

# E-Voting: The State of the Nations

By Kristine Grow



Thanks to the 2000 presidential election in the United States, *butterfly ballot* and *hanging chads* are dirty words. The inaccuracy of such voting technology may taint U.S. citizens' faith in the voting system for quite some time.

But ballot design is just one facet of the complex issues surrounding voting, both in the United States and in democracies around the world. Preserving clean voter rolls is a continuous challenge. Maintaining antiquated voting machines creates additional difficulties. Public lack of understanding of voting processes compound the technical issues. In addition, government regulations -- such as the Motor Voter Act and the Americans With Disabilities Act in the United States -- while well-intentioned, require significant changes to existing processes and technologies.

Revising policies, implementing new technologies and initiating comprehensive educational efforts are staggering undertakings. But election officials are welcoming the public's recent attention to the issues and support for reform, which is helping officials achieve some of the results they've been striving for over the past several years.

## Process Fundamentals

There are four fundamental components to the voting process: registration, verification, recording and reporting. While recent attention has been on vote recording, each component is critical to ensure that every citizen can cast one vote -- and only one vote -- and that each vote is counted.

In many democracies around the world, the voting process is centrally controlled by a government agency, which makes policies, chooses technologies and then implements policies and technologies throughout the nation. In the United States, however, the mechanisms for each stage of the process are the responsibility of the individual counties. Lack of centralized control makes it difficult to roll out new systems and practices statewide or nationwide.

"The challenge in the United States is that we do not have a general election," states Barry Lurie, managing principal, public administration, Unisys. "We have 55 general elections that happen on the same day. And they all happen differently."

In a November and December 2000 survey by research firm [Gartner](#) (Stamford, Conn.), senior election officials in 40 of the largest voting jurisdictions in the United States unanimously agreed that reform of the election process must be a top priority. Who oversees that reform and how it is conducted are issues yet to be settled, but many states do not believe they can afford to wait.

Says Lurie: "Postponing a move to embrace new voting processes carries three political risks: the embarrassment risk, of being the next Florida; the patriotic risk, of voters beginning to question the very foundation of the republic; and the voter disenfranchisement and disinterest risk, which could mean lost votes for political office seekers and legislation."

As a result, many states have already launched voting initiatives. But they're not starting with bleeding-edge technologies such as Internet voting, which still requires infrastructure and security refinements before it will be viable, say experts. In most cases, states are beginning with the basics, such as sanitizing their voter data.

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## Registration and Verification

Clean voter data is not just a U.S. concern, says Dhimant Desai, international program manager for Unisys. Voter registration is a challenge in many countries, with frequent instances of voter turnout being higher than the number of registered voters. Voter rolls must regularly be sanitized of deceased citizens, felons who have lost their right to vote and citizens who have moved.

One approach gaining popularity internationally is the use of biometric solutions, which match voter identification with a fingerprint, for example. Costa Rica, one of the oldest democracies in Central and South America, issues a voter identification card that includes a photo and a bar code that stores the data of two

fingerprints from the voter. This card is the primary means of identification, and is used for everything from voting, to social security and driver identification, to buying and selling property.

"The ID is critical to doing many things within Costa Rica," states Fernando Viquez, executive director of the Supreme Tribunal of Elections for Costa Rica. "Because of this, we began evaluating solutions in 1995 that would allow our citizens to get their ID in just two or three days rather than three or four weeks, and that would use more up-to-date, secure technology."

Unisys implemented Costa Rica's ID card solution with biometric technology in 1998, complete with back-office systems to process and store the data. Citizens apply to receive their new card when their existing cards expire. Costa Rica expects to have 2 million voters using the card by the February 2002 elections.

"The card will also be the basis for an e-voting solution," Viquez explains. "We are conducting feasibility studies now, and expect to have an e-voting plan before December 2002."

Desai of Unisys points out that adoption of such a solution in the United States is not likely in the near future. "While in other countries the voter ID is the primary source of identification, in the States it's the driver's license," he comments. "Also, citizens express more of a concern over the protection of their privacy in the United States than in other countries."

Instead of biometrics, U.S. election officials may look into integrating voter registration data centers with databases of other institutions, such as the Department of Public Health to automatically purge voters who are deceased, or the Department of Motor Vehicles to automatically update records of voters when they move.

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## Recording and Reporting

Many of the devices used today for recording votes are under heavy fire from election officials, especially in the United States. Lever machines and their replacement parts have not been manufactured since the 1980s, making them difficult to maintain. Many states are moving to make outdated technology, such as punch-card ballots, illegal. Taking their place are devices such as direct-record electronic machines, which use technology similar to automated teller machines to record votes, and optical scan devices, which require voters to mark ovals with a pencil or special pen and feed the ballot into an electronic reader.

One country that actively sought a reliable electronic voting solution is Brazil. Minister Carlos Velloso, president of the Superior Electoral Court, stated in his installation speech in December 1994, "Fraud will be banned from the Brazilian electoral process the very moment we eliminate the ballot paper, the ballot boxes and the ballot-box maps by voting through electronic means."

After much researching of solutions, Brazil asked Unisys to implement an electronic ballot box, a small, self-contained computer and printer that stores voting data. The box also includes a renewable power source and battery backup, so that votes can't be lost because of power failure.

"The boxes are standalone devices that register each vote as it is given," says Paulo Camarão, technology director for the Brazilian Supreme Electoral Court. "When the voting is completed, polling place representatives print the results of each box and immediately issue those results as the official tally for that location. They send a disk from each box to a counting location. Computers read the disks and transmit the totals to a central office. When all votes are totaled by a central computer, voting officials disseminate the official results through the media and manually post those results on the Internet."

Approximately 77,000 ballot-box units were used in the 1996 elections, recording the votes of about 33 percent of the country's population and dramatically reducing the failure index of voting results. Today, every voting location in Brazil uses the ballot boxes, which operated with a failure index of less than 1 percent in the 2000 elections.

In other locations around the world, officials are working to implement end-to-end systems to manage voting data from ballot construction to final reporting. For example, the state of [Minnesota](#) in the United States has worked with Unisys and others to design its own voter and election management system (VEMS). With this system, candidate information may be housed in a central repository kept by the office of the secretary of



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state. The state's 87 counties may access that repository through a secure Internet connection. Citizens cast votes locally on the county's mechanism of choice. A vote tabulation system collects the votes from the machines at the end of the day, which feeds the results into a separate Election Night Reporting System. The Election Night Reporting System then counts and tabulates the votes, and posts the results to a Web server, allowing citizens, the media and candidates access to data via the Internet.

VEMS also contains voter registration functions that will make it easier for election administrators to keep voter registration information accurate and secure. As a result, individuals who register to vote will be added to the voter registration system database more promptly. In the future, it may even be possible to enter voters into the database when the voter fills out an application at the polling place on Election Day.

"The system will enable true statewide election management," says Mary Kiffmeyer, secretary of state for Minnesota. "All information about a candidate will be uniform from beginning to end, and authorized users will be able to access the information regardless of which office they are in." This is an important capability, since the one-time, uniform entry of candidate information eliminates unnecessary work and reduces the potential for error in all stages of election administration.



Using technology to enable end-to-end statewide election management: Mary Kiffmeyer, secretary of state for Minnesota.

While counties still choose their own vote-recording systems, Minnesota officials are encouraging counties to implement new technologies. The state has established a matching grant account, out of which it matches each dollar that local governments commit toward the purchase of new voting equipment.

Desai of Unisys advises that as election officials such as those in Minnesota evaluate new technology, they also evaluate existing legislation. "Technology and policies go hand in hand," he says. "In many countries, the election laws and bylaws are historical. But with new technologies, these laws do not apply as cleanly. For example, some of these laws do not recognize the electronic signature. New legislation has to be passed."

Revising legislation can also help reduce complexities of the process. "In our state, we worked to simplify and add clarity to our election laws," Minnesota's Kiffmeyer says. "The more complicated or ambiguous the laws are, the more room there is for errors."

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## A Foundation of Education

A great deal of planning, time and resources go into the implementation of a voting-reform solution. Experts advise that countries give equally as much attention to training citizens and representatives on how to take advantage of the system's benefits.

"In many jurisdictions the personnel are ill-trained and have a lack of understanding of the fundamentals of voting," says Terry Madonna, chair of the government department of [Millersville University](#) (Millersville, Pa.). "This leads to inadequate explanations of how to use devices."

Paper	12%	10%	7%	4%
Mechanical Lever	15%	10%	5%	0%
Punch Card	18%	12%	5%	0%
Optical Scan	40%	50%	55%	55%
Electronic Voting	9%	14%	17%	15%
Internet Voting	-	2%	10%	25%

2000	2004	2008	2012
<p>Based on a survey of senior election officials in 40 of the largest voting jurisdictions in the United States, research firm Gartner projects that paper-ballot, mechanical-lever and punch-card systems will be phased out in their regions by 2012.</p> <p style="text-align: right;">Source: Gartner, 2001</p>			

To combat this, the state of Minnesota provides certification for local polling officials, as well as up-to-date training programs, manuals, booklets and other materials. This will be key to the successful use of VEMS, through which these officials may download candidate data. The special training and attention also gives officials a greater sense of empowerment and enables them to provide better instruction to citizens.

When Costa Rica instituted its new voter ID card, it launched a communications campaign to educate its citizens about the benefits of the card and how and when to apply for it. The campaign comprised newspaper and television advertisements, as well as TV news bulletins.

In Brazil, the Superior Electoral Court assigned a separate communications group to conduct both national and regional campaigns concerning its new electronic ballot boxes. Tactics included advertisements on TV and radio and in newspapers; fliers; informational TV spots; and nationwide tours to let the citizens try their hands at using the new ballot boxes before election day.

Desai of Unisys says that such campaigns are key to overcoming voter apathy and skepticism. "In some countries, citizens are not used to trusting the government," he confides. "They are used to hearing about elections failing and voting fraud. This can be partly overcome through a public education campaign."

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### **Toward Internet Voting**

The 2000 presidential election in the United States is over. The next presidential election will not occur until 2004. But Lurie of Unisys reveals that voting reform is a key issue for many U.S. representatives; more than 40 election-reform bills have been proposed in Congress. With congressional elections looming in 2002, there may be increased pressure to see some sort of reform before the end of this year.

In other countries, particularly those where the voter ID card is the primary source of identification, Desai feels that it won't be long before smart cards proliferate. While a voter ID card houses only information that enables a citizen to vote, smart cards can hold additional data, including medical insurance and health-related information, as well as driver's license information. He cites the example of Malaysia, which has already implemented a smart card that includes information for national identification, driver's license, healthcare and immigration status.

"Many nations are looking at the smart card as the next logical step for voting registration, and for the other components of the voting process," says Desai. "Because of the level of security provided by the technology, these cards will be an important step toward realizing true Internet voting when the infrastructure is in place.

"Practically speaking," he continues, "Internet voting cannot succeed without some form of biometrics technology deployed. The actual vote recorded must be supported with a strong mechanism for authenticating that it is actually the registered voter casting the ballot. In addition, the solution must protect each voter's record of choices from a hacker attack on the system during an election."