

Origins, Principles and Functions of the Estonian State Information System

Prof Kuldar Taveter

With the help of Regina Sirendi

Department of Informatics

Tallinn University of Technology

Who am I?

- Name: Kuldar Taveter
- Position: Professor, Chair of Software Engineering
- Education:
 - Dip.Eng., TUT, 1988
 - M.Sc., TUT, 1995
 - Ph.D., TUT, 2004
- Work experience:
 - 1985-1989: Institute of Cybernetics
 - 1989-1993: Private companies
 - 1993-1998: Department of Informatics of TUT
 - 1997-2005: Technical Research Centre of Finland
 - 2005-2008: The University of Melbourne, Australia
 - 2008- : Department of Informatics of TUT
 - Jan-Aug 2011: University of South Carolina, USA
- Research areas: Agent-oriented software engineering, engineering of sociotechnical systems, multiagent systems, intelligent systems, ambient intelligence, agent-based simulation

Who is Regina?

- Name: Regina Sirendi
- Position: Lecturer, Tallinn University of Technology
- Education:
 - 2014 - ...: Joint PhD at Tallinn University of Technology, Estonia and Swinburne University of Technology, Australia
 - 2012: MSc, Technology and International Development, University of Edinburgh, UK
 - 2010: BA, Public administration and governance, University of Tallinn
- Work experience:
 - 2014 - ...: Tallinn University of Technology
 - 2008-2012: Private companies
- Research areas: Service design, agent-oriented modelling, public sector marketing, service-orientation

Some facts on Estonia

Population: 1.3
Million
Size: 45 227 km²
Capital: Tallinn
Language:
Estonian
Member of EU
Currency: Euro
GDP: 17 BEUR



- 84,2% of the population use Internet
- 82,9% of the households are connected to Internet
- 100% of schools are connected to Internet
- 100% of public sector are connected to Internet
- 79% of enterprises use e-government services
- More than 1000 public WiFi networks have been registered
- The whole territory of Estonia is covered by mobile Internet
- 99,6% of all banking transactions are done electronically
- 96% of Personal Income Tax Declarations are submitted on-line



The origins of Estonia's e-government (1)

- 1993 – Strategy paper by the IT community to establishing foundations and principles for the management of “modern, well-functioning state information systems”
 - A specialised IT department in the central government
 - Finances allocated for all IT expenditures at various government agencies
- E-government in Estonia was moulded by a number of laws

The origins of Estonia's e-government (2)

- 1996 – The law of private data protection
- 1996 – The foundations of informatics
- 1997 and 2006 – The law of databases
- 1998 – The foundations of information politics
- 2000 – The law of identification documents and digital signature
- 2001 – The law on public information
- Principles of the Estonian Information Policy (1998, 2004)
- Digital Agenda (2013)

The origins of Estonia's e-government (3)

- Government wide backbone network
EEBone (Peatee) implemented in 1998:
 - Joined governmental organisations with secure access to the Internet and intranet
- X-road network implemented in 2001:
 - Enabled a diverse range of government databases to communicate with one another

The origins of Estonia's e-government (4)

- Liberal economic regime
- Sound financial policies
- Birth of the modern banking sector – became an influential IT innovator
- Introduction of Internet banking in 1996
- Simple, high-quality, secured system
- Qualities that led many governmental agencies to use the identification verification system of Internet banking
- However, initiative by individual governmental agencies rather than following a grand plan by the government
- Influence of “ethical hackers”, such as Cybernetica Ltd.

Starting points



- Legislative framework and adaption of the new thinking
- Technological needs were described
- Government and public sector understood the importance of digitalised management



Technological pillars



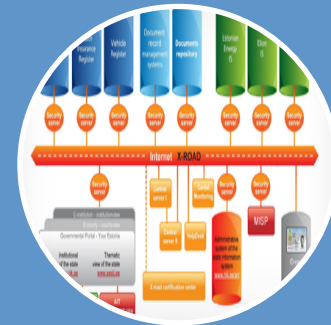
Electronic Identity:

- Authentication of a user by digital certificate embedded in the ID card or SIM card



Digitalised information:

- Information systems and databases on all levels of government



Formalised exchange:

- X- road - the connection of government databases by a data exchange service layer



National chip-based Identity Card

Issuing authority:

Estonian Citizenship and
Migration Board

Service contractor:

TRÜB Switzerland

Start of issue: January 1, 2002

Conformance with:

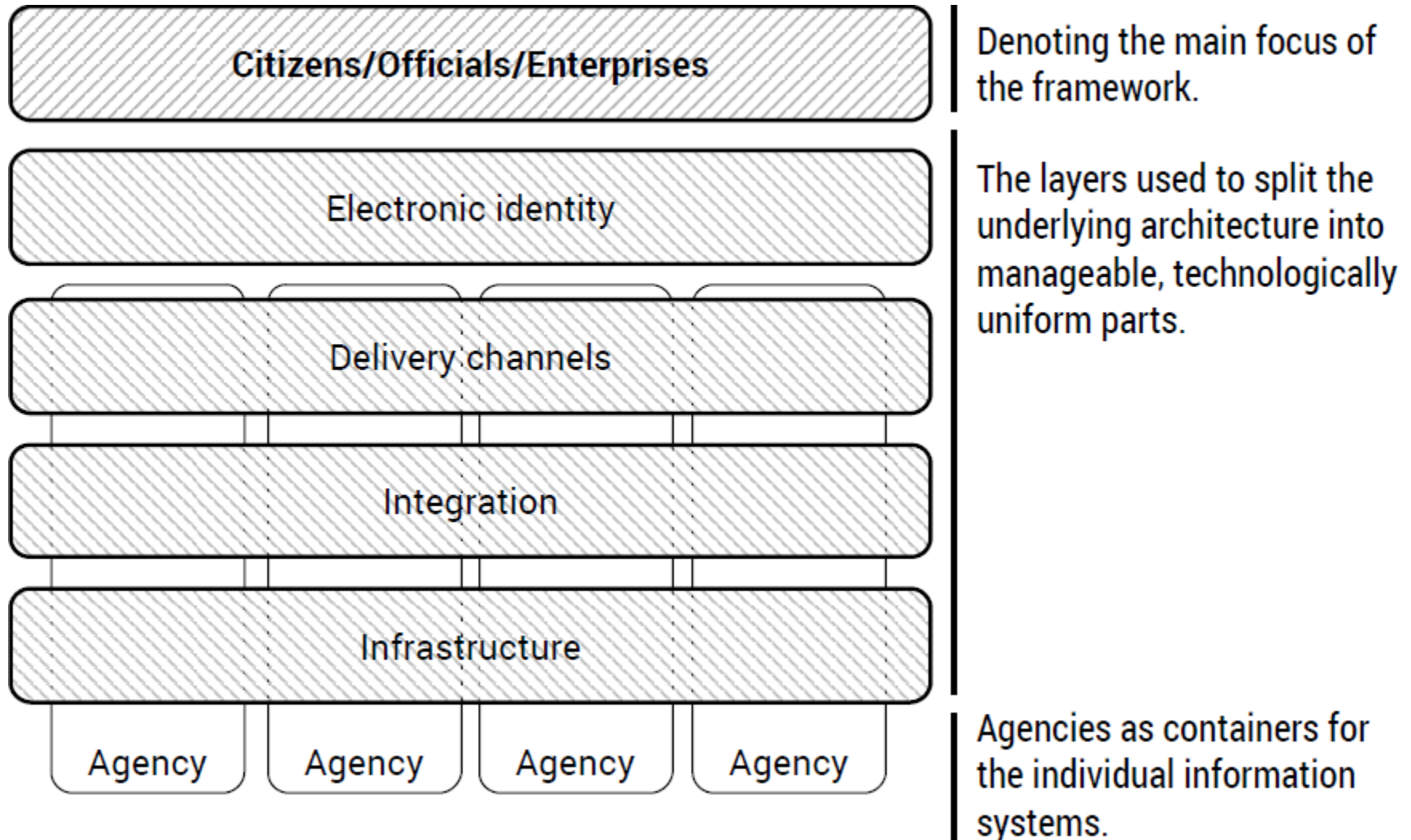
ICAO Doc. 9303 part 3

More than 1 100 000 smart-card
type ID-cards have been issued

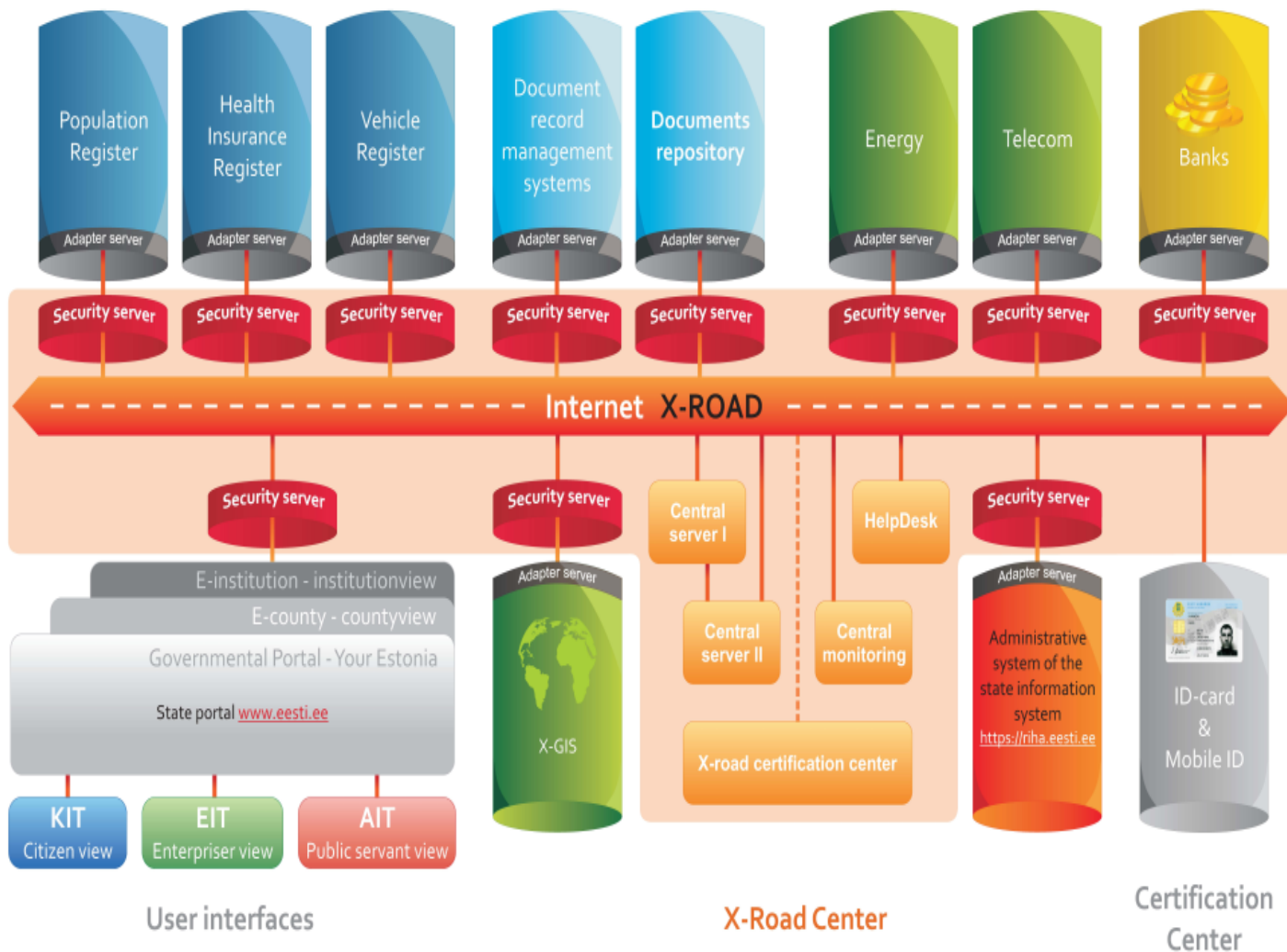


Inside 16 Kb RSA crypto chip are :
2 private keys; authentication certificate;
digital signature certificate;
personal data file

Estonian architectural framework (source, Andres Kütt, RIA)

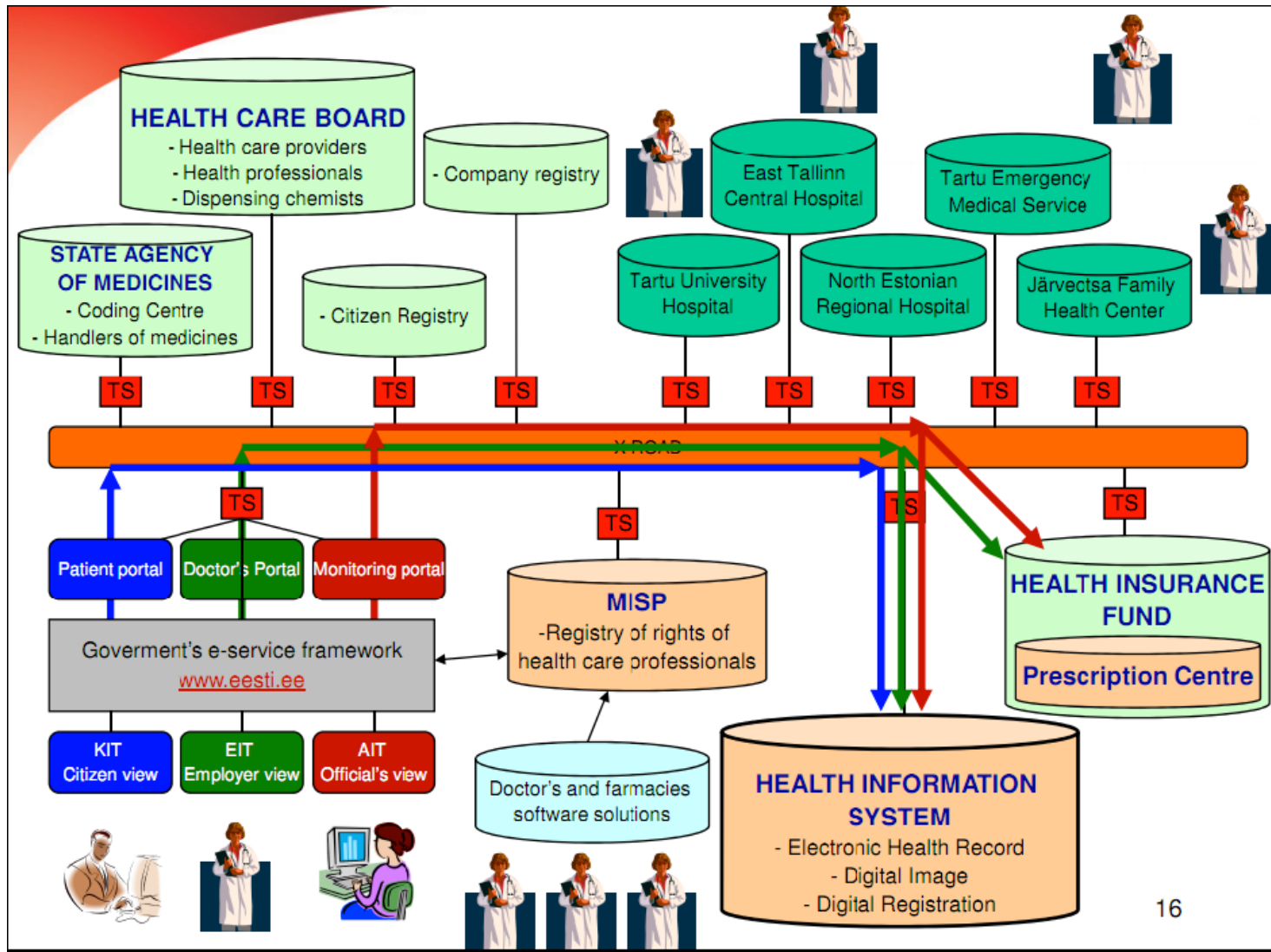


X-road – nationwide architecture for e-government

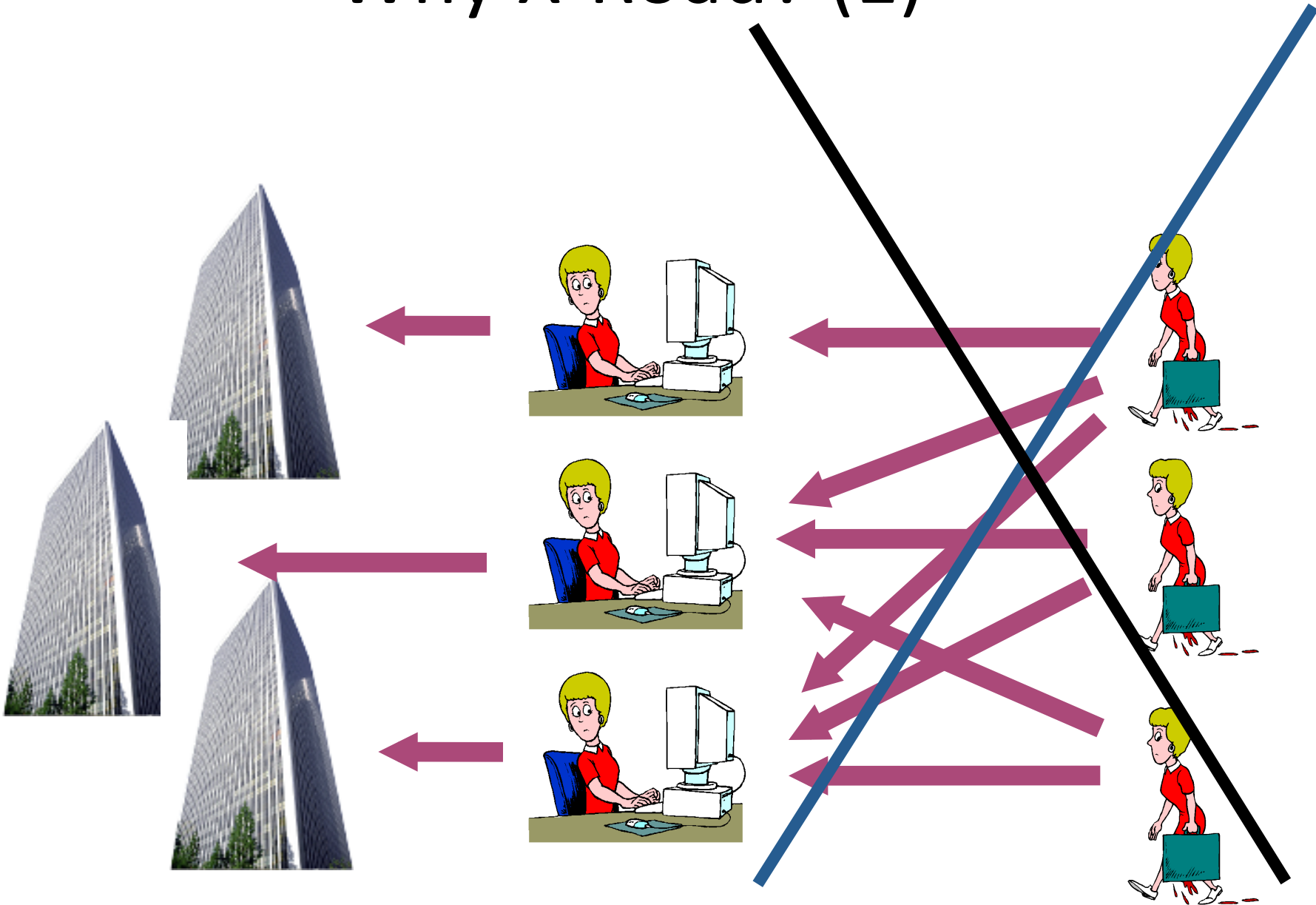


X-road populated for healthcare

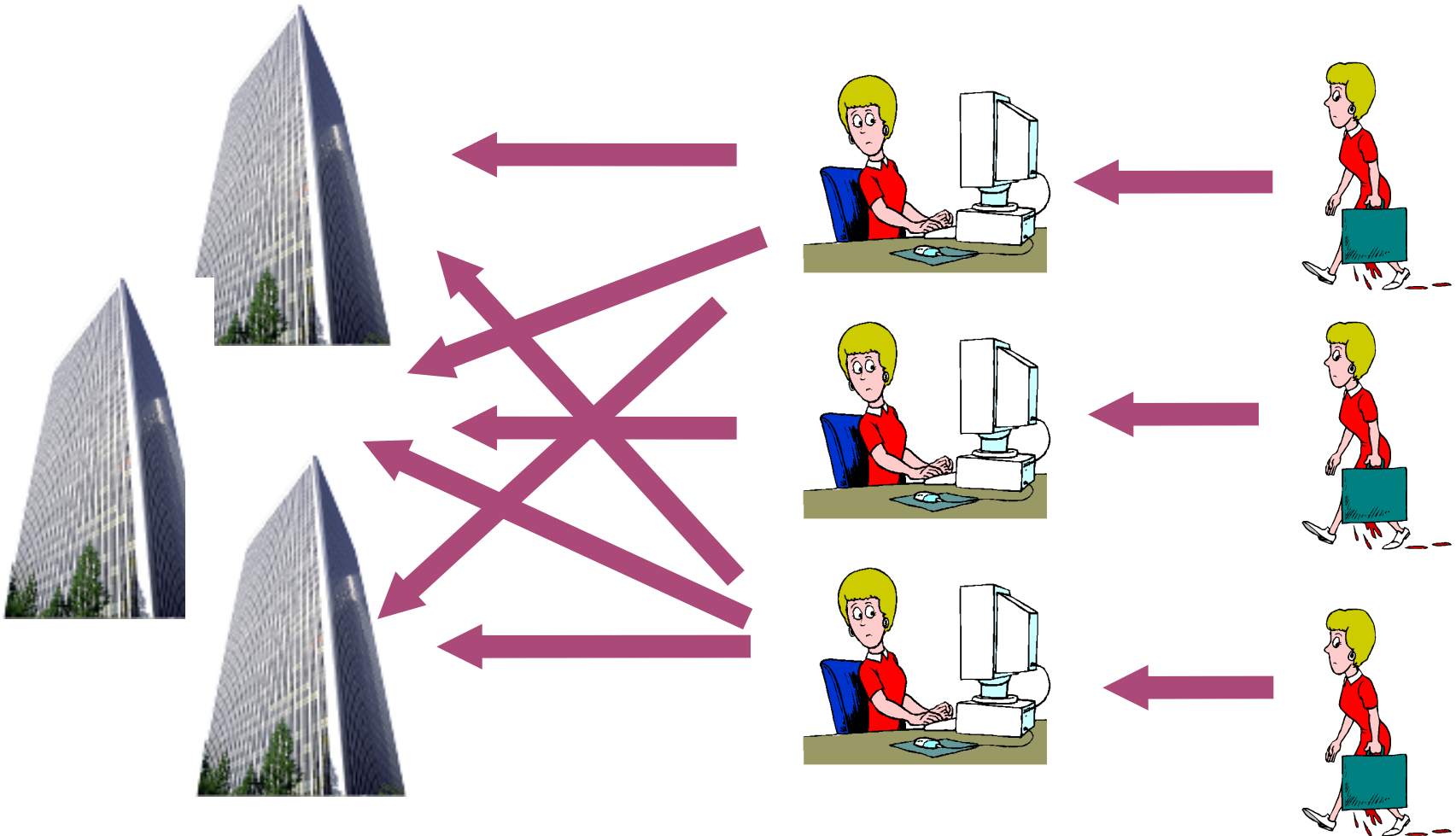
(Source: Riho Oks)



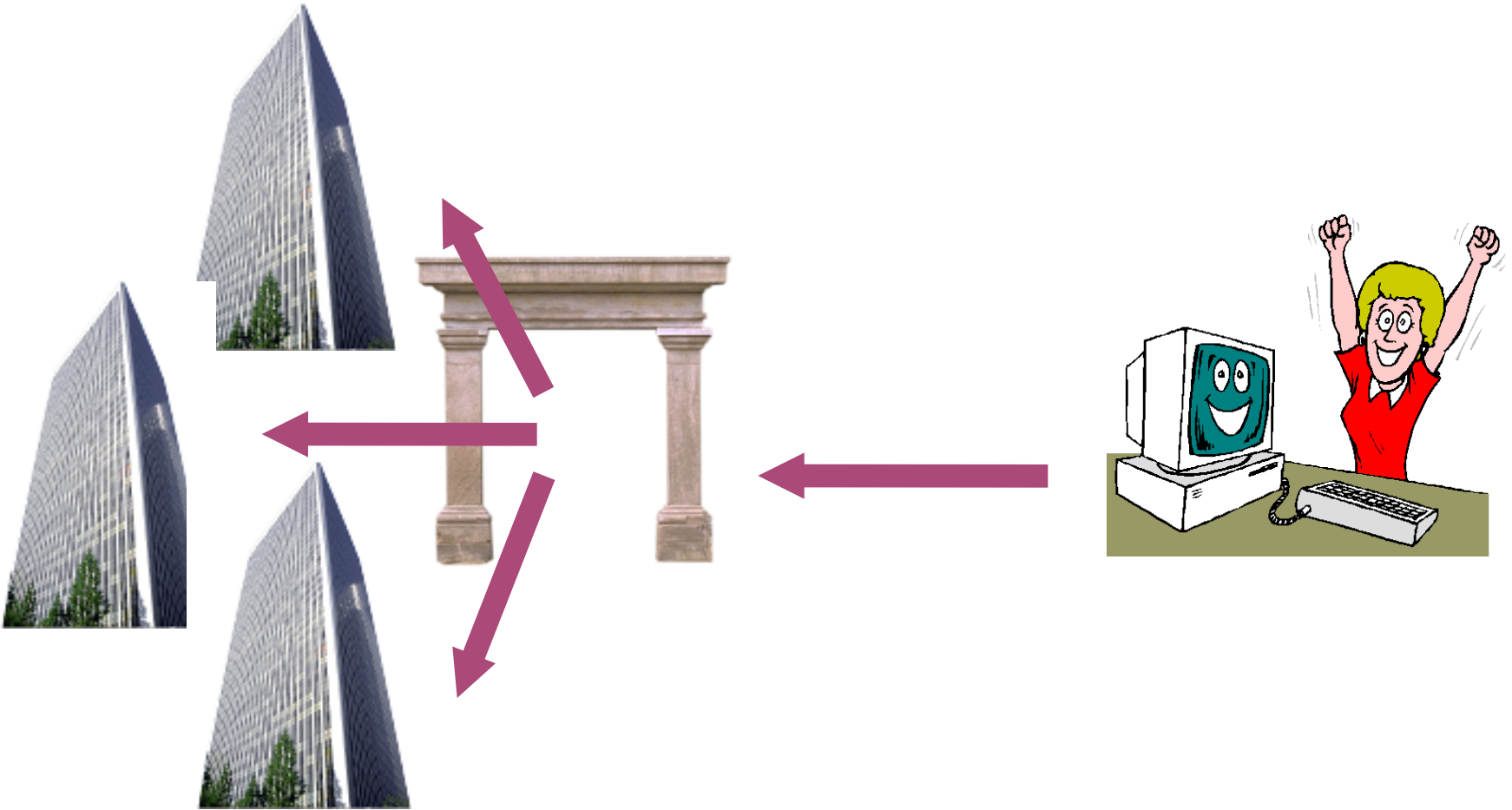
Why X-Road? (1)



Why X-Road? (2)



Why X-Road? (3)

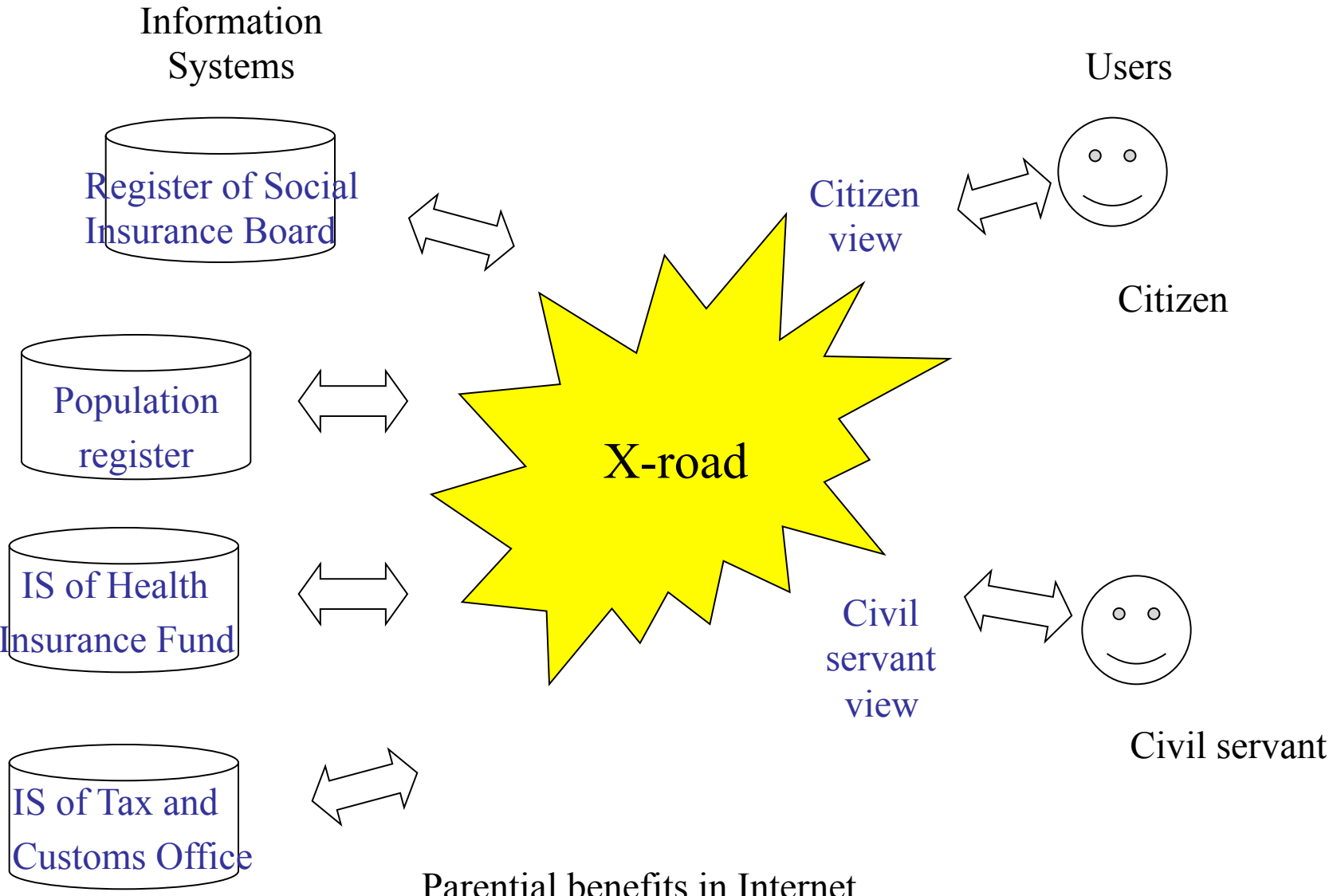


Example of public service based on X-road (1)

Parental benefit – best e-government service in 2004
(interoperability of 5 information systems from 5 government organizations)

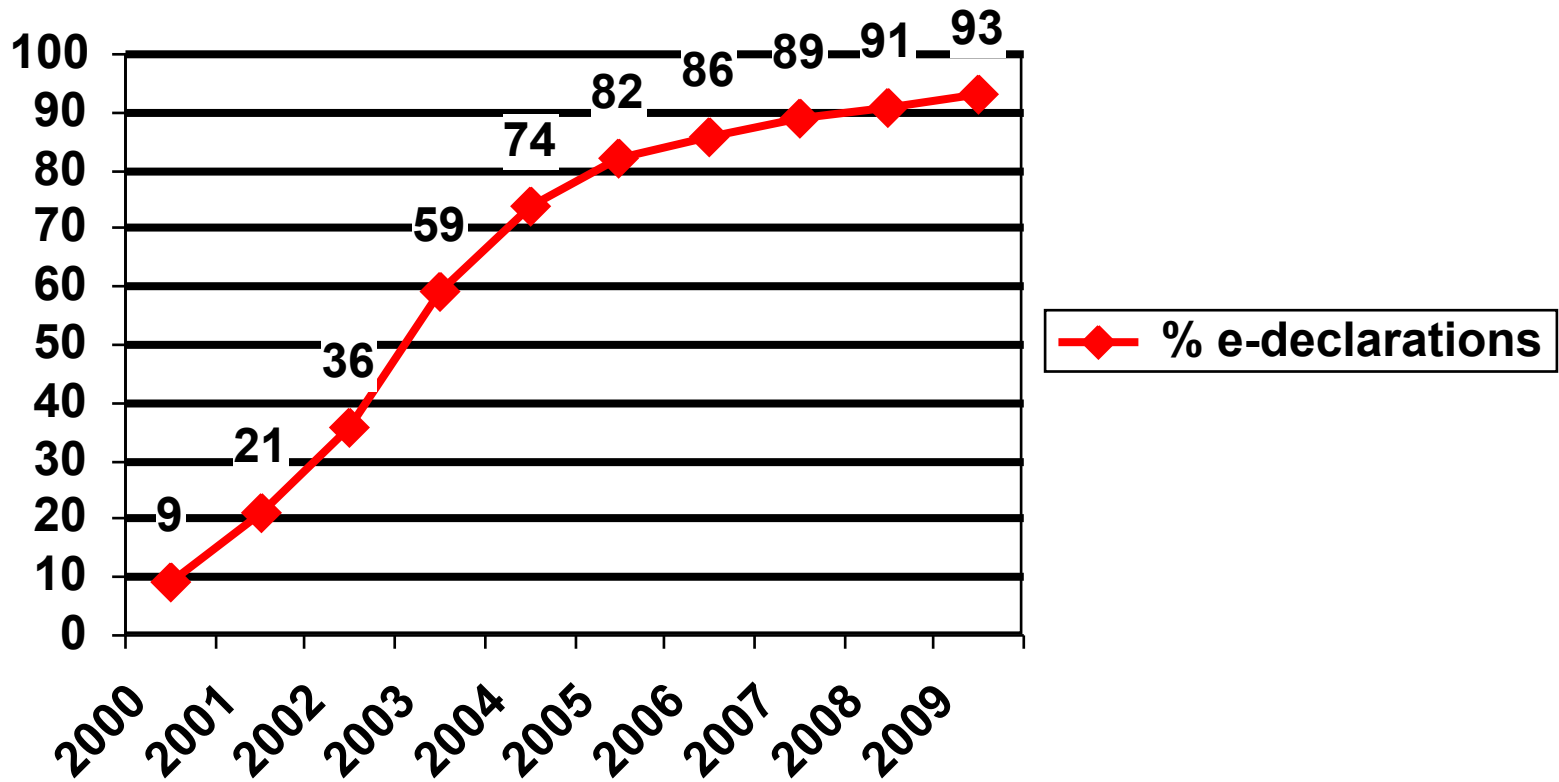


Example of public service based on X-road (2) by Ahto Kalja



Parential benefits in Internet

Another public service via X-road: Submitting tax declarations on-line



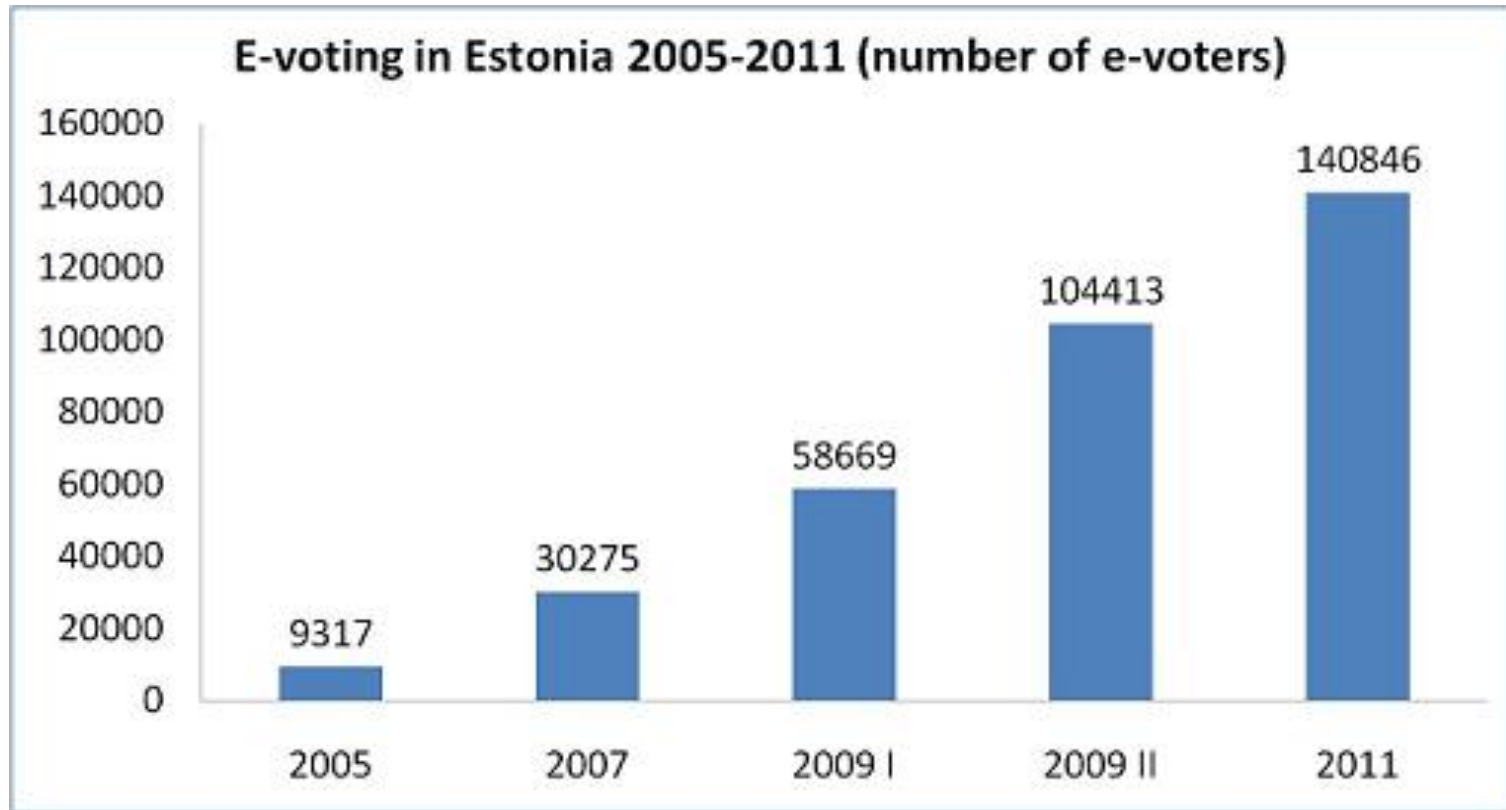
E-participation via X-road

E-voting in Estonia (176 328 e-voters in 2015!)

TUGITOOLIVAJAD
ASUVAD HÄÄLETAMA...



E-voting in Estonia

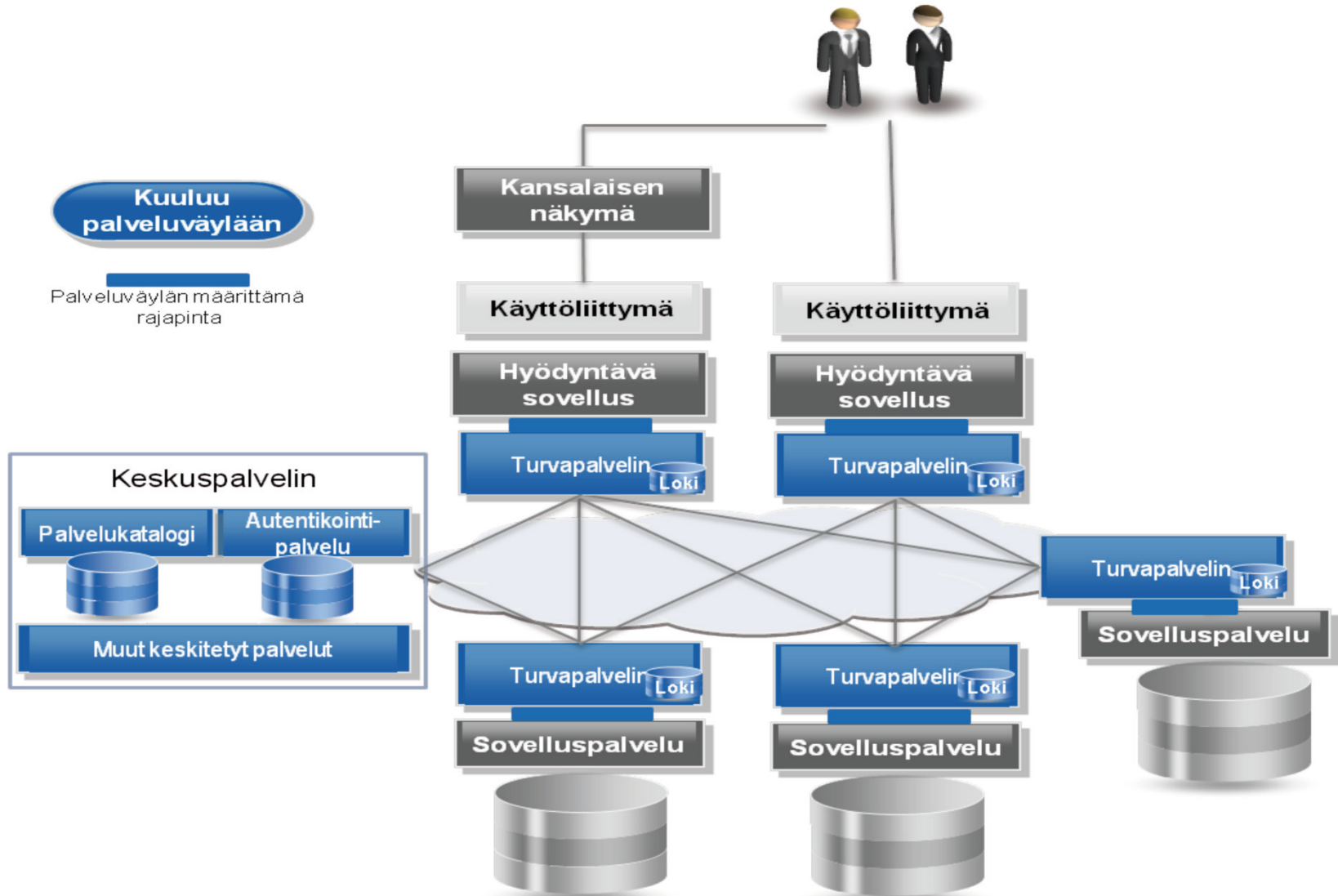


2005 – local elections
2007 – parliamentary elections
2009 I – local elections
2009 II – European Parliament elections
2011 – parliamentary elections

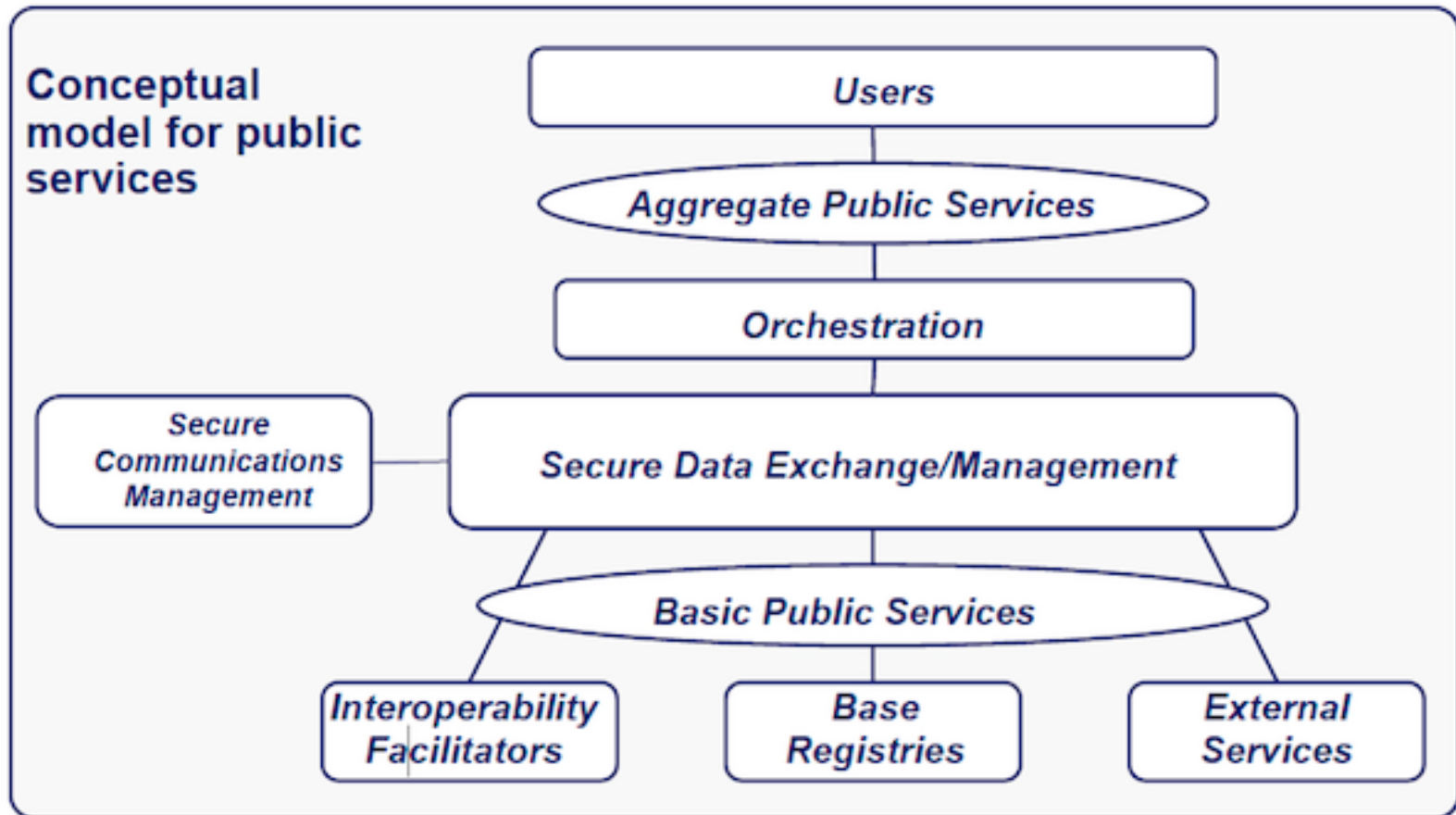
Public services in Estonia

- Around 2500 public services available
- e-Banking, e-Tax Board, e-Police, e-Voting, e-School, e-Health, e-Road Administration, e-Social Insurance Board, e-Prescription, e-Business Registry, e-Land Registry, e-Building Registry.... e-Residency
- For example, it takes only 15 minutes to establish a company online

X-road of Finland: work in progress



European Interoperability Framework: work in progress



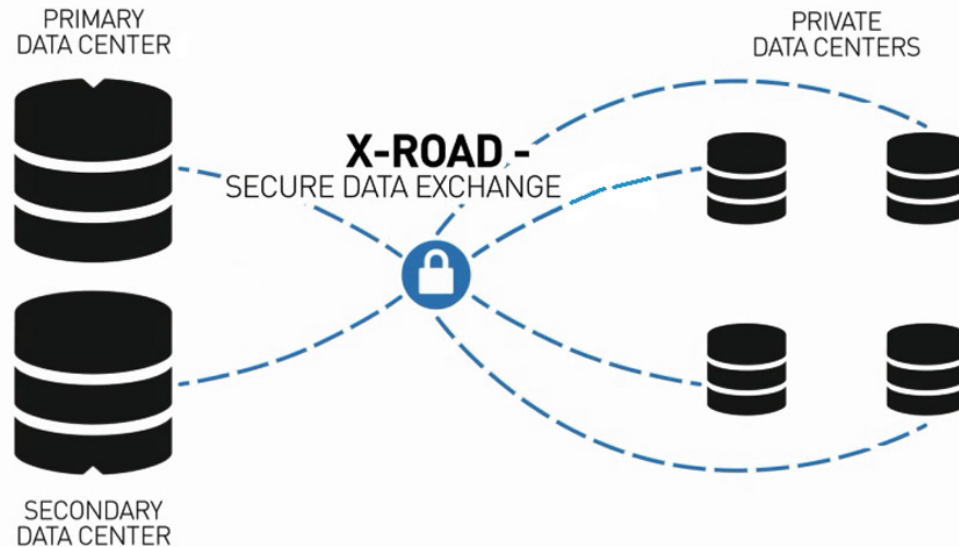
Do you notice any
difference of ELF from
X-road of Estonia?

Government as a Platform (GaaP)



The government Cloud within Estonia

(Source: Kotka & Liiv)



The government Cloud includes international public clouds (Source: Kotka & Liiv)



The concept of data embassies (Source: Kotka & Liiv)

ESTONIAN DATA EMBASSIES



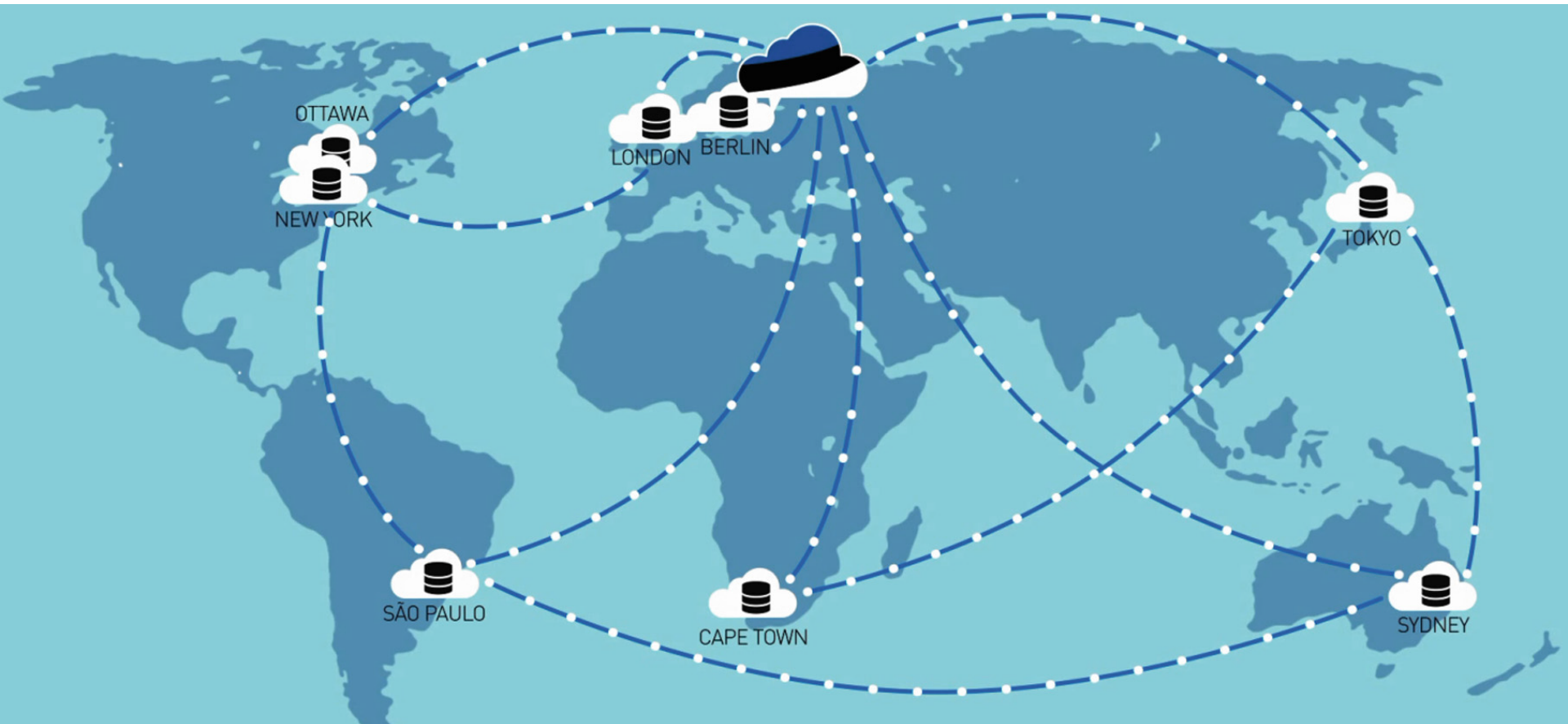
SECURE FACILITY

NECESSARY HARDWARE AND NETWORKS

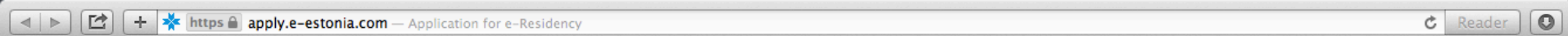
TRAINED SPECIALISTS

LIKE A REAL EMBASSY

Proposed network of Estonian Data Embassies (Source: Kotka & Liiv)



Best public service in Estonia in 2015



e-estonia.com
The Digital Society



About e-Residency

Application for e-Residency

You'll find laws and regulations concerning current application here: [Identity Documents Act](#), [State Fees Act](#)

Required fields *

Due to high volume of applications, the application review process will currently take longer than expected. Thank you for your patience.

Type of application *

Choose option...

Personal details (as on your identity document)

First name(s) * ?

Enter exactly as stated on your identity document

Last name * ?

Enter exactly as stated on your identity document

Country of birth *

Select country...

Citizenship *

Select citizenship...

Date of birth * ?

Day

Month

Year

Sex *

Male

Female

The Republic of Estonia is the first country to offer e-Residency - a secure digital identity available to everybody in the world interested in **running a location independent international business online.**

e-Residents receive a smart ID-card to use for:

- secure digital authentication
- digital signing of any documents

This way, the ID-card gives access to digital services which so far have been available only for Estonians.

e-Residency does not give a citizenship, physical or tax residence, nor any rights of travel and entry to Estonia or to the EU.



Government-as-start-up: quick launch + iteration

e-Residency launched on **1 December 2014**.

As of September 29, 2015:

- **5,000 applications from 114 different countries**
- 4,500 cards issued *aka* actual e-Residents out there
- 20,000 potential e-Residents signed up to newsletter

From May 13, 2015 e-Residency is in **public beta** - everybody can apply and get the card in Estonian representations **in 34 countries around the world**.

We look for user feedback to constantly improve and add the services.

Sept '14

Nov '14

Dec '14

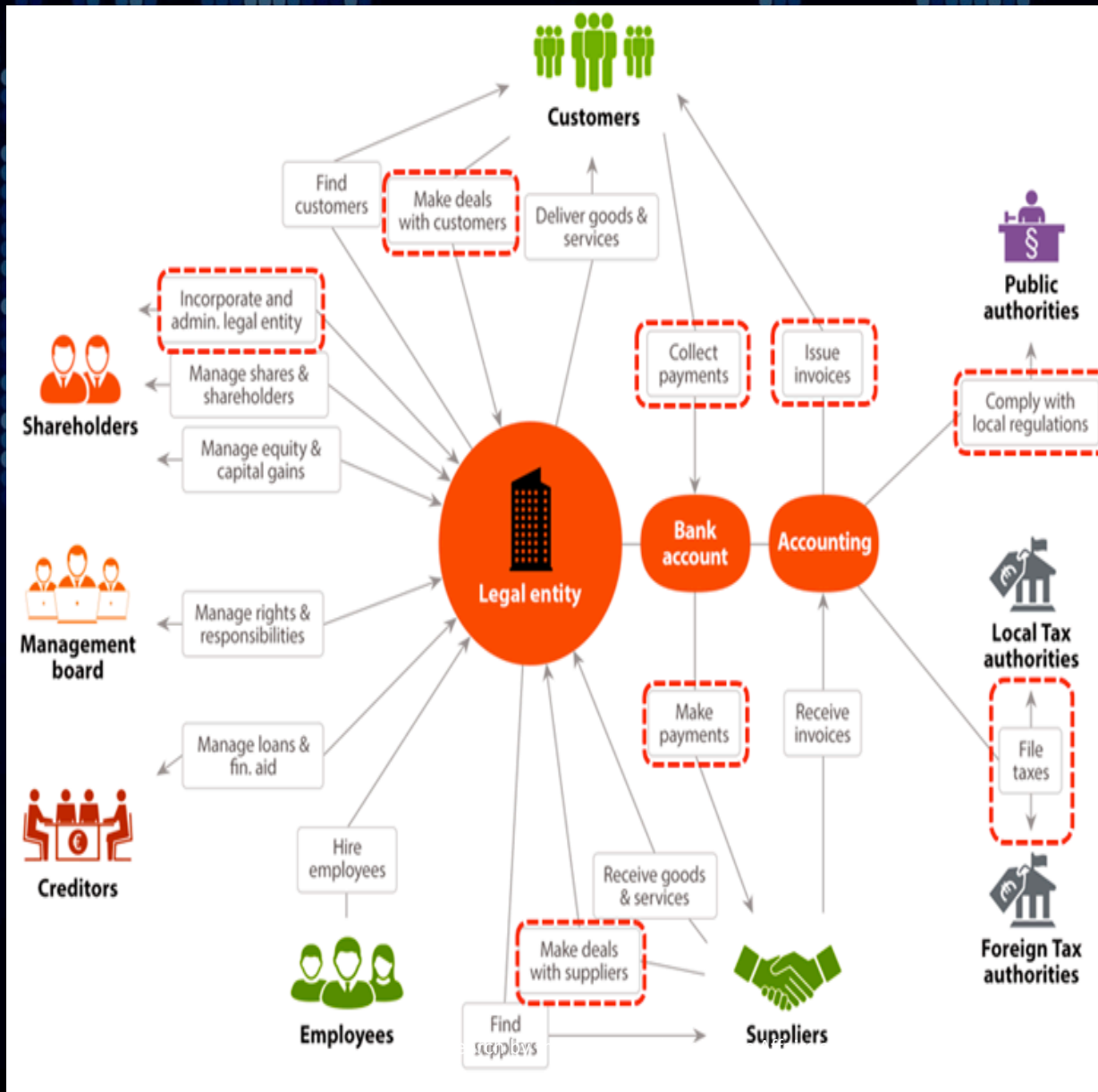
May '15

Project kickoff approved

First Public Beta



Summary of freelancer's pain points



Solution



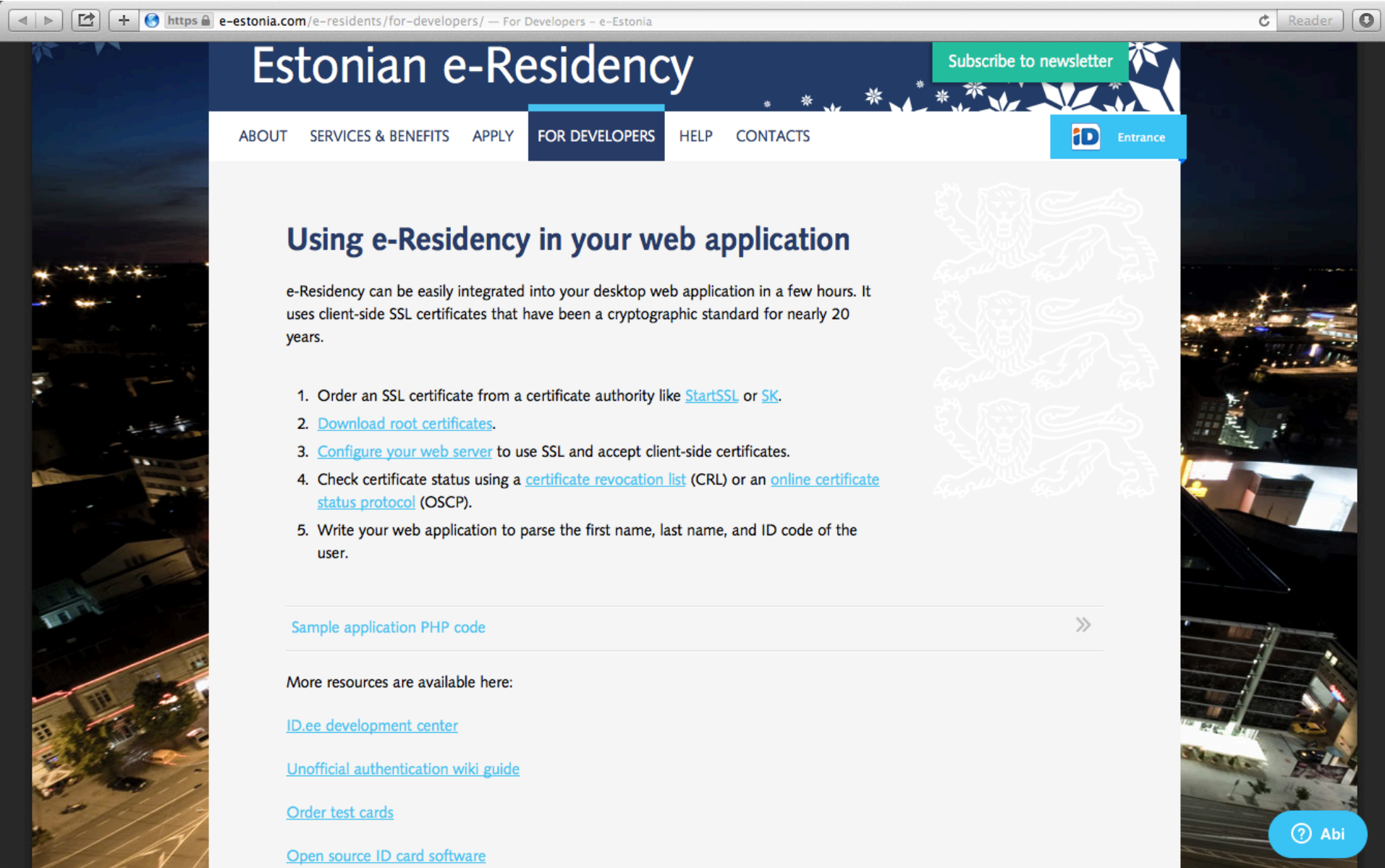
1. Establish a company online

2. Open a bank account in Estonia

3. Administer the company online

4. Digitally sign documents and contracts

E-residency as a platform



The image shows a browser window displaying the Estonian e-Residency website. The browser's address bar shows the URL <https://e-estonia.com/e-residents/for-developers/>. The website header features the title "Estonian e-Residency" and a "Subscribe to newsletter" button. The navigation menu includes "ABOUT", "SERVICES & BENEFITS", "APPLY", "FOR DEVELOPERS" (which is highlighted), "HELP", and "CONTACTS". There is also an "ID Entrance" button. The main content area is titled "Using e-Residency in your web application" and contains a paragraph explaining that e-Residency can be integrated into desktop web applications in a few hours. It lists five steps for integration, including ordering an SSL certificate, downloading root certificates, configuring the web server, checking certificate status, and parsing user information. A "Sample application PHP code" link is provided with a right-pointing arrow. Below this, there are links to "More resources are available here:", "ID.ee development center", "Unofficial authentication wiki guide", "Order test cards", and "Open source ID card software". The background of the website features a stylized lion emblem and a night cityscape.

Browser address bar: <https://e-estonia.com/e-residents/for-developers/> — For Developers – e-Estonia

Estonian e-Residency

Subscribe to newsletter

ABOUT SERVICES & BENEFITS APPLY **FOR DEVELOPERS** HELP CONTACTS

ID Entrance

Using e-Residency in your web application

e-Residency can be easily integrated into your desktop web application in a few hours. It uses client-side SSL certificates that have been a cryptographic standard for nearly 20 years.

1. Order an SSL certificate from a certificate authority like [StartSSL](#) or [SK](#).
2. [Download root certificates](#).
3. [Configure your web server](#) to use SSL and accept client-side certificates.
4. Check certificate status using a [certificate revocation list](#) (CRL) or an [online certificate status protocol](#) (OCSP).
5. Write your web application to parse the first name, last name, and ID code of the user.

[Sample application PHP code](#) >>

More resources are available here:

- [ID.ee development center](#)
- [Unofficial authentication wiki guide](#)
- [Order test cards](#)
- [Open source ID card software](#)

Abi

Crucial factors for success of e-residency

- The number and quality of e-services, such as:
 - Opening of bank account online
 - E-notary
- The success of e-residency as a platform
- The number of e-residents

e-Estonia: Main reasons for success

- Appropriate mix of private and public initiative
- Active role of government, project-based development
- Identification infrastructure and secure data exchange environment X-road
- Secure citizen portal and secure document exchange portal
- Supportive legislation
- Little legacy of previous practices

