

# Legal and Social Issues in Electronic Voting. Report on the Catalan Essays during the Elections of November, 2003

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**Abstract.** This paper provides an overview of the three e-voting systems that have been tested during the last Catalan election (a remote voting one, a touch-screen system and a third application with an electronic ballot). It has been the broadest pilot experience in Spain, managed by three leading Spanish companies, and the authors have been external observers. They summarize the data obtained focusing on the main legal and sociopolitical considerations.

## 1 Introduction

Catalonia is a Spanish autonomous land with a census of 5307837 people and the pilots were developed within the framework of its seventh parliamentary elections. The Catalan electoral law doesn't allow electronic devices. At Spanish level, only the Basque Country has an e-voting Act, passed in 1998, although there has been no real application yet (Fernández Riveira, 2001).

The three pilots had a non-binding character and were authorized by the Central Electoral Board that, according to the received explanations, insisted that the procedures of electronic vote should specify, in a very clear way, its complementary character to the traditional system and the invalidity of these suffrages. Anyway, the recent creation of a specific Commission in the Spanish Senate shows that there is nowadays an increasing institutional interest.

These essays were the continuation of others carried out during the same parliamentary elections in 1995. Then, under the monitoring of the company *Odec*, there has been a more restricted essay with only one e-voting procedure. Two polling stations of different sociological profile were chosen: an urban one in Barcelona -Enxample- and another rural in Anglès, a village near Girona. The polling method consisted in the recording, with a touch-screen machine, of the electoral option in a magnetic card that was introduced later into a traditional ballot box (Cano Bueso, 2001).

## 2 Remote Vote

This option was provided by *Scytl*, a Catalan company whose origin is the research developed since 1994 in the University of Barcelona where "the only two European doctorates on electronic voting security have been granted" (Scytl 2003a, [3]). These academic results gave rise to the creation of a spin-off that, in the last years, has developed and applied technologies of remote e-voting in different areas: the internal elections of the Catalan Police or, in a binding format, the presidential elections of the IEEE IT Spanish chapter (Scytl, 2003b, 13).

### 2.1 The Process

Using the census of Spanish citizens living abroad the electoral administration sent a letter of introduction to the voters registered in five countries (Mexico, Argentina, United States, Belgium and Chile). The letter contained the following data: a) indication that such data were destined for a non-binding e-voting pilot; b) country of the elector's residence –i.e. Argentina–; c) electoral district in which he has to cast his vote –i.e. Tarragona–; d) voter credential in strict sense, that is, an alphanumeric code (i.e. i0f7-442f-5ky8-qx9x) that gives information about, among other elements, the district in which the suffrage must be counted. The document was similar to an envelope, like those used by banks to provide a personal pin. Everybody could identify the electoral administration as well as other elements except the alphanumeric code that, obviously, was inside the credential.

It was an anonymous one since there were no data about the voter's identity. Although this is positive, it must be kept in mind that, if the credentials were sent by ordinary mail –no specific indication was provided about this during the polling day–, nobody can guarantee, even using the official addresses, that the receiver has really been the person legally enabled to vote. Changes of addresses, a postal error or its reception by a relative can easily facilitate the vote of an unauthorized person. A possible solution could be a personalized delivery, with an adequate identification, using existing postal methods or, much better, a delivery restricted to the administrative offices.

The voter identifies himself typing the code. He can use any computer with Internet and a java enabled browser. When there are repeated errors, the voter is requested to contact the company –not the electoral administration– with an electronic mailbox providing the error code appeared on screen. However, neither a telephone nor a real postal address are offered. Even admitting the difficulty to solve these problems agilely, it will be useful to extend to the utmost the possibilities of contact between a voter with problems and the organizers. Probably neither the phone nor the postal address will settle all the problems, but they will mitigate, at least partially, the weak position of a citizen who, wishing to vote, encounters specific technical difficulties.

These solutions are very important since the usability is a key element. The citizen should find an easy system to vote and different ways to solve any problem. In the Catalan essay, there have been some little difficulties with a confusion

between the characters "I" and "1" of the personal code and with citizens who did not have a java enabled browser (Scytl, 2003c, 10-11).

The blockage of the system can also have other consequences. Does it apply to a specific machine or only to the individual code of an user? Both possibilities have their risks. Affecting to a specific equipment and considering the hypothesis of places with scarce points of connectivity, other citizens could find unexpected and maybe insuperable obstacles. Trusting to vote in a specific place, they could not because somebody previously rendered useless the equipment. On the other hand, the fraudulent use of a random code, coincident with a real one, could obstruct likewise the vote of a legally enabled person.

Anyway, after the identification, the computer application shows the different candidatures of the voter's constituency. As it is known, the electronic appearance of this information should respect scrupulously the equality among all the political parties. *Scytl* offers a good interface, with the candidatures well ordered and with the same measures. Therefore, it guarantees a fair election.

The voter can also view the candidates' list of each party. Comparing the computer solution suggested by *Scytl* with the philosophy underlying our representative system, where a parliamentary seat belongs to an individual candidate –not to the political party–, we notice that the application shows the candidature's logos and requires a second movement to view their specific names. Such a design strengthens the leadership of political parties since, at least in a symbolic level, the voter first has to think in terms of parties rather than candidates. In the traditional system, however, he receives both data in a more or less simultaneous way.

Following this comparison between traditional and electronic systems, blank votes and especially null ones usually poses some problems. If, from a democratic point of view, both options enrich citizen participation, every electronic system should be designed in such a way that voters could, as actually do, cast both types of votes. Blank ones do not pose great problems since they are similar to the rest with the only particularity of the space destined for the candidature not being filled in. *Scytl* includes such an option with a blank square that completes the exhibition of all the candidatures.

Anyway, the Spanish Electoral Act says that a blank vote is, at least in the elections for the Congress –not for the Senate–, an envelope without a paper ballot ["sobre que no contenga papeleta" (art. 96, Spanish Electoral Act –LOREG–, section 5)]. Therefore, this vote is neither another paper ballot, like those of each political party, nor only a blank paper. It is the absence of any paper ballot. Although the legislation is logically thought for the traditional voting and its modification may be foreseen if the electronic voting is finally introduced, we should not forget the current definition of this type of suffrage in order to reduce the changes generated by the electronic voting.

Null votes pose more questions since they can not be limited to cases of error. They must also include those consciously cast (vid. art. 96LOREG, sections 1 to 4). The deliberate invalidation of a vote entails a valuable democratic behavior that we should not exclude and therefore e-voting systems should include pro-

cedures that resemble the conventional null votes. The simplest solution, to add another electoral option, does not reflect with accuracy the democratic potential of null votes because they are not supplementary options, like blank votes. They are wrong, although deliberate, manipulation of valid votes –i.e. comments added in specific ballots–. How can such spontaneity be included in the electronic voting procedures? A specific null vote option is one solution, although imperfect. Regrettably, *Scytl* includes neither this possibility nor more advanced options.

After confirming the vote, the *Scytl*'s system gives a receipt where the elector is informed that the process has successfully ended. There is also an identifier of the vote as well as a control code. The receipt does not specify, however, the electoral option. Such a solution offers certain advantages since a document with the voter's ideological orientation could encourage corruption. The fact that nobody, nor the voter himself, can certify the orientation of his vote provides complete safety, even having received previous pressures (Mitrou 2002, 19). It is also true, however, that the absence of a more detailed receipt rules out an alternative control with traditional methods and therefore the system's reliability depends on the internal computer protocols.

## 2.2 Technical Details

The organizers emphasized some technical features of the *Scytl*'s system that guarantee the safety of the process. For instance, during the polling day, the system does not show partial results, only turnout data. It also avoids the use of the abstentionist voters' codes by people with privileges of access.

In accordance with the received explanations, its key element is the separation among "critical and non-critical [computer] modules" (Riera Jorba, 2003, 5). The first ones are two modules located in the extremes: the voting agent and the Electoral Board agent. Taking into consideration that is very difficult to guarantee all the process, it could be enough to audit these critical modules in order to provide confidence to the citizenship. The voting agent is a small applet. It puts the information of each suffrage in digital envelopes that are stored until the end of the polling day. Nobody can open them since only the Electoral Board has the key. The system also accepts several technological platforms like PDAs or touch-screens.

These remarks about the technical features have great importance since, in case of remote voting, there is no paper trail and the control and transparency of the computer's source code used by the organizers becomes the only solution. *Scytl*'s managers affirm even that "the current technology can and must go further, and provide audit trails that are safer and more dependable than paper-based ones" (Riera Jorba, 2003, 8). It is again the recurrent debate between the necessary control of these codes and the private interests of the companies.

In the Catalan essays, neither *Scytl* nor the other two companies offered detailed explanations about their codes and therefore it is impossible to know whether they respect the legal and democratic requirements of every election. Anyway, *Scytl* entrusted the control to an Electoral Board that, without knowing the internal computer details, should guarantee the credibility of all the process.

### 2.3 The Electoral Board

It consisted of five representatives of the political parties with parliamentary presence in Catalonia and two members of the Catalan electoral administration. Each one of them had a fraction of the key that opened the digital ballot box –a completely disconnected computer– and there was enough with a minimum of five fractions to obtain it. A technician began the process storing the electoral data in the digital ballot box, he typed his code and each member of the Board, once introduced his smart card –in the future with fingerprints– in a reader, also typed his own password. The electoral results were obtained immediately, but they have not been shown to the observers because the Catalan Government wanted to be the first to offer these data to the citizenship in a press conference.

### 2.4 Socio-Political Considerations

There is a misleading low level of participation: only 730 citizens cast their e-vote and there was 23,234 possible electors. Therefore, there was a scarce 3.14 per cent of participation<sup>3</sup> However, in the ordinary elections, the turnout among citizens living abroad is usually quite more reduced than the one obtained in Catalonia. Normally about 20 per cent of these electors usually vote. Therefore, if we take the number of electors that normally vote as a reference, 15.23 per cent of them agreed to participate.

However, the results are low and they are quite far from those obtained by *Demotek* and *Indra*. There is usually a mythological idea according to which the simple possibility to vote through Internet should result in a spectacular increase of the participation. Not only this condition of panacea with regard to the improvement of the electoral participation is unfounded (LGA, 2002), but the data obtained in some –not all– sectorial elections have shown depressing values [i.e. elections to the General Assembly of the University of Barcelona (Reniu, 2003)].

It is interesting likewise to consider in each country the weight of the pilot voters as for the traditional ones. Although this measure only informs us of the degree of coincidence among the participation results in both types of vote, we find really surprising data. In the Mexican case, the pilot voters amply double –226.47 per cent– the traditional ones. The existence of some engaged Catalan institutions in Mexico, the dispersion of the Catalan community and maybe the Mexican social context itself, where the effectiveness of the postal service is far from the Catalan standards, could be an initial explanation.

On the other hand, the distribution of the remote votes shows that they are divided into two great groups. Those living in America grant mostly its support to *Convergència i Unió* (CiU) as well as to *Esquerra Republicana de Catalunya* (ERC). Perhaps the nationalistic bias of these results is due to the distance, which undoubtedly would highlight the patriotic feeling. Those living in Belgium put the *Partit dels Socialistes de Catalunya - Ciutadans pel Canvi*

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<sup>3</sup> The detailed results and a longer paper are available at Barrat i Esteve (2004).

(PSC-CpC) in the first place of its preferences, in a more similar way to the conventional polls. Anyway, the non-binding character may entail a feeling of experimentation that explains the existence of some votes of protest or with a certain folkloric component (i.e. votes received by *Estat Català* in Mexico).

### 3 Touch-Screen Machines

The second system, based on touch-screen machines, was managed by *Indra*, a Spanish company specialized in the information technologies, simulation and automatic maintenance systems and defence technological equipment. The first one includes the relationship between computers and public administrations and, in a more specific way, the improvement of the electoral processes. *Indra* has a long experience since 1978, with the Spanish constitutional referendum, and with further electoral processes in Spain and abroad. There have also been several e-voting experiences like the internal elections of the Spanish Police –*Guardia Civil*– or other elections in the United Kingdom and Argentina –Ushuaia–.

#### 3.1 The Process

The identification is developed in a traditional way. After the exhibition of an identity document, the President delivers a smart card with which the citizen, once introduced it in the touch-screen machine, would be able to cast his vote. These cards have also an internal control system that invalidates themselves once used. In Canyelles, one of the five villages with e-voting pilots (with Torres de Segre, La Fatarella, Llers and Creixell), the responsible stored these nullified cards and we could check how the ballot box refused them. The cards can also be reset and used in subsequent elections.

In this case, *Indra* decided not to deliver the cards, but, in a binding election, the solution could be different. If such cards store electoral data, perhaps they could be used as receipts and delivered to the citizens, more or less like in the *Scytl's* system. On the other hand, following the *Demotek's* point of view, they could also be introduced in a conventional ballot box controlled by the polling station. The electoral safety will increase, but obviously there will be no paper trail.

Touch-screen machines need a protected space around them in such a way that each citizen could cast secretly his vote. A limited perimeter around the electronic ballot box or even an individualized polling booth could be useful. Following this question, there were surprising results in Torres de Segre (157 blank votes / 47.01 per cent). Comparing these data with the other four villages or with the official results, we will notice that they are abnormally high. However, compared with the results of *Demotek* in the same village, we will observe that there are also many blank votes (9.77 per cent).

Either some members of the Town Council and the *Indra's* responsible in this village told us that the incorrect position of the touch-screen, orientated to the president of the polling station, jeopardized the secret of the vote and favored

that many people decided, at least for the case of *Indra*, to cast a blank vote. The electronic polling station was in a small room and the responsible, after a first decision that posed some problems, decided to put the ballot box in its center, although the President and other members of the polling station could see how the citizens were casting their votes. This decision increased the turnout, but several citizens, above all aged ones, decided to cast a blank vote.

Finally, as *Scytl* and *Demotek*, *Indra* accepts only blank votes, not null ones. In relation to the screen design, we can reproduce here the same remarks mentioned in the previous section.

### 3.2 Socio-Political Considerations

As for the results, Canyelles stands out because it has the greatest abstention, either in absolute –66.41 per cent– or relative terms, that is, in relation to the official results –almost thirty points of difference–. Creixell has the same characteristic, but we can find there another trend that will be also present in the other villages: the *Partit Popular* (PP) obtains an e-vote score lower than the official one and, on the other hand, ERC and *Iniciativa per Catalunya Verds - Esquerra Alternativa* (IC-V) have higher results in the e-votes. The experimental profile of the election could explain this behavior: the e-votes reflect the real desires of the voter before being influenced by other strategic considerations.

## 4 Paper Electronic Ballots

The last system consists in a ballot box that is able to scan paper ballots and to develop an automatic counting. It was managed by *Demotek*, a Basque company where institutional –Direction of Electoral Processes and Documentation of the Basque Government–, economic –Ibermatika, Ikusi, Hunolt and Euskalteland– and academic actors –University of the Basque Country, Ikerland and Robotiker– work together (Demotek, 2004a). They developed different systems of e-vote trying always as much as possible to respect ”la forma actual de votación” (Demotek, 2004). Either *Ikusi* or the University of the Basque Country have already use this system in their own internal elections (Demotek, 2004).

### 4.1 The Process

There is no change in the first step since the *Demotek's* system, like *Indra*, accepts the traditional identification rules.

The voting system is based on a paper electronic ballot: a ballot with a specific electronic device that facilitates its automatic reading. The citizen does not change a lot his behavior since there are, as in the traditional polls, ballot papers for each candidature. The voter will be able to check simultaneously the logo of the chosen party as well as the individual candidates. The only novelty consists in that, instead of introducing the ballot in an envelope, it has to be folded and introduced in the ballot box.

The ballot box has two slots. The first one is a control mechanism that avoids the introduction of an incorrect ballot. In these elections there were four electoral districts and each party had a different list in each one. Therefore, this slot checks that the ballot belongs to a specific polling station. Once the ballot has been verified, the ballot box opens automatically the other slot and it is the President who introduces the ballot into. Finally, every ballot box has a reader, placed under the second slot, that scans the paper ballot, identifies the candidature and generates, at the end of the polling day, an automatic counting.

The blank vote was foreseen, with a paper ballot similar to the previous ones in which no candidature appears, whereas null votes were not accepted. In accordance with the received explanations, this second suffrage could become a *reserved vote*. If somebody wrongly strikes out a ballot, the president could qualify it as a reserved vote and therefore it would be transferred to a higher Electoral Board for its definite counting. However, such an option would only be feasible with a manual counting and refusing consequently the main advantage of this e-voting method.

Finally, the results can be transmitted using GSM standards and, as safety controls, every president of a polling station has either an opening or a closing card that will erase the electoral data in order to use the same ballot box in future elections.

## 4.2 Auditability

Although *Demotek* offers the easiest system of control since a traditional counting is always feasible, such a solution should be an exception whereas the automatic counting should become the ordinary application of this system. Therefore, we encounter again the same obstacle. How can we guarantee the credibility of that system if we do not know its internal code? How can we guarantee that there has not been no manipulation in any of the installed ballot boxes?

Anyway, Catalonia has closed candidatures that do not allow specific marks on the ballot. Therefore, the optical reader is safer than those used in other electoral systems where the citizens' marks may be difficult to scan (Jones, 2003, 8).

In accordance with the provided explanations, *Bearing Point* is auditing this system and it is foreseen likewise, although not in non-binding essays as the Catalan one, a control by the members of the Electoral Board. This option intends to be a balanced solution in such a way that, without revealing the source code, some selected institutions would be able to check it in order to provide confidence to the citizenship.

## 4.3 Socio-Political Considerations

This is the system with less changes for the voter, although it offers low versatility since its goal is to accelerate the counting, but not to decentralize it. Basque political parties also appreciate its compatibility with the electoral mailing that is usually carried out during the Spanish electoral campaigns. The political parties



use to send each citizen their own ballot as well as the specific electoral envelope and other political information. Therefore, the citizen will be able to go to the polling station with the envelope just closed. Touch-screen machines and remote voting systems have no paper ballots and it is more difficult –not impossible– to carry out the described electoral mailing. This is the real reason that let the Basque Parliament to start the modification of the existing e-voting Act. We cannot forget that parties are the key actors in this process and they should be engaged in the spread of the e-voting systems.

*Demotek's* results are very similar to *Indra's* ones. Turnout, even presenting some noticeable percentages, always keeps at a distance of the traditional voting system and the PP is sub-represented whereas ERC and IC-V are over-represented. However, using *Demotek's* electronic ballots, we detected that citizens could have some difficulty in correctly identifying the political option for which they want to cast their vote. This a logical conclusion in the light of the vote dispersion observed towards political parties different to the five big ones: CiU, PSC-CpC, ERC, PP and IC-V.

Anyway, the three pilots –*Scytl*, *Demotek* and *Indra*– seem to point out the same thing: e-voting new technologies are not a panacea for the democratic process. They are positive novelties, but they are not a panacea. Either in these essays or in other previous experiences in Spain (University of Barcelona) or in other countries (LGA, United Kingdom), turnout is the main challenge that e-voting, above all remote one, has to face. Therefore, the e-vote cannot be the only magical solution to overcome democratic problems like current abstention or other things, like the digital gap, that are core elements of any e-democracy project: "utilizar el voto como una varita mágica que va a solucionar los problemas actuales de desidia a la hora de votar o la mala percepción que los usuarios tienen de la política es como mínimo irrelevante y hasta puede convertirse en contraproducente" (eDemocracia, 2004, 8).

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