

Monroe County, Indiana

**VOTING SYSTEMS  
ADVISORY COUNCIL**

**Initial Report**

**to**

**Monroe County Commissioners**

**June 19, 2009**

## Charge and Summary of Report

We, the members of the Monroe County Voting Systems Advisory Council, were appointed on February 27, 2009, and charged with the following duties:

“To investigate and evaluate the *availability, accuracy, security, and cost* of voting machines and voting systems which have been approved by the Indiana Secretary of State for use in the 2010 elections and future elections thereafter;” and

“To deliver a written report of its findings and recommendations to the Monroe County Commissioners no later than June 19, 2009.” (Resolution 2009-08 of the Monroe County Board of Commissioners)(Emphasis added)

We held ten meetings from May 1 through June 17, the minutes of which were forwarded to the Monroe County Commissioners, to be posted on their website:

<http://www.co.monroe.in.us/commissioners/VotingSystemsAdvisoryCouncil.html>.

During those meetings we weighed information collected by recognized authorities and witnessed presentations by vendors of electronic voting machines and systems. In addition, we visited the facilities of the Marion County Election Board to learn first-hand about Marion County’s experience with its system of optical scan and direct recording electronic (DRE) machines.

This report summarizes our work to date. It first addresses the availability of voting systems and then focuses on the priorities to be considered in choosing a voting system. We conclude with our recommendations, which most but not all of us support.

**In summary, we recommend a voting system that allows voters to mark paper ballots that are then scanned by optical or digital machines because it permits post-election audits and recounts. We also recommend the auditing of election results as necessary to insure accuracy and security.**

A chronology of our work is in Appendix A. Resources consulted are listed in Appendix B. Vendor demonstrations are described in Appendix C. Appendix D provides explanatory notes on optical and digital scanners. Appendix E provides explanatory notes on auditing procedures.

## **Availability of Voting Systems**

Voting methods range from marking paper ballots, which may be counted by hand or by an optical or digital scanner, to using a DRE machine that internally records and counts votes that a voter selects by touching buttons, twisting a dial, or using a touch-screen. DREs may be equipped to print records for voters to verify before casting their ballots; however, no DRE with a voter-verifiable paper audit trail has been certified for use in Indiana.

### 1. Indiana-Certified Voting Systems

Voting systems certified for use in Indiana's 2008 elections were the following, listed by manufacturer. All certifications will expire, however, on October 1, 2009, per Indiana Code 3-11-7.5-28, and each vendor (except Voting Technologies International, which is no longer in business) is currently applying with the Indiana Election Division to certify equipment for use in elections from 2010 through 2013. In addition to its currently-approved machines, ES&S is seeking certification of a new digital scanning device called the DS 200.

**ES&S:** Model 100 Optical Scan  
Model 650 Optical Scan  
iVotronic (DRE with touch screen)

**Hart InterCivic:**  
eScan Ballot Scanner (digital scanner)  
eSlate Electronic Voting System (DRE with dial)

**MicroVote:**  
Infinity (DRE with buttons)

**Premier (formerly Diebold):**  
AccuVote OS (optical scanner)  
Accuvote TSX (DRE with touch screen)

**Voting Technologies International:**  
Scan Tron ES 2800 (optical scan)  
VotWare System 5 DRE (touch screen)

Appendix C details our efforts to set up demonstrations from the four vendors currently in business.

### 2. Monroe County Voting System

Monroe County's current system consists of:  
257 MicroVote Model 464 blue machines (DRE with buttons), half of which are currently usable, and

120 MicroVote Infinity machines, all usable.

The Infinity machines were purchased in 2005 with Help America Vote Act (HAVA) funds in order to provide accessibility to all voters. The Model 464 machines are 26 years old and have not been certified since October 1, 2005; MicroVote does not intend to seek recertification of them. However, the Model 464 machines may continue to be used under Indiana Code 3-11-15-13.3(b), which allows continued use of machines certified before October 1, 2005 if they were purchased before October 1, 2005, and they otherwise comply with the applicable provisions of HAVA. (HAVA requires one accessible machine, such as the Infinity, per polling place in order for additional non-accessible machines such as the Model 464 to be used.) MicroVote personnel estimate that for under \$10,000 they could bring the Model 464 machines into working order.

In addition to the MicroVote voting machines, there are two MicroVote optical scanners for reading absentee ballot cards on which voters fill in numbered circles corresponding to ballot selections.

Monroe County currently has 67 precincts and 59 polling places, numbers not anticipated to change unless the larger registration for the 2008 general election carries over to subsequent elections. The Clerk's Office predicts that the number of registered voters will drop from 89,000 currently to 70,000 in future elections.

State legislative activity has so far ruled out the possibility of voting centers except in four experimental counties, although the uniformly positive reports from those counties may influence consideration of extending the possibility statewide. Such legislation would significantly reduce equipment needs.

## Priorities

At the beginning of our work, we unanimously identified and prioritized five characteristics to be considered in developing recommendations for a voting system. We ranked these characteristics in the following order of importance:

1. *Accuracy* – ensuring that the voter’s intent is recorded and counted
2. *Auditability* – the capacity of the various parts of the system to be tested and documented in order to ensure accuracy
3. *Resistance to tampering* – the built-in checks and security that protect accuracy
4. *Accessibility/ease of use* – user friendliness that enables all voters to cast their votes as they intended.
5. *Cost* – both initial and ongoing, with consideration of both purchase and lease possibilities.

### 1. Accuracy

Accuracy—capturing voter intent—is of the highest priority because an election is not valid without an accurate vote count. Indiana law requires that a voting system “must be able to record accurately each vote and be able to produce an accurate report of all votes cast.” Indiana Code 3-11-15-20. Pre-election testing is required on a limited number of electronic machines to ascertain that they will count votes correctly. Despite this safeguard, electronic voting systems have produced erroneous election results. A partial history of electronic voting problems in the U.S. can be found in “MythBreakers: Facts about Electronic Elections,” at [www.votersunite.org](http://www.votersunite.org). Post-election audits are necessary to verify that the voting system did indeed perform with accuracy on election day.

### 2. Auditability

The conduct of the 2000 presidential election sensitized the nation’s voters to the integrity of the voting process. About one-third of the states now require some form of election auditing and the number of these states is growing rapidly. For instance, California requires a hand recount of 1% of randomly selected precincts as a systematic check on accuracy; new regulations in 2008 expand the percentage of audited precincts to 10% when the winning margin is less than 0.5%. Minnesota provides for statistically-based sampling of ballots from a pre-determined number of precincts, depending on the size of the voting unit, and expands the audit if discrepancies are found. Although Indiana does not now require audits, it is both prudent and good practice to anticipate auditing requirements in considering the features of an election system to be adopted in Monroe County.

Auditing is a way to verify accuracy and to detect tampering. Auditing can assure that the intent of the voter is reflected in the outcome of an election. An audit, unlike a simple recount, can evaluate the whole voting process from registration of voters to storage of voting records. An audit includes many of the measures currently in place to assure the

accuracy and integrity of the election process, such as a secure chain of custody for ballots and machines, but may add other steps as well. The level of assurance is provided by the design of the audit.

The most important aspect of an auditable election system is the existence of a voter-verifiable paper record of the voter's intent (audit trail). A paper ballot, marked directly by the voter, is a tangible, physical record of the vote. Ballots may be sampled in a statistically significant number of randomly selected precincts following an election as part of a designed audit. Votes must reconcile to assure accuracy and freedom from tampering before certification can occur.

An audit entails the recount of some ballots but also may involve an examination of the system used, the election process, and the custody and handling of the ballots. DRE systems have been problematic. They provide no verifiable physical record of individual votes and the software for processing some or all of the election data is typically considered to be proprietary by DRE manufacturers. Popular apprehension about DRE systems' non-transparent nature and potential vulnerability has grown to such an extent that their role in U.S. elections is waning. Voter-marked paper ballot-based systems are on the rise.

### 3. Resistance to Tampering

Any voting system must be protected from tampering to ensure accuracy. After pre-testing, a machine needs to be secured through a chain of custody until the election results are certified. Electronic voting systems pose unique problems, such as passwords that can be deciphered, software that allows election results to be edited, and unencrypted memory cards holding voting data that can be altered.

### 4. Accessibility/ease of use

We examined the effects of ballot design and ease of use on a voting system's accuracy. A poorly designed ballot or a difficult-to-use voting machine may not capture a voter's intent accurately.

Voters with disabilities may find some voting machine formats easier to use than others. For example, voters with limited motor skills may prefer manipulating a dial to touching a screen.

### 5. Cost

Although we did not obtain exact costs of specific voting systems, we can give rough estimates for leasing and purchase. Equipment might normally be purchased, but there are reasons to consider leasing as an alternative. Technology is changing rapidly and may render current systems obsolete. In addition, election law is evolving and the trend is to require systems that produce a voter-verified paper trail. The potential for vote centers is

another factor to consider; if they are someday authorized and adopted by Monroe County, we will have fewer voting locations and need less voting machinery.

Whatever voting system is chosen, we are required by HAVA to provide a minimum of one accessible voting machine per polling place. We currently have 120 accessible Infinity machines for use in 59 polling places (67 precincts).

An optical or digital scan system would require for each precinct both a scanner and an electronic ballot marker (for impaired voters who need such markers). An optical or digital scanner costs around \$5,500 to purchase and may be leased for about \$900. We do not have figures for an electronic ballot marker. Although our current Infinity machines could be used in lieu of ballot markers, they would not provide voters with a method for producing a paper ballot that could be scanned. Paper ballots are an additional cost and raise questions of design, printing, supply and storage. Vendors' printing cost estimates range from \$0.23 to \$0.34 per ballot; at 70,000 ballots per election, printing would cost about \$20,000. Monroe County would need a total of approximately 75 scanners for absentee and election-day voting, costing around \$413,000 to buy and \$68,000 to lease.

A system using DREs would require about five times as many machines, approximately 375, to serve all of Monroe County. The cost of a DRE ranges from \$3,500 to \$3,750 to buy and about \$750 to lease; total costs would be about \$1.4 million to purchase and \$280,000 to lease. (This assumes replacing all current Infinity machines; if our Infinity machines were compatible and could be used with new DREs, the total costs would be reduced by about one-third.)

Clearly budget will play a crucial role in the implementation of the recommendations contained in this report. For that reason we have laid out long-range recommendations that set goals to be attained in time for the 2012 primary election, then short-range goals that provide concrete guidance for how to attain those goals over the next three years within the financial realities that we face.

## **Recommendations**

### **Long-Range Recommendations: 2012 and Beyond**

**Recommendation #1: Monroe County should focus its resources on implementing a voting system based on paper ballots verifiable by all voters and processed by means of optical or digital scanners.**

Public confidence in the integrity of U.S. elections has suffered badly from widely reported incidents in recent history. To help restore that confidence we think it essential that results obtained by means of electronic systems be routinely audited. No meaningful audit can be conducted of results recorded by DRE machines such as our MicroVote 464 and our MicroVote Infinity. Accordingly, we recommend adoption of paper ballots

verifiable by the voter and processed by means of optical or digital scanners. (See Appendix D for notes on optical and digital scanners.)

Incidental advantages of a paper-ballot system are that it is not subject to overload by crowds at the polls, since voters may mark their ballots wherever there is space and privacy, then quickly put them into the scanner, a process that normally takes 3-5 seconds. A second incidental advantage is that in the event of a scanner breakdown, voters can continue to mark and secure their ballots, to be scanned later, without waiting for the repair or replacement of the scanner.

In our recommended system, a typical polling place would offer ballots, marking implements, and places where the voter can mark the ballot in private. Check-in with the clerks would include ballot distribution. The voter could mark the ballot anywhere within the polling place that ensured privacy, then would feed the completed ballot into the scanner, which would immediately process the ballot and either accept it and store it in a locked compartment without further ado or reject it with further instructions to the voter in the case of overvotes or other such problems.

For impaired voters, an electronic ballot marker would allow them to express their choices in a manner appropriate to the impairment and then produce a marked ballot that the voter would put into a privacy envelope and deliver to the poll worker for storage in a secure compartment to be processed later by the scanner. In this system, all voters create a paper ballot and all votes are thus equally auditable.

This system would require for each polling place both a scanner and an electronic ballot marker for voters unable to mark ballots manually, plus some means of creating multiple booths for privacy. Election headquarters would have some combination of software and hardware able to read, compile, and display the data stored on scanner memory cards.

**Recommendation #2: Whatever voting system is adopted or in place, a complete protocol should be developed and implemented for routine pre-election testing of machines.**

Before conducting an election, counties are required by law to select randomly three precincts and pre-test the electronic voting machines to be used in those precincts. Indiana Code 3-11-14.5-1. This limited testing does little to ensure that all ballot styles are programmed correctly and all machines will perform accurately in each of our 67 precincts. The best practice would be to test each machine in each precinct.

**Recommendation #3: Whatever voting system is adopted or in place, a complete protocol should be developed and implemented for post-election auditing of results.**

Routine auditing should be conducted after every election. After the polls close the electronic totals should be published right away. However, they should be proclaimed as unofficial results until the conclusion of an audit that compares them with totals based on a hand count of paper ballots chosen at random. Should they fail the audit, a hand count of all ballots would be necessary, as well as an investigation of the cause of the failure.

Audit procedures should be adopted, based on best practices, to ensure that the audit will engender public confidence, detect errors and tampering, and provide feedback for improving future elections. Best practices in developing an audit system might be drawn from the report, *Post-Election Audits: Restoring Trust in Elections*. (See Appendix B, page 17; see also Appendix E for notes on auditing.)

**Recommendation #4: Whatever voting system is adopted or in place, a complete set of guidelines should be developed and implemented for designing ballots that are clear to read and easy to understand.**

No vendor should be accepted without some assurance of local control of graphic design. We say this because every sample ballot displayed by vendors compromises legibility and risks voter confusion, by violating basic principles of graphic design. A universal example is the mistaken use of all-capital letters instead of caps in combination with lowercase letters. Another common error is misalignment: candidates' names did not line up with their respective checkmarks. (See Marcia Lausen's *Design for Democracy: Ballot + Election Design*, University of Chicago Press, 2007.)

#### **Short-Range Recommendations: 2009—2011**

**Recommendation #5: By the 2010 primary election, resources should be committed to making all of the machines currently owned by the county usable, a task which MicroVote estimates could be done for under \$10,000.**

The certification process at the federal and state levels is sufficiently slow that it is impossible to gather information on all systems that will be certified by October in time to make careful decisions for the 2010 election. We therefore recommend investing in refurbishing the MicroVote 464 machines and continuing to use our current system for Election Day voting for the 2010 election cycle.

**Recommendation #6: For the 2010 primary election, we recommend a newly-designed paper ballot for use in all early and absentee voting and the purchase of an optical or digital scanner with software necessary for processing this ballot, as a test of the system envisioned for eventual purchase.**

As a practicable first step toward the envisioned system, we recommend the adoption of a new paper ballot to be used by all early and absentee voters of Monroe County,

formulated with the advice of local graphic design experts. Eventually all voters will use the same paper ballot, but in 2010 precinct voters on Election Day will use the MicroVote DREs already on hand, the 464 and the Infinity. Only early and absentee voters will use a newly designed ballot, a single sheet of paper, printed on both sides if necessary, with mark-sense fields (e.g., “bubbles”) appearing next to the candidates’ names.

The processing of this new ballot will require the acquisition of a new kind of optical/digital scanner, for use in election central, that can read both sides of the ballot simultaneously. Certified scanners of this kind are already on the market. Two such scanners should suffice, one to serve as backup.

We hope that in the future all precinct voting places will use the same ballots and scanners as those described above. At that time Monroe County will have taken a momentous step away from our complex, hybrid system of multiple machines and ballots—the most costly kind of system—toward a simpler system much to be preferred in terms of cost, transparency, and auditability. In the meantime, the changes proposed for 2010 will give us a chance to pretest the envisioned system on a modest scale and evaluate its practicality and its public acceptability. It will also enable us to test its accuracy, because we propose to conduct a rigorous audit of the new scanners by hand counting a random sample of early and absentee ballots. We expect our proposal for 2010 would also allow us to compare various ways of hand counting paper ballots in terms of efficiency and accuracy.

**Recommendation #7: Monroe County should commit to adding annually to the funds set aside for voting machines in 2009 in order to purchase an envisioned new system and have it ready for implementation by the 2012 primary election.**

As the Commissioners acquire detailed cost information on Indiana-certified voting systems, budgeting can be planned for the next two years in preparation for purchase of machines in 2011 to implement the new system for the 2012 primary.

**Recommendation #8: For the 2010 primary election, we recommend that an audit protocol be developed for the voter-verifiable paper ballots to be used in conjunction with the new scanner.**

Audits ensure that the voter’s intent is what is actually reflected in reported results. Audits have not been done under our current system because we have no tangible evidence of voter intent but only tapes from the machines that are assumed to have registered that intent accurately. We have, however, no way of knowing that they have done so. By using voter-verifiable paper ballots, we create tangible evidence of voter intent, and by hand-counting a sample of the ballots we ensure that their intent was registered accurately. Introducing a system of auditing in Monroe County will not only assure voters using paper ballots that their votes have been counted as they wished but introduce voters at large to a voting system with transparency and accountability.

