

E-Voting: Switzerland's Projects and their Legal Framework – in a European Context

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Abstract: Firstly, the reader is introduced to the Swiss political system, which can be described as a federalist state with direct democracy. Secondly, the Swiss e-voting pilot projects will be presented, against the background of the political system. Switzerland runs three pilot projects in order to test the feasibility of e-voting. In a third part the legal framework of e-voting in Switzerland is highlighted. In a fourth part the work of the Council of Europe is addressed. A last part contains Recommendations to the Swiss legislator. Today, the legal scheme allows for pilot projects. Should e-voting be introduced in Switzerland, the legal basis has to be adapted, taking into account the experience acquired through the pilot projects, and the Council of Europe's Recommendation on e-voting.

1 Introduction

1.1 Switzerland – a federalist state with direct democracy

Switzerland is well known for its direct democracy. All Swiss citizens over the age of eighteen¹⁰ may take part in elections to the National Council (main chamber of the Federal Parliament) both actively and passively. They may also cast their vote in popular ballots.¹¹ A referendum¹² is compulsory for all amendments to the Constitution and for membership to some international organisations.¹³ A vote must be held in such cases. In addition, voters have the right to initiative¹⁴ and referendum¹⁵, which means that they

¹⁰ Except for those who have been incapacitated on grounds of mental illness or mental disability. See article 136 I of the Swiss Federal Constitution.

¹¹ Article 136 II of the Swiss Federal Constitution.

¹² A referendum (in the Swiss context) means: Popular vote by means of which voters can decide on, i.e. accept or reject, new or amended constitutional provisions, federal acts, and certain other decrees of the Federal Assembly.

¹³ See article 140 of the Swiss Federal Constitution.

¹⁴ See articles 138 and 139 of the Swiss Federal Constitution. Citizens may seek a decision on an amendment they want to make to the Constitution. For such an initiative to take place, the signatures of 100,000 voters must be collected within 18 months.

¹⁵ See article 141 of the Swiss Federal Constitution. Federal laws, generally binding decisions of the Confederation, international treaties of indefinite duration and international treaties providing for the accession to an international organisation are subject to an optional referendum: in this case, a popular ballot is held if 50,000 citizens so request. The signatures must be collected within 100 days of a decree's publication.

can request a popular vote by collecting the requisite number of signatures. At present Swiss voters go to vote at the polls on polling weekends or in many places, depending on the local regulations, they can also cast a *postal vote*, i.e. they fill out their ballot paper before the polling weekend at any place outside the polling station and the vote is transmitted by ordinary mail.

Switzerland is a federalist state with 26 cantons and around 3'000 communes. *At least four times a year there are popular votes* in Switzerland on the national, cantonal and communal level. The four voting weekends and the intense political discussion on issues put to the vote in the run up to these votes are a particular feature of Switzerland.¹⁶

2 Swiss e-voting considerations

Switzerland is considering the question, whether e-voting should be introduced as an additional form of voting. The considerations in Switzerland are focused on *remote e-voting*, i.e. casting a vote from any PC that is connected to the internet or from mobile phones. The notion of e-voting includes casting a vote in *elections and referenda as well as the electronic signature of initiatives, requests for referenda and candidate proposals* for the election of the National Council.¹⁷

2.1 Why is Switzerland considering e-voting?

The new information and communications technologies and especially the internet have already changed the face of everyday and indeed political life. Political information is increasingly being offered and obtained over the internet. The changes in the information and communication habits have a significant impact on political discussions and efforts to mobilise the public. These changes are happening very fast whether or not e-voting is introduced. The Swiss Government wants to keep pace with these changes.¹⁸ Young people, in particular, will perhaps soon come to see it as "old-fashioned" if they can do everything through the internet and yet not be able to cast their vote electronically. The reasons for considering e-voting in Switzerland include¹⁹:

- bringing political procedures in line with new developments in society
- making participation in elections and referenda easier
- adding new, attractive forms of participation to the traditional forms
- possibly increasing voter's turnout
- better protection of the democratic principle "one person – one vote" against traditional abuse

¹⁶ For further information on Swiss Democracy in English see [L98].

¹⁷ [B02], p. 646.

¹⁸ [B02], p. 653.

¹⁹ cf. [B02], p. 646+647.

One of these reasons is of special interest: the possibility of increasing voter's turnout with e-voting. Before considering this question (2.3), the Swiss scheme of pilot projects must be presented (2.2).

2.2 The three pilot projects

E-voting is a joint project of the Confederation and the cantons. The cantons are the main actors in the running of Swiss referenda and elections. This is why the necessary e-voting trials are carried out in three cantons that have volunteered to participate.²⁰ Two are French-speaking cantons, Geneva and Neuchâtel, and the third is a German-speaking canton, Zurich. Up to 80% of the trials are funded by the Confederation and the results will then be made available to all other cantons.²¹

The pilot projects in the three cantons should be completed by summer 2005 and then be evaluated. The political question as to whether and when e-voting will actually be introduced will subsequently be discussed and decided in the appropriate competent bodies, in the government and in the federal parliament.

2.2.1 Geneva: Three real e-votes²²

Geneva has the most advanced pilot project. The cantonal administration, in partnership with Hewlett Packard and Wisekey of Geneva, developed an e-voting application. The system is based on existing voting materials and does not require any special features on a voter's computer. Swiss registered voters already receive their voting card and postal ballot by mail before every election. The card must be presented when voting or sent with the postal ballot by mail. Geneva added a scratchable field to the voting card that contains a personal ID code. When voting on the Internet, a voter uses this code to be recognised as an authorised voter by the Geneva servers. The voter then submits his/her vote and confirms or alters the choice before confirming his/her identity once again. This time the voter enters his/her date of birth and commune of origin, which are difficult to guess or counterfeit. The system then confirms that the vote has been successfully transmitted and recorded.

The electronic ballot is encrypted and sent to one of three servers, each one running on a different operating system. The votes are then forwarded to an electronic ballot box in a centralized location. Two keys are necessary in order to open the electronic ballot box.

²⁰ See survey among all the cantons <http://www.admin.ch/ch/d/egov/ve/dokumente/umfrage.pdf>

²¹ Further information on the organisation of the Swiss e-voting pilot projects is available on: <http://www.admin.ch/ch/d/egov/ve/index.html>.

²² For further information on the e-voting project in Geneva see: <http://www.geneve.ch/chancellerie/e-government/e-voting.html>.

To ensure security, the keys are given to members of different political parties that are represented in parliament. Since a voter's identity and ballot are kept in two distinct files, it is not possible to match a ballot and a voter. Geneva also carried out several hacking tests that showed the system to be very safe. Furthermore, any voting card with a scratched-off field is automatically rendered invalid for voting in person or by mail unless it can be proven that the voter tried to vote electronically but for some reason was unsuccessful. This can be confirmed by voting officials online or on lists distributed to voting stations. E-voting lasts 3 weeks and ends the day before the election or referendum.

The first regular referendum at which e-voting was allowed, took place on 19th January 2003 in the small commune of Anières. A second regular referendum with e-voting took place on 30th November 2003 in the commune of Cologny and the third regular referendum with e-voting was carried out on 18th of April 2004 in the city of Carouge.²³ Among the next steps, Geneva is planning to use e-voting within the national referendum on the 26th of September 2004 which has to be allowed by the Swiss Federal Council.

2.2.2 Neuchâtel: e-voting as part of a secure one-stop e-counter²⁴

This pilot project will use a different approach to e-voting and should be ready for its first test during a national referendum in June 2005. Close collaboration between the canton and its 62 communes has given way to the creation of a "virtual government window" – the "guichet sécurisé unique". This window is an information network resulting from the shared management of voter registration lists and communications infrastructure. Similar to Internet banking today, canton residents will receive a user-ID and password to enter the one-stop e-counter, which offers many other government services. Before each popular vote, voters will receive an additional code that will allow them to cast their electronic ballot.

2.2.3 Zurich: Tackling the problem of decentralised voter registers²⁵

Zurich has 216,000 registered voters divided into small communes of in some cases less than 200 voters. Each commune uses its own information system, manages its own registered voter's lists and counts its own votes. For this reason, this project will be the most ambitious one. Because voting is carried out at the canton and commune levels, close cooperation between all levels of government is vital for success. The plan is to implement e-voting at the commune level and have the communes pass on the results to the canton. Zurich is creating a canton-wide shared database of voters that will constantly be updated by the communes, whilst hardly changing the existing network of information systems in the communes. The first test during a national referendum is scheduled for the beginning of 2005.

²³ For details on voter turnout during these three referenda with e-voting see below §2.3

²⁴ For further information on the e-voting project in Neuchâtel see: <http://www.ne.ch/gvu/>.

²⁵ For further information on the e-voting project in Zurich see: <http://www.statistik.zh.ch/projekte/evoting/evoting.htm>

2.3 Enhancement of voter turnout

Wherever e-voting is tested and implemented, there are a lot of expectations that voter participation will be raised.²⁶ In Switzerland this expectation exists as well and the experience with the introduction of postal voting in 1994 shows that this expectation is to a certain extent justified.²⁷ However, two expert opinions come to different results. The Research and Documentation Centre on Direct Democracy (C2D) comes to the conclusion that participation in the canton of Geneva could be raised by 9%²⁸. Another study analysing voter participation within Switzerland comes to the conclusion that e-voting would raise voter participation by less than 2%.²⁹ Both studies date from the year 2001 – a time where e-voting had not yet been tested during a regular referendum. Meanwhile three referenda have been held with e-voting in the canton of Geneva. It is therefore interesting to look at the voter participation in those referenda:

Anières (19.01.03): Voter participation was raised by 13,8%³⁰:

Registered voters	Votes cast	Participation	Average participation in Anières	Votes cast with e-voting	Remote votes (postal votes and e-voting)
1'162	741	63,8%	50%	43,6%	93,5%

Cologne (30.11.03): 28,9% of the votes cast were cast over the internet.³¹

Registered voters	Votes cast	Participation	Average participation in Cologne	Votes cast with e-voting	Remote votes (postal votes and e-voting)
2'523	1'495	59,3%	no indication ³²	28,9%	66,8%

Carouge (18.04.04): 25,9% voters cast their vote using the internet.³³

Registered voters	Votes cast	Participation	Average participation in Carouge	Votes cast with e-voting	Remote votes (postal votes and e-voting)
9'049	3'978	43,9%	no indication	25,9%	95,2%

²⁶ See e.g. [C04]

²⁷ [B98].

²⁸ [AT01], p. 54.

²⁹ [L01], p.6.

³⁰ [RA03].

³¹ [RC03].

³² Since 1980, Cologne did not have any referenda exclusively on topics of the communal level. Therefore no comparative data exists.

³³ [RC04].

On the basis of the data collected during the three referenda using e-voting, the conclusion can be drawn, that e-voting has the potential of rising voter turnout. However, the data is not sufficient in order to give any indication as to what extent participation could be enhanced. A second conclusion that can be drawn is, that where voters have the possibility of using other remote voting channels, e-voting is not the most popular channel. Traditional remote voting channels seem to be preferred.

3 Legal Framework

3.1 The legal provisions for the testing of e-voting

The paramount concept in Switzerland can be summarised as follows: e-voting has to be as secure and reliable as the traditional voting methods (i.e. postal voting and voting at polling stations). In order to make sure, that e-voting complies with all the existing provisions that rule traditional elections and referenda, articles 27a-27q of the Order on Political Rights³⁴ contain detailed requirements. The cantonal e-voting projects have to comply with these requirements in order to use their e-voting system for carrying out national elections and referenda. An e-voting system has to ensure, inter alia:

- that only entitled voters may take part in the ballot
- that each voter shall have a single vote and shall vote only once
- that it is impossible for any third parties systematically to intercept, alter or divert electronic votes or decisively influence the result of the ballot
- that it is impossible for any third parties to find out the content of the votes cast
- that all the votes cast are taken into account when the votes are counted
- that any systematic fraud is impossible

Special attention has been given to the principles of secret and of free suffrage.

3.2 Secret suffrage

The Order on Political Rights contains various requirements that have to be fulfilled in order to safeguard the principle of secret suffrage. *First* of all, the measures taken to ensure that votes remain secret must guarantee that the responsible authorities will receive only those electronic votes which have been made perfectly anonymous and which cannot be traced in any way.³⁵ *Secondly*, the transmission of electronic ballot papers, the monitoring of voter status, the recording on the electoral roll of the casting of each person's vote and the depositing of the ballot in the electronic ballot box must be so designed and organised that it is impossible at any time to identify any voter's vote.³⁶

³⁴ Verordnung über die politischen Rechte; available on the internet under http://www.bk.admin.ch/ch/d/sr/c161_11.html

³⁵ Article 27f of the Order on Political Rights.

³⁶ Article 27f of the Order on Political Rights.

The Swiss legislation requires *thirdly* an encryption during the whole voting process, i.e. ballot papers must be encrypted at the very start of the procedure when the vote is submitted and they must be transmitted in encrypted form.³⁷ The votes cast shall be decoded only when they are to be counted.³⁸ As a *fourth* requirement, every measure must be taken to ensure that no link can be established between a ballot paper cast in the electronic ballot box and the voter casting it.³⁹ *Fifthly*, applications connected with electronic voting must be clearly separated from other applications⁴⁰ and *sixthly*, while an electronic ballot box is open, any intervention affecting the system or one of its component parts must be carried out by a minimum of two people, must be the subject of a report and must be able to be monitored by representatives of the responsible authority.⁴¹ As a *seventh*, general requirement, every measure must be taken to ensure that none of the information needed during electronic processing can be used to breach the secrecy of the voting.⁴² *Eighthly*, during the electronic voting process, there must be no intervention unconnected with the voting which is under way affecting either the ballot and election server or the electronic ballot box server.⁴³ *Ninthly*, the legislation requires that the votes cast must be stored randomly in the electronic ballot box. The order in which the votes are stored must not make it possible for the order in which they arrived to be reconstituted.⁴⁴ Furthermore, the legislation states in a *tenth* requirement, that the instructions for the machine used for the voting must indicate how the user's vote may be deleted from all the said machine's memories.⁴⁵ *Finally*, the vote must disappear from the screen of the machine used by the voter to cast the vote as soon as that vote has been sent and the software used must not enable the votes cast to be printed.⁴⁶

3.3 Free suffrage

Different provisions deal with the ensuring of this principle. In order to guarantee free suffrage, *firstly*, the machine which the voter is using to vote must advise him/her that his/her vote has reached its destination.⁴⁷ *Secondly*, the encryption of the data transmitted must be so designed as to ensure that no electronic ballot paper which has been altered will be counted.⁴⁸ *Thirdly*, the way in which persons using electronic voting are guided through the procedure must not be such as to encourage them to vote precipitately or without reflection.⁴⁹ As a *fourth* requirement, the legislation states, that before voting,

³⁷ Article 27f of the Order on Political Rights.

³⁸ Article 27f of the Order on Political Rights.

³⁹ Article 27g of the Order on Political Rights.

⁴⁰ Article 27g of the Order on Political Rights.

⁴¹ Article 27g of the Order on Political Rights.

⁴² Article 27g of the Order on Political Rights.

⁴³ Article 27h of the Order on Political Rights.

⁴⁴ Article 27h of the Order on Political Rights.

⁴⁵ Article 27h of the Order on Political Rights.

⁴⁶ Article 27h of the Order on Political Rights.

⁴⁷ Article 27e of the Order on Political Rights.

⁴⁸ Article 27e of the Order on Political Rights.

⁴⁹ Article 27e of the Order on Political Rights.

voters must have their attention explicitly drawn to the fact that, by submitting their vote by electronic means, they are playing a valid part in a ballot.⁵⁰ *Fifthly*, it must not be possible for any manipulative message to appear during the process of electronic voting on the machine being used by the voter to cast the vote.⁵¹ *Finally*, as they vote, voters must be able to alter their choice before submitting their vote, or to break off the procedure.⁵²

4 The work of the Council of Europe

Within the Integrated Project “Making democratic institutions work”, the Council of Europe has mandated a Multidisciplinary Ad Hoc Group of Specialists⁵³ with the task to draft legal, operational and technical standards for e-enabled voting. The result of this work will be a Recommendation which will be adopted by the Committee of Ministers in autumn 2004.⁵⁴ The Recommendation consists of a set of legal and operational standards and core technical requirements for e-voting. The legal standards are intended to apply the principles of existing Council of Europe and other international instruments in the field of elections to the circumstances of e-voting.

4.1 Legal standards

In this article the legal standards, i.e. those standards relating to the legal context in which e-voting is permitted, are of special interest.⁵⁵ The legal standards follow the pattern of the five basic principles of democratic elections and referenda: universal, equal, free, secret and direct suffrage.⁵⁶ These five principles are equally applicable to e-voting as to traditional elections or referenda. However, specificities of e-voting do not give rise to issues to the same extent in relation to all of the five principles. Whereas for the principles of universal, equal, free and secret suffrage special provisions with regard to e-voting are made, the principle of direct suffrage is not addressed. The legal standards also contain a set of procedural safeguards to ensure that all five basic principles of democratic elections and referenda are implemented and maintained with e-voting. Out of this set of standards, three will be highlighted and discussed below:

1. Standard no I,4⁵⁷: *"Unless channels of remote e-voting are universally accessible, they should be only an additional and optional means of voting."*

⁵⁰ Article 27e of the Order on Political Rights.

⁵¹ Article 27e of the Order on Political Rights.

⁵² Article 27e of the Order on Political Rights.

⁵³ The author of this article was a member of the Swiss delegation to this group.

⁵⁴ [C04].

⁵⁵ The legal standards can be found in Appendix I to the Recommendation.

⁵⁶ In 2002, the European Commission for Democracy through Law (Venice Commission) has adopted a non-binding Code of Good Practice in Electoral Matters (Opinion no. 190/2002) in which these five principles are identified as the fundamental rules underlying Europe's electoral heritage.

⁵⁷ The numbering refers to the draft Recommendation from 29.3.04.

This provision is to protect the voter from a situation where the only means being offered for voting is one that is not effectively available to him/her. Adding additional electronic voting channels to traditional forms of voting may make elections and referenda more accessible. However, the drafters of the Recommendation suppose that using a single electronic voting channel in isolation restricts accessibility. This is one of several provisions in the Recommendation, in which the drafters have consciously been careful not to endanger the five above mentioned principles. However, they take into account the possibility that future developments in technology might lead to a change of these provisions.

2. Standard no I,20: *"Member states should take steps to ensure that voters understand and have confidence in the e-voting system in use."* and no I, 21: *"Information on the functioning of an e-voting system should be made publicly available."*

Confidence by voters and candidates in the voting system(s) used is essential not only to participation but also to the democratic system as such. The drafters of the Recommendation agree that only the understanding of the e-voting system(s) can be the basis for this confidence. There were long discussions on the level of understanding of the e-voting system. Traditional voting methods are simple and well tried. Voters are familiar with voting systems using ballot papers and ballot boxes and understand the general rules that govern how they should vote and how their vote is collected and counted unaltered. The introduction of e-voting produces a new situation in which voters will be less familiar with the system and perhaps less able to understand it. Confidence can be enhanced by providing to the voters as much information as possible with regard to the technique, which is being used for e-voting. However, unless a voter has specific technical knowledge, he/she may never be able to understand the system in the same way as he/she understands a traditional voting system.

3. Standard no I, 24: *"The components of the e-voting system should be disclosed, at least to the competent electoral authorities, as required for verification and accreditation purposes."*

The drafters agreed that the correct functioning of e-voting and the maintaining of its security are essential. There was some debate on how these aims could be achieved. While some clearly preferred to mention that the system suppliers had to disclose the source code of their system, others preferred a more general requirement which demands the disclosure of the critical elements of the system. The standard takes into account both reflections. The "components of the e-voting system" include, for instance the design of the system, detailed documentation, component evaluation, certification reports, in-depth penetration testing as well as the source code.

5 Conclusion: Recommendations to the Swiss legislator

The experience gained in the three pilot projects and the Recommendation of the Council of Europe have to be taken into account when drafting future legislation on e-voting. The Recommendation does not contain any provisions contradicting the current Swiss requirements for e-voting. However, there are some provisions that are worth being integrated in a future Swiss legislation on e-voting, for instance standard no I, 22: *"Voters should be provided with an opportunity to practise any new method of e-voting before and separately from the moment of casting an electronic vote."* Although the pilot tests provide an opportunity for the voters to practise e-voting, a future introduction of e-voting in Switzerland would have to be accompanied by measures ensuring that voters have trust and confidence in the system. The possibility of practising is a very good way of enhancing this confidence.

Another standard which should be integrated into a future legislation on e-voting in Switzerland is standard no I, 27: *"The e-voting system should not prevent the partial or complete re-run of an election or a referendum."* Whereas this requirement can already be deducted from existing electoral legislation in Switzerland, it is nevertheless worth mentioning in the context of e-voting. Indeed, if a re-run of an election or referendum becomes necessary, the re-run may not be possible without the support of the e-voting system used in the original election or referendum, even if this e-voting system is not to be used in the re-run itself.

Finally it can be said that the work on e-voting is an ongoing process. The legislation has to be continuously reviewed and adapted to developments in technology.

References

- [AT01] Auer A./Trechsel A. (Research and Documentation Centre on Direct Democracy , C2D): Voter par Internet? Le projet e-voting dans le canton de Genève dans une perspective socio-politique et juridique de l'introduction du e-voting dans le canton de Genève. Geneva, Novembre 2001; available on the Internet under: http://www.admin.ch/ch/d/egov/ve/dokumente/dokumente_beilagen/e_auer.pdf.
- [B98] Bundeskanzlei: Umfrage über die briefliche Stimmabgabe, November 1998, available at http://www.bk.admin.ch/ch/d/pore/va/doku/pdf/enquete_bsa.pdf
- [B02] Bericht über den Vote électronique: Chancen, Risiken und Machbarkeit elektronischer Ausübung politischer Rechte vom 9. Januar 2002, Bundesblatt 2002, S. 645-700 (BBl 2002 645). Available at <http://www.admin.ch/ch/d/ff/2002/645.pdf>.
- [C04] Council of Europe: Draft Recommendation of the Committee of Ministers to member states on legal, operational and technical standards for e-voting; 29th March 2004; available at http://www.coe.int/t/e/integrated_projects/democracy/02_Activities/02_e-voting/02_Draft_Recommendation/
- [L98] Linder, Wolf: Swiss Democracy: possible solutions to conflict in multicultural societies, 2nd ed., New York 1998
- [L01] Linder, Wolf: Gutachten zum e-Voting, Bern September 2001; available at: http://www.admin.ch/ch/d/egov/ve/dokumente/dokumente_beilagen/e_linder.pdf.