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General Observations

The primary premise behind the creation of the 2007 VVSG is the belief that these standards will be enforced when they become active in 2012. Five years of recent evidence indicate this will not be the case. Current, known violations of the 1990 and 2002 voting systems standards have resulted in no sanctions or recalls for the deployed systems that were approved under those standards and yet exhibit such defects.

The second premise is that the design requirements laid out in the various Voluntary Voting System Guidelines can be considered in isolation from the rest of the EAC structures being created, such as the Quality Monitoring Program, the Testing and Certification Program, and the National Voluntary Lab Accreditation Program for Voting System Test Labs. These structures as currently designed do not work together and, in fact, seem to have been designed, each in isolation from the others. I would urge the Election Assistance Commission, the National Institute of Standards and Technology, and the Technical Guidelines Development Committee to consider as a whole the various pieces and parts of the proposed regulatory framework of elections.

Enforcement Concerns

The EAC has neglected its HAVA mandated role to be a clearinghouse of information on voting systems. This duty is laid on the EAC under Section 202 paragraph (3) of the Help America Vote Act which reads:

> *The Commission shall serve as a national clearinghouse and resource for the compilation of information and review of procedures with respect to the administration of Federal elections by —*
> > *(3) carrying out the duties described in subtitle C (relating to conducting studies and carrying out other activities to promote the effective administration of Federal elections);*

Subtitle C is entitled [emphasis mine] *Studies and Other Activities To **Promote Effective Administration of Federal Elections,*** and the pertinent portion of subtitle C to the EAC role as a clearinghouse is Section 241 paragraph (a)(2) which reads:

> *On such periodic basis as the Commission may determine, the Commission shall conduct and make available to the public studies regarding the election administration issues described in subsection (b), with the goal of promoting methods of voting and administering elections which –*
> *(2) will yield the most accurate, secure, and expeditious system for voting and tabulating election results;*

Presently, the only clearinghouse of information on actual system faults found in currently fielded voting systems is maintained on a volunteer basis by VotersUnite and can be found on the website http://www.VotersUnite.org. In the last year, the EAC has been notified of at least two serious defects found in voting systems used across the county, and in both cases the EAC declined to warn affected election officials of the existence of these defects. The first defect is the smoothing filter problem found on the iVotronic touch screen DRE. While this problem was discovered in Florida, the particular version of iVotronic software is used around the country and in Taylor County of my home state of Wisconsin. The town and municipal clerks are unaware of the smoothing filter defect found in the software they use to administer elections. The second problem that the EAC has declined to publicize is the scanning defect in the AccuVote OS manufactured by

Premier Election Systems. With this defect, the paper ballot is fed into the front of the scanner and deposited in the lock box below without registering that a ballot has been cast. This defect was reported by Premier itself as a product advisory, but only to selected counties in Florida. This particular system fault is of particular interest to me because I observed the fault in both the November 2, 2004 and April 5, 2005 elections in my home voting location: District 1 of the village of Germantown, Wisconsin. My village and county clerk deserve to be told that there is a known defect in the voting system they have chosen to administer elections. Prior to these two faults was the discovery of interpreted code in both the Diebold scanner and DRE systems. Interpreted code is explicitly prohibited by the 2002 VVSG. Each of these defects can and have led to inaccurate election results.

Recently, VotersUnite has begun tracking a new category of system fault. Section 301(a) of HAVA has few requirements for a voting system used in a federal election, but one of them is the accuracy requirement found in §301(a)(5). This paragraph of HAVA requires a voting system have a maximum error rate of no more than one error per 500,000 ballot lines scanned. VotersUnite's tracking so far shows that this accuracy requirement has been violated by systems from at least four different manufacturers.

The official position of the EAC is that since these faults are in systems which are not certified by the EAC, the Commission has no duty to report on such systems. Since the EAC has taken no action on reported violations of §301(a)(5), it appears that the Commission also believes it has no duty to decertify systems that violate HAVA mandates.

The EAC will not carry out the simplest of its HAVA-mandated duties: reporting on currently fielded voting systems. It is truly faith (the belief in things not seen) which would lead one to believe the EAC will do the much more difficult task of enforcing standards.

Isolation of Technical Programs

Elections take place in a complex technical, social, political, and legal environment. The consideration of the VVSG is on the purely technical aspects of voting machinery. This is a mistake. This fragmenting of duties and isolation regarding the technical aspects will be taken up in more detail below.

On the wider, non-technical aspects of elections and the voting machinery used to administer them, consider Sarasota County , Florida. During .the November 6, 2006 election in Sarasota County, Florida, 18,000 votes for Congressional District 13 are unaccounted for. The speculation of the Supervisor of Elections of Sarasota County is that 18,000 voters deliberately skipped this high profile race. The speculation of one candidate, Christine Jennings, is that the voting machinery faulted in some manner which resulted in the loss of the votes cast by 18,000 voters. Unfortunately, the voting machinery in question is so poorly designed that it provides evidence that supports the speculation of either the Supervisor of Elections or the contesting candidate. Moreover, there is no way to resolve this uncertainty, so the question can only linger and fester.

Had the technical community recognized the larger social, political, and legal context of elections, this uncertainty could have been eliminated. If an election is to capture the complete spectrum of possible consent options from the governed, then the ballot should contain options for:
- Pre-printed candidates (or their electors)
- Write-in candidates whether certified or not
- None of the Above; New Election (i.e. neither candidate is acceptable)
- None of the Above; Abstain (i.e. either candidate is acceptable)

Under the Times and Manners clause of the Constitution, Congress could require for all federal contests that all consent options be present and that a voter in a federal contest must select one and only one of the consent options available. Every voting system currently fielded today can implement this requirement. Had such a requirement been in place on November 6, 2006, then there would not have been any uncertainty in Sarasota County Florida. Either there would be 18,000 missing votes (a clear system fault) or there would be 18,000 votes distributed among the write-in option and the two NOTA options.

This is not the official position of VotersUnite, nor is it a recommendation from VoterUnite. The "none of the above" options described above are meant simply to illustrate that by recognizing the limits of the technology, it is possible to use the social, political, and legal aspects of the election environment to create a working election system.

But, this solution begs the question: What is a working election system? This is not a question American society has asked in over 100 years. The problem with the current VVSG structure is that it is assumes there is a consensus on what constitutes a working election system. Moreover the TDGC assumes the definition of a working election system largely ends with the hardware and software of the election machinery used to administer an election. Because of this there is little to no integration of the 2005 or 2007 VVSG with the Testing and Certification program developed by the EAC. Because of this there is little to no integration of the 2005 or 2007 VVSG with the National Voluntary Laboratory Accreditation Program for Voting System Test Labs developed by NIST.

For example, the handbook NIST-150b states that the lab accreditation program can be made more stringent based on the defects reported to the Quality Monitoring Program or a change to the underlying standards. The Quality Monitoring Program, though, has such a narrow definition of "anomaly" that it is unlikely any entry will ever be reported to the program. The open ended testing proposed by the VVSG assumes that the Voting System Test Labs will provide the information to the EAC in its role as a clearinghouse and that the EAC will provide information to the VSTL from its Quality Monitoring Program. Since the database for the EAC Quality Monitoring Program is likely to remain empty, there will be no information upon which the VSTL will have the authority to conduct the open ended testing allowed by the VVSG.

Because the pieces and parts of the proposed regulatory framework (VVSG, NVLAP, VSTL, and the EAC QMP) do not mesh, none of the pieces and parts will work as expected, if at all.

Responses to Roundtable Questions

I am pessimistic that the currently proposed election regulation framework will improve election management. The current standards in force, 2002 VVSG, have already been violated by currently fielded voting technology qualified under those standards. The 2007 VVSG (more properly the 2008 VVSG) cannot affect the voting technology of an election until at least 2012. More likely, there will be no effect until 2014. Such a long lead time between the specification of requirements and deployment to the field nearly guarantees failure.

Risk Assessment

The essential elements to consider in assessing risk for malicious action are a threat model and an attack surface. A threat model is an assessment of what kinds of threats are posed by which classes of attackers. The attack surface is an assessment of the kinds of interfaces to the system and how interactions with those interfaces affect system behavior.

The essential elements to consider in assessing risk for non-malicious action are a failure mode analysis and a reliability analysis. A failure mode analysis is an assessment of all the ways the system can fail, and a reliability analysis is an assessment of the likelihood of each failure mode.

These are two kinds of risk: malice and mistake. For each risk, there is already a well established framework for making the risk assessments. That the best practices of neither the security community (risks posed by malice) nor reliability engineering (risks posed by mistake) has been applied to election technology is a testament to how ill-conceived the technological mandates of HAVA have been implemented.

Open-Ended Vulnerability Testing

Open ended vulnerability testing is very valuable in a software system that is also expected to be either a high reliability system or a highly secure system. Election software systems are expected by many to be both highly reliable and highly secure. Any of the risks associated with performance of the open ending testing are more than outweighed by the benefits such testing brings by uncovering defects which compromise security or reliability. The smallest benefit such testing brings is simple information on how a system is unreliable or how a system is vulnerable to manipulation. In the case of administration, knowledge is power. If you are unaware of a failure mode or manipulation potential, you will neither watch for it nor guard against it.

While the inclusion of the open ended vulnerability testing in the 2007 VVSG is a welcome addition, there is no need to wait until 2010 or beyond to perform such testing. The EAC has had the authority since 2002 to conduct and supervise such testing. Section 241(b)(19) of the Help America Vote Act has already given the EAC the authority to conduct or to sponsor such testing at any time since the legislation was enacted.

The best way the EAC could enact open-ended vulnerability testing is to immediately sponsor the work of the University of Connecticut, Princeton, MIT, UC Berkeley, and others that are already doing the open ended vulnerability testing the EAC claims it wants to conduct.

Test Methodologies

Test methodologies already exist which would ensure voting systems are high-reliability systems. High-reliability techniques are used in both avionics and health care. Until such methods are applied to voting

technology, voting technology will continue to be poorly designed and unreliable. Until it is recognized that failed election administration carries risks at least as high as failed medical or avionics technology, there will be no incentive to apply the proven techniques of high-reliability design to election technology.

Conflicting Needs

The perception that there are conflicting design goals for voting technology stems from the fact that Americans as a body politic have no consensus on the virtues to be preserved in an election or a consensus on the priority of those virtues. Here are examples of virtues for an election, presented in no particular order.

- Observable by Citizens
- Re-countable
- Auditable
- Accurate – Correctly identifies and reports votes
- Correct – Correctly administers applicable election law
- Usable – Election Official
- Usable – General Voter
- Usable – Voter Language
- Usable – Physical Disability
- Usable – Cognitive Disability
- Secure from Manipulation – Election Officials
- Secure from Manipulation – Political Parties
- Secure from Manipulation – Voters
- Secure from Manipulation – Other

The needs are conflicting to the technology design because there is no consensus in the larger social, political, and legal worlds as to what is a successful election. It is not the place of the TDGC to balance these needs and election virtues. An evaluation of the technical options available cannot be made until a rough consensus in the political, legal, and social world has emerged.

Conclusions

The 2007 VVSG is part of a continuing pattern of distracting attention from current problems in election administration by proposing a technological fix to a failed technology and then postponing the deployment of that new technology to the distant future. Five years in elections is the distant future. The current 2005 VVSG is already obsolete. This new standard applies to no system currently on the market. But, because the 2005 VVSG does not .incorporate the latest information discovered over the last year by open ended testing done by volunteers and states, voting systems can carry these known defects forward and still meet the requirements of the 2005 VVSG.

To a large degree technology is not the solution to the problem. Technology is the problem.

The Election Assistance Commission has the authority *NOW* to alleviate most of the election administration ills addressed by the 2007 VVSG.

The EAC can and should document known defects found in currently fielded systems. The EAC should publish those defect reports on a public web-site. The EAC should also pro-actively contact the affected jurisdictions when a new defect is discovered. In short, the EAC should be a clearing house for information on election technology used to administer elections. This is one of the primary duties the Congress mandated to the EAC via the Help America Vote Act. It is a duty the EAC has yet to fulfill.

The EAC can and should exercise its authority under §241 of the Help America Vote Act to sponsor and expand the open ended vulnerability testing already being done on a volunteer basis by citizens and universities.

In short, even if the 2007 VVSG specified high-reliability technology, the fact is that the EAC is unlikely to enforce the standards. Because of this, some time in 2015 we will realize the 2007 VVSG was a wasted effort and that we have lost 5-7 years engaged in yet another dysfunctional voting system certification process. We can better spend this time addressing, and possibly improving, election administration in the context of political, legal, and social realities.