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Debate Continues over Security, Reliability of Voting Technology
Many states, localities may turn to paper ballots for November 4 elections

An election worker sets a voting machine as a woman waits to vote in Delaware.

By Cheryl Pellerin
Staff Writer

Washington - - Even in a nation that has held elections for more than 232 years, advances in voting technology spark debates about the best designs for ballots and the most reliable, secure ways to collect and count votes.

Those questions will not be settled before November 4, the date of the next U.S. presidential election. And the questions - - including whether the federal government rather than individual states should regulate voting technology, whether national standards for voting machines should be mandatory and whether one technology should be adopted nationwide - - do not lend themselves to quick answers.

American voting began in the late 1700s with paper ballots that were not secret, according to the nonprofit Web site ProCon.org, and evolved over time - - to the secret paper ballot in 1888 that originated in Australia, the lever voting machine in 1892, the optical scanner in 1962, the punch card in 1964 and the electronic voting machine in 1974.

In the United States, states and localities administer elections through about 10,000 jurisdictions at the county level or below, according to Eric Fischer, senior specialist in science and technology at the Congressional Research Service, in *Voting Technology in the United States: Overview and Issues for Congress* (2001).

VOTING TECHNOLOGIES

The federal government does not set standards for voting machines, Fischer said, and all but a few states use more than one kind of voting technology:

• Paper ballots were the only technology available during the first 100 years of American voting; 1 percent of voters used paper ballots in the 2004 presidential election.

• Mechanical lever machines allow a voter to choose candidates listed on a posted ballot by pulling a lever for each candidate choice. A counting mechanism records the votes and poll workers read the numbers. In 2004, 14 percent of voters used lever machines.

• Punch cards let a voter mark choices by punching holes in a paper computer card that is later fed into a computer reader to record the vote. In 2004, 13 percent of voters used these systems.

• Optical scanners, technology used for decades to score standardized tests, provide voters with a paper form and special writing instrument to fill in a box or oval or complete an arrow for each candidate choice. A computer senses and records the marks. In 2004, 35 percent of voters used this system.

• Electronic voting, or direct recording electronic (DRE) technology, allows a voter to choose candidates from a ballot posted on the voting machine or displayed on a computer screen. Voters make choices by pushing a button or touching a screen, then push a "vote" button to store the vote on a computer. In 2004, 29.5 percent of voters used DREs.

Internet voting is a fledgling form of electronic voting that in the United States is limited to demonstration programs.

Nepal Election Commission officers pack electronic voting machines for transport to polling centers in Katmandu.

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WAKE-UP CALL IN 2000 ELECTION

During the 2000 presidential election between George Bush and Al Gore, problems with punch-card voting systems in Florida and the subsequent 2000 Supreme Court case *Bush v. Gore*, brought public attention to voting technology.

Two years later, Congress passed the Help America Vote Act (HAVA) to improve voting systems by, among other things, authorizing $3.9 billion in federal funds to replace punch-card systems and lever machines with DREs or optical scan systems. HAVA also mandated that polling places have at least one handicap-accessible voting device such as a DRE.

In 2003, computer security experts Avi Rubin and Dan Wallach performed a security analysis of a touch-screen model of a DRE machine based on source code they found on the Internet. Their analysis showed several potential vulnerabilities and inspired other computer scientists to join the debate over the use of electronic voting machines in federal elections.

"What people have managed to show is that there are indeed certain vulnerabilities to DRE systems," Michael Shamos, professor of computer science at Carnegie Mellon University in Pennsylvania, said during a recent panel discussion in Washington on voting technology, "but no one has ever been able to exploit those vulnerabilities in an election."

BACK TO PAPER

The main issue, according to a 2005 overview of electronic voting by the Institute of Governmental Studies at the University of California-Berkeley, is that if the record of votes cast exists only in digital form in a touch-screen system, there is no independent way to confirm the votes were recorded accurately and thus no way to conduct a reliable recount.

Overall, in the nation's 170,000 polling places, there has been a shift from predominantly using manual systems (lever machines, punch cards, paper ballots) to computer-based systems (optical scan and DREs) in federal elections.

But according to news reports, as a result of the controversy over DRE machines, in the 2008 election many states might use optical scan paper ballots that require voters to fill in ovals with a pen.

"It will be interesting to see what happens when generations change," Fischer said during the panel discussion. "Obviously, the people who have grown up with computers are much more comfortable with them."

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