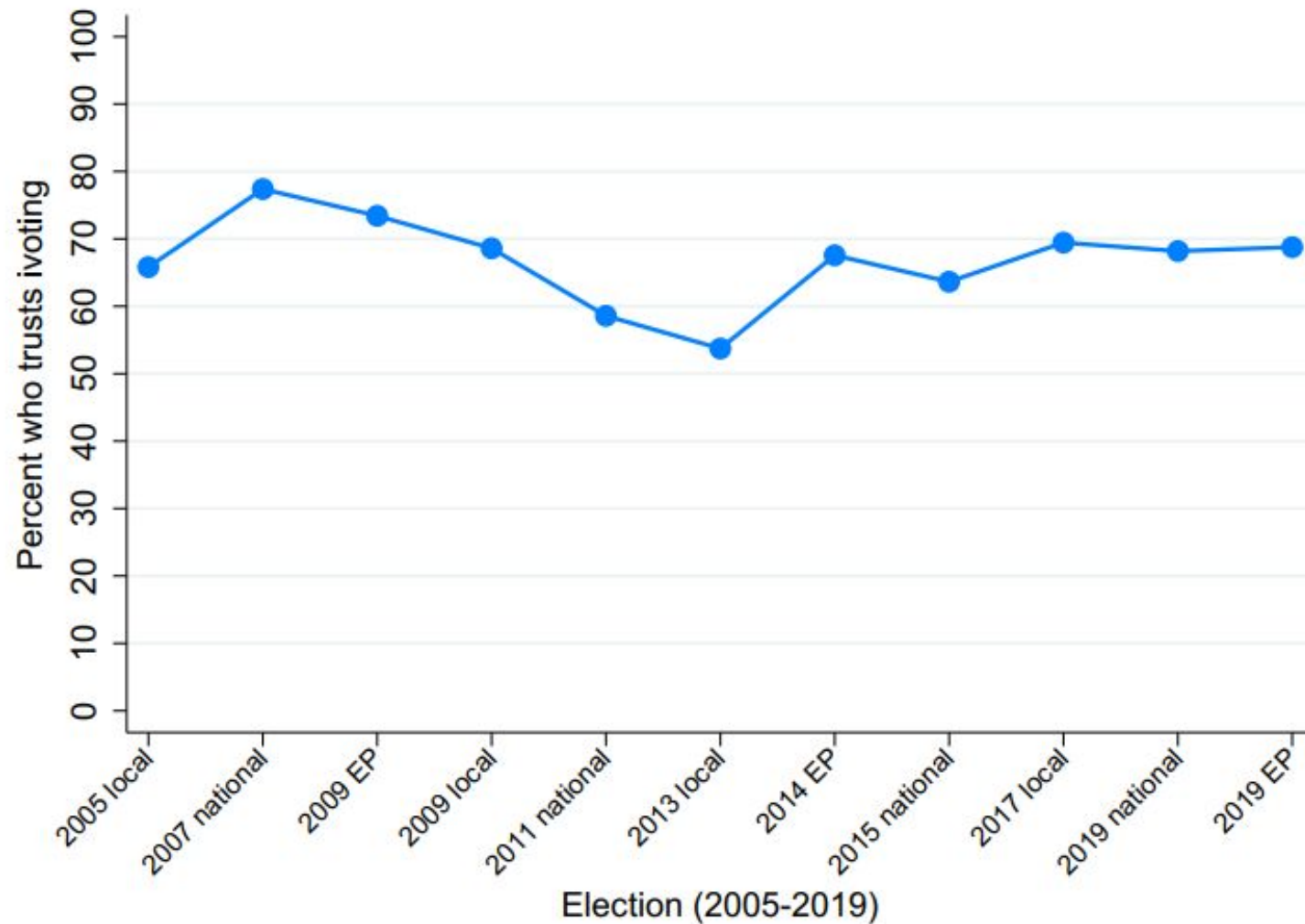# I-Voting: Trust and Reliability

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Trust in Internet voting 2005-2019

Source: Mihkel Solvak, Johan Skytte
Institute of Political Science,
University of Tartu (2019)

Trust in relation to voting habits

On the average trust is:

Highest: people who i-vote

Lowest: people wo do not vote at all

Polarization of electorate

Majority of voters showed high trust

Minority of voters showed low trust

Very few remained undecided/neutral

Adding new security measures doesn't affect trust level of dedicated i-voting opponets

Trust in Internet Voting, (Norstat Poll, 2023)

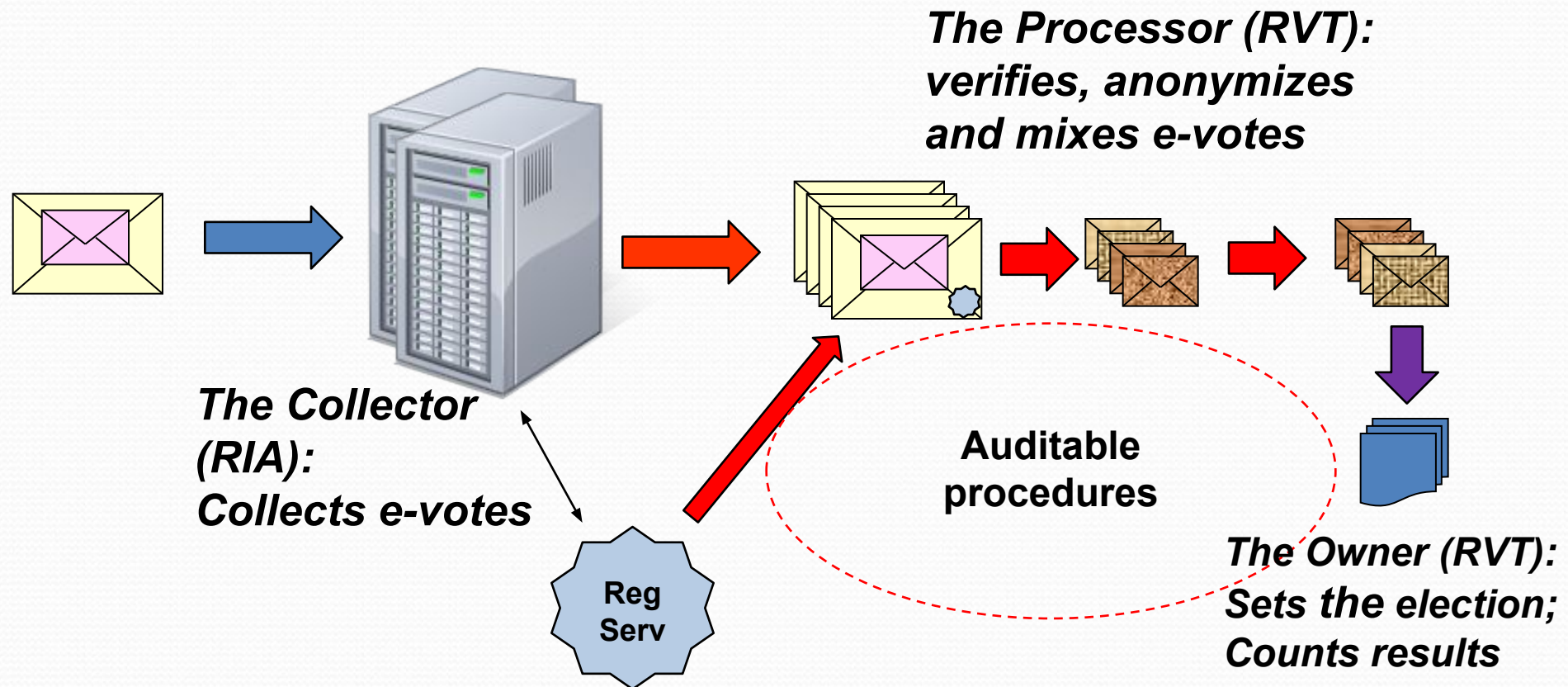Opinion poll commissioned by EKRE

Can i-voting be trusted?

Were i-voting results partially falsified?

Can i-voting be trusted?		Were i-voting results partially falsified?	
Yes:	36,6%	Yes:	22,1%
Mostly yes:	17,6%	Mostly yes:	17,6%
No:	14%	No:	35,6%
Mostly no:	24,3%	Mostly no:	12,5%
No answer:	7,6%	No answer:	12,2%

Role/component-based approach

The Processor (RVT): verifies, anonymizes and mixes e-votes

The Collector (RIA): Collects e-votes

Reg Serv

Auditable procedures

The Owner (RVT): Sets the election; Counts results

State Electoral Office
of Estonia

Building trust through transparency and verifiability

Trust on the level of individuals – to enable usage of i-voting

Aggregate trust level – to ensure wide acceptance of the election outcome

Transparency

Source code published

Documentation and protocols are public

Procedures of the SEO are public

Public system system trial is carried out and the results tested publicly before the start of voting

Observation encouraged with a preparatory course available

Results auditable by 3d parties

Transparency: limitations

How much into detail should observation go?

Voter data protection

Direct and unlimited access to the system cannot be granted to eliminate interference

Observation takes time and can be complicated

Testing and auditing

1.1. Security testing of the system (penetration tests)
 - *plans for code audit and red teaming*
1.2. E-ITS security audit
1.3. I-voting procedures audit (commissioned by Ministry of Economics and Communications, 2022)

2. Voting trial; testing that votes are cast and voting results are ascertained correctly
2. Data and Process Audit of all procedures

3. Verification of results after the votes have been counted

Testing and auditing: TODO list

Code audit for the Internet voting system

Red-teaming

Bug hunt

Raising awareness

Voter education

Engaging the scientific community

Alleviate fears of political actors

State institutions also need refresher courses

Verifiability and trust assumptions

Some features are trusted axiomatically

- Cryptography Scheme

- electronic ID

- Population Register

Another goal is to remove dependency from outer factors (PC, OS or network etc)

Verifiability

Voter can verify that vote was cast as intended

Voter signing the ballot ensures that the ballot cannot be tampered with

Registration service enables to verify that votes were not added or removed

Signing the final set of i-votes enables to verify that the set has not been tampered with

Vote counting and mixing proofs verify that the encrypted votes and the result correspond to the input

Limits of vote verification

Different levels:

1. Vote received as cast
2. Vote is cast as intended
3. Vote is included in the tally
4. Voter's choice is tallied correctly

Individual verification and universal verification

Maintaining vote secrecy vs verifiability

Common accusations

- Votes are changed somewhere between the vote app and collecting server

- e-ID is faked, phantom e-IDs created by the government

- The administrators add i-votes or tamper with the results at will

- I-voting cannot be observed because full access to system is not granted

I-voting: Political debate

Does I-voting benefit certain parties or candidates? (No)

I-voting enables the voter to change their choice and vote for a diferent party/candidate

Traditional paper voting is more engaging due to extra effort required

Which is more secure, paper or i-vote?

Scientific or technical debate used as proof

Winning party's i-votes and results are fake (because who would even vote for them)

Thank you! Questions?

More information at elections website:

https://www.valimised.ee/en

Euroopa Parlamendi valimised

E-hääletamine www.valimised.ee 03.—08.06.2024
Keskuste valimisjaoskondades eelhääletamine 03.—06.06.2024
Kõigis valimisjaoskondades eelhääletamine 07.—08.06.2024
Valimispäev 09.06.2024