Usability and Accessibility Test Report of VotingWorks VxSuite, Version 4.0 with 13 participants for VVSG 2.0, Section 8.4

Report Based on ISO/IEC 25062:2006 Common Industry Format For Usability Test Reports

Voting Works VxSuite, Version 4.0, includes VxScan, VxMark, VxBallot box.

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Report Prepared by:	VotingWorks Jessica Myers 717-403-6128 jessica@voting.works 548 Market St, Ste 53001, San Francisco, California 94104-5401
Report Prepared for:	VotingWorks Jessica Myers 717-403-6128 jessica@voting.works 548 Market St, Ste 53001, San Francisco, California 94104-5401

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1.0 Executive Summary

A usability test of VxMark, VxScan, and accompanying ballot box was conducted on August 27, 2024 in Austin, TX by VotingWorks. The purpose of this test was to fulfill Section 8.4 of the Voluntary Voting System Guidelines (VVSG).

During the usability tests, a total of 13 poll workers used the VxMark, VxScan and accompanying ballot box in a simulated election. The test consisted of:

- Polling place set up
- Open polls
- Cast ballots
- Close polls
- Equipment tear down

The instructions included tasks listed above and requested feedback on usability of the equipment from a poll worker perspective including:

- Ability to manage the weight of the equipment
- Using VotingWorks provided documentation to set up and tear down the equipment
- Successful set up and tear down of equipment
- Successfully able to open polls, cast ballots, and close polls
- And overall satisfaction with the equipment

Following the conclusion of the testing, the results were analyzed to determine participants' effectiveness, efficiency and satisfaction using the VxMark, VxScan, and the accompanying ballot box.

During the usability test, the testing team collected and analyzed the following types of data:

- Ability to manage the weight of the VxMark, VxScan, and ballot box
- Ability to manage the set up of the VxMark, VxScan, and ballot box based on provided documentation
- Successfully opening the polls on the VxMark and VxScan without assistance
- Each team member was asking to complete a voting session on at least one device

- Successfully closing the polls on the VxMark and VxScan without assistance
- Ability to manage the tear down of the VxMark, VxScan, and ballot box based on provided documentation
- Rate and provide feedback on the documentation
- Overall satisfaction rating of the experience of interacting with the equipment as a poll worker

Below is a high-level summary of the results:

Measure	Description	Usability Test Results
Weight management	Ability to manage the weight of: • VxMark • VxScan • Ballot Bx Based on sliding scale of 1-5, 1 being poor and 5 being excellent	• 3.23 • 3.77 • 3.92
Successful Completion: Set up equipment	Ability to successfully set up the equipment based on documentation: • VxMark • VxScan • Ballot Bx Based on sliding scale of 1-5, 1 being hard and 5 being easy	• 3.08 • 3.15 • 3.31
Successful Completion: Open polls	Ability to open the polls on the equipment equipment based on documentation: • VxMark • VxScan	• 38.5% • 84.6%

	Based on Yes/No question posed to each member of the team.	
Successful Completion: Complete at least one voting session	Each member of the team was asked to complete a voting session on either VxMark or VxScan.	100.0%
Successful Completion: Close polls	Ability to close the polls on the equipment equipment based on documentation: ● VxMark ● VxScan Based on sliding scale of 1-5, 1 being hard and 5 being easy	● 3.69 ● 3.15
Successful Completion: Tear down equipment	Ability to successfully tear down the equipment based on documentation: ● VxMark ● VxScan ● Ballot Bx Based on sliding scale of 1-5, 1 being hard and 5 being easy	● 3.69 ● 2.62 ● 3.54
Successful Use: Documentation	Ability to successfully follow the documentation provided: Based on sliding scale of 1-5, 1 being hard and 5 being easy	2.46

Time	Mean time to: • Set up • Open polls & vote • Close polls & tear down Equipment following the documentation.	 • 28 min • 35 min • 17 min
Satisfaction: User Satisfaction	Mean satisfaction level expressed by testers, based on sliding scale of 1-5, 1 being hard and 5 being easy	3.08

2.0 Introduction

2.1 Full Product Description

During the usability test, the VxMark, VxScan, and ballot box were evaluated. This version is the same version that will be provided to the Voting System Test Laboratory.

Designed to present ballots to voters throughout the U.S. and collect voter responses, the VxMark consists of a ballot marking device with accessible input options and features to allow all voters, but particularly voters with disabilities, to make ballot selections, print their ballot, review the ballot, and cast their ballot into a secure ballot bin for central tabulation (no tabulation on this device).

Designed to present ballots to voters throughout the U.S. and collect voter responses, the VxScan and ballot box consists of a precinct scanner that sits atop a collapsible ballot box and accepts handmarked paper ballots and ballots printed from VxMark.

The VxMark, VxScan, and ballot box are typically used in federal, state and local elections and are set up in designated voting locations. The usability testing attempted to simulate these environmental conditions and users' real-world context of use.

2.2 Test Objectives

The usability test objectives include:

- Ability to manage the weight of the VxMark, VxScan, and ballot box
- Ability to manage the set up of the VxMark, VxScan, and ballot box based on provided documentation
- Successfully opening the polls on the VxMark and VxScan without assistance
- Each team member was asking to complete a voting session on at least one device and vote at least one ballot (per team) in each language provided on each device (VxScan and VxMark)
- Successfully closing the polls on the VxMark and VxScan without assistance
- Ability to manage the tear down of the VxMark, VxScan, and ballot box based on provided documentation
- Rate and provide feedback on the documentation
- Overall satisfaction rating of the experience of interacting with the equipment as a poll worker

3.0 Method

3.1 Participants

Participants were recruited by a contact in Texas who had experience serving as a pollworker. She recruited from a pool of folks she served with over the years.

A total of 13 pollworkers, with a varying mix of backgrounds and demographic characteristics, were selected to participate in the usability test. All participants were age 18 or over, eligible to vote in the U.S., and able to communicate in English.

Please see Appendix A for a full spreadsheet of participant demographics.

Breakdown by demographics for 13 total participants

Demographic	All Participants

Sex	[5] Men
	[8] Women
Age	[2] 18-24 years
	[3] 25-34 years
	[0] 35-44 years
	[2] 45-54 years
	[6] 55-69 years
	[0] 70+ years
Education	[0] Less than high school
	[2] High school
	[3] Some college
	[6] College degree
	[2] Graduate/professional degree
Race/Ethnicity	[0] American Indian/Alaska Native
	[0] Asian
	[0] Black/African-American
	[0] Hispanic/Latino
	[0] Pacific Islander
	[13] White/Caucasian

	[0] Other
Voter	[11] Yes
	[2] No
Years of Voting Experience	[2] None
	[0] Less than 2 years
	[0] 2-5 years
	[2] 6-10 years
	[1] 11-20 years
	[8] 20+ years
Number of elections in the past 4 years	[2] None
	[2] 1-2
	[5] 3-5
	[4] 6+

3.2 Context of Use in the Test

3.2.1 Tasks

During the usability test, participants were instructed to set up, manage, and tear down a polling place consisting of:

- Polling place set up
- Open polls
- Cast ballots and select correct ballot styles and languages
- Close polls

    - Prior to closing polls, testers were asked to pause polls and print a polls paused report then unpause polls following instructions provided in the manual
- Equipment tear down

Participants were asked to perform tasks that were selected to model typical Election Day from around the country, as well as to thoroughly test the voting system's usability. The instructions included tasks listed above and requested feedback on usability of the equipment from a poll worker perspective including:

- Ability to manage the weight of the equipment
- Using VotingWorks provided documentation to set up and tear down the equipment
- Successful set up and tear down of equipment
- Successfully able to open polls, cast ballots, pause polls, and close polls - including printing reports for opening polls, pausing polls, and closing polls
- And overall satisfaction with the equipment

Participants were instructed on how to vote and were asked to perform the tasks without assistance. A task was considered successful if the participant was able to complete the task following the documentation and without assistance from the test administrator.

Data was collected for each task, including successful completions, time to complete each task, ease of completion, and general satisfaction with the experience.

3.2.2 Test Location

The VxMark, VxScan, and ballot box are intended to be used at designated polling locations across the U.S., including schools, libraries, churches and other public facilities large enough to house multiple voting stations.

In order to simulate this environment, the test was conducted at a private residence with a large open room. The room was divided into two polling places and participants were divided into two teams to mimic Election Day.

3.2.3 Voting Environment

During an actual election, poll workers are expected to use the voting system provided at the polling location. Poll workers may have experience with a wide-range of systems or may only have experience with one type of system.

During the usability test, all participants were instructed to engage with VxMark, VxScan, and the ballot box just as if this system was implemented at their local polling location.

3.2.4 Test Administrator Tools

During the usability test, various tools were used to facilitate the test sessions, including:

Informed Consent (See Appendix B)

Instructions for Participants (See Appendix D)

Questionnaire (See Appendix C)

Team members used their phones to record the start and end time on their questionnaire. This is something the test administrator would change in future sessions.

3.3 Methodology

During the usability test, participants interacted with the VxMark, VxScan, and ballot box. Each team used the system in the same room, but separate halves of the room and was provided with the same poll worker materials, instructions, user manual, and checklists.

The system was evaluated for effectiveness, efficiency and satisfaction. To evaluate these factors, the usability team collected data on:

- Ability to manage the weight of the VxMark, VxScan, and ballot box
- Ability to manage the set up of the VxMark, VxScan, and ballot box based on provided documentation
- Successfully opening the polls on the VxMark and VxScan without assistance
- Each team member was asking to complete a voting session on at least one device

- Successfully closing the polls on the VxMark and VxScan without assistance
- Ability to manage the tear down of the VxMark, VxScan, and ballot box based on provided documentation
- Rate and provide feedback on the documentation
- Overall satisfaction rating of the experience of interacting with the equipment as a poll worker

Additional information about the various measures and associated metrics can be found in the section on Usability Metrics.

3.3.1 Procedure

Upon arrival, participants were greeted and each participant received a Test Questionnaire (See Appendix E)]. They were provided with a basic overview of the test process and then broken into two teams. Participants meeting the qualifications were asked to review and sign an Informed Consent (See Appendix C), which described their rights during the study.

The test administrator was not allowed to provide pollworker training, so testers were provided with the equipment needed to set up and operate a polling place, a user manual, and set up checklists. They were not otherwise provided with information on the equipment.

Testers were provided with instructions orally on test expectations. They were instructed to work through each step - set up, open polls, voting, close polls, tear down - and record feedback and ratings on their questionnaires. The test administrator was available to help if testers got stuck, but otherwise stayed a distance away and observed the test.

Pollworkers were provided an overview of the accessibility features of the equipment and three members of each team were instructed to adjust screen contrast, text size, use audio features, and engage with the accessible controller to navigate through a voting session.

Each team was also asked to cast at least one ballot in every language provided on VxScan and VxMark. They were also asked to adjust the language settings on each unit to complete the voting session in each language provided.

At the conclusion of the test, participants were thanked for their time and compensated $50.

One staff member participated in this test and was responsible for providing the equipment, test instructions, answering tester questions, observing the test, collecting the questionnaires, and providing compensation to test participants.

3.3.2 Participant General Instructions

The participants were instructed that they would work along during the test, but that they could ask for the same sort of assistance or the same sort of questions they might ask an election official or trainer.

3.3.3 Participant Task Instructions

Participants were also provided with instructions on how to work through each test phase and otherwise were instructed to make use of the user manual to complete operations (open polls and print reports; pause polls, print report, and unpause polls; and close polls, print reports, and shutdown the equipment) and checklists to set up the equipment. Testers were also instructed to select the correct ballot style (precinct) and ballot languages prior to each voting session. They were asked to use accessible features, including contrast, text size adjustment, audio, and tactile inputs to complete These instructions were provided to users orally.

See Appendix D for the instructions for participants.

3.4 Usability Metrics

The usability test collected various metrics for effectiveness, efficiency and satisfaction.

Name	Measure	Description
Weight management	Ability to handle the weight of the voting system	Sliding scale from 1-5, 1 being hard to 5 being easy.

Successful completion: Set up	Able to set up the equipment following the documentation without asking for assistance	Sliding scale from 1-5, 1 being hard to 5 being easy.
Successful completion: Open Polls	Able to open the polls on the equipment following the documentation without asking for assistance	Yes/No question; total number and percentage.
Successful completion: Voting session	Able to cast a ballot following on screen instructions	Yes/No question; total number and percentage.
Successful completion: Close Polls	Able to close the polls on the equipment following the documentation without asking for assistance	Sliding scale from 1-5, 1 being hard to 5 being easy.
Successful completion: Tear down	Able to tear down the equipment following the documentation without asking for assistance	Sliding scale from 1-5, 1 being hard to 5 being easy.
Successful use: Documentation	Able to follow the equipment documentation easily throughout test session	Sliding scale from 1-5, 1 being hard to 5 being easy.
Time	Mean time for each test phase	Mean time taken per test participant to complete the process of activating, marking,

		and casting the ballot, both overall and by interaction mode
Satisfaction: Overall user satisfaction	User satisfaction rating	Sliding scale from 1-5, 1 being hard to 5 being easy.

4.0 Results

4.1 Data Analysis

To analyze the data, each phase of the session was timed and the test administrator provided assistance to team members only when requested. Testers documented successful completion of tasks and rated the experience of each phase.

In addition, the test team analyzed the overall satisfaction with the system, ease of use of documentation, and accepted open ended feedback from testers.

4.2 Presentation of the Results

This section details the performance results for weight management (VxMark, VxScan, and ballot box), successful completion of each phase (set up, open polls, voting session, close polls, tear down), successful use of documentation, mean time for each phase, and overall user satisfaction.

Name	Measure	Results
Weight management	Ability to handle the weight of the voting system. Mean of 13 responses on a sliding scale from 1-5, 1 being hard to 5 being easy.	• VxMark 3.23 • VxScan 3.77 • Ballot Box 3.92

Successful completion: Set up	Able to set up the equipment following the documentation without asking for assistance Mean of 13 responses on a sliding scale from 1-5, 1 being hard to 5 being easy.	• VxMark 3.08 • VxScan 3.15 • Ballot Box 3.31
Successful completion: Open Polls	Able to open the polls and print reports on the equipment following the documentation without asking for assistance Yes/No question to all participants; total number and percentage.	5 of 13 testers (38.5%) were able to open the polls on VxMark without asking for assistance with their assigned task. 11 of 13 testers (84.6%) were able to open the polls on VxScan without asking for assistance with their assigned task.
Successful completion: Voting session	Able to cast a ballot following on screen instructions Yes/No question to all participants; total	13 of 13 testers (100.0%) were able to cast at least one ballot on VxMark and/or VxScan following the instructions provided on screen.

	number and percentage.		
Successful completion: Close Polls	Able to close the polls and print reports on the equipment following the documentation without asking for assistance Mean of 13 responses on a sliding scale from 1-5, 1 being hard to 5 being easy.	• VxMark • VxScan	3.69 3.15
Successful completion: Tear down	Able to tear down the equipment following the documentation without asking for assistance Mean of 13 responses on a sliding scale from 1-5, 1 being hard to 5 being easy.	• VxMark • VxScan • Ballot Box	3.69 2.62 3.54
Successful use: Documentation	Able to follow the equipment documentation easily throughout test session Mean of 13 responses on a sliding scale from	2.46	

	1-5, 1 being hard to 5 being easy.		
Time	Mean time for each test phase		• Set up - 28 min • Open polls & voting - 35 min • Close polls & tear down - 17 min
Satisfaction: Overall user satisfaction	User satisfaction rating Mean of 13 responses on a sliding scale from 1-5, 1 being hard to 5 being easy.	3.08	

5.0 Conclusion

VotingWorks learned a lot during this testing session, both positive and negative, regarding VxMark, VxScan, and the ballot box.

Limited Training Prior to the Session

One of the biggest problems was that testers did not receive training prior to working through this session. Many felt they would be more comfortable and successful even with a basic overview of the equipment and introduction to the system.

VxMark

Weight

All participants commented about the weight of the VxMark and the fact that it requires two people to unpack, set up, and tear down. Many expressed concern about older pollworkers managing set up and tear down.

Location of Poll worker card reader

Most testers found the location of the pollworker cardreader confusing and difficult to use. During testing, it was in the well with the accessible controller. The test administrator provided this feedback to the VotingWorks hardware team and this will be corrected in the version submitted for EAC certification.

VxScan

Thumb drive and pollworker door high temperature

The thumb drive and pollworker door on the VxScan became very hot during this test session. So hot that one team had difficulty completing the polls close and tear down process easily. The test administrator provided this feedback to the VotingWorks hardware team and this will be corrected in the version submitted for EAC certification.

VxScan stuck on ballot box at tear down

One team noted that the VxScan got “stuck” or “jammed” onto the ballot box during tear down. The test administrator had to assist this team to get the VxScan released from the ballot box. The test administrator provided this feedback to the VotingWorks hardware team and this will be corrected in the version submitted for EAC certification.

Ballot Box

Color coding and numbering needed on latches

Both teams commented that color coding and numbering on ballot box latches would make it easier to set up correctly. The test administrator provided this feedback to the VotingWorks hardware team and this will be corrected in the version submitted for EAC certification.

Ballot box latch broke during set up

Related to the feedback above, one of the teams broke the latch handle on the ballot box because they were unclear on which direction to turn to latch it correctly. The test administrator provided this feedback to the VotingWorks hardware team and this will be corrected in the version submitted for EAC certification.

Documentation

Steps missing from Checklists

Most users expressed frustration at steps missing or out of order in set up and tear down checklists. The test administrator provided this feedback to the VotingWorks documentation team and this will be corrected in the version submitted for EAC certification.

Pictures missing from checklist

Most users expressed that images were missing from the VxScan checklist and more images would be helpful for all three pieces of equipment. The test administrator provided this feedback to the VotingWorks documentation team and this will be corrected in the version submitted for EAC certification.

Appendixes

Appendixes A - E to the CIF include detailed participant demographics, all of the forms and surveys used in the test, and both the instructions given to the participants and an image or specifications for the ballots used.

Appendix A: Participant Demographics

Appendix B: Informed Consent

Appendix C: Test Questionnaire

Appendix D: Instructions for Participants

Appendix E: Results

Appendix A: Participant Demographics

Poll worker tester demographics.xlsx

Appendix B: Informed Consent

Informed Consent Form - Pollworker testing - 2024 (2).pdf

Appendix C: Test Questionnaire

Poll Worker Testing Feedback Form - Google Forms.pdf

Appendix D: Ballot Implementation

official-precinct-ballot-Precinct_1-1_en.pdf

official-precinct-ballot-Precinct_1-1_es-US (1).pdf

official-precinct-ballot-Precinct_1-1_zh-Hans.pdf

official-precinct-ballot-Precinct_1-1_zh-Hant.pdf

Appendix E: Instructions for Participants

Instructions for pollworker UAT.pdf

Appendix F: Results

Poll Worker Testing Feedback Form (Responses).xlsx