

# Untangling Florida's Voting System Controversy

## An Analysis of Optical Scan and DRE (direct recording electronic) Voting Systems

By Susan Pynchon, Executive Director, Florida Fair Elections Coalition and Center

In an effort "to build a better voting system," the National Science Foundation (NSF) in August 2005 awarded a \$7.5 million, 5-year grant to the ACCURATE project, headed by Dr. Aviel Rubin of John Hopkins University, who wrote in September 2006:

*More and more, I believe the best solution to the e-voting dilemma is to use computer-marked [ballot marker] or hand-marked paper ballots that are optically scanned, and to randomly audit the scanners. Audio modules can be used for sight-impaired access.*

*I do not like the idea of retrofitting DREs [direct recording electronic voting machines, often called "touchscreens"] with long rolls of paper trails, or as one elections official referred to it, 'an octopus of paper.'*

That is where a year and a half and a \$7.5 million grant have gotten us: Back to optical scan (combined with mandatory audits) as "the best solution to the e-voting dilemma," in Rubin's own words.

On March 7, 2007, Rubin testified before the U.S. House Appropriations Subcommittee on Financial Services and General Government -- his **written testimony** is public record. Following his testimony, he wrote the following:

*...I was asked if I thought that a DRE with a paper trail was an adequate voting system. I replied that when I first studied the Diebold DRE in 2003, I felt that a Voter Verified Paper Audit Trail (VVPAT) provided enough assurance. But, I continued, after four years of studying the issue, I now believe that a DRE with a VVPAT is not a reasonable voting system. The only system that I know of that achieves software independence as defined by NIST, is economically viable and readily available is paper ballots with ballot marking machines for accessibility and precinct optical scanners for counting - coupled with random audits. That is how we should be conducting elections in the US, in my opinion.*

### Sarasota's Election Debacle Would NOT Have Occurred with Optical Scan

The recent election meltdown in the Congressional District 13 race in Sarasota, is now the most expensive Congressional race in U.S. history. It is also a perfect example to support Rubin's conclusion. The huge expenditure of time, energy, and money as a result of this debacle would not have been necessary if the county had had an optical scan voting system and voter-marked paper ballots as the official record of the election.

With paper ballots, the entire process would likely have taken no more than a week to complete. Voter intent would have been clear, and Sarasota voters would have accepted the winner of that process as the legitimate new representative of District 13. Simply adding printers to Sarasota County's direct recording electronic voting machines, however, would NOT have solved the problem.

Instead of enduring a machine recount, a "manual" recount, a state audit, two court cases (partisan and non-partisan), a possible Congressional hearing, political in-fighting, and citizen unrest, Sarasota would have counted its paper ballots and been done with it.

### Comparing Optical Scans and DREs

There is documented evidence in hundreds of elections across the U.S. that DRE voting systems have miscounted votes, recorded false undervotes, and suffered from machine breakdowns, calibration problems,

programming bugs, screen freezes, unexplained “glitches” and more. Adding printers to these failed systems will compound problems, not solve them, as further explained in this analysis.

Florida legislators should support Governor Crist’s call to move to optical scan/paper ballot voting systems in all counties, a move that would provide Florida with one uniform voting system that is auditable, verifiable, and trustworthy. The costly regressive “interim” step of DREs with printers should be bypassed completely. Instead, optical scan systems should be required for all counties for all voting methods, as has occurred successfully in many states. The reasons are compelling:

- **Voter intent can ONLY be proven on voter-marked ballots, filled out by the voter’s own hand or with the help of an assistive device such as a ballot-marker. It is never, and can never be, correct to call a DRE printout a “verified” record, and certainly incorrect to ever call it a “verified” ballot.**

This is the heart of the problem with DREs, and the reason why they will never be equal to a voter-marked ballot, no matter how much the technology is “improved:” ***If voter intent cannot be proven, then an election cannot be proven, audited, verified, or accurately certified.*** The ONLY way to confirm voter intent is on a voter-marked, or “voter-generated” paper ballot, filled out by a voter’s own hand or with the help of an assistive device such as a paper-ballot-marker. The printout produced by a DRE is a “verifiable” record but can never be determined to be “verified” because there is no way to know if the voter has checked it or not.

A line in the federal 1990 Voluntary Voting System Guidelines (VVSG) was removed by the vendors for the creation of the 2002 VVSG, but it remains as true today as it was in 1990:

“Voter confirmation is no guarantee that the voter’s choices have been accurately recorded in the machine’s memory registers.” This means that you could verify your vote on the electronic screen and on the DRE “printout” but the machine, through some type of programming error or “bug,” could have electronically recorded your vote differently than you intended.

Studies have shown that the vast majority of voters do NOT check the paper printout from a DRE. Even when they do, they don’t catch errors because the printout is in a different format than the one just voted on the electronic screen. Furthermore, people tend to see what they expect to see, rather than what’s actually there, just as you might overlook an error in a letter you’ve just written because you think it says what you intended it to say, rather than what it actually says. Since there’s NO WAY to know if a voter has confirmed her printout or not, a DRE record can never be proven to be “verified.”

- **DREs chronically lose votes as shown in high undervote rates on ES&S iVotronics in Florida’s 2006 general election**

Florida Fair Elections Research Director, Kitty Garber, is preparing an in-depth analysis of undervote rates in the Florida 2006 election. Some of the highlights from her preliminary analysis include:

- ES&S iVotronics chalked up a 14.89% undervote rate in the U.S. Congressional District 13 race in Sarasota County (12.92% if absentee ballots are included in the average).
- ES&S iVotronics had an undervote rate between 20% and 25% in the Attorney General’s race in Charlotte, Sumter and Lee counties.
- ES&S iVotronics had an undervote rate in Miami-Dade and Broward counties of 9.14% and 10.48% in the Attorney General’s race in Miami-Dade County and Broward County,
- In all the above counties, the undervote rate on absentee ballots ranged from 1% to 3% in the AG race (with the exception of Miami-Dade, which had a 5.9% undervote rate in the AG race on absentee ballots).
- The ES&S iVotronics recorded 100% more undervotes in Florida in the U.S. Senate race than did the Diebold optical scanner.
- The theory that poor ballot design caused some or all of these high undervote rates has never explained why voters would not only miss the races in question, but would also miss the

Undervote Warning on the review screen that is supposed to be part of every iVotronic voting system and which is supposed to prevent such undervotes.

- **DREs can be used for ethnic profiling**, as evidenced in **a study of New Mexico undervotes** by Ellen Theisen of VotersUnite.org. In 2004, undervotes spiked dramatically on DREs among Native American and Hispanic voters, then plummeted in 2006 when optical scan systems were mandated in New Mexico. Following is a table from Theisen’s study:

New Mexico Undervote Rates:

UNDERVOTE RATES BY BALLOT TYPE			
Ethnicity	2004 Paper Ballots	2004 DRE Ballots	2006 Paper Ballots
Native American	0.74%	7.61%	1.11%
Hispanic	1.29%	6.33%	1.99%
Anglo	0.92%	2.22%	1.76%

- **It is imperative to recognize that DREs can disenfranchise not only minority voters, but all voters.** DREs have lost votes and miscounted votes in hundreds of elections around the country without any ability to accurately audit or recount those votes.

- **DREs disenfranchise voters by creating long lines to vote.** Long lines occur ONLY in DRE precincts and these lines, clearly, result in voter disenfranchisement (particularly minority disenfranchisement) and “denial of service.” Because each DRE is also a voting booth, voters must wait until a machine is free.

By contrast, each voter only uses the optical scan machine for a few seconds while his/her ballot is scanned, so one optical scan machine can serve over 3,000 voters per day with no delay. With optical scan, if there is a power failure or machine breakdown, voters can continue to vote on paper ballots – thus, long lines do not occur. Accidental and purposeful disenfranchisement of voters, by allocating an inadequate number of DREs, has already happened around our nation.

- **Optical scanners are the only system with the potential for providing one uniform system for all Florida voters.** Florida counties that now use DREs still have to count absentee ballots on optical scan machines. The state needs to follow the example of states such as New Mexico that use optical scanners with ballot markers, thus creating one uniform voting system for all voters, including absentee voters. By dealing only with paper ballots, elections administrators will have to worry about procedures, training, security, etc. for only one type of voting system, not two.
- **Optical scanners are less expensive to purchase, administer, and maintain than DREs** because only one opscan is needed per precinct. As stated above, one optical scan can easily serve over 3,000 voters per day because the opscan is only being used for about 15 seconds per voter while each ballot is scanned.

By contrast, one DRE can serve no more than 150 people per day (generously estimated at each voter taking 5 minutes to vote, which equals 12 voters per hour, which equals 144 voters in a 12-hour day). The true number of voters served is far less, of course, given that voters do not show up in neatly-timed, 5-minute increments. It is virtually impossible to plan the number of DREs needed in any given precinct since fluctuations in voter turnout are inevitable.

Florida Secretary of State Kurt Browning has said that the state will only fund printers for DREs but will not fund optical scans with ballot markers, because the latter would be “too expensive.” A quick example shows that Browning is mistaken.

Example: Sarasota County has 1,590 iVotronic DRE voting machines and 156 precincts.

To add a printer to each of the 1,590 Sarasota machines, at a cost of \$1,000 per printer, would equal \$1,590,000. By contrast, the cost to install one optical scanner and one ballot marker per precinct in each of Sarasota County’s 156 precincts, at a cost of \$8,000 per precinct (Browning himself said “seven-to-eight thousand dollars per precinct”), would cost \$1,248,000 – a SAVINGS of \$342,000. Even if the cost were \$10,000 per precinct, the total would be \$1,560,000, still less than adding printers to DREs.

Finally, the estimate for DRE printers is far too low because the truth is that the state is in the process of certifying brand new DREs to go with the brand new printers. Current DREs are not designed for printers nor are existing DREs being certified to be used with printers. The actual cost for Sarasota County would include the cost of all new DREs PLUS the printers. Even if the cost for each DRE plus printer were only \$3,000 (and it will probably be much higher), the cost to Sarasota to replace its 1,590 DRE voting machines would be \$4,770,000. These projected costs are illustrated in the table below:

**SARASOTA COUNTY’S POSSIBLE CHOICES**

	<b>Add Printers Only (\$1,000 per Machine)</b>	<b>Add Opscans With Ballot Markers (\$8,000 per Precinct)</b>	<b>New DREs With Printers (\$3,000 per machine)</b>
<b>1,590 voting machines</b>	<b>\$1,590,000</b>		<b>\$4,770,000</b>
<b>156 Precincts</b>		<b>\$1,290,000</b>	

In summary, the LEAST expensive alternative for Sarasota County will be optical scanners with ballot markers.

- **Elections with opscans save money for counties**, as shown in an in-depth comparison of voting system costs in Florida by Rosemarie and Richard Myerson of Sarasota; a North Carolina study by Joyce McCloy, and in other excellent studies. To illustrate this fact, compare Sarasota and Volusia counties. Sarasota County has fewer registered voters than Volusia County, and yet Sarasota has 1,590 iVotronic DREs compared to Volusia’s 358 machines (179 opscans and 179 DREs for voters with disabilities).

The cost to maintain, repair, test, store, transport, set up, and operate Sarasota's voting machines is far greater than the cost to Volusia.

- **Post-election contests are easily solved with optical scan voting systems.**  
If an optical scan voting system had been in place in Sarasota County, the contest over the U.S. Congressional District 13 race would have been solved in one week *by simply hand counting the paper ballots*. This election has been the most expensive in the history of the U.S. Congress. The huge, ongoing expenditure of county, state and federal resources (time, energy and money) would have been unnecessary and avoided completely if Sarasota County had had voter-marked paper ballots.
- **Arguments against punch-cards are not valid against optical scanners--they are entirely different systems.** Volusia County, for example, successfully completed its recount on its optical scan system in 2000 before the deadline, whereas the punch-card counties were unable to do so. Proponents of DREs often try to confuse the issue by talking about punch-card systems and optical scan systems as though they were similar. The punch-card systems were inaccurate and difficult to recount; optical scan systems are brilliant in their very simplicity.
- **Only optical scan machines allow for a meaningful audit in the event of close elections, equipment failures, or other problems.**  
Any "audit" of a DRE system is nothing more than a reprint of the original results – this is why the results are always exactly the same on a DRE recount – the same information in the computer's memory registers is being spit out a second time with no way to determine if the first count was accurate or not. With DREs, if the first count is affected by a programming error or "bug," by machine breakdowns, screen freezes, calibration issues, or by tampering, there is no way to determine the effects of those problems. Worse, a "recount" will only duplicate the same errors that existed in the first count.
- **Optical scan voting machines have now been used for more than a decade in Florida counties.** All Florida counties use optical scan systems for absentee ballots, so election administrators are familiar with how they operate. This experience has given vendors and election supervisors the ability to understand the equipment, improve its performance, and work out problems. Florida counties switching to optical scanners should benefit from this depth of experience.

**Voters should not have to be computer literate in order to vote at a polling place.**

Many voters, including many elderly, are intimidated by DRE technology. By contrast, voters do not have to be computer literate to use an optical scan voting system, since nearly everyone -- including elderly, low-income, and newly-registered voters -- knows how to use pen and paper. Additionally, most people have either filled out a lottery ticket or completed a multiple-choice test. Filling in an oval next to the candidate or ballot question of choice is far simpler for everyone to understand. Paper ballots are not as intimidating or confusing for voters who are not comfortable with new technology. In Pinellas County, examination of precinct logs following the March 2006 election showed that poll workers had to give as many as 60 demonstrations in one precinct in one day to explain to voters how to use the DREs. This type of explanation is not required on optical scan.

- **Paper Ballots and Mandatory Audits must go together**  
Voter-marked paper ballots are essential for accurate and auditable elections, since they are the only "technology" that accurately reflects voter intent. However, paper ballots are meaningless without audits to check the accuracy of the machines. All electronic voting systems, including DREs and optical scanners, are subject to programming errors, software "bugs," and tampering. That is why a statistically significant manual audit (hand-to-eye count) must be performed to check machine results.

The whole intent of an audit is to determine whether there might be a problem that affects the outcome of an election -- in time to do something about it. Once an election is certified in Florida there is no way

to change it. Conducting an audit after certification would be nothing but the *pretense* of checking -- a panacea without any meaning. Furthermore, if significant problems were found in any post-certification audit, Florida could once again be dragged through the ordeal of national headlines and ridicule. *Audits must be completed prior certification of the election.* Currently, Florida law allows 11 days between the election and certification (for general elections). By contrast, Oregon has 31 days between the election and certification and New York has 25 days. If the certification date in Florida is too soon after the election, don't use this as a reason to do away with meaningful audits. Instead, change the law to allow time for essential audits to be conducted.

- **DREs Are Not Necessary for Accessibility**

No voter should have to sacrifice her verified ballot to attain accessibility. There are ballot-marking devices that allow voters with disabilities to vote privately and independently on paper ballots without being relegated to second-class status by having to use DREs. The governor and Florida legislators should insist that the Division of Elections certify ballot-markers with ALL opscan systems currently in use in the state, as well as other innovative technologies, as **Florida Statutes § 101.015(7)** requires:

*“The Division of Elections shall continuously review the voting systems certification standards to ensure that new technologies are appropriately certified for all elections in a timely manner. The division shall also develop methods to determine the will of the public with respect to voting systems.”*

Two years ago, when counties were required to buy disabled-accessible equipment to meet the requirements of the Help America Vote Act (HAVA) and state law, they had no choice but to buy DREs because the state refused to certify any equipment other than DREs to serve voters with disabilities. Other states across the nation, however, did certify and use ballot-markers for disabled accessibility, allowing all citizens in those states to vote on verifiable, auditable, voter-marked paper ballots.

Two years after AutoMark's original application was filed with the Division of Elections in February, 2005, the state finally certified it in February, 2007 -- but for use with only one ES&S voting system. This unconscionable delay, fueled by ES&S' desire to sell the more profitable DREs and facilitated by certain individuals within the Division of Elections, must not be allowed to continue. The AutoMark is a stand-alone system that was designed to work with ballots from all major vendors and should be certified IMMEDIATELY with Diebold and any other ES&S optical scan systems used in Florida. It has already been certified with Diebold optical scans in other states.

- **Programming “bugs” or tampering can be detected on optical scan voting systems with mandatory audits**

The term audit has several different meanings with respect to an election. There can be an audit of the election itself (examining the procedures followed); an audit of the voting system (checking to assure the software is the certified version, for example); or an audit of the results. The latter is the type of audit referred to by Dr. Avi Rubin in his quote above. It is impossible to ensure that the “paper trail” printed by DREs is a true reflection of voter intent. The only meaningful way to audit results is to conduct a manual (hand-to-eye) count of a statistically significant portion of voter-marked paper ballots.

Inevitably, someone will raise the point that the voting system that was “hacked” in Leon County (in a test of that voting system) was an optical scan system. It is important to point out that the scientific papers that have been written regarding the Hursti hack present the vulnerabilities of an optical scan system (which is as vulnerable as any electronic voting system), but then *re-instate* optical scan as the only system that can effectively detect tampering by auditing (hand-counting) a statistically significant portion of the paper ballots to verify machine counts.



Please read my paper, *The Hursti Hack and its Importance to Our Nation*, which is one of seven papers referenced in the bibliography of a study entitled, *Security Assessment of the Diebold Optical Scan Voting Terminal*, published by the University of Connecticut's Voting Technology Research Center. Also read, *Security Analysis of the Diebold AccuBasic Interpreter*, published by a panel of distinguished California computer scientists in a study confirming the Hursti Hack. These papers, and other studies, note that auditing paper ballots is the only way to detect many types of programming errors or tampering.

*Successful attacks can only be detected by examining the paper ballots: There would be no way to know that any of these attacks occurred; the canvass procedure would not detect any anomalies, and would just produce incorrect results. The only way to detect and correct the problem would be by recount of the original paper ballots..."*

Pg. 2, Paragraph 6, *Security Analysis of the Diebold AccuBasic Interpreter*

- **Florida Voters' Coalition presents six necessary measures**

The previous paragraph describes one Florida law -- the short period of time between the election and certification -- that should be changed to permit meaningful election reform. Please see the Florida Voters Coalition Position Paper, endorsed by many of Florida's non-profit organizations (with more organizations signing on all the time) that includes six measures that must be changed, at a minimum, to begin the process towards accurate and auditable elections in Florida.

In addition, numerous other problematic election laws, not addressed in the FVC Position Paper, are miring Florida in a quagmire of poor policies and procedures. Florida laws must be changed where they interfere with the state's ability to ensure accurate, auditable, accessible and transparent elections.

**It is no longer acceptable to allow "bad" laws to stand in the way of doing the right thing—those "bad" laws must be changed by the Legislature and effective changes supported by the Department of State.**

**Note:** We would be happy to meet with you and your staff to answer questions you may have about voting systems and to review other problems noted by us in our ongoing analysis and study of Florida elections.

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