Norwegian Experiences with Internet Voting

Mombasa 03.08.2012

Project Manager Henrik Nore

The Ministry of Local Government and

Regional Development

BIST DU SICHER, DASS DEINE STIMME RICHTIG GEZÄHLT WIRD?

Henrik Nore

1983-2008

ICT and management consultant 1983-2008

2008-

Employed in EMB within the Norwegian Ministry of local management.

Responsible for acquisition, implementation and operation of new fully integrated election system in Norway.

Facts on voting in Norway

- EMB is within the Ministry of local government
- 3.800.000 in electoral roll
- Parliamentary and local every four years, offset by two years
- Complex ballot. Voters can make changes by reordering, adding and deleting candidates.
- 30 days voting period
  - Early voting possible in 500 poll stations
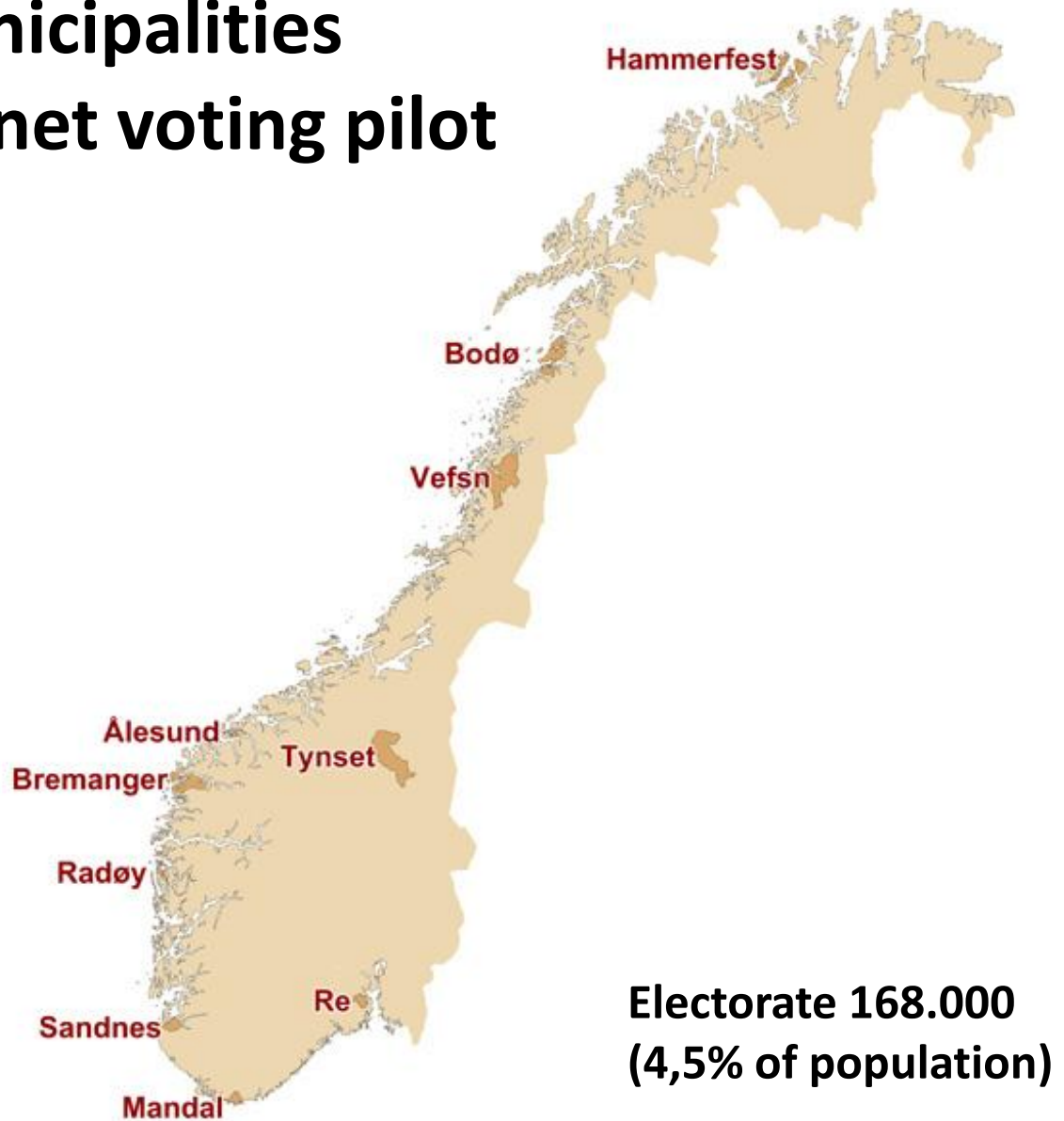 - Voting on election day in 2800 poll stations

Changes to the EMB's role in Norway

- **Previously** all election ICTs used in Norway were provided by private vendors
- **From 2013** Norway will use ICT systems owned and operated by the EMB

- **Previously** the EMB was only responsible for the legal framework on elections
- **From 2013** the EMB is also responsible for operations and maintenance of the central election ICT system
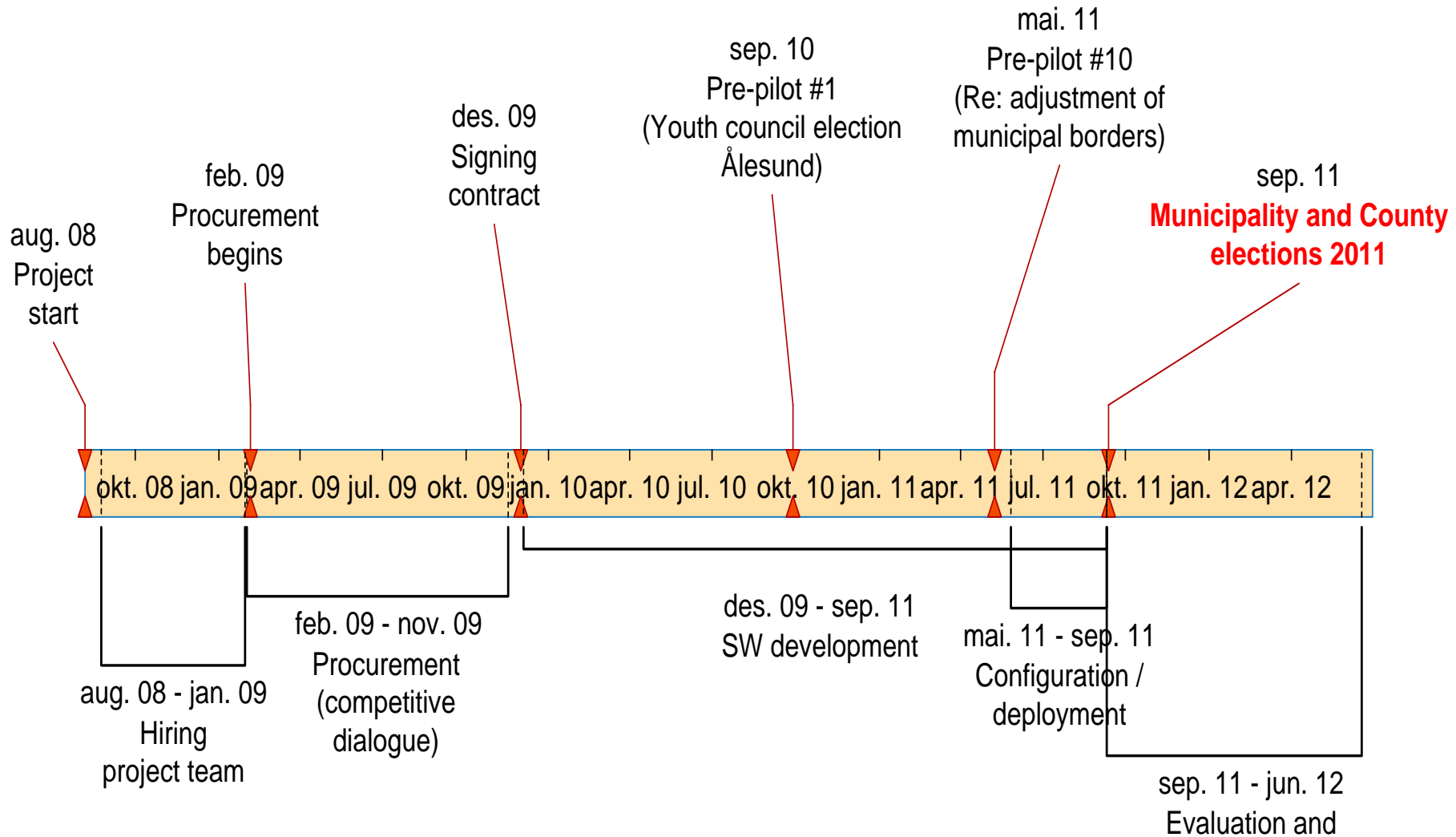
E-vote 2011 project scope

- Implement a new, central, fully integrated elections administrative system

  - Government owned and operated system:
    - internet-voting
    - E-voting in poll station
    - paper ballot scanning
    - online electoral roll/Voter register in all poll stations (mark off in VR when voted)
    - No paper-based VR in poll stations
    - VR derived from population registry
    - Result management

  - No specialized Hardware only industry standard PC/Servers
  - No proprietary software, only Open Source

- Pilot Internet voting in 10 municipalities (4,5% of population) in the 2011 municipal and county council elections

Participating municipalities in the 2011 Internet voting pilot

Hammerfest

Bodø

Vefsn

Ålesund

Bremanger

Tynset

Radøy

Re

Sandnes

Mandal

**Electorate 168.000
(4,5% of population)**

Milestones 2008-2012

mai. 11
Pre-pilot #10
(Re: adjustment of
municipal borders)

sep. 10
Pre-pilot #1
(Youth council election
Ålesund)

sep. 11
**Municipality and County
elections 2011**

des. 09
Signing
contract

feb. 09
Procurement
begins

aug. 08
Project
start

okt. 08 jan. 09 apr. 09 jul. 09 okt. 09 jan. 10 apr. 10 jul. 10 okt. 10 jan. 11 apr. 11 jul. 11 okt. 11 jan. 12 apr. 12

aug. 08 - jan. 09
Hiring
project team

feb. 09 - nov. 09
Procurement
(competitive
dialogue)

des. 09 - sep. 11
SW development

mai. 11 - sep. 11
Configuration /
deployment

sep. 11 - jun. 12
Evaluation and

Cost

- Project cost 2008-2012 $30 mill
         -hw cost only 10% of total budget
         -evoting app. 10% of total budget

- Full rollout 2013 $10 mill
  (Central cost HW+SW+training)

- Poll- station cost full rollout $?
           (reuse of standard PCs)

- Yearly SW maintenance/enhancement cost $8 mill

The Norwegian definition of "e-voting"

- **In Norwegian terms, e-voting means that an electronic ballot is sent via the Internet and counted centrally**
  - not scanning of paper ballots
- Norway has piloted <u>remote</u> e-voting via Internet in a binding election
  - Poll site e-voting was only piloted in two small non-binding referenda

Reasons for piloting Internet voting in Norway

- Increasing availability for handicapped, expatriates, citizens on temporary stays abroad

- Proving quicker and more precise results

- Meeting expectations of new generations of voters

- Cost reduction (long term)

Increased turn-out is not a short term goal

Why is Internet voting possible in Norway? (1)

- Legislation for piloting different voting methods is in place
- Very high trust in central election administration and elections in general
- Relatively low level of political conflict
- No history of electoral fraud
- Economical and academic resources to implement a secure Internet voting solution

Why is Internet voting possible in Norway? (2)

- Widely available strong authentication mechanisms
- Everybody have access to Internet:
  – From home
  – From work
  – Public PCs (Library, municipal service center)
- Public services are commonly available online

Norwegian Internet voting challenges

- Secrecy of the ballot is an absolute requirement
  - The only real controversy has been the possibility of coercion / family voting
  - The Conservative Party introduced a parliamentary motion to stop remote Internet voting in November 2010

Why <u>not</u> poll site e-voting in Norway?

- Low frequency of elections means that tailor-made voting machines will be seldomly used and will have higher cost than internet-voting
- Because of the well-functioning electoral system, voting machines will not significantly improve the correctness of results
- Risk of hacking might be greater in poll stations than on voter's own PC (!)

- However: cost/benefit *might* still be positive. Further pilots might be considered.

The Norwegian Internet voting system

- Log on
- Submit vote

Internet voting system

Return code

Polling card
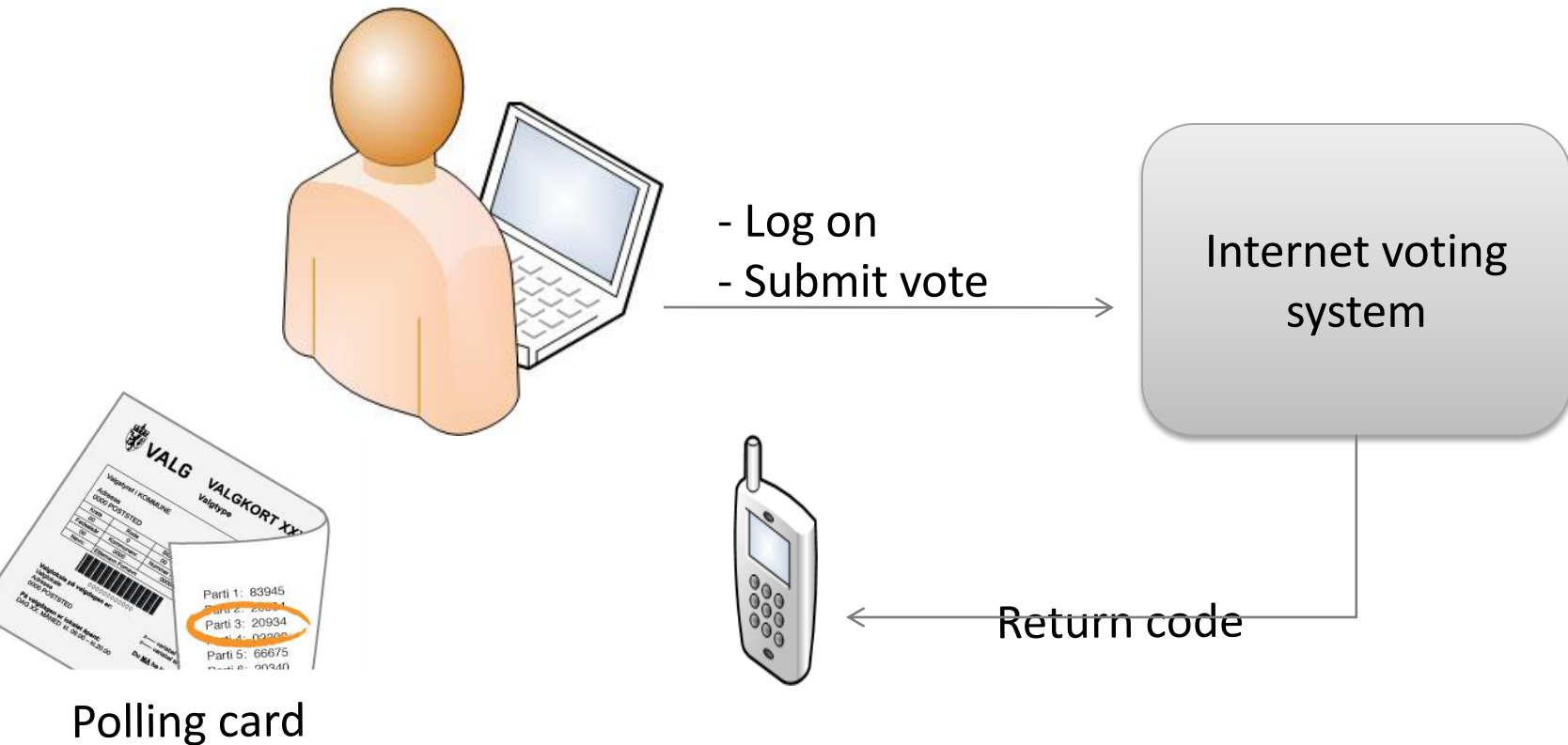
- You can e-vote as many times you want (re-voting)
- Possibility to cancel your e-vote by voting on paper

Voting stage 1: Authentication

Voting stage 2: Electronic ballot

Voting stage 3: Vote encryption

Voting stage 4: SMS return code

Hi, Kirsti Bostrøm.
Your vote at the municipal council election was received 09/08-11 09:18:00.
You voted for the party with code 2467.
You have 11 personal votes and listed 2 candidates from other parties.
You should check your return code against your poll card. Call 800 38 254 if the codes do not correspond.

The poll card

VALG · VALGKORT 2011
Kommunestyre- og fylkestingsvalget 2011

DISTRIBUERT AV POSTEN NORGE
posten
NORGE P.P. PORTO BETALT

Bodø kommune
Valgstyret
Postboks 319
8001 Bodø

Nore Per Wessel
LANGHØYANE 28

0553 Forsøkskommune

Krets	Rode	Side	Linje
0025			

Fødselsår	Kommunenr.	Nr. i manntallet
1991	1804	000044

Navn	Nore Per Wessel

18040004411

Valglokale på valgdagen er:

Landego skole

8098 Landegode

På valgdagen er lokalet åpent:

16.08.2011 Kl. 11.00 - 05.00

....
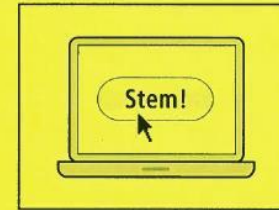Dato   Stemmemottakers signatur

Outside of poll card

Stem via Internett på evalg.stat.no

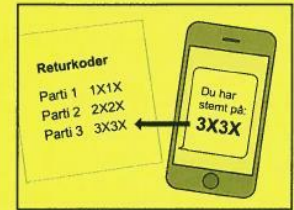evalg.stat.no

Stem!

Returkoder
Parti 1 1X1X
Parti 2 2X2X
Parti 3 3X3X ←
Du har stemt på:
3X3X

1. Gå inn på evalg.stat.no
2. Gi din stemme
3. Kontroller at returkoden du får via SMS er den samme som på valgkortet

Hva bruker jeg returkodene som står på valgkortet til?

Returkodene på valgkortet er unike for deg og kan brukes til å kontrollere at stemmen din er kommet fram og er riktig registrert. Stemmer du via Internett, vil du få tilsendt en returkode via SMS. Returkoden kan du sammenligne med koden på valgkortet ditt. Kodene skal være like. Det er frivillig å gjøre denne kontrollen.

Hvis returkoden ikke er i samsvar med det du har stemt, er det viktig at vi får vite om det. Ta straks kontakt med brukerstøtte på tlf. 800 38 254 og meld fra om problemet.

### Returkoder for kommunestyre- og fylkestingsvalget

Parti- /gruppenavn	Kode	Parti- /gruppenavn	Kode
Blank stemmeseddel	6129	Det norske Arbeiderparti	3643
Demokratene i Norge	8152	Fremskrittspartiet	5766
Høyre	3605	Kristelig Folkeparti	0681
Kystpartiet	0975	Miljøpartiet De Grønne	7663
Norges Kommunistiske parti	2700	Pensjonistpartiet	5241
Rødt	5252	Samfunnspartiet	0321
Senterpartiet	3348	Sosialistisk Venstreparti	7153
Venstre	0904		

Ved valg skal alle få stemme på det partiet eller den gruppen de selv ønsker. Pass derfor på at du er alene når du stemmer via Internett, og at ingen andre ser hva du stemmer på. Husk at du når som helst kan stemme på nytt, både i forhånds-stemmeperioden og på valgdagen. På valgdagen må du gå i et valglokale og stemme der.

Inside of poll card

Verifiability in Norwegian e-voting

- The return codes form the first link in a chain of *verifiability*

- Verifiability allows a voter or third party to <u>mathematically prove</u> that the vote has been correctly processed.

- NB: Source code review or certification is **not** the same as verifiability

Norwegian approach to verifiability
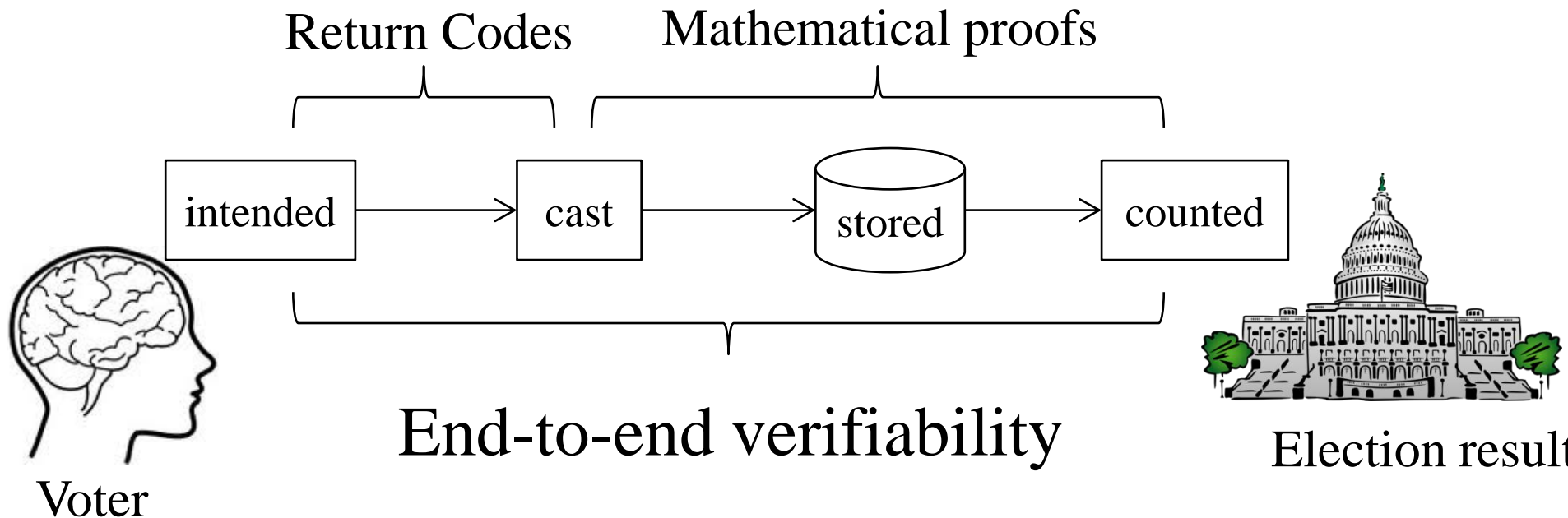
Why verifiability?

- Return codes makes attacks on voter pc's detectable
  - and voters appreciate feedback that the vote was successfully cast
- Verifiability builds trust among stakeholders
  - Academia will never trust a non-verifiable electronic voting system!
- Mathematical proofs of correct counting gives the EMB confidence that the system is working correctly

What we believe we've achieved in Norway

New approach to transparency

- A fully open source system
  (you must be very clear in procurement process)

- End-to-end verification of entire vote life cycle, including voter verification by using return codes

- Near independence of client side (in)security

- Auditing combined with voter observation of return code replaces the observer in the polling station

Lessons learned…

- This *really* takes <u>a lot</u> of time to implement.
- High security means it's time consuming to test, and there are a lot of special cases to test.
- Work closely with the vendor, but make sure skills are transferred to the EMB
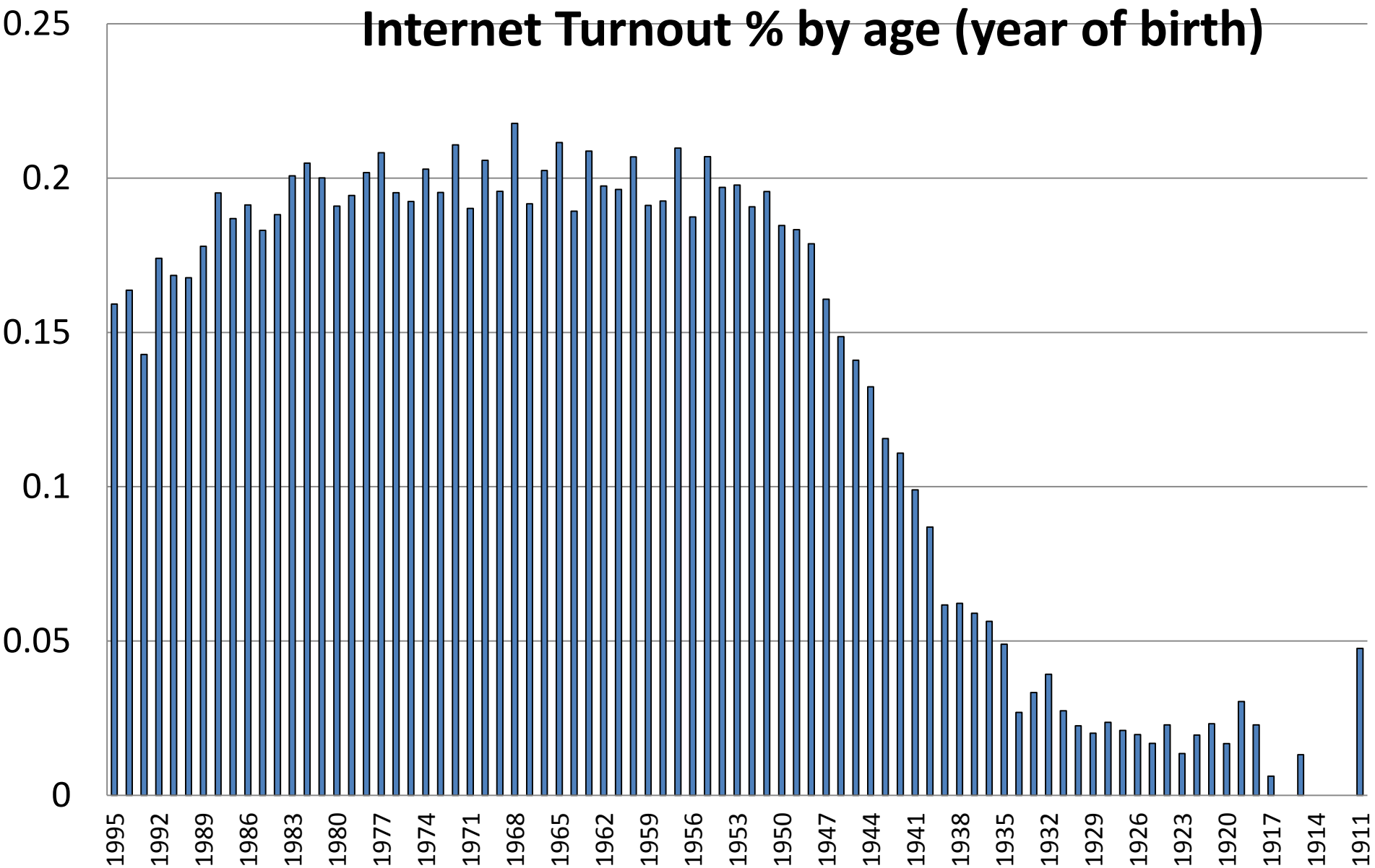
Conclusions on e-voting

- If there is a lack of public trust in the EMB, e-voting is probably not the way to go
- Internet voting from home is cost-efficient but requires good public infrastructure
- e-voting in polling stations can improve transparency if implemented correctly
- You need at least 3-4 years from idea to pilot. Academia must be involved at an early stage.

Every country has different preconditions! The Norwegian solution is built to solve Norwegian challenges and exploit Norwegian advantages.
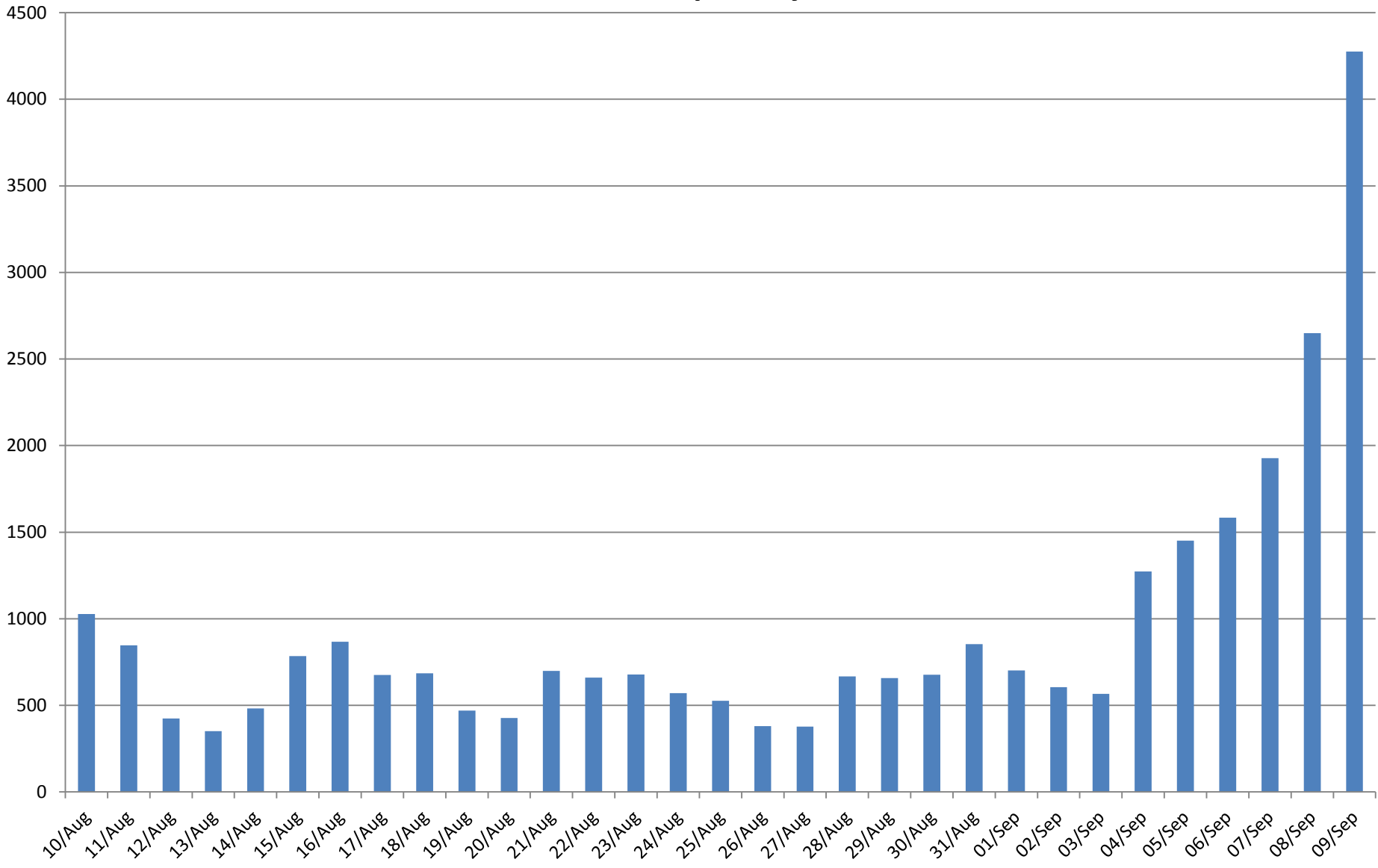
Key numbers from the 2011pilot

# Internet votes	55.785 ballots (in two contests)	73% of early votes via Internet, 27% paper votes
# Internet voters	28.001 voters	27% of total votes cast (paper+internet /early voting+voting day)
Max number of votes cast by one voter:	5 votes	
Multipe Internet voters	1020 voters	3,6% of e-voters
Multipe Internet ballots removed	1775	3.2% of ballots
Internet ballots cancelled by paper ballots	653 ballots	1,17% of ballots

Internet Turnout % by age (year of birth)

Voters per day

Questions?

More info: http://evalg.stat.no