

### Architecting a country

**Andres Kütt** 

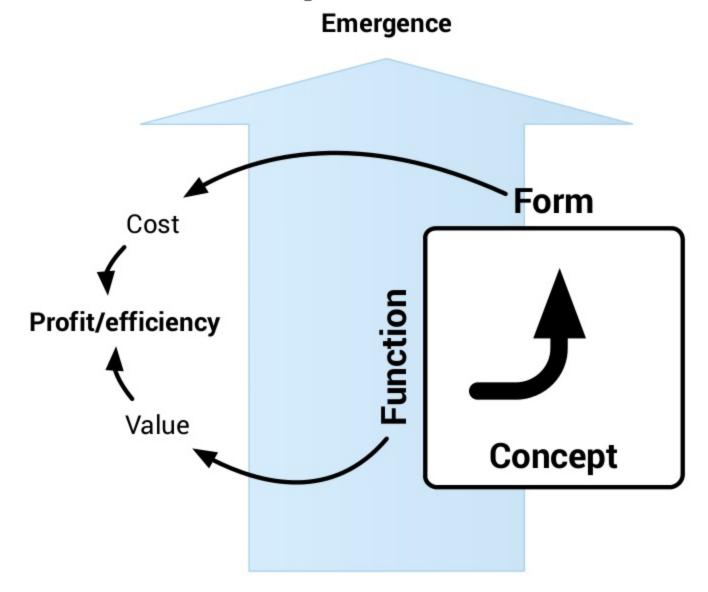
Estonian Information System Authority / Architect

21.07.2014

#### **Agenda**

- Fundamental concepts
- Country background
- Problem statement: what are we solving here?
- E-government meta-architecture
- Application of the architecture in Estonia

#### **Fundamental Concepts**



#### Country background: Estonia

#### A small open economy in Northern Europe

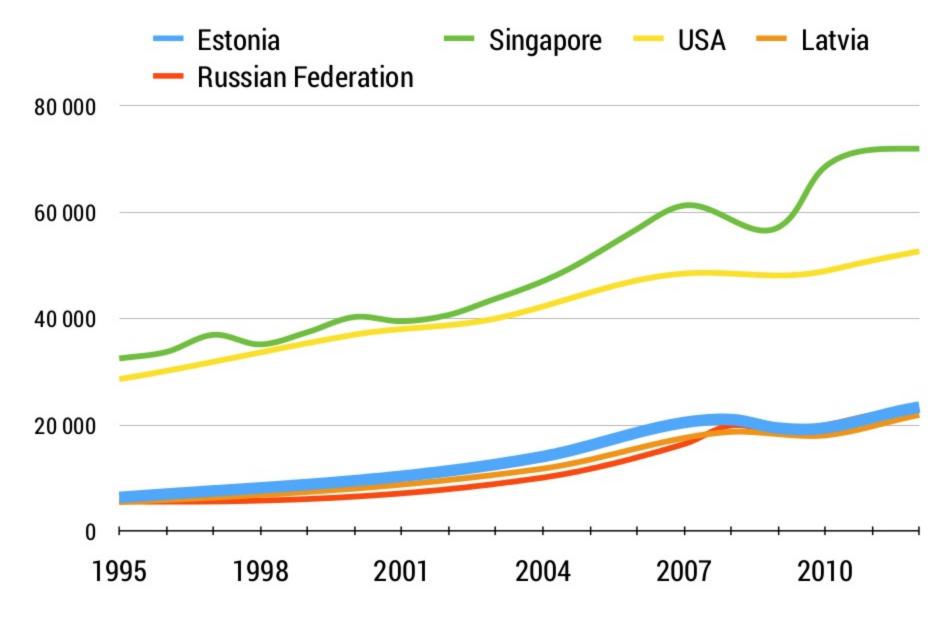
#### Some perspective

	Popu- lation	Surface area	Population density	PPP gross national income per capita
Estonia	1	45	31	23,280
Latvia	2	64	33	21,820
Russian Federation	144	17,098	9	22,800
Singapore	5	1	7,589	71,900
<b>United States</b>	314	9,832	34	52,610

<sup>&</sup>lt;sup>1</sup> - In milions, rounded to 1

<sup>&</sup>lt;sup>2</sup> - In sq. km thousands

#### **GNI** per capita



# How to run a country with a small scattered population, tiny economy and no natural resources?

For the past 20 years, Estonia has chosen focusing on e-government

#### E-government problem statement

- A need to provide increasingly complex services in an increasingly complex world
  - Systematic development of functional architecture requires a structured understanding of the technical architecture
- Impact of e-government on democracy
  - Predicting emergence assumes a well-developed understanding of the technical architecture
- Cost-reduction without damaging business alignment
  - Thoughtful consolidation of services is a platform problem that assumes a robust technical architecture

#### Architecture of an architecture framework

What does a framework for describing technical architecture look like in a loosely coupled organization?

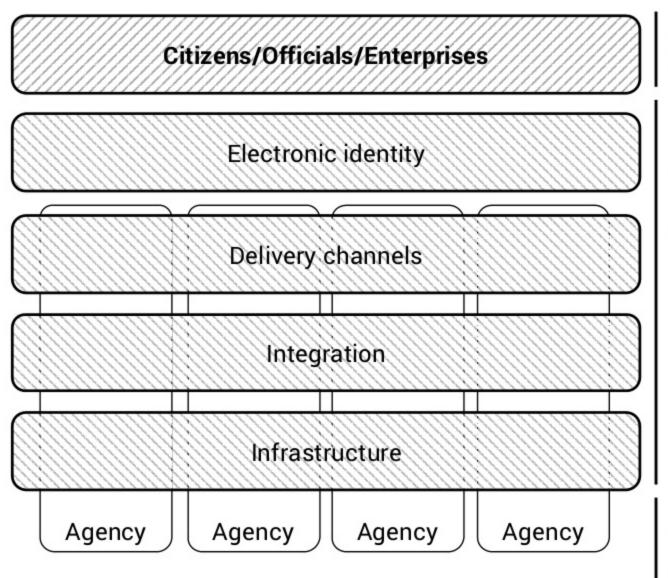
#### Meta-architecture. Function

- Provide a holistic view covering the entire system in question
- Apply in a wide variety of international settings
- Have a right level of abstraction allowing for addition or removal of detail as need be
- Be usable as a communication tool for nontechnical decision-makers

#### Meta-architecture. Concept

- How to relate the technical architecture to an unknown functional architecture?
  - The framework must be compatible with a wide range of differences between countries and be able to respond to democratic change
- Establish a set of defining functional issues which the technical decisions depend on
- Three main axes to focus the questions
  - Centralization. How centralized is the system in question?
  - Privacy & security. What are the relevant security- and privacy policies?
  - Diversity. What is the level of diversity in the solution space?

#### Meta-architecture. Form



Denoting the main focus of the framework.

The layers used to split the underlying architecture into manageable, technologically uniform parts.

Agencies as containers for the individual information systems.

### The e-governance technical architecture framework

## What is it that we ended up building and using?

#### The electronic identity layer

- E-government services require a way to relate citizens to their portfolio of rights and obligations
- The questions
  - Who is the target customer? I.e. What can be assumed about the user?
  - What is the legal significance of electronic identification?
    Higher significance requires a more robust technical solution
  - What is the multiplicity relationship between legal and electronic identities? A citizen could have several electronic identities and shared electronic IDs could be conceived

#### The delivery channels layer

- A distinct set of solutions providing electronic access to the information systems of the agencies
- The questions
  - What is the diversity of channels across the services? I.e. what channels a particluar service tends to be provided on?
  - What is the diversity of channels across the country? I.e. what is the total set of channels all the services make use of?

#### The integration layer

- The integration layer joins the information systems of different agencies allowing for sharing of data and functionality
- The questions
  - To what extent are services centralized between the agencies? Effectively, what is the feasibility of a centralized middleware solution?
  - What are the integration paradigms (e.g. document, data or service) used? This has a strong impact on the functionality of the middleware solution used.
  - How are privacy and data ownership regulated? Integration layer is a central point for any privacy policy implementation

#### The infrastructure layer

- All of the software described in previous layers needs servers and network infrastructure
- The questions
  - How tightly is the infrastructure consolidated? This question is mainly about physical infrastructure and networks
  - To what extent are platforms offered centrally? I.e. what is the cloud strategy in place?
  - What restrictions exist for the physical location of data? I.e. to what extent can off-shore infrastructure and platforms be used?

#### Technical architecture of Estonia

Using the framework to describe the technical architecture of Estonian egovernment

#### Estonia. The electronic identity layer

- PKI based on a smart-card picture ID
  - A SIM card can be used as a secondary token
  - For authentication, federated bank-based authentication schemes can be used
- The card is tied to a unique ID code of a person
  - There is little information on the card but that code
- Digital signature is legally equivalent to the physical one
  - 2-3 digital signatures per capita given per month

#### Estonia. The delivery channels layer

- Web is the main service delivery channel for most widely used services
  - Mobile is not there yet
  - Branches are used for tailored or complex services
- In 2011, 94% of personal tax returns were filed via a web-based portal
- 120+ different contact points exist, centralization is low
  - Although a central service portal, eesti.ee, exists