Notes to reviewers – 02/07/18:

I have taken several passes through the requirements, adding Word comments as to their disposition. I have removed some requirements that dealt solely with DREs (all-electronic voting systems, no voter-verified paper record). Much more needs to be done. The PDF version of this file does contain the comments, but I find it easier to read this using Word.

These are very important requirements. They deal with a number of usability, quality, security, and integrity issues. It is highly important that EOs and security people review these requirements, as well as other audiences.

The applies to: fields will be made more understandable where needed.

- CCOS is central count optical scanner.
- PCOS is precinct count optical scanner.
- Optical scanner is obvious, CCOS and PCOS must implement all requirements specific to optical scanners.
- Tabulators could be a dedicated tabulator, or it could be that part of an EMS that deals with tabulation, or it could be that part of a CCOS/PCOS that has tabulator capability.
- Election definition device could be a dedicated device or would generally be that part of an EMS that deals with setting up an election.
- EBM is electronic ballot marker.
- Voting system means that the requirement applies to the entire voting system and must be met in some way by one or more of the devices that constitute the voting system.
- Some of the fields have terms such as "Provisional / challenged ballots" – this means that the requirement applies to voting systems that will handle provisional or challenged ballots. Many of these terms will likely be replaced by "voting system" or the terminology will be made easier to understand.

There is a section of assumed EO practices at the end of some of the sections – they do not mandate any EO procedures, they identify the almost-always typical EO procedures that the requirements are written to support.

The material below starts with the principle and guidelines that the requirements pertain to (I have doubts as to whether this is the simplest and most readable way to organize the requirements, but it is being done for now). Then there are subsections for each phase of running an election, i.e., election definition, … equipment setup, … casting, … reporting.

Principle 1 - High Quality Design

The voting system is designed to accurately, completely, and robustly carry out election processes.

1. Election Definition

1-A Election definition devices, ballot definition

The election definition device MUST provide for the logical definition of the ballot, including the definition of the number of allowable votes for each contest.

Applies to: Election definition devices

Status: under review
Updated: 12/21/17
Gap notes: Reworded from VSS2002 I.2.3.2.a

1-A.1 Election definition devices, ballot definition details

The election definition device MUST be capable of collecting and maintaining

a. Contests and their associated labels and instructions;

b. Candidate names and their associated labels; and

c. Ballot questions and their associated text.

Applies to: Election definition devices

Status: under review
Updated: 12/21/17
Gap notes: Reworded from VSS2002 I.2.3.1.1.1.b

Commented [WJ(1): Will the security group require signing and validating imports and exports? Seems like requirements to do so should go in the security section, otherwise they go here.

1-B Election definition devices, administrative subdivisions

The election definition device MUST provide for the logical definition of administrative subdivisions, where the list contests varies between subdivisions.

Applies to: Election definition devices

Status: under review

Updated: 12/21/17
Gap notes: Reworded from VSS2002 I.2.2.6.a and I.2.3.2.b

1-C Election definition devices, election districts

The election definition device MUST enable EOs to define multiple election districts.

Applies to: Election definition devices

Discussion
An election district is generally associated with a contest in an election, e.g., a state is the district for the state senator contest.

Status: under review
Updated: 12/21/17
Gap notes: Reworded from VSS2002 I.2.2.6.a

1-D Election definition devices, identifiers

The election definition device MUST enable EOs to associate a minimum of 3 identifiers each for administration subdivisions, election districts, contests, and candidates.

Applies to: Election definition devices

Discussion
This is based on the need to support cross-referencing of state-wide identifier schemes or schemes such as OCD-IDs with those used on a more local basic.

Status: under review
Updated: 12/21/17
Gap notes: New requirement based on NIST CDF work.

1-D.1 Election definition devices, OCD-IDs

The election definition device MUST support the use of Open Civic Data Identifiers with administration subdivisions, election districts, contests, and candidates.

Applies to: Election definition devices

Commented [WJ(2): The OCD-ID spec is developing, hopefully will be sufficiently ready in time.

Discussion
An authoritative reference will need to be established, as well as uniform methods for associating OCD-IDs with contests and candidates.

Status: under review
Updated: 12/21/17
Gap notes: New requirement based on NIST CDF work

1-E Election definition devices, voting methods

The election definition device MUST enable EOs to define and identify contests, contest choices, candidates, and ballot questions using all voting methods indicated in the manufacturer-provided implementation statement.

Applies to: Election definition devices

Status:	under review
Updated:	12/21/17
Gap notes:	New requirement

1-E.1 Election definition devices, 1-of-M voting method

When implementing the 1-of-M voting method, the election definition device MUST allow the definition of contests where the voter is allowed to choose at most one contest choice from a list of contest choices.

Applies to: Election definition devices

Status:	under review
Updated:	12/21/17
Gap notes:	new requirement / implicit in VSS2002

Commented [WJ(3): Do all modern voting systems handle n of m? If so, require it of the system by default.

1-E.2 Election definition devices, yes/no questions

The election definition device MUST allow the definition of contests where the voter is allowed to vote yes or no on a question.

Applies to: Election definition devices

> **Discussion**
> This requirement concerns referenda/ballot questions with a yes or no voter choice.

Status:	under review
Updated:	12/21/17
Gap notes:	New requirement / clarification of VSS2002 intent

1-E.3 Election definition devices, multiple choice questions

The election definition device MUST allow the definition of contests where the voter is allowed to vote on one or more from a list of possible choices on a question.

Applies to: Election definition devices

Commented [WJ(4): New requirement based on feedback that some referenda are multiple choice.

> **Discussion**
> This requirement concerns referenda/ballot questions that are multiple choice.

Status:	under review
Updated:	12/21/17
Gap notes:	New requirement / clarification of VSS2002 intent

1-E.4 Definition of parties and party affiliations and endorsements

The election definition device MUST allow the definition of political parties and the indication of the affiliation and/or endorsements of each contest choice.

Applies to: Election definition devices

Status:	under review
Updated:	12/21/17
Gap notes:	Implicit in VSS2002

1-E.5 Election definition devices, primary elections, party-specific and non-party-specific contests

When implementing primary elections, the election definition device MUST support the definition of both party-specific and non-party-specific contests, with the capability to include both party-specific and non-party specific contests on the same ballot.

Applies to: Election definition devices

Status:	under review
Updated:	12/21/17
Gap notes:	Added precision, based on VSS2002 I.2.2.8.2

1-E.6 Election definition devices, write-ins

The election definition device MUST support the definition of contests that include ballot positions for write-in opportunities.

Applies to: Election definition devices

Status:	under review
Updated:	12/21/17
Gap notes:	Reworded from VSS2002 I.2.4.3.1.d

1-E.7 Election definition devices, straight party voting

When implementing straight party voting, the election definition device MUST be capable of defining the necessary straight party contest and recording the endorsements made by each party in the election definition to support the gathering and recording of votes for the slate of contest choices endorsed by a given political party.

Applies to: Election definition devices

Commented [WJ(5): Probably should use other language, intent is to require this if the manufacturer says it supports it. There is also the question, how many of these variations should be supported in ALL equipment?

Status: under review
Updated: 12/21/17
Gap notes: Added precision, based on VSS2002 I.2.2.8.2

1-E.8 Election definition devices, cross-party endorsement

When implementing cross-party endorsement, the election definition device MUST be capable of defining the necessary straight party contest and recording the endorsements made by each party in the election definition to support the gathering and recording of votes for the slate of contest choices endorsed by a given political party when a given contest choice is endorsed by two or more different political parties.

Applies to: Election definition devices

Status: under review
Updated: 12/21/17
Gap notes: Clarification or extension of existing requirements in VVSG1.1

1-E.9 Election definition devices, define precincts and election districts

The election definition device MUST support the definition of election districts and precincts in such a way that a given polling place may serve two or more election districts.

Applies to: Election definition devices

Discussion

This requirement addresses the capability to support the definition of split precincts, each split unique to a particular district, as well as the association of the split precincts with the precinct. This requirement goes further and also addresses the capability to support the definition of other configurations of precincts, such as combined precincts.

Status: under review
Updated: 12/21/17
Gap notes: Added precision, based on VSS2002 I.2.2.8.2

1-E.10 Election definition devices, N-of-M voting

When implementing the N-of-M voting method, the election definition device MUST be capable of defining contests where the voter is allowed to choose up to a specified number of contest choices from a list of contest choices.

Applies to: Election definition devices

Status: under review
Updated: 12/21/17
Gap notes: Added precision, based on VSS2002 I.2.2.8.2, I.2.3.2.a

1-E.11 Election definition devices, cumulative voting

When implementing the cumulative voting method, the election definition device MUST be capable of defining contests where the voter is allowed to allocate up to a specified number of votes over a list of contest choices, possibly giving more than one vote to a given contest choice.

Applies to: Election definition devices

Status:	under review
Updated:	12/21/17
Gap notes:	Added precision, based on VSS2002 I.2.2.8.2, I.2.3.2.a

1-E.12 Election definition devices, ranked choice voting

When implementing the ranked choice voting method, the election definition device MUST be capable of defining contests where the voter is allowed to rank contest choices in a contest in order of preference, as first choice, second choice, etc.

Applies to: Election definition devices

Status:	under review
Updated:	12/21/17
Gap notes:	Added precision, based on VSS2002 I.2.2.8.2

1-F Election definition accuracy

The election definition device MUST record the election contests, contest choices, issues, and political and administrative subdivisions exactly as defined by EOs.

Applies to: Election definition devices

Status:	under review
Updated:	12/21/17
Gap notes:	Reworded from VSS2002 I.2.2.2.1.a / VVSG2005 I.2.1.2.a

1-G Voting options accuracy

The election definition device MUST record the options for casting and recording votes exactly as defined by EOs.

Applies to: Election definition devices

Status:	under review
Updated:	12/21/17
Gap notes:	Reworded from VSS2002 I.2.2.2.1.b / VVSG2005 I.2.1.2.b

1-H Election definition devices, confirm recording of election definition

The election definition device MUST verify (i.e., actively check and confirm) the correct recording of election definition data to the persistent storage of the devices.

Applies to: Election definition devices

Discussion
"Persistent storage" includes nonvolatile memory, hard disks, optical disks, etc.

Status: under review
Updated: 12/21/17
Gap notes: From VSS2002 I.3.2.3.1.c and e (VVSG2005 I.4.1.3.1.c and e), expanded to include persistent storage

1-I Election definition devices, election definition distribution

The election definition device MUST provide for the generation of master and distributed copies of election definitions as needed to configure each voting devices in the system.

Applies to: Election definition devices

Status: under review
Updated: 12/21/17
Gap notes: Reworded from VSS2002 I.2.3.2.e

Commented [WJ(6): Should be signed?

2. Ballot Preparation, Formatting, and Production

2-A Election definition device, define ballot styles

The election definition device MUST enable EOs to define ballot styles.

Applies to: Election definition device

> Status: under review
> Updated: 12/21/17
> Gap notes: Reworded from VSS2002 I.2.2.6.c

2-A.1 Election definition device, auto-format

The election definition device MUST be capable of automatically formatting ballots in accordance with the requirements for offices and contest choices qualified to be placed on the ballot for each political subdivision and election district.

Applies to: Election definition device

> Status: under review
> Updated: 12/21/17
> Gap notes: Reworded from VSS2002 I.2.3.1.1.1.a

2-A.2 Election definition device, include votable contests

The election definition device MUST provide for the inclusion in a given ballot style of any all contests in which the voter would be entitled to vote.

Applies to: Election definition device

> Status: under review
> Updated: 12/21/17
> Gap notes: Extrapolated from relevant requirements in VSS2002

2-A.3 Election definition device, exclude nonvotable contests

The election definition device MUST provide for the exclusion from a given ballot style of any contest in which the voter would be prohibited from voting because of place of residence or other such administrative criteria.

Applies to: Election definition device

Discussion
In systems supporting primary elections, this would include the exclusion of party-specific contests that are not votable by the selected political party.

Status: under review
Updated: 12/21/17
Gap notes: Reworded from VSS2002 I.2.3.2.c

2-A.4 Election definition device, nonpartisan formatting – delete?

The election definition device MUST support the uniform allocation of space and fonts used for each office, contest choice, and contest such that the voter perceives no contest choice to be preferred to any other.

Applies to: Election definition device

Status: under review
Updated: 12/21/17
Gap notes: Reworded from VSS2002 I.2.3.1.2.c

Commented [WJ(7)]: Cross-reference to U&A.

2-A.5 Election definition device, jurisdiction-dependent content

The election definition device MUST enable EOs to add jurisdiction-dependent text, line art, logos and images to ballot styles.

Applies to: Election definition device

Status: under review
Updated: 12/21/17
Gap notes: Reworded from VSS2002 I.3.2.3.1.d

2-A.6 Election definition device, primary elections, associate configurations with parties

When implementing primary elections, the election definition device MUST support the association of different contests with different political parties.

Applies to: Election definition device

Discussion

In paper-based systems, open primaries have sometimes been handled by printing a single ballot style that merges the contests from all parties, instructing the voter to vote only in the contests applicable to a single party, and rejecting or discarding votes that violate this instruction. The election definition device must therefore be capable of associating different contests with different political parties.

Status: under review
Updated: 12/21/17
Gap notes: Reworded from VSS2002 I.2.3.1.1.1.d

2-A.7 Election definition device, ballot rotation

When implementing ballot rotation, the election definition device MUST support the production of rotated ballots and/or the activation of ballot rotation functions in vote-capture devices through the inclusion of relevant metadata in distributed election definitions and ballot styles.

Applies to: Election definition device

Status:	under review
Updated:	12/21/17
Gap notes:	Added precision, based on VSS2002 I.2.2.8.2

2-A.8 Election definition device, split precincts, associate ballot configurations

When implementing split precincts, the election definition device MUST support the definition of distinct ballot configurations for voters from two or more election districts that are served by a given polling place.

Applies to: Election definition device

Status:	under review
Updated:	12/21/17
Gap notes:	Added precision, based on VSS2002 I.2.2.8.2

2-B Election definition device, ballot style distribution

The election definition device MUST provide for the generation of master and distributed copies of ballot styles as needed to configure each voting device in the system.

Applies to: Election definition device

Status:	under review
Updated:	12/21/17
Gap notes:	Reworded from VSS2002 I.2.2.6.d

2-B.1 Election definition device, ballot style identification

The election definition device MUST generate codes or marks as needed to uniquely identify the ballot style associated with any ballot.

Applies to: Election definition device

Discussion

In paper-based systems, identifying marks would appear on the actual ballots. Electronic ballot markers would make internal use of unique identifiers for ballot styles but would not necessarily present these where the voter would see them. In both cases, the identifying mark could be also recorded in the cast vote record.

Status: under review
Updated: 12/21/17
Gap notes: Reworded from VSS2002 I.2.3.1.1.1.e

2-C Election definition device, reuse of definitions

The election definition device MUST support retention, modification, and reuse of general districting/precinct definitions and ballot formatting parameters within the same election and from one election to the next.

Applies to: Election definition device

Status: under review
Updated: 12/21/17
Gap notes: Reworded from VSS2002 I.2.3.1.2.e and g

2-D Election definition device, ballot style protection

The election definition device MUST prevent unauthorized modification of any ballot styles.

Applies to: Election definition device

Status: under review
Updated: 12/21/17
Gap notes: Reworded from VSS2002 I.2.3.1.2.f

3. Equipment Setup

3.1 Logic and accuracy testing

This section deals primarily with logic and accuracy testing ("L&A"), whose purpose is to detect malfunctioning and misconfigured devices before polls are opened. It is not a defense against fraud.

Election personnel conduct equipment and system readiness tests prior to the start of an election to ensure that the voting system functions properly, to confirm that system equipment has been properly integrated, and to obtain equipment status and readiness reports. The content of those reports is defined in Section 8 "Reporting".

3-A Support L&A testing

All systems MUST provide the capabilities to:

   a. Verify that all voting devices are properly prepared for an election and collect data that verify equipment readiness;

   b. Verify the correct installation and interface of all system equipment; and

   c. Verify that hardware and software function correctly.

Applies to: Voting system

Status:	under review
Updated:	01/26/18
Gap notes:	VSS2002 I.2.3.4.1, I.2.3.5.a2 and b2 (the second a and b, respectively), I.4.4.2.a

3-B Built-in self-test and diagnostics

All programmed devices MUST include built-in measurement, self-test, and diagnostic software and hardware for monitoring and reporting the system's status and degree of operability.

Applies to: Programmed device

Status:	under review
Updated:	01/26/18
Gap notes:	VSS2002 I.2.2.4.1.j, I.2.2.8.1.a

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3-C Verify proper preparation of ballot styles

The election definition device MUST enable EOs to test that ballot styles and programs have been properly prepared.

Applies to: Election definition device

Status:	under review
Updated:	01/26/18
Gap notes:	VSS2002 I.2.2.6.f, I.4.4.2.c

3-D Verify proper installation of ballot styles

Vote-capture devices, tabulators, and ballot-on-demand printers MUST include a capability to automatically verify that the software and ballot styles have been properly selected and installed in the equipment and immediately notify an EO of any errors.

Applies to: Vote-capture devices, Tabulators, Ballot-on-demand printer

Discussion

At a minimum, notification means an error message, a log entry, and a "failed" result on this portion of the L&A test. Examples of detectable errors include use of software or data intended for a different type of device and operational failures in transferring the software or data.

Status:	under review
Updated:	01/26/18
Gap notes:	VSS2002 I.2.3.3.b, I.4.4.2.c

3-E Verify compatibility between software and ballot styles

Vote-capture devices, tabulators, and ballot-on-demand printers MUST include a capability to automatically verify that software correctly matches the ballot styles that it is intended to process and immediately notify an EO of any errors.

Applies to: Vote-capture devices, Tabulators, Ballot-on-demand printer

Discussion

At a minimum, notification means an error message, a log entry, and a "failed" result on this portion of the L&A test.

Status:	under review
Updated:	01/26/18
Gap notes:	VSS2002 I.2.3.3.c, I.4.4.2.c

3-F Test ballots

Tabulators MUST provide the capability for EOs or election judges to submit test ballots for use in verifying the integrity of the system.

> **Commented [WJ(9)]:** Should apply to vote-capture devices, but why ballot on demand printers?

> **Commented [WJ(10)]:** Ditto

Status:	under review
Updated:	01/26/18
Gap notes:	VSS2002 I.2.4.3.3.s, generalized from DREs; I.4.4.2.d and f

3-G Test all ballot positions

Optical scanners MUST support testing that uses all potential ballot positions as active positions.

Applies to: Optical scanners

Status:	under review
Updated:	01/26/18
Gap notes:	VSS2002 I.2.3.4.2.a, I.4.4.2.f

3-H Optical scanners, testing calibration

Optical scanners MUST support the use of test ballots to test the calibration of the paper-to-digital conversion (i.e., the calibration of optical sensors, the density threshold, and/or the logical reduction of scanned images to binary values, as applicable).

Applies to: Optical scanners

Commented [WJ(11)]: Modify if we are allowing COTS scanners as part of voting system – used in tabulation as opposed to only audit.

Status:	under review
Updated:	01/26/18
Gap notes:	Interpretation of VSS2002 I.2.3.4.2.b

3-I Ballot marker readiness

EBMs MUST include a means of verifying that the ballot marking mechanism is properly prepared and ready to use.

Applies to: EBM

Status:	under review
Updated:	01/26/18
Gap notes:	VSS2002 I.2.4.1.2.1.a

3-J L&A testing, no side-effects

Logic and accuracy testing functions MUST introduce no effects on operation during the election other than audit log entries, status changes to note that the tests have been run with a successful or failed result, separate storage of test results, changes in the "protective counter" or "life-cycle counter" (if the device has one), and normal wear and tear.

Applies to: Voting device

Discussion

Requirements in the next section preclude the device from actually serving in the election unless these tests are successful. Apart from that safeguard, it should be impossible (by design) for the L&A testing to have any influence on the operation of the device during the election or on the results that are reported for the election. Most notably, election results must never include any test votes that were counted during L&A testing.

Status: under review
Updated: 01/26/18
Gap notes: VSS2002 I.2.3.4.1.b2 (the second b), significantly revised

4 Opening Polls

4-A Programmed device, verify L&A performed

Programmed devices MUST provide an internal test or diagnostic capability to verify that the applicable tests specified in Section 3 "Equipment Setup" have been successfully completed.

Applies to: Programmed device

Status: under review
Updated: 01/26/18
Gap notes: VSS2002 I.2.4.1.1.a

4-B Programmed device, disable untested devices

Programmed devices MUST NOT enter an election mode unless and until the readiness test has been performed successfully and any steps necessary to isolate test data from election data have been performed successfully.

Applies to: Programmed device

Discussion

If a device has not been tested, has failed its L&A test or the test data have not been isolated (i.e., test votes could end up being included in election results), then the device is "not ready" for use in the election and should "fail safe" so that it cannot contaminate election results.

Status: under review
Updated: 01/26/18
Gap notes: VSS2002 I.2.4.1.1.b; EAC RFI 2008-07

4-B.1 Non-zero totals

Tabulators MUST NOT enter an election mode unless and until the logic and accuracy test has been performed successfully, any steps necessary to isolate test data from election data have been performed successfully, and all vote counters have been zeroed. An attempt to open polls with non-zero totals MUST be recorded in the audit log, and a clear notification of the event MUST be communicated to an EO.

Applies to: Tabulators

Discussion

Jurisdictions that allow "early voting" before the nominal election day should note that a distinction is made between the opening and closure of polls, which can occur only once per election, and the suspension and resumption of voting between days of early voting. The open-polls operation, which requires zeroed counters, is performed only when early voting commences; the resumption of voting that was suspended overnight does not require that counters be zeroed again.

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Status: under review
Updated: 01/26/18
Gap notes: VSS2002 I.2.4.1.1.b; EAC RFI 2008-07

4-C Optical scanners tabulator activation

Optical scanners MUST include a means of activating the ballot counting device.

Applies to: Optical scanners

Status: under review
Updated: 01/26/18
Gap notes: VSS2002 I.2.4.1.2.2.a

4-D Optical scanners, verify activation

Optical scanners MUST include a means of verifying that the ballot counting device has been correctly activated and is functioning properly.

Applies to: Optical scanners

Status: under review
Updated: 01/26/18
Gap notes: VSS2002 I.2.4.1.2.2.b

> **Commented [WJ(12):** Do we want to allow COTS scanners in the voting system? If so, mods are needed here.

4-E Vote-capture devices, open poll function

Vote-capture devices MUST provide designated functions for opening the poll.

Applies to: Vote-capture devices

Status: under review
Updated: 01/26/18
Gap notes: VSS2002 I.2.4.1.3, generalized

4-E.1 Vote-capture devices, protect open poll function

Vote-capture devices MUST include access control to prevent the inadvertent or unauthorized actuation of the poll-opening function.

Status: under review
Updated: 01/26/18
Gap notes: VSS2002 I.2.4.1.3.a

4-E.2 Vote-capture devices, enforce correct poll opening process

Vote-capture devices MUST include a means of enforcing the execution of poll-opening steps in the proper sequence if more than one step is required.

Status: under review
Updated: 01/26/18
Gap notes: VSS2002 I.2.4.1.3.b

4-E.3 Vote-capture devices, verify activation

Vote-capture devices MUST include a means of verifying that the system has been correctly activated.

Status: under review
Updated: 01/26/18
Gap notes: VSS2002 I.2.4.1.3.c

5 Casting

These functional capabilities include all operations conducted at the polling place by voters and officials while polls are open.

5.1 Issuance of voting credentials and ballot activation

The term "ballot activation" is sometimes used in a broad sense to cover the general activities of (1) determining what type of ballot must be presented to the voter, and (2) activating the voting system to present the ballot style that is appropriate for that voter. In this section, "issuance of voting credentials" is used for the first activity, and "ballot activation" is used exclusively for the second activity.

Voting credentials are those data items sufficient for the voting system to activate the appropriate ballot for the voter. The credentials consist of an indication of the ballot style and ballot configuration as well as any additional ballot options that the voting system may be capable of presenting if selected by the voter, such as a magnified ballot for a voter with low vision. If the voting system is used for provisional voting, the credentials may also include an identifier that effectively would link the voter's identity with the voter's cast ballot. The credentials must also indicate the election for which the credentials are valid. Lastly, there is usually a code calculated on the credentials so that the voting system can verify their integrity and verify that an authorized activation device issued the credentials.

An activation device (e.g., an epollbook) stores the credentials on a token (e.g., a memory card) so that the voter can carry them to a vote-capture device, e.g., an EBM. Thus, there is typically an "air gap" required between the activation device and the vote-capture device. The requirements in this section do not prohibit, however, the activation device from being connected to a network of EBMs. In this case, the credentials and token would be represented by whatever signaling and data is exchanged across the network between the activation device and the EBMs. Credential issuance also may be performed pre-election by an EBM in a ballot activation mode (for example, a series of memory cards could be activated for certain ballot styles and ballot configurations in advance of opening the polls).

Preserving privacy of the ballot is a paramount consideration in issuance of voter credentials and ballot activation because knowledge of the voter's identity is involved. The requirements in this section mandate that privacy of the ballot be protected throughout the entire process of credential issuance and ballot activation, and that no information be maintained in reports or logs that could assist in identifying a voter's cast ballot (except for provisional voting on a DRE).

> **Commented [WJ(13):** need new term

5.1.1 Credential issuance and ballot activation

5.1.1-A Activation device, EBM, ballot activation

EBMs MUST support ballot activation.

Applies to: Activation device, EBM

> **Discussion**
> All EBMs, in addition to activation devices, must support ballot activation, as defined in the following subrequirements.

Status: under review
Updated: 02/01/18
Gap notes: VSS2002 I.2.4

5.1.1-A.1 Activation device, EBM, credential issuance

EBMs MAY function exclusively as an activation device and issue ballot activation credentials.

Applies to: EBM

> **Discussion**
> An EBM could be configured, pre-election, to function exclusively as an activation device. During elections, an EBM cannot be used as both an activation device and a vote-capture device.

Status: under review
Updated: 02/01/18
Gap notes: New requirement but existing practice

5.1.1-A.2 Activation device, EBM, at most one cast ballot per session

Activation devices, EBMs MUST enable poll workers either to initiate, or to provide the voter with the credentials sufficient to initiate, a voting session in which the voter may cast or print at most one ballot.

Applies to: Activation device, EBM

> **Discussion**
> A voting session on an EBM may culminate with the printing of the ballot. Activation devices and EBMs must prevent re-use of the credentials, e.g., by erasing a memory token used to carry ballot activation information.

Status: under review
Updated: 02/01/18
Gap notes: VSS2002 I.2.4.2.d, rewritten to respect the limits of what the system can do

5.1.1-B Activation device, contemporaneous record

Activation devices MAY create contemporaneous records of credential issuance to a voter. The record, once made, MUST NOT be able to be modified by the voting system.

Applies to: Activation device

Discussion

The voting system must create a record at the time when credentials are issued to voters so that the collection of records can be compared to the number of ballots voted. This may be done if the activation device prints a record, or by using a paper pollbook.

Status:	under review
Updated:	02/01/18
Gap notes:	New requirement

5.1.1-C Activation device, EBM, control ballot configuration

Activation devices and EBMs MUST enable poll workers to control the ballot configuration(s) made available to the voter, whether presented in printed form or electronic display, such that each voter is permitted to record votes only in contests in which that voter is authorized to vote.

Applies to: Activation device, EBM

Discussion

For an electronic display, poll workers control the ballot configuration using an activation device and issuing credentials. See also Requirement 7.2-A.2, Requirement 7.2-A.3, and Requirement 5.7-C.

Status:	Under review
Updated:	02/01/18
Gap notes:	VSS2002 I.2.4.2.a

5.1.1-C.1 Activation device, EBM, enable only applicable contests

EBMs MUST activate all portions of the ballot upon which the voter is entitled to vote and MUST disable all portions of the ballot upon which the voter is not entitled to vote.

Applies to: EBM

Discussion

In paper-based systems, open primaries have sometimes been handled by printing a single ballot style that merges the contests from all parties, instructing the voter to vote only in the contests applicable to a single party, and rejecting or discarding votes that violate this instruction. To use that approach on an EBM would violate this requirement.

Status:	Under review
Updated:	02/01/18

Commented [WJ(16)]: Again, is this okay, should it be a MUST?

Gap notes: VSS2002 I.2.4.2.g., VSS2002 I.2.4.2.h

5.1.1-C.2 Activation device, EBM, select ballot configuration for party in primary elections

EBMs MUST enable the selection of the ballot configuration that is appropriate to a party affiliation declared by the voter in a primary election.

Applies to: EBM

Status: Under review
Updated: 02/01/18
Gap notes: VSS2002 I.2.4.2.f

5.2 General voting functionality

5.2-A No advertising

The ballot presented to the voter MUST NOT display or link to any advertising or commercial logos of any kind, whether public service, commercial, or political, unless added by EOs using the functionality described in Requirement part1:7.2-A.5.

Applies to: Vote-capture devices

Status: Under review
Updated: 02/01/18
Gap notes: Clarification of VSS2002 I.2.3.1.3.1.b

5.2-B Capture votes

All vote-capture devices MUST record the selection and non-selection of individual contest choices for each contest.

Applies to: Vote-capture devices

Status: Under review
Updated: 02/01/18
Gap notes: VSS2002 I.2.4.3.1.c

5.3 Voting variations

> **Commented [WJ(17)]:** Review the draft CVR spec and add any additional CVR-related requirements – there are some to improve auditing, so need to ensure this jives with security.

> **Commented [WJ(18)]:** Rewrite so that they all apply to vote-capture devices when a particular vote variation is used. A number of them might be required of all vote-capture devices. Make sure this jives with Lauren Massa-Lochridge's work.

5.3-A Vote-capture devices, voting variations

All vote-capture devices MUST support the gathering of votes using all voting variations indicated for them in the implementation statement.

Applies to: Vote-capture devices

Status: Under review
Updated: 02/01/18
Gap notes: Extrapolated from VSS2002 I.2.2.8.2 and I.2.4

5.3-A.1 Vote-capture devices, 1-of-M

All vote-capture devices MUST be capable of gathering and recording votes in contests where the voter is allowed to choose at most one contest choice from a list of contest choices.

Status: Under review
Updated: 02/01/18
Gap notes: VSS2002 I.2.4. Extended VSS2002 I.2.4.2.e to all systems

5.3-A.2 Vote-capture devices, yes/no question

All vote-capture devices MUST be capable of gathering and recording votes in contests where the voter is allowed to vote yes or no on a question.

Status: Under review
Updated: 02/01/18
Gap notes: New requirement / clarification of VSS2002 intent

> **Commented [WJ(19)]:** Update to include multiple choice ballot questions.

5.3-A.3 Vote-capture devices, indicate party affiliations and endorsements

All vote-capture devices MUST be capable of indicating the affiliation and/or endorsements of each contest choice.

Status: Under review
Updated: 02/01/18
Gap notes: Added precision

5.3-A.4 Vote-capture devices, closed primaries

All vote-capture devices MUST be capable of gathering and recording votes within a voting process that assigns different ballot styles depending on the registered political party affiliation of the voter and supports both party-specific and non-party-specific contests.

Applies to: Vote-capture devices

Status: Under review

> **Commented [WJ(20)]:** Make this apply to all – all support closed primaries?

Updated: 02/01/18
Gap notes: Added precision, based on VSS2002 I.2.2.8.2 and glossary

5.3-A.5 Vote-capture devices, open primaries

Vote-capture devices MUST be capable of gathering and recording votes within a voting process that assigns different ballot styles depending on the political party chosen by the voter at the time of voting and supports both party-specific and non-party-specific contests.

Applies to: Vote-capture devices

> **Discussion**
>
> In paper-based systems, open primaries have sometimes been handled by printing a single ballot style that merges the contests from all parties, instructing the voter to vote only in the contests applicable to a single party, and rejecting or discarding votes that violate this instruction. To satisfy the requirements for Open primaries, the vote-capture device must be capable of handling the case where different ballot configurations are associated with different political parties.

Status: Under review
Updated: 02/01/18
Gap notes: Added precision, based on VSS2002 I.2.2.8.2 and glossary

5.3-A.6 Vote-capture devices, write-ins

Vote-capture devices MUST record the voter's selection of candidates whose names do not appear on the ballot and record as many write-in votes as the voter is allowed.

Applies to: Vote-capture devices

Status: Under review
Updated: 02/01/18
Gap notes: VSS2002 I.2.4.3.1.d

5.3-A.7 Vote-capture devices, support write-in reconciliation

Vote-capture devices MUST be capable of gathering and recording votes within a voting process that allows for reconciliation of aliases and double votes.

Applies to: Vote-capture devices

> **Discussion**
>
> Reconciliation of aliases means allowing EOs to declare two different spellings of a candidate's name to be equivalent (or not). Reconciliation of double votes means handling the case where, in an N-of-M contest, a voter has attempted to cast multiple votes for the same candidate using the write-in mechanism. See 7.2.4 "Logic for reconciling write-in double votes" for details.

Status: Under review

Commented [WJ(21)]: Ditto – all support open primaries?

Commented [WJ(22)]: Should this be required across the board?

Commented [WJ(23)]: Ditto.

TaubUpdated: 02/01/18
Gap notes: Added precision based on clarification of write-in reconciliation
                      process

5.3-A.8 Vote-capture devices, ballot rotation

Vote-capture devices MUST be capable of gathering and recording votes when the ordering of contest choices in ballot positions within each contest is variable.

Applies to: Vote-capture devices

Status: Under review
Updated: 02/01/18
Gap notes: Added precision, based on VSS2002 I.2.2.8.2 and glossary

5.3-A.9 Ballot rotation, equal time for each contest choice

Vote-capture devices that enable ballot rotation in a given contest MUST alter the ordering of contest choices in such a manner that no contest choice MUST ever have appeared in any particular ballot position two or more times more often than any other.

Applies to: Vote-capture devices

Discussion

This is less restrictive than requiring sequential rotation. For a contest of M contest choices, the order may be shuffled randomly after each batch of M ballots and rotated sequentially within each batch.

Status: Under review
Updated: 02/01/18
Gap notes: Clarification or extension of existing requirements

5.3-A.10 Vote-capture devices, straight party voting

Vote-capture devices MUST be capable of gathering and recording votes for a special contest in which the selection of a political party implies votes for the contest choices endorsed by that party in all straight-party-votable contests on the ballot.

Applies to: Vote-capture devices

Status: Under review
Updated: 02/01/18
Gap notes: Added precision, based on VSS2002 I.2.2.8.2 and glossary

Commented [WJ(24): Do all devices support rotation?

5.3-A.11 Vote-capture devices, cross-party endorsement

Vote-capture devices MUST be capable of gathering and recording straight-party votes when a given contest choice is endorsed by two or more different political parties.

Applies to: Vote-capture devices

Status:	Under review
Updated:	02/01/18
Gap notes:	Clarification or extension of existing requirements

5.3-A.12 Vote-capture devices, split precincts

Vote-capture devices MUST be capable of gathering and recording votes in a precinct where there are distinct ballot styles for voters from two or more election districts.

Applies to: Vote-capture devices

Status:	Under review
Updated:	02/01/18
Gap notes:	Added precision, based on VSS2002 I.2.2.8.2 and glossary

Commented [WJ(25): New term? This needs to apply to all combinations of precincts that are typical.

5.3-A.13 Vote-capture devices, N-of-M voting

Vote-capture devices MUST be capable of gathering and recording votes in contests where the voter is allowed to choose up to a specified number of contest from a list of contest choices.

Applies to: Vote-capture devices

Status:	Under review
Updated:	02/01/18
Gap notes:	Added precision, based on VSS2002 I.2.2.8.2 and glossary

5.3-A.14 Vote-capture devices, cumulative voting

Vote-capture devices MUST be capable of gathering and recording votes in contests where the voter is allowed to allocate up to a specified number of votes over a list of contest choices, possibly giving more than one vote to a given contest choice.

Applies to: Vote-capture devices

Status:	Under review
Updated:	02/01/18
Gap notes:	Added precision, based on VSS2002 I.2.2.8.2 and glossary

5.3-A.15 Vote-capture devices, ranked choice voting

Vote-capture devices of the Ranked choice voting device class MUST be capable of gathering and recording votes in contests where the voter is allowed to rank contest choices in a contest in order of preference, as first choice, second choice, etc.

Applies to: Vote-capture devices

Status:	Under review
Updated:	02/01/18
Gap notes:	Added precision, based on VSS2002 I.2.2.8.2 and glossary

5.3-A.16 Vote-capture devices, provisional / challenged ballots

Vote-capture devices MUST be capable of gathering and recording votes within a voting process that allows the decision whether to count a particular ballot to be deferred until after election day.

Applies to: Vote-capture devices

Discussion

Unique identification of each provisional / challenged ballot is required. See Requirement 7.2-A.5.

Status:	Under review
Updated:	02/01/18
Gap notes:	Added precision, based on VSS2002 I.2.2.8.2 and glossary

5.3-A.17 Vote-capture devices, review-required ballots

Vote-capture devices MUST be capable of gathering and recording votes within a voting process that requires certain ballots to be flagged or separated for review.

Applies to: Vote-capture devices

Discussion

In some systems and jurisdictions, all ballots containing write-in votes require flagging or separation for review. Support for the class indicates that the system can flag or separate ballots in this manner and include the results of the review in the reported totals. Other reasons for which ballots are flagged or separated are jurisdiction-dependent. It is assumed that ballot presentation is unchanged for review-required ballots.

Status:	Under review
Updated:	02/01/18
Gap notes:	Extrapolated from VSS2002 I.2.5.2

5.4 Recording votes

5.4-A Record votes as voted

Vote-capture devices MUST record each vote precisely as indicated by the voter.

Applies to: Vote-capture devices

Status: Under review
Updated: 02/01/18
Gap notes: VSS2002 I.2.2.2.1.c / [VVSG2005] I.2.1.2.c

5.4-A.1 Records consistent with feedback to voter

All CVRs and logs MUST be consistent with the feedback given to the voter.

Status: Under review
Updated: 02/01/18
Gap notes: Added precision

Discussion

This does not mean that every message displayed to the voter during an interactive session must be included in every log. It just means that the records and the interactive messages must not be in conflict with one another. E.g., It is not permissible to show a vote for candidate X on the display and then record a vote for candidate Y.

5.4-A.2 Record ballot selection information

Vote-capture devices MUST record ballot selection information in the CVR that includes:

a. All ballot selections made by the voter for all supported vote variations;

b. Position on the ballot associated with each ballot selection made by the voter, if applicable;

c. Position on the ballot associated with each ballot selection made by the voter when multiple selections are permitted, if applicable;

Applies to: Vote-capture devices

Discussion
For an EBM or other device that marks the ballot for the voter, items b and c will not be applicable.

Status: Under review
Updated: 02/08/18
Gap notes: New requirement

5.4-A.3 Record write-in information

Vote-capture devices MUST record write-in information in the CVR that includes:

a. Identification of write-in selections made by the voter;

b. The text of the write-in; if applicable;

c. An image or other indication of the voter's write-in markings, if applicable;

d. The total number of write-ins in the CVR.

Applies to: Vote-capture devices

Discussion

For an EBM or other device that marks the ballot for the voter, item b will be applicable. For scanners, item c will be applicable.

Status:	Under review
Updated:	02/08/18
Gap notes:	New requirement

5.4-A.4 Record election and contest information

Vote-capture devices MUST record additional contest information in the CVR that includes:

a. An identification of all contests or ballot measures in which voter has made a ballot selection;

b. An identification of the contest vote variation including number of votes allowed in the contest and the maximum number of valid ballot selections;

c. Identification of all overvoted and undervoted contests and ballot selections;

d. The number of write-ins recorded for the contest; and

e. An identification of the party for partisan ballots or partisan contests.

Applies to: Vote-capture devices

Discussion

For item e, a ballot in a partisan primary may in some cases contain contests for different parties. Thus, an indication as to whether the contest is partisan is required.

Status:	Under review
Updated:	02/08/18
Gap notes:	New requirement

5.4-A.5 CCOS, PCOS, record ballot selection override information

CCOS and PCOS, if overriding valid voter selections according to election or contest rules in effect, MUST record information in the CVR that includes:

a. An identification of the ballot selection made by the voter;

b. An identification of the changed voter selection; and

c. An identification of the reason for the change.

Applies to: CCOS, PCOS

Discussion

When marking a ballot directly, a voter may vote in contests or measures in which the voter is not allowed to make ballot selections. For example, a voter may elect to vote straight party, but then make ballot selections in contests anyway. Election or contest rules may cause a CCOS or PCOS to invalidate the contest markings or may require other actions.

Status: Under review
Updated: 02/08/18
Gap notes: New requirement

5.4-A.6 CCOS, PCOS, record detected mark information

CCOS and PCOS MUST record, for each mark detected on the ballot, information in the CVR that includes:

a. Indications of marginal marks that are made by the voter or that are due to imperfections on the ballot; and

b. Mark quality information for each detected mark.

Applies to: CCOS, PCOS

Discussion

This applies to ballot selections recognized as valid as well as to marginal marks or other detected facets of ballot selection target areas that are detected by the scanner. For example, a crease in the ballot may be detected by the scanner as a marginal mark. The measurement of mark quality may be specific to manufacturer and model of scanner.

Status: Under review
Updated: 02/08/18
Gap notes: New requirement

5.5 Casting

5.5-A Casting

All systems MUST support the casting of a ballot.

Applies to: Voting system

Discussion

This does not entail retaining a ballot image. DREs are required to retain ballot images (see 4.3 "Electronic Records") but other devices might not.

Status: Under review
Updated: 02/01/18
Gap notes: VSS2002 I.2.4. Extended VSS2002 I.2.4.2.e to all systems

5.5-A.1 Equipment allows each eligible voter to vote

All systems MUST make it possible for each eligible voter to cast a ballot, provided that the limits declared in the implementation statement for each device are not exceeded.

Discussion
See also Requirement 5.7.

Status: Under review
Updated: 02/01/18
Gap notes: VSS2002 I.2.4.2.b, generalized to all systems

5.5-B Paper-based, must have secure ballot boxes

Systems that include manually-marked paper ballots and/or EBMs MUST include secure receptacles for holding voted ballots.

Applies to: EBM

Status: Under review
Updated: 02/01/18
Gap notes: VSS2002 I.2.4.1.2.1.c

5.5-C Tabulators, prevent counter overflow

When a tabulator can no longer accept another ballot without the potential of overflowing a vote counter or otherwise compromising the integrity of the counts, it MUST notify the user or operator and cease to accept new ballots.

Applies to: Tabulators, Vote-capture devices

Discussion
Assuming that the counter size is large enough such that the value will never be reached is not adequate. Systems are required to detect and prevent an impending overflow condition.

Status: Under review
Updated: 02/01/18
Gap notes: Clarification of VSS2002 II.5.4.2.g

5.5-D EBM, ballot orientation

EBMs MUST either:

a. Correctly mark ballots regardless whether they are loaded upside down, right side up, forward, or reversed; or

b. Detect and reject ballots that are oriented incorrectly.

Applies to: EBM

Status:	Under review
Updated:	02/01/18
Gap notes:	New requirement

5.6 Recording audit information

5.6-A Record audit information

Vote-capture devices MUST record audit-related information in the CVR that includes:

a. An identification of the specific creating device such as a serial number;

b. An identification of the geographical location of the device;

c. Identification of the ballot style corresponding to the CVR;

d. An identification of the corresponding voted ballot;

e. For multi-sheet ballots, an identification of the individual sheet corresponding to the CVR and an identification associated with the entire voted ballot.

f. An identifier of the batch containing the corresponding voted ballot, when applicable.

g. Sequence of the corresponding voted ballot in the batch, when applicable.

Applies to: Vote-capture devices

Discussion
Items f and g are required when batching of ballots is in effect.

Status:	Under review
Updated:	02/08/18
Gap notes:	New requirement

5.6-A.1 Records consistent with feedback to voter

All CVRs and logs MUST be consistent with the feedback given to the voter.

Commented [WJ(33)]: Any additional usability requirements needed here?

Commented [WJ(34)]: Assuming that security will have a requirement to log the casting of a ballot, but otherwise need one here. Perhaps other things to log about the casting as well?

Commented [WJ(35)]: This would require that the scanner impress some ID on the ballot so that it can be included in the CVR. Not all scanners do this – is this something to require does it go too far?

Commented [WJ(36)]: Are there other requirements to be added that are more specific to EBMs and the ballot information written to the paper?

Do we need a requirement regarding the format of the encoded info that the EBM prints, or do the general interoperability requirements cover that sufficiently? Perhaps we need a requirement that the packed format that gets encoded also be easily/freely available.

Status:	Under review
Updated:	02/01/18
Gap notes:	Added precision

Discussion

This does not mean that every message displayed to the voter during an interactive session must be included in every log. It just means that the records and the interactive messages must not be in conflict with one another. E.g., It is not permissible to show a vote for candidate X on the display and then record a vote for candidate Y.

5.7 Procedures assumed for correct system functioning

The requirements for voting systems are written assuming that these procedures are generally followed:

Process allows each eligible voter to vote: The voting process must allow each eligible voter to cast a ballot. (VSS2002 I.2.4.2.b, generalized from DRE systems to the voting process.) See also Requirement 5.4-C.1.

At most one cast ballot per voter: The voting process must prevent a voter from casting more than one ballot in the same election. (VSS2002 I.2.4.2.d, generalized from DRE systems to the voting process.) See also Requirement 5.1.1-A.2.

Process ensures correct ballot style: The voting process must prevent a voter from voting a ballot style to which he or she is not entitled. (VSS2002 I.2.4.2.c, generalized from DRE systems to the voting process.) See also Requirement 7.2-A.2, Requirement 7.2-A.3 and Requirement 5.1-C.

Process prevents vote tampering: The voting process must prevent modification of the voter's vote after the ballot is cast. (VSS2002 I.2.4.3.3.n, generalized.) See also Requirement 5.4-D, cast ballot.

Early voting, ballot accounting: In the presence of a witness, election judges must record the value of the ballot counter from each tabulator at the end of each active period. (Issue #1366, Issue #2143) See 8.2 "Vote-Capture Device State Model (informative)". This procedure might be facilitated by designated functions of the voting equipment (i.e., printing of special early-voting end-of-day reports that include the timestamp, the value of the ballot counter, and little else).

Early voting, resumption practices: Election judges returning equipment to the ready state after it has been placed in the suspended state must perform this operation in the presence of a witness, confirm that the equipment recorded no activity, and confirm that the ballot counter is unchanged from the value that was recorded when voting was suspended. See 8.2 "Vote-

Capture Device State Model (informative)". This procedure might be facilitated by designated functions of the voting equipment (i.e., printing of special early-voting resumption reports that include the timestamp, the value of the ballot counter, confirmation that nothing happened overnight, and little else).

Commented [WJ(37): Reword these and make sure they sync with the Dziurlaj process models.

6 Closing Polls

6-A Vote-capture devices, poll-closing function

Vote-capture devices MUST provide designated functions for closing the polls.

Applies to: Vote-capture devices

Status:	Under review
Updated:	02/01/18
Gap notes:	Reworded from VSS2002 I.2.5

6-A.1 Vote-capture devices, no voting when polls are closed

Vote-capture devices MUST prevent the further enabling, activation or marking of ballots by those devices once the polls have closed.

Discussion

An EBM cannot prevent a voter from marking a paper ballot with a writing utensil after polls have closed. This must be prevented through procedures.

Status:	Under review
Updated:	02/01/18
Gap notes:	Reworded from VSS2002 I.2.5.1.a

6-A.3 Vote-capture devices, poll closing integrity check

Vote-capture devices MUST provide an internal test that verifies that the prescribed closing procedure has been followed and that the device status is normal.

Status:	Under review
Updated:	02/01/18
Gap notes:	Reworded from VSS2002 I.2.5.1.b

6-A.4 Vote-capture devices, report on poll closing process

Vote-capture devices MUST provide a means to produce a diagnostic test record that verifies the sequence of events and indicates that the poll closing process has been activated.

Status:	Under review
Updated:	02/01/18
Gap notes:	Reworded from VSS2002 I.2.5.1.d

6-A.5 Vote-capture devices, prevent reopening polls

Vote-capture devices MUST prevent reopening of the polls once the poll closing has been completed for that election.

Status: Under review
Updated: 02/01/18
Gap notes: Revised from VSS2002 I.2.5.1.e; made consistent with [VSS1990]
                     2.2.3.1

6-B Precinct reporting device, post-election reports

Precinct reporting devices MUST provide designated functions for generating precinct post-election reports.

Applies to: Precinct reporting device

Status: Under review
Updated: 02/01/18
Gap notes: Reworded from VSS2002 I.2.5

7 Counting

7.1 Integrity

7.1-A Detect and prevent ballot style mismatches

All voting systems MUST detect ballot style mismatches and prevent votes from being tabulated or reported incorrectly due to such a mismatch.

Applies to: Voting system

> **Discussion**
>
> For example, if the ballot styles loaded on a tabulator disagree with the ballot styles that were used by vote-capture devices, the system must raise an alarm and prevent the incorrect ballot styles from being used during tabulation. Otherwise, votes could be ascribed to the wrong contest choices. Such a mismatch should have been detected and prevented in L&A testing (see Requirement **Error! Reference source not found.**-C, Requirement **Error! Reference source not found.**-D and Requirement **Error! Reference source not found.**-E), but if it was not, it must be detected and prevented before tabulation commences.

Status:	Under review
Updated:	02/05/18
Gap notes:	Amplification of existing requirements

7.1-B Detect and reject ballots that are oriented incorrectly

Optical scanners MUST either:

a. Correctly count ballots regardless of whether they are fed upside down, right side up, forward, or reversed; or

b. Detect and reject ballots that are oriented incorrectly.

Applies to: Optical scanners

Status:	Under review
Updated:	02/05/18
Gap notes:	New requirement

7.2 Voting variations

7.2-A Tabulators, voting variations

All tabulators MUST support all voting variations indicated in the implementation statement.

Status:	Under review
Updated:	02/05/18
Gap notes:	VSS2002 I.2.2.8.1 plus I.2.2.8.2

7.2-A.1 Tabulators, 1-of-M

All tabulators MUST be capable of tabulating votes, overvotes, and undervotes in contests where the voter is allowed to choose at most one contest choice from a list of contest choices.

Discussion

In a device where overvoting is prevented entirely, there are no overvotes to tabulate. Nevertheless, the total of zero overvotes may need to be recorded, reported, and/or exported by that device to support the precinct- and jurisdiction-wide tabulation processes. The production of this zero total where needed satisfies the requirement for such a device to "tabulate overvotes." Note that overvotes can be produced by write-in reconciliation even when direct overvoting is prevented (see 7.2.4).

Status:	Under review
Updated:	02/05/18
Gap notes:	Implicit in VSS2002

7.2-A.2 Tabulators, yes/no question

All tabulators MUST be capable of tabulating votes, overvotes, and undervotes in contests where the voter is allowed to

   a. Vote yes or no on a question, or

   b. Choose from a list of multiple choices on a question.

Discussion

See Discussion in 7.2-A.1 regarding tabulation of overvotes when overvoting is prevented.

Status:	Under review
Updated:	02/05/18
Gap notes:	New requirement / clarification of VSS2002 intent

7.2-A.3 Tabulators, absentee voting

Tabulators MUST be capable of tabulating votes, overvotes, and undervotes from absentee ballots.

Applies to: Tabulators

Discussion

Commented [WJ(42): Why is this needed? Shouldn't all voting systems be required to handle absentee voting? Maybe I'm wrong here?

39

See Discussion in 7.2-A.1 regarding tabulation of overvotes when overvoting is prevented.

Status:	Under review
Updated:	02/05/18
Gap notes:	Added precision, based on VSS2002 I.2.2.8.1, I.2.2.8.2 and glossary

7.2-A.4 Tabulators, provisional / challenged ballots

Tabulators MUST be capable of tabulating votes, overvotes, and undervotes in contests where the decision whether to count a particular ballot is deferred until after election day.

Applies to: Tabulators

Discussion

See Discussion in 7.2-A.1 regarding tabulation of overvotes when overvoting is prevented.

Status:	Under review
Updated:	02/05/18
Gap notes:	Added precision, based on VSS2002 I.2.2.8.1, I.2.2.8.2 and glossary

7.2-A.5 Tabulators, accept or reject provisional / challenged ballots individually

Tabulators MUST support the independent acceptance and rejection of individual provisional / challenged ballots.

Applies to: Tabulators

Discussion

This is meant to rule out the mode of failure in which the IDs assigned to provisional ballots fail to be unique, rendering the system incapable of accepting one without also accepting the others with the same ID.

Status:	Under review
Updated:	02/05/18
Gap notes:	Added precision, based on VSS2002 I.2.2.8.1, I.2.2.8.2 and glossary

7.2-A.6 Tabulators, accept or reject provisional / challenged ballots by category

Tabulators MUST support the acceptance and rejection of provisional / challenged ballots by category.

Applies to: Tabulators

Commented [WJ(43)]: What are implications of this – I gather that the tabulator must keep separate counts for provisional.

Commented [WJ(44)]: All required aspects of 1500-100 should be included as requirements here. This begs the question, are there optional items in 1500-100 that should be required, e.g., should all tabulators be capable of reporting by all the categories in 1500-100?

Status: Under review
Updated: 02/05/18
Gap notes: [P1583] 5.6.5.2.s.3**Error! Reference source not found.**

7.2-A.7 Tabulators, primary elections

Tabulators MUST be capable of keeping separate totals for each political party for the number of ballots read and counted.

Applies to: Tabulators

Discussion

In paper-based systems, open primaries have sometimes been handled by printing a single ballot style that merges the contests from all parties and instructing the voter to vote only in the contests applicable to a single party. This approach requires additional logic in the tabulator to support the rejection or discarding of votes that violate these special instructions, while the approach of assigning different ballot configurations to different parties does not. Support for the merged ballot approach is not required for a tabulator.

This requirement to separate by party applies only to the number of read ballots and counted ballots. It does not apply to contest choice vote totals.

Status: Under review
Updated: 02/05/18
Gap notes: Added precision, based on VSS2002 reporting requirements

7.2-A.8 Tabulators, write-ins

Tabulators MUST be capable of tabulating votes for write-in candidates, with separate totals for each candidate.

Applies to: Tabulators

Status: Under review
Updated: 02/05/18
Gap notes: Added precision, based on VSS2002 I.2.2.8.1, I.2.2.8.2 and glossary

Commented [WJ(45)]: Ditto. How about for absentee, early, election day, provisional, UOCAVA, write-in, others?

7.2-A.9 Tabulators, support write-in reconciliation

Tabulatorss MUST be capable of tabulating votes within a voting process that allows for reconciliation of aliases and double votes.

Applies to: Tabulators

Discussion

Reconciliation of aliases means allowing EOs to declare two different spellings of a candidate's name to be equivalent (or not). Reconciliation of double votes means handling the case where, in an N-of-M contest, a voter has attempted to cast multiple votes for the same candidate using the write-in mechanism. See 0 "7.2.4 Logic for reconciling write-in double **votes**" for details.

Status:	Under review
Updated:	02/05/18
Gap notes:	Added precision based on clarification of write-in reconciliation process

7.2-A.10 Tabulators, ballot rotation

Tabulators MUST be capable of tabulating votes when the ordering of contest choices in ballot positions within each contest is variable.

Applies to: Tabulators

Discussion

This simply means that ballot rotation must not impact the correctness of the count. A mode of failure would be getting confused about the mapping from ballot positions to contest choices.

Status:	Under review
Updated:	02/05/18
Gap notes:	Added precision, based on VSS2002 I.2.2.8.1, I.2.2.8.2 and glossary

7.2-A.11 Tabulators, straight party voting

Tabulators MUST be capable of tabulating straight party votes.

Applies to: Tabulators

Status:	Under review
Updated:	02/05/18
Gap notes:	Added precision, based on VSS2002 I.2.2.8.1, I.2.2.8.2 and glossary

7.2-A.12 Tabulating straight party votes

A straight party vote MUST be counted as a vote in favor of all contest choices endorsed by the chosen party in each straight-party-votable contest in which the voter does not cast an explicit vote.

Applies to: Tabulators

Status:	Under review
Updated:	02/05/18
Gap notes:	Added precision, based on VSS2002 I.2.2.8.1, I.2.2.8.2 and glossary

7.2-A.13 Tabulators, cross-party endorsement

Tabulators MUST be capable of tabulating straight-party votes when a given contest choice is endorsed by two or more different political parties.

Applies to: Tabulators

Status:	Under review
Updated:	02/05/18
Gap notes:	Added precision, based on VSS2002 I.2.2.8.1, I.2.2.8.2 and glossary

7.2-A.14 Tabulators, split precincts

Tabulators MUST be capable of tabulating votes for two or more election districts within the same precinct.

Applies to: Tabulators

Commented [WJ(46)]: This needs to apply to a vote center or tabulation from the results of a combined precinct. Maybe a different term than split?

Status:	Under review
Updated:	02/05/18
Gap notes:	Added precision, based on VSS2002 I.2.2.8.1, I.2.2.8.2 and glossary

7.2-A.15 Tabulators, N-of-M voting

Tabulators MUST be capable of tabulating votes, overvotes, and undervotes in contests where the voter is allowed to choose up to a specified number of contest choices from a list of contest choices.

Applies to: Tabulators

7.2-A.16 Tabulators, cumulative voting

Tabulators MUST be capable of tabulating votes, overvotes, and undervotes in contests where the voter is allowed to allocate up to a specified number of votes over a list of contest choices however he or she chooses, possibly giving more than one vote to a given contest choice.

Applies to: Tabulators

7.2-A.17 Central reporting device, ranked choice voting

Central reporting devices MUST be capable of determining the results of a ranked choice contest for each round of tabulation.

> Commented [WJ(47): Tabulators?

Applies to: Central reporting device

The following subsections discuss cases for which tabulation logic is not specified in the VVSG.

> Commented [WJ(48): Here, we get into requirements deailing with voting variations. I'm thinking that either the requirement or discussion field references Lauren's work. Should additional voting variations be added other than NofM, cumulative, range, RCV? No requirement at present for range voting.

7.2.1 Merged ballot approach to open primaries

> Commented [WJ(49): Good material, don't want to throw it out, not sure if it stays in this format. Lauren's group should comment.

In paper-based systems, open primaries have sometimes been handled by printing a single ballot style that merges the contests from all parties and instructing the voter to vote only in the contests applicable to a single party. This approach requires additional logic in the tabulator to support the rejection or discarding of votes that violate these special instructions, while the approach of assigning different ballot configurations to different parties does not.

Support for the merged ballot approach is not required for a tabulator to satisfy the requirements in these Guidelines for support of open primaries. Voting systems may provide this option as an extension to the Guidelines without breaking conformance.

7.2.2 Recall candidacy linked to recall question

In some jurisdictions, a vote for a candidate to replace a recalled official is counted only if the recall question on the same ballot was voted, and sometimes only if it was voted in the affirmative. Voting systems may provide this option as an extension to the Guidelines without breaking conformance.

7.2.3 Logic for counting straight party overrides

Although initially it seems obvious that a straight party override in a 1-of-M race should take precedence over a straight party vote, it is less obvious after considering the generalized case of an N-of-M race in which the number of candidates endorsed by the selected party might be less than N. Approaches supported by commercially available technology include (1) all straight party votes are cancelled when an explicit vote exists; (2) both straight party and explicit votes are counted; (3) both straight party and explicit votes are counted unless this exceeds N, in which case only the explicit votes are counted; (4) both straight party and explicit votes are counted unless this exceeds N, in which case straight party votes from the bottom of the list are dropped until the number of votes is reduced to N.

These requirements do not specify any particular approach to resolving straight party overrides, but the approach(es) supported are required to be described in the Voting Equipment User Documentation.

7.2.4 Logic for reconciling write-in double votes

Reconciliation of double votes means handling the case where, in an N-of-M contest, a voter has attempted to cast multiple votes for the same candidate using the write-in mechanism. If the voter has selected a ballot position for a given candidate but also written in that candidate's name, or if the voter has written in the same candidate twice using the same spelling or different legal spellings, some corrective action is required—possibly counting only one of the

votes, possibly considering the contest to be overvoted. Which action should be specified by jurisdiction election law.

Given a sufficiently robust mechanism for reconciliation of aliases, the reconciliation of double votes can be automated. Once it is known that the name written in identifies the same candidate as the previous ballot position, the tabulator can take whatever action is specified by election law.

These requirements do not specify any particular approach to reconciling double votes, but the approach(es) supported are required to be described in the Voting Equipment User Documentation.

7.2.5 Logic for ranked choice voting

The single-winner case of ranked choice voting, known by various names including instant runoff voting, requires the definition of criteria for breaking ties. Whereas in plurality voting the voting system need only report the vote totals, a voting system supporting ranked choice voting must implement tie-breaking logic in order to be certain of reaching a reportable result.

It is also necessary to decide whether voters may assign equal rankings to two contest choices, whether voters are required to rank every choice, and how to compute a result in the case where they do not.

The multiple-winner generalization, called single transferable vote, has two additional adjustable parameters: the vote quota (the number of votes required to declare a candidate elected) and the weighting or distribution of votes transferred from contest choices that exceed the quota.

Finally, to the extent that a particular ranked choice variant defines certain voter responses to be partly or wholly invalid, the manner in which the votes from the affected ballots are to be accounted for and reported (analogous to the reporting of overvotes in plurality contents) must be decided.

7.3 Ballot separation

7.3-A CCOS, ballot separation

In response to designated conditions, CCOS MUST (a) outstack the ballot (i.e., divert to a stack separate from the ballots that were normally processed), (b) stop the ballot reader and display a message prompting the EO to remove the ballot, or (c) mark the ballot with an identifying mark to facilitate its later identification.

Applies to: CCOS

Status: Under review
Updated: 02/05/18
Gap notes: VSS2002 I.3.2.5.1.2

7.3-A.1 CCOS, unreadable ballots

All CCOS MUST perform this action in response to an unreadable ballot.

Status: Under review
Updated: 02/05/18
Gap notes: VSS2002 I.3.2.5.1.2

7.3-A.2 CCOS, write-ins

CCOS MUST be able to perform this action in response to a ballot containing write-in votes.

Applies to: CCOS

Status: Under review

Discussion

The requirement to separate ballots containing write-in votes is not applicable in systems in which an EBM encodes write-in votes in machine-readable form and an optical scanner generates individual tallies for all written-in candidates automatically. Separation of ballots containing write-in votes is only necessary in systems that require the allocation of write-in votes to specific candidates to be performed manually.

Status: Under review
Updated: 02/05/18
Gap notes: VSS2002 I.3.2.5.1.2

7.3-A.3 CCOS, overvotes, undervotes, blank ballots

CCOS MUST provide a capability that can be activated by EOs to perform this action in response to ballots containing overvotes, blank ballots, and ballots containing undervotes in a designated contest.

Status: Under review
Updated: 02/05/18
Gap notes: VSS2002 I.3.2.5.1.2

7.3-B PCOS, write-ins

PCOS of the Review-required ballots device class containing a write-in vote, to segregate the ballot or mark the ballot with an identifying mark to facilitate its later identification.

Applies to: PCOS

Commented [WJ(51): Should be ALL CCOS?

Commented [WJ(52): All PCOS?

Status:	Under review
Updated:	02/05/18
Gap notes:	VSS2002 I.3.2.5.1.3.b

7.3-C React to marginal marks and overvotes on EBM-marked ballots

PCOS should provide a capability to alert an EO when an electronically-marked ballot that is scanned appears to contain marginal marks or overvotes.

Applies to: PCOS

Status:	Under review
Updated:	02/05/18
Gap notes:	New requirement

7.4 Misfed ballots

Commented [WJ(53)]: Golden opportunity for EO's to weigh in here.

7.4-A Optical scanners, ability to clear misfeed

If multiple feed or misfeed (jamming) occurs, an optical scanner MUST halt in a manner that permits the operator to remove the ballot(s) causing the error and reinsert them in the input hopper (if unread) or insert them in the ballot box (if read).

Applies to: Optical scanners

Status:	Under review
Updated:	02/05/18
Gap notes:	VSS2002 I.3.2.5.1.4.a, expanded to include jamming and ballots that were read

7.4-B Optical scanners, indicate status of misfed ballot

If multiple feed or misfeed (jamming) occurs, an optical scanner MUST clearly indicate whether or not the ballot(s) causing the error have been read.

Applies to: Optical scanners

Status:	Under review
Updated:	02/05/18
Gap notes:	[MISS05] 14.2.5.3 (page 46)

7.5 Accuracy

The following requirements elaborate the overall accuracy requirement in SECTION-TBD with respect to issues that are unique to paper-based systems.

7.5-A Optical scanners, ignore unmarked voting targets

Optical scanners MUST ignore (i.e., not record as votes) unmarked voting targets to the satisfaction of Requirement 6.3.2-B.

Applies to: Optical scanners

Discussion

"Unmarked" in this requirement means containing no marks of any kind other than those designed to be present as part of the ballot style. This includes extraneous perforations, smudges, folds, and blemishes in the ballot stock. See Requirement 0-D, Requirement 0-E and Requirement 0-F.

Status:	Under review
Updated:	02/05/18
Gap notes:	VSS2002 I.3.2.5.2, "Recognize vote punches or marks, or the absence thereof"

7.5-B Optical scanners, accurately detect perfect marks

Optical scanners MUST detect marks that conform to manufacturer specifications to the satisfaction of Requirement 6.3.2-B.

Applies to: Optical scanners

Status:	Under review
Updated:	02/05/18
Gap notes:	VSS2002 I.3.2.5.2.a and I.3.2.6.1.1

7.5-C Optical scanners, accurately detect imperfect marks

Optical scanners MUST detect a 1 mm thick line that is made with a #2 pencil that crosses the entirety of the voting target on its long axis, that is centered on the voting target, and that is as dark as can practically be made with a #2 pencil, to the satisfaction of Requirement **Error! Reference source not found.**-B.

Applies to: Optical scanners

Discussion

Different optical scanning technologies will register imperfect marks in different ways. Variables include the size, shape, orientation, and darkness of the mark; the location of the mark within the voting target; the wavelength of light used by the scanner; the size and shape of the scanner's aperture; the color of the ink; the sensed background-white and maximum-dark levels; and of course the calibration of the scanner. The mark specified in this requirement is intended to be less than 100 % perfect, but reliably detectable, i.e., not so marginal as to bring the uncontrolled variables to the forefront. In plain language: scanning technologies may vary, but as a minimum requirement, all of them should be capable of reliably reading *this* mark.

Status:	Under review
Updated:	02/05/18
Gap notes:	New requirement

7.5-D Optical scanners, ignore extraneous outside voting targets

Optical scanners MUST NOT record as votes any marks, perforations, smudges, or folds appearing outside the boundaries of voting targets.

Applies to: Optical scanners

Discussion

In previous iterations of these VVSG it was unclear whether "extraneous perforations, smudges, and folds" included perforations, smudges and folds appearing within voting targets. Those appearing within voting targets are now discussed in Requirement 0-E and Requirement 0-F. Those other requirements are "should" not "shall"—technology in wide use as of 2006 cannot reliably distinguish extraneous marks within voting targets from deliberate marks.

Marks that conflict with timing marks may cause a tabulator to reject a ballot. This is conforming behavior, as it does not result in the recording of bogus votes.

Status:	Under review
Updated:	02/05/18
Gap notes:	Clarified from VSS2002 I.3.2.5.2.b

7.5-E Optical scanners, ignore extraneous inside voting targets

Optical scanners SHOULD NOT record as votes any imperfections in the ballot stock, folds, and similar insignificant marks appearing inside voting targets.

Applies to: Optical scanners

> **Discussion**
>
> Insignificant marks appearing inside voting targets can be detected as votes. This problem should be minimized.

Updated:	02/05/18
Gap notes:	Clarified from VSS2002 I.3.2.5.2.b

7.5-F Optical scanners, ignore hesitation marks

Optical scanners SHOULD NOT record as votes Error! Reference source not found.s and similar insignificant marks.

Applies to: Optical scanners

> **Discussion**
>
> It may be possible to reliably detect reasonable marks and reliably ignore Error! Reference source not found.s if the scanner is calibrated to a specific marking utensil. Unfortunately, in practice, optical scanners are required to tolerate the variations caused by the use of unapproved marking utensils. Thus, lighter marks of a significant size are detected at the cost of possibly detecting especially dark Error! Reference source not found.s. Emerging technologies for context-sensitive ballot scanning may solve this problem. It is also solvable through procedures that ensure that all voters use only the approved marking utensil.

Status:	Under review
Updated:	02/05/18
Gap notes:	Clarified from VSS2002 I.3.2.5.2.b

7.5.1 Marginal marks

A marginal mark is a mark within a voting target that does not conform to manufacturer specifications for a reliably detectable vote. The word "marginal" refers to the limit of what is detectable by an optical scanner, not the margin of the page. Marks that are outside of voting targets are called extraneous marks.

A marginal mark is neither clearly countable as a vote nor clearly countable as a non-vote. It is an ambiguous vote, analogous to dimpled chad on a punchcard.

The voter should always be instructed to make an ideal mark, which in a typical optical scan system means completely filling the oval with a #2 pencil. To allow for variations in the marks that diligent voters actually make when trying to follow this instruction, the accidental use of

Commented [WJ(56): MUST NOT?

Commented [WJ(57): MUST NOT?

non-approved marking utensils, et cetera, optical scanners are configured to accept a relatively wide range of marks as votes (Requirement 0-C). Marginal marks are below this range. They happen when voters do not follow instructions, or the instructions are inadequate.

Although the criteria are not necessarily simple, manufacturers are required to specify what constitutes a reliably detectable mark versus a marginal mark. If this cannot be accomplished, then the voting system is counting votes using a mystery algorithm. Such a system cannot be found compliant.

A ballot that was marked with an EBM should never contain marginal marks. If it does, an equipment malfunction has occurred, and it should be handled as such (Requirement 0-C).

In the case of precinct counting of manually-marked paper ballots, the precinct count scanner should be configured to reject ballots containing marginal marks (Requirement **Error! Reference source not found.**-E). For example, a hypothetical optical scanner that detected marks based only on overall darkness could be configured so that a mark that was more than (30 ± 2) % dark would count as a vote, a mark that was less than (10 ± 2) % dark would count as a non-vote, and anything in between would be rejected as marginal. (These numbers are just examples to clarify the general intent and are not necessarily fit for use in an any given election.)

The uncertainty at both ends of the marginal zone is of no consequence. A mark that was exactly 30 % dark would either be accepted as a vote or rejected as marginal and returned to the voter for clarification. Either way, it would not be mistaken for a non-vote. Similarly, a mark that was exactly 10 % dark would either be accepted as a non-vote or rejected as marginal and returned to the voter for clarification. Either way, it would not be mistaken for a vote. (Detectable marks in the lower range are typically Error! Reference source not found.s, accidental smudges, or damage to the paper.)

In the central count case, rejection of marginal marks is helpful only if someone is going to examine each affected ballot and judge the intent of the voter. If this is not going to occur, then it is preferable to disable the detection of marginal marks so that every mark is counted either as a vote or as a non-vote. Unfortunately, it is not technically possible to do this without creating the potential for irreproducible tabulation results. For example, if a hypothetical optical scanner that detected marks based only on overall darkness were calibrated to distinguish votes from non-votes using a threshold of (25 ± 2) % darkness, the detection of marks that were between 23 % and 27 % dark would not reproduce on a different scanner of the same kind. Moreover, the detection of marks that happened to fall very close to the actual detection threshold of the scanner as calibrated would not repeat on the same scanner. As the darkness of a mark (or whatever the scanner is measuring) approaches the detection threshold, the signal-to-noise ratio approaches zero. At some point, the noise determines the result that is tabulated.

Commented [WJ(58)]: Around 2008, an EAC commission objected to requiring manufacturers to document their criteria for marginal mark detection, and NIST did not pursue it further. I think this has been overtaken by time. Maybe we want a requirement to publish the criteria and also include in the CVR some form of mark quality or density?

Commented [WJ(59)]: An HFP requirement?

Commented [WJ(60)]: Again, am wondering whether all scanners must include a mark quality measurement and also include an adjudication capability in the CVR to handle marginal marks – should also flag those ballots and possibly separate them when counting?

Short of banning the use of manually-marked paper ballots, which would create a crisis for absentee voting, the best that can be done for this central count case is to prohibit bias in the detection of marginal marks (Requirement 0-A) and advise that the detection of marginal marks be made as repeatable as possible (Requirement 0-B).

7.5.1-A Optical scanners, marginal marks, no bias

The detection of marginal marks from manually-marked paper ballots MUST NOT show a bias.

Applies to: Optical scanners

> **Discussion**
> Bias errors are not permissible in any system ([VSS1990] 7.3.3.3). An example of bias would be if marginal marks in the first ballot position were detected differently than marginal marks in the second ballot position.

Status:	Under review
Updated:	02/05/18
Gap notes:	New requirement

7.5.1-B Optical scanners, marginal marks, repeatability

The detection of marginal marks from manually-marked paper ballots SHOULD be repeatable.

Applies to: Optical scanners

> **Discussion**
> It is difficult to have confidence in the equipment if consecutive readings of the same ballots on the same equipment yield dramatically different results. However, it is technically impossible to achieve repeatable reading of ballots containing marks that fall precisely on the sensing threshold.

Status:	Under review
Updated:	02/05/18
Gap notes:	New requirement

7.6 Consolidation

7.6-A Precinct reporting device consolidation

Precinct reporting devices MUST consolidate the data contained in each unit into a single report for the polling place when more than one vote-capture device or PCOS is used.

Applies to: Precinct reporting device

Status:	Under review

Updated: 02/05/18
Gap notes: Reworded from VSS2002 I.2.5.3.2

7.6-A.1 Consolidate in 5 minutes

If the consolidation of polling place data is done locally, the precinct reporting device MUST perform this consolidation in a time not to exceed 5 minutes per PCOS.

Status: Under review
Updated: 02/05/18
Gap notes: Reworded from VSS2002 I.3.2.6.2.1

7.7 Procedures assumed for correct system functioning

The requirements for voting systems are written assuming that these procedures are generally followed:

Optical scanners, clearing misfeeds when ballot was read: If it is necessary to clear a misfed ballot that was read by an optical scanner but became stuck on its way to the ballot box, election judges or EOs must perform this task in the presence of a witness.

If an audit found that the contents of the ballot box and the records from the tabulator did not match, one would want to be able to rule out the possibility that something made its way into the ballot box while the tabulator was disconnected.

8 Reporting

8.1 General reporting functionality

8.1-A Reports are time stamped

All reports MUST include the date and time of the report's generation, including hours, minutes, and seconds.

Applies to: Voting system

> **Discussion**
> Even if the clock's accuracy leaves something to be desired, second precision is useful to have if two reports are generated in quick succession.

Status:	Under review
Updated:	02/05/18
Gap notes:	New requirement

8.1-B Timestamps should be ISO 8601 compliant

Timestamps in reports SHOULD comply with ISO 8601 [ISO04], provide all four digits of the year and include the time zone.

Applies to: Voting system

Status:	Under review
Updated:	02/05/18
Gap notes:	New requirement

8.1-C Reporting is non-destructive

All programmed devices MUST prevent data, including data in transportable memory, from being altered or destroyed by report generation.

Applies to: Programmed device

> **Discussion**
> The appending of an audit record reflecting the fact that a report has been generated is not considered an alteration.

Status:	Under review
Updated:	02/05/18
Gap notes:	From VSS2002 I.2.2.6.h, I.2.5.3.1.g, and I.2.5.3.2.d

Commented [WJ(63)]: Is security going to make devices sign their exports and verify their imports for integrity? Would be a disappointment if not.

55

8.2 Audit, status, and readiness reports

8.2-A Audit reports

All systems MUST be capable of producing reports of the event logs defined in Section 5.7.

Applies to: Voting system

Status:	Under review
Updated:	02/05/18
Gap notes:	VSS2002 I.2.2.6.i and I.2.5.3.1.f

8.2-B Pre-election reports

The election definition device MUST provide the capability to obtain a report that includes:

a. The allowable number of votes in each contest;

b. The counting logic (e.g., N-of-M, cumulative, or ranked choice) that is used for each contest;

c. The inclusion or exclusion of contests as the result of split precincts;

d. Any other characteristics that may be peculiar to the jurisdiction, the election or the precincts;

e. Manual data maintained by election personnel;

f. Samples of all final ballot styles; and

g. Ballot preparation edit listings.

Applies to: Election definition device

Discussion

For the logging of auditable events during election programming see **Error! Reference source not found.** "**Error! Reference source not found.**".

Status:	Under review
Updated:	02/05/18
Gap notes:	VSS2002 I.4.4.1 / [VVSG2005] I.5.4.1

8.2-C Status reports

All programmed devices MUST provide the capabilities to obtain status and equipment readiness reports.

Applies to: Programmed device

Discussion

Commented [WJ(64)]: I am thinking that this should be broken out into distinct sections for Audit, Status and Readiness, and Pre-election.

Commented [WJ(65)]: Should refer to a security section.

Commented [WJ(66)]: Here, should be required to support 1500-100 imports.

Commented [WJ(67)]: This should point to a security section.

These reports typically are generated during pre-voting logic and accuracy testing; see **Error! Reference source not found.** "**Error! Reference source not found.**".

Status: Under review
Updated: 02/05/18
Gap notes: Reworded from VSS2002 I.2.3.4.1.b

8.2-D Readiness reports, per polling place

Readiness reports MUST include at least the following information for each polling place:

a. The election's identification data;

b. The identification of the precinct and polling place;

c. The identification of all voting devices deployed in the precinct;

d. The identification of all ballot styles used in that precinct;

e. Confirmation that no hardware or software failures were detected during setup and testing, or a record of those that occurred; and

f. Confirmation that all vote-capture devices are ready for the opening of polls, or identification of those that are not.

Applies to: In-person voting

Status: Under review
Updated: 02/05/18
Gap notes: VSS2002 I.2.3.5, separated generic precinct vs. precinct tabulator reqs, modified to deal with failures

> **Commented [WJ(68)]:** Do EOs want more here? Same with remaining readiness requirements. Security should examine these.

8.2-E Readiness reports, precinct tabulators

Readiness reports MUST include the following information for each PCOS and precinct reporting device:

a. The election's identification data;

b. The identification of the precinct and polling place;

c. The identification of the tabulator;

d. The contents of each active contest choice register at all storage locations;

e. Confirmation that no hardware or software failures were detected during setup and testing, or a record of those that occurred; and

f. Any other information needed to confirm the readiness of the equipment and to accommodate administrative reporting requirements.

Status: Under review
Updated: 02/05/18
Gap notes: VSS2002 I.2.3.5, separated generic precinct vs. precinct tabulator reqs, harmonized with Requirement 0-F, modified to deal with failures, deleted "special voting options"

8.2-F Readiness reports, central tabulators

Readiness reports MUST include the following information for each CCOS and central reporting device:

a. The election's identification data;

b. The identification of the tabulator;

c. The identification of all ballot styles used in the system extent;

d. The contents of each active contest choice register at all storage locations;

e. Confirmation that no hardware or software failures were detected during setup and testing, or a record of those that occurred; and

f. Any other information needed to confirm the readiness of the equipment and to accommodate administrative reporting requirements.

Status: Under review
Updated: 02/05/18
Gap notes: VSS2002 I.2.3.6, harmonized with Requirement 0-E, modified to deal with failures, deleted "special voting options"

8.2-G Readiness reports, public network test ballots

Systems that send ballots over a public network MUST provide a report of test ballots that includes:

a. The number of test ballots sent;

b. When each test ballot was sent;

c. The identity of the machine from which each test ballot was sent; and

d. The specific votes contained in the test ballots.

> **Commented [WJ(69)]:** Definitely should have security look at this.

Status: Under review

Updated: 02/05/18
Gap notes: VSS2002 I.4.4.2.g / [VVSG2005] I.5.4.2.g

8.3 Vote data reports

The requirements in this section specify a minimum set of information that a voting system must report. They do not prohibit any voting system from reporting additional information that may be required by jurisdictions or otherwise found to be useful.

8.3.1 General functionality

8.3.1-A Reporting, ability to produce text

All devices used to produce reports of the vote count MUST be capable of producing:

    a.   Alphanumeric headers;

    b.   Election, office and issue text; and

    c.   Alphanumeric entries generated as part of the audit record.

Applies to: Voting system

Status: Under review
Updated: 02/05/18
Gap notes: VSS2002 I.3.2.7.2 / [VVSG2005] I.4.1.7.2

8.3.1-B Report all votes cast

All systems MUST be able to produce an accurate, human-readable report of all votes cast.

Applies to: Voting system

Discussion

Binary document formats and text containing markup tags are not considered human-readable. The system may generate such documents, but it must also provide the functionality to render those documents in human-readable form (e.g., by including the necessary reader application).

Status: Under review
Updated: 02/05/18
Gap notes: VSS2002 I.2.2.2.1.c as expanded by [P1583] 5.2.1.1.c

8.3.1-C Account for all cast ballots and all valid votes

All systems MUST produce vote data reports that account for all cast ballots and all valid votes.

> Status: Under review
> Updated: 02/05/18

8.3.1-D Vote data reports, discrepancies can't happen

Vote data reports MUST be completely consistent, with no discrepancy among reports of voting device data at any level.

Applies to: Voting system

> Status: Under review
> Updated: 02/05/18
> Gap notes: Reworded from VSS2002 I.3.2.6.2.2, extended to all systems

8.3.1-D.1 Discrepancies that happen anyway must be flagged

Any discrepancy that is detectable by the system MUST be flagged by the system by an annotation or error message in the affected report(s) and/or a separate discrepancy report.

Commented [WJ(73): Check with security on this.

Discussion

If this requirement is applicable, then the system has failed to satisfy Requirement 8.3.1-D and is therefore non-conforming. Nevertheless, in practice it is essential that discrepancies be flagged by the system as much as possible so that they are not overlooked by election judges. The system cannot detect discrepancies if no single voting device is ever in possession of a sufficient set of data.

> Status: Under review
> Updated: 02/05/18
> Gap notes: New requirement

8.3.1-D.2 Discrepancies that happen anyway must be explainable

Any discrepancy in reports, regardless of source, MUST be resolvable to a specific cause.

Discussion

If this requirement is applicable, then the system has failed to satisfy Requirement 0-D and is therefore non-conforming. Nevertheless, in practice it is essential that a specific cause be determinable.

> Status: Under review
> Updated: 02/05/18
> Gap notes: Reworded and generalized from VSS2002 I.3.2.6.2.2

8.3.1-E Reporting, combined precincts

All systems SHOULD be capable of generating reports that consolidate vote data from selected precincts.

Applies to: Voting system

> **Discussion**
> Jurisdictions in which more than one precinct may vote at the same location on either the same ballot style or a different ballot style may desire reports that consolidate the voting location.

Status:	Under review
Updated:	02/05/18
Gap notes:	Derived from [ND06] 5.04.05.g, [UT04] Requirement 23 and [MISS05] 14.3.2.3

8.3.1-F Precinct reporting devices, no tallies before close of polls

Precinct reporting devices MUST prevent the printing of vote data reports and the extraction of vote tally data prior to the close of polls.

Applies to: Precinct reporting device

> **Discussion**
> Providing ballot counts does not violate this requirement. The prohibition is against providing vote totals. Ballot counts are required for ballot accounting, but early extraction of vote totals is an enabler of election fraud.

Status:	Under review
Updated:	02/05/18
Gap notes:	Revised from VSS2002 I.2.5.3.2

8.3.2 Ballot counts

Source for Requirement 8.3-A through Requirement 8.3.3-I: These requirements were distilled, refactored, and clarified from overlapping, subtly differing requirements appearing several places in Chapters 2 and 4 of VSS2002, including: I.2.2.2.1.c (produce an accurate report of all votes cast), I.2.2.6.h (printed report of everything in I.2.5), I.2.2.9 (ballot counter), I.2.5.2 (means to consolidate vote data), I.2.5.3.1.a (geographic reporting), I.2.5.3.1.b (printed report of number of ballots counted by each tabulator), I.2.5.3.1.c (contest results, overvotes, and undervotes for each tabulator), I.2.5.3.1.d (consolidated reports including other data sources), I.4.4.4.a (number of ballots cast, using each ballot configuration, by tabulator, precinct, and political subdivision), I.4.4.4.b (candidate and measure totals for each contest, by tabulator), I.4.4.4.c (number of ballots read within each precinct and for additional jurisdictional levels, by configuration, including separate totals for each party in primary elections), I.4.4.4.d (separate

accumulation of overvotes and undervotes for each contest, by tabulator, precinct, and additional jurisdictional levels), and I.4.4.4.e (for paper-based systems, the total number of ballots both processed and unprocessable, and the total number of cards read).

8.3.2-A Report cast ballots

All voting systems MUST report the number of cast ballots both in total and broken down by ballot configuration.

Applies to: Voting system

> **Discussion**
> There is no subrequirement for separate reporting of provisional cast ballots because the system is unlikely to know whether a ballot is provisional until it is successfully read.

8.3.2-B Report read ballots

All systems MUST report the number of read ballots, both in total and broken down by ballot configuration.

Applies to: Voting system

Status:	Under review
Updated:	02/05/18

8.3.2-B.1 Report read ballots, multi-page

Systems that include optical scanners MUST, if there are multiple card/page ballots, report the number of cards/pages read both in total and broken down by ballot configuration.

Status:	Under review
Updated:	02/05/18

8.3.2-B.2 Report read ballots by party

Systems MUST report separate totals for each party in primary elections.

Applies to: Primary elections

> **Discussion**
> This requirement to report by party applies only to the number of read ballots. It does not apply to contest choice vote totals.

Status:	Under review
Updated:	02/05/18

Commented [WJ(74)]: Question whether ballot count breakdowns for absentee ballots and other categories are a required line item in all reporting contexts. Taken together, 2002 VSS I.2.5.2 / VVSG 1.0 I.2.4.2 plus 2002 VSS I.2.5.3.1.d / VVSG 1.0 I.2.4.3.d say that the optional support for absentee and other "ballot sources" would incur a requirement to report broken-out ballot counts for them, analogous to the requirements below to provide counts for provisional ballots. However, it has previously been considered an acceptable approach, particularly in blended systems, to assign all absentee ballots to a synthetic precinct (absentee precinct), in which case there's no special line item for them in every other reporting context. One option is to say that all future systems should fully support ballot categorization so that synthetic precincts are not needed.

8.3.2-B.3 Report read provisional ballots

Systems MUST report the number of provisional / challenged read ballots, both in total and broken down by ballot configuration.

Applies to: Provisional / challenged ballots

Status:	Under review
Updated:	02/05/18

8.3.2-C Report counted ballots

All systems MUST report the number of counted ballots, both in total and broken down by ballot configuration.

Applies to: Voting system

Discussion
See also Requirement 0-D, which breaks down counted ballots by contest.

Status:	Under review
Updated:	02/05/18

8.3.2-C.1 Report counted ballots by party

Systems MUST report separate ballot counts for each party in primary elections.

Applies to: Primary elections

Discussion
This requirement to report by party applies only to the number of counted ballots. It does not apply to contest choice vote totals.

Status:	Under review
Updated:	02/05/18

8.3.2-C.2 Report counted provisional ballots

Systems MUST report the number of provisional / challenged counted ballots, both in total and broken down by ballot configuration.

Applies to: Provisional / challenged ballots

Status:	Under review
Updated:	02/05/18

8.3.2-C.3 Report blank ballots

All systems SHOULD report the number of blank ballots (ballots containing no votes) that were counted, both in total and broken down by ballot configuration.

> **Discussion**
> Some jurisdictions find this information to be useful. Blank ballots sometimes represent a protest vote.

    Status: Under review
    Updated: 02/05/18

8.3.2-D Report counted ballots by contest

All systems MUST report the number of counted ballots for each relevant N-of-M or cumulative voting contest.

Applies to: Voting system

> **Discussion**
> This is by contest, while Requirement 0-C is the overall count. The count by contest could be inferred from the other counts that are broken down by ballot configuration, but providing this figure explicitly will make it easier to account for every vote per **Error! Reference source not found.** "**Error! Reference source not found.**". N-of-M in this requirement includes the most common type of contest, 1-of-M.

    Status: Under review
    Updated: 02/05/18

8.3.3 Vote totals

For the source of these requirements, please see the note in 0 8.3.2 Ballot **counts**.

8.3.3-A Report votes for each contest choice

All systems MUST report the vote totals for each contest choice in each relevant N-of-M or cumulative voting contest.

Applies to: Voting system

> **Discussion**
> N-of-M in this requirement includes the most common type of contest, 1-of-M.

    Status: Under review
    Updated: 02/05/18

8.3.3-B Report overvotes for each contest

All systems MUST report the number of overvotes for each relevant N-of-M or cumulative voting contest.

Applies to: Voting system

> **Discussion**
>
> N-of-M in this requirement includes the most common type of contest, 1-of-M.
>
> VSS2002 required the reporting of overvotes even on 100 % DRE systems where overvoting is prevented (Requirement **Error! Reference source not found.**-A); that requirement is retained here, though it may be redundant.
>
> Overvotes are defined in **Error! Reference source not found.** "**Error! Reference source not found.**". Consistent with the definition of undervotes (see Requirement 0-C), the count is of votes lost to overvoting, not of ballots containing overvotes. This means that a ballot that overvotes an N-of-M contest would contribute N to the count of overvotes for that contest.

Status: Under review
Updated: 02/05/18

8.3.3-B.1 Reporting overvotes, ad hoc queries

All systems MUST be capable of producing a consolidated report of the combination of overvotes for any contest that is selected by an authorized official (e.g., the number of overvotes in a given contest combining candidate A and candidate B, combining candidate A and candidate C, etc.).

Status: Under review
Updated: 02/05/18
Gap notes: From VSS2002 I.2.2.6.h and I.2.5.3.1.e

8.3.3-C Report undervotes for each contest

All systems MUST report the number of undervotes for each relevant N-of-M or cumulative voting contest.

Applies to: Voting system

> **Discussion**
>
> N-of-M in this requirement includes the most common type of contest, 1-of-M. Undervotes are defined in **Error! Reference source not found.** "**Error! Reference source not found.**" as needed to enable accounting for every vote. Counting ballots containing undervotes instead of votes lost to undervoting is insufficient.

Status: Under review
Updated: 02/05/18

8.3.3-D Ranked choice voting, report results

Systems implementing Ranked choice voting MUST report the contest choice vote totals for each ranked choice contest for each round of tabulation.

Applies to: Ranked choice voting

> **Discussion**
>
> This requirement is minimal. Since ranked choice voting is not currently in wide use, it is not clear what must be reported, how bogus orderings are reported, or how it would be done in multiple reporting contexts. See 0 "7.2.5 Logic for ranked choice **voting**".

Status:	Under review
Updated:	02/05/18

8.3.3-E Include in-person votes

Systems MUST include all votes collected from in-person voting in the consolidated reports.

Applies to: In-person voting

> **Discussion**
>
> "Include" simply means that the final totals must reflect them. It does not entail separate totals for the different kinds of votes.

Status:	Under review
Updated:	02/05/18

8.3.3-F Include absentee votes

Systems MUST include all votes from absentee ballots in the consolidated reports.

Applies to: Absentee voting

> **Discussion**
>
> "Include" simply means that the final totals must reflect them. It does not entail separate totals for the different kinds of votes.

Status:	Under review
Updated:	02/05/18

8.3.3-G Include write-in votes

MUST include all write-in votes in the consolidated reports.

Applies to: Write-ins

> **Discussion**

Commented [WJ(76)]: Not sure about this – check with Lauren.

"Include" simply means that the final totals must reflect them. It does not entail separate totals for the different kinds of votes.

Status: Under review
Updated: 02/05/18

8.3.3-H Include accepted provisional / challenged votes

Systems MUST include all votes from accepted provisional / challenged ballots in the consolidated reports.

Applies to: Provisional / challenged ballots

Discussion

"Include" simply means that the final totals must reflect them. It does not entail separate totals for the different kinds of votes. See also Requirement 0-A.4, Requirement 0-B.3 and Requirement 0-C.2.

Status: Under review
Updated: 02/05/18

8.3.3-I Include accepted reviewed votes

Systems MUST include all votes from accepted reviewed ballots in the consolidated reports.

Applies to: Review-required ballots

Discussion

"Include" simply means that the final totals must reflect them. It does not entail separate totals for the different kinds of votes.

Status: Under review
Updated: 02/05/18

8.4 Procedures assumed for correct system functioning

The requirements for voting systems are written assuming that these procedures are generally followed:

Ballot accounting: All precincts must account for all ballots pursuant to the current best practices for ballot accounting.

Label unofficial reports: Any unofficial reports must be clearly labeled as unofficial. (VSS2002 I.2.5.4.c, converted to procedural requirement.)