

# Overview

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Although the recent developments might give the impression that e-voting is an invention of the last decades, in fact it was one of the first applications of computers in public environments. First voting machines even date back to the end of the 19<sup>th</sup> century. The idea of modernising elections through electronic means has been an issue of visionary people early on. Forward thinkers like Fromm, Fuller, Arterton or Rheingold [From55, Full63, Arte87, Rhei93] have come up with ideas on how electronic voting could change and enhance democracy as such.

In the past years many governments have started to adopt computer-supported applications for their administrative processes; applications range from the simple download of forms to Internet-based submission of applications. Amongst these the most controversial application is electronic voting, which stands for the use of electronic means in elections. Motives for implementing electronic voting procedures are manifold, amongst the most important are as noted in the 2004 Council of Europe recommendation for electronic voting [CoE04, Remm04]:

1. enabling mobility of the voters
2. facilitating the participation in elections from abroad
3. raising voter turnout by offering additional channels
4. widening access for citizens with disabilities
5. reducing cost
6. delivering voting results reliably and more quickly

While the first four are benefits for citizens in the field comfort and participation and last two are benefits for administrators in the field of process workflows and costs. Also the last two are benefits that hold for any form of e-voting while the first four are mainly to be found for remote electronic voting. This might explain part of the controversies with citizens involved with electronic voting machines. In transition democracies the last two reasons are especially important as they promise to solve on one hand problems with alphabetisation of the population and problems with infrastructure in regard to delivering the results in time.

Therefore electronic voting not only serves as aid in counting the votes, by now they support all three main voting processes:

1. Pre-Election Phase: Identification of the voter, checking of eligibility
2. Election Phase: Casting the vote
3. Post-Election Phase: Counting of the votes.

Besides the discussion of polling place e-voting the debate in many countries specially concentrates on remote electronic voting, i.e. through the Internet and shares the common problems of remote voting procedures like vote coercion and buying.

Environment	Controlled	Uncontrolled	
Medium			
Paper	Polling Place	Postal Voting	Counting Machines
Electronic	Stand-Alone Electronic Voting Machine	Remote Electronic Voting (PC, Cell Phone)	
	Networked Electronic Voting Machine		
	Networked Kiosk Electronic Voting		

Figure 1: Forms of Voting [cp. VoKr06]

In general electronic voting is based on the separation of voter identification and vote casting as identified by Nurmi [NSS91]. Basic technologies for identifying voters are [VoKr06]:

- Username and passwords [knowledge]
- Transaction Numbers (TAN) [possession]
- Smart Cards [possession and knowledge]
- Biometric properties [might also be combined with the above].

For anonymity purposes these are [VoKr06]:

- Organisational pre-registration [handing out TANs]
- Hidden result calculation [using hardware security modules]
- Blind signatures

While the worldwide implementation approaches might be different in detail, many efforts still share the criticism by the public in regard to the lack of transparency of the application itself. Oostveen and van den Besselaar have shown that trust in the e-voting process is not dependent on the actual level of security but on the user's belief how secure the system is. This belief is largely dependent on the transparency of a system and here the 'main challenge for electronic voting [comes in:] the lack of transparency' [OoBe05].

The programme committee therefore tried to select the best papers based on their relevance to the conference topics and their quality to contribute to the growing need in qualified and argued discussion of the emerging topic of e-voting. The papers are grouped in nine sessions, which address the topics of experiences made with e-voting, social, technical, political issues as well as legal and democratic issues of e-voting, analyzing solutions for the uncontrolled environment, redesigning workflows for e-voting, observation, implementation and security of e-voting and finally political views and democratic challenges.

In session one the first hands-on experiences with legally binding political elections are presented. It includes two papers with reports from Estonia and Switzerland. *Ülle Madise* and *Tarvi Martens* explain the technological and legal point of view in Estonia as well as empirical findings on who were the voters in the worldwide first country-wide binding internet e-voting. *Nadja Braun* and *Daniel Brändli* then evaluate the swiss e-voting pilot projects and depict a road ahead for the time after the first trials.

The second session then tries to give an interdisciplinary view on the topic by looking at deep technological advances, political issues and social implications. It starts with a paper by *Ana Gómez*, *Sergio Sánchez Garcia*, and *Emilia Pérez Belleboni* who present an advanced technological solution based on a java card for future enhancement of smart cards to best suit electronic voting. In the second paper *Jordi Barrat Esteve* tries to answer the questions do we really need electronic voting and in which way (not) to take to implement it. *Laurence Monnoyer-Smith* then brings up the topic of the change of the voting ritual. This discussion is very necessary as the experiences in Ireland have shown us.

Session three addresses the legal and democratic issues of e-voting. *Rosa M. Fernández*, *Esther González*, and *José Manuel Vera* present the legal regulations set for e-voting in the autonomous Spanish Basque community. The experiences with e-voting in Brazil are presented by *José Rodrigues-Filho*, *Cynthia J. Alexander*, and *Luciano C. Batista*. They give a report about how e-voting have unwished results when implemented in the wrong way.

In the fourth session we analyze how possible influence on the voter can be handled in the uncontrolled environment. *Melanie Volkamer* and *Rüdiger Grimm* first discuss the possibility of multiple casting a vote. *Gerhard Skagestein*, *Are Vegard Haug*, *Einar Nødtvedt*, and *Judith Rossebø* then conclude with an architecture for trust building measures in the uncontrolled environment.

The topic of the fifth session is the election process and to support and redesign it. *Alexandros Xenakis* and *Ann Macintosh* present an methodology on how to re-engineer an electoral process to make it fit for e-voting. *Goran Obradovic*, *James Hoover*, *Nick Ikonomakis* and *John Poulos* then present their solution for a fully supported electronically supported election workflow.

Session six's topic is observing and testing of electronic voting. *João Falcão e Cunha, Mário Jorge Leitão, João Pascoal Faria, Miguel Pimenta Monteiro, and Maria Antónia Carravilla* present their methodology used to test e-voting systems used for Portuguese parliamentary elections. The election specialist *Kåre Vollan* presents the problems of to observing electronic voting. *Jörn Schweisgut* then concludes with a technical solution to allow for observers in e-voting and solve the problem of voter coercion.

The implementation of e-voting is discussed in session seven. *Carol Boughton* presents the eVACS system and how it maintains the democratic values. *Letizia Caporusso, Carlo Buzzi, Giolo Fele, Pierangelo Peri, and Francesca Sartori* presents results of an implementation process of an Italian e-voting project and propose a careful approach.

The session on security for e-voting is the eighth. In an collaboration effort *Rüdiger Grimm, Robert Krimmer, Nils Meissner, Kai Reinhard, Melanie Volkamer and Marcel Weinand* present the approach of the Gesellschaft für Informatik on how to develop a protection profile. *Klaus Diehl* and *Sonja Weddeling* then present how their system is guaranteeing the German election principles.

The last session then gives room to democratic challenges and the politician's view on e-voting. *Joan Josep Piles, José Ruiz, and José Maria Moreno-Jiménez* present the challenges their e-voting proposal for what they call the e-cognocracy. Finally *Tina Jukić* and *Mirko Vintar* bring the often forgotten politicians on the table and present their view that might give answers to some questions we raised before.

As you can see this proceedings volume gives a heterogeneous picture of what is state of the art and what are current topics of discussion in the e-voting community. This gives good hope for a successful continuation of our e-voting workshop at Castle Hofen in Austria. For the future it will also be interesting to develop a road map of future research which would then guide the development and implementation of e-voting worldwide.

## References

- [Arte87] Arterton, C.: Teledemocracy: can technology protect democracy? Sage Publications, Newbury Park, Washington D.C, 1987.
- [CoE04] Council of Europe (2004): Electronic Governance. Recommendation Rec(2004)15 and explanatory memorandum, Council of Europe, Strassbourg, 42 pages.
- [From55] Fromm, E: The Sance Society. New York, Rinehart, 1955.
- [Full63] Fuller, B. R.: No more Secondhand God, Southern Illinois University Press, 1963.
- [OoBe05] Oostveen, A., van den Besselaar, P.: Trust, Identity, and the Effects of Voting Technologies on Voting Behavior, *Social Science Computer Review* (23) 3, 2005, pp. 304-311
- [Remm04] Remmert, M.: Towards European Standards on Electronic Voting. In: Prosser, A., Krimmer, R.: Proceedings of the 1<sup>st</sup> ESF TED Workshop on Electronic Voting, GI LNI P-47, Bregenz, 2004, pp. 13-16.
- [Rhei93] Rheingold, H.: The Virtual Community, Addison-Wesley, Reading, 312 pages, 1993.
- [VoKr06] Volkamer, M., Krimmer, R.: Die Online-Wahl auf dem Weg zum Durchbruch. *Informatik Spektrum*, Springer,