

Testimony for the Election Assistance Commission

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Thank you for the opportunity to provide written comments in response to the accessibility and usability questions posed.

1. *Are there emerging broad themes in the accessibility and usability community that should be discussed as an overview for this discussion? For example new research, new methods, new technology.*

Unfortunately, most if not all of the new, cutting edge assistive technology developments are electronically based. With the security concerns over electronic media being used in voting systems, it will be difficult to utilize new developments in assistive technology to provide increased access in voting systems. While my interest is primarily in ensuring adequate and efficient accessibility of voting systems for people with disabilities, I would be remiss if I did not point out the significant complications that have been introduced for accessibility by a return to paper ballots. If indeed paper ballots are the short-term (and perhaps even the long term) solution to security concerns, then the options for expanding accessibility are correspondingly limited and complex.

2. *What are the overarching usability concerns in voting systems? What are the overarching accessibility concerns in voting systems? Is there an intersection of these concerns?*

My area of experience and expertise is accessibility, not usability. As a result, my comments overall will be focused on accessibility. However, I would like to provide some background on the distinctions between accessibility and usability as related to individuals with disabilities and HAVA legal requirements.

Accessibility and usability are obviously interconnected, and it is highly desirable to have a voting system that is both accessible for people with disabilities and usable by all voters including those with disabilities. While interconnected, it is critical to understand that "accessibility" is a legal requirement that has already experienced court challenges. HAVA Section 301(a)(3)(A) requires one "accessible" voting system per polling place. As a result there must be a legally defensible mechanism for determining when a voting system meets HAVA requirements as "accessible." The Department of Justice, along with years of disability case law, indicates that conformance to a set of nationally accepted access standards is the mechanism used by courts to verify that something is "accessible." Personal perspectives about how a voting system was or was not "usable" for one or more individuals with disabilities, does not translate into verifying a system is "accessible" in legal challenge. Too often vendors, election officials, and advocates have used subjective opinions of a few individuals with disabilities regarding "usability" as accessibility verification. When technical standards for accessibility were applied to the same voting system, a far different picture of accessibility resulted.

Usability of a voting system by all voters is obviously important. Conformance to technical accessibility standards is a critical underpinning for usability by individuals with disabilities.

Valid evaluation of usability by individuals with disabilities will require adequate representation of a wide range of type and degree of functional limitations along with varying skill and experience levels with assistive technology. While it is not impossible to assemble a group of individuals with disabilities that can reasonably represent the nuances of the population to complete usability testing, it will require a significant investment of resources. As a result, this kind of evaluation is best done at a national level rather than at a state and local level.

3. *Do the accessibility requirements in the Draft TGDC VVSG (ex. Software Independence) document allow individuals with disabilities the opportunity to participate independently? If not, what requirements should be added/removed to the standards document?*

In general, the draft TGDC VVSG makes important improvements in many accessibility requirements. Issues not addressed previously (such as speed control of speech output and synchronized speech and visual display output) now have standards. However, in some cases accessibility has been significantly compromised by proposed standards with ambiguous wording or standards that undermine adequate and equitable access for individuals with certain types of disabilities. The current draft needs a number of additions and edits to ensure a private and independent vote for individuals with disabilities. Two major problems exist in the draft and have been identified multiple times as concerns.

- ▶ Voters with vision disabilities (blindness and low vision) are not ensured access to verification of a paper ballot when that ballot is the official vote record. The lack of a requirement for large print or large visual display for vote verification of all determinative vote records, including paper ballots will disenfranchise a large number of voters who have age related vision and hearing limitations. Requiring only an audio “play-back” of a paper ballot does not provide an acceptable level of access to vote verification.

- ▶ Voters with motor limitations are not ensured access to verification or casting of a paper ballot when that ballot is the official vote record. The standards for independent vote verification and casting by individuals with dexterity limitations are unclear and are consistently misinterpreted to the detriment of accessibility. The standard related to non-manual input does not clearly require switch input which is critical to allow a reasonable range of individuals with disabilities to vote privately and independently.

These issues were identified as problems in 2005 testimony I presented to the EAC and persist today. Section 301 (a)(1)(A)(i) of HAVA requires that each voter be able to: “verify (in a private and independent manner) the votes selected by the voter on the ballot before the ballot is cast and counted”. If a paper ballot is or can be the official ballot of record, voters with disabilities must be able to privately and independently verify the print content of that ballot (including write-in candidates) and cast that print ballot. Those voters must be able to use the same access features to verify and cast the print ballot as they used to generate that ballot. Having fewer or different access features available for vote verification or vote casting as compared to vote generation will not ensure private, independent voting as all three actions must be accessible.

A number of additional issues and recommendations for revisions to specific standards and the overall organization of the draft TGDC VVSG are included in the attached comments that were submitted to the EAC during the on-line comment period.

4. *Accessibility/usability testing is always a concern, and particularly so because, to our knowledge, there are no certification programs which would allow lab personnel to become*

experts in this field. Do any of you have ideas or suggestions on how we obtain qualified testers?

Again, I will focus on accessibility, as usability is not my area of expertise. The only individuals who are likely to have the expertise needed to develop and implement testing protocols that verify conformance to access standards are those who work in the field of assistive technology or accessible information technology. Unfortunately, assistive technology experts come from a variety of professional disciplines, occupational therapy, special education, rehabilitation engineering, etc. Those working in accessible information technology are even more diverse in background and professional discipline.

Development of a set of consistent assessment protocols for those access standards that are measurable would go a long way to supporting the ability of the testing labs to verify conformance with those standards. Those access standards whose conformance relies on "expert observation" will require utilization of some individuals with assistive technology or accessible information technology expertise. Perhaps a pool of such individuals could be identified who are available to provide support to the testing labs.

- 5. Would component testing and certification assist in bringing new and better assistive technology to voting systems? What technologies have you seen that would be useful for voting?*

There are certainly instances where access features can and should be evaluated discreetly. For example, the continuing barrier of manual paper handling during vote verification and vote casting will need to be addressed with some form of automatic paper handling mechanism. Whatever the technological access solution -- it could be developed, tested and certified as a voting system component and deployed with multiple already certified voting systems that generate a paper ballot. While it is unclear if this would bring new and better assistive technology to voting systems, it could definitely bring more timely access solutions to voting systems.

- 6. Are cognitive disabilities addressable in the standard? If so how could they be better addressed?*

Research in Universal Design for Learning (UDL) indicates that the most effective mechanism to address cognitive, information processing, and learning differences is through the use of adaptable media and interfaces, especially those that can be adjusted to meet the unique needs of an individual. Many of the accessibility and usability features in the draft VVSG provide for adjustable input and output. To provide more input and output variants means increasing the user adjustment capabilities within the electronic interface. So long as we continue to have a paper ballot in the mix, it will continue to be difficult to add more adaptations into the interface.

For example, one could certainly use graphemes and/or pictorial media associated with candidates or ballot initiatives to provide support in comprehension and attention. While that is not unreasonable to do for an electronic ballot, to add such representations to a print ballot is more challenging. Great strides are being made in utilization of sign language avatars and similar inserts that could support comprehension of text in ballot initiatives. Again, those kinds of additions would be possible electronically and not possible on paper.

In reality, usability improvements are probably the most critical to increasing accessibility for individuals with cognitive, language and learning disabilities. Intuitive design, readily understandable instructions, etc. are all critical for individuals with cognitive limitations.

7. *Are existing interfaces between vendors and the usability and accessibility communities sufficient for proper design and testing of systems? If not how could this be improved?*

Unfortunately, there appears to be a fairly significant disconnect between the assistive technology community and voting system vendors. I continue to be surprised at the degree to which basic understanding of access features like switch input is lacking within the vendor community. Similar to providing support to the testing labs, perhaps a group of assistive technology experts could be identified as a resource for vendors. Certainly assistive technology organizations, like the Association of Assistive Technology Act Programs (the federally funded network of state assistive technology programs) could assist in this kind of endeavor.

8. *What is your professional assessment of the usability benchmarks in Chapter 3 (attached) of the proposed VVSG? Where are the benchmarks strong? Where can the benchmarks be improved?*

Usability is not my area of expertise -- see relevant previous comments regarding the relationship of accessibility and usability.

Specific Comments on TGDC VVSG Draft (submitted via on-line comment system)

3.1 Overview

The current organization is extremely complex and difficult to follow when trying to determine which standards make up the minimum access requirements for the one required "accessible" voting machine per polling place. The Chapter 3, Section 3 access standards do not include all the required access features for a HAVA mandated "accessible" voting system. Some access features are required by usability standards and other requirements are part of the overall typology structure. Specifically, the typology structure indicates that the accessible voting system (Acc-VS) must have an electronic interface or be a VEBD in the schema used by the VVSG. However, that fact is only implied via the typology system, never explicitly stated in Chapter 3. If an election official, advocacy group or any other reader just looked at the Chapter 3 access standards, it would be difficult to impossible to understand comprehensively what is required of an "accessible" voting system.

The VVSG should be organized either in a way that provides a central location for the "access standards" or a way of readily identifying all the "access" features that must be available on the one legally mandated "accessible" system. If one location is not feasible, the organization should at least provide a way to identify and pull out the required access features so that election officials and others can use the standards as the benchmark for determining what meets the legal requirement for "accessible".

3.1.3. Interaction of usability and accessibility requirements

This section should make it clear that an accessible voting system as mandated by HAVA MUST have a voter editable interface. Simply saying an Acc-VS is classified as a Voter –Editable Ballot Device does not make it clear that manually-marked paper ballot systems will not conform to the requirements for the legally mandated accessible voting system.

3.2.2 Functional capabilities

This section should include a statement that an accessible voting system, as mandated by HAVA, MUST have a voter editable interface.

3.2.5-E Available font sizes

The wording of this standard is confusing and can lead readers to the erroneous conclusion that a voting system claiming to be "accessible" that does not have an "electronic image display" does not need to provide two text sizes to meet the needs of individuals with low vision. The words "that uses an electronic image display" should be deleted as the application notation to VEBD-V covers this issue. This would be consistent with the wording of 3.2.5-I A for High Contrast as that standard does not include application restriction wording in the standard. A note should also be added that clarifies that ALL accessible voting systems must have an electronic image display and must conform to this provision.

3.3 Accessibility requirements

This section should also add a statement that the Acc-VS must be a VEBD, both VEBD-A and VEBD-V. A statement should also be added to this section clarifying that access must be provided for ALL forms of official ballots (any ballot of record) -- both paper and electronic. Access features must also provide for access across all voting processes including generating, verifying and casting an official ballot. It is not acceptable to have a lesser level of accessibility available for paper ballots as compared to electronic ballots or to have a lesser level of accessibility for ballot verification or ballot casting than for ballot generation.

3.3.1-E Accessibility of paper-based vote verification

This standard must be reworded to ensure that accessible vote verification is available for ALL paper ballots that are or can be a determinative ballot of record. The standard cannot be restricted in application to only DREs with Voter Verified Paper Audit Trails (VVPAT). The current standard requires an accessibility feature be provided only when the purpose of the paper ballot is for “allowing voters to verify their votes”. Some will interpret this to mean that ballot marking devices and other paper based voting systems that use paper as the core countable ballot (whose primary purpose is not for verification) do not have to provide access to that paper record even though it is the ballot of record. The wording of this standard should be revised to read follows to make it clear that paper ballot based systems designated as the accessible system are covered by the provision, regardless of the main purpose the paper serves.

3.3.1-E Accessibility of Paper-based Vote Verification

If the Acc-VS uses or generates a voter verifiable paper record that can be the official ballot or determinative vote record, then the system shall provide a means to ensure that the paper verification record is accessible to all voters with disabilities, as identified in [XREF 3.3].

The wording of the discussion section should be revised to align with the revised standard wording and the reference to 3.2.5-G “Legibility of Paper Ballots and Verification Records” should be deleted as those standards do NOT provide an acceptable level of access for individuals with low vision. The wording of 3.2.5-G expressly sanctions a significantly lesser level of access for vote verification for the Acc-VS than is required for vote generation for individuals with low vision. The standard only requires the voting system “provide features that assist in reading a paper ballot” instead of requiring delivery of a specific access feature designed to ensure access. Further, this deficient standard then allows for “optical devices for magnification”. This wording authorizes an individual accommodation approach to enlarging print text, rather than requiring such access to be built into the voting system, which is simply unacceptable. It is impractical, and perhaps impossible, to have on hand at every polling place the variety of individual magnification devices necessary to accommodate differing types and degrees of vision loss exhibited by voters. It is also impracticable to expect poll workers to appropriately match magnifying devices to individual visual limitations and have expertise in the use of such devices to support voters who need them. Voters with low vision, just like those who are blind, should have the same access features available to support both generation and verification a paper ballot. As a result, the discussion section should be revised as follows:

DISCUSSION -- While paper records generally provide a simple and effective means for technology-independent vote verification, their use can present difficulties for voters with certain types of disabilities. The purpose of this requirement is to ensure that all voters have a similar opportunity for vote verification of any paper record that is or can be an official or determinative vote. Note that this requirement addresses the special difficulties that may arise with the use of paper. Verification is part of the voting process, and all the other general requirements apply to verification, in particular those dealing with dexterity (e.g. 3.3.4-C “Ballot Submission and Vote Verification”) and blindness (e.g. 3.3.3-E “Ballot Submission and Vote Verification)*

3.3.1-E.1. Audio readback for paper-based vote verification

This standard needs two significant revisions. First, it should be revised to clarify that the read-back or re-display of ALL ballot content, including write-in text, is required for verification purposes. Many current ballot-marking devices do not provide access to write-in text. The system simply notifies the voter that a write-in has been done (e.g. says “write-in”). This leaves voters with disabilities unable to verify their write-in votes. The standard should be revised to read as follows:

3.3.1-E.1 Audio Readback for Paper-based Vote Verification.

If the Acc-VS uses or generates a voter-verified paper record that can be the official ballot or determinative vote record, then the system shall provide a mechanism that can read that record and generate an audio representation of its entire vote contents, including write-in votes.

Second, this standard only provides for audio readback for blind individuals. It does not provide individuals with low vision an equal level of accessibility. Individuals who are blind are ensured the same level of access for both vote generation and verification of a paper ballot through a required audio-tactile interface. A comparable standard is not in place that ensures that individuals who are visually impaired can generate and verify their paper ballots through enhanced visual display, i.e., large text size. While two text sizes ARE required for individuals with low vision to *generate* their vote (3.2.5-E), that same level of access is NOT required for *verification* of a paper ballot and should be added.

It is perplexing to understand why the standards would require manufacturers to deliver two text sizes for vote generation (per 3.2.5-E), but then not require the same two text sizes for vote verification. Requiring two sizes of text output merely ensures the Acc-VS provides an equal level of access for both vote generation and verification for individuals with low vision – it does not prescribe how that output be delivered by the Acc-VS. To ensure individuals with low vision have equal access to vote generation and verification, an additional standard should be added as follows:

3.3.1-E.2 Enhanced visual display for paper-based vote verification.

If the Acc-VS uses or generates a voter verified paper record (or some other durable, human-readable record) that can be the official ballot or determinative vote record, then the system shall provide a mechanism that can read that record and generate a visual display or other output representation of its entire vote contents, including write-in votes, in at least two font sizes (a) 3.0-4.0 mm and (b) 6.3-9.0 mm.

3.3.3-E Ballot submission and vote verification

This standard must be clarified to ensure private and independent ballot submission and vote verification is provided by the Acc-VS for individuals who are visually impaired (not just those who are blind) and those with dexterity disabilities. HAVA requires that all voters, including individuals with disabilities, be able to privately and independently verify and cast their ballots. However, this standard begins with the caveat: “[i]f the voting station supports ballot submission or vote verification for non-blind or non-disabled voters . . .” To conform with HAVA, an accessible voting station must offer a voter with a disability the opportunity to verify their ballot--whether it is paper or electronic—and the ability to cast that ballot privately and independently. Accessible ballot verification and ballot casting should not be contingent on what the voting station supports for other voters. The wording of this standard should be revised to read:

3.3.3-E Ballot Submission and Vote Verification

The Acc-VS shall provide features that enable voters who have vision impairments to verify and submit their ballots privately and independently.

3.3.4-B Support for non-manual input

This requirement is unclear. The discussion section of the standard indicates that use of a mouth stick satisfies the requirement. An individual with good fine control of a mouth stick might be able to operate a voting system with the normal touch screen interface. However, this input option would not at all meet the needs of most individuals with motor limitations. To meet the needs of a reasonable range of individuals with motor disabilities, switch input should be required and specific minimum standards should be developed to ensure the usability of

that switch input. The audio-tactile interface has many specific requirements designed to ensure the voting process is efficient and effective for voters who are blind. Similarly, using switch input with auditory or visual scanning that has adjustable features are necessary to make the voting process efficient and effective. Those ATI features that are appropriate for switch input scanning should be referenced in this standard. For example, the 3.3.3-C features for audio output are appropriate for auditory scanning. New standards should be developed that apply to both auditory or visual scanning based on the 3.3.3-B features for the ATI. For example, the requirement that the ATI allow the voter to skip to next contest or return to previous contests is an excellent requirement for switch input scanning. If a voting system only allows for forward navigation -- the only way to return to a contest is to scan through the entire ballot again. Adjustable scanning speed is another critical requirement.

3.3.4-C Ballot submission and vote verification

This standard must be clarified to ensure private and independent ballot submission and vote verification is provided by the Acc-VS for individuals who have dexterity disabilities. HAVA requires that all voters, including individuals with disabilities, be able to privately and independently verify and cast their ballots. However, this standard begins with the caveat: “[i]f the voting station supports ballot submission or vote verification for non-blind or non-disabled voters . . .” To conform with HAVA, an accessible voting station must offer a voter with a disability the opportunity to verify their ballot--whether it is paper or electronic—and the ability to cast that ballot privately and independently. Accessible ballot verification and ballot casting should not be contingent on what the voting station supports for other voters. The wording of this standard should be revised to read:

3.3.4-C Ballot Submission and Vote Verification

The Acc-VS shall provide features that enable voters who lack fine motor control or the use of their hands to verify and submit their ballots privately and independently.

4.4 Independent Voter Verifiable Records

This version of the VVSG requires voting systems to be “software independent.” This means that the system can be audited through the use of Independent Voter-Verified Records (IVVR). The voting systems today that meet the requirements for software independence and provide accessible options include ballot-marking devices and electronic systems with a voter verified paper audit trail (VVPAT). However, this section does not adequately address the accessibility challenges related to a paper-based ballot. In particular there are a number of standards that simply cannot be met when the VVPAT is rendered in an accessible media. (See 4.4.2.3. A and B for examples.) It is also unclear what if any software independence standards apply to ballot-marking devices as related to generating versus verify ballot contents for voters with disabilities. (See 4.4.3 for more issues.)

For both VVPATs and ballot marking devices, the standards are unclear regarding hardware options. Voters with disabilities should be able to use the same hardware output device (headset and/or visual display screen) to receive information from two distinct software sources without violating software independence requirements – but this is not clear in the current standards. In a system that produces a VVPAT or in a ballot-marking device the software that generates the print on the ballot and the software that scans the content of the print vote selections can be kept separate without requiring physically separate output hardware. Language should be added to the standards to clarify that duplicative output devices for either DREs with a VVPAT or ballot marking devices are not required to ensure software independence.

4.4.2.3 A VVPAT prints and displays a paper record

This standard requires a VVPAT to print a ballot that can be easily compared with the electronic ballot in similar format and presentation. This clearly describes the visual comparison process

that will be used by non-disabled voters. For voters with disabilities, comparison of the print and electronic ballots will be more challenging, as the task will not be a straightforward visual comparison. This standard needs to address how non-standard print format material comparison can be accomplished or allow for alternative comparison.

4.4.2.3 B Title

This standard requires rapid and accurate comparison of a print and electronic ballot. This clearly describes the visual comparison process that will be used by non-disabled voters. For voters with disabilities, comparison of the print and electronic ballots will be more challenging, as the task will not be a straightforward visual comparison. This standard needs to address how non-standard print format material comparison can be accomplished or allow for alternative comparison.

4.4.3 PCOS Systems

The standards applicable to systems using a base paper ballot seem to assume that voters will be completing those ballots directly, thus there is no need for verification standards that ensure software independence. However, in the case of voters with disabilities using a ballot-marking device, a secondary verification process dependent on software is required. This verification is somewhat similar to the comparison of electronic and paper ballot contents except the comparison is between the electronic display prior to generating the print ballot and the actual marked ballot. Voters who use a ballot-marking device must be able to verify that the marked paper ballot is in fact printed with the vote selections made via electronic interface which requires a software assisted verification process.

It is unclear what if any standards apply to the software of a ballot-marking device pursuant to the software independence requirement. Is it acceptable for the same software to generate and verify ballot contents? Or do ballot marking devices need to have software that generates the marked ballot and separate OCR software that will "read" the contents (including write-in text) and render it in alternative forms (audio and large print) for voters with disabilities? The standards should address these critical issues.