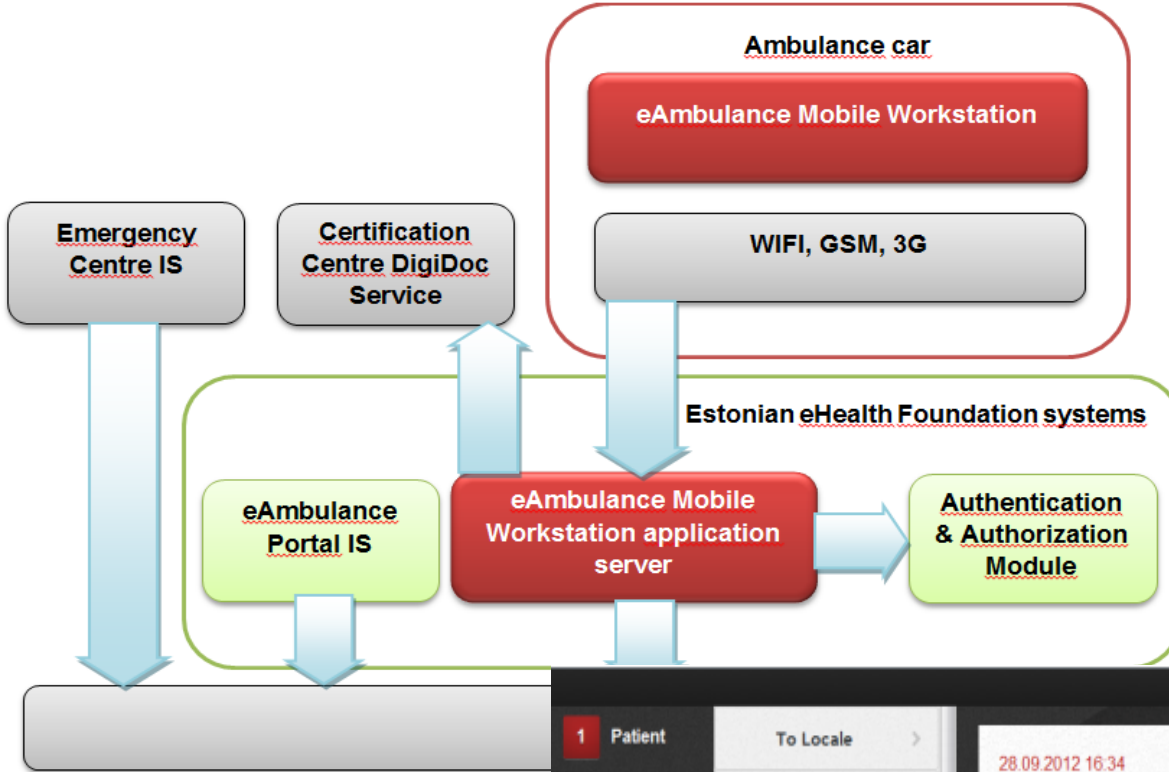




# eHealth services in Estonia

- Nation-wide health information system
  - Available documents
    - Medical files
      - Time critical data (allergy, chronic diseases)
      - General practitioners and hospital visits
      - Summary of ambulatory and stationary case
      - Link to medical images
      - Referral letter
- ePrescription
- Digital images
  - Available all over the county
- eReferral
- eAmbulance

# eAmbulance



The screenshot displays the eAmbulance iPad application interface. The top bar shows the date and time: **28.09.2012 16:34**. The main screen is titled **Trauma** and contains several input fields for patient information, including **Place where the trauma occurred**, **Activity at the moment of injury**, **Approximate time of trauma**, and **Cause of injury**. Below these fields, there is a **Traffic** section with a **Vehicle used by the injured person** field. The bottom of the screen shows a navigation bar with icons for **Ravimid**, **Diagnoosid**, **Juhised**, and **Seaded**.

- Paramedics are using iPads
- Queries are made about time critical and other health related data directly from HIE platform



# Legal environment of eHealth

- The Health Services Organisation Act regulates the development and maintenance of the health information system
  - Lay down the necessary requirements to the patient, health service provider, document standards, etc.
- All healthcare providers must send certain health data to national HIS
  - 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 HIE platform
- Citizen can
  - Access their own data
  - Declare intentions and preferences
  - Monitor logs



## Security and electronic authentication

- The access to HIE is secured by using the electronic identity card (ID-card) solution issued by the state
- ID-card is a compulsory and primary document for the purposes of personal identification in Estonia
- All attempts to view health care data are monitored both by patients and Estonian E-Health Foundation
- In case of the suspicions of the unlawful access to the data the necessary actions are taken immediately

# Patient Portal – 2013

Bytt rolle

Innlogget og representerer: Ly Cuusk

Hjelp

Logg ut

4800505995 LY CUUSK (Kutj ja Carti tasealine laps)

## Svar på henvisning

Apptingsvisning

Helseopplysninger

Under-søkesresultater

Under-søkesresultater

Skriv ut

**Helseinstitusjon**  
SA Tartu Ülikooli Kliinikum (Stiftelsen Universitetssykehuset i Tartu)  
**Registreringsnummer (org.nr.)** 90001478  
**Adresse**  
Puiusepa 1A, Puiusepa 1A-Kabinet 4019, Tartu, 50700 Tartumaa, Estland  
**Telefon** +372 7 654 321 | **Faks** +372 7 654 322  
**E-post** epost@tervishoiuasutus.ee  
**Utført av**  
**Navn** Kaja Kivimäe **Kode** D00441

Svar på henvisning nr. U008 versjon 1

### Pasient

**Personnummer** 4890505995  
**Fornavn** Ly  
**Etternavn** Cuusk  
**Fødselsdato** 05.05.1989  
**Kjønn** kvinne  
**Bosted** Kaunase pst 1-11, Tartu, 50706 Tartumaa, Estland  
**Telefon** +372 50 123 456

Bestillingsnummer for henvisning: testDokument.8

### Utførte undersøkelser

Dato	Trygdekassens prislister-kode	Alternativkode
20.03.2012	7973 – Computertomografi med kontrastvæske	

Beskrivelse av undersøkelsen

Analysar

Analyse	Parameter	Referanseverdi	Dato	Resultat	Enhet
Status blod-oksygen	tO2	10 Vol %	20.03.2012 13:41:59	9.2	Vol %
Status blod-oksygen	p50	22 mmHg	20.03.2012 13:41:59	23.25	mmHg

### Merknad

Merknad fra lege til svar på henvisning

**Vedtak** G09 - følgetilstander etter betennelsessykdommer i sentralnervesystemet  
Beskrivelse av vedtak som fritekst.

**Dokumentet utført** 20.03.2012 11:39:45  
**Dokumentets språk** NOR  
**Konfidensialitet**  
**Appt for pasient** Appt

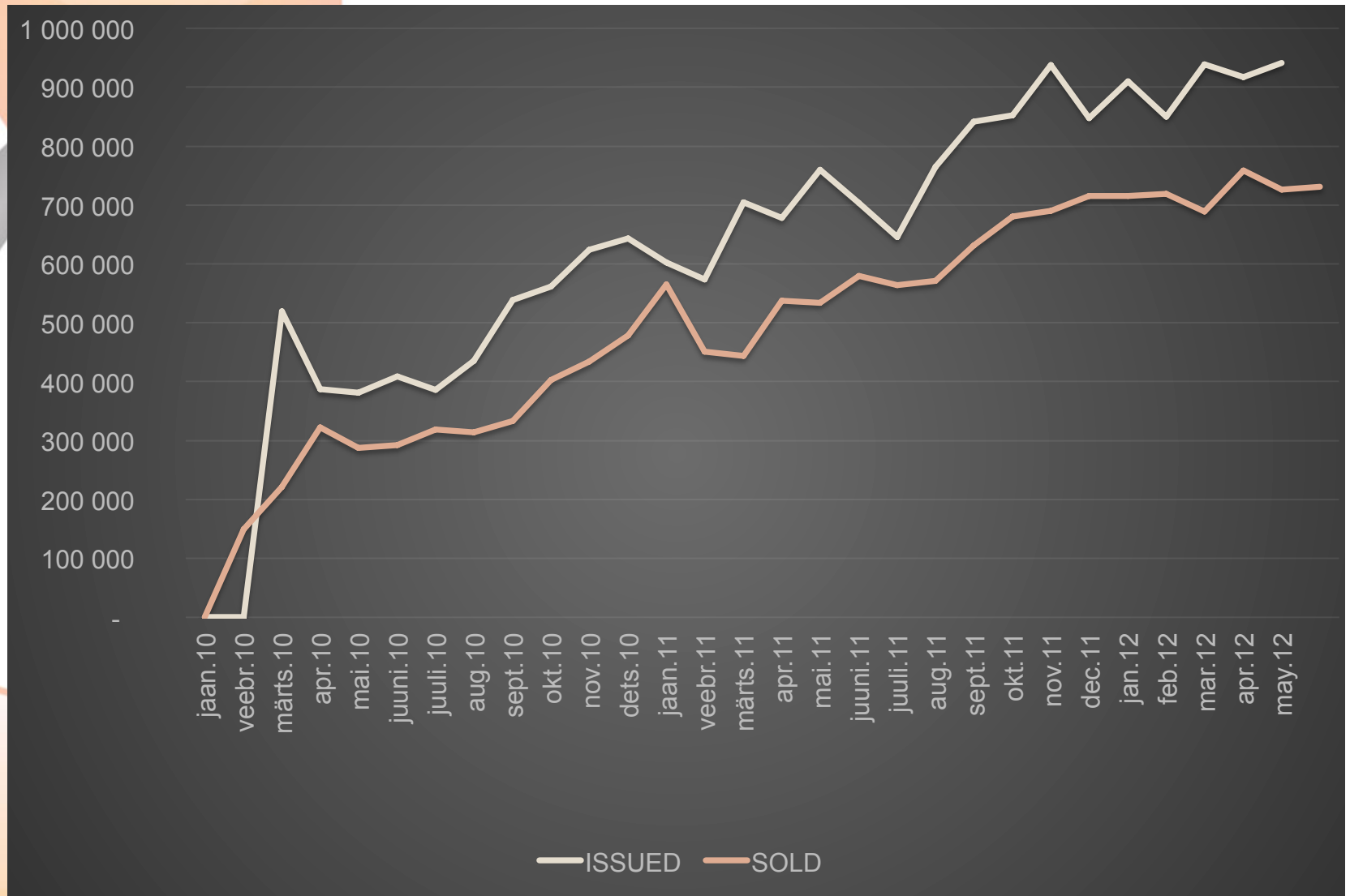
**Ansvar**  
**Etat / person navn** SA Tartu Ülikooli Kliinikum (Stiftelsen Universitetssykehuset i Tartu)  
**Kode** 90001478



# Acceptance

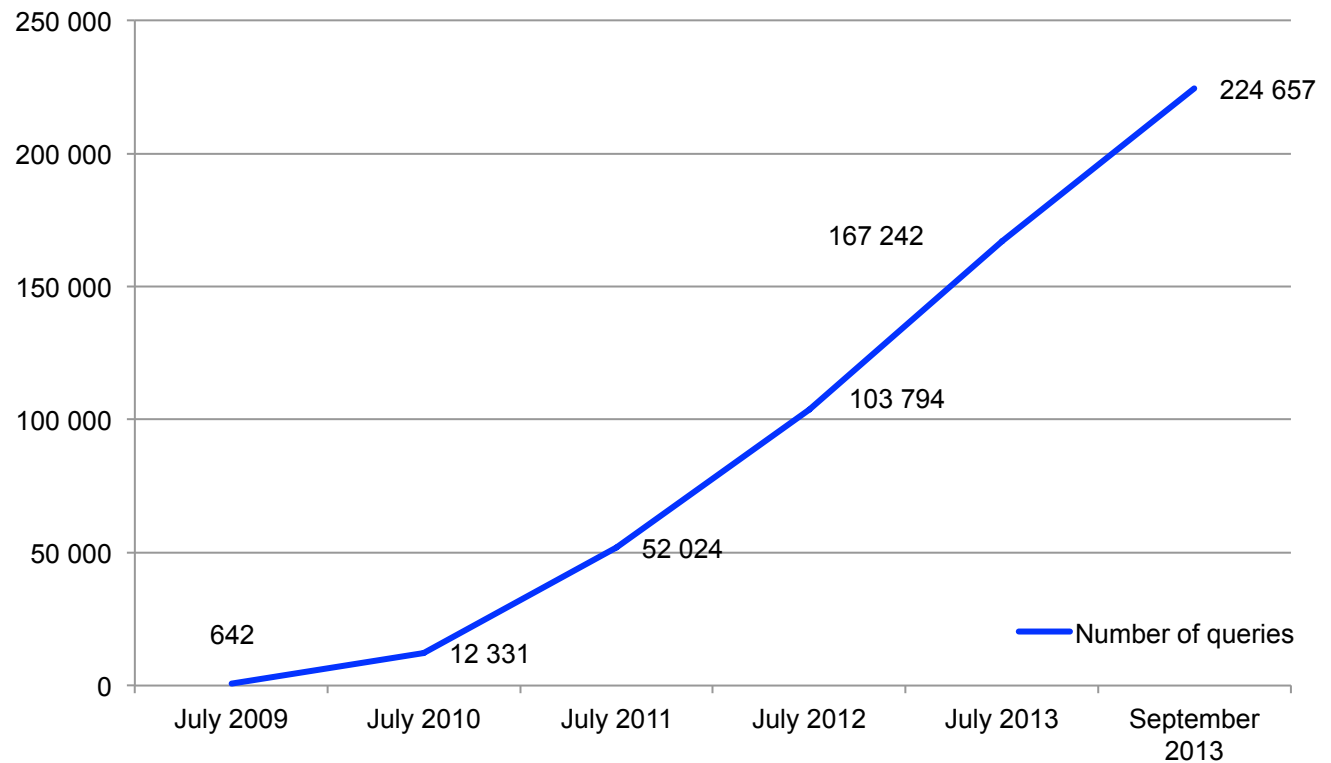
- ePrescription covers 94% of issued prescriptions
- Over 90% of Hospital discharge letters are digital
- Ambulatory case summaries sending level is low
- Patient portal usage is low
  - 58 115 unique visitors (4,5% of population)
  - **1 160 000** persons have documents (90% of population)

# ePrescription



# Acceptance

## Retrieval of medical documents by healthcare providers



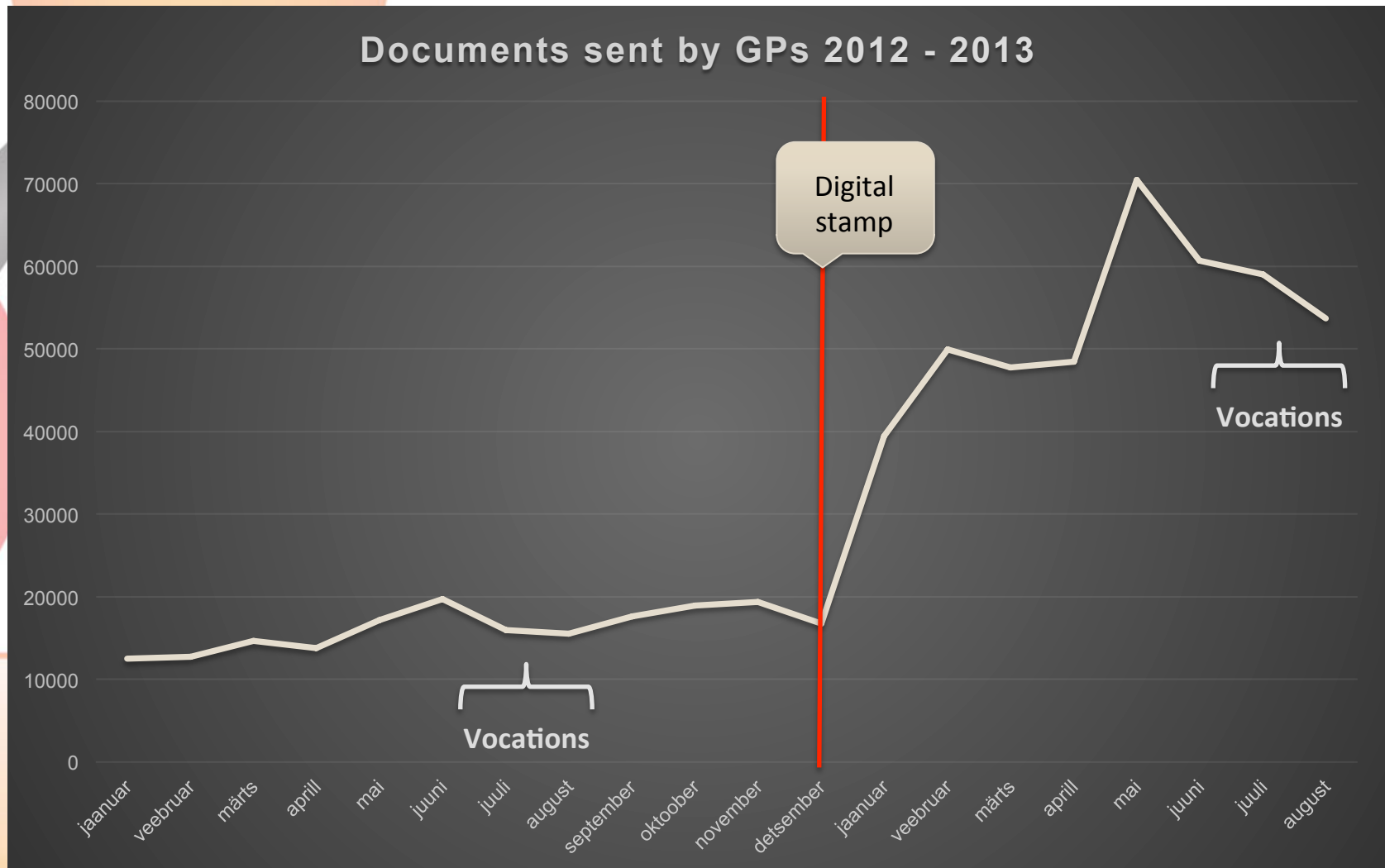


## Difficulties

- General acceptance of hospital personnel to share medical data in patient portal with patient
- Much attention had to be paid on the security and electronic authentication of the users
- Resources were planned only for central development.
- Usability. Developing process has to include medical competence – users
- Data quality is important
  - Complete and quality data give value.
- Balance between security and usability
  - PIN for every document ...

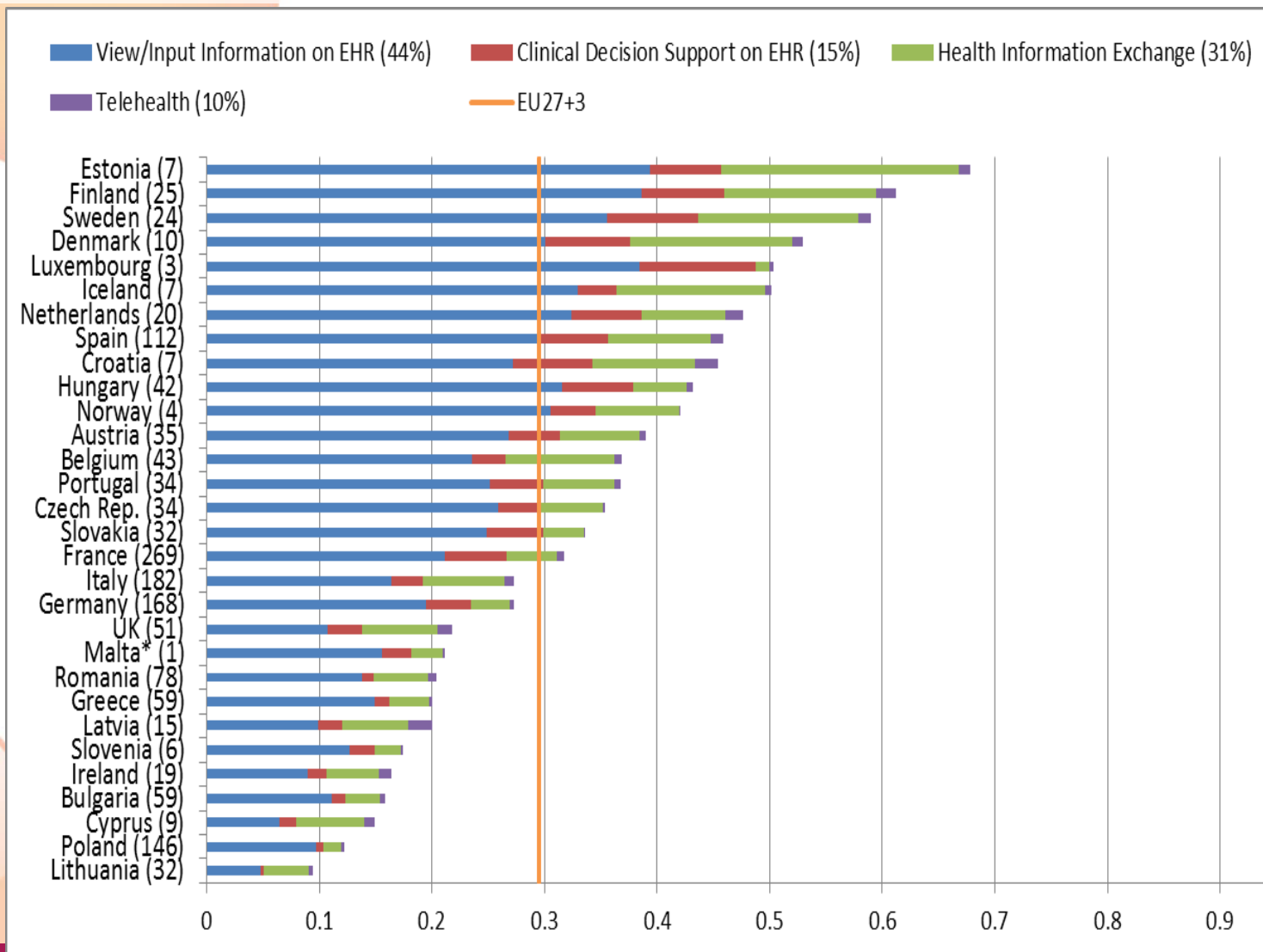


# Digital stamp for general practitioners



# BENCHMARKING INFORMATION AND COMMUNICATION TECHNOLOGIES IN HEALTH SYSTEMS

JOINT EC- OECD WORKSHOP BRUSSELS, APRIL 18-19, 2013



eHealth availability and use Indicator 2012: by country

**Thank you!**  
**Peeter.Ross@ttu.ee**

