



An Analysis Of Improvements For Voter Interfaces In Polling Station And Remote Electronic Voting Systems

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INTRODUCTION

- Constant evolution of human-machine interfaces.
- Evolution divided into two categories:
 - Hardware
 - Software
- Disabled, elder and illiterate people not always in mind in this evolution



ELECTRONIC VOTING SYSTEMS

- Democratic elections: universal, equal, secret and free
- Electronic Voting Systems: accuracy, invulnerability, privacy, verifiability, accessibility, flexible ballot formats and mobility.
- Appropriate interfaces to fulfil properties, depending on interaction environment:
 - Polling Station E-voting
 - Remote E-voting



ELECTRONIC VOTING SYSTEMS

- Polling Station E-voting: controlled environment
 - Guaranteed: invulnerability, privacy
 - Negatively affected: mobility
- Remote E-voting: uncontrolled environment
 - Guaranteed: mobility
 - Negatively affected: invulnerability, privacy



ELECTRONIC VOTING SYSTEMS

- Digital gap: closing
- Disabled:
 - Still need assistance
 - Lack of secrecy
- Interfaces should integrate all properties equally for all voters



POLLING STATION ELECTRONIC VOTING SYSTEM INTERFACES

- Interface parts:
 - Voter validation interface
 - Electronically guarantee invulnerability
 - Data output: screen
 - Data input: validation based on
 - Something voter knows
 - Something voter has
 - Biometric parameters
 - Voting interface
 - Voting booth to guarantee privacy
 - Electronic systems:
 - DRE: buttons and touch screen
 - OMR: Scanner and mark recognition software



POLLING STATION ELECTRONIC VOTING SYSTEM INTERFACES

- Proposed adaptations:

	Blind	Deaf	Physically Disabled
Electronic interface	Data output: audio Data input: audio mouse, Braille keyboard	Data output: screen Data input: virtual keyboard on touch screen, mouse	Data output: screen Data input: quadriplegic adapted mouse
Voting Booth	Audio via earphones	Adequate medium for written instructions	Sufficient room for wheelchair

- Summary:

- Data output: touch screen, earphones
- Data input: virtual keyboard on touch screen, audio and quadriplegic adapted mouse
- Voting booth with ample space



POLLING STATION ELECTRONIC VOTING SYSTEM INTERFACES

- Demotek

- System characteristics:

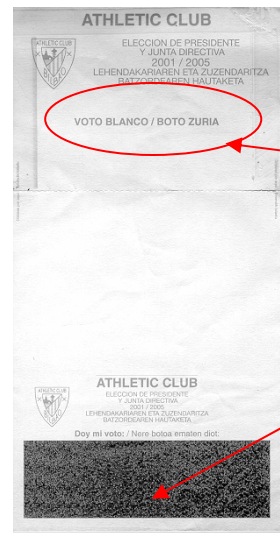
- Polling Station Electronic Voting System
- Closed list elections
- Basque Government electronic elections law
- Improvements in privacy of vote preparation and tallying

POLLING STATION ELECTRONIC VOTING SYSTEM INTERFACES

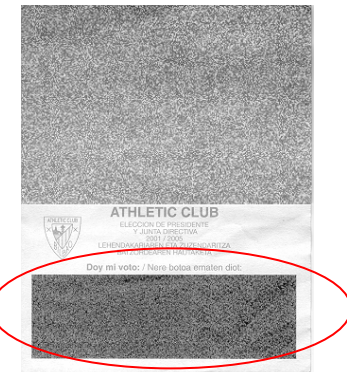
Demotek

Privacy of vote preparation:

- Demotek Voting Booth equipped with detection system to avoid more than one person at a time
- Ballots available only inside booths:



Visible text showing the option chosen by the voter



Non-visible text: Text to be read by the electronic ballot box only visible with ultraviolet light

- Ballot checking device



POLLING STATION ELECTRONIC VOTING SYSTEM INTERFACES

○ Demotek

- Privacy of vote preparation: Adaptation proposals
 - Voters without barriers: screen
 - Illiterate voters:
 - Audio support, illustrative pictograms, candidate photos, etc.
 - Blind voters:
 - Additional audio description of elements in the booth
 - Scanner, OCR and audio output in checking device
 - Deaf voters
 - Physically disabled voters:
 - Mechanical arm controlled by quadriplegic mouse

POLLING STATION ELECTRONIC VOTING SYSTEM INTERFACES

- Demotek

- Electronic Ballot Box tallying:
 - Votes counted when cast



- Results only available at the end of voting period



REMOTE ELECTRONIC VOTING SYSTEMS

- First binding remote electronic voting elections in Estonia (2007):
 - Mobility: I-voting
 - Privacy, invulnerability: multi-casting
- Multi-casting does not solve family-voting
 - Instead, adapted interface

Interface requirements	System requirement fulfilled
Portable	Mobility
Personalizable	Invulnerability
Tamper resistant	Invulnerability Privacy
Cryptographic capability	Privacy
WAN (Internet) connection	Mobility
Autonomous*	Mobility Privacy



REMOTE ELECTRONIC VOTING SYSTEMS

- Proposal for a remote e-voting interface
 - Components:
 - Personalization card
 - Voting card
 - Simple device
 - Without processing capability
 - Input-output peripherals adapted to all types of voters
 - Ports for cards and WAN connection



REMOTE ELECTRONIC VOTING SYSTEMS

- Proposal for a remote e-voting interface
 - Fulfilment of requirements:
 - Portability
 - Personalizable
 - Personalization card
 - Voting card
 - Tamper-resistant
 - Cryptographic capability
 - Guaranteed by the cards
 - WAN connection capacity
 - Autonomy
 - Appropriate peripherals and software
 - Adequate power supply
 - Private environment



CONCLUSIONS

- Analysis of current e-voting interfaces
- Proposals:
 - Polling Station e-voting: adaptation to all kind of voters.
 - Remote e-voting: new type of interface creating private environment



Q&A



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