

Transition to electronic voting and citizen participation

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Abstract This paper draws attention to the need of a systematic approach to introducing electronic voting systems and presents empirical results from a pilot project by the Provincia Autonoma di Trento, Italy. Main attributes of this experience are the constant monitoring of the social impact and the development of a technological solution in accordance to the comments provided by the users themselves. We suggest that no sudden switch to a new form of ballot should be imposed on electors but rather that action research is to be fostered in order to uncover and preserve the traditional and symbolic connotations embedded in the act of voting.

1. Introduction

Electronic voting has been tested and used in Italy at least since 1997: major occasions include the election of workers' representatives of the National Institute of Social Security (INPS) in 2000, the election of the rector and academic senate of the Università di Pisa in 2002, referenda in private institutions and many experiments held alongside political and local elections.

Remote voting was tried out in many of these occasions but its acceptance in actual political elections comes under scrutiny of family voting and other types of brogue; likewise, voting by mail has always been forbidden in Italian electoral law and its recent introduction, though limited to Italians residing abroad, has been severely criticised [Orofino, 2002]. Current jurisprudence might offer some opportunity for remote ballot if performed in a public and supervised environment [Bettinelli, 2002] but at present off-line systems appear to be more adequate to meet the needs and remove fears of both the legislator and population.

Because of historical and political reasons Trento benefits from special autonomy status in respect to other Italian areas and can determine, by its own legislation, how the council and the president of the province are elected. This peculiar condition is favouring a boost in the development of e-government, including a thorough study of the possibility to introduce e-vote for local elections.

The Current Italian ballot consists of a paper-and-pencil method and electors are allowed to vote only in the section where they are registered. The vote is expressed

by drawing a cross on the symbol of the party and eventually writing down the names of the candidates selected. During the count contentions do arise, among other reasons, due to the misinterpretation of ballots that are not clearly written or ballots that seem to have been purposely marked in order to be recognized. Citizens who are physically impaired have their vote cast by a person they trust, as no technological support is available to help them vote on their own. In order to overcome these obstacles as well as to keep the democratic process aligned with the development of e-society, new forms of voting are being considered by the Provincia di Trento, which in December 2004 set up a project (ProVotE) aimed at crafting a voting machine that, complying with the standards indicated by the Venice Commission [2004], is accepted and easily employable by electors regardless of their age, sex, education and confidence in the use of technology.

2. A systematic approach

ProVotE is characterized by a permanent round-table where representatives of the Provincial Electoral Bureau, researchers from the Centre for Scientific and Technological Research (IRST) and from the Dipartimento di Sociologia e Ricerca Sociale, Università di Trento, meet on a regular basis to share developments in each area of expertise and plan systemic activities aimed at testing electors' reactions to a likely, but yet to establish, switch from paper-and-pencil to electronic voting.

In the light of the key role played by the study of the social impact, we designed a set of investigations spread over one year in order to get the clearest picture of citizen's beliefs and attitudes toward e-voting before and after the two experiments that took place in May and November 2005.

We define social impact as any change occurring in the symbolic order or in the concrete behaviour of a population in consequence of the exposure to an external stimulus. In investigating the social impact of the introduction of electronic voting we had to consider people's attitudes, expectations, fears and practices *before* they even heard of the possibility of e-voting in their own area, *during* the experiments and some time *after* the trials.

The research plan included:

- 8 focus groups held in urban and rural areas, with young people, senior citizens, women and scrutinizers according to a criterion of internal homogeneity, to explore practices and habits related to voting;
- over 2500 telephone interviews to test attitudes toward electronic voting and assess the technological ability of the population;
- 160 supervised trials, to investigate man-machine interaction by means of questionnaires and ethnographic observation;
- monitoring of participation to unsupervised free trials held in the five towns chosen for the first experiment;

- a large scale experiment in five towns alongside local elections, involving 6950 voters and a smaller scale follow-up experiment with 336 electronic voters;
- analysis of electoral data and comparison of electronic and paper-and-pencil results;
- 1200 telephone interviews four months after the experiments to compare attitudes and motives of those who took part in the electronic voting trial and those who didn't.

This paper offers a brief account of the main empirical results of the research activities summarised above and aims at stressing the importance of a continuous exchange with the final users of electronic voting systems.

3. Paving the way to switch to electronic voting systems

3.1. The sense of voting and the practices related to elections

Socio-anthropological literature studies show what happens on the very day of elections as a form of *ritual* which enhances the individuals' sense of belonging to a civic community [Edelman M., 1964; Kertzer D., 1988]. Little has been said, however, about the intrinsic value and significance of the act of voting from a subjective standpoint: the *sense* of "having one's say", as well as the *body of practices* related to the expression of the citizens' will, appears to have been widely neglected. A preliminary "qualitative" study was therefore aimed at unveiling the entangled mixture of symbolic and material elements that come into play in the apparently ordinary act of casting a vote.

The focus groups portrayed a rather customary and standardized schedule of the day of elections: people show preferences about the time of day devoted to voting (i.e: early in the morning or late at night to fit with Sunday outings, rather than just before or just after Holy Mass); those which might result in queues and a potential intolerance towards any innovation should it imply a longer time to mark the ballots. The habit of going to vote together with relatives also appears to be rather widespread, in the main if going to the polling station requires a means of transport: the presence of younger people in family groups going together to cast their ballots might then be crucial to reinforce institutional tuition and to bridge the technological gap between generations, should electronic voting be extensively introduced.

More considerations pertain electors' awareness of their ability to vote "properly": whereas paper ballot is considered an easy, automatic act in which the chance of making mistakes is minimal, the idea of voting electronically evokes more perplexities. The perceived social impact can be summarised in the following key issues, which need to be taken into careful consideration, as beliefs often anticipate or even modify the course of future events:

- a.* interviewees believe that e-voting will have no effect in increasing the turn-out
- b.* interviewees fear that costs for elections will increase, compared to paper ballots
- c.* interviewees project their worries onto a specific segment of population (senior citizens) and fear that this social group might be, though indirectly, deprived of the right to vote
- d.* interviewees reckon age will have more of an impact than educational capital or technological ability
- e.* a general distrust in politics and a feeling of usefulness of one's vote are often expressed, which, according to the interviewees, might result in an apathetic or critical attitude toward innovations in such a delicate matter.

Nonetheless, the interviewees (especially the youngest) also brought evidence of some hindrance experienced in the choice of candidates with the paper-and-pencil method: this requires to write down the names properly and correctly to avoid having the vote invalidated, which gives rise to frequent undervoting.

Some practices related to paper voting emerged, such as the frequent use of fac-similes, which are mailed by candidates and show how to fill in the ballot. In the light of such a habit, keeping the visual layout of the touchscreen consistent to that reproduced on paper doesn't require a major change in the electors' expectations and is welcomed by all interviewees.

A surprising result of this preliminary investigation relates to the citizens' opinion about the use of a printer that allows electors to verify their ballot [see for instance Mercuri, 2002]: unexpectedly, they seem to consider it an unnecessary token which doesn't fit with the idea they have of "electronic" voting. They argue that the cost of printing and counting ballot proofs will equal or exceed the expense of traditional ballots without affording the same feeling of control and trust that the paper offers.

At the same time it is important to stress that the confidence of electors in the traditional procedure is also influenced by the fact that anyone has the chance to be a scrutinizer or a list representative and therefore to be protagonist and witness of the entire process. The switch from material to "immaterial" practices seems to deprive the community of the direct contact with the ballots, that only a voter verified system might efficiently allow.

By interviewing the scrutinizers, further evidence related to the need of trust also emerged:

- a.* trusting that one's ballot is personal and secret (thus guaranteeing one's freedom of choice)
- b.* trusting that each and every vote is actually counted (i.e., not "thrown away")
- c.* trusting that the ballot count truly respects the voter's will (also by being available for further controls and re-counts)

The board of scrutinizers appears to be a peculiar kind of organization, in the sense that it is formed and disbanded on the same day of elections: it learns to optimize time and procedures while already in action and often shows more flexibility and discretionary power than it'd be strictly allowed by norms and legislation, in order to

prevent mistakes due to fatigue or lack of attention. Its “professional culture” is easy to acquire and available to almost anyone: the practices related to casting a ballot become, in the course of the elections day, a lubricated “machine”.

When this voting machine works, be it paper-based or electronic, it should become sort of invisible: its efficiency and its acceptance by the citizenship is signified by its “disappearance” in the sense that it becomes a *routine* taken for granted and not a matter generating anxieties.

At present, the complex and time-consuming bureaucratic procedures related to data management is described as cumbersome and old fashioned: a simplification of the procedures related to electors identification, ballots count and register filling would definitely be welcome.

Above all, both scrutinizers and citizens explicitly and implicitly stress the need of adequate information: switching to electronic voting implies a significant change in a long established and framed routine. A new habit has to be created from scratch and it can’t be learned “by trial and error” as one might find acceptable in other technological settings.

To facilitate a smooth transition to e-voting this preliminary study suggested that:

- the most appropriate elections to test a new form of voting are those at the local level, as people appear to feel more interested in the outcome and therefore more likely to participate
- appropriate tuition should be ensured to both electors and scrutinizers: their confidence with the new system can be enhanced by free trials
- special consideration should be granted to senior citizens: the care that institutions show towards this group will be reflected in the appraisal of many others
- the touchscreen should show some continuity with the paper ballot to avoid the need for the electors of a cognitive re-adaptation

3.2. Are we ready to vote electronically? Attitudes and technical skills

Alongside the “qualitative” investigation, a preliminary “quantitative” survey was carried out by means of telephone interviewing to assess the interest of the population in changing the voting procedures. The sample (2561 respondents) was representative of the adult population in Trentino, controlling for age, gender and geographical distribution.

This study was aimed at considering the attitudes towards electronic voting as well as the practical ability of using a technologically-based support. The latter was measured by an index created on the basis of statements related to the use of common electronic appliances which require skills similar to those needed for e-voting: as a result, about 10% of the respondents turned out to possess a scarce contiguity to technology and a further 6% to be very unacquainted with menu-like

procedures. Those who might be impaired in the use of electronic means are mostly elderly people, retired, with no or very little education.

The attitudes toward electronic voting, or rather, to whatever the respondents thought electronic voting to be (as they had never tested it in elections), are summarised in Table 1.

How much do you agree with the following sentences?	%
• Voting procedures should inevitably be changed, sooner or later	70.3
• Electronic voting is a good idea, but I believe it'd be difficult to implement	58.2
• Electronic voting might eliminate contentions in interpreting voters' will	55.9
• Electronic voting might increase abstentions	54.4
• Electronic voting might lower the mistakes that today cause ballots to be invalidated	53.2
• Electronic voting is a dangerous solution as it'd be prone to brogues that can't be easily demonstrated	42.0
• With electronic voting there'd be no tangible proof of my vote	36.5
• Electronic voting wouldn't fully guarantee that the ballot is secret	36.1
• People are ready to switch to electronic voting	28.2
• I don't trust technology and therefore I don't trust electronic voting	27.9

Table 1 – Attitudes toward electronic voting
(% of answers "agree" and "strongly agree", n=2561)

These attitudes confirm some of the comments we already gathered through in-depth interviewing, such as the fear that some sectors of the population might not be ready to vote electronically, thus increasing abstentions; the wish that some kind of mistakes and contentions will be eliminated and the feeling of inevitability of change.

However, citizens are on the whole in favour of voting electronically even in the nearby future, as Chart 1 shows. It's mainly professionals, students, educated people approximately below 50 years of age who are enthusiastic about e-voting (more than 65% are in favour), whereas elderly, retired citizens with no education show very little interest (less than 40% are in favour).

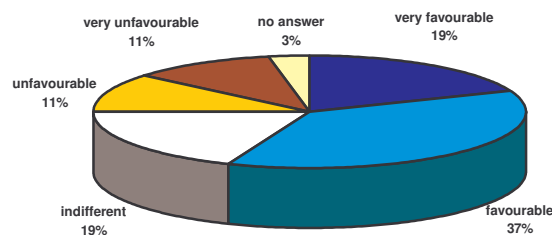


Chart 1 – "Should electronic voting be adopted for the next provincial elections, would you be in favour or against this idea?" (% , n=2561)

The voters' openness toward voting electronically in the next elections can be predicted by their attitudes more than by usual socio-demographic characteristics: a structural equation model [Jöreskog and Sörbom, 1993] shows that gender, social class, education and even age have no impact on the will to use electronic ballot, if these are considered simultaneously with technological ability and attitudes.

Age is actually a rather interesting factor, as young people are better inclined to technology but seem to be little interested in politics; on the other hand, senior citizens are less confident with electronic means but are very motivated towards participate in elections, as they feel it to be a duty, not just a right.

Education level has a limited direct impact on the will to vote electronically, but it appears to be strongly related to the index of technological ability, which in turn is a rather good predictor of a voter's openness towards electronic voting.

The size and the level of development of a town also have, perhaps unexpectedly, almost no influence: this proves that smaller, rural and peripheral locations are likely to switch to electronic voting at the same pace as urban areas, despite being conditioned by more "traditionalism".

What really determines the acceptance of electronic voting is the image of the strengths and pitfalls of the system: trusting or distrusting this unknown and never experienced means being the most powerful incitement or deterrent, controlling all other variables in the model.

As a consequence, the quantitative preliminary study suggested that:

- citizens are generally in favour of adopting electronic voting and their expectations are mostly positive, though some doubts remain and should be cleared before this new method is adopted
- the fear of not being ready for the challenge is eliminated by the widespread use of electronic appliances that require skills similar to those necessary to vote electronically
- campaign for the introduction of e-vote should stress the benefits and assure electors that safety is guaranteed
- voting machines should be adapted to the electors' needs (rather than expect electors to adapt to voting machines) and citizens should be aware of this effort.

As soon as a prototype of the voting machine had been made ready, trials and simulations were organized in the five towns chosen for the first large-scale experiment scheduled to be performed during local elections. To test the electronic ballot with the most disadvantaged social group, a sample of 80 senior citizens was randomly chosen from the registries, ensuring that their educational level was very low or null; a control group of further 80 young or middle-aged people was also invited to the tests, on condition that they possessed at most a high school diploma. Participants in the trials filled in a questionnaire before and after the trials and were video-recorded during the test.

As a result:

- the visual layout of the screen, i.e. the position of “buttons” and the size of the characters were modified
- the choice of preferences and, generally speaking, man-machine interaction, were optimized by observing how people “naturally” tend to cast a vote by means of a touchscreen.

The flyer with instructions for the correct use of the new form of ballot were also submitted to non-experts for concept-testing carried out by focus-groups and in-depth interviewing.

This complex but continuous exchange between the efforts of the technological team, the law standards required and guarantees of the electoral bureau and the contribution of citizens themselves helped to develop a low-impact system which was ready to be put to trial in May 2005.

4. Trialling electronic voting: evaluation of the social impact

On May the 8th, 2005, elections took place throughout the province of Trento to choose town majors and councillors. This turned out to be an excellent occasion to trial a large scale electronic voting system: such an opportunity had no legal value, as such, as electors were invited to try out the new form of ballot after they cast the paper one, which remained the only valid one.

Five locations were chosen for the test, according to their size and geographical position: each of the 7782 electors received a letter of invitation and instructions. About 74% went to the polling station and cast the traditional paper-and-pencil ballot; of those, an average of 59% (with peaks of up to 80%) tested the electronic system, too, and were asked to answer a questionnaire after completing the trial.

On the whole the experimenters were very satisfied with the system (Chart 2) although some hindrance was reported, especially in choosing councillors, in modifying a wrong choice and in being sure that the procedure was terminated.

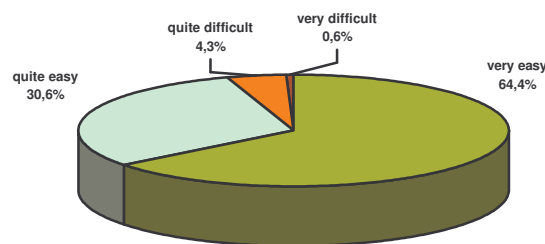


Chart 2 – “How do you evaluate this new system of voting?” (% , n=5534)

Those who tested the electronic booth are an auto-selected sample and it is reasonable to think that people who are very against e-voting didn't even try it; nonetheless, the impression the testers got is so positive that 61% would be very favourable to voting only electronically already in the next provincial elections and only 10% would be very or quite against it, which is a remarkable result compared to that obtained before the experiment took place (see Chart 1).

The effect of exposure to different media on the perceived friendliness of the e-voting system was also considered and useful points were taken up for the calibration of future communication campaigns.

Last but not least, this experiment revealed the importance of what we labelled as "scrutinizers effect", that is, the key role played by people at the polling station in reassuring and supporting electors, which leads to a higher turn-out in the electronic booth and a lower number of perceived impediments.

A second experiment, on a much smaller scale, took place in November on the occasion of another round of local elections and provided a useful test of the implementations brought to the system.

Interestingly, in the town where this trial took place voter turn-out resulted in one of the highest in a ten years span, thus suggesting that electronic voting and the communication campaign that preceded it, caused some kind of "Hawthorne effect" stimulating the citizens' curiosity and interest in elections.

89% of those who cast their ballot repeated their vote electronically (vs. the quota of 59% reached in May): though the absolute numbers of citizens involved in the two experiments are very different (336 in November and 6950 in May), it is quite obvious that greater attention to communication and to motivating scrutinizers significantly increases the voters' will to try electronic voting.

Voters' subjective evaluation of the system was extremely positive: none judged it to be very difficult to use and only 2% described it as "quite difficult" (compare with Chart 2). Electors that experienced some kind of trouble while testing the system relied on the assistance of scrutinizers whose support from outside the voting booth helped them in overcoming difficulties and resulted in a positive evaluation of the experiment (see also Chart 3). As with the first experiment, the respondents are an auto-selected sample, which leads to an optimistic bias, but such a positive result indicates that the experience of using the touchscreen proved to be much easier than the image of it (as portrayed in Chart 1).

The technical effort in improving the way councillors are chosen also abated the perceived hindrance in performing this operation, thus highlighting the importance of repeated tests and trials in "true world" settings to optimize the system according to real voter-machine modes of interaction.

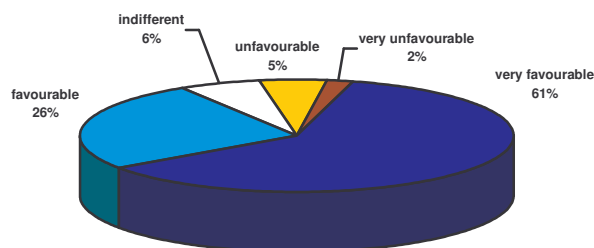


Chart 3 – “Should electronic voting be adopted for the next provincial elections, would you be in favour or against this?” (% , n=306)

At present further studies are being carried out to test for the statistical significance of the experiments on turn-out and on the vote cast, though from a strictly descriptive viewpoint electronic voting trials appear not to have impinged on attendance and the ballots electronically recorded are consistent with those having legal value.

5. Recalling memories: capitalising on the effects produced by the experiments

A *post hoc* telephone survey on a sample of the citizens potentially involved in the first experiment allowed further evaluation the social impact of the introduction of e-voting: recalling the memory of the elections some months after they took place helps to understand how much of this experience “remained”.

These follow-up interviews were aimed at monitoring the exposure to an array of media forms used during the communication campaign and to verifying their effect on the decision of participating in the experiment. They also provided a useful assessment of the perceived trust in electronic voting: as Table 2 shows, interviewees are altogether slightly more favourable to e-voting with respect to the first telephone interview (compare with Chart 1) and those who experimented the electronic booth first hand are definitely very satisfied. Results for those who watched others e-voting are also reported, as well as the attitude of the citizens who declared not to have voted at all.

	sample	experimenters	watchers	non-voters
very favourable	21%	32%	12%	9%
favourable	41%	49%	39%	28%
indifferent	17%	8%	20%	36%
unfavourable	14%	9%	19%	12%
very unfavourable	7%	2%	10%	14%
N	1206	503	372	146

Table 2 – “Should electronic voting be adopted for the next provincial elections, would you be in favour or against this?”

Those who tested the touchscreen were also required to provide a subjective comparative evaluation of the traditional paper-and-pencil system and of the electronic one on a set of aspects such as user-friendliness, perceived secrecy, facility for interpretation of electors' will, proneness to brogues *et al.* The results show a preference for electronic voting regardless of gender, age, education and level of habitual participation in elections. Consistently with the outcomes of the *pre-hoc* survey, favour towards electronic voting increases with level of education and participation and decreases with age, whereas paper-and-pencil ballot doesn't show any clear-cut trend related to those variables.

6. Conclusions

All through this paper we attempted to stress that studying social feasibility is a central issue in introducing a new process such as electronic voting. The impact of this innovation in a setting traditionally governed by symbolic and material customs is a very delicate matter that can be faced efficaciously only through the active involvement of all stakeholders: policy-makers, technicians, but above all citizens. We suggested a model of action research aimed at facilitating the switch from paper-and-pencil to electronic ballot, though more studies need to be carried out to provide a comprehensive assessment of the social impact. The empirical results we presented hint that citizens in the province of Trento are ready to accept the challenge but they need to be adequately supported by a communication campaign. It is also important that more trials and experiments are carried out to help people get used to the touchscreen before it is granted legal value: only by "going local" and by listening to citizens is it possible to develop a voting system truly compatible with their needs.

Acknowledgements

The work described in this paper has been and is being developed within the ProVotE Project, a project sponsored by Provincia autonoma di Trento. As with any large project, the results presented in this paper based on the joint and coordinated work of several people. We wish in particular to thank the following people: Giordano Adami (IRST), Sergio Bettotti (PaT), Carlo Buzzi (Università di Trento), Letizia Caporusso (Università di Trento), Alessandro Ceschi (Consorzio dei Comuni Trentini), Costantino Charalabopoulos (ArtLegno), Giuseppe Conti (Fondazione Graphitech), Andrea Cossu (Università di Trento), Claudio Covelli (Comune di Trento), Raffaele Deamicis (Fondazione Graphitech), Giorgia Fasanelli (CRC Trentino), Alberto Faustini (PaT), Giolo Fele (Università di Trento), Michela Frontini (Università di Trento), Patrizia Gentile (PaT), Luciana Giuliani (Informatica Trentina), Francesca Gleria (Pat), Bianca Lanzalone (Informatica Trentina), Antonella Lavarian (Informatica Trentina), Enzo Loner (Università di Trento), Cristina Margheri (Università di Trento), Maurizio Napolitano (IRST), Giuseppe Negri (Regione T.A.A), Enrico Parola (Informatica Trentina), Ernesto Passante (IPRASE), Giampaolo Pedrotti (PaT), Pierangelo Peri (Università di Trento), Nicola Prantil (PaT), Roberto Resoli (Comune di Trento), Cristiano Santinello (Università di Trento), Francesca Sartori (Università di Trento), Lodovica Simmionato (Università di Trento), Gianfranco Stellucci (Informatica Trentina), Roberto Tiella (IRST), Catherine Tonini (Consorzio dei Comuni Trentini), Paolo Troebinger (Informatica Trentina), Adolfo Villafiorita (IRST), Michele Welponer (Fondazione Graphitech),

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