

# Report on technical aspects of E-Voting<sup>1</sup>

## *Sub-group „Technical Aspects“ of the working group E-Voting in the Austrian Federal Ministry of the Interior*

This report addresses technical aspects of E-Voting, if introduced in Austria. It is a translation of the „Executive Summary“ of a comprehensive report on E-Voting that has been developed by the sub-group on technical aspects (the comprehensive report is available in German).

### **Executive Summary**

The report addresses E-Voting from a technical perspective. Basing on the Council of Europe Recommendation on E-Voting various scenarios are discussed and the technical and economical consequences of the approaches are sketched.

The report is technology-neutral and not to be considered as a recommendation of particular solutions. However, where deemed promising specific approaches have been included in the report. The report is based on the assumption of citizen cards as a security infrastructure that is widely available in Austria in the near future. Thus, the report is based on this high security standard. Moreover, using existing infrastructure is obvious from a cost perspective. This for instance applies to using the Central Register of Residents as basis of Voter Registers or applies to further synergies with the E-Government strategy.

In all variants that have been elaborated a Central Voters Register is a necessary basis for E-Voting. Electronic voters list can be centralized or federated. Federated voters lists also need to be generally accessible to all authorized parties involved. With the introduction of a Central Voters Register and voters lists that are based on it, improvements can be achieved even without the actual introduction of E-Voting (i.e. casting a vote electronically). Examples are to apply electronically for enrolment to the voters register (as e.g. to be carried out by expatriots or EU citizens living in Austria) or the examination of the records in the voters register or the voters list by using a citizen card to authorize access to the citizen's records.

A common E-Voting infrastructure (e.g. Voters Register, E-Voting Server, etc) can act as a service provider for municipalities, cities, or provincial governments for their elections.<sup>2</sup>

The essential challenge for E-Voting is to maintain secret suffrage and to prevent casting multiple votes, in particular when using different media in parallel, such as electronic and paper ballots.

To prevent casting multiple votes two approaches turned out promising, which distinguish in the required equipment at the polling stations and the alternatives that are available when components fail, the components to be used by the voters (PCs, Internet access, etc.), respectively:

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<sup>1</sup> In this report, the term “E-Voting” refers to casting a vote electronically outside the polling station, such as Internet voting from the voter's PC. Approaches such as voting machines in the polling station are not addressed, except for situations where the authorities offer some equipment as an alternative to using the home-equipment (e.g. the PC)

<sup>2</sup> This does not rule out infrastructure that is set up by the local or regional authorities themselves.

- The first option is to advance the eligible period for E-Voting so that voting lists used at the election day for casting the vote conventionally do not contain those voters that already cast their vote electronically.
- The second option is implementing an electronic substitute of postal voting, where voters that have opted for using E-Voting before the election day have to vote electronically. Casting the vote by paper ballot than would require inspection of the (electronic) voter list to ensure that no electronic vote has been cast. This results in at least some polling stations needing online access to the Central Voters Register, e.g. to allow for alternative voting channels in case of breakdowns of the voters' technical infrastructure (PCs, Internet access, etc.)

Approaches where voters can choose between E-Voting and casting a paper ballot on the election day at short notice require online access at polling stations – in the general case online access of all polling stations. Alternatives where a call center is consulted by phone are possible<sup>3</sup>, if the number of calls is limited (e.g. checking the Central Voter List when the PC of a voter who is expected to vote electronically breaks down).

The report points out transition scenarios where casting a vote is not done electronically, such as issuing electronic polling cards (allowing to cast a vote using a paper ballot outside the voter's constituency) as an alternative to conventional paper-based polling cards. As such electronic polling cards can easily be duplicated; costs arise to equip the polling stations and the embassies/consulates with the needed technology (to avoid multiple votes, i.e. access to the Central Voter Register, and the components needed to read electronic polling cards). These costs question the added value of such an approach.

Various technical and scientific approaches exist to maintain secrecy and anonymity of the vote. Due to the Austrian citizen card concept a security infrastructure exists that will be widely available as mobile phone solutions, the e-card (Austrian health insurance card) or as bank cards. Therefore, using that infrastructure is deemed useful. Beyond that, no recommendations of a specific approach are given.

The report clarifies that the requirements of personal suffrage and making choice without being watched by others cannot be guaranteed by technical means in distant E-Voting scenarios, as it cannot be guaranteed with postal voting.

Similar to the conventional paper-based system, the electoral commission or observers need to have the opportunity to observe the casting of votes, the opening of the votes, and the counting. In particular, a common act by the electoral commission is needed to get access to the votes.

The report also addresses that by using information technology a range of possibilities exist that are not given in conventional voting systems. It is to be discussed how far using such possibilities results in excessive inequality of the various media to vote. This needs to result in conditions for the technical realisation. An example is to admit deliberately spoiled votes (e.g. ticking several candidates) vs. avoiding spoiled

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<sup>3</sup> It needs to be provided that the response of the call center can be attached to the election protocol authentically.

votes technically or giving hints on the assumption of a vote spoilt by mistake. In any case an E-Voting system can allow for blank votes.

Aspects are highlighted where existing infrastructure lays a basis for a step towards E-Voting. Such aspects are synergies to E-Government when applying for voting electronically or the Central Register of Residents as a basis of a Central Voters Register. Such existing basis is up against areas such as the actual process of casting the vote where the need of further development or comprehensive tests and pilots is evident.

When exploiting synergies with the existing E-Government infrastructure an E-Voting scenario can be sketched that by following conventional polling card or postal voting systems seems to be capable of being implemented efficiently:

- Introduction of a Central Voters Register and central voters lists
- Using their citizen cards voters opt for E-Voting in advance
  - an electronic polling card is issued which is also marked in the voters list
  - the voter than can no longer offhand vote by conventional paper ballot (see below)
- When the vote is cast, securing the vote and its transmission to central E-Voting servers is done using a citizen card
  - various options exist how casting the vote (and securing it) can be done – these options are not listed here
  - if for voters that opted for E-Voting are to be provided alternatives to also vote in polling stations (e.g. in case of breakdown of voter's equipment), the fact that a vote has been cast electronically needs to be registered in the voters list
  - voting in polling stations can than be done in polling stations with online access to the voters list, alternative accesses such as phone access to call centers, respectively. The response whether a vote has already been cast electronically than needs to be authentic, accessible to all authorised parties, and storable for enclosure to the election protocol
- Counting needs to be done over sufficiently large sets of votes

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