**Test Assertions for VVSG 1.0 Section 3.2.2.2**

**August 24, 2015**

**Requirement 3.2.2**

**VVSG 1.0 Requirement 3.2.2:** The voting process shall be accessible to voters with visual disabilities.

**Note:** This is a high-level requirement that is fulfilled by the lower-level ones.

**Test Assertions**

None.

**Requirement 3.2.2.2**

**VVSG 1.0 Requirement 3.2.2.2:** The accessible voting station shall be accessible to voters who are blind.

**Note:** This is a high-level requirement that is fulfilled by the lower-level ones.

**Test Assertions**

None.

**Requirement 3.2.2.2a**

**VVSG 1.0 Requirement 3.2.2.2a:** The vendor shall conduct summative usability tests on the voting system using individuals who are blind. The vendor shall document the testing performed and report the test results using the Common Industry Format. This documentation shall be included in the Technical Data Package submitted to the EAC for national certification.

**Test Assertions**

**TA3222a-1:** The manufacturer SHALL conduct realistic summative usability tests on the features of the voting system used by blind individuals during the voting session.

**TA3222a-2:** The summative usability tests SHALL be performed upon a completely functioning product.

**TA3222a-3:** The summative usability tests SHALL use individuals whose visual acuity is less than 20/200 or who are not able to use the low-vision interface.

**TA3222a-3-1:** The population under test SHALL consist of a mix of voters including, but not limited to, users of different ages, genders, ethnicities, levels of education, voting experience.

**TA3222a-3-2:** The population under test SHALL consist of voters who are eligible to vote in the U.S.

**TA3222a-3-3:** The population under test SHALL NOT consist of voters who are, or have been, a poll worker, a voting machine manufacturer, a voting machine developer, in the marketing or sales of voting systems, or involved in any other position that is part of the voting process.

**TA3222a-3-4:** The population under test SHALL NOT consist of voters who are involved with a usability or market research business/company.

**TA3222a-3-5:** The population under test SHOULD NOT consist of voters who have previously participated in a voting system usability test.

**TA3222a-4:** The manufacturer SHALL report the total number of participants tested and demographics of the participants.

**TA3222a-5:** Manufacturers SHOULD describe their recruiting strategy.

**TA3222a-6:** The manufacturer SHOULD detail any compensation given to participants.

**TA3222a-7:** The manufacturer SHALL describe how the voters were screened and selected.

**TA3222a-8:** The manufacturer SHOULD note any differences between the users profiled as recruits and the users who participated in the actual study.

**TA3222a-9:** The manufacturer SHALL ensure that at least eight blind test participants are able to complete the testing session, without assistance.

**TA3222a-9-1:** The manufacturer SHOULD initially target at least 10 - 12 blind participants, in order to ensure that at least 8 blind individuals are able to complete the testing sessions.

**TA3222a-10:** The manufacturer SHOULD ensure that at least 30 test participants are able to complete the testing session.

**TA3222a-11:** The manufacturer SHOULD include detailed tables of all participant demographics, whether or not they completed the test, as an appendix to the test report.

**TA3222a-12:** The manufacturer SHALL report the test results for all participants, whether or not they completed the test, using the Common Industry Format.

**TA3222a-13:** The manufacturer SHOULD use the Modified CIF Template for manufacturers as a template and guidance for the semantics, content and testing.

**TA3222a-14:** Manufacturers MAY define their own testing protocols for the summative usability tests.

**TA3222a-15:** The Technical Data Package submitted to the EAC for national certification SHALL contain the summative Usability Test Report.

**TA3222a-16:** The summative usability tests SHALL measure and report metrics for efficiency, effectiveness, and satisfaction as defined in the ISO/CIF standard (ISO/IEC 25062:2006).

**TA3222a-17:** The test ballot used in the summative usability tests, conducted by the manufacturer, SHALL be realistic.

**TA3222a-17-1:** The test ballot used in the summative usability tests SHOULD look like a real ballot, such as the NIST test ballot.

**TA3222a-17-2:** The test ballot used in the summative usability tests SHOULD have 12 contests.

**TA3222a-17-3:** The test ballot used in the summative usability tests SHOULD have 2 ballot questions.

**TA3222a-17-4:** The test ballot used in the summative usability tests SHOULD have 5 propositions.

**TA3222a-17-5:** The test ballot used in the summative usability tests SHOULD have at least one multiple-vote contest.

**TA3222a-17-6:** The test ballot used in the summative usability tests SHOULD have at least one write-in contest.

**TA3222a-18:** The test script used in the summative usability tests, conducted by the manufacturer, SHALL be realistic.

**TA3222a-18-1:** The test script SHALL enable testing of all valid operations for the voter interface under test.

**TA3222a-19:** The testing environment for the summative usability tests, conducted by the manufacturer, SHALL be realistic.

**TA3222a-19-1:** The testing environment SHOULD be set up as it would be in a polling place.

**TA3222a-20:** The summative usability tests conducted by the manufacturer MAY use the NIST medium complexity test ballot.

**TA3222a-21:** The manufacturer SHALL ensure that the summative usability documentation/report is included in the TDP.

**TA3222a-22:** The manufacturer SHALL ensure that the summative usability documentation/report conforms to the formatting and content requirements of the Common Industry Format (CIF).

**Requirement 3.2.2.2b**

**VVSG 1.0 Requirement 3.2.2.2b:** The accessible voting station shall provide an audio-tactile interface (ATI) that supports the full functionality of the visual ballot interface, as specified in Subsection 2.3.3.

**Test Assertions**

**TA3222b-1:** The accessible voting station SHALL provide an audio-tactile interface (ATI) that supports the full functionality of the visual ballot interface.

**TA3222b-2:** IF initial activation of the ballot (such as insertion of a smart card) is normally performed by the voter on comparable voting stations THEN The accessible voting station SHALL provide an audio-tactile interface (ATI) that supports instructions and feedback for this initial activation process.

**TA3222b-3:** The accessible voting station SHALL provide an audio-tactile interface (ATI) that supports instructions and feedback to the voter on how to operate the accessible voting station, including settings and options (e.g., volume control, repetition).

**TA3222b-4:** The accessible voting station SHALL provide an audio-tactile interface (ATI) that supports instructions and feedback for navigation of the ballot.

**TA3222b-5:** The accessible voting station SHALL provide an audio-tactile interface (ATI) that supports instructions and feedback for contest choices, including write-in candidates.

**TA3222b-6:** The accessible voting station SHALL provide an audio-tactile interface (ATI) that supports instructions and feedback on confirming and changing selections.

**TA3222b-7:** The accessible voting station SHALL provide an audio-tactile interface (ATI) that supports instructions and feedback on final submission of ballot.

**TA3222b-8:** The accessible voting station SHALL provide an audio-tactile interface (ATI) that includes audio output.

**TA3222b-9:** The accessible voting station SHALL provide an audio-tactile interface (ATI) that includes tactilely discernible controls for voter input.

**Requirement 3.2.2.2b-i**

**VVSG 1.0 Requirement 3.2.2.2b-i:** The ATI of the accessible voting station shall provide the same capabilities to vote and cast a ballot as are provided by other voting machines or by the visual interface of the standard voting machine.

**Test Assertions**

**TA3222bi-1:** The audio-tactile interface of the accessible voting station SHALL provide the same capabilities to vote as are provided by other voting machines or by the visual interface of the standard voting machine.

**TA3222bi-2:** The audio-tactile interface of the accessible voting station SHALL provide the same capabilities to cast a ballot as are provided by other voting machines or by the visual interface of the standard voting machine.

**TA3222bi-3:** IF a visual ballot supports voting a straight party ticket and then changing the choice in a single contest, THEN the ATI SHALL support voting a straight party ticket and then changing the choice in a single contest.

**Requirement 3.2.2.2b-ii**

**VVSG 1.0 Requirement 3.2.2.2b-ii:** The ATI shall allow the voter to have any information provided by the voting system repeated.

**Test Assertions**

**TA3222bii-1:** IF the voter indicates that he or she would like any information presented to him or her, by the voting system, to be repeated THEN the ATI SHALL repeat the information.

**Requirement 3.2.2.2b-iii**

**VVSG 1.0 Requirement 3.2.2.2b-iii:** The ATI shall allow the voter to pause and resume the audio presentation.

**Test Assertions**

**TA3222biii-1-1:** The ATI SHALL allow the voter to pause.

**TA3222biii-1-2:** The ATI SHALL allow the voter to resume the audio presentation.

**Requirement 3.2.2.2b-iv**

**VVSG 1.0 Requirement 3.2.2.2b-iv:** The ATI shall allow the voter to skip to the next contest or return to previous contests.

**Test Assertions**

**TA3222biv-1:** IF a next contest exists, THEN the ATI SHALL allow navigation to the next contest, without requiring change to the current contest.

**TA3222biv-2:** IF a previous contest exists, THEN the ATI SHALL allow navigation to the previous contest, without requiring change to the current contest.

**Requirement 3.2.2.2b-v**

**VVSG 1.0 Requirement 3.2.2.2b-v:** The ATI shall allow the voter to skip over the reading of a referendum so as to be able to vote on it immediately.

**Test Assertions**

**TA3222bv-1:** The ATI SHALL allow a voter to make selections for a referendum without requiring the reading of its entire content.

**Requirement 3.2.2.2c**

**VVSG 1.0 Requirement 3.2.2.2c:** All voting stations that provide audio presentation of the ballot shall conform to the following requirements:

**Note:** This is a high-level requirement that is fulfilled by the lower-level ones.

**Test Assertions**

None.

**Requirement 3.2.2.2c-i**

**VVSG 1.0 Requirement 3.2.2.2c-i:** The ATI shall provide its audio signal through an industry standard connector for private listening using a 3.5mm stereo headphone jack to allow voters to use their own audio assistive devices.

**Test Assertions**

**TA3222ci-1:** IF the voting station provides an audio presentation of the ballot, THEN the voting station SHALL provide its audio signal through an industry standard connector for private listening.

**TA3222ci-2:** IF the voting station provides an audio presentation of the ballot, THEN the voting station SHALL provide its audio signal using a 3.5mm stereo headphone jack to allow voters to use their own audio assistive devices.

**Requirement 3.2.2.2c-ii**

**VVSG 1.0 Requirement 3.2.2.2c-ii:** When a voting machine utilizes a telephone style handset or headphone to provide audio information, it shall provide a wireless T-Coil coupling for assistive hearing devices so as to provide access to that information for voters with partial hearing. That coupling shall achieve at least a category T4 rating as defined by American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids, ANSI C63.19.

**Test Assertions**

**TA3222cii-1:** IF a voting machine utilizes a telephone style handset or headphone to provide audio information THEN the voting machine SHALL provide a wireless T-Coil coupling for assistive hearing devices.

**TA3222cii-2:** The wireless T-Coil coupling for assistive hearing devices SHALL achieve at least a category T4 rating as defined by American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids, ANSI C63.19.

**Requirement 3.2.2.2c-iii**

**VVSG 1.0 Requirement 3.2.2.2c-iii:**  No voting equipment shall cause electromagnetic interference with assistive hearing devices that would substantially degrade the performance of those devices. The voting equipment, considered as a wireless device, shall achieve at least a category T4 rating as defined by American National Standard for Methods of Measurement of Compatibility between Devices and Hearing Aids, ANSI C63.19.

**Test Assertions**

**TA3222ciii-1:** Voting equipment, when used with assistive hearing devices, SHALL achieve at least a category T4 rating as defined by American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids, ANSI C63.19.

**TA3222ciii-1-1:** Voting equipment, when used with cochlear implants, SHALL achieve at least a category T4 rating as defined by American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids, ANSI C63.19.

**TA3222ciii-1-2:** Voting equipment, when used with hearing aids, SHALL achieve at least a category T4 rating as defined by American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids, ANSI C63.19.

**Requirement 3.2.2.2c-iv**

**VVSG 1.0 Requirement 3.2.2.2c-iv:** A sanitized headphone or handset shall be made available to each voter.

**Test Assertions**

**TA3222civ-1:** Headphones or handsets that can be sanitized SHALL be provided as part of the ATI.

**TA3222civ-2:** The requirement for sanitized headphones or handsets MAY be achieved by providing throwaway headphones.

**TA3222civ-3:** The requirement for sanitized headphones or handsets MAY be achieved by providing sanitary coverings.

**Requirement 3.2.2.2c-v**

**VVSG 1.0 Requirement 3.2.2.2c-v:** The voting machine shall set the initial volume for each voter between 40 and 50 dB SPL.

**Test Assertions**

**TA3222cv-1:** The voting machine SHALL set the headphone initial volume to be at least between 40 db SPL and 50 db SPL.

**TA3222cv-2:** The voting machine SHOULD set the headphone initial volume to be between 60 db SPL and 70 db SPL.

**TA3222cv-3:** IF a voter changes audio volume for the voting machine during a voting session, THEN, after the end of the voting session, the audio volume SHALL have the original default volume of at least between 40 SPL and 50 db SPL.

**TA3222cv-4:** IF a voter changes audio volume for the voting machine during a voting session, THEN, after the end of the voting session, the audio volume SHOULD have the original default volume of between 40 SPL and 50 db SPL.

**Requirement 3.2.2.2c-vi**

**VVSG 1.0 Requirement 3.2.2.2c-vi:** The voting machine shall provide a volume control with an adjustable volume from a minimum of 20dB SPL up to a maximum of 100 dB SPL, in increments no greater than 10 dB.

**Test Assertions**

**TA3222cvi-1:** The voting machine SHALL provide a volume control with an adjustable volume.

**TA3222cvi-2:** The volume control SHALL be adjustable from a minimum of 20dB SPL up to a maximum of 100 dB SPL.

**TA3222cvi-3:** The volume control SHALL be adjustable in increments no greater than 10 dB.

**Requirement 3.2.2.2c-vii**

**VVSG 1.0 Requirement 3.2.2.2c-vii:** The audio system shall be able to reproduce frequencies over the audible speech range of 315 Hz to 10 KHz.

**Test Assertions**

**TA3222cvii-1:** The audio system SHALL be able to reproduce frequencies over the audible speech range of 315 Hz to 10 KHz.

**Requirement 3.2.2.2c-viii**

**VVSG 1.0 Requirement 3.2.2.2c-viii:** The audio presentation of verbal information should be readily comprehensible by voters who have normal hearing and are proficient in the language. This includes such characteristics as proper enunciation, normal intonation, appropriate rate of speech, and low background noise. Candidate names should be pronounced as the candidate intends.

**Test Assertions**

**TA3222cviii-1:** For both recorded and synthetic speech the audio presentation of verbal information SHOULD be readily comprehensible by voters who have hearing loss no greater than 25 dB.

**TA3222cviii-2:** For both recorded and synthetic speech (from 1.1 Discussion), the audio presentation of verbal information SHOULD be readily comprehensible by voters who are proficient in the language implemented and under test.

**TA3222cviii-3:** Characteristics that SHOULD be taken into consideration in the audio presentation of verbal information include, but are not limited to, proper enunciation, normal intonation, appropriate rate of speech, and low background noise.

**TA3222cviii-4:** For both recorded and synthetic speech, candidate names SHOULD be pronounced as the candidate intends.

**Requirement 3.2.2.2c-ix**

**VVSG 1.0 Requirement 3.2.2.2c-ix:** The audio system shall allow voters to control the rate of speech. The range of speeds supported should be at least 75% to 200% of the nominal rate.

**Test Assertions**

**TA3222cix-1:** The audio system SHALL allow voters to control the rate of speech.

**TA3222cix-2:** The range of speeds supported by the audio system SHOULD be from 75% to 200% of the default rate.

**TA3222cix-3:** The range of speeds supported by the audio system MAY be wider than from 75% to 200% of the default rate.

**Requirement 3.2.2.2d**

**VVSG 1.0 Requirement 3.2.2.2d:** If the normal procedure is to have voters initialize the activation of the ballot, the accessible voting station shall provide features that enable voters who are blind to perform this activation.

**Test Assertions**

**TA3222d-1:** IF the non-accessible voting system provides features that enable voters to initialize the activation of the ballot, THEN the accessible voting system SHALL provide features that enable voters who are blind to initialize the activation of the ballot.

**TA3222d-2:** One such feature MAY be smart cards providing tactile cues so as to allow correct insertion.

**Requirement 3.2.2.2e**

**VVSG 1.0 Requirement 3.2.2.2e:** If the normal procedure is for voters to submit their own ballots, then the accessible voting station shall provide features that enable voters who are blind to perform this submission.

**Test Assertions**

**TA3222e-1:** IF the non-accessible voting system provides features that enable voters to submit their ballot, THEN the accessible voting system SHALL provide features that enable voters who are blind to submit their ballot.

**Requirement 3.2.2.2f**

**VVSG 1.0 Requirement 3.2.2.2f:** All mechanically operated controls or keys on an accessible voting station shall be tactilely discernible without activating those controls or keys.

**Test Assertions**

**TA3222f-1:**  All mechanically operated controls on an accessible voting station SHALL be tactilely discernible without activating those controls.

**TA3222f-2:** All mechanically operated keys on an accessible voting station SHALL be tactilely discernible without activating those keys.

**TA3222f-3:** Vision SHOULD not be needed to conduct various operations including, but not limited to, inserting a smart card or plugging into a headphone jack.

**Requirement 3.2.2.2g**

**VVSG 1.0 Requirement 3.2.2.2g:** On an accessible voting station, the status of all locking or toggle controls or keys (such as the “shift” key) shall be visually discernible, and discernible either through touch or sound.

**Test Assertions**

**TA3222g-1:** On an accessible voting station, the status of all locking controls SHALL be visually discernible.

**TA3222g-2:** On an accessible voting station, the status of all locking controls SHALL be discernible either through touch or sound.

**TA3222g-3:** On an accessible voting station, the status of all toggle controls SHALL be visually discernible.

**TA3222g-4:** On an accessible voting station, the status of all toggle controls SHALL be discernible either through touch or sound.

**TA3222g-5:** On an accessible voting station, the status of all locking keys SHALL be visually discernible.

**TA3222g-6:** On an accessible voting station, the status of all locking keys SHALL be discernible either through touch or sound.

**TA3222g-7:** On an accessible voting station, the status of all toggle keys SHALL be visually discernible.

**TA3222g-8:** On an accessible voting station, the status of all toggle keys SHALL be discernible either through touch or sound.