CAN TECHNOLOGY ENHANCE CITIZEN PARTICIPATION AND REDUCE BUREAUCRACY?

By Juan Maria Segura for the Harris School[1]

In 2002, more than 115 million citizens voted electronically in Brazil. This experience was of great importance. Firstly, because this is the 5th most populated country on earth. Secondly, because of its vast territory, 8th largest country on the globe. And finally, and more importantly, because this country has the worst distribution of wealth among the group of big countries, with a Gini Index of 61 (v 40 China, 38 India, 41 US, and 32 Indonesia).

March, 2005

[1] This document was written as part of the requirements of the course Managing High Performance Government, at the Masters of Arts in Public Policy Studies in the University of Chicago. The author holds fully responsibility for the opinions and suggestions, in particular for those that do not respond to a specific academic or scientific frame.

INDEX

INTRODUCTION

Founded in 1500 and organized as a republic since 1889, Brazil, despite periods of dictatorship and military rule, has always returned to a democratic form of government. In the early 1980s, the country once again started the transition from a dictatorship to a democracy, establishing a new constitution in 1988. One of the key tenets of that constitution is the universal right to vote.

To ensure the integrity of its election results, Brazil began to move toward computerized voting in the early 1990s. In 1993, Brazil's electoral authorities developed a proprietary network and set up an infrastructure of servers and desktop computers for its 2,860 electoral zones. Two years later, the President of the Tribunal Superior Eleitoral (Supreme Electoral Court, or TSE) decided that the 1996 elections would be a good time to introduce computerized voting. The initial operating system chosen was a proprietary system called Virtuos. The government implemented the voting machines first in Brazil's major cities and then to the rest of the country. By 2000, Brazil had more than 350,000 electronic ballot boxes in use.

Finally in October 2002, and after more than 10 years experiencing technologies at different scale and levels of government, an electorate of more than 115 million citizens voted electronically in the general elections in Brazil. This was the first big-scale totally digitalized voting process ever seen in history. With a network of 367.000 machines distributed along the country, the electorate submitted ballots electronically. Only 3 hours after the closing, results were available, and 3 weeks later Luiz Ignacio Lula Da Silva (Lula), on his 4th attempt to the presidency, finally got the office.

In my understanding, this experience was of great importance for different reasons. Firstly, because Brazil is the 5th most populated country on earth, with more than 180 million people. Secondly, because of its vast territory. Brazil is the 8th largest country on the globe, totaling 8.5 million sq. km. And finally and more importantly, because this country has the worst distribution of wealth among the group of big countries, with a Gini Index of 61 (v 40 China, 38 India, 41 US, and 32 Indonesia). This means that if Brazil was able to succeed in such an endeavor, nobody can

at least try to attempt the same experience. If Brazil was able to manage such a mega-scale challenge, which was to make vote electronically millions of citizens (with 25 to 30 million people of illiterate and technology-illiterate citizens among them), relatively on time even in rural and in the most disenfranchised places, then everyone should be capable of doing the same. Even more, if Brazil succeeded in combining the massive use of technology to enhance citizen's participation with the power of government to reduce poverty, then everybody should be paying a lot of attention to this experience.

FOCUS OF PAPER

It is fair to say that when a government develops an initiative like this, what's visible is just a piece of a more complex picture. To put it in another way, when you see a voting process going from paper to electronic ballots, probably the initiative is just a piece of an IT master plan, that has many other parts not so visible, but playing a role as important as the one played by the electronic ballots. Despite the fact of realizing that the correct approach to address the Brazilian case would be, first, by identifying and fully understanding this IT plan, and subsequently understanding how the electronic voting fits on it, my paper will be exclusively focus on the electronic voting process itself. It is far way the scope of this work to analyze or assess the existence, quality or coherence of an eventual IT master plan of the Federal Government of Brazil.

An initiative of electronic voting may have different objectives, being some of these goals more crucial under certain circumstances, and some others top priority under a different context. Specifically in the case of Brazil, some of these objectives were the following:

- Reduce probability of fraud through manipulation of ballots
- Accelerate recount of votes ones the election is over
- Increase overall efficiency, reducing operational and control costs
- Increase citizen's participation and interest in the election of public authorities and officers
- Increase citizen's confidence in the public sector

- Enhance and reinforce a democratic system of government
- Reduce the digital divide

Although all of these objectives were of highly importance in the case of Brazil and very much related one to each other, and even many of them were achieved (like the absence of fraud, or turnout increase), the focus of my analysis will be exclusively on the one that deals with the existence of improvements in terms of efficiency. I will explore to what extend did this implementation positively affect the bureaucracy of the agencies in charge of conducting the electoral process.

Given the above definition of the focus of this paper, I propose the following research questions:

General questions referred to Electronic Voting:

- What is electronic voting?
- Why and under what circumstances should we consider its applicability?
- What is it trying to fix, add, promote or enhance?
- What is high performance on this matter?

Specific questions referred to the Brazilian Case:

- What were the main business case drivers for the change in Brazil?
- Was it a coherent theoretic concept by the time they tried it?
- Was there any previous practical successful story to mirror on?
- What were assumed to be the barriers for its implementation?
- Was the operational process impacted, to what level?
- Was efficiency obtained, and bureaucracy reduced, to what percentage?
- What were the lessons learned?

ICTs

Before getting into the research questions, seems reasonable to make a little refresh of the short story of the ICTs (Information and Communication Technologies), to see where electronic voting fits in, and when did governments start thinking more seriously about this technology. It is hard to understand or properly define electronic voting if we can't explain what the ICTs are and where do they come from.

The ICTs are defined as a set of close and related technologies including microelectronics (chips), informatics (hardware, software), telecommunication technologies (mobile), and optoelectronics (broadband, laser technology). The revolution of these industries started with isolated events in the 50s, converged in the 70s at the Silicon Valley in California, and exploded commercially in the 90s. Bell Laboratories invented the chip in 1947, and the first computer, ENIAC, was produced in 1946. The first ideas of transporting data through 'packages of information' came from a doctoral student from the MIT, back in 1961. In 1969, ARPAnet, the first computer network ever (of only 4 terminals!) saw the light. The 70s at the Silicon Valley (thanks to strategic initiatives of Stanford University) was a moment for picking up these pieces. The microchip appeared in 1971, while in 1975 Microsoft and Apple were developing software for computers. These events plus others gave shape to a big and chaotic expansion of the use of ICTs during the 80s. Finally, and with the creation of the Wild Web World (www) in 1992, the overall industry grew exponentially, and these technologies covered the globe, invading everything.

If we take Internet as the most visible piece of this 'invisible revolution' that's pushing society to a new state of order, it is clear that the 90s were the moment of large-scale production of the base-technologies invented in the 50s, and assembled in the 70s. The number of Internet users increased from 1 million in 1992, to 25 million in 1995, to 276 million in 1999, to 813 million in 2004[2].

[2] Segura, Juan. "*Es Internet una Oportunidad o una Amenaza para la Democracia?*" (Is the Internet an Opportunity or a Threat for Democracy?). Libertas 41, October 2004, Buenos Aires. The complete work in Spanish can be found on the web at www.eseade.edu.ar/libertas/41/Segura.pdf.

And the pace is still strong enough to predict that this is not ended yet, since the average growth rate for the last 4 years was of +125%.

The number of Internet users in Brazil evolved similarly, with less than 1 million of users in 1995, 7 million in 1999, and 21 million by the end of 2004, with a penetration of 12% of the population. Although this figure is not close enough to a high performer in this (approximately 25 countries have a penetration between 50% and 75%), it is clearly on the right track, being ranked 10th in terms quantity of Internet users, and with a compounded annual growth rate of +273% for the period 2000-2004.

Understandably and for many reasons, the private sector first started showing improvements in efficiency due to the incorporation of these technologies, driving many industries to its redefinition and reconfiguration, once a momentum of mergers and acquisitions reduced the number of players. Likewise, and in this race for efficiency and for making more and better with less, the public sphere needed to adapt, and started considering the implementation of isolated e-initiatives first in order to deliver better, but finally understanding the nature and depth of the transformation of society. Starting in some moment of the late 90s, governments from every ideological spectrum and political system began to invest heavily on them. And here we are…

ELECTRONIC VOTING

Now, going back to the research questions, let start with the generic ones. The electronic voting is a method of choosing between different alternatives (the act to vote) but with the distinctive feature of using electronic means almost exclusively to do so, instead of using the more conventional method of picking up the paper ballots. Electronic voting, so, refers to the use of computers or computerized voting equipment to cast ballots. Electronic systems can also be used to register voters, tally ballots, and record votes. Often times the electronic voting is confused with the Internet voting, but they are slightly different concepts, since the latter can only take place through the Internet, which is not necessarily the case of the electronic voting. The Internet voting is a narrower concept. In other words, Internet voting is always an electronic voting

process (because it uses electronic means to choose between different alternatives), while the electronic voting not always takes place through the Internet. I would say that rarely happens that way.

Broadly speaking, the components of a standard electronic voting system are essentially 3: the electronic ballot box (EBB) itself, where voters choose between candidates, the network that receives and transmits the data, and the data center where the information is centralized and tallied. Given that a standard voting system necessarily needs to have the 2nd and 3rd components of the system, the defining feature of an electronic voting system is the electronic ballot box.

The EBB is the fronting of the system, the place where voters face technology and choose between candidates. It comprises technology from different industries: software, hardware, printing, and from monitors. Direct-recording electronic voting machines (DRE) require voters to use a keyboard, touch screen, or pointer to mark their ballot on a computer terminal. The votes are immediately added to a running tally. The original DRE machines were simply electronic implementations of the traditional mechanical lever machines[3]. Some more recent DRE models look more like automated teller machines or personal computers and have the ability to display photographs as well as text.

Picture 1. EBB Used in Brazilian Elections

[3] Machine-readable ballot systems, in use since 1964, require voters to mark their votes on a paper card with a pencil or marker, or remove divots from a perforated card with a stylus or mechanical hole-puncher. The ballot cards may be taken to a centralized computer center to be scanned and tallied, or they may be scanned and tallied at each polling place.

Electronic voting may be conducted in a variety of ways. Some electronic voting systems simply transfer ballots from local precincts to centralized tallying centers. Other systems allow voters to vote from any computer connected to the Internet. Such Internet vote-from-home systems may be used in place of polling place voting, or they might be used only for absentee balloting. Internet vote-from-home systems are appealing in that they can eliminate the expenses associated with setting up and staffing polling places, making vote more convenient for voters who have computers at home or work, and eliminating the need for separate absentee ballot systems. Encryption technology can be used to help ensure that votes cast over the Internet remain secure and private. Internet vote-from-home systems, however, raise many of the concerns associated with absentee balloting and vote-by-mail systems, including concerns about people being influenced or forced to vote a certain way and concerns about people selling their right to vote. Critics have also questioned whether Internet voting systems might serve to further disenfranchise minority communities that tend to have little or no Internet access. And questions remain about the security of Internet voting systems and the feasibility of verifying that they perform properly.

Electronic voting, and especially Internet voting, has the potential to reduce the costs associated with running elections and increase participation in elections. It may also make voting more accessible to people with disabilities, allowing them to vote from home and use equipment that can accommodate their special needs. However, ensuring the security and integrity of online elections poses many new challenges for election administrators.

The circumstances under which the implementation of electronic voting should be consider may vary, but broadly speaking are:

- When looking to reduce the opportunity of altering or manipulating the results of the election during the recount stage, trying to favor or hurt some of the candidates. If what's at stake is big enough to increase the incentives of manipulations, a more secure voting system is preferred, and often times this happens where less human intervention occur.

- When looking to reduce margin of (not intended) error on the election, since machines fail less than humans. The 2000 president's election in the US was a good example of the impact that a voting system may produce in the confidence of those participating, when the election is tight enough and the system has a considerable margin of error.

- When looking to gain speed in the delivery of the results of the election. There is a positive correlation between the size of the electorate and the time in which final results are available. The same type of correlation appears with the level of complexity of the election (more options to choose from, more time needed to get with the tallying done).

- When looking for efficiency in the use of scarce resources, trying to avoid intermediate stages and controls, and minimizing logistical and operational processes. Police officers protecting ballot boxes, agencies counter-controlling other agencies, millions of printed ballots transported one way and the other, thousands of electorate officials controlling each other while doing the recount of ballots, and so on. All these can be minimized or even eliminated if technology is properly dispose.

Moving from a standard to an electronic voting system, therefore, opens the chance to gain some security (more automatic controls), transparency (less human manipulation), accuracy (less margin of error), and accountability (less resources demanded). When referring to the public sector, it also opens the chance to increase citizen's participation, confidence in public and elected officers, and willingness to accept the results of the elections whatever these are, since now they represent a picture more similar to the true will of the people.

Given though, it is easy to define an ideal electronic voting system as the one that is flawless, delivers results on-line and requires minimum human intervention, using processes, operations and facilities already in place. Since perfect (or ideal) is enemy of good (not in the sense of the book 'Good to Great'), ***a high performance electronic voting system it the one that delivers better***

results in a more effective way and more rapidly when comparing with the system applied before to the same situation (given geography and electorate equal).

LITERATURE REVIEW

Generally speaking, literature covering this has been moving from a very enthusiastic and idealistic conception of electronic voting and its implications in the 90s, to a more careful and balanced view, with a not so clear overall outcome ex-ante.

Morris (1999)[4], for example, says that the Internet directly will replace the voting machine, becoming the ballot box. More emphatically he states that 'Internet voting in elections will change how we choose our candidates [...] It will make the process of nomination and election an active one -and interactive one- and will stimulate voters to new levels of involvement and participation. It will be a healthy shot in the arm for a democracy increasingly devoid of passion'. Similarly, Nixon and Johansson (1999)[5] note that ICTs have the potential to change, radically, the democratic system as we know it today, when is comes to voting procedures. They remark the presence of this not only in the possibility of replacing paper with electronic ballots, but also in giving to citizens the chance of participating in the day-to-day government decisions. Going further with the argument, they conclude that electronic voting will eventually challenge the system of representation through an increasing reliance on electronic referenda.

With data of the pioneering experiences available, Holmes (2001)[6] separates two different kind of online voting procedures: those in which election officials control the computers used for voting (the Brazilian case), and those in which they don't have full control of the computers (the Arizona democratic primaries case), so people can vote from home, work, school, the public library. He sustains that initially we will only see government authorities installing computers in the polling

[4] Morris, Dick. "*Vote.com. How big-money lobbyists and the media are losing their influence, and the Internet is giving power back to the people*". California, USA. Renaissance Books, 1999.
[5] Hague, Barry N. and Loader, Brian D. "*Digital Democracy. Discourses and Decision Making in the Information Age*". London, UK. Routledge, 1999.
[6] Holmes, Douglas. "*@.Gov, e-business strategies for government*". Maine, USA. Nicholas Brealey Publishing, 2002.

stations, because they will only trust what they can control. Generally speaking, voters react positively to DRE machines with touchscreens located in polling stations. Although the author highlights the convenience of flexibility given by remote voting, he also mentions the mayor importance of matters such as security, privacy, fairness, and cost-free, arguing in favor of an absolutely fail-free system. He says 'online voting is not an e-commerce transaction (where some degree of fraud is tolerated). No amount of election fraud can be tolerated'. Also Done (2002)[7], when analyzing the experience of the democratic primaries in the State of Arizona in 2000, says that the use of Internet to support elections was limited to speculation until recently. Done supports with empirical data the increase in voter registration and voter participation over this small-scale experience, and he also points out that this technology 'should not eliminate current voting technology, but rather complement it by improving the efficiency and effectiveness of balloting'.

Finally, Norris (2003)[8] points out that 'democratic electoral systems must meet certain stringent standards of security, secrecy, reliability, accuracy, efficiency, integrity, and equality, making the administrative challenges of electronic voting more difficult than the implementation of many common forms of electronic commerce or government'. He concludes from several pilot schemes conducted in Britain that 'although a potentially useful addition to supplement existing practices, electronic voting by itself will not radically improve turnout and simpler facilities such as all-postal ballots may prove more effective, straightforward, and cheaper. On balance, therefore, the new communication and information technologies have greater potential for deepening pluralist and representative democracy, by strengthening government transparency, and by improving public satisfaction with the delivery of routine public services, more than by stimulating new forms of civic activism'.

[7] Abramson, Mark A. and Morin, Therese L. "*E-Government 2003*". Maryland, USA. Rowman & Littlefield Publishers Inc., 2003.
[8] Norris, Pippa. "*Deepening Democracy via E-Governance".* Harvard University. Boston, USA. Draft chapter for the UN *World Public Sector Report. 2003.*

ISOLATED STORIES (THAT MAKE A TREND)

During the 1990s, some non-governmental organizations began conducting elections for the first time using personal computers connected to the Internet or private networks. Because of the widespread availability of computers on university campuses, many universities found this to be a convenient way for students to elect student government representatives. Some professional societies began using Internet voting to elect their officers, and some corporations began offering Internet voting as an option for shareholders to cast proxy votes.

In August 1996, the Reform Party became the first US political party to use Internet voting (along with telephone and postal mail voting) to select a Presidential candidate. Over 2000 voters voted via the Internet. In January 2000, 35 voters cast their ballots over the Internet in the Alaska Republican party's Presidential straw poll. Up to here, only small-scale experiences and not a lot of empirical data to analyze and take lessons from.

The first large-scale binding governmental election to be conducted online was in March 2000 at the Arizona Democratic primary, where 39.942 voters cast their votes over the Internet. No security problems were reported; however, the system proved unusable for a large numbers of voters, including many Macintosh computer users and visually impaired voters who rely on screen-reading software.

During the US 2000 election cycle, a number of limited Internet voting trials were held in both primary and general elections. Arizona's Democratic Party launched what they called "the first-ever, legally-binding public election over the Internet" from March 7 to March 11. Voters cast ballots from their homes or offices between March 7th and 10th, or at polling locations on March 11th. The party mailed a personal identification number (PIN) to all 843.000 eligible voters, who could subsequently vote their ballot via the Internet by logging on to the party's website, entering their PIN, and providing two kinds of personal identification. Voters who used the polls could also cast their vote by paper ballot or computer at the polls. According to the Arizona

Democratic Party, about 41% of the 86.907 ballots cast in the election were sent via the Internet from remote locations.

The Arizona trial election created problems for some Internet voters, and resulted in confusion in some locations because of the new procedures. Some voters with Macintosh computers were unable to vote because the software was incompatible with the security system used in the election. The party added phone lines in the last few days of voting to field calls from Macintosh users and from voters who had lost their PIN and could not vote online without it. In response to a federal lawsuit, the Party also increased the number of polling places in the month before the primary. The Voting Integrity Project, a nonprofit organization, filed the lawsuit in U.S. District Court in Arizona charging that the process violated the Voting Rights Act by creating a disparity between voters with computers and those who lacked computer access, resulting in a dilution of minority votes. While the Democratic Party increased the number of polling places in response to the suit, it had difficulty finding locations with dedicated phone lines to allow for Internet connections (although paper ballots were available at all polling locations). U.S. District Court Judge Paul G. Rosenblatt permitted the election to proceed; the Voting Integrity Project did not appeal the decision, but continues to pursue its lawsuit in district court.

Also during the Presidential primary season, voters in three election districts in Alaska cast ballots via the Internet in the Republican Party's Presidential straw poll on January 24, 2000. The project was conducted by VoteHere.net, an Internet voting company located in Bellevue, Washington, and provided 3.500 voters in remote areas the opportunity to cast ballots in the straw poll.

In the past, it was difficult for voters in these areas to participate in the straw poll. In the November general election, some members of the military and citizens living abroad were eligible to vote via the Internet on November 7th. Voters who were covered by the Uniformed and Overseas Citizens Absentee Voting Act and whose legal residence was one of fourteen counties participating in the project in Florida, South Carolina, Texas, and Utah were eligible to participate. The pilot project was limited to a total of 350 voters who could request and vote an absentee

ballot via the Internet; only 84 voters representing 28 states and territories, cast ballots under the program.

Another strong source of evidence concerning electronic voting systems is the results of the pilot studies that have been conducted under the supervision of the UK Electoral Commission in selected areas in the United Kingdom local elections of 2000, 2002 and 2003. Building on previous experience, the 59 pilot studies conducted in May 2003 used the context of a real local election with real votes, explored innovative ways in which people can vote electronically using techniques such as mobile phone text message services, touch telephones, digital television, as well as on-line voting methods using home computers, local libraries, and council-run information kiosks. In total 17 electronic voting pilot schemes were tried using a wide range of electronic technologies. In the same contests, 32 pilots replaced the traditional ballot process in polling stations with all-postal voting. Another seven pilot schemes involved mobile polling stations or changes to polling hours. Experiments were also conducted in North East Lincolnshire in official election websites providing impartial information about all candidates, parties and local issues featured in the election. These pilot studies provided one of the most rigorous tests of how electronic voting works in practice under different conditions and, in particular, whether turnout is boosted by the opportunity to cast an official electoral ballot through a variety of electronic technologies. The results of the electronic voting pilots can be compared with alternative attempts to improve electoral turnout through more conventional means, including all-postal ballots used in other wards. Overall the pilot schemes in May 2003 covered 6,5 million eligible electors.

The results suggest that although there are considerable hopes for the role of new technologies in elections, in practice the use of more conventional voting facilities such as the introduction of all-postal ballots provided a far stronger and consistent boost to voting participation, as well as being cheaper and more straightforward to implement. On average use of the all-postal voting schemes produced a 10% increase in turnout (rising from 34% in the same wards in the previous local election to 44% in May 2003). In a few wards using all-postal voting turnout rose by more

than 20%. By contrast the overall impact of all the electronic voting schemes proved ineffective overall and inconsistent, with some pilots such as Vale Royal and South Somerset experiencing a rise in participation while others such as Chorley and Stratford-upon-Avon suffered equivalent falls. This largely confirms the experience of the pilot schemes conducted in previous years in a smaller range of wards, where the vote in all-postal areas went up by 15%. Further evaluation of these schemes remains in progress, with surveys conducted by the Electoral Commission after the event to monitor the experience of users. But a simple comparison across local councils suggests that the variations among areas were not associated with the adoption of any particular technology, such as text-messaging over Internet voting, or the telephone versus digital TV. On average, only about one in ten elector chose to use the electronic voting facilities that were made available, a pattern that could increase in subsequent contests if people became more familiar with the available technology; in Swindon, 10.000 people used the internet connection from home to vote, up from 6.000 the previous year. Moreover the implementation of the new technology was not always effective. In St Albans, problems with British Telecom's installation and connectivity of computers in polling booths meant returning officers had to abandon machines for the more old-fashioned paper checks and similar problems occurred in Sheffield.

The stories of Arizona and the repeated experiences in UK, very successful in many ways, show with lot of realism the type of struggle that the development of an attractive and reliable electronic voting system generally faces. The Arizona case, in part responsible for multiplying voter's participation by 6, received lots of critics from the fairness side despite the effort made. In the UK case, the critics came from the social side, or the 'coldness' of reaction of the electorate. Given that both cases used the electronic voting in a broader sense (including Internet voting as one of many available options), the usefulness of their results and the critics they received are of great significance. The same mood summarized in the literature review of this paper is present in these examples, moving from a theoretical usefulness and idealistic conception of the electronic voting system (the Arizona case), to a more carefully balanced judgment of it (the UK case), with no clear predefined outcomes.

Now let's zoom in into the specifics of the Brazilian case.

THE BRAZILIAN NETWORK

The country's approximately 415.000 voting machines were provided mainly by National Semiconductor Corporation, a US based company (Santa Clara, Ca). The system runs on the Microsoft Windows CE operating system, and the software is from another partner in the venture, Unisys Corp. (Blue Bell, Pa.). The programming language is completely encrypted.

To cast a vote, voters first enter their identification number into a micro terminal, which authenticates them to go to a voting machine. Each electronic ballot box has an integrated LCD screen and a numeric keyboard that resembles a telephone keypad. The machine displays serially a 3x4 photo of each candidate and a number besides his or her name and party affiliation. Voters select preferred candidates by keying in the numbers assigned to each. Once the voting is completed, the machine plays a tune to let the voter know that the job is done.

Picture 2. Man Casting Ballot

Votes are recorded in flash memory and transferred to a floppy disk. At the end of the election, officials bring the encrypted disks to regional electoral tribunals, which transmit results via dial-up links to Brasilia, the nation's capital. A hard copy of each vote is also recorded on an internal

printer locked inside the machine. The latest voting machines include two flash memory cards, one internal 16-megabyte card and one external 16-megabyte card. The internal flash card operates like a hard disk and includes both Windows CE.NET and the voting software. The external flash card stores the available voting choices, and the voting results are saved to a floppy disk. The floppy disk is removed at the end of the day and sent to a central location, where all results are tallied.

The Windows CE.NET–based voting machines run on electrical as well as battery power. They can be fully operational for up to 12 hours on battery power alone in rural sites where there is no electricity or in urban areas if there is a power failure. In places where electricity is not available, car batteries are used.

Additionally, in the first round of October elections, some 52.000 new machines, about one-eighth of the total, enabled voters to examine their vote on the printout through a small window to confirm that the ballot was properly cast. In addition, in each electoral zone, 3% of the ballot boxes were checked against the paper printout.

The electronic ballot box was tested for the first time in the 90th Electoral District of Brusque in the election of 1989, where there were 373 voters. At each new step along time, the technicians improved on the system, mobilizing resources from the Brazilian National Institute of Space Research, INPE, and the armed forces. In the general elections of 2002, this system became totally the norm, covering state and federal representatives and senators, governors and presidential candidates.

Many countries have analyzed the Brazilian model as a great example for implementing electronic elections in their own areas. 'The real value of electronic voting in a democracy is that it assures voters that their choices will be fully respected, without any possibility of manipulation,' explains Camarão, Chief Information Officer for the Tribunal Superior Eleitoral. 'More and more countries

are starting to embrace electronic elections, not only because of the speed of the counting process, but because it guarantees the voters that their decisions are fully taken into account.'

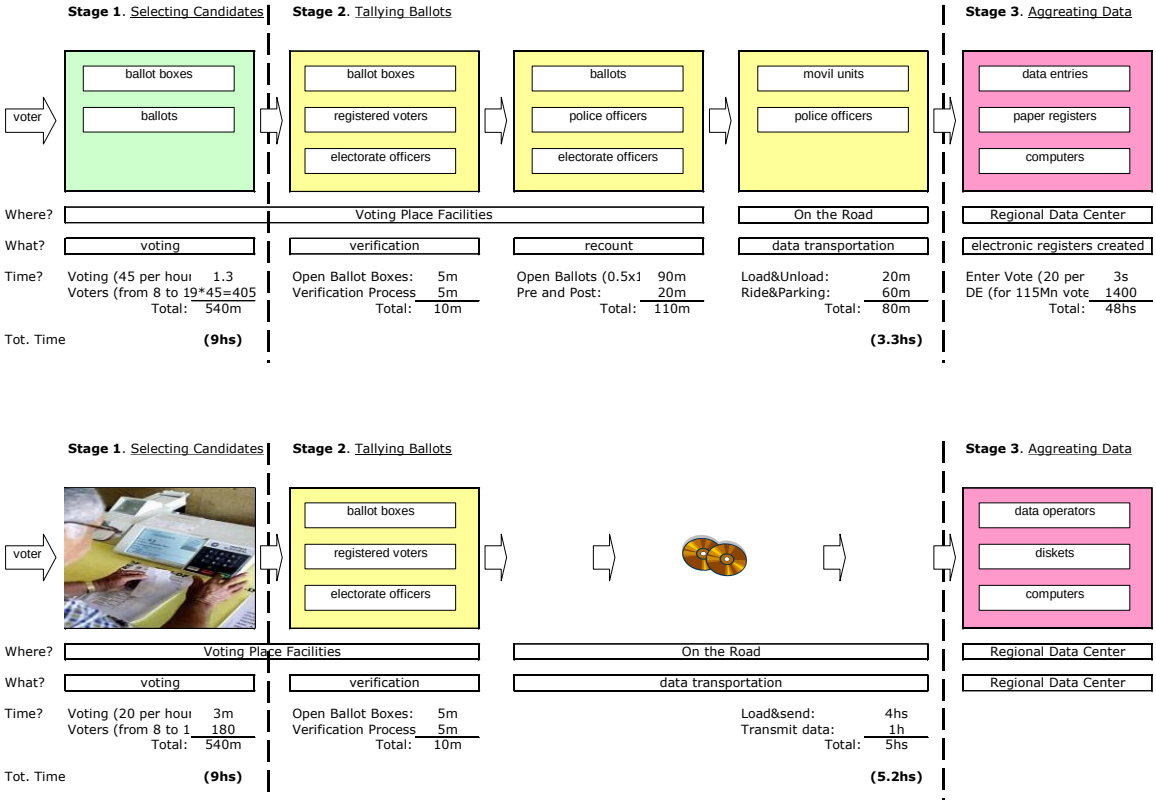


Chart 1. Standard v Electronic Voting in Brazil

Of course that a few problems did occur, since the idea of flawlessness is more than anything a guiding principle, but they were small. The Brazilian press indicated that authorities have recorded problems with 4.163 electronic ballot boxes. All of them were fixed on time and 111 were replaced by other electronic ballot boxes during elections. According to the TSE minister Fernando Neves, this was not at all significant, and corresponds to only about 1% of the electronic ballot boxes displayed.

This little failure becomes even more significant, given that roughly 10% of the Brazilian population is illiterate and a still to be determined percentage have gone to school but have problems with math and reading. The issue of digital exclusion caused problems. This combined percentage is

estimated to correspond roughly to some 26 million persons. Despite that fact, the failure rate was around 1%.

IMPLEMENTATION APPROACH

In 2002, Unisys won a bid to provide an additional 56.000 electronic voting machines. The main requirements were that these machines be:

- Secured for both voting and counting processes
- Friendly and easy for voters to use so that voters could preview their vote to confirm their choices before submitting their final decision
- Simple, small, portable, and robust because of the vast territory that had to be covered
- Capable of working on batteries for more than 12 hours
- Able to support a range of peripherals and include multiple storage systems—an embedded flash card, an external flash card, and a floppy disk drive.

In developing its system, Unisys tested the proprietary operating system already in use and the Microsoft Windows CE.NET operating system. The company chose Windows CE.NET version 4.1 because of the operating system's rich feature set, security enhancements, reliability, support for a broad range of peripherals, advanced power management, available development tools, and favorable licensing cost.

Unisys developed the Windows CE.NET–based voting machines in Portuguese in approximately six months. It started the project using Windows CE.NET 3.0, then, in the middle of the project, migrated easily to Windows CE.NET 4.1 when that version of the operating system became available. 'We moved to Windows CE.NET 4.1 because it met all the technical requirements for our solution,' says Luis Gaviao, Unisys Lead Project Manager. Once the system was ready, it was submitted to the technology commissions of Brazil's political parties for a thorough analysis, which confirmed the integrity of the Windows CE.NET–based voting machines.

- *Increased Security*

Increased security was perhaps the most critical requirement for the electronic voting machines, to prevent fraud and to ensure the integrity and accuracy of the results. 'The Brazilian government required a product with a highly secured operating system, and the other systems that were considered didn't offer the degree of security provided with Windows CE.NET,' says Gaviao.

In addition, the Windows CE.NET protected-store application-programming interface helps prevent data tampering, and the Kerberos security protocol authenticates the voters as they log on to the system.

To meet the Brazilian government's national security requirements, Microsoft also provided TSE with access to the Windows CE source code so that all the parties could examine the code to ensure the integrity of the system. 'Microsoft was extremely helpful in opening the Windows CE source code to provide the access that we requested,' says Paulo Camarão. 'The political parties had access to the Windows CE Shared Source code and stated that there was no possibility of fraud or manipulation within this system. Prevention of fraud was one of the primary benefits of this technology.'

- *Faster Results, Long Battery Life*

The Windows CE.NET–based voting machines delivered unprecedented performance. Whereas previous systems required several days to process results, the new voting machines enabled the electoral authorities to total 80 percent of the results in less than four hours and all of the results within the next day. In addition, the advanced power management features in Windows CE.NET enable each machine to run for at least 12 hours on a small battery, which helped reduce the cost and weight of the device.

'The advanced power management in Windows CE.NET enabled us to use a small battery without compromising our battery life requirements, which made the system more competitive than if we'd had to include a more powerful battery,' says Gaviao.

- *Easy Integration with Existing Peripherals*

The TSE voting machines needed to work with a range of peripherals, such as the microterminals for logging on, as well as printers and floppy disk drives. It also needed to support the internal and external flash cards. Windows CE.NET provides extensive device driver support out of the box, as well as sample device drivers to assist embedded developers. This made it much easier and faster for Unisys to develop all the drivers required to support the diverse hardware requirements and range of peripherals.

'It was very easy to assemble all the device drivers because most of them were already available in Windows CE.NET,' says Gaviao.

- *Faster Development and Extensibility*

Using Platform Builder, the operating system development tool included in Windows CE.NET, Unisys developers were able to build and debug the entire operating system configuration for the voting machines using a single toolset.

Brazil has become a world leader in electronic elections, using first more electronic ballot boxes in more places than any other country. The results have proved so successful that many countries have analyzed the Brazilian model and requested information on how they can implement it for their own elections. The 2002 election was closely witnessed by 37 representatives of different nations, and by members of 3 international organizations. TSE recently signed a technical cooperation agreement with the Organization of American States and the United Nations to support member countries in their electronic election processes.

INTERVIEW RESULTS

Like Camarão and Gaviao, Guillermo Worman argued that the electronic voting system might be easy, convenient and secure if some actions are taken in advance. 'When government works thoroughly and collaboratively with the private sector, it is possible to pass the first test on this smoothly'. Worman is a representative of Participacion Ciudadana, a local NGO of Argentina that audited the first electronic voting process held in this country. In October 2003, the City of Ushuaia celebrated local elections, and 49.300 citizens voted electronically for the first time. 'Before the election day, there was a lot of anxiety in the government and a lot of curiosity from the side of the electorate', said Worman. His NGO plus other 3 monitored different polling stations, and were responsible for assessing different parts of the process. He said, 'in the voting places our organization covered, the election day evolved normally. People arrived a bit earlier, but they voted faster than in a standard system'. Average voting time was below 2 minutes, with 70% taking less than a minute to complete it. Regardless of the presence of official technicians and assistants, 64% of voters didn't ask for help. 'It was a walk in the park', explain Worman, 'and as hours and voters passed along, the faces of government officers and representatives of the company provider of the system started to celebrate'. The network performed as expected, and 1,5 hours after the election was done, results were final and public. Polls conducted the week after the elections showed that 84% felt that the system was between better and much better than the standard, and 92% thought it was between good and very good.

The company that supplied the technology for the Argentinean case was INDRA, a Spanish company that operates in the country since the 90s. Enrique Olivera, a sales manager of the company, said that INDRA 'definitely passed the exam! We knew we had a competitive and reliable system, but we didn't know how responsible the government was going to be'. Even when the current market is still small in this country 'the potential for growth is gigantic, and even more if you think of the region as a whole. We know a lot of governments at different level are discussing the benefits of this system, and even some are testing in very small scales[9]. On that

[9] During 2004 and as a result of the Ushuaia experience, at least 4 argentinean states tested the electronic voting system.

sense, the Ushuaia experience was of great importance for us, and everybody knew our company was behind it from the first moment'. When referring to the most important lessons learned from this, he said 'work in advance with government as much as you can. You can control the quality and reliability of your systems, but you can't assure the quality of the job of the people conducting the election. It you are unable to work with government as a team, chances of failure are big'.

I also had the chance to speak with a couple of Brazilians that used the electronic ballot boxes in Brazil more than one. Both are currently living and working in the US, but had different social conditions. One, Rodrigo, is a consultant, and the other one, Ivani, is a nanny. For Rodrigo everything was upside. 'I voted in the same school as before. The steps before the precise act of voting were almost identical when comparing to the previous one.' He is very enthusiastic about the benefits of the system from a citizen standpoint: 'the system was very friendly to me. Straightforward and easy to follow, and it also gave me the chance to see the face (picture) of many politicians that were only a name for me before that day.' The most remarkable thing for Rodrigo was the speed with which results were available. 'It was such a shock to have 80% of votes tallied in hours after the election was finished. Historically the period from the closing of the polls to the announcement of results have lasted many days, easily a week. And this is terrible since it gives the idea that corruption is operating, and fraud speculations are part of the game. Since the implementation of this system, those elements are out of discussions, fortunately!'.

Understandably, for Ivani the transition wasn't that easy, since she had no previous experience interacting with technology. 'The first time I entered the voting room I was a bit scared. I was struggling between asking for help and keeping my vote secret'. She also found useful the incorporation of the candidate's picture. 'I saw a lot of faces for the first time, and internally I was able to link my election decision to real personas instead of just names'. After a couple of elections, though she feels much more confidence. 'In the end it was not that bad. Once you get to know what you are capable of, and as long as the machines remain similar from election to election, the process is easier and faster.'

These few interviewed people show the multiplicity of dimensions and factors involved in an election. The government trying to enhance citizen participation and deliver faster and more accurately, the private sector trying to sell equipments and gain market share, the NGO sector acting as a monitoring and independent agent, some wealthy citizens trying to economize the time dedicated to the public sector, and some not-so wealthy citizens trying not to get distressed by the cultural shock imposed by the technology change. This is probably the main reason why it is so difficulty to evaluate this implementations overall. They're always going to be winners and losers.

BEST PRACTICES

Before trying to answer the research questions referred specifically to Brazil, it is necessary at this point to mention what a list of best practices would look like. From the previous stories, data and interviews analyzed, I can separate the list in the *pre*, the *while*, and the *post*.

Pre *(actions taken before the election's day)*

- Anticipation: Start working early in order to allow market providers develop the specific technology needed, and congress define the proper legal framework.
- Coordination: With the participation of all relevant political actors, establish a realistic timeframe of implementation, and monitor constantly its evolution.
- Education: Give the electorate the opportunity to learn about the features and benefits of the new system, and also allow them to practice with real equipment.
- Training: Give electoral officers sufficient technical and on-the-job training. Prepare them to solve basic problems like a paper jammed on real time.
- Communication: Keep electorate constantly informed, expanding sources of information, and intensifying the level of support we elections are coming.
- Options: Especially in the beginning, permit electronic ballots cohabit with other standard methods of voting, making the transition less dramatic.

▶ Testing: Prove the reliability of the network, test the ability of electoral officers to solve problems under pressure, and learn from different focus groups.

▶ Financials: Develop an economic and financial model, showing investments needed, and potential savings gained from reengineering of processes.

▶ Targets: Identify key indicators, and establish specific metrics for them. Develop a system of red flags and alerts on these areas.

While *(actions taken during the election's day)*

▶ Flexibility: Extend the time to vote the day of the election, to allow anxious voters arrive earlier, spreading risk of bottlenecks and excessive waiting times.

▶ Monitoring: Constantly monitor performance of the system, fixing on-line or replacing machines underperforming, keeping the pace of the voting process.

▶ Tutoring: Provide a helpdesk service at every voting center, in order to answer general questions or to guide voters along part or the entire voting process.

▶ Logistics: Interchange human and technical resources from less concentrated voting center to those showing bottlenecks and excessive delays.

▶ Secrecy: Despite the presence of the many tutors, technicians, electoral officers, and controlling agencies, guaranty the secrecy of the voting act.

▶ Communication: On an hourly basis send reports to the media telling about general pace of the election, and special recommendations to take care of.

Post *(actions taken after the election's day)*

▶ Tallying: Accelerate the process of closing the poll, securing the electronic ballot boxes, and transmission of data to the regional or central tallying centers.

▶ Control: Randomly choose some ballot boxes, and check the figures saved in floppy memory with the results showed in the printout produce by each ballot.

▶ Communication: Announce results of the election in a clear and comprehensive manner, as soon as the overall results are tallied, controlled and overseen.

▶ Evaluation: Complete the economic and financial model designed before with real data. Check the way key indicators performed, in order to set up standards.

▶ Storage: Keep records (electronic and in paper) of election for a reasonable period of time, till the results are accepted and internalized by all parts involved.

With this list we can go back to the Brazilian case, and see if some of the best practices on electronic voting systems were presented.

RESEARCH QUESTIONS ANSWERED

At the beginning of the paper we made some questions referred to the case of Brazil. With the data obtained along the paper I will try to go through them:

- What were the main business case drivers for the change in Brazil?

On one hand the reduction of chance of fraudulent elections, and on the other hand the massive induction of the entire electorate to enter to the information age. The fist one has to do with the institutional fragility and political immatureness of the democratic system after a long period of dictatorship. The latter has to do with the long-term objective of leveraging available technologies to narrow the gap between the wealthier and the most disenfranchised populations of the country.

- Was it a coherent theoretic concept by the time they tried it?

By the time TSE started developing the proprietary network, the concept was coherent but completely untested. Today the concept remains coherent, but some empirical data suggest that achieving overall performance (efficiency, participation, flawlessness, etc) demands a consistent effort, a sustained level of investment and a clear vision of why to do it.

- Was there any previous practical successful story to mirror on?

Almost nothing. The Arizona case happened in 2000, and the UK experiments between 2000 and 2003. In Belgium 2000 municipal elections, 44% of the electorate voted electronically for the first

time. And in 2004 India deployed a network of 1 million electronic ballot boxes to receive 650 million votes. Again, by 1996, first test with legislative elections, nothing whatsoever; and for the 2002 general elections, almost nothing to mirror on.

- What were assumed to be the barriers for its implementation?

First and for the most, the digital divide. That is, the millions of illiterates and technology-illiterates adults that do not have the minimum skills needed to interact properly with a computer. In fact, many of them live in concentrated areas, like *favelas* o rural emplacements, with very little basic infrastructure. Another barrier was the political class: congress, political parties, and those 'loosing" with a more transparent voting system. Both barriers were satisfactory jumped, getting 100% of the electorate on the system, and receiving no claims of fraud of any kind.

- Was the operational process impacted, to what level?

Clearly it was structurally impacted. The development of the proprietary network first, in 1993, and the redesign of process to transmit and receive information later, changed primarily the first stages of the process of collecting and tallying the data. Some regional centers were eliminated, and all the data-enter positions at the remaining electoral centers were eliminated, since now the data was received in *bits* and not in paper format.

- Was efficiency obtained, and bureaucracy reduced, to what percentage?

All the data suggests that average voting time was reduced, electorate participation was increased, and tallying time was accelerated. However, whether efficiency was obtained or not is a question that remains open, since there is no available data computing the overall plus and minus of this mega-scale implementation. The same answer is extensive to whether the bureaucracy was reduced or not. We know some positions were eliminated, some processes redefined and some electoral agencies merged. But we can't say if this movement ended up in a less bureaucratic organization or not.

LESSONS LEARNED

Arriving to the end of the paper seems to be a good opportunity to conclude with the lessons I believe Brazil learned from this experience.

First and foremost, thinking big was a right strategy to approach to a matter of such a magnitude, of such a potential. Given the lack of empirical data on electronic voting by the time TSE started working, it was critical to arrive to a shared vision of the possible impact of an endeavor like this. The time devoted to develop the network, suppliers, legal framework, and political acceptance, was in proportion with this long-term view of the potential of ICTs in modern society.

Secondly, testing small was a wise movement. The first test of 1996 covered only 1% of the municipalities, increasing the chances of a more rigorous control over it. It was also overestimated (intentionally, I guess) the size of the network, distributing along those cities almost 20% of what would be the final size of the network (77.5M EBB v a final size in 2004 of 415M). Finally the system was tested first in legislative elections, which in general have less importance and media coverage that general elections in countries with a strong *presidential* system of government[10]

And last but not least, scaling fast was risky, bud showed to be the right decision. From 1% of municipalities in 1996, to 10% in the general elections of 1998, to 100% in legislative elections of 2000, reaching to 100% of coverage in October 2002 general elections. The EBB network was multiplied by 5 times in just 6 years. From nobody using this technology in 1994 general elections, to everybody (even the most poor and disadvantage people!) in 2002.

Unfortunately it is still open the question whether efficiency was obtained or not. I said fraud was eliminated, participation was increased, and apparently democracy was enhanced. And they all

[10] This presidential system is widespread in most of Central and South American Countries, where the executive branch of government has a stronger role and presence than the other two branches of government: the Congress and the Judiciary System. The opposite situation is the parliamentary system, where Congress sets pace (many European countries).

look like desirable goals to go for and to invest in. In fact they represent an enormous challenge for any government nowadays, and should be constantly pursued. But the question of efficiency enhancement should necessarily be added to the overall analysis of the convenience or not of implementing electronic voting systems across the board.

I leave unanswered the question of efficiency enhancement and bureaucracy reduction. In the Brazilian case analyzed here, it was not possible for me to go through it. Therefore, and based on the definitions given before, I can't tell if Brazil is a high performer on this matter or not. Its experience is huge, its effort admirable, and its results replicable in many situations. But it is not clear if, end to end, is a complete successful story.

APPENDIX 1: WORLD INTERNET USAGE AND POPULATION STATISTICS

World Regions	Population (2004 Est.)	Population % of World	Internet Usage, Latest Data	Usage Growth 2000-2004	Penetration (% Population)	World Users %
Africa	893,197,200	14.0 %	12,937,100	186.6 %	1.4 %	1.6 %
Asia	3,607,499,800	56.5 %	257,898,314	125.6 %	7.1 %	31.7 %
Europe	730,894,078	11.4 %	230,886,424	124.0 %	31.6 %	28.4 %
Middle East	258,993,600	4.1 %	17,325,900	227.8 %	6.7 %	2.1 %
North America	325,246,100	5.1 %	222,165,659	105.5 %	68.3 %	27.3 %
LatinAmerica/Caribbean	**541,775,800**	**8.5 %**	**55,930,974**	**209.5 %**	**10.3 %**	**6.9 %**
Oceania / Australia	32,540,909	0.5 %	15,787,221	107.2 %	48.5 %	1.9 %
WORLD TOTAL	6,390,147,487	100.0 %	812,931,592	125.2 %	12.7 %	100 %

SOUTH AMERICA	Population (Est. 2005)	Internet Users, Latest Data	Usage Growth 2000-2005	% Population (Penetration)	% Users in S.A.
Argentina	37,584,554	5,600,000	124,0 %	14.9 %	14.6 %
Bolivia	9,073,856	270,000	125.0 %	3.0 %	0.7 %
Brazil	**181,823,645**	**18,660,650**	**273.2 %**	**10.3 %**	**48.5 %**
Chile	15,514,014	4,000,000	127.6 %	25.8 %	10.4 %
Colombia	45,926,625	2,732,200	211.2 %	5.9 %	7.1 %
Ecuador	12,090,804	569,700	216.5 %	4.7 %	1.5 %
Falkland Islands	2,661	-	-	-	n/a
French Guiana (FR)	194,277	3,200	60.0 %	1.6 %	0.0 %
Guyana	877,721	125,000	4,066.7 %	14.2 %	0.3 %
Paraguay	5,516,399	120,000	500.0 %	2.2 %	0.3 %
Peru	28,032,047	2,850,000	14.0 %	10.2 %	7.4 %
Suriname	460,742	20,000	70.9 %	4.3 %	0.1 %
Uruguay	3,444,952	1,190,120	221.7 %	34.5 %	3.1 %
Venezuela	24,847,273	2,310,000	143.2 %	9.3 %	6.0 %
TOTAL	365,389,570	38,450,870	169.0 %	10.5 %	100.0 %

APPENDIX 2: TOP 20 COUNTRIES WITH HIGHEST NUMBER OF INTERNET USERS

#	Country or Region	Internet Users, Latest Data	Population (2004 Est.)	Internet Penetration	Source and Date of Latest Data	% World Users
1	United States	198,878,016	296,208,476	69.0 %	Nielsen//NR Nov/04	25.3 %
2	China	87,000,000	1,288,307,100	6.8 %	CNNIC June/04	10.9 %
3	Japan	67,677,947	127,853,600	52.1 %	Nielsen//NR Nov/04	8.3 %
4	Germany	46,455,848	82,633,200	57.1 %	Nielsen//NR Nov/04	5.9 %
5	United Kingdom	35,309,534	59,595,900	58.5 %	Nielsen//NR Nov/04	4.4 %
6	Korea (South)	30,670,000	49,131,700	62.4 %	KRNIC June/04	3.8 %
7	Italy	28,610,000	57,987,100	49.3 %	C.I.Almanac Dec/03	3.6 %
8	France	24,953,347	60,011,200	38.7 %	Nielsen//NR Nov/04	2.9 %
9	Canada	20,450,000	31,846,900	64.2 %	C.I.Almanac Dec/03	2.6 %
10	**Brazil**	**18,660,650**	**179,383,500**	**10.8 %**	**Nielsen//NR Nov/04**	**2.4 %**
11	India	18,481,000	1,088,056,200	1.7 %	ITU Dec/03	2.3 %
12	Spain	14,095,951	41,895,600	34.2 %	Nielsen//NR Nov/04	1.8 %
13	Australia	13,410,824	20,275,700	65.9 %	Nielsen//NR Nov/04	1.7 %
14	Mexico	12,250,000	102,797,200	9.8 %	ITU Sep/04	1.3 %
15	Taiwan	11,602,523	22,689,300	51.1 %	Nielsen//NR July/01	1.5 %
16	Netherlands	10,806,328	16,254,900	66.5 %	Nielsen//NR June/04	1.4 %
17	Poland	8,970,000	38,158,100	23.5 %	ITU Dec/03	1.1 %
18	Malaysia	8,692,100	25,581,000	34.0 %	ITU Dec/03	1.1 %
19	Indonesia	8,000,000	221,777,700	3.6 %	ITU Dec/02	1.0 %
20	Sweden	6,722,559	9,010,700	74.6 %	Nielsen//NR Nov/04	0.8 %
TOP 20 Countries		671,315,561	3,816,518,100	17.6 %	IWS - Jan./05	83.9 %
Rest of the World		128,724,937	2,573,629,387	5.0 %	IWS - Jan./05	16.1 %
Total World - Users		812,931,592	6,412,064,319	12.7 %	IWS - Jan./05	100.0 %

APPENDIX 3: TOP 22 COUNTRIES WITH THE HIGHEST INTERNET PENETRATION RATE

#	Country or Region	Penetration (% Population)	Internet Users Latest Data	Population (2004 Est.)	Source and Date of Latest Data
1	Sweden	74.6 %	6,722,576	9,010,700	Nielsen//NR Aug./04
2	Hong Kong	72.5 %	4,878,713	6,727,900	Nielsen//NR Aug./04
3	United States	68.8 %	201,661,159	293,271,500	Nielsen//NR Aug./04
4	Iceland	66.6 %	195,000	292,800	ITU - Dec./03
5	Netherlands	66.5 %	10,806,328	16,254,900	Nielsen//NR Aug./04
6	Australia	65.9 %	13,359,821	20,275,700	Nielsen//NR Aug./04
7	Canada	64.2 %	20,450,000	31,846,900	C.I.Almanac - Dec/03
8	Switzerland	63.5 %	4,432,190	7,433,000	Nielsen//NR Aug./04
9	Denmark	62.5 %	3,375,850	5,397,600	Nielsen//NR June/02
10	Korea, (South)	62.4 %	30,670,000	49,131,700	KRNIC - July/04
11	Singapore	61.0 %	2,135,000	3,499,500	ITU - Sept/04
12	United Kingdom	58.5 %	34,874,469	59,595,900	Nielsen//NR Aug./04
13	Liechtenstein	57.6 %	20,000	34,700	CIA - Dec/02
14	Germany	57.1 %	47,182,668	82,633,200	Nielsen//NR July/04
15	Bermuda	54.2 %	34,500	63,600	ITU - Dec/03
16	Japan	52.2 %	66,548,060	127,853,600	Nielsen//NR July/04
17	Croatia	52.1 %	2,318,240	4,453,700	ITU - Sept/04
18	New Zealand	52.0 %	2,110,000	4,059,900	ITU - Dec/03
17	Taiwan	51.1 %	11,602,523	22,689,300	Nielsen//NR June/01
20	Faroe Islands	50.9 %	25,000	49,100	CIA - Dec/02
21	Finland	50.7 %	2,650,000	5,231,900	ITU - Dec/02
22	Norway	50.0 %	2,288,000	4,577,500	C.I.Almanac - Dec/03
TOP 22 in Penetration		62.1 %	468,840,669	754,384,600	IWS - Sept.30/04
Rest of the World		6.1 %	344,090,923	5,582,313,287	IWS - Sept.30/04
Total World - Users		12.7 %	812,931,592	6,390,147,487	IWS - Sept.30/04

NOTES: (1) Only countries with a Penetration Rate higher than 50% qualify for this list. (2) Internet Penetration Statistics were updated on September 30, 2004. (3) Demographic (population) numbers are based on the data contained in gazetteer.de. (4) The most recent usage information comes from data published by Nielsen//NetRatings , ITU and other research sources, for definitions please read the surfing guide. (5) Data from this site may be cited, giving due credit and establishing an active link back to InternetWorldStats.com .

APPENDIX 4: GUIDING QUESTIONS FOR PEOPLE INTERVIEWED

From Juan Maria Segura, Master of Arts (c) in Public Policy
Harris School of Public Policy Studies
University of Chicago

To

Date February 25th, 2005
Topic Guiding questions for the paper of *'Electronic Voting and the Brazilian Experience'*
Course: Managing high performance government
Professor: Rowan Miranda

---

1. What are the main components or different parts of an electronic voting system? Consequently, what are the different types of industries involved?

2. What is the most vulnerable part of this system? Was any significant improvement on reliability over time on it?

3. Is the industry currently well developed and competitive? Is cost structure easy to understand? Is the pricing process transparent?

4. Is electronic back up of an election trustworthy? What are the many ways or means in which an election result can be safely storage?

5. Are bottlenecks of the system coming more from the technology side or from the stage of implementation?

6. How time consuming is implementation? In what ways, other than by doing, can it be reduced?

7. In general, do government support or not the adoption of these technologies, the implementation of these changes? What is the role played by political status quo?

8. Are basic operational facilities already in place for the adoption of electronic voting?

9. Are political costs of a failure a disincentive for its adoption?

10. Is the digital divide a strong impediment to extend the use of electronic voting systems across the board?

11. Besides its apparently benefits in terms of security and speed, can overall efficiency be gained? Is the cost-benefit analysis a useful tool to decide whether to adopt it or not?

APPENDIX 5: SUMMARY OF CLASS PRESENTATION

Why this case?

- Because of what Brazil means…
  - Size (5th most populated; 8th bigger)
  - Poverty (Gini 61; 30Mn illiterates)
  - 'New' Democracy (regained in 1988, but struggling)
- Because of what e-voting may offer…
  - Efficiency and effectiveness (more and better with less)
  - Transparency (more, and more public)
  - Participation tool/channel (passive to active)
- Because of how a HP should look like…
  - Attractive (given 'perfect storm' diagnosis)
  - Replicable (given Brazil complexity)

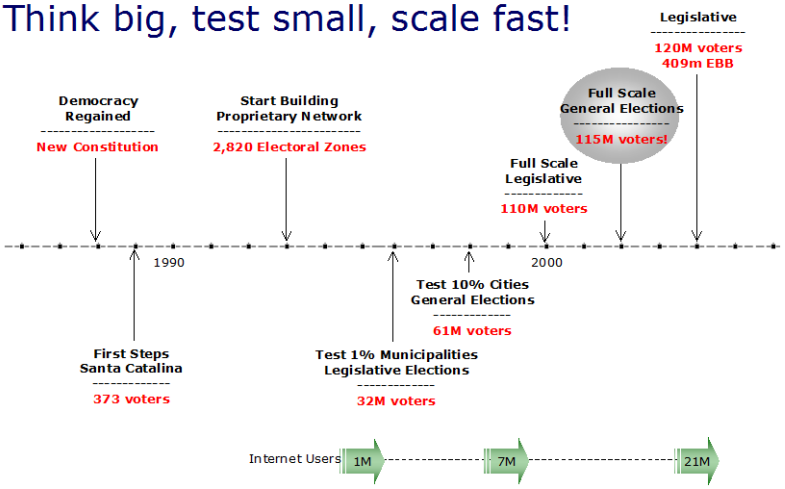
High Performance Government
- Professor Rowan Miranda -

- 2 -

Summary of Paper
- Juan Segura -

Implementation

- Think big, test small, scale fast!



High Performance Government
- Professor Rowan Miranda -

- 5 -

Summary of Paper
- Juan Segura -

BIBLIOGRAPHY

- Abramson, Mark A. and Morin, Therese L. *"E-Government 2003"*. Maryland, USA. Rowman & Littlefield Publishers Inc., 2003.
- Castells, Manuel. *"La era de la información, economía, sociedad y cultura. Volumen I: La sociedad red"*. México City, México. Siglo Veintiuno Editores, 1999.
- Castells, Manuel. *"La era de la información, economía, sociedad y cultura. Volumen II: El poder de la identidad"*. México City, México. Siglo Veintiuno Editores, 1999.
- Dutta, Soumitra, Lanvin, Bruno y Fiona, Paua. *"The Global Information Technology Report 2003-2004"*. World Economic Forum, 2004.
- Geer, Sean. *"Internet"*. London, UK. Profile Books Ltd., 2000.
- Hague, Barry N. and Loader, Brian D. *"Digital Democracy. Discourses and Decision Making in the Information Age"*. London, UK. Routledge, 1999.
- Hayward, Allison. *"e-Politics, using the internet to participate in politics and interact with your government"*. Indiana, USA. Sams Publishing, 2000.
- Holmes, Douglas. *"@.Gov, e-business strategies for government"*. Maine, USA. Nicholas Brealey Publishing, 2002.
- Holzer, Marc y Seang-Tae, Kim. *"Digital Governance in Municipalities Worldwide: An Assessment of Municipal Web Sites Throughout the World"*. New Jersey, USA. National Center for Public Productivity, 2003.
- Morris, Dick. *"Vote.com. How big-money lobbyists and the media are losing their influence, and the internet is giving power back to the people"*. California, USA. Renaissance Books, 1999.
- Shane, Peter. *"Democracy Online; The prospectus for political renewal through the internet"*. New York, USA. Routledge, 2004.
- Simons, Leslie David et Al. *"Democracy and the Internet: Allies or Adversaries?"*. Washington DC, USA. Woodrow Wilson Center Press, 2002.