

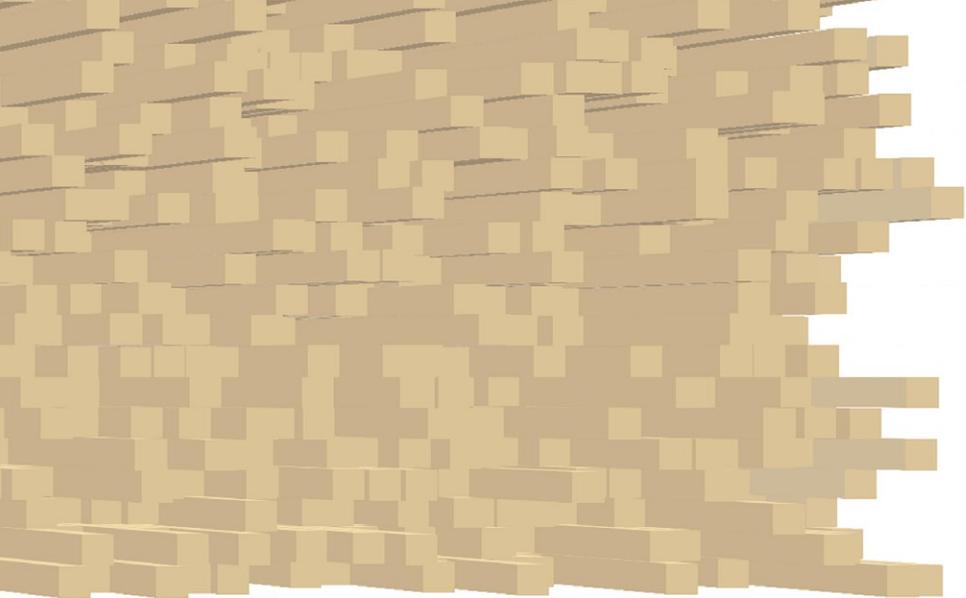
# Rocking the Vote

By Elisabeth Nadin



George Caleb Bingham's 1852 painting *The County Election* shows a typical election-day scene in Missouri. At the time, only white male property owners had the right to vote, and they did so by voice, recorded in public. Alcohol flowed freely, and candidates or their representatives could solicit votes just before they were cast. Today, campaigning is prohibited within 300 feet of a polling place.

Painting courtesy of the Saint Louis Art Museum.



“Every vote counts” is a familiar motto, but how true is it? Certainly the 2000 presidential election swung on a handful of votes in Florida. But that handful also spurred nationwide protests as more and more vote-counting errors were uncovered, and people became painfully familiar with absurdities of the system such as hanging and pregnant chads. Even then, however, advances in voting technology were under way. That year saw the first ballots cast online—before the 2000 general election, participants could vote over the Internet in Arizona’s Democratic primary and in a straw poll in the Alaskan Republican primary. Soon after, the first online ballots ever counted in a presidential election were cast by 84 citizens overseas in a government-sponsored endeavor to the tune of \$6.2 million. If Michael Alvarez, Caltech political science professor and codirector of the Caltech/MIT Voting Technology Project (VTP), has his way, Internet voting will eventually be an option for the rest of us. But there’s a big hill to climb before we get there.

The VTP was initiated in December 2000 by former Caltech president David Baltimore and former MIT president Charles Vest “to prevent a recurrence of the problems that threatened the 2000 U.S. Presidential Election.” Since then, Alvarez and his VTP colleagues have uncovered significant flaws in our current voting system and, in some of the remedies already being implemented, threats to future elections far greater than hanging chads. Alvarez also thinks that Internet voting holds the best promise for reaching citizens who historically can’t or don’t vote on Election Day—“I’d love to be able to vote online. I like to vote as simply and quickly as possible. I have a six-year-old, my wife works. Many times we’re traveling on election day,” he says. But for now, it’s simply not an option.

Countries like Switzerland and Estonia are overtaking the United States as we stall on the path toward ubiquitously available online voting. There are several reasons for this, says Alvarez.



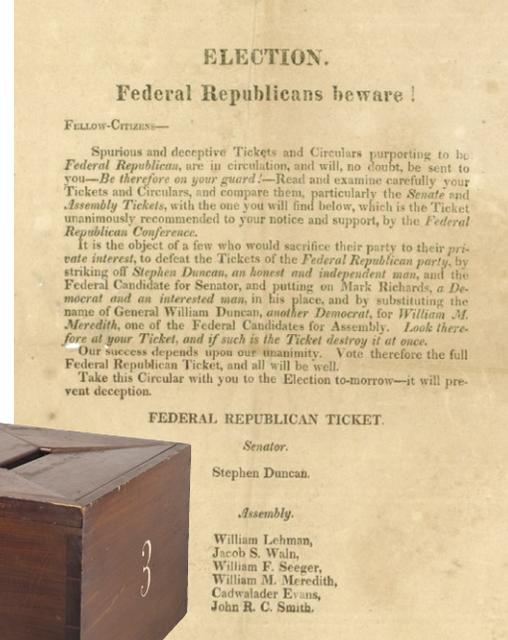
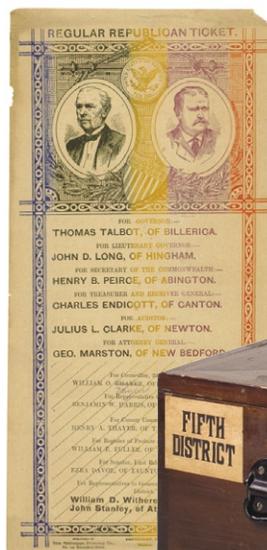
Photo by William L. Bird, courtesy National Museum of American History.

**Miscast and miscounted Florida ballots in the 2000 election set off a flurry of protests around the country.**

*Point, Click, and Vote: The Future of Internet Voting*, published by Alvarez and his colleague Thad Hall of the University of Utah shortly before the 2004 election, decries the shabby legacy of voting reform that has culminated in the haphazard introduction of electronic voting machines—which have failed time and again—without any real testing. Instead of continuing in this tradition, Alvarez advocates a rigorous, scientific implementation of Internet voting, just like clinical trials for medical advances. Citizens overseas or college students away from home would form control (traditional vote) and treatment (Internet vote) groups. If these votes were successfully cast and counted, the experiment could be expanded to the scale of statewide elections, with some counties allowing Internet voting and others not. The eventual aim would be, for any citizen who wants it, the option to vote from any computer anywhere.

Among the questions raised in the aftermath of the 2000 election was whether or not our country needs to change the way people vote. Another presidential election is upon us, with primaries even nearer. How effective are the changes that were made? Can we achieve Internet voting? And what, after all, is the most foolproof way to cast a vote?

**Voting-related antiquities hint at the fraud that tainted early elections. From left to right: The 1878 official ballot of the Regular Republican Party was boldly colored to distinguish itself; a wooden ballot box from 1870—these often hid compartments stuffed with fake ballots; and a Vermont circular from 1816 that warned of “spurious and deceptive” party tickets.**



### OUR VOTING HISTORY

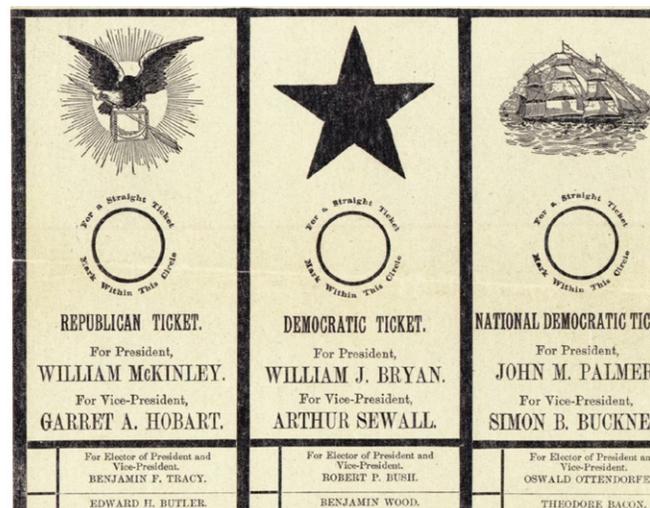
The first votes in the United States were cast in a fairly crude manner, and as more and more people won the right to vote, systems to accommodate them grew increasingly cumbersome. Indeed, the 200-odd years since the first votes (exclusively by white men who owned property) have been plagued by fraudulent elections and slipshod progress. “At various times, poor people, women, African Americans, and younger Americans have been kept from voting by legal or extralegal measures,” says Alvarez. Those early votes were either spoken and recorded in public, or written on paper ballots and slipped into boxes in public. Ballots were printed and distributed by political parties that listed just their own candidates, and had to conform to specifications that varied from state to state. Not only did the color of your ballot immediately give away your vote, but parties often printed fake ballots to trick voters. The potential for confusion and fraud was high.

Election officials called for improvements after the Civil War as the voting population swelled

with immigrants and black men, who had won the right to vote (though they and other poor men were often denied this right by restrictions such as taxes and tests). The number and variety of ballots issued by political parties had grown so unmanageable that state governments finally wrested the logistical duties from the competing parties. The blanket ballot was introduced, listing the names of all the candidates, and ballot boxes sported new security features. Voting finally became a private affair with the introduction of the booth, and ballots featuring party symbols meant even illiterate men could vote. But intimidation and manipulation often reigned in the political scene, despite the hiring of poll watchers by political parties.

By the early 1900s, multiple candidates and referenda made for lengthy and complex ballots. The electorate practically doubled in 1920 when women won the right to vote under the 19th Amendment, thus justifying local government investment

**Right: The blanket circular, listing all candidates for office regardless of party, was developed in Australia in the 1850s but only reached the United States in 1888. Voters marked their ballot in the privacy of a booth. Far right: Two election-scene operatives try to rescue their booth from a surprise attack in 1887.**

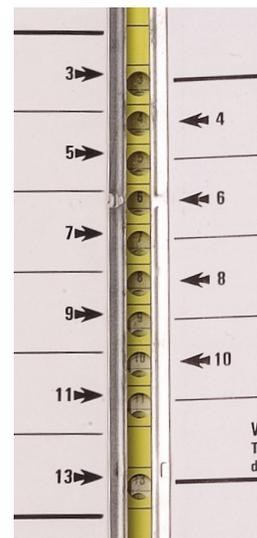


in the new gear-and-lever voting machine. In the mid-1960s, protests against discriminatory voting practices shook Congress into action and, by the early 1970s, barriers to voting such as restrictions requiring that voters have fathers and grandfathers who had voted, literacy tests, and whites-only primaries had finally been outlawed. In 1971, the 26th Amendment lowered the voting age to 18 for both state and federal elections, and the voting ranks swelled again with the enfranchisement of about 11 million new voters. This period also saw the dawn of the electronic age, which offered quick election returns via computer-read ballot systems. In the late 1960s IBM began selling its Votomatic, whose punch-card ballots are either processed by computer or counted by hand. By the early 1980s about half the American electorate was voting by punch card. (These machines were still in wide use when the 2002 Help America Vote Act (HAVA) decreed that they be phased out.)

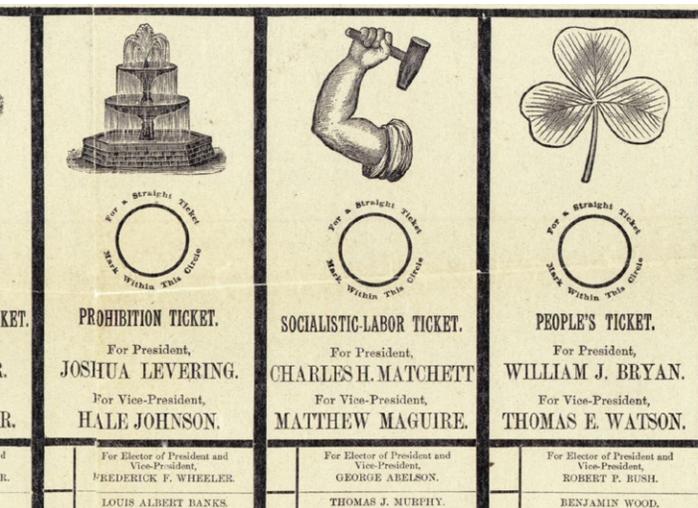
Then came the Florida fiasco. In most previous national elections, the margins of victory were large enough to mask the mistakes made by both voters and vote-counting systems. But the contest between George W. Bush and Al Gore was close—it came down to 537 out of six million votes cast in Florida. Incompletely punched ballots that could not be counted by machine, misaligned ballot cards with off-center punches, and a confusing “butterfly” ballot design—a single page of presidential candidates enlarged to two pages in one Florida county—revealed failures that sparked a wholesale pessimism about our voting system. Indeed, the VTP concluded that between four and six million votes were lost in the 2000 election, through a combination of faulty equipment, confusing ballots, problems with voter registration, and polling-place difficulties.

“Unfortunately, the field of election administration has not been known for developing and testing products in an orderly, systematic manner,” says Alvarez. “Many of the problems that occurred in Florida during the 2000 presidential election

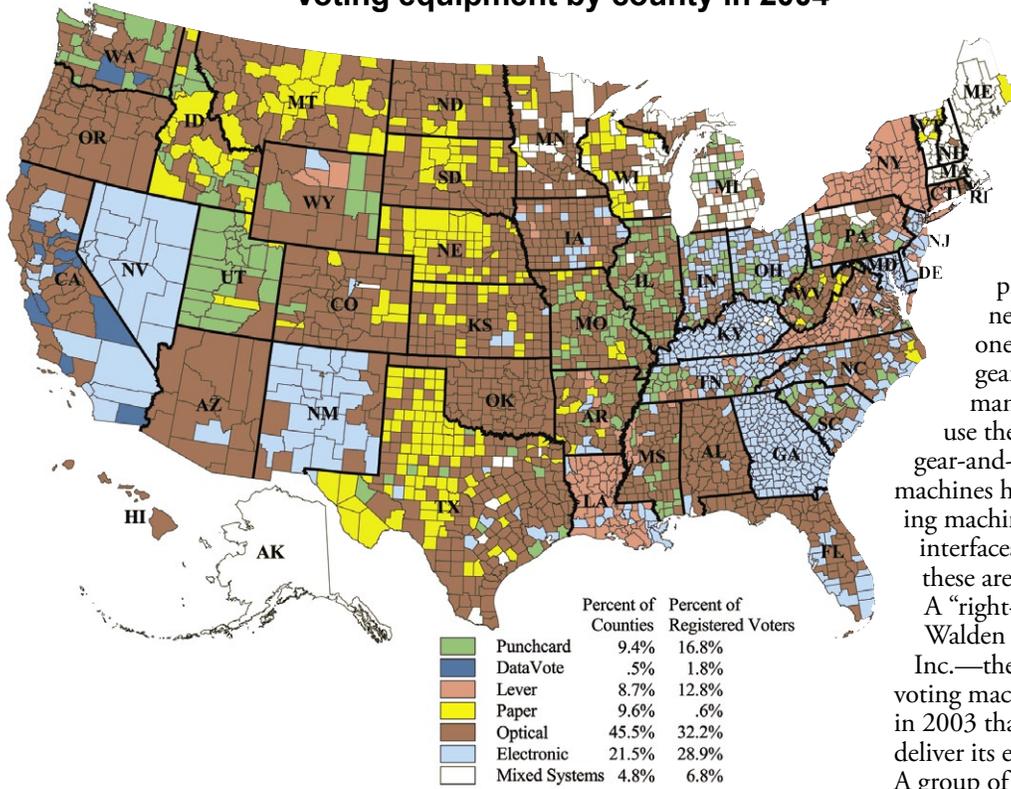
**Misaligned ballot cards with off-center punches were among the culprits blamed for the 2000 presidential election debacle. The Caltech/MIT Voting Technology Project estimates that up to six million votes were lost in this election due to a variety of registration and polling-place difficulties.**



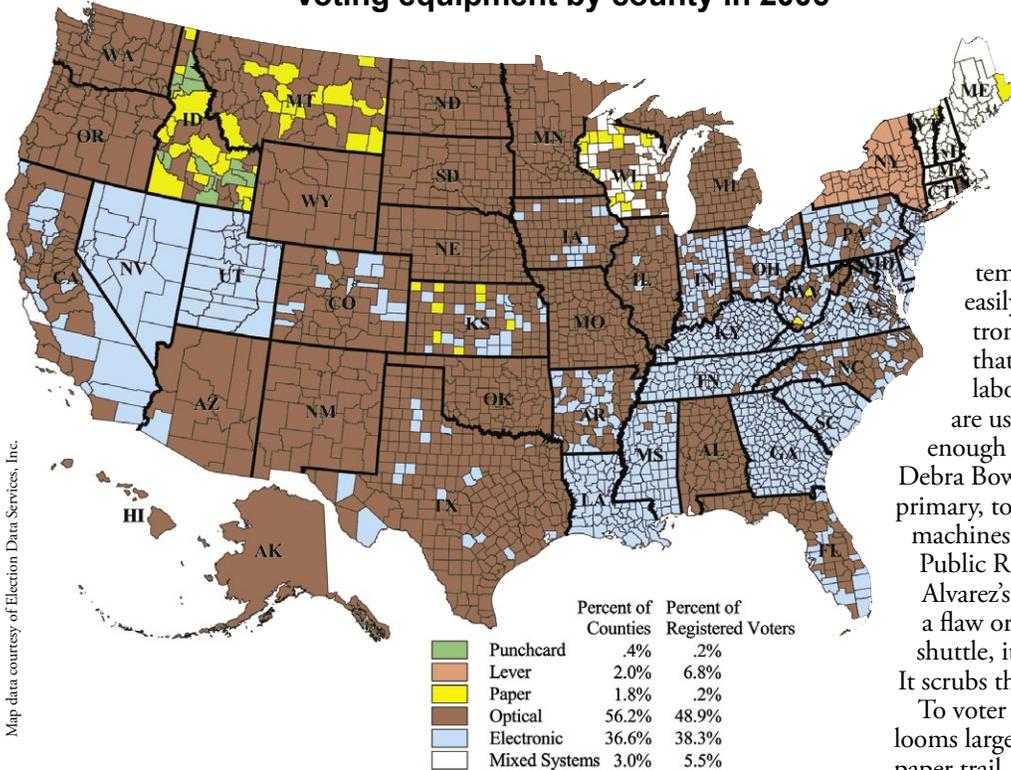
can be traced to lack of testing or failure to use the scientific method of investigation. Imagine, for instance, that the Palm Beach County election administrator had tested the butterfly ballot in a random sample of voters before using it on Election Day, and compared that group to a control group that used a more traditional ballot format. It is likely that the problems with the butterfly ballot design would have been revealed, and it would not have been used,” he explains. “Even today, after the 2000 elections illustrated the problems that voters have with almost every type of voting technology, from punch cards to optical-scan ballots, localities across the country are buying new voting technologies without conducting field tests to determine how well they will work. Florida passed election reform legislation in 2000 that allowed communities across the state to purchase optical-scan equipment, even though it has been asserted that optical-scan voting was the source of a tremendous number of voting errors in the 2000 presidential election in Georgia.”



## Voting equipment by county in 2004



## Voting equipment by county in 2006



Map data courtesy of Election Data Services, Inc.

A comparison of voting equipment in the 2004 (top) and 2006 (bottom) elections shows that states are seeking uniformity in their vote-counting systems. Most have chosen exclusively electronic machines (blue) or optical scanners of paper ballots (brown), but some states use mixed systems, and New York still relies on lever machines last manufactured 20 years ago.

## WHERE WE ARE NOW

Since 2000, the VTP and other organizations have uncovered major flaws in how we vote in this country. It's not that we don't try. But elections are poorly funded by states, leaving us with a patchwork of hundreds of voting methods. HAVA provided federal funds to states to get new voting systems and phase out old ones—it's been more than 20 years since gear-and-lever voting machines were last manufactured, and people actually still use them in New York. In most states, the gear-and-lever and Votomatic punch-card ballot machines have been replaced by electronic voting machines that directly record votes through interfaces like touch-screen or push-button, but these are fraught with their own set of problems. A "right-wing conspiracy" was invoked when Walden O'Dell, chief executive of Diebold Inc.—the primary manufacturer of electronic voting machines in the United States—declared in 2003 that he was "committed to helping Ohio deliver its electoral votes to the president next year." A group of Princeton University computer scientists subsequently demonstrated how malicious code could be installed in Diebold machines in

less than a minute to steal votes undetectably and pass viruses from machine to machine. Diebold responded that the scientists had used a two-generation-old machine whose security standards had been vastly improved. The *Los Angeles Times* reported in July that three of California's electronic voting systems—Diebold, Hart, and Sequoia—were easily hacked into by both physical and electronic means. The manufacturers replied that these hacks were made in unrealistic laboratory settings, while their machines are used in secure rooms. Still, the report was enough to prompt California Secretary of State Debra Bowen, just months before the February 5 primary, to prohibit the use of electronic voting machines until the flaws are fixed. In a National Public Radio report in August, she echoed Alvarez's main concern: "When NASA discovers a flaw or a potential safety concern in the space shuttle, it doesn't continue launching missions. It scrubs the mission and fixes the problem."

To voter watchdog groups, the bugaboo that looms largest in electronic voting is the lack of a paper trail, which leaves no possibility for vote verification and recount. "An electronic ballot is a secret from the voter who cast it!" is the mantra of Ellen Theisen, codirector of the voter advocacy group VotersUnite.Org. The organization keeps track of when and where and to what extent



**Touch-screen voting machines like this one by Diebold have been at the center of the electronic voting controversy. Many think the machines are easily hacked into; they also suffer electronic glitches, and they leave no paper trail.**

different electronic voting machines fail, and the list is dumbfounding: touch screens reverse voters' selections, Washington State, 2004; electronic voting machine presents invalid options, Hawaii, 2004; programming error fails to count votes—initial tallies show four times as many votes as voters—South Carolina, 2005; flawed ballot programming fails to count 432 votes, Arkansas, 2006, to name just a few of the numerous standouts. "Recording ballots electronically is a mistake," says Theisen. "Your official ballot is just the electrical charges in the computer. Voters cannot verify the vote that's counted because you can't verify the electrical charges." She argues that if these machines must prevail they should be used only if the cast vote is printed on paper, and that only those paper ballots should be counted. Unfortunately, in some machines retrofitted with printers, the ballot doesn't always match the vote that was cast, and more often than not the voter doesn't check the printout.

For Theisen, electronic voting poses too high a risk to election security. "Fraud is one of our traditions, and it's not going to stop. We have to do things in such a way that we can catch it or minimize it. That everything is counted correctly," she says. But the VTP is more concerned about the potential for mistakes. While electronics were only recently introduced for casting ballots, they've dominated vote counting for decades, typically as optical scanners of paper ballots. Each scanner is programmed anew for every election, raising valid concerns about errors. As Caltech political science professor, newly appointed chair of the Division of the Humanities and Social Sciences, and VTP codirector Jonathan Katz points out, things get complicated in a place like Los Angeles County, where a typical general election can have 3,000 different ballot forms—one for each combination of local races—written in seven different languages. While logistically complicated because the polling place needs to supply

**Don't trip! This photo of a polling place from the 2006 election shows just how susceptible electronic votes are in an insecure environment. One accident could wipe out a day's worth of votes.**





turned on less than three dozen ballots that were either invalidated or improperly counted the first time. Many ballots were thrown out because of comments and drawings in the margins—most of those were Vietnamese-language ballots. Tossing a vote for some doodles sounds silly, but there's a historical context for this decision: "In the 1800s, we regularly had vote buying in the U.S.," says Katz. "You would publicly cast your ballot, and I would pay you afterward. Now our ballots are void if there are stray marks, because they could possibly identify a voter." Internet voting would handily dispense with this snafu, but opponents to Internet voting wonder what would stop a politician from paying a citizen to cast an easy vote online from the privacy of their own home. Indeed, according to an ongoing study of vote fraud by the Justice Department, vote buying continues to be a tradition in rural areas, where local politicians offer \$5 to \$100 for an individual vote. In response to these concerns, Katz points to the same study, which, since its 2002 inception, has uncovered no evidence of *organized* fraud efforts. In fact, only 120 people have been charged so far, the majority of whom mistakenly filled out registration forms because they misunderstood—and thus violated—voting eligibility rules. These incidents speak to perhaps the biggest flaw in our voting system: the registration and voter verification process.

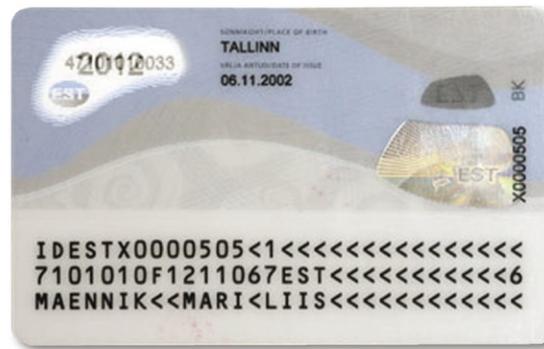
#### A CYBERSPACE SOLUTION?

Alvarez thinks the Internet holds the likeliest promise of easing voting problems in this country, including those surrounding registration. "In most states in the U.S. it's very difficult to determine whether you're even registered to vote or not," says Alvarez. "Yet you can file your taxes online." His research reinforces a long-standing view that the registration process is one of the key factors in keeping people from voting. HAVA required that states follow steps to verify the voters on their registration lists, including cross-checking voters' names with their states' motor vehicle records. According to *Point, Click, and Vote* coauthor Hall, in 2006 California's voter-registration database couldn't recognize surnames with hyphens or with spaces. "So think about Benicio del Toro—he would get kicked off immediately because he has a two-word last name," jokes Hall. "They were kicking off thousands of people a week." California eventually changed its voter verification rules, but this example reveals how unhitched voting is from other government functions. Somehow when you move, your driver's license will eventually track you, as will your car registration and your tax forms, but your voter registration never will. People become progressively alienated from voting when they have no easy way of checking where or even if they're registered to vote, and no idea where their precinct is.

Some countries have successfully implemented Internet voting, and their systems also track registered voters. In March, Alvarez and some of his VTP colleagues flew to Estonia to survey the world's first Internet votes cast in a parliamentary election. The demand for Internet voting in that country is marked by the number of people who use it, which tripled from 9,500 to more than 30,000 in the two years since the option was introduced. Alvarez and Hall credit technology penetration within a recent democracy as well as

**Although vote buying is a tradition in rural areas—and some voting watchdog groups think that Internet voting would make this easier—a 2002 Department of Justice study uncovered no *organized* voting fraud efforts.**





Images courtesy Estonian Citizenship and Migration Board.

**An Estonian ID card stores the carrier's information on a chip and sports various security features, including a microprint poem by Estonia's poet and politician Paul-Eerik Rummo.**

both public and governmental support. "People use technology in a way that you just shake your head," says Alvarez, citing old ladies texting on new Nokia pop-up phones, the ubiquity of wireless Internet throughout the country's capital Tallinn, and 80-somethings who opted for Internet voting.

To establish Internet voting, Estonia first passed a series of laws that provided a legal basis for it, including a legislative act allowing people to authenticate themselves to the government using a digital signature. (People in the United States can create a digital signature, too, but outside the military it can't be used to sign any documentation necessary to the voting process.) The rules for how Internet voting was to work, and the technology for using it, were set up independent of online voting. Now, an Estonian's ID card has her photo on it and a chip with her digital signature in it. She inserts her ID face up into any computer carrying a card reader that costs \$7 to install. She types in her password to enter the government portal. From there, she can pay taxes, register her car, renew her passport, or vote.

Internet voting is available between six and three days before the election. The vote can be changed anytime during this window but not afterward, except in person by paper ballot on Election Day, a vote that replaces any previous vote. A testimony to how well the system works is that only 32 people revoted on paper, Alvarez says. It's not a completely rosy picture, though—rural parties oppose Internet voting, because their constituents typically lack computer resources. The day after the election, Alvarez and Hall visited one of the parties that strongly championed the cause and asked what their supporters were like. "They had lots of wealthy urban voters who use the Internet all the time," says Hall. "They had clearly thought through the calculus of how this was going to benefit them."

As a small and new democracy lacking the scads of ballot measures we have in the United States,

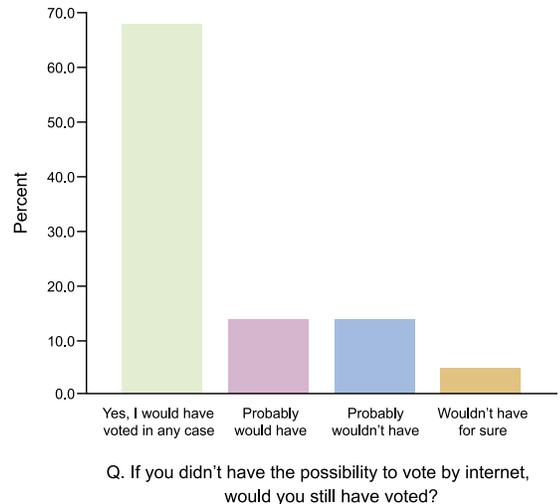
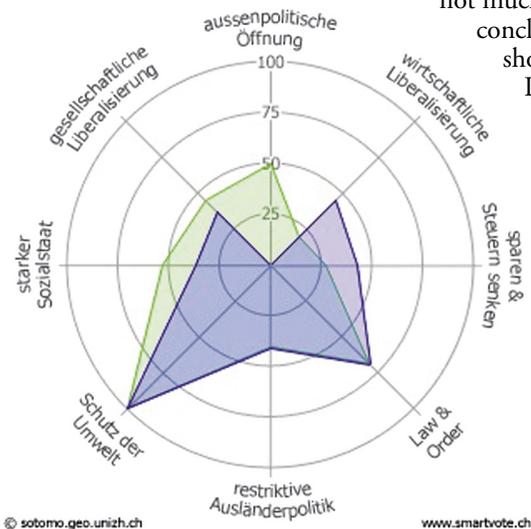
Estonia might not be our best model. Switzerland, an old democracy with heaps of initiatives and referenda, is a better bet. To learn a bit more about how the Swiss successfully implemented Internet voting on a limited scale, Alvarez invited a Swiss delegation to a voting symposium at Caltech in April. The Swiss initiated the experiment in three of their 26 cantons after a 1999 parliamentary request to study Internet voting feasibility, according to Max Klaus, a scientific officer in the Federal Chancellery. Each of the three cantons—Neuchâtel, Geneva, and Zurich—takes a different approach, but all are based on a government portal similar to the one in Estonia. Citizens can log on to check their insurance, taxes, and car registrations, and print out a receipt verifying that they voted.

Based on its success so far, the Swiss continue to spread Internet voting in their methodical fashion. Some fundamental groundwork helps: in contrast to the United States, Switzerland automatically registers her citizens to vote when they turn 18, and when they move, their registration tracks with them. The Swiss consider themselves tech savvy—65 percent have private Internet connections, and even more use it at their jobs. Furthermore, they appear to innately trust their government. There is no real voting secrecy—people can still vote by raising their hand in the town square. Government portals allow citizens to look up anyone's license plate number. They can be as politically active as they want, challenging or proposing laws through initiatives. But because the Swiss are asked to vote often and for a lot of things, voter turnout is historically low. Internet voting proponents hope the ease of Internet accessibility will change this. Postal voting was extremely successful after its introduction 10 years ago, increasing voter turnout by 20 percent in Geneva, for example, where 80 percent of voters quickly turned to voting by mail. So after federal law was amended to allow for Internet voting, a subset of postal voters was easily transposed

Ever the tech-savvy nation, the Swiss embrace Internet voting and have devised programs to encourage it. On the website [www.smartvote.ch](http://www.smartvote.ch), voters and politicians alike input their political views. The program generates a graphic showing the voter where his views (green field) overlap or diverge from those of his most closely matching candidate (purple field). It's then a quick link to cast the vote.

into cyberspace without reengineering the whole voting process.

In Geneva, 20 percent of voters now cast their ballots online, a large number that begs the question, "Does Internet voting change the political process?" Specifically, does it give one party an advantage over the other? According to Alex Trechsel, a Swiss professor of political science at the European University Institute in Florence, Italy, the answer is no. "There's a neutral effect of e-voting (Internet voting) that has been confirmed by multivariate analyses looking at all of the data," he says. He cites specifically the September 2004 Geneva referenda and the Estonia parliamentary election. "E-voting would not have changed the political result," he says. It's also shown little impact on turnout so far. "We found a small effect, but let's be honest—this effect is not huge," he says. "We asked occasional voters, who said they vote from time to time, and those who are declared abstentionists, whether the introduction of Internet voting made them reconsider. And the simple answer to that is a little bit, but not much." He adds an important conclusion, at least for now: "This should serve to remind us that Internet voting will certainly not be any panacea for increasing turnout." The recent French presidential election punctuates that statement—with no option of Internet voting, a record 85 percent of the voting population turned out.



**This survey of Internet voters in the 2007 Estonian parliamentary election suggests that the Internet will play a minimal role in increasing voter turnout. The majority would have voted anyway, by other means.**

#### POTENTIALS AND PROBLEMS

What can Internet voting offer that we don't already have? Alvarez lists several possibilities, including flexibility, long-term savings, and service options. Every computer with an online connection becomes a potential voting booth, erasing inconveniences like bad weather, long lines, and polling place mix-ups. This is handy for the voter who can't take time off from work to vote, or for the overseas voter who has to work out the logistics of getting and mailing a ballot. It's also cheaper for the entire electorate in the long run, because running an election from the polling place is a logistical nightmare. "Electronic voting tabulation and counting has no standard procedure," says Alvarez. "The process in L.A. County has been compared to a military mobilization. People have to pull out ripped and written-upon ballots, which are invalid. Volunteers are often high school students, because it's a problem getting people to help. And it doesn't help that voting is on a Tuesday!"

Internet voting should be especially attractive to disabled voters, Alvarez says. A 2000 study by the General Accounting Office showed that more than 80 percent of polling places are wheelchair inaccessible, and Alvarez has seen this himself in his



**A hodgepodge of signs indicating polling stations in Pasadena, California: Some are clearly not handicapped friendly, and others just seem bush-league.**

countrywide surveys of voting operations. “In the U.S., we have a very serious problem with accessibility,” he says. “The Americans With Disabilities Act and the Help America Vote Act require that polling places and voting devices be accessible to people with different types of disabilities, both visual and physical. I can show you hundreds of photographs of polling places within just a mile or two of Caltech that violate these provisions. We went to a polling place that’s about 400 yards from here that was not accessible to someone in a wheelchair, which may be a violation of federal law.” Furthermore, the overseas soldier, the frequent traveler, and the working single parent are effectively disenfranchised by our current system, Alvarez argues. Then there are the 18- to 25-year-old voters, who historically turn out to vote at the lowest rates, but who are practically hardwired to

new information on a candidate surfaces.

Finally, there is the “why not?” argument. Online voting opponents raise security issues, including the possibility of hacking. But it’s clear that Americans trust Internet security with some pretty major stuff: we regularly shop and conduct many forms of personal exchange online. It’s how nearly 34 percent of taxpayers filed for fiscal year 2005—in raw numbers, that’s more than 76 million e-filers! Perhaps it’s an unfair comparison, but the voting systems in Switzerland show no successful hacks so far. Geneva’s Internet voting information website claims “Internet voting is more secure than postal voting for at least four reasons: human mistakes are no longer possible; you receive an acknowledgment that we received your ballot; you cannot mistakenly invalidate your ballot; and you are told by the system if you try to vote after the system’s closure, allowing you the possibility to vote in the polling station.” Their point is that all other voting systems have thus far proven to be significantly flawed. Certainly, the 2000 election showed that people believe in the potential for an election to be stolen the old-fashioned way. “We never have, nor never will, make light of security and integrity,” says Alvarez. “But in our work, we stress that all voting systems should be evaluated in the same manner—that is, that paper-based and electronic-based systems should be held to the same security, accuracy, auditability, verifiability, usability, accessibility, and transparency standards. We also stress that dimensions other than security are extremely important, and should not be overlooked when evaluating any type of voting system or election administration practice.”

But the opposition to online voting is strong, and presents several cogent arguments beyond security from hacking, viruses, vote buying, and loss of anonymity. One is that Internet voting may erect a “digital divide” that appears to exacerbate current inequities by favoring white, wealthy, well-educated, male, Republican voters who are more abundantly and more quickly connected to the

“Voting at polls on Election Day is an act of community, balanced with individual freedom . . .” (Norm Ornstein)

“Are people really missing joining hands with their neighbors and singing ‘Kumbaya’ as they go to vote?” (Thad Hall)

the Internet.

Increasing vote quality is another argument that Alvarez advances. Imagine the potential: one browser displays the ballot, while others show a voter guide and information about candidates and ballot measures. Voters would be allowed to cast or change ballots until 8 p.m. on Election Day, allowing decisions to be made based on last-minute information. As many as 20 percent of voters nationwide now mail their ballots weeks in advance, losing the option to change their minds if

Internet. Although the VTP study so far indicates that Internet votes will likely be more accurately counted (for example, application features would make overvoting impossible and help avoid under-voting), it doesn't necessarily see the Internet as a means to end the legacy of discrimination that limits voting access. Still, Alvarez argues that the Internet can do better in this regard when it comes to other aspects of the electoral process, like registration and administration.

Another argument against Internet voting focuses on the communal fervor of Election Day. Opponents believe that Internet voting is the antithesis of the community-based electoral process and see it as a potential disintegrator of civic life. As Norm Ornstein, a political scientist with the American Enterprise Institute, argued recently, "Voting at polls on Election Day is an act of community, balanced with individual freedom . . . It is an exquisitely balanced act where you go to congregate with your fellow citizens, showing that you are a community, but then you move into a private booth, draw a curtain, and perform a supremely private act, an enormous act expressing the freedom of choice that exists in a democracy." Hall raised this issue at the Swiss-American voting symposium, cheekily asking, "In Switzerland, are people really missing joining hands with their neighbors and singing 'Kumbaya' as they go to vote?" In some ways this is already a nonissue. For one, the VTP proposes Internet voting only as a viable option, not a replacement. Secondly, some states appear to have already either lost faith in polling-place voting or opted for the relative convenience of the post office. Oregon abandoned the

civic moment in 2000 in favor of exclusively mail-in ballots. In California, 50 percent of voters mail their ballots, and that number is likely to grow. In Washington, the rate is up to 75 percent.

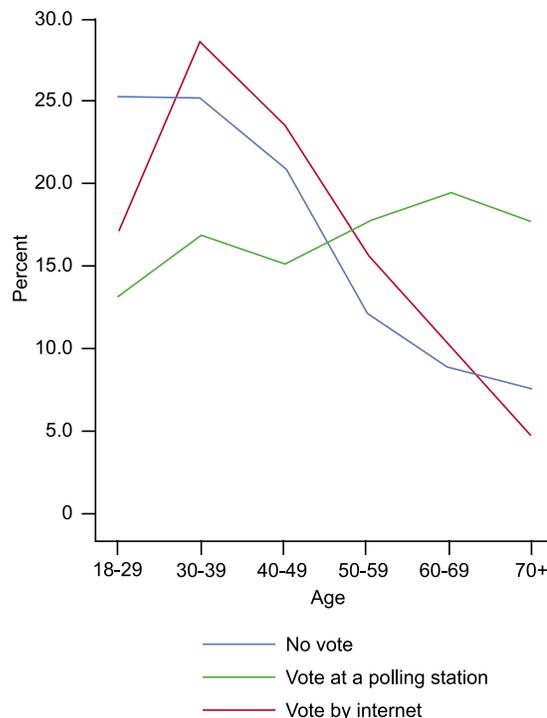
The complexity of our system alone raises a fairly well-fortified barrier to Internet voting. Trying to develop an Internet voting application that covers all voting issues gets complicated quickly. The Voting Rights Act requires that ballots be provided in many different languages depending on the number of language minorities that live in a particular area. Alvarez adds, "We ask our voters to vote a lot and to vote for a lot of stuff. This will keep us from moving forward as quickly as other countries can." Contrast the United States with a country like Estonia, where there is only one vote in one race, and only one language option.

Not only are election regulations complex overall, they basically have to be reinvented with each election. "Every ballot requires new programming. That's where we see a lot of the problems," says Theisen, of VotersUnite. "We get so used to using computers, and most of the time they work great, but in almost every other application besides voting, you see what you put in and you see what comes out. With Internet voting, you put something on the screen, and then you click some button that shifts the data off somewhere, and how do you know that data has been correctly recorded? The person who voted is not ever going to see the ballot the way it gets shipped into cyberspace, and they don't know that it's going to be counted right. Internet voting is as unobservable as electronic voting."

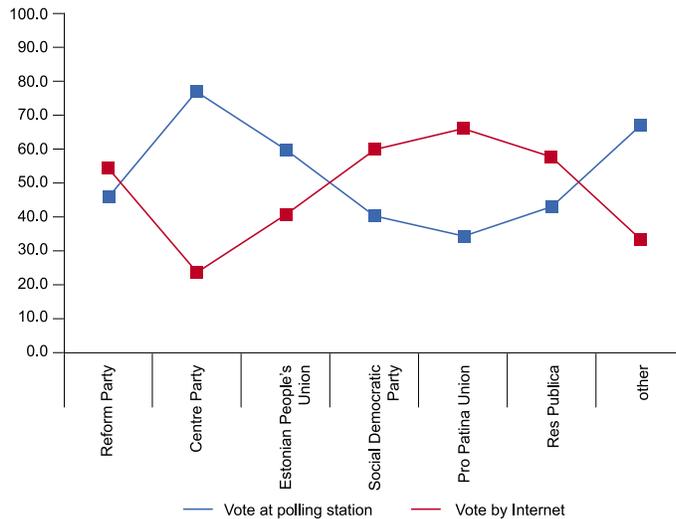
But the ultimate resistance could come from voters who innately distrust any electronically sophisticated

system that could potentially cloak subterfuge. "Conceptually, I find it difficult to accept something that is so complicated that only experts can understand it," says Theisen. "I think that it's foolishness to trust the system when it comes to something like this. I see it as a distinct advantage and a chance for us to hold on to our democracy longer because we're *not* trusting the system. One recurring theme throughout history is that those in power attempt to stay in power however they can. Theoretically, the people are in power in a democracy, and they should be the ones who observe the election."

**The Internet holds the potential to lure younger voters. In this survey of Estonian voters, the majority of those who cast their votes online were under the age of 40.**



Are Internet voters skewed more heavily toward one party or another? According to Estonian voters, the answer seems to be a little, but not much.



To Alvarez, the bottom line on Internet voting is obvious. “There is no way to know whether any argument regarding Internet voting is accurate unless real Internet voting systems are tested, and they should be tested in small-scale, scientific trials so that their successes and failures can be evaluated,” he says. In Switzerland, comments Hall, “you actually experiment; you decide you want to see if Internet voting works, and you create some objectives for what you’re going to look for; you research, you collect data, you survey people.” In contrast, “in America we experiment with everybody! What I mean by that is, we get some great idea, like ‘What would happen if we liberalized our laws regarding early voting or absentee voting?’ and then pass a law and let everybody do it and then we don’t evaluate it, or we evaluate it poorly.”

Just before the 2004 election, the Department of Defense designed an experiment in ballot encryption and transfer that would also provide receipts and would be a voting option for up to 100,000 citizens in the primary and general elections. But because the Secure Electronic Registration and Voting Experiment (SERVE) was to be distributed across 50 counties in seven states with seven entirely different methods of voting, as well as to overseas soldiers, it was quickly mired in complexity and was abandoned two weeks prior to its proposed launch for the 2004 election. The four-person panel of computer scientists who posted an unofficial evaluation of SERVE on the Internet claimed, “It is impossible to estimate the probability of a successful cyber-attack (or multiple successful attacks) on any one election. But we show that the attacks we are most concerned about are quite easy to perpetrate.” The sponsoring agency, the Federal Voting Assistance Program, never released an official evaluation.

There are no formal plans for Internet voting in the 2008 election, although some states are discussing pilot tests of electronic or Internet voting for their military and overseas voters, says Alvarez. He

foresees lots of debate in the wake of the upcoming election: “Given what is likely to be a hotly contested presidential election, many competitive House and Senate races, unprecedented scrutiny of election procedures and technologies, and all of the problems we know of in polling-place practices, early and absentee voting procedures, voter registration, and voting technologies, we may not know until well after Election Day who the next president is, and which party will control Congress.”

At the close of the voting symposium at Caltech, one Swiss delegate wondered, “If a Democrat was elected to the presidency, would Internet voting come quicker?” To this Hall replied that, after all, there is little incentive for change. “You have to acknowledge that the system you won by is effective,” he laughed. □



Caltech VTP members Michael Alvarez (top) and Jonathan Katz (bottom) have their voter ID cards ready, just in case.

PICTURE CREDITS: 14, 15 — National Museum of Natural History, Smithsonian Institution; Bob Paz; 17, 18, 22, 24 — Melissa Slein; 19 — Doug Cummings