



Elections to the Parliament of Catalonia 2003

Report on the Remote Electronic Voting Pilot

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EXECUTIVE SUMMARY

The Generalitat of Catalonia organized a non-binding remote electronic voting test pilot in parallel with the 2003 Elections to the Parliament of Catalonia. This was the first remote electronic voting experiment performed in Spain to be run alongside actual public elections, and approved by the Central Electoral Council.

The main objective of the test was to evaluate the advantages, usability and reliability of this voting system in order to consider its potential use in future electoral processes, mainly as a complementary channel to postal voting.

The pilot was run by ScytI Online World Security S.A. with the cooperation and supervision of the Oficina de Coordinació Electoral de la Conselleria de Governació i Relacions Institucionals of the Generalitat de Catalonia. The technology used was built around *Pnyx*, the innovative security technology for electronic voting developed by ScytI Online World Security S.A.

Over 20.000 Catalans residing in Argentina, Belgium, United States, Mexico and Chile were invited to participate in the pilot. The voters could participate from any computer connected to Internet using a simple navigator that supports Java. Several Catalan Casals (trade missions) in the chosen countries offered the use of their computer systems to facilitate local voting.

The participation results obtained and voters' opinions indicate that the experience was very positive and that the goals of the pilot were reached. The experience was also very useful in detecting some points to improve, especially with respect to usability, for future activities in this field. However, none of the incidents detected were significant.

PILOT OBJECTIVES

The main objectives of the pilot consisted in evaluating the ability of the new technologies in public elections to:

- **Facilitate the participation of voters resident abroad.** At the present time these voters can only vote by post, and many of them do not receive the ballot on time or have problems sending it back.
- **Easily participate in the election.** The installation of any specific software or hardware was not required.
- **Maintain the electoral process open longer without increasing the number and availability of people responsible.** The current postal voting system entails a logistical challenge that new technologies can simplify and make less expensive.
- **Protect the voter's personal data from third parties.** To avoid risks deriving from an incorrect application of the Organic Law of Data Protection.
- **Guarantee the honesty of the electoral process.** Offering the same level of security and confidence that you have with traditional paper-based voting.
- **Obtain the results immediately, once the elections are closed.** This permits the integration of the results of the remote vote with the local vote without having to wait several days for mailed-in ballots to arrive.

All these advantages should increase the participation of the foreign resident voters in the elections, and reduce the complexity and time dedicated to the organization of the elections as well as the final tally of the remote votes.

DESCRIPTION OF THE PILOT

The non-binding pilot was run in parallel to the 2003 Elections to the Parliament of Catalonia. The pilot was run by Scytl Online World Security S.A. with the cooperation and supervision of the Oficina de Coordinació Electoral de la Conselleria de Governació i Relacions Institucionals de la Generalitat de Catalunya.

Over 23.000 Catalans in Argentina, Belgium, United States, Mexico and Chile had a chance to try the electronic Internet voting system, from 10h on the 14th of November until 20h on the 16th of November. The phases of the election were:

Creation and Distribution of the Voting Credentials

To properly identify each voter, Scytl randomly generated a 16 character key for each participant, without knowing their personal data, and printed them in sealed PIN envelopes. These credentials, along with some brief instructions and a letter from the Generalitat inviting them to participate, was sent to each voter 15 days before the pilot began.

Pilot Promotion Campaign

The pilot was promoted by sending brochures to each of the Spanish Consulates and Catalan Casals. Furthermore, the website www.gencat.net/governacio-ri/eleccions/e-votacio.htm (where the participants could access to information on the pilot) and the gencat@e-lectoral.com e-mail address (where any questions asked were personally responded to by Scytl personnel) were created.

Constitution of the Electoral Board

On the 13th of November, at 18h a representative of each political party present in the Parliament of Catalonia (5 in total), the director of the Oficina de Coordinació Electoral (acting as president) and a representative of the Conselleria de Governació i Relacions Institucionals (acting as a secretary) created an electoral board at the World Trade Center of Barcelona to manage the pilot. Following a simple and quick

procedure, the cryptographic key that allows to protect the confidentiality of the votes casted and that is necessary for the tally, was generated and divided in 7 parts, one for each member of the electoral board.

Vote Casting Procedure

Scyti's electronic voting platform permitted voting from any computer connected to Internet, with a simple navigator that supports Java (virtually 100% of the navigators on the market). Java is needed to guarantee the security and confidence requirements of any electoral process.

To cast their votes the participants had to follow a simple procedure on the voting website, identifying themselves at the beginning of the procedure with the credentials that had been sent to them by post. Once the vote was confirmed and sent, the participant obtained a voting receipt that allowed him/her to verify that his/her vote had been included in the final tally.

Vote Tally and Verification of Results

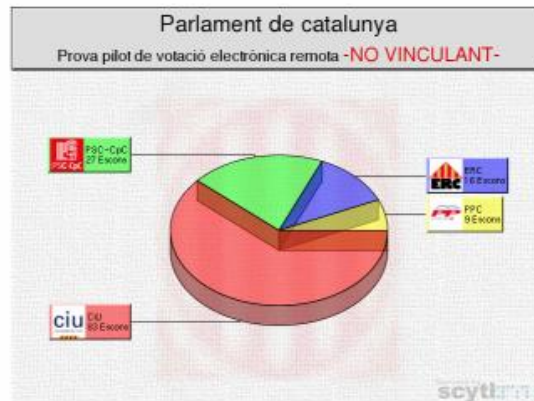
The vote tally was performed on the 16th of November in the World Trade Center, once the polls were closed at 20h. The ballot box opening process and the tally of results was initiated by the 7 members of the Electoral Board in front of more than 20 national and international observers as well as representatives of the Electronic Voting Study Group of the Spanish Senate. When voting closed, it took only 7 minutes to obtain the results. The results, along with the voting receipts used for the result verification, were published on Monday the 17th of November on the official website of the pilot.

ELECTORAL RESULTS

Listed below are the aggregated results of the pilot vote (integrating the four electoral districts and the five countries chosen to participate), as well as a hypothetical Parliament created by only counting the votes casted in the pilot. The results from each of the five countries varied substantially, although they were similar to the results from the real election.

Cens	Votants	Abstenció	Vots			
			nuls	en blanc	a candidatures	vàlids
23234	730 3.14%	22504 96.86%	0 0.00%	11 1.51%	719 98.49%	730 100.00%

Nom del partit	Vots	%	Escons
Convergència i Unió	373	51.10	83
Partit dels Socialistes de Catalunya - Ciutadans pel Canvi	149	20.41	27
Esquerra Republicana de Catalunya	85	11.64	16
Partit Popular de Catalunya	47	6.44	9



Below we compare the data from the real remote votes received by post from the countries involved in the pilot test with the results obtained from the Internet vote.

Country	Census	Voters	Abstinance	Votes				% on real votes
				null	blank	candidate s	valid	

Catalonia Real	23234	4794 20,63%	18440 79,37%	Not avail	Not available	Not available	Not available	
Catalonia Pilot	23234	730 3.14%	22504 96.86%	0 0.00%	11 1.51%	719 98.49%	730 100.00%	15,23%
Argentina Real	10539	3034 28,79%	7505 71,21%	Not avail	Not available	No dispon	No dispon	
Argentina Pilot	10539	290 2.75%	10249 97.25%	0 0.00%	2 0.69%	288 99.31%	290 100.00%	9,56%
Belgium Real	1876	632 33,69%	1244 66,31%	Not avail	Not available	Not available	Not available	
Belgium Pilot	1876	55 2.93%	1821 97.07%	0 0.00%	2 3.64%	53 96.36%	55 100.00%	8,70%
USA Real	4210	409 9,71%	3801 90,29%	Not avail	Not available	Not available	Not available	
USA Pilot	4210	158 3.75%	4052 96.25%	0 0.00%	1 0.63%	157 99.37%	158 100.00%	38,63%
Mexico Real	4528	68 1,50%	4460 98,50%	Not avail	Not available	Not available	Not available	
Mexico Pilot	4528	154 3.40%	4374 96.60%	0 0.00%	1 0.65%	153 99.35%	154 100.00%	226,47%
Chile Real	2081	651 31,28%	1430 68,72%	Not avail	Not available	Not available	Not available	
Chile Pilot	2081	73 3.51%	2008 96.49%	0 0.00%	5 6.85%	68 93.15%	73 100.00%	11,21%

We can observe that the pilot test participation rate was very high compared to the real participation rate, as we can see in the 15,23% average. We must point out the participation rate in the United States: almost 40% of the voters that cast their vote also tried the electronic system, which was something predictable considering the penetration of Internet in this country. The Mexican result is even more surprising: the

pilot voting participation is more than double the real postal voting participation. As a few voters pointed out, this is probably due to problems receiving the real ballot on time, inevitably making it impossible to return on time to be counted.

INCIDENTS DETECTED

One of the main objectives of the pilot was to test the system with a real field trial. During the entire pilot, the remote electronic voting system worked properly. After reviewing the system's registers and the 145 e-mails received, Scytl detected some minor incidents detailed below, basically related with usability issues.

Usability of the Voter's Credentials

The font used in the letter sent to voters has very similar looking characters for the letter "l" and the number "1". This caused confusion among a few voters who were not able to correctly identify themselves and vote. In future elections this problem will be solved by applying a few different solutions: using typographies that do not cause confusion; having error detecting codes; and eliminating characters that cause confusion.

Dynamic Downloading of the Java Programme

To achieve the same security and confidence guarantee that the traditional paper-based system offers, the electronic voting system created by Scytl requires that the voters' computers do certain operations. To avoid installing software in the computer of each voter, we decided to use Java, a popular programming language that is supported by practically all web navigators. There are operating systems that do not include Java by default, and there is always a small subset of specific combinations of navigators, operating systems and Java versions that do not function properly.

Scytl has detected that 4% of the voters had problems with Java for these reasons. This percentage is low if we compare it to several Internet studies that indicate a 12% incidence of such problems. To lower the number of voters' Java problems, Scytl has equipped its electronic voting platform with a Java detecting system that finds out if the voter has a correct configuration. In this way, if there is a problem, the voter can be instructed on how to solve it. In any case, in remote Internet elections the different

electors' devices and configurations will always be a real concern that will never be 100% resolved.

Access from the Generalitat's Website

The use of an official Generalitat de Catalunya web address to access the voting gave confidence to the voters, even though the length caused a few of them to write it incorrectly and be unable to access it properly. Other problems detected were related to the language of the homepage (it was written only in Catalan) and the low visibility of the voting link. This simple problem will be very easy to solve in future elections using a shorter web address that includes bilingual (Catalan and Spanish) web pages.

Late Reception of the Voting Credentials

The pilot organization learned that some electors did not receive the credentials on time and weren't able to participate. There are at least 7 people that mentioned this, plus others reported by the participating Catalan Casals. This indicates the need to find a better system of distributing the credentials earlier. The ideal system would be that the electors already had a digital certificate given out a homologated Certification Authority, making any action through the postal service completely unnecessary.

VOTER FEEDBACK

One of the electronic remote voting pilot's aims consisted in evaluating the impact of this new voting method on the voters. This is why the voters were asked, once the vote was casted, to fill in a simple survey through the same voting website.

From the 730 voters that participated, 563 answered the survey, with 216 open comments.

	Answers per option	% on the total
1.- In general, how would you qualify/rate the remote electronic voting pilot experience?		
Very satisfactory	397	70,52%
Satisfactory	151	26,82%
Unsatisfactory	10	1,78%
Very Unsatisfactory	5	0,89%
2.- What confidence does the electronic remote voting process give you?		
Much confidence	286	50,80%
A reasonable amount	255	45,29%
A little	18	3,20%
None	4	0,71%
3.- How would you qualify/rate the electronic and remote voting process?		
Very easy	347	61,63%
Easy	206	36,59%
Complicated	9	1,60%
Very Complicated	1	0,18%
4.- What factors are most important to you when using a remote electronic voting platform like the one in the pilot? (multiple answers were possible)		
Comfort	411	73,00%

Security	187	33,21%
Easy to use	146	25,93%
Others	15	2,66%
5.- Would you have chosen this voting system if it would of been a real (and binding) alternative to postal voting?		
For sure	471	83,66%
Probably	82	14,56%
Unlikely	3	0,53%
No	4	0,71%

The voter's opinions showed a clear approval of the system: 97,34% were satisfied or very satisfied with the experience, 96% found that the system gave much or a reasonable amount of confidence, 98,2% considered that the voting process was simple or very simple, and 98,2% surely or probably would have chosen this system to vote if the process would have been binding. Finally, over the factors that the voter considered most important to use the system, 73% chose comfortableness, 33,2% the security, and 25,9% for it to be easy to use.

Regarding the 5 voters who rated the experience as very unsatisfactory, curiously all of them rated the system positively and in fact they even say that they would probably use the system to vote if it were binding. Among the 10 voters with unsatisfactory opinions, we find as main reasons the problems with Java and/or with the credentials, but most once again have valued the other aspects of the system positively and would also use this mechanism if it were binding.

CONCLUSIONS

Catalonia has taken a crucial step in the study and experimentation of the new technologies offered in order to make electoral processes more convenient to the citizens of the XXI century. With the test pilot carried out, Catalonia takes a clear lead in Spain in this field, and is situated in the vanguard with the group of European countries analyzing this question.

In general, from the information on voter participation and their opinions as well as the technical incidents reported, we can conclude that the electronic remote voting test pilot was a success. Regarding participation, keeping in mind that it was a non binding pilot test where voters did not obtain any benefits from participating and where there was no promotional action, the 15,23% participation of real voters was excellent proving the interest among the voters. We must also point out the case of Mexico where the electronic participation rate was more than double the real rate. Many electors indicated in the survey their predisposition to use this electronic system in binding elections.

The main objectives were all successfully achieved:

- **Facilitate the participation of foreign resident voters.** The electorate could vote from Friday to Sunday from work, their homes or several Catalan Casals, with a simple credential (identification code).
- **Participate in the election easily and properly.** 98,2% of the surveys value the voting process as very easy or easy.
- **Withhold the voter's personal data without giving it out to any third party.** ScytI only knew the total number of voters for each country and constituency.
- **Totally guarantee the honesty of the electoral process.** The voting platform achieved these goals thanks to the *Pnyx* security technology.

- **Maintain the electoral process open more time without increasing the number and availability of people responsible.** Only 7 minutes after the election closing, the results were available, and all under the control of the electoral board.

Despite the success of the electronic voting process, the pilot has highlighted some points that need improving, basically related to usability, which have already been solved with some very simple measures.

The pilot experience has also permitted us to detect some points initially not considered key, in which the electronic remote voting promises other benefits:

- **Facilitate the mobility of the citizens** who are not necessarily abroad. Some citizens may find themselves away from their home location on the day of the elections. An electronic remote voting system, or decentralized electronic presential voting, would help solve this problem.
- **Reduce the resources needed to manage the election.** The use of electronic ballots allows the concentration of a great number of votes in one electoral board, reducing the number of people needed to manage the process. Furthermore, lengthening the electoral period (for example to two or more days) does not require more availability of the members of the electoral board.
- **Facilitate the management of the electoral rolls.** Last minute changes in the electoral roll can be made transparent to the voters, avoiding displacement to an incorrect poll.