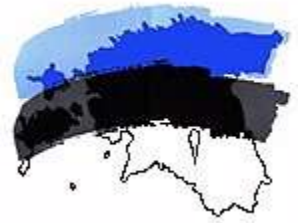


Internet Voting in Estonia



Tarvi Martens
I-Voting Project Manager

National Electoral Committee

Internet Voting?

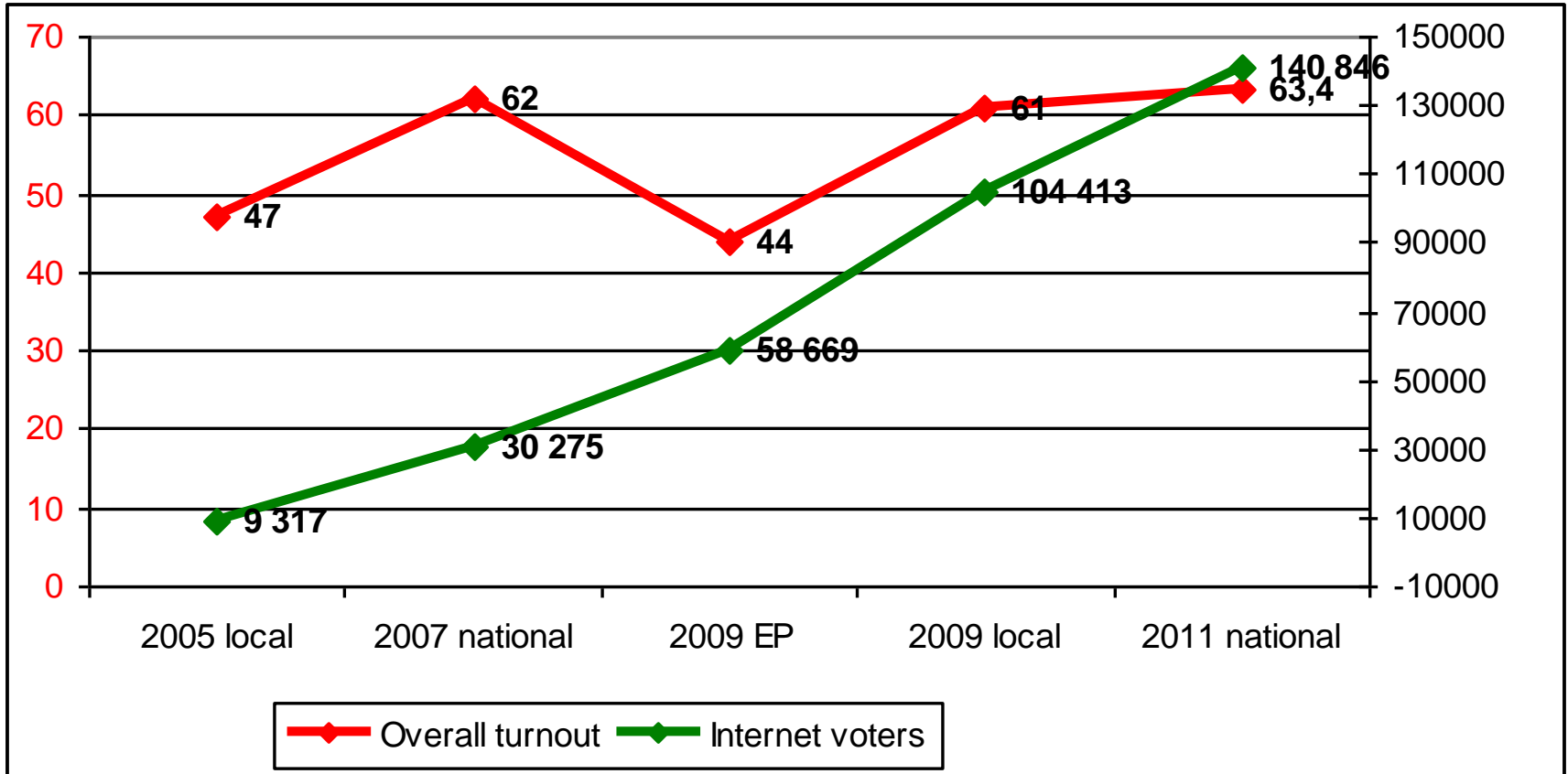


- In October 2005 Estonia had first-ever pan-national Internet Voting **with binding results**



- Ever since, i-voting has been used in **five** elections in total (last one closed 2 days ago)

The spread of internet voting



E-stonia ?



- Population: 1.35M
- Everyday Internet usage: 63%
- Internet banking: 88%
- Mobile penetration: >100%
- 1000+ Free Internet Access points
- Member of EU and NATO since 2003
- **Electronic identity delivered: >90% (age 15+)**





ID-card Project

- Started in 1997
- First card issued: Jan 28, 2002
- October 2006: 1 000 000th ID-card was issued
 - “rollout completed”



The Card

- “Compulsory”
for all residents
- Contains:
 - Personal data file
 - Certificate for authentication
(along with e-mail address
Forename.Surname@eesti.ee)
 - Certificate for digital signature





Usage of the ID-card

- Major ID-document
- Replacement of
 - (transportation) tickets
 - library cards
 - health insurance card
 - driver documents
 - etc...
- **Authentication token for all major e-services**
- **Digital signature tool**



Internet Voting ?

- Not a nuclear physics
- Just another application for ID-card
...with some special requirements & measures...



I-voting Main Principles

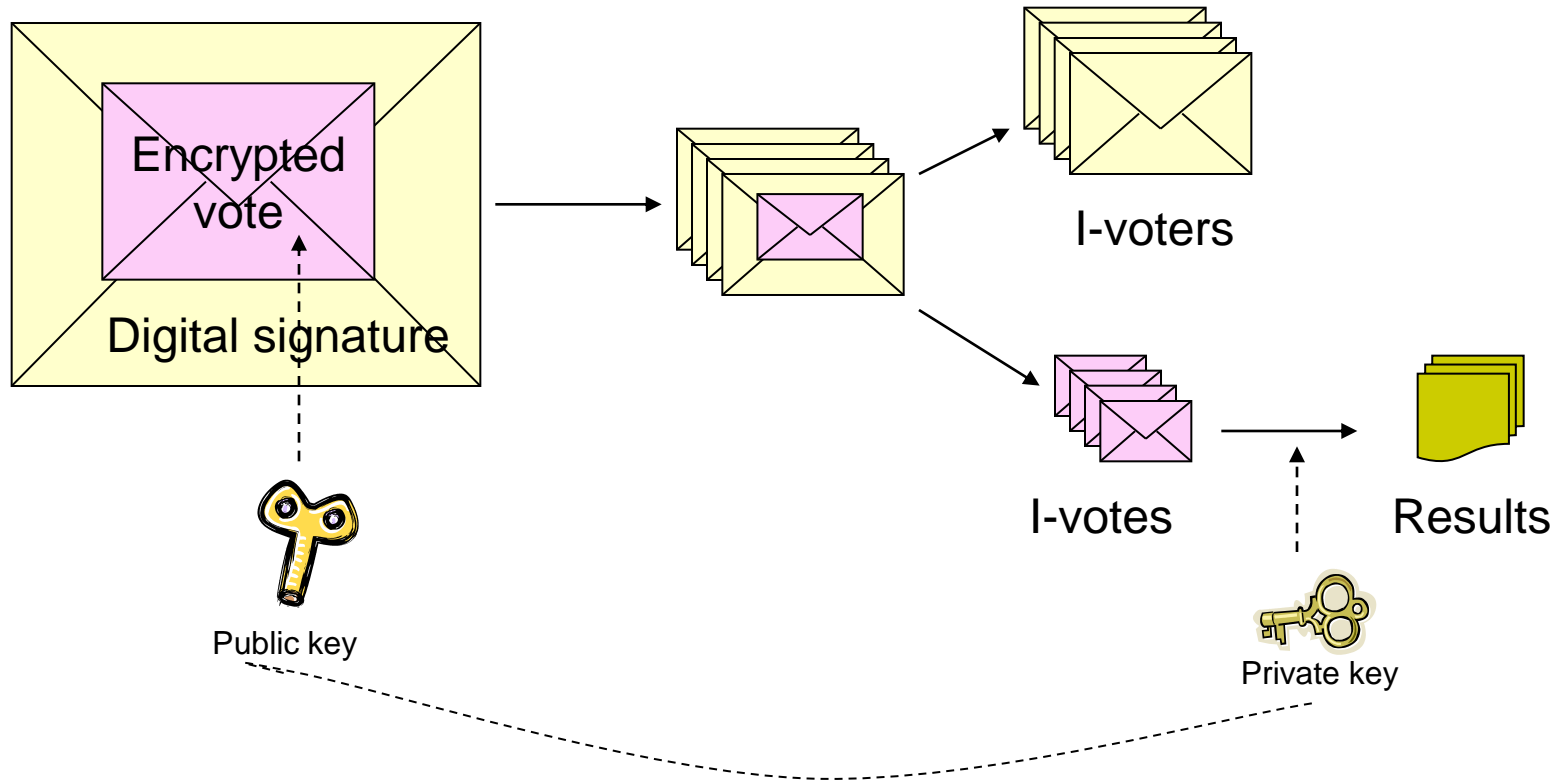
- All major principles of paper-voting are followed
- I-voting is allowed during 7-day (was: 3-day) period before Voting Day
- The user uses ID-card or Mobile-ID
 - System authenticates the user
 - Voter confirms his choice with digital signature
- Repeated e-voting is allowed
 - Only last e-ballot is counted
- Manual re-voting is allowed
 - If vote is casted in paper during pre-voting days, i-vote(s) will be revoked

Voter registration

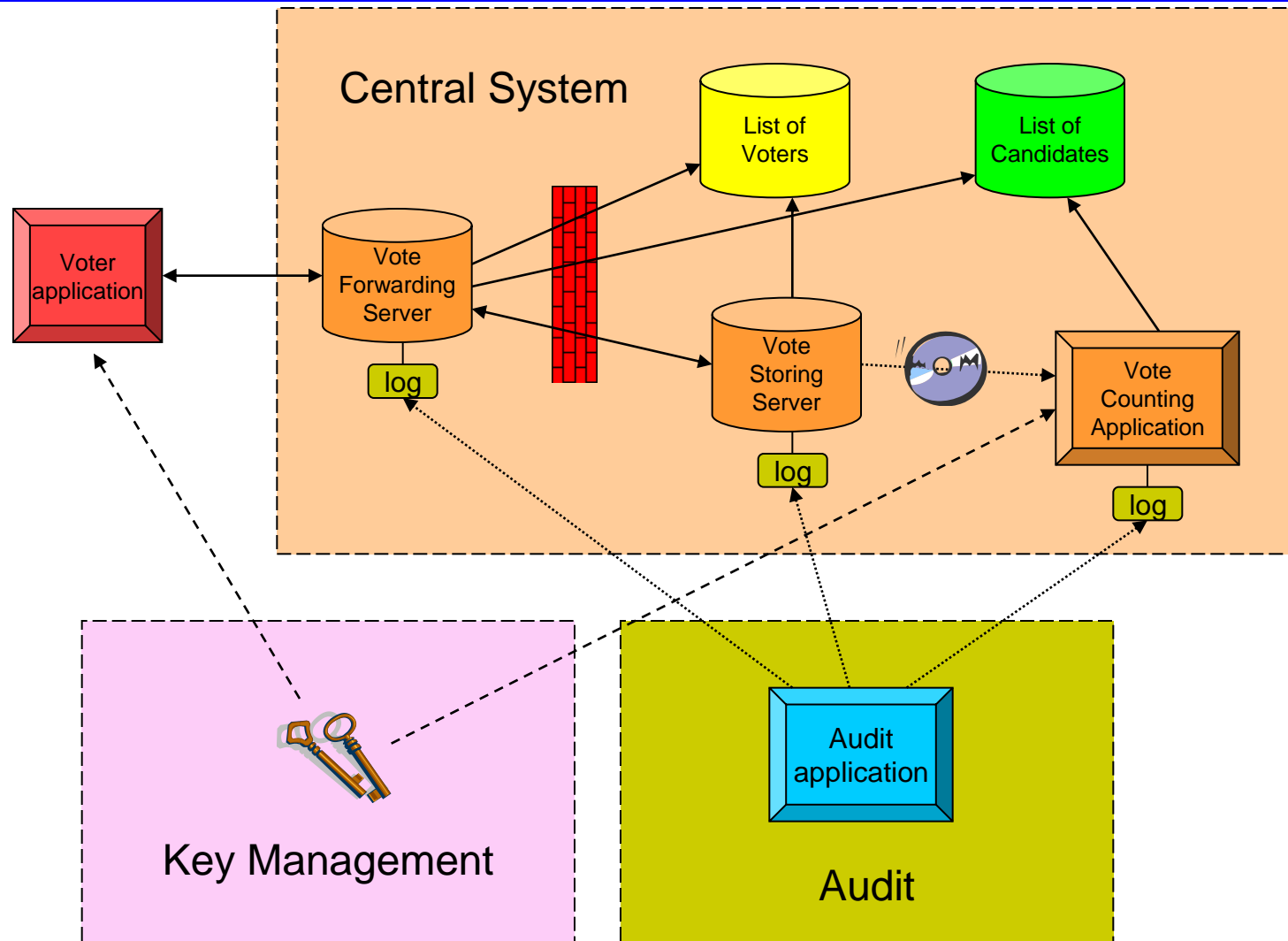


- Missing
- All citizen (residents) should register their place of living in central population register
- Only voters with registered addresses are eligible
- Population register is used

Envelope scheme



Architecture



Cancellation of i-votes



All Internet Voters' lists are printed and sent to polling stations two days before Election Day

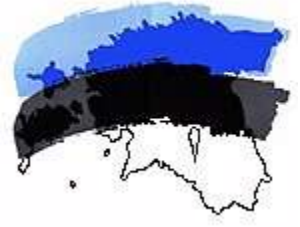


Polling stations check the polling lists for possible Internet Voters who voted in the polling station on paper and mark all Internet Voters in the polling station list with "E"



If a double voter is found a note of cancellation is drafted in the Election Infosystem by the polling station and the I-vote is cancelled centrally

User view



Website for voting



www.valimised.ee

E-hääletamine on käimas!

Hääletamine algas 24. veebruaril kell 9.00 ja lõpeb 2. märtsil kell 20.00.

E-hääletamiseks tuleb alla laadida valijarakendus ning see käivitada.

- [Laadi alla valijarakendus Windowsi jaoks](#)

Tehniline abi **e-hääletamisega** seotud teemadel telefonil **1777** või e-posti aadressil abi@valimised.ee. Teave valimistega seotud küsimustes: info@wk.ee või www.wk.ee.

Done Internet 100%

Download and run
Voting Application



Run the Application

- Select your eID



In case of ID-card... ****



- Put your card into card reader
- Insert PIN 1

A screenshot of a web application interface. At the top, there is a navigation bar with buttons labeled "Sisenemine" and "Hääletamine". A modal dialog box titled "ID - kaart" is open in the center, containing a text input field with "****" and two buttons: "OK" and "Katkesta". Below the dialog, the main content area contains the text "Hääletamiseks peate ennast tuvastama ID-kaardi või Mobiil-ID abil:" and two buttons: "KAART" and "MOBIIL-". The "KAART" button features a grid icon with red and blue squares, and the "MOBIIL-" button features a similar grid icon with blue and red squares.

Valijarakendus

Sisenemine

Hääletamine

ID - kaart

Sisesta PIN-kood isikutuvastuseks (PIN 1)

OK Katkesta

Hääletamiseks peate ennast tuvastama ID-kaardi või Mobiil-ID abil:

KAART MOBIIL-

In case of Mobile-ID...



- Enter phone number
- Verify verification code
- Insert PIN 1

Telefoninumber

5252525252



Sõnumit saadetakse, palun oodake. Mobiil-ID-ga sisenemiseks tuleb Teil oma telefoni sisestada Mobiil-ID PIN1 kood pärast seda, kui olete saanud SMS-i sama kontrollkoodiga, mida näete siin:

7030

Valimised
kontrollkood
7030
Sisenen?

Sisesta PIN1

Go to Menu Names

Go to Menu Names

You are identified



Valijarakendus

Sisenemine Tutvustus Valiku tegemine Hääletamine

TERE TULEMAST!

Nimi: **PEETER HÄÄLETAJA**
Isikukood: **37012021234**

Olete hääletamas 2011. aasta Riigikogu valimistel. Tegemist on ametlike valimistega, kus elektroonilist häält arvestatakse samamoodi kui pabersedeliga antud häält. Järgnevalt teete valiku ühe oma elukohajärgse valimisringkonna kandidaadi poolt.

Katkesta Otsustama

Ballot completion



- Choose a candidate

The screenshot shows a web browser window titled "Valijarakendus" with a navigation bar containing four steps: "Sisenemine", "Tutvustus", "Valiku tegemine" (highlighted in blue), and "Hääletamine".

On the left, a scrollable list of candidates is shown. The candidate "821: HELMI LOOPMANN" under the "Eesti Pensionäride Erakond" is selected and highlighted in blue. Other candidates listed include Paul Himma, Tõnis Rüütel, Aare Kitsing, Irina Stelmach, Ülo Russak, Toivo Eensalu, Tiina Mägi, Ebba Rääts, Vanda Sokolova, Loit Rõuk, Piret Saat, Toivo Jürgenson, Tiina Vallikivi, Venno Laul, Olev Remsu, Aili Kogerman, Anna-Greta Gutman, Viido Polikarpus, Epp Rebane, Ülo Ruubel, Riina Enke, and Mare Räis.

On the right, the text reads: "Klõpsake soovitud kandidaadi nimel." followed by the question "Kelle valite Riigikogusse?". Below this, it states "Teie valimisringkond: Tallinna Kesklinna, Lasnamäe ja Pirita linnaosa - Valimisringkond nr 2". Underneath, it says "Minu valik on:" followed by the selected candidate's name and party: "kandidaat nr. 821 HELMI LOOPMANN Eesti Pensionäride Erakond".

At the bottom right, there are two blue buttons: "Katkesta" and "Valin".

Confirmation (ID-card)

- Confirm your choice with PIN2



Valijarakendus

ID - kaart

Sisesta PIN-kood digiallkirjastamiseks (PIN 2)

OK Katkesta

Hääle kinnitamisel küsitakse teie ID-kaardi PIN2 koodi digitaalseks allkirjastamiseks.

Kelle valite Riigikogusse?

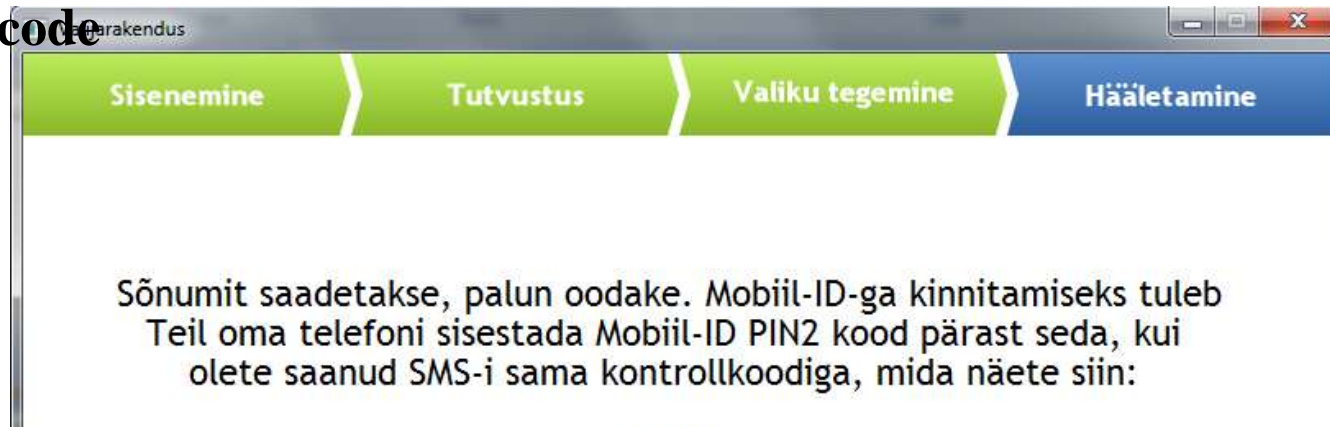
Kandidaat nr. 821
HELMİ LOOPMANN
Eesti Pensionäride Erakond

Tagasi Hääletan

Confirmation (mobile-ID)



- Confirm your choice by signing digitally
- Verify verification code
- Insert PIN 2



3654



Vote received



Valijarakendus

Sisenemine > Tutvustus > Valiku tegemine > Hääletamine

Teie tehtud valik läks arvesse

Soovi korral saate häält muuta eelhääletamise ajal uuesti elektrooniliselt hääletades (24. veeb kuni 2. märts) või valimisjaoskonnas pabersedeliga hääletades (28. veeb kuni 2. märts). Valimispäeval (6. märts) oma häält muuta ei saa!

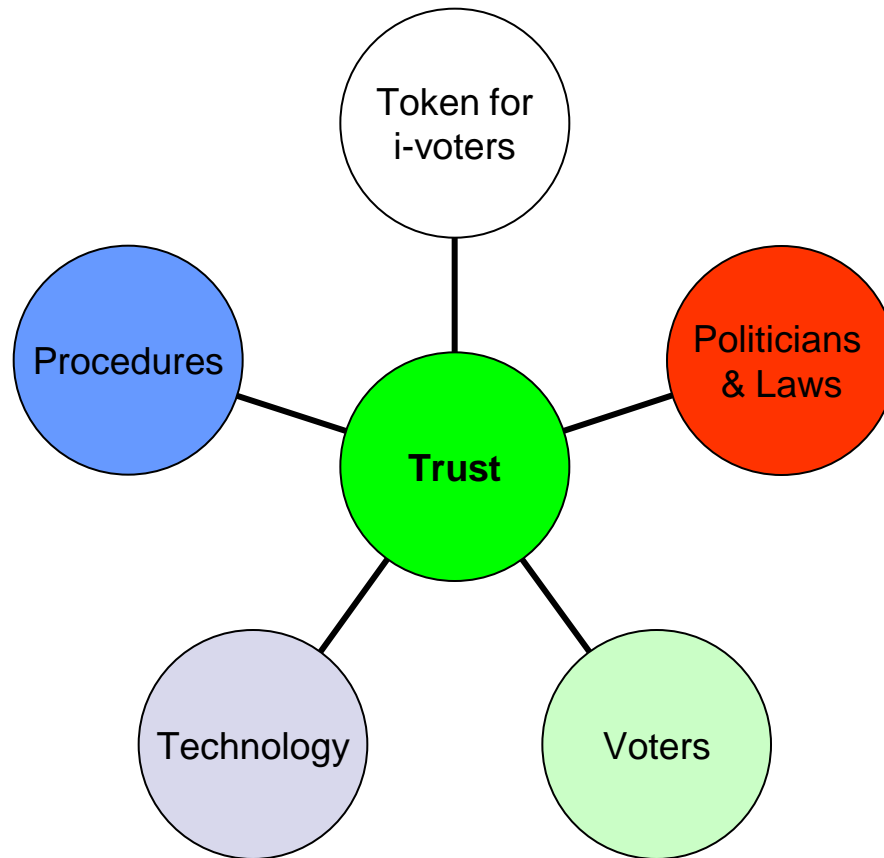
Kui olete hääletanud mitu korda elektrooniliselt, võetakse arvesse viimane hääl. Kui olete hääletanud valimisjaoskonnas pabersedeliga, arvestatakse seda ja elektrooniline hääl tühistatakse.

Märge Teie antud elektroonilise hääle arvestamise kohta tehakse 6. märtsiks elukohajärgse valimisjaoskonna valijate nimekirja.

Palun sulgege rakendus. Suurema turvalisuse huvides eemaldage ID-kaart lugejast!

Valmis

What it takes ?





Principle of Transparency

- All system components shall be transparent for auditing purposes
- No “black boxes” are allowed
 - No use of 3rd party-controlled authentication mechanisms or services
 - No components without source code



Technology Selection

- Keep it as simple as possible
- Build it on secure & stable platforms (Debian)
- Use widely known programming languages
- No fancy user interfaces for server operations



Managing Procedures

- All fully documented
- Crash course for observers-politicians & auditors
- All security-critical procedures:
 - Logged
 - Audited & observed
 - Videotaped



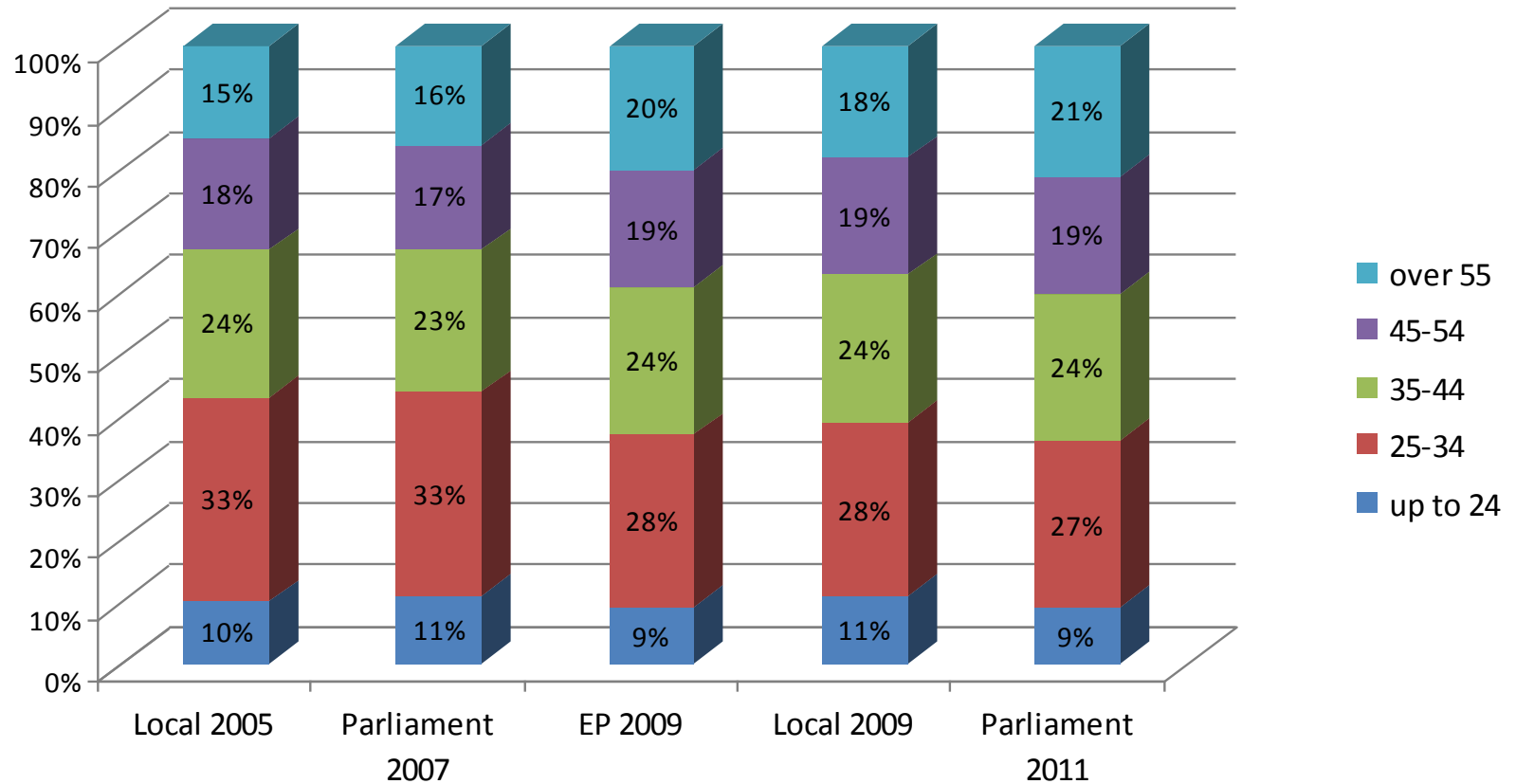
Hosting and Monitoring

- Governmental security hosting
- Strict requirements for entering the server premises
 - Auditor(s), cam-man, operator(s), police officer
- Sealing of hardware and data carriers
- Large number of network security specialists involved in network-monitoring 24/7 for dDOS or trojans in voluntary basis

Is it for young people?



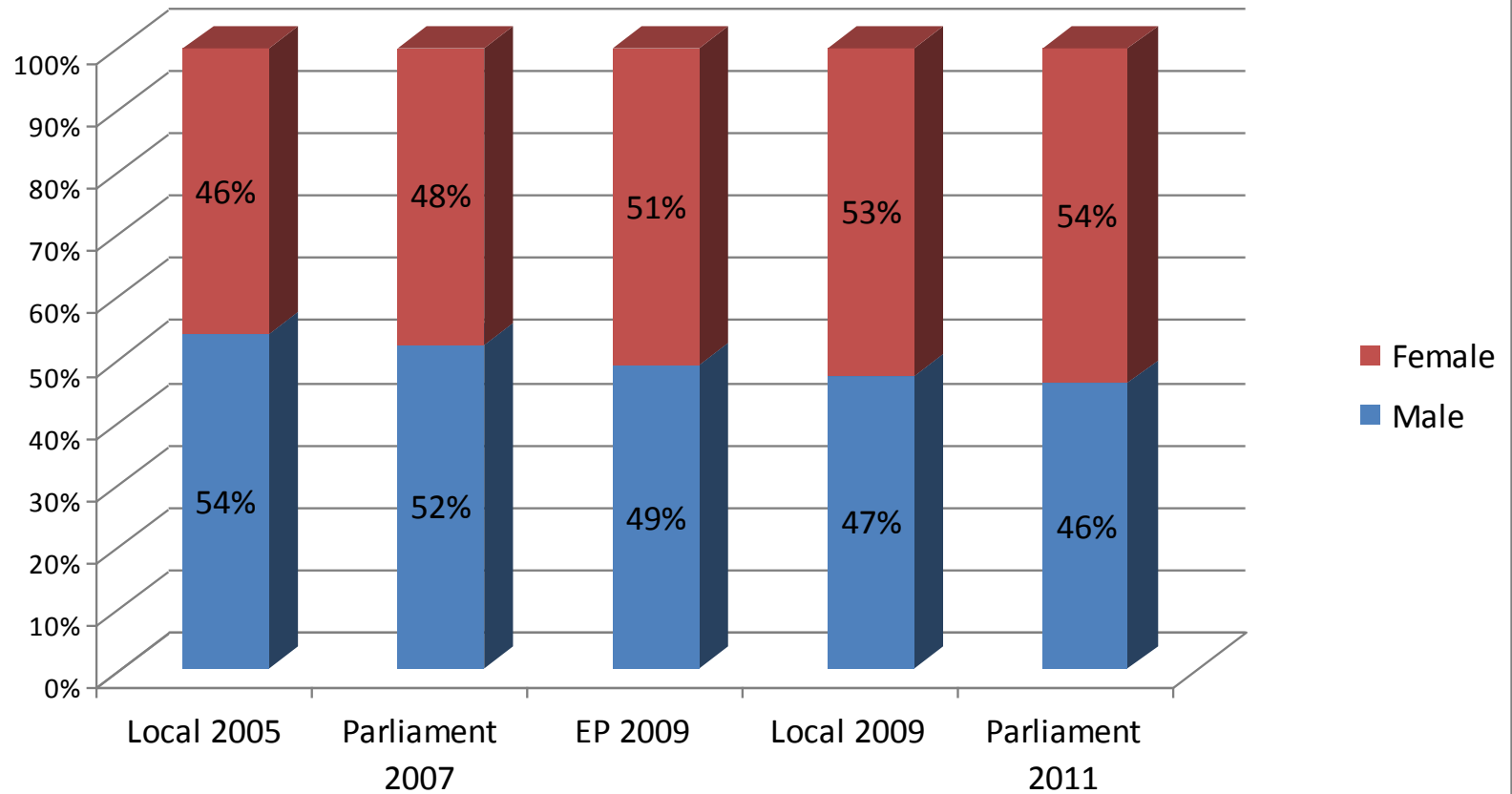
I-Voters by Age, 2005-2011



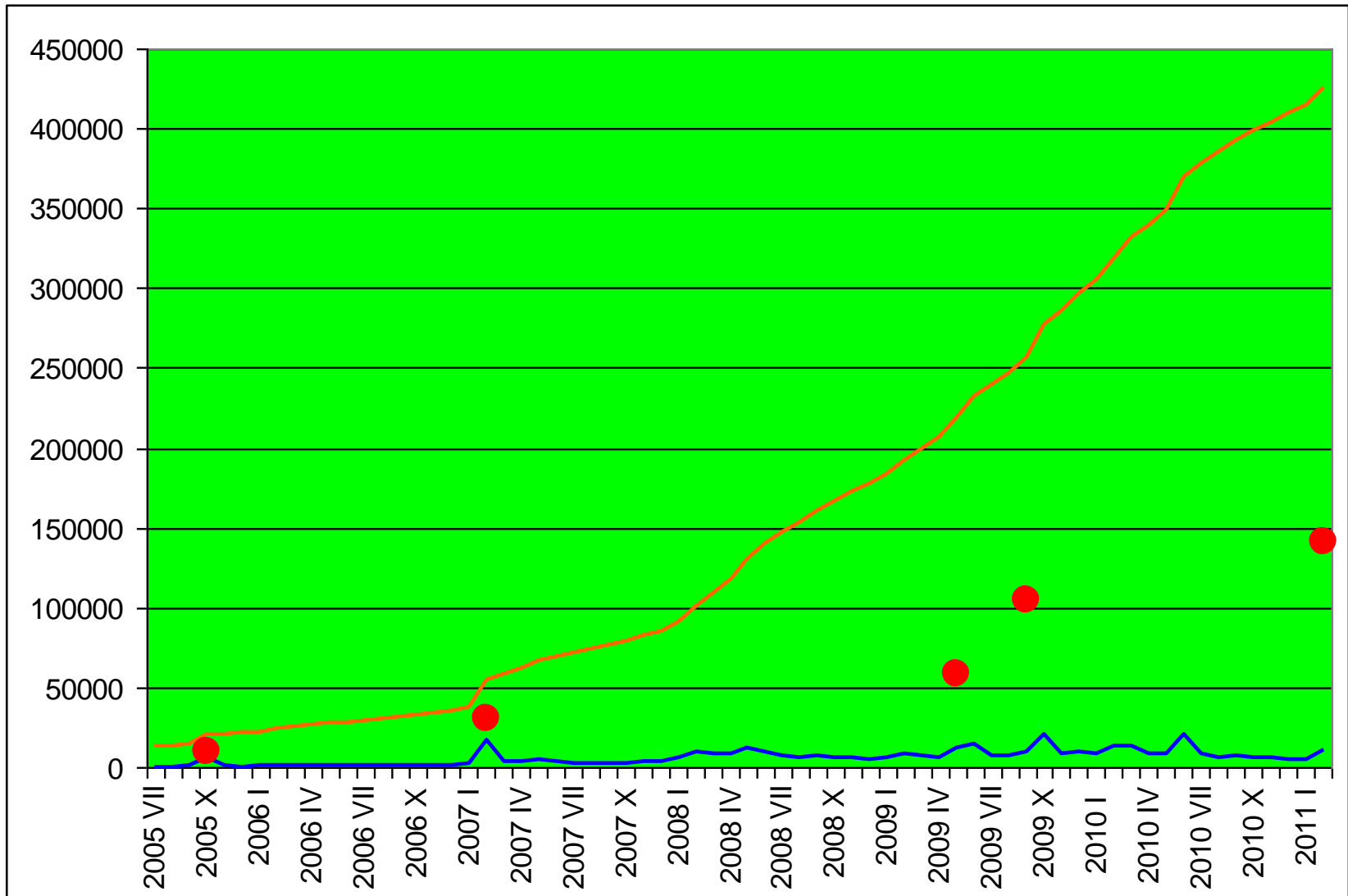
Is it for brave men?



I Voters by Gender, 2005-2011



ID-card usage vs. I-voting



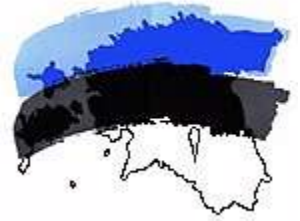


Lessons learned

- I-voting is not a killer-application.
It is just another way for people to vote
- People's attitude and behavior change in decades and generations, not in seconds
- I-voting is as natural as Internet-banking but even more secure

- Internet voting is here to stay

More information



www.valimised.ee

www.vvk.ee

tarvi@sk.ee