Elections: Guaranteeing Integrity

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Brief Course Description:

Elections are the only mechanism by which citizens can hope to maintain effective control over their government. It is obviously crucial that elections work well. Equally obviously, elections have ***not*** been working at all well. It is both critical and urgent that airtight integrity of elections be achieved and maintained. Citizens must always be able to trust election results *implicitly*. With the proper and careful use of modern technology, it should be possible to have accurate, final, trusted results within a half hour of polls closing. Why are we waiting days or even weeks for results that many do not trust? In this course, you will learn what is required to achieve such a high level of integrity, where there are deficiencies and what is necessary to get our house in order.

Lesson 1: Background and Current State of US Election Integrity

What on Earth is wrong with the United States of America? Millions of people do not trust the results of elections. Worse, there seems to be no satisfactory way to prove to them that there was no fraud. All the turmoil is highly disruptive and exacerbates polarization. It is prima facie evidence that election integrity is inadequate.

It is critical that election integrity be so airtight that no one would think it necessary or worth their while to question results. In the event that there should be any question, it must be possible to conclusively and reasonably quickly prove that results are correct. One would expect this to be the case here in the modern cradle of democracy. Sadly and dangerously, it is not.

Beginning with the nation's founding and continuing until the late twentieth century, the overall trend was toward improving election integrity. Concern for integrity was virtually universal. When problems were identified, they were fixed. A seminal event was the realization in 1880 that it was quite important to guarantee a completely secret ballot to prevent coercion of voters and outright vote buying.

The highest integrity was achieved during the several twentieth century decades when nearly all voters voted using hand-marked and hand-counted paper ballots at polling places which ensured ballot secrecy. But since then, integrity has declined at an accelerating rate.

The decline, beginning in the late twentieth century and continuing into the twenty-first century, was caused by attempts to improve efficiency through the use of modern technology. Many such "improvements" were ill conceived and/or poorly tested and implemented. Examples are the

famous “hanging chads” in Florida and the “DRE” (direct-recording electronic) voting machines which had no audit trails so results could not be verified.

Much more alarming is that the decline in integrity has accelerated in the twenty-first century, caused by measures ostensibly intended to make it easier for people to vote and thereby increase participation. Chief among them are a radical expansion of absentee and mail-in voting, early voting and the use of ballot drop boxes. All of these things not only add cost and complexity to the administration of elections, but also open the door for hard-to-detect and harder-to-prosecute fraud. Complete secrecy of the ballot also is a casualty.

There is no indication that voter participation or turnout has actually been increased by such reckless measures, yet any attempt to tighten up procedures is met with howls of “voter suppression.” The state of Georgia enacted some fairly minor improvements after the 2020 election and was accused of passing “Jim Crow” laws that would crush minority voter turnout. However, voter turnout for the 2022 election set all-time records; so obviously, there wasn’t *any* suppression of voters.

It would be dead wrong to think that other modern democracies pay even less attention to the integrity of their elections than does the US. Generally, the opposite is true. A very large percentage require positive (photo) ID for voters and either do not allow absentee voting at all or have extremely tight controls on it.

Mexico is a particularly interesting case because it had a history of election fraud, but fairly recently implemented very strict reforms. Absentee voting was eliminated. Voters are required to show an ID with a photo *and* their thumb print! To prevent voting more than once, the thumb printed digit is coated with indelible ink. Those crying “voter suppression” may be surprised to learn that, instead of decreasing, voter participation actually increased from 59 percent to 68 percent, which exceeds the turnout for almost any US election. More people made the effort to vote when they had high confidence that their votes actually would determine the outcomes of elections.

Lesson 2: The Requirements for Airtight Integrity

Almost needless to say, if elections become cheating contests where the faction that cheats most effectively always wins, our republic is lost; perhaps permanently.

The difficulty of achieving the necessary level of integrity must not be underestimated. The overall process and every part of it must be carefully thought through. Every step must be engineered to make fraud substantially impossible. It must be extremely difficult and highly unlikely that election results could be nefariously controlled or influenced by any special interest group. If fraudulent manipulation should nevertheless somehow occur, its detection and correction must

be virtually certain. Furthermore, the evidence required for successful prosecution of the perpetrators should be available.

It is not terribly difficult to write down the essential requirements for solid integrity.

1. **List of Registered Voters –** An accurate, current and complete list must be maintained of citizens who are eligible to vote and have registered to do so. The list must, of course, show the voting precinct to which each voter has been assigned.

2. **Positive Voter Identification and Control –** There must be control mechanisms and procedures which ensure that only those on the registered voter list are allowed to vote, and only once in each election.

3. **Durable Audit Trail –** There must be a durable audit trail (e.g. paper ballots) which forms the legal record of voters' intents and supports audits which can verify results.

4. **Guaranteed Secret Ballot –** A completely secret ballot must be guaranteed for each and every voter. There are two aspects to ballot secrecy: 1) If the voter wishes to keep how she voted a secret, that must be possible; 2) If the voter wishes to prove to anyone else how she voted, that must *not* be possible.

5. **Transparency, Supervision and Control –** Other than any brief time when voters handle their own individual ballots, any and all handling of (even including just access to) ballots and/or official ballot tallies must be done *only* under the supervision of election officials and while observers from opposing factions are present and able to closely observe. In order to have confidence in elections, the public needs to have a good general understanding of how elections work and have as much visibility into them as possible.

6. **Machine Verification –** If any output of any machine can affect the election results, each such output must be checked and verified as a part of, and in the course of, normal operating procedure**.**

Following lessons will examine each of these requirements in greater depth.

Lesson 3: Managing Voter Registration Rolls

Airtight election integrity begins with accurate voter rolls. The Help America Vote Act (HAVA) of 2002 requires that states maintain a database of eligible voters who have registered to vote. The basics are elementally simple. Add eligible voters to the database when they register. Remove registered voters from the database when they die or move to another state. Update voters' records when they move to a different voting precinct within the same state. Update voters' records to indicate in which elections they have actually voted.

Registration – When someone applies to become a registered voter, it obviously is important to verify all of these things:

1. Name – A living person by the name given actually exists.
2. Citizenship
3. Age
4. Address – The address is not fictitious and the person actually is currently living there.
5. Uniqueness – The person is not already in the database (at a different address or under an alias, for example).

It is a mistake to short cut or hurry the verification process. Also, accurate, current and complete information must be available at each polling place on election day. Therefore, voters need to register a safe period (say, at least 10 or 14 days) before an election in order to be able to vote in that election.

Some advocate accepting registrations up to, and sometimes even on, election day; that is, someone could register then vote essentially immediately. It should seem obvious to anyone that such a policy compromises integrity. Furthermore, there is no compelling need or problem that would be solved by allowing this. Timely registration is just one very minor additional requirement of good citizenship.

Purging – Even if voter registration is under perfect control, registration rolls can still be incorrect. Voters do relocate occasionally and they also die, sometimes without notice. Consequently, the database must be carefully purged and/or updated, either continuously or at least in advance of each election (HAVA prohibits purging within 90 days of an election). Historically, this has sometimes been neglected, and there certainly are examples of fraud where impersonators have shown up to vote claiming to be voters who had recently passed away.

One method of purging is called "Voter Caging." US registered mail is posted to voters and any returned as "undeliverable" are taken as evidence that the voter should be purged. Often this was done by political parties for voters of opposing parties. If/when such voters did appear to vote, they were challenged. Voter caging is now illegal in several states and some judges have declared the practice illegal.

It can be especially difficult to detect voters who have moved outside a state. To cover that base, a non-profit organization called The Electronic Registration Information Center (ERIC) was formed with the sole mission of assisting states to improve the accuracy of America's voter rolls. It is supported by the 33 states which are ERIC members and users. ERIC maintains a database comprised of voter and motor vehicle registration data from all member states. All states should utilize ERIC.

Purging is not going to be perfect, but it needs to be very, very good if citizens are going to trust elections implicitly. Occasional mistakes are inevitable. HAVA requires that a voter who appears at a polling place and finds that s/he is not on the voter rolls must be allowed to complete a provisional ballot. Provisional ballots are then counted or not counted based upon confirmation of voters' eligibility. This is a good solution and there should be very few provisional ballots.

HAVA also prohibits purging voters solely on the basis of their voting history. However, it does not seem at all unreasonable that, as a "catch all," voters who have not voted in any election for, say, four years be purged and mailed a notification that they must re-register. Ohio implements this policy but combines it with other checks to comply with HAVA.

Lesson 4: Positive Voter Identification and Control

It is an obviously basic and critical integrity requirement that only registered voters be permitted to vote and that each be limited to one vote per election. When voters check in at a polling place, their names are looked up in the voter rolls to be certain they are entitled to vote. As soon as a voter is approved to vote, the records are marked to show that he or she has voted in the current election.

It is equally important to verify that voters are, in fact, who they say they are. The simplest, easiest and most widely acceptable way to accomplish that is for the voter to show a photo-ID (e.g. a driver's license). Requiring a photo ID to vote is nearly universal among all modern democracies. The US, where only about half the states require a photo-ID, is a glaring exception.

A "blue ribbon" commission, known as the Carter-Baker Commission, was formed in 2005 to study US elections and recommend changes and improvements. It was jointly chaired by former president Jimmy Carter (a Democrat) and former Secretary of State James Baker (a Republican). Chief among the commission's very sensible recommendations was the universal use of photo-IDs.

Polls consistently show that roughly 80% of citizens believe that a photo-ID should be required to vote. That is as close to unanimous as polls ever get. Wherever this has not been made law, it clearly is the fault of the elected politicians. Their specious excuse is that this would place an unnecessary burden on voters and result in voter suppression!?

States are beginning a transition from the traditional bulky paper "poll books" of registered voters to electronic poll books. A possible alternative to a photo-ID might then be simply to snap a picture of each voter as they check in. It would be compared to photos of the voter from previous elections which would appear on the screen. This would place absolutely no burden on voters, so it would be interesting to hear what the excuse would be for not doing that.

Wherever photo-IDs are not required, the predominant fallback mechanism employed is some form of signature verification. *Signature verification cannot be relied upon for positive voter*

identification. Worse, it creates a false sense of legitimacy and security. It is worth thinking about this carefully to understand why this is so.

The first problem is that people simply do not always sign their names the same way. Signatures can change radically as people age, suffer from arthritis or perhaps undergo injury or surgery on their writing hand or wrist. The appearance of someone's signature can be significantly affected by the texture of the surface upon which they are writing, the position they are in, whether or not they are hurrying, how they feel and many other similar factors. Trained handwriting experts sometimes have difficulty and in any case require some time (at least 5 or 10 seconds) to make a determination.

During an election, voters frequently must be processed quickly. The poll workers are not trained handwriting experts. Poll workers who would have the confidence to challenge a voter's signature for a mismatch are few and far between. This alone renders the process unreliable, and that assumes the poll worker actually makes an attempt to verify the signature. The next time you check in to vote, watch the poll worker and see if he or she makes any effort at all to compare signatures. It is a rather safe bet that zero time will be spent verifying the signatures of more than half the voters.

Thus far, we have assumed that voters are voting at a polling place. There, it is at least possible to implement positive voter identification. *It also is a sure thing that the voter who checked in will be the person who votes.* But suppose mail-in ballots are being used.

Since voters are not mailed with their ballots, positive voter ID is not possible. As we already know, signature matching is a crap shoot. Imagine tabulators processing thousands of ballots as quickly as possible; not much time to study signatures. Even if signature verification were not a problem, there still is no way to know for sure who actually marked the ballots.

Consider also that workers verifying signatures in a large processing operation could be a vulnerability. A strongly partisan worker processing ballots from a municipality known to vote heavily for the opposition might (either consciously or sub-consciously) reject more signatures. Of course, when processing a municipality known to strongly favor the worker's party it might be a little harder to find any problems with signatures. Such a subtle bias could never be reliably detected, let alone be successfully prosecuted. Whether it ever actually happens or not, it is the kind of vulnerability that just cannot exist if citizens are ever going to trust results implicitly.

Clearly, there is no way mail-in voting can be made to satisfy this requirement. That should be sufficient reason to prohibit its use. However, we will learn in later lessons that mail-in has even greater problems with some other requirements.

Lesson 5: Durable Audit Trail

There must be a durable audit trail which forms the legal record of voters' intents and supports audits which can verify results. The customary, and still quite satisfactory, way of accomplishing this is with a paper ballot that is a record of each voter's choices. Citizens need to be confident that, if there is any question about the results of an election, there is a guaranteed way to resolve it. An audit or recount will either verify the original result or provide a way to correct it. Audit trails (including all pertinent or related records) should be sealed and saved for at least two or three years after each election.

It is extremely difficult to audit an entire election at one time; it's hard to manage and there is a high probability of mistakes occurring during the audit. It may be hard to have a high confidence in the audit! This is yet another strong reason favoring voting at polling places with 500 to 2,500 voters assigned to each. Such a small isolated unit can be audited quickly and with very high confidence. The total time and effort to audit all polling places would be less than would be required to audit the entire election as a whole.

Even if election outcomes are not challenged, it is a good standard practice to audit a small number of randomly selected precincts. If significant problems are discovered, the audit would be expanded, perhaps to a total recount. Another similar approach is a risk-limiting audit (RLA). The statistical basis for RLAs is beyond the scope of this course. The concept is to audit a small number of randomly selected ballots to gain an acceptably high confidence that the outcome of a given race is correct. Close races will require a larger ballot sample than races with large margins of victory to achieve the same confidence level. If the ballot sample does not support the result of the race, additional ballots need to be examined which may lead to a complete recount. RLAs are now required in a few states.

Of course, suspicions or accusations of fraud should be decisively resolvable by audits. Audits assure election integrity and their availability builds citizens' confidence. One of the worst blunders in this regard was the (one has to believe thoughtless) adoption of the "DRE" (Direct Recording Electronic) voting machine. The DRE had no audit trail. The machine had to be trusted. People don't trust machines, nor should they, so election integrity took a major hit. Thankfully, the DREs have been phased out as a result of the passage of laws requiring durable audit trails.

Lesson 6: Guaranteeing a Completely Secret Ballot

Of course, *all* of the requirements are essential to attaining adequate election integrity. However, guaranteeing a completely secret ballot is both critically important and quite difficult to achieve in practice. It must not be possible for any person, other than the voter, to know for sure how a voter voted. The easier part of this is that, if a voter does not want anyone to know how s/he

voted, it must be possible for the voter to keep that information secret. The hard part is that, even if a voter *wants* to prove to someone else how they voted, they must *not* be able to do so.

Everyone readily agrees that they should be able to keep how they voted a secret if they wish to do so. However, the second equally important secret ballot requirement tends to be forgotten. The reason voters must not be able to prove to anyone else how they voted, *even if they want to do so*, is that it exposes voters to possible coercion to vote a certain way, and it flings the door wide open to vote buying. And yes, those things can and do happen if it is possible.

Coercion could be as simple as a domineering spouse dictating how their mate should vote. Vote buying is the greater threat and has myriad variants. South Carolina was the last state to recognize the importance of the secret ballot and adopted it in 1950 because of significant vote buying. The percentage of people voting dropped by about 12 percent when the gravy train ended, indicating that fraud had been even more widespread than thought.

France banned absentee ballots completely in 1975 when rampant vote buying was discovered on Corsica. It should be totally obvious that voters can easily prove how they vote with absentee or mail-in ballots simply by showing someone their ballot or photographing it. There is no way to this can be effectively controlled. Although there are many other very good reasons to not allow mail-in voting, the lack of ballot secrecy is the most obvious and dangerous. Mail-in voting renders vote buying both extremely easy and very hard to detect.

When voters vote at a properly staffed and managed polling place, there is at least a good possibility that a completely secret ballot can be guaranteed. When voters vote in the privacy of a voting booth and then directly drop their ballots into a ballot box, each voter is the only one to see their own ballot. If voters wish to keep how they voted secret, they certainly are able to do that. But what if a voter *wants* to prove to someone else that they voted a certain way? Thanks to progress and modern technology, that's a lot easier to do than it used to be.

Imagine a vote purchaser intercepting voters in the parking lot on their way into a polling place. After negotiating the price, the purchaser hands the voter a cell 'phone containing instructions on how to vote or just a picture of a sample ballot filled in the way the voter is to vote. The voter uses the same 'phone to snap a pic of the actual completed ballot while in the booth. The voter returns the 'phone to the buyer, the buyer verifies that the voter voted as agreed and hands the voter a cash payment. This type of operation might be relatively easy to detect and prosecute, but individual voters using their own cell 'phones clearly would not.

It must be illegal for anyone to possess any device capable of capturing and/or transmitting an image or facsimile of a ballot while in the voting booth or ballot box area of a polling place. Penalties must be stiff, even for first offenses, and enforcement must be taken seriously. Notices

should be prominently posted. Provisions could be made for people to check their 'phones at the door and reclaim them on the way out.

Note that federal and state laws in all fifty states already prohibit vote buying. There are stiff penalties for both the buyer and the seller. These laws alone are not going to prevent this type of fraud, especially not with mail-in ballots. When political organizations are willing to spend more than a hundred million dollars just to influence one senate race, the motivation to buy votes as a more sure-fire and lower-cost alternative obviously is intense. Vote buying needs to be made as impossible as possible or it is going to happen, regardless of its legality.

Lesson 7: Transparency, Supervision and Control

Everything about elections should be as transparent as possible, except of course, how any specific voter voted. Such transparency would be of little value, however, if voters do not understand how elections work. Therefore, it is important to comply with "The Jones Rule." The Jones rule is named for computer science professor Douglas Jones (U. of Iowa) who stated it so succinctly: **Everything about elections should be understandable by a reasonably bright high school student.** Voters cannot be expected to trust anything they cannot understand.

Every step of every process must be engineered to make fraud substantially impossible. It must be extremely difficult and highly unlikely that election results could be nefariously controlled or influenced by any special interest group. If fraudulent manipulation should nevertheless somehow occur, its detection and correction must be virtually certain. Furthermore, the evidence required for successful prosecution of the perpetrators should be available.

Every operation (other than a voter's handling of his or her own ballot) that could affect an election's outcome must be supervised by trained election officials and must be closely observable by observers from opposing factions; preferably, also the public. It should be obvious that there must be no exceptions to this as even one exception is enough to engender doubt and destroy trust. Some of the operations that must be so controlled are:

- Identification of voters and verification of their eligibility to vote
- Guaranteeing that the voter who checked in is the person who completes a ballot
- Any handling of ballots, including counting and verification
- Any transport or storage of ballots between operations
- Any handling, transport or storage of ballot tally information prior to its publication

Achieving and maintaining the required level of supervision, control and transparency is difficult. The difficulty increases rapidly as the time period over which controls must be maintained is made longer. The difficulty also increases rapidly as the spatial area, the number of people or the complexity of the operations is made larger. It follows that all such critical operations should be carried out in a small area, with the fewest people and over the shortest possible time period.

This requirement, as is true for some of the others, is best met by having a manageable number of voters (say, 500 to 2,000) vote in each properly staffed and managed polling place. The physical setup is prescribed, and carefully thought-through procedures are followed as established by law. A Judge of Elections is in charge. Poll workers assist. Watchers from opposing factions can watch. Polling place personnel are trained on the procedures.

Video surveillance of polling places is a good idea; a copy would be sealed and preserved with the ballots. Obviously, it must not be possible to read the choices on any ballot, but observing the movement, flow and activities of people could be quite helpful evidence in the event of audit discrepancies or suspected fraud.

Although it should be unnecessary to state, it must be said that mail-in voting cannot meet this requirement. Mail-in ballots float around the countryside for at least days, more likely weeks. They are handled by an unknown and unknowable number of unknown people. When returned, they are handled by more people who validate and count them. The opportunities for serious problems are too numerous to discuss. Some of the ways to manipulate elections that are possible when perpetrators have plenty of time and no one is looking are very hard to detect and harder still to prosecute.

Transparency, supervision and control difficulties explode exponentially with mail-in and also with large mail-in ballot counting operations, especially ones spanning multiple days and requiring safe overnight storage and lots of handling of ballots. Even if, miraculously, no fraud occurred, fraud would often be suspected and there is no conclusive way to prove that it didn't happen. Citizens could not *implicitly* trust their elections, which would be endlessly disruptive, just as it now is.

Lesson 8: Machine Verification

People don't trust machines. They are quite correct to not trust them. No one can guarantee that any machine at least as complicated as a paper stapler will work correctly 100% of the time.

Modern machines are way far more complex than a paper stapler. They almost inevitably depend for their operation upon a digital computer. Digital computers are extremely complex, and worse, they are controlled by complex "software" (or "firmware") that can be modified fairly easily. Software can be defective; that is, contain mistakes (known as "bugs") which can cause malfunctions. Bugs are accidents. But software can also be intentionally modified in subtle and hard-to-detect ways that could fraudulently affect election results.

The customary way to ensure that machines used for voting have a very high probability of working correctly through an entire election day is to rigorously test them before approving them for use. State agencies are responsible for "certifying" voting machines. Such certification processes were satisfactory for the older and simpler electro-mechanical voting machines.

However, advance certification is not at all sufficient for modern digital hardware/software machines and can only create a false sense of security. Of course, rigorous testing in advance is still necessary to avoid the possibility of disruptive system failures on election day. But it can no longer adequately assure integrity for two reasons.

First, it is possible to engineer a system that will pass testing with flying colors, and yet still manipulate voting on election day. Recall the fairly recent case where Volkswagen scurrilously engineered the software that operated its vehicles to detect when its emissions were being measured. The software tweaked engine operation to minimize emissions during testing. At all other times the software operated the engine to achieve maximum performance, even though emissions then exceeded legal limits.

Second, and more likely, the software could be nefariously replaced or modified at any time after certification testing. This could happen during machine storage, transport or whenever it is connected to a network, either before or even on election day (network connections can be wireless and invisible). There would be no obvious evidence of such software modification. Of course, it should be possible to develop rules and procedures that could minimize the opportunities for fraud and provide some reasonable assurance of machine integrity. However, a significant number of voters are bound to question machine integrity and there is no quick and conclusive way to prove to them that all machines are indeed functioning properly.

Unfortunately, there is yet one more problem standing in the way, and it's a serious one: The Jones Rule. There simply is no way that a large majority of voters are ever going to be able to understand these highly complex machines. A lack of understanding is a lack of transparency that inevitably engenders a lack of trust.

Does all this bad news mean we have to forego the huge advantages that modern complex machines can provide? No. It just means we have to be extremely careful to properly engineer the overall election system that the machines will be a part of. We need a new rule to govern that. **Each and every output of a machine that could affect the outcome of an election must actually be checked and verified routinely as a part of normal operating procedure.**

If every machine output is indeed verified, we can guarantee that any mistake, whether just a machine malfunction or an attempt to fraudulently manipulate the election, definitely *will* be caught and can be corrected. This is something that all voters can understand and trust. It takes the machine complexity (and all its unavoidable risks) right out of the picture and renders it irrelevant.

Checking and verifying each and every machine output (that could affect election results) sounds so onerous and burdensome that it could obviate the advantages of machine automation. That is

not necessarily so. One system complying with this new rule already exists. It awaits further testing and acceptance into service. Here are the basics of how that system works.

Voters vote in the customary private voting booth, choosing and selecting candidates for each race using a computer touch screen. After making and checking their selections (as often as desired), voters touch a "Cast Ballot" button to finalize their ballots. A clear and simple plain paper ballot is printed showing the candidates they have selected in each race. There is nothing on the ballot that the voter cannot read and understand.

Voters are instructed to read and carefully check their ballots. If there is any problem with the ballot, voters can touch a "Ballot NOT Printed Correctly" button which will summon the Judge of Elections and a poll worker to immediately resolve whatever the issue may be. If the ballot is correct, the voter touches a "Ballot Printed Correctly" button. Each voter then takes the paper ballot that they have verified to the customary ballot box and deposits it there on the way out of the voting booth area.

When the polling place closes, the machine produces a text file which is a list of every ballot cast in a random order, including the selections made on each ballot. The text file is in a well-known, widely-understood and widely-used format called XML (Extensible Markup Language). XML files can be read both by humans and by computers. The XML ballot list has triple redundancy and also has quadruple tamper protection. There is no way to prevent someone from tinkering with or modifying such a file, but the tamper protection means that any modification(s) will be obvious and easily detected.

Each polling place posts its list of ballots publicly on the Internet ASAP after closing. There is no way anyone can tell which voter cast any particular ballot, so complete ballot secrecy is guaranteed. A computer anywhere can read and tally the ballots from all polling places. Anyone anywhere can verify the tally, even by a tedious hand count, if desired. Final election results, including all write-in votes, can be available a half hour after the polls close.

There are only two outputs from the machine that can affect an election outcome. The first is the ballot that is printed for each voter. Each one of those is immediately checked and verified by the voters themselves. The second is the list of ballots (and the selections thereon) that is produced when the polling place closes. The ballot list can be positively verified by matching up the ballots from the ballot box, one-to-one, with the list. This can be done later or immediately by the polling place crew before sealing a copy of the file with the ballots.

Some of the many advantages are:

- Every machine output is actually checked and verified as normal procedure. Voters can easily understand the procedure. Thus, they are able to implicitly trust election outcomes without having to understand how the machine functions.

- Complete secrecy of every ballot is guaranteed.
- Transparency is maximized. All polling place procedures are simple and understandable. Every choice on every ballot from every polling place is made publicly available immediately after the polls close. Therefore, election results can be verified by anyone anywhere using any method.
- Efficiency is greatly improved by automation and opportunity for fraud is minimized.
- The currently available system supports a choice of voting methods. The Plurality, the BAWV (Best, Alternate, Worst Voting) or the AADV (Approve, Approve, Disapprove Voting) method can be selected for each election.

Many mistakes have been made through the improper use of technology for voting systems. However, there is every reason to utilize the most modern technology if it is carefully and properly done. In fact, elections could have and should have been benefiting from such automation for the past quarter century.