Disability Rights Pennsylvania

Ensuring the Accessibility of Voting Systems in Pennsylvania: Report and Recommendations

September 30, 2018

**The Disability Voting Coalition Subcommittee
of Disability Rights Pennsylvania
in cooperation with
the Association of Assistive Technology Act Programs**

Disability Rights Pennsylvania (DRP) is the federally-mandated, state-designated Protection and Advocacy (P&A) system for persons with disabilities in Pennsylvania and has been providing legal and advocacy services to Pennsylvanians with disabilities for over 40 years. DRP is a member of the National Disability Rights Network (NDRN), the non-profit membership organization for the federally mandated P&A system. Collectively, the P&A network is the largest provider of legally based advocacy services in the United States. P&As are mandated by the Help America Vote Act (HAVA) to ensure the full participation in the electoral process for individuals with disabilities and works collaboratively to comply with HAVA and increase access to a private and independent ballot for all.

Association of Assistive Technology Act Programs (ATAP) is a membership organization that represents the federally funded network of State Assistive Technology (AT) programs. There is one state AT program in each state and territory, 56 total grantees. The Assistive Technology Act is the federal law that funds state AT programs and it mandates a number of activities including device demonstrations, in which individuals are provided with guided exploration of the access features of a device by someone who has technical expertise in the device and its features and a continuum of other activities designed to increase access to and acquisition of assistive technology by individuals with disabilities across the lifespan.

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I.   INTRODUCTION

Voting is one of our Nation's most fundamental rights and a hallmark of our democracy. Yet we continue to struggle to ensure that individuals with disabilities are able to participate equitably in a fully accessible voting system in a manner that provides the same opportunity for access and participation as other voters.

According to the census bureau, one in five Americans has a disability. More than 12 percent of Pennsylvania's residents have disabilities. In the past, these individuals – especially those with the most severe disabilities – were largely invisible, confined to state institutions or kept in family homes with little or no contact with their communities. Public policy, societal attitudes, and individual and family values have changed. Now, individuals with disabilities have a right to self-determination, personal dignity, and services to achieve independence. People with disabilities have the same right as their fellow Americans to privately and independently mark the ballot and then verify that the marks correctly represent their intended selections before casting the ballot. However, our election system falls short of the model of the private and independent vote for voters with disabilities.

While all Americans rely on the expertise of our election authorities to administer fair, accessible, and secure elections across the nation, election officials are increasingly expected to demonstrate expertise in a number of new and complex areas, including security, technology, and accessibility.

Election security is important and must be addressed. New, modern, and secure voting systems, databases, and systems should not come, however, at the expense of people with disabilities losing their ability to fully exercise their fundamental right to vote. Both security and accessibility needs can and must be addressed.

This project is a continuation of DRP's ongoing work on voting rights, focusing primarily on accessible voting technology for persons who are blind and low vision. This report addresses accessible voting systems for persons with disabilities with meaningful recommendations regarding appropriate, accessible, usable voting technology that supports an individual's right to mark, verify, and cast the ballot privately and independently as do their fellow Pennsylvanians.

II.   BACKGROUND ON RELEVANT VOTING LAWS

Election law is traditionally a state - rather than a federal - responsibility. States have the power to regulate election issues in areas which Congress

has not preempted the field.[1] In fact, there may be over 10,000 election

jurisdictions throughout the country with over 700,000 voting machines.[2] As

a result, election practices are extremely localized, and procedures can

vary between local election offices.[3] Most states have established

accessibility standards and funded improvements concerning voting for

those with disabilities, but states vary in terms of the specificity of the

requirements and the aspects of accessibility addressed.[4]

A. Pennsylvania Law

In Pennsylvania, election laws are codified in the Pennsylvania Election

Code.[5] The code covers a wide array of requirements regarding elections.[6]

Included in the Code are requirements of voting machines[7] and

requirements of electronic voting systems.[8] The Code requires that all

electronic voting systems in the state be examined by the Secretary of the

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[1] *See* Cook v Gralike, 531 U.S. 510, 523 (2001).
[2] Rabia Belt, *Contemporary Voting Rights Controversies Through the Lens of Disability*, 68 STAN. L. REV. 1491, 1496 (2016).
[3] *See* Stephen Ansolabehere & Nathaniel Persily, *Measuring Election System Performance*, 13 N.Y.U. J. LEGIS. & PUB. POL'Y 445, 447–48 (2010) (Noting the extreme decentralization of election practice with county and town elections officials managing "registrations systems, vote tabulation systems, absentee ballots, vote reports, and the precincts, polling stations, and legions of poll workers necessary to carry out an election").
[4] *See* U.S. GEN. ACCOUNTABILITY OFFICE, GAO-09-941, VOTERS WITH DISABILITIES: ADDITIONAL MONITORING OF POLLING PLACES COULD FURTHER IMPROVE ACCESSIBILITY 24 (2009) [hereinafter GAO, 2009 REPORT]; *see also* Belt, *supra* note 3, at 1516 ("not every state guarantees their polling place is accessible or has an easy or convenient way to figure out in advance whether a particular polling place fits the needs of a particular vote.").
[5] 25 PA STAT. AND CONS. STAT. ANN. § 2600 (West 2017).
[6] *See Id.*
[7] 25 PA STAT. AND CONS. STAT. ANN. § 3007 (West 2017).
[8] 25 PA STAT. AND CONS. STAT. ANN. § 3031.7 (West 2017).

Commonwealth. The Pennsylvania Department of State (DOS) is

overseen by the Secretary of the Commonwealth who is the Chief Election

Official and a member of the Governor's Executive Board. The Secretary

must issue a report explaining if the systems meet the Code's

requirements. Neither section requires machine accessibility for voters with

disabilities.[9]

B. Federal Civil Rights Laws

There are several federal laws in place to protect the fundamental right

to vote for all Americans including people with disabilities.

In 1984, Congress enacted the **Voter Accessibility for the Elderly and**

Handicapped (VAEH) Act, which states that all polling places used for

federal elections must be accessible to voters with mobility disabilities and

those age 65 and older. The VAEH, however, provides that if the state

certifies that a polling place cannot be made accessible or relocated to an

accessible location, then it must offer voters the opportunity to vote by

"alternative ballot" up until the polls close.[10]

In 1990, Congress enacted the **Americans with Disabilities Act**

(ADA). Title II of the ADA applies to state and local government programs

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[9] *See* 25 PA STAT. AND CONS. STAT. ANN. § 3007 (West 2017); *see* 25 PA STAT. AND CONS. STAT. ANN. § 3031.7 (West 2017).
[10] Voter Accessibility for the Elderly and Handicapped (VAEH) Act, 52 U.S.C.S. § 20102(b)(2)(B)(ii) (2018).

and services, including elections. Title II of the ADA has been interpreted

to require election officials to assure that all newly selected polling places

are accessible and to maximize the accessibility of existing polling places

by relocating inaccessible polling places to accessible sites or by assuring

that temporary modifications (such as portable ramps or threshold mats)

are available and in place on Election Day.[11]

   The Help America Vote Act of 2002 (HAVA) is the most recent and

relevant federal statute concerning voting procedure. This statute

specifically states that voting systems must be accessible for people with

disabilities, including the blind and visually impaired, in a manner that

provides the same opportunity for access and participation as other

voters.[12] Enactment of HAVA was the first time individuals with disabilities

were ensured a private, independent vote based on federal law.

   HAVA set out guidelines for voting machines for those with disabilities.

Each polling place must have at least one machine that is equipped for

individuals with disabilities.[13] For a system to be considered accessible, the

voting machine should be turned on and set up, equipped with the

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[11] **Section 504 of the Rehabilitation Act** preceded the ADA and similarly provides that qualified individuals with disabilities shall not be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance, which includes most all public entities. 29 U.S.C. § 794.
[12] Help America Vote Act of 2002, 52 U.S.C. § 21081(a)(3) (2015)).
[13] 52 U.S.C. § 21081(a)(3)(B) (2015)).

necessary access features, and positioned to provide the same privacy as other voters.[14] However, voters with disabilities often discover that the one accessible machine at their polling location is not turned on, not set up, or not maintained in good working order. They also often encounter poll-workers who do not know how to turn on, set up, or assist them in using the voting machine. Poll workers need to be knowledgeable about the equipment and able to assist in its operation.[15] HAVA specifically identifies the use of a "direct recording electronic voting system or other voting system equipped for individuals with disabilities" as a way of complying with the requirement for an accessible voting system. However, the statute does not mandate which systems should be used by states and local officials to comply.

The HAVA Act established the U.S. Election Assistance Commission (EAC) to serve as an information clearinghouse for election administration, develop and maintain Voluntary Voting System Guidelines (VVSG) as well as testing and certifying voting systems. On December 13, 2005, the EAC unanimously adopted the 2005 VVSG, which significantly increased security requirements for voting systems and expanded access, including

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[14] GAO, 2009 REPORT, *supra* note 5, at 11.
[15] *Id.*

opportunities for individuals with disabilities to vote privately and independently. The 2005 guidelines updated and augmented previous guidelines to address advancements in election practices and computer technologies. The VVSG guidelines were again updated and approved by the EAC's Commissioners on March 31, 2015, creating VVSG Version 1.1.

On September 12, 2017, the Technical Guidelines Development Committee (TGDC), a committee formed by the National Institute of Standards and Technology (NIST) and the Election Assistance Commission (EAC), finalized the VVSG 2.0 Principles and Guidelines document, the first step toward VVSG 2.0. According to (now former) EAC Chairman Matthew Masterson, the designated federal officer for the TGDC, "These new guidelines are designed to spur innovations that allow local election officials to give voters the best experience possible. The standards will ensure improved accessibility, security, accuracy and auditability of voting systems." In conjunction with approving the principles and guidelines for VVSG 2.0, the TGDC also approved a resolution [Ensuring Accessibility and Security](#) that specifically addressed the need to ensure both accessibility and security in voting systems that used paper ballots. Currently, that draft of the principles and guidelines for VVSG 2.0 is being circulated and reviewed by the other EAC advisory boards and it is

anticipated it will be approved by EAC Commissioners when they have a quorum.

The EAC voting system testing and certification program certifies and decertifies voting system hardware and software and accredits test laboratories, marking the first time in history that the federal government holds this responsibility. While states are not required to participate in the program, the majority – 47 out of 50 - enacted laws that require some level of participation.[16] Pennsylvania requires EAC certification.

To induce states to comply with the requirements of HAVA, funding was provided to all states to upgrade their voting systems with new machines required to meet voting system standards for disability access.[17] Following passage of HAVA, there was a surge in the purchase of upgraded voting technology, including voting technology to provide access for voters with disabilities. However, it is important to note that this equipment was not always effective in enabling a person with a disability to be able to mark the ballot, then verify that the marked ballot reflects who the voter picked and

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[16] EAC's System Certification Process, https://www.eac.gov/voting-equipment/system-certification-process-s/ (last visited Sept. 5, 2018).
[17] 52 U.S.C. § 21081(a)(3)(C) (2015).

lastly, be able to cast the ballot privately and independently.[18] And, all of this technology is now 10 or more years old.

On March 23, 2018, the Consolidated Appropriations Act of 2018 was signed into law. The Act included $380 million in grants made available to states to improve the administration of elections for federal office, including enhancing technology and make certain election security improvements. This funding will provide states with additional resources to secure and improve the election system.[19]

III.   ACCESSIBLE VOTING SYSTEMS GENERALLY

HAVA requires that voters with disabilities vote privately and independently regardless of the voting system used (paper-based, electronic or a combination). With the requirements for one accessible voting machine per polling place, a diverse array of accessible voting systems (AVS) have been deployed and used across the country.

Jurisdictions primarily use two types of technology for tabulating votes: 1) **optical/digital scanners** which are scanning devices that tabulate paper ballots. Ballots are marked by the voter and may either be scanned on precinct-based optical scan systems in the polling place

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[18] *See* NAT'L COUNCIL ON DISABILITY, *supra* note 2, at 12.
[19] HAVA Funds State Chart View, https://www.eac.gov/payments-and-grants/hava-funds-state-chart-view/ (last visited Sept. 5, 2018).

("precinct count system") or collected in a ballot box to be scanned at a central location ("central count system); and 2) **direct-recording electronic (DRE) machines** that are designed to allow a direct vote on the machine by the manual touch of a screen, monitor, wheel, or other device. A DRE records the individual votes and vote totals directly into computer memory and does not use a paper ballot. Some DREs come with a Voter-Verified Paper Audit Trail (VVPAT), a permanent paper record showing all votes cast by the elector.

There are also **ballot marking devices (BMD)** that permit voters to mark a paper ballot. A voter's choices are usually presented on a screen in a similar manner to a DRE, or perhaps on a tablet. However, a BMD does not record the voter's choices into its memory. Instead, it allows the voter to mark the choices on-screen and, when the voter is done, prints the ballot selections. The resulting printed paper ballot is then either hand counted or counted using an optical scan machine. Some systems produce print-outs with bar codes or QR codes that store the vote selections to be used for counting/tabulation. Security experts have pointed out that there are risks associated with these types of systems since the bar code itself is not human readable.

A few small jurisdictions **hand count** paper ballots - the process of counting paper ballots without the use of technology. Many (usually smaller) jurisdictions in the U.S. hand count all paper ballots. Others hand count some paper ballots, such as absentee ballots or provisional ballots.[20]

The majority of the AVS units currently used in U.S. voting jurisdictions utilize some kind of electronic interface that allow a voter with a disability to digitally mark a ballot (versus manually or hand-marking a ballot). The form of the ballot itself may be paper or electronic or both. With great national attention and debate focused on paper-based voting, confusion abounds regarding accessibility of paper-based voting systems. The VVSG 1.1 access standards provide technical specifications regarding the access features that must be provided by a voting system for it to be considered an accessible system pursuant to HAVA requirements. For example, the VVSG 1.1 indicates that an accessible voting system must provide –

- An audio-tactile interface so that a blind voter can listen to the ballot and navigate/mark the ballot through tactile controls;

- Enlarged and enhanced text for individuals who have vision loss but do not need or cannot use an audio ballot;

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[20] http://www.ncsl.org/research/elections-and-campaigns/voting-equipment.aspx

- Simultaneous audio and enhanced visual display for individuals who have vision loss and those with print disabilities such as dyslexia; and

- A "non-manual" input option (usually dual switch) that allows individuals with very limited motor skills navigate/mark and cast the ballot. A switch input is an access feature that allows an individual to use a dual switch (such as a pneumatic air switch or "sip and puff") to control, navigate, mark, and cast the ballot. Most accessible voting systems will allow a voter to plug in their own dual switch if they already have/use one. The output used with switch input is typically the regular text visual display.

In addition, an AVS must be accessible during all parts of the voting process – marking, verifying, and casting a ballot. This approach creates a framework for analyzing the access features that an AVS will need to ensure that a reasonable range of individuals with disabilities, especially those with vision and motor limitations, can mark, verify, and cast a ballot privately and independently.

Two major shortcomings exist in current voting systems that use a paper ballot: 1) Direct electronic voting systems with voter verified paper audit trail (VVPAT) printers do not provide a mechanism for alternative access to the print on the VVPAT. As a result, voters with vision disabilities

cannot <u>verify</u> the paper ballot privately or independently; and 2) ballot

marking devices require voters with disabilities to visually verify the printed

ballot and manually handle the paper ballot to verify and cast their ballot.

As a result, voters with vision, motor, and other disabilities cannot <u>verify or</u>

<u>cast</u> the paper ballot independently.

In the case of an electronic ballot, the digital interface of the AVS will

typically provide verification of the marked ballot using the same access

feature used to digitally mark the ballot. In other words, if a voter with a

disability used audio output and tactile keypad input to mark their ballot,

they would be able to use that same access feature of the electronic

interface to also verify the marked electronic ballot. Similarly, a voter who

used a large print visual display and a touchscreen to mark the ballot would

use the same to verify the content of the marked electronic ballot. And

finally, voters using an AVS with an electronic ballot would use the same

access features of the electronic interface to cast the digital ballot.

When an AVS uses a paper ballot, voters with disabilities must be

able to <u>verify and cast</u> their ballot using the access features of the AVS.

For example, a blind voter should be able to mark and verify the content of

the printed (marked) paper ballot using the audio-tactile digital interface.

Similarly, a voter with low vision who used an enlarged visual display on

the screen of the voting system to mark their ballot should also be able to verify the printed paper ballot using that display. Lastly, a voter with a physical disability who used switch input (e.g. sip and puff) to mark a paper ballot should be able to use that same switch input to verify and cast the paper ballot.

Unfortunately, providing accessible verification and casting of marked paper ballots is technologically challenging for voting systems. Accessible paper ballot verification requires converting the content of a marked paper ballot back into digital form through some form of "scanning". There is no consensus on what mechanisms are acceptable for conversion of the print content of a paper ballot into accessible forms. Some security experts advocate for text readable by humans to be the "marked ballot content" that all voters verify which must then be converted (scanned) into accessible forms requiring highly advanced optical character recognition (OCR). Other security advocates are comfortable with the print content of a paper ballot including a bar code or other machine-readable code (e.g. optical scan marks/positions) that are used to convert the content into accessible forms. It is important to remember that even when using machine-readable code or markings to convert marked ballot content into digital form, some type of OCR capacity is likely needed for write-in votes. Without any kind

of OCR, blind and low-vision voters will only be able to verify that something was "written in" not the actual content of the write-in text.

One can argue that the AVS should convert whatever print content is verified by non-disabled voters so that disabled voters equitably verify the same print content. However, others believe that providing voters with disabilities the option of verifying ballot content through bar code or other machine-readable code is a better option especially when that code is used for ballot counting which means the voter with a disability is actually verifying the more important ballot content (how it will be counted).

Accessible paper ballot casting requires automatic paper handling mechanisms which move the paper ballot through all three voting processes (marking, verifying and casting) without requiring the voter to ever manually handle the paper ballot. This typically means that a "ballot box" or similar mechanism that can officially collect and store a cast ballot must be an integral part of the electronic interface that was used to mark and verify the paper ballot. This may mean adding an official ballot collection point in jurisdictions that use precinct counters with associated procedure adaptations.

Many paper-based voting system proponents have used shortcomings of current electronic interfaces to support their request for a

"ban" on direct response electronic voting machines or DREs. Since BMDs

and DREs use the same electronic interface to deliver required access

features, neither is inherently more or less accessible than the other. Any

electronic interface is readily able to deliver any, all, or none of the required

access features of the VVSG. To criticize the accessibility of the electronic

interface of DREs and extol the accessibility of the electronic interface of

BMDs is baseless. Any differences in the access features delivered

reflects what vendors have included in the electronic interface, not what the

interface is capable of delivering nor any inherent accessibility difference

between DREs and BMDs as types of voting systems.

IV.   ACCESSIBLE VOTING SYSTEMS IN PENNSYLVANIA

In Pennsylvania, there are 67 counties and 8,405 polling places.

Each polling place has one AVS, which is not the primary voting method

but rather is only used when requested by voters with disabilities. In 50 of

the 67 counties, the primary voting method is on unverifiable voting

systems. Thus, 83% of voters in Pennsylvania vote on unverifiable voting

systems and the other 17% use voter-marked paper ballots.[21]

Pennsylvania is taking major steps to increase security on all voting

systems currently used. In April, the Acting Secretary of State made a

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[21] https://www.verifiedvoting.org/voting-system-technology-and-security-in-pennsylvania/

dramatic announcement requiring all counties to have voter-verifiable paper record voting systems selected no later than December 31, 2019, including those currently using paper. This is because all the current systems are using out-of-date hardware and software and are no longer in line with federal or state standards.

This announcement effectively decertified the systems of all counties, which as a result, must purchase new voting systems. To that end, Pennsylvania has issued New Comprehensive 2018 Voting System Security and Accessibility Requirements (or the new Pennsylvania Standards)[22] that incorporate and consider the principles and guidelines in the not yet approved VVSG2.0. The new Pennsylvania Standards aim to cover any gaps in VVSG1.1 testing. Pennsylvania is to be commended for taking a proactive approach in decertifying previously certified, non-verifiable voting systems and developing its own standards, as the VVSG 2.0 are not yet approved. The new Pennsylvania Standards provide requirements on the usability of voting systems for voters with disabilities. The new Pennsylvania Standards also address security and, among other things, tests to assure confidentiality, vote anonymity, integrity, availability,

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[22] Pennsylvania Department of State Attachment E to the Directive for Electronic Voting Systems - PA Voting System Security Standard -
https://www.phila.gov/rfp/Documents/Pennsylvania%20Voting%20System%20Security%20Standard.pdf

and auditability of voting systems. The new Pennsylvania Standards include requirements for risk limiting audits which are audits of an election contest that provide strong statistical evidence that the election outcome is right. Importantly, a risk limiting audit has a high probability of correcting a wrong outcome.

DOS tests the accessibility of voting systems as part of the Pennsylvania state certification to ensure that the voting system is accessible and is making efforts to improve this testing. The test also allows DOS to gather insights on how systems can be effectively deployed in polling places to serve voters with disabilities better. DOS recently contracted with the Center for Civic Design (CCD) and CCD is thus the Accessibility examiner for DOS. CCD brings in a team of personnel with usability and accessibility/disability expertise to work together for a voting system examination and test to Pennsylvania's new accessibility requirements.

Pennsylvania will only certify systems that meet both the new Pennsylvania Standards and federal standards. In April 2018, Pennsylvania released an invitation to bid for vendors to submit proposals for voting systems that meet these standards; this was released on

September 27, 2018 to provide additional requirements for electronic poll books.

Pennsylvania will receive a $13,476,156 grant award provided by the consolidated Appropriations Act of 2018 and will also contribute its five percent match of $673,800 in 2019. These funds will be distributed to the 67 counties for voting equipment replacement and upgrades "thereby strengthening security, resiliency, accessibility, and auditability for all Pennsylvania voters."[23]

V.   DISABILITY VOTING COALITION SUBCOMMITTEE TESTING RESULTS AND OBSERVATIONS

DRP established a seven-member subcommittee of the Disability Voting Coalition (DVC), primarily made up of individuals who are blind or have low vision. The DVC, a project of DRP, is a cross-disability group committed to improving the voting experiences of people with disabilities established with funding from Pennsylvania Development Disabilities Council (DDC). DVC members include individuals with disabilities and a cross section of Pennsylvania's organizations that provide services to, or advocate for, people with disabilities.

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[23] Pennsylvania Department of State Program Narrative, at 3.

The Subcommittee focused first on learning what laws protect their fundamental right to vote and what features are available on accessible voting systems currently on the market, as well as performed actual testing of voting systems. As part of this process, Subcommittee members visited the National Federation of the Blind (NFB) in February 2018 and were able to test a number of accessible voting systems. The experience was extremely valuable, however, none of the systems were equipped with the ability for a voter to verify the vote before it was cast. The Subcommittee also attended the Department of State (DOS) sponsored April 26, 2018 demonstration on new voting systems at the Pennsylvania Farm Show Complex in Harrisburg. There were five voting system vendors in attendance, and Subcommittee members had the opportunity to explore the accessibility features and options offered by the new machines and ask questions of the voting system vendors.

Subcommittee members voted using the system with a Pennsylvania specific ballot. The process included discussing their experience throughout the process. The Center for Civic Design (CCD) examiners observed and made notes.

Importantly, DRP is assisting DOS with testing the accessibility functions of systems that are being certified. DOS tests the accessibility

of voting systems as part of the Pennsylvania state certification to ensure that the voting system is accessible. The test also allows DOS to gather insight on how systems can be effectively deployed in polling places to serve voters with disabilities better.

DOS is in the process of testing voting systems from five vendors. DRP did not participate in the accessibility testing for the system certified at the end of 2017 and the Subcommittee has, to date, tested two systems that are currently in the certification process. The two remaining systems to be certified are in the process of being scheduled.

Lastly, the Subcommittee met with a DOS official and shared their experience and recommendations. This report is the culmination of the Subcommittee's work and will be shared with DOS and all Pennsylvania counties.

A.   Visit to the National Federation of the Blind

A description of each of the three machines tested and the observations of the Subcommittee members follows.

Hart InterCivic Verity Touchwriter

According to the manufacturer, the Verity TouchWriter is a stand-alone precinct level Ballot Marker Device that also includes an Audio Tactile Interface (ATI) that allows voters who cannot complete a paper ballot to

generate a machine-readable and human-readable ballot based on vote selections made using the ATI. Once the voter has completed voting, their ballot is printed onto regular ballot paper and following the county's ballot processing procedures would be incorporated in the canvassing process.

- Overall, it is user friendly and very accessible.

- The buttons on the keypad are very tactile and easy to push.

- The keypad includes buttons to increase and decrease audio volume and tempo, so these actions can be performed quickly and easily.

- The audio instructions are content specific, and not front-end loaded.

- The ballot it prints out is smaller than the hand marked ballot, and that it only contains the selected candidates, so it is also different in content from the ballots that are hand marked.

Unisyn OVI

According to the manufacturer, the Unisyn OpenElect Voting System (OVS) is a paper ballot voting system using touch screen and scan technology to scan and validate ballots, provide voter assisted ballots to accommodate voters with special needs, and tabulate results.

- The audio ballot seems to have been added to this machine as an afterthought.

- A voter who wants to use the audio ballot has to listen to all of the instructions on how to use the touchscreen before finally hearing the audio ballot instructions.

- Once the voter has accessed the ballot, instructions are not always provided when they are needed.

- The buttons on the keypad are not very tactile and the voter must exert a lot of pressure to activate them.

- The ballot printed out by this machine is smaller than the hand marked ballot and it only contains the voter's choices.

Dominion Image Cast Evolution (ICE).

Dominion made a lot of changes to this machine since NFB purchased it; thus, no useful feedback was given.

B. **DOS Voting Systems Demonstration**

The demonstration was quite informative and there were five vendors.

The Democracy Suite 5.5 Voting System

According to the manufacturer, this system is a paper-based optical scan voting system consisting of the following major polling place components: the ImageCast X (ICX) Ballot Marking Device (BMD) and ImageCast Precinct (ICP) hybrid precinct optical scan paper counter.

Voters can mark a pre-printed paper ballot by hand or use Democracy Suite ImageCast X ballot marking platform which is an accessible solution that is used for creation of paper cast vote records. These ballots can be scanned, reviewed, cast, and tabulated at the polling location on an ImageCast Precinct device or can be retained to be counted at the central location by ImageCast central scanner.

- This system has a keypad to access the touch screen.

- There were braille markings to identify the keys. The keypad has movement keys to take a voter through the ballot and make selections.

- The keypad seemed to move back to the beginning of the instructions when the rate of speech was changed.

- In order to vote for a write-in candidate, the voter must individually select each letter. Members did not see instructions at first look for write-ins but were assured that instructions can be made more apparent. To cancel a write-in vote, one has to navigate to the end of the alphabet to cancel or take any other action.

- Once one was in voter review mode, the system could be changed back to ballot mode fairly easily and almost accidentally.

- Once one got back into review mode, all contests have to be reviewed again because it does not take one back to where one has left off. The system should remind the voter if it has changed modes.

- The voice used for the demo was terrible. Subcommittee members were told that counties usually use the voices of real people or other speech voices when they do their ballots.

- The instructions at the end of marking the ballot didn't indicate where to look on the machine for the paper ballot once it had printed.

- In this configuration, one would have to take it to another machine to scan it if he or she wanted to review it before putting it in the casting or counting machine.

- The representative indicated that the scanner could be configured to read the ballot before casting and give audio feedback.

Unisyn OpenElect 2.0A

According to the manufacturer, Unisyn OpenElect 2.0A is a paper-based voting system that consists of two accessible ballot marking devices - Freedom Vote Tablet (FVT) and OpenElect Voting Interface (OVI), and a polling place optical scanner OpenElect Voting Optical (OVO). The typical voting experience involves the voter marking their ballot by hand or using

either the FVT or the OVI, printing their ballot on one of those machines, and then scanning their printed ballot on the OVO to cast the ballot. The system allows a configuration to retain the marked ballots to be scanned later at the central office using the central scanner component OpenElect® Voting Central Scan (OVCS).

- This system uses taps and swipes like an Android, though it does have a keypad if that is what is chosen by a county.

- Members didn't use the keypad; instead they just swiped on the actual touch screen.

- They also did not examine the keypad, so they were unable to see how it was marked.

- Voting was done with the screen reader function of the Android system itself.

- A voter must swipe to move and double tap to select a candidate.

- To adjust the volume, only one finger is needed.

- If voting for a write-in candidate, one has to cycle through items and select what one wants.

- It did not appear to have a touch keyboard, but then one became visible when one selected write-in.

- A voter could not spell a name if he did not understand what the machine said, unless they do sound files for all letters.

- The spelling issue may not be important if a different voice is used or if pronunciation is checked before the ballot goes live, but it is unclear how would one be sure if there were both a Schmitt and a Schmidt running for office. This may actually be a problem with all of the audio voting machines.

- A voter can turn the screen off and on for privacy.

- Settings can increase and decrease volume and speed

- Although Android Gestures would have to be learned, one could easily mark this ballot

- One could use the review mode to check what was marked.

- The paper ballot cannot be verified once it prints; thus, this system is missing a key component for an accessible machine.

HART VERITY INTERCIVIC

According to the manufacturer, the Hart system includes Verity Touch Writer and Verity Scan that can be installed in polling places. Voters can either hand mark paper ballots or use the Verity Touch Writer to mark ballots. The ballots can then be scanned on Verity Scan at the polling

place or can be retained to be scanned at the central office using the Verity

Central scanning component.

- The controller is a box with a wheel that lets one cycle through choices and use a select button.

- There is a Help button that allows the voter to listen to the instructions at any time. An Election Official must enter an access code that tells the system what kind of ballot the voter is using.

- One can change the volume and speed of the audio with the wheel and the select button, which are both found under audio on the menu.

- The voice levels varied because the recordings were not quite uniform, but equalization could take care of that, and this is offered by the company as part of their package. For the demo, this machine used recorded human voices.

- This machine went easily from review mode back into ballot mode.

- Once the ballot is printed, it can be taken to the scanner to be counted, but at the time of the demonstration, the company did not have the piece of equipment needed to be able to put the printed ballot through to verify audibly before putting it into the scanner.

- A secrecy sleeve will allow one to put the ballot into it and take it to the scanner where the scanner will suck the ballot out of the sleeve from the open end.

- This machine allows one to easily mark the ballot and review it in review mode.

- Subcommittee members were not able to verify the ballot after printing but before casting. The vendor did indicate that this feature is possible.

- There was no audio feedback after casting the ballot although a sighted tester saw a waving American flag and may have also seen a "thank you for voting" message.

CLEAR BALLOT

According to the manufacturer, ClearBallot ClearVote 1.4.5 consists of the following polling place components – ClearAccess, an in-person accessible voting solution that allows marking ballots and ClearCast precinct-scan, precinct scanner. On Election Day, voters mark a pre-printed paper ballot by hand or using ClearAccess accessible device. Voters then print their ballot and scan their printed ballot on precinct-scan voting solution, ClearCast. The system also allows retaining the marked

ballots to be scanned later at the central location using the central scanning component ClearCount.

- The presenter did not really know the equipment, so she was not helpful with explaining its functionality.

- While attempting to use the equipment, it was discovered that one could control audio speed.

- Apparently, this machine had a "next" button to move from one contest to another.

- It had a voter review mode but members couldn't discern whether one could verify the ballot before casting.

- The vendor seemed to think that it would be possible to have the counting device read the printed ballot before counting, but her credibility is questionable as she did not seem to really know the product.

- The members were able to mark this ballot.

ES&S EVS6000 with EXPRESSVOTE

According to the manufacturer, ES&S EVS 6000 is a voting system that consists of two accessible polling place vote capture devices - ExpressVote XL™ and ExpressVote® 2.1 and a polling place optical scanner,

DS200. The typical voting experience involves the voter marking their ballot by hand or by using either the ExpressVote XL™ or ExpressVote® 2.1 followed by either casting their ballot to the secure bin attached to the device or printing their ballot, and then scanning their printed ballot on DS200 optical scanner. Jurisdictions can opt to retain the scanned ballots to be scanned later using central count scanning components DS450 or DS850.

- All voters using the machine start with an activator card.

- Members suggest that a headphone icon be placed at the spot where one plugs in the headphone jack.

- The controller is marked in braille.

- The machines are similar to ivotronic in functionality.

- One can reinsert the ballot into the Expressvote machine to have it read the printed choices before being inserted into the scanner device. Members felt the ballot could be marked easily and it appears that one could verify it by feeding it back through the machine.

- These machines use a bar code to verify the ballot.

C. DOS Voting Systems Certification Accessibility Testing

The systems that will undergo examination are: **Unisyn OpenElect Voting System 1.3.0.2, ES&S, Unisyn OpenElect 2.0A, Dominion Democracy Suite, Clear Ballot Clear Vote,** and **Hart Verity.**

ES&S - Examination was in June 2018.

- Although there had been two versions of the Expressvote machine at the April demonstration, Subcommittee members looked at only one during the usability testing, the unit with a larger keypad.

- Keypad was more complicated and had dedicated buttons instead of menu choices like the smaller keypad or controller.

- The machine read back votes for verification from the bar codes.

- One member could not get the ballot to read consistently using Seeing AI (a free app that narrates, designed for persons that are blind and low-vision), but another member had better luck.

- The iPhone solution for reading the ballot would not work in some polling places because they are in buildings that have limited cell phone signals at least for GMS systems like T-Mobile and AT&T. CDMA that Verizon uses can get through thicker walls at present.

- Members who have absolutely no vision cannot judge where on the printed ballot the writing is for more accurate focus of the camera.

- The ballot on this machine was read and verified after printing using the barcodes.

- If Subcommittee members chose a straight party ballot, there was no explanation that the system would let the voter go through the ballot and take their straight party choices and change them to the other party.

- Members felt that they could not tell after they had chosen a straight party ticket, that they had already done so.

- Some members thought there were issues with the ballot questions being read through completely.

- This system allows one to mark the ballot and verify it both at the end of the process before printing and after printing.

- After printing the ballot can be reinserted in the marking device for verification purposes.

- Verification is with bar codes.

- One can cast the ballot at the counting machine.

Unisyn OpenElect 2.0A

This system was certification tested by DOS in August 2018. Only one Subcommittee member was able to test this system as of this writing.

- There was an activation stub which had to be slid under a part of the voting machine to start the voting process.

- That item had no marking on the machine that was tactile to be able to know how to line it up to have it so that its barcode scanned properly.

- It did beep once it had scanned.

- It was pointed out by CCD examiner that the voting official could be the one to take that action.

- The headphone jack has no marking to let one know that it is a headphone jack. This is not referring to braille but just the little symbol that means headphones.

- This machine can leave the screen on when using it in audio mode.

- The tester had a speaker turned on instead of headphones so that the CCD examiners could hear the maneuvering through the ballot. First, a language had to be selected.

- The member voted straight Republican at the beginning then went to the particular races. When the member wanted to change from the

straight Republican marking in a particular race, the machine dumped

everything else for that race.

- It seemed more reasonable that to avoid overvoting when member

  attempted to vote for someone, the machine would have prompted

  the voter to cancel someone already on the list for that race. For

  example, when a local school board election that says vote for 6 and

  one looks down the list and realizes that a neighbor is one of the

  people not yet voted for, marking that individual appears to remove all

  other choices in the race that were chosen at the top of the ballot

  when the straight party choice was made. It seemed that when one

  overvotes in any race, it wipes out all choices but the one that caused

  the overvote.

- Voter could not proceed to the next race until all names in the current

  race had been read. That included the number of write in candidates

  available in the race.

- The member went through the ballot and changed several races, and

  also did a write-in. The member could not figure out how to get the

  write-in to register and used the help key which indicated that there

  was an enter button in the list of letters and actions on the screen.

- One odd thing noted was that when in review mode, it still showed a straight Republican choice with maximum choices for that contest although some candidates had been changed to other parties.

- In the "review ballot mode" when a change was made the instruction said it was at the end of the ballot and not at the end of the race, however, it was at the end of the race.

- The select button was then used to lock in the change and that took the voter to the next race.

- Upon finishing in review mode, the print ballot option is given. This machine thanks the voter for voting and prints the ballot.

- The equipment did not instruct on where to look for the ballot that came out of the machine.

- A privacy sleeve was given in order to bring it to casting machine. The ballot hung out a little from one end of the sleeve.

- The casting machine had no markings to show where to put the ballot.

- There was no indication that the ballot had been successfully fed into the machine for counting.

- The ballot was retrieved after casting so that the voter could experiment with a Smart Phone app to verify the ballot.

- The voter tried to read the ballot. The voter couldn't tell where she was on the ballot using Seeing AI but it could read parts of the ballot.

- Because of the shape of the ballot the member could not easily use the document reader, only the short text reader which reads what is under the camera lens.

- There were both names and numbers associated with those names, and the member did not know what the numbers meant.

- Because the member could not tell where she was on the ballot with her camera lens, things could be read out of order as she moved the camera around to try to cover everything on the ballot. If there were a difference in texture for the areas that had print on them, perhaps voters could better zero in on the part of the ballot to focus on with the camera.

- This ballot gave better results than the ES&S ballot that that was read with the same screen reading software on the IPhone in June.

- This ballot was easy to mark.

- It could be reviewed before printing.

- This voting system does not provide a way to review the ballot after printing, and there was no feedback when ballot was placed in the

casting or counting machine to know that nothing went wrong in reading the cast ballot.

- The voice on the Unisyn 2.0A that was tested for certification pronounced a candidate's name which was Tonya something. The pauses that occurred during the reading of the name made it sound like Tom something else.

VI. RECOMMENDATIONS

The process to select new, accessible voting technology is critical and decisions must be made with the involvement of the disability community.

Based on the Subcommittee's work regarding appropriate, accessible, and usable voting technology, the Subcommittee recommends:

The use of separate voting systems for voters with disabilities amounts to unequal treatment under the law. Voters should use the AVS at each polling site regardless of disability, rather than limiting the use of the AVS to just voters with disabilities. This will ensure that the AVS are set up correctly and poll workers are accustomed to the AVS throughout election day.

AVS must have a full range of accessible features to allow individual to mark/generate the official ballot digitally, on paper, or both. The access

features must conform to the accessibility standards of the Pennsylvania Standards, VVSG 1. and optimally would conform in the future to the current VVSG 2.0 accessibility standards, as they are adopted.

AVS must have mechanisms that convert the print content of a marked paper ballot into multiple accessible forms (audio, large visual display) that enable a voter with a disability to use the same format to verify and cast the paper ballot as they used to mark that ballot. When applicable, verifying ballot content though a bar code or other machine-readable code that provides audio verification to the user is acceptable.

AVS must have mechanisms that move or handle the paper ballot automatically or in a way that does not require a voter with a disability to handle the paper ballot, place it under a scanner, or manipulate the ballot to verify or cast it.

AVS must have audio with voice quality that is at a frequency that people with limited hearing can hear. Further, the voice quality, whether synthesized or real, must be such that words are recognizable and content can be understood.

AVS should have several speeds for voices on the audio.

An AVS help screen should be available from wherever one is in the voting process and should answer questions related to that screen.

When creating an audio ballot, counties should spell out similar sounding names.

DOS should work with the counties to make equipment more readily available at county office buildings, informational fairs, local libraries, or upon request by interested advocates to familiarize all voters with the voting system, including online demonstrations easily available for people to watch and listen to on how to operate the new equipment.

DOS should make available on its website vendor videos for all AVSs used by counties. The DOS website does provide information and the vendor video for the systems used by counties, however, only the video for the primary method of voting for each county is available on the website and not the AVS system each county uses.

DOS should meet periodically with DVC to exchange information about the implementation of the rollout of new county voting technology over the next four years.