Norwegian experiences with Internet voting

Henrik Nore and Ida Sofie Stenerud
The Ministry of Local Government and modernization

CoE Vienna
Ida Stenerud
2010 -
Product owner of Norwegian Internet voting solution

Henrik Nore
2008 -
Responsible for acquisition, implementation and operation of new fully integrated election system in Norway.
Facts on voting in Norway

- 3.600.000 in electoral roll
- 78,2% turnout in 2013 parliament election
- Election period 4 years
- Complex ballot (A preferential list system where voters can choose one or more candidates across multiple lists.)
- 25 days advance voting period (Internet and paper)
- Voters can cast multiple electronic votes (advance voting), and cancel evotes by voting on paper (both in advance and on election day)
Norwegian Internet voting timeline

2005: Feasibility study
2007: Parliament approval
2008: Project starts
2010: Internet voting tested in 10 referenda

2011: Local and regional election
    Internet pilot in 10 municipalities
    168.000 eligible voters (4.5% of population)

2013: Parliament election
    Internet pilot in 12 municipalities
    250.000 eligible voters (7%)

2015: ???
Reasons for piloting electronic voting

• Improved accessibility
  • ex-pats
  • disabled

• Efficiency and correctness of counting

• Cost reduction (long term)

• Turnout
## Voting methods used in Norway

<table>
<thead>
<tr>
<th>Medium</th>
<th>Use in an Controlled Environment</th>
<th>Use in an Uncontrolled Environment</th>
<th>Use in Mixed Environments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voting with paper ballots</td>
<td>Voting with paper ballots in polling stations</td>
<td>Postal voting</td>
<td>Mobile ballot box voting</td>
</tr>
<tr>
<td>Voting with NVT</td>
<td>Direct recording electronic (DRE) voting systems</td>
<td>Internet voting</td>
<td>Hybrid NVT: DRE systems using Internet voting technology</td>
</tr>
<tr>
<td>Paper ballots and electronic counting</td>
<td>Ballot scanner</td>
<td></td>
<td>Centrally counted postal votes using ballot scanners</td>
</tr>
</tbody>
</table>

Table 1: Forms of Voting in the OSCE Area

- In 2015?
Premises for the Norwegian solution

• Voting from standard computers – no extra equipment needed
• Use of existing authentication infrastructure (IDporten)
• A government owned and operated system
• Full transparency of process and solution
A quick overview of the Internet voting solution

- Log on
- Submit vote

E-voting system

Return code

Polling card
2011 verifiability model

Voters can check return codes

Independent auditor(s) verifies mathematical proofs

Verifiable mixnet

Voter

Election result
2013 verifiability model

Voters can check return codes
Independent auditor(s) verifies mathematical proofs

Voters can check Stored-as-cast proof

Fully Verifiable mixnet

Election result
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 every cast vote is counted correctly
2011 Internet voting project success factors

• Procurement process – competitive dialogue
• Learning by observing and improving other solutions
• All stakeholders – including the opposition – were involved
• 10 pilot elections before “the real” pilot
2013 Internet voting project

- Improved verifiability model
- Internet Election Committee (IEC) was introduced
- Improved routines for poll card printing and key management
- Replaced Java with Javascript on e-voting client
- A programming error resulted weak encryption of 40,000 ballots (corrected during election)
  - Openness (still) builds trust
Numbers from 2011 and 2013

2011: 28001 Internet voters
  • 73% of advance votes were cast over the Internet
  • 16% internet turnout of all eligible voters

2013: 70622 Internet voters
  • 76% of advance votes cast over the Internet
  • 28% internet turnout of all eligible voters
Data from 12 internet municipalities (250,000 possible voters):

**Total Turnout (%) by age**

- **Total turnout (%):**
- **Paper votes advance voting:**
- **Internet votes advance voting (% Turnout):**
- **Paper votes election day:**

The graph shows the distribution of total turnout by age, with different lines representing paper votes advance voting, internet votes advance voting, and paper votes election day.
The future of Internet voting in Norway

• According to Norwegian law, Internet voting is in compliance with secrecy of the vote
• Still, this is politically controversial
• The new government (formed 2013) have earlier voted against Internet voting in parliament

• The government has not yet decided how to proceed with Internet / electronic voting
System demonstration (If time)
Internet voting

All eligible voters in Bodø, Bremanger, Fredrikstad, Hammerfest, Larvik, Mandal, Radøy, Re, Sandnes, Tynset, Vefsø and Ålesund may vote electronically during the parliamentary election.

You may vote online until September 6th 23:59.

For your security, you will automatically be logged out after 30 minutes.

How to vote online

Authentication is done through iD-porten (using, for example, MiniID or BankID), where your cell phone number must be registered.

The first time you authenticate, you'll be prompted to share your phone number. In order to vote online, you must select "Share with eValg".

Watch a video illustrating the voting process.

Your ballot must be kept secret.

You must therefore ensure that you cast your vote unobserved.

Remember that you may vote via the Internet again at any time during the advance voting period. You may also vote with a paper ballot at a polling station. A paper vote will cancel an Internet vote.

Log in to vote
2013 parliamentary election

Your ballot must be kept secret
- You must therefore ensure that you cast your vote unobserved.

You may vote via the Internet as many times you want
- To vote again, you must log out and in again.
- In the interest of keeping the ballot secret, you will never be able to see previously cast votes.
- Your last Internet vote will be the one that counts.

A paper vote will cancel all Internet votes
- You may vote both via the Internet and on paper.
- You may only vote once on paper.
- On election day you may only vote at the polling station.

Parliamentary election in Hordaland
Online voting period: 1. January 2013 00:00 - 31. December 2013 23:59:00

Start voting
Select ballot for parliamentary election in Hordaland

There are 15 electoral lists in your county. These are listed in random order below. Choose the party you want to vote for.

- Norges Kommunistiske Parti
- Pensjonistpartiet
- Det norske Arbeiderparti
- Miljøpartiet De Grønne
- Sentrumssalliansen
- Rødt
- Demokratene
- Fremskrittspartiet
- Socialistisk Venstreparti
- Kystpartiet
- Venstre
- Senterpartiet
- Høyre
- Kristent Samlingsparti
- Kristelig Folkeparti
- Blank stemmeseddel

Show ballot
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Show ballot
Ballot for Norges Kommunistiske Parti in the parliamentary election in Hordaland

You may change the sequence of the candidate list by entering new numbering in the boxes to the left of each candidate. You may also delete candidates by clicking in the field to the right of the candidate's name.

Change order
- Assign a new position to the candidate by clicking the associated field in front of the candidate's name and select the desired number from the list.
- You cannot assign multiple candidates to the same number.
- If you want to change the number of a candidate you have stricken, you must first uncheck the box to the right of the name.

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Ballot for Norges Kommunistiske Parti in the parliamentary election in Hordaland

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<td>1 2 3 4 5 6 7 8 9 10</td>
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<tr>
<td>7</td>
<td></td>
<td>Beate Barsheim</td>
<td>f. 1970</td>
<td>☑</td>
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<td></td>
<td>Ruth Gjøsund</td>
<td>f. 1930</td>
<td></td>
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</tbody>
</table>
Checking your ballot

Below you will find your completed ballot. If you have made changes to the ballot, these will be displayed. The rest of the candidate list will remain unchanged. Verify your ballot before submission.

You are voting for:

**NORGES KOMMUNISTISKE PARTI**

You have re-numbered the following candidates:

<table>
<thead>
<tr>
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<th>To</th>
<th>Name</th>
<th>Birth year</th>
</tr>
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You have stricken the following candidates:

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<td>f. 1979</td>
</tr>
<tr>
<td>9</td>
<td>Viljar Lege</td>
<td>f. 1994</td>
</tr>
<tr>
<td>41</td>
<td>Sana Sjaen</td>
<td>f. 1968</td>
</tr>
<tr>
<td>43</td>
<td>Sanna Grønli</td>
<td>f. 1982</td>
</tr>
<tr>
<td>45</td>
<td>Siren Steine</td>
<td>f. 1955</td>
</tr>
</tbody>
</table>
Your vote will now be recorded.
Please wait...
This normally takes between 15 and 60 seconds.
Thank you for voting!

Your vote has now been recorded.

- You will shortly receive a text message that contains a return code. This code allows you to verify that your vote has been registered correctly.
- Verify that the return code you receive in the text message is identical to the party/group’s return code on your polling card. Each voter has a unique set of return codes.
- Please contact user support at 800 38 254 if the return codes received via text message and on the polling card do not match.

Do you want to help observe the Internet election?
Find your vote in the digital ballot box

Your vote has now been submitted; this step is voluntary and not necessary in order to complete voting.

It may be advantageous to have a certain technical interest and insight to carry out this step, but in principle anyone can do it.

You can personally verify whether your vote has been saved in the digital ballot box. This will be possible until the votes are counted at the end of election day. By following the instructions on this page you can download an SHA-256 hash of your encrypted vote. It is important to understand that the hash does not reveal who you are or your vote.

A complete list of the hashes of all received votes will be published every hour on the hour at the GitHub page. The list will be updated and available until the votes are counted on election day. By checking that your hash is on the list, you will know that your internet vote is saved in the digital ballot box. On election day, an independent third party will verify that the list matches the content of the digital ballot box when the contests are counted. As long as the list and ballot box match, we know all the votes are counted.

Please note!! If you navigate away from this page, you will not be able to see the hash of your encrypted vote later. You should therefore make sure that you save your hash.

See SHA-256 hash

Clicking the link below will display a hash and two digital signatures. The hash is an abbreviation of your encrypted vote. The signatures can be used to verify that the hash is from a real vote.

See the bullet point list below for a description of how to find your hash in the list.

- Click "See SHA-256 hash" below. This will bring up a screen with one hash and two hash signatures. You should save this information in an empty text document so you can look up your hash later.
- The list will be updated each hour. At the GitHub page for the election you can find the textfile "Bulletin_130001.txt". When you open this textfile you can search for your hash, Ctrl+f, and paste in (Ctrl+v) your hash, to verify that your vote's hash is on the list. For a more detailed description of how to verify your vote see the "README"-file at the github-page.
- If you find the hash, you know that your vote has been received and stored.
- If you cannot find the hash, you may have been too quick and the list may not have been updated. If you believe the list has been updated after you voted, but you still cannot find your hash, call user support at 800 38 254.
- If you vote multiple times, all the hashes will be in the list. Feel free to verify multiple times.
Hi, Erik Vik.

Your vote in the parliamentary election was received at 7/9-2013: 12:18.

The party/group you voted for has return code 1758.

You deleted 7 candidates and made 1 re-numberings.

Please check the return code against your poll card. Call 800 38 254 if the return codes do not match.
Revised conceptual model for 2013

Internet voting in Norway
From OSCE handbook for observation of NVT Annex B: Master Checklist:
Norway have considered and evaluated all questions, here are some:

• Has the NVT system been certified in a transparent process by a qualified independent body, under both national legislation and international good practice?

• To what extent are voters, election administrators and observers capable of understanding and using the system? What skills are needed to make them educated users? What kind of training or voter education could build these skills?

• Do international observers have full access to the process and to documentation, including certification, testing, verification and audit reports?

• Is a voter-verifiable paper record produced in order to ensure that the voter’s choice has been recorded accurately and to create the possibility for observers without technical expertise to observe a recount? If not, what measures ensure universal, end-to-end verifiability of the results?